

1. 2-door Coupe

A: DIMENSIONS

Model				2200	2500
				AWD	AWD
				L	RS
Overall length		mm (in)	4,375 (172.2)		
Overall width		mm (in)	1,705 (67.1)		
Overall height		mm (in)	1,410 (55.5)		
Compartment	Leg room	Front Max.	mm (in)	1,094 (43.1)	
		Rear Min.	mm (in)	825 (32.5)	
	Head room	Front	mm (in)	995 (39.2)	
		Rear	mm (in)	933 (36.7)	
	Shoulder room	Front	mm (in)	1,335 (52.6)	
		Rear	mm (in)	1,325 (52.2)	
Wheelbase		mm (in)	2,520 (99.2)		
Tread		Front	mm (in)	1,460 (57.5)	1,470 (57.9)
		Rear	mm (in)	1,450 (57.1)	1,460 (57.5)
Minimum road clearance		mm (in)	145 (5.7)		

B: ENGINE

Model		2200	2500
Engine type		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine	
Valve arrangement		Overhead camshaft type	
Bore x Stroke	mm (in)	96.9 x 75.0 (3.815 x 2.953)	99.5 x 79.0 (3.917 x 3.110)
Displacement	cm ³ (cu in)	2,212 (135)	2,457 (150)
Compression ratio		10.0	
Firing order		1 — 3 — 2 — 4	
Idle speed at Park/Neutral position		700	650 (MT), 700 (AT)
Maximum output		106 (142)/5,600	123 (165)/5,600
Maximum torque		202 (20.6, 149)/3,600	225 (22.9, 166)/4,000

C: ELECTRICAL

Model		2200	2500
Ignition timing at idling speed BTDC/rpm		15°/700	10° ± 8°/650 (MT), 15° ± 8°/700 (AT)
Spark plug	Type and manufacturer	CHAMPION: RC10YC4 (Standard) NGK: BKR6E-11 CHAMPION: RC8YC4 NIPPONDENSO: K20PR-U11	
Generator		12V — 75A	
Battery	Type	55D23L (MT), 65D23L (AT)	
	Reserve capacity min	99 (MT), 111 (AT)	99 (MT), 118 (AT)
	Cold cranking amperes amp.	356 (MT), 420 (AT)	356 (MT), 520 (AT)

SPECIFICATIONS

D: TRANSMISSION

Model		AWD	
Transmission type		5MT*	4AT*
Clutch type		DSPD	TCC
Gear ratio	1st	3.545	2.785 (2200 cc model) 3.027 (2500 cc model)
	2nd	2.111	1.545 (2200 cc model) 1.619 (2500 cc model)
	3rd	1.448	1.000
	4th	1.088	0.694
	5th	0.780	—
	Reverse	3.333	2.272
Reduction gear (Front drive)	1st reduction	Type of gear	—
		Gear ratio	—
	Final reduction	Type of gear	Hypoid
		Gear ratio	3.900 (2200 cc model) 4.111 (2500 cc model)
Reduction gear (Rear drive)	Transfer reduction	Type of gear	Helical
		Gear ratio	1.000
	Final reduction	Type of gear	Hypoid
		Gear ratio	3.900 (2200 cc model) 4.111 (2500 cc model)

5MT*: 5-forward speeds with synchromesh and 1-reverse – with center differential and viscous coupling

4AT*: Electronically controlled fully-automatic, 4-forward speeds and 1-reverse – with hydraulically controlled transfer clutch

DSPD: Dry Single Plate Diaphragm

TCC: Torque Converter Clutch

E: STEERING

Type	Rack and Pinion
Turns, lock to lock	3.2
Minimum turning circle m (ft)	Curb to curb: 10.2 (33.5), Wall to wall: 11.0 (36.1)

F: SUSPENSION

Front	Macpherson strut type, Independent, Coil spring
Rear	Dual link strut type, Independent, Coil spring

G: BRAKE

Model	2200	2500
Service brake system	Dual circuit hydraulic with vacuum suspended power unit	
Front	Ventilated disc brake	
Rear	Drum brakes	Disc brakes
Parking brake	Mechanical on rear brakes	

SPECIFICATIONS

[S1J1] 1-1
1. 2-door Coupe

H: TIRE

Model	2200	2500
	AWD	AWD
	L	RS
Size	P195/60R1587H	P205/55R1689V
Type	Steel belted radial, Tubeless	

I: CAPACITY

Model		AWD	
		5MT	4AT
Fuel tank	ℓ (US gal, Imp gal)	60 (15.9, 13.2)	
Engine oil	Upper level ℓ (US qt, Imp qt)	4.0 (4.2, 3.5)	
	Lower level ℓ (US qt, Imp qt)	3.0 (3.2, 2.6)	
Transmission gear oil	ℓ (US qt, Imp qt)	3.5 (3.7, 3.1)	—
Automatic transmission fluid	ℓ (US qt, Imp qt)	—	8.4 (8.9, 7.4) (2200 cc model) 9.3 (9.8, 8.2) (2500 cc model)
AT differential gear oil	ℓ (US qt, Imp qt)	—	1.2 (1.3, 1.1)
AWD rear differential gear oil	ℓ (US qt, Imp qt)	0.8 (0.8, 0.6)	
Power steering fluid	ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)	
Engine coolant	ℓ (US qt, Imp qt)	5.8 (6.1, 5.1)	

J: WEIGHT

1. U.S. SPEC. VEHICLES

Model			2200		2500	
			AWD			
			L		RS	
			5MT	4AT	5MT*	4AT*
Curb weight (C.W.)	Front	kg (lb)	717 (1,580)	739 (1,630)	742 (1,635)	762 (1,680)
	Rear	kg (lb)	521 (1,150)	531 (1,170)	526 (1,160)	528 (1,165)
	Total	kg (lb)	1,238 (2,730)	1,270 (2,800)	1,268 (2,795)	1,290 (2,845)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	885 (1,950)			
	Rear	kg (lb)	816 (1,800)			
	Total	kg (lb)	1,701 (3,750)			

*: The weight of a vehicle with sunroof is 5 kg (10 lb) larger at the front, 7 kg (15 lb) larger at the rear and 12 kg (25 lb) larger in total.

2. CANADA SPEC. VEHICLES

Model			2500	
			AWD	
			RS	
			5MT*	4AT*
Curb weight (C.W.)	Front	kg (lb)	742 (1,635)	762 (1,680)
	Rear	kg (lb)	526 (1,160)	528 (1,165)
	Total	kg (lb)	1,268 (2,795)	1,290 (2,845)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	885 (1,950)	
	Rear	kg (lb)	816 (1,800)	
	Total	kg (lb)	1,701 (3,750)	

*: The weight of a vehicle with sunroof is 5 kg (10 lb) larger at the front, 7 kg (15 lb) larger at the rear and 12 kg (25 lb) larger in total.

2. 4-door Sedan

A: DIMENSIONS

Model				2200		2500			
				AWD				AWD	
				L		TS		RS	
Overall length				mm (in)	4,375 (172.2)				
Overall width				mm (in)	1,705 (67.1)				
Overall height				mm (in)	1,410 (55.5)				
Compartment	Leg room	Front Max.	mm (in)	1,094 (43.1)					
		Rear Min.	mm (in)	825 (32.5)					
	Head room	Front	mm (in)	995 (39.2)					
		Rear	mm (in)	933 (36.7)					
	Shoulder room	Front	mm (in)	1,335 (52.6)					
		Rear	mm (in)	1,315 (51.8)					
Wheelbase				mm (in)	2,520 (99.2)				
Tread		Front	mm (in)	1,460 (57.5)		1,470 (57.9)			
		Rear	mm (in)	1,450 (57.1)		1,460 (57.5)			
Minimum road clearance				mm (in)	145 (5.7)				

B: ENGINE

Model		2200	2500
Engine type		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine	
Valve arrangement		Overhead camshaft type	
Bore x Stroke		96.9 x 75.0 (3.815 x 2.953)	99.5 x 79.0 (3.917 x 3.110)
Displacement		2,212 (135)	2,457 (150)
Compression ratio		10.0	
Firing order		1 — 3 — 2 — 4	
Idle speed at Park/Neutral position		700	650 (MT), 700 (AT)
Maximum output		106(142)/5,600	123(165)/5,600
Maximum torque		202 (20.6, 149)/3,600	225 (22.9, 166)/4,000

C: ELECTRICAL

Model		2200	2500
Ignition timing at idling speed BTDC/rpm		15°/700	10° ± 8°/650 (MT), 15° ± 8°/700 (AT)
Spark plug	Type and manufacturer	CHAMPION: RC10YC4 (Standard) NGK: BKR6E-11 CHAMPION: RC8YC4 NIPPONDENSO: K20PR-U11	
Generator		12V — 75A	
Battery	Type	55D23L (MT), 65D23L (AT)	
	Reserve capacity min	99 (MT), 111 (AT)	
	Cold cranking amperes amp.	356 (MT), 420 (AT)	

D: TRANSMISSION

Model			AWD	
Transmission type			5MT*	4AT*
Clutch type			DSPD	TCC
Gear ratio	1st		3.545	2.785 (2200 cc model) 3.027 (2500 cc model)
	2nd		2.111	1.545 (2200 cc model) 1.619 (2500 cc model)
	3rd		1.448	1.000
	4th		1.088	0.694
	5th		0.780	—
	Reverse		3.333	2.272
Reduction gear (Front drive)	1st reduction	Type of gear	—	Helical
		Gear ratio	—	1.000
	Final reduction	Type of gear	Hypoid	Hypoid
		Gear ratio	3.900 (2200 cc model) 4.111 (2500 cc model)	4.111 (2200 cc model) 4.444 (2500 cc model)
Reduction gear (Rear drive)	Transfer reduction	Type of gear	Helical	—
		Gear ratio	1.000	—
	Final reduction	Type of gear	Hypoid	Hypoid
		Gear ratio	3.900 (2200 cc model) 4.111 (2500 cc model)	4.111 (2200 cc model) 4.444 (2500 cc model)

5MT*: 5-forward speeds with synchromesh and 1-reverse – with center differential and viscous coupling

4AT*: Electronically controlled fully-automatic, 4-forward speeds and 1-reverse – with hydraulically controlled transfer clutch

DSPD: Dry Single Plate Diaphragm

TCC: Torque Converter Clutch

E: STEERING

Type	Rack and Pinion	
Turns, lock to lock	3.2	
Minimum turning circle	m (ft)	Curb to curb: 10.2 (33.5), Wall to wall: 11.0 (36.1)

F: SUSPENSION

Front	Macpherson strut type, Independent, Coil spring
Rear	Dual link strut type, Independent, Coil spring

G: BRAKE

Model	2200	2500
Service brake system	Dual circuit hydraulic with vacuum suspended power unit	
Front	Ventilated disc brake	
Rear	Drum brakes	Disc brakes
Parking brake	Mechanical on rear brakes	

SPECIFICATIONS

H: TIRE

Model	2200		2500
	AWD		AWD
	L	TS	RS
Size	P195/60R1587H		P205/55R1689V
Type	Steel belted radial, Tubeless		

I: CAPACITY

Model			AWD	
			5MT	4AT
Fuel tank		ℓ (US gal, Imp gal)	60 (15.9, 13.2)	
Engine oil	Upper level	ℓ (US qt, Imp qt)	4.0 (4.2, 3.5)	
	Lower level	ℓ (US qt, Imp qt)	3.0 (3.2, 2.6)	
Transmission gear oil		ℓ (US qt, Imp qt)	3.5 (3.7, 3.1)	—
Automatic transmission fluid		ℓ (US qt, Imp qt)	—	8.4 (8.9, 7.4) (2200 cc model) 9.3 (9.8, 8.2) (2500 cc model)
AT differential gear oil		ℓ (US qt, Imp qt)	—	1.2 (1.3, 1.1)
AWD rear differential gear oil		ℓ (US qt, Imp qt)	0.8 (0.8, 0.6)	
Power steering fluid		ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)	
Engine coolant		ℓ (US qt, Imp qt)	5.8 (6.1, 5.1)	

J: WEIGHT

1. U.S. SPEC. VEHICLES

Model			2200		2500	
			AWD			
			L		RS	
			5MT	4AT	5MT*	4AT*
Curb weight (C.W.)	Front	kg (lb)	719 (1,585)	744 (1,640)	744 (1,640)	764 (1,685)
	Rear	kg (lb)	521 (1,150)	528 (1,165)	526 (1,160)	529 (1,165)
	Total	kg (lb)	1,240 (2,735)	1,272 (2,805)	1,270 (2,800)	1,293 (2,850)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	885 (1,950)			
	Rear	kg (lb)	816 (1,800)			
	Total	kg (lb)	1,701 (3,750)			

*: The weight of a vehicle with sunroof is 5 kg (10 lb) larger at the front, 7 kg (15 lb) larger at the rear and 12 kg (25 lb) larger in total.

2. CANADA SPEC. VEHICLES

Model		2200		2500		
		AWD				
		TS		RS		
		5MT	4AT	5MT*	4AT*	
Curb weight (C.W.)	Front	kg (lb)	719 (1,585)	744 (1,640)	744 (1,640)	764 (1,685)
	Rear	kg (lb)	521 (1,150)	528 (1,165)	526 (1,160)	529 (1,165)
	Total	kg (lb)	1,240 (2,735)	1,272 (2,805)	1,270 (2,800)	1,293 (2,850)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	885 (1,950)			
	Rear	kg (lb)	816 (1,800)			
	Total	kg (lb)	1,701 (3,750)			

*: The weight of a vehicle with sunroof is 5 kg (10 lb) larger at the front, 7 kg (15 lb) larger at the rear and 12 kg (25 lb) larger in total.

3. Sport Wagon

A: DIMENSIONS

Model				2200		
				AWD		
				Brighton	L	OUTBACK
Overall length		mm (in)	4,375 (172.2)			
Overall width		mm (in)	1,705 (67.1)			
Overall height		mm (in)	1,410 (55.5)		1,430 (56.3)	
Compartment	Leg room	Front Max.	mm (in)	1,094 (43.1)		
		Rear Min.	mm (in)	825 (32.5)		
	Head room	Front	mm (in)	995 (39.2)		
		Rear	mm (in)	950 (37.4)		
	Shoulder room	Front	mm (in)	1,335 (52.6)		
		Rear	mm (in)	1,315 (51.8)		
Wheelbase		mm (in)	2,520 (99.2)			
Tread		Front	mm (in)	1,460 (57.5)		
		Rear	mm (in)	1,450 (57.1)		
Minimum road clearance		mm (in)	145 (5.7)		165 (6.5)	

B: ENGINE

Model		2200	
Engine type		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine	
Valve arrangement		Overhead camshaft type	
Bore x Stroke		mm (in)	96.9 x 75.0 (3.815 x 2.953)
Displacement		cm ³ (cu in)	2,212 (135.0)
Compression ratio			10.0
Firing order			1 — 3 — 2 — 4
Idle speed at Park/Neutral position		rpm	700
Maximum output		kW (HP)/rpm	106(142)/5,600
Maximum torque		N.m (kg-m, ft-lb)/rpm	202 (20.6, 149)/3,600

C: ELECTRICAL

Model		2200
Ignition timing at idling speed BTDC/rpm		15°/700
Spark plug	Type and manufacturer	CHAMPION: RC10YC4 (Standard) NGK: BKR6E-11 CHAMPION: RC8YC4 NIPPONDENSO: K20PR-U11
Generator		12V — 75A
Battery	Type	55D23L (MT), 65D23L (AT)
	Reserve capacity min	99 (MT), 111 (AT)
	Cold cranking amperes amp.	356 (MT), 420 (AT)

SPECIFICATIONS

D: TRANSMISSION

Model		AWD	
Transmission type		5MT*	4AT*
Clutch type		DSPD	TCC
Gear ratio	1st	3.545	2.785
	2nd	2.111	1.545
	3rd	1.448	1.000
	4th	1.088	0.694
	5th	0.780	—
	Reverse	3.333	2.272
Reduction gear (Front drive)	1st reduction	Type of gear	Helical
		Gear ratio	1.000
	Final reduction	Type of gear	Hypoid
		Gear ratio	4.111
Reduction gear (Rear drive)	Transfer reduction	Type of gear	Helical
		Gear ratio	1.000
	Final reduction	Type of gear	Hypoid
		Gear ratio	4.111

5MT*: 5-forward speeds with synchromesh and 1-reverse – with center differential and viscous coupling

4AT*: Electronically controlled fully-automatic, 4-forward speeds and 1-reverse – with hydraulically controlled transfer clutch

DSPD: Dry Single Plate Diaphragm

TCC: Torque Converter Clutch

E: STEERING

Type	Rack and Pinion
Turns, lock to lock	3.2
Minimum turning circle	m (ft) Curb to curb: 10.2 (33.5), Wall to wall: 11.0 (36.1)

F: SUSPENSION

Front	Macpherson strut type, Independent, Coil spring
Rear	Dual link strut type, Independent, Coil spring

G: BRAKE

Model	2200
Service brake system	Dual circuit hydraulic with vacuum suspended power unit
Front	Ventilated disc brake
Rear	Drum brake
Parking brake	Mechanical on rear brakes

H: TIRE

Model	2200		
	AWD		
	Brighton	L	OUTBACK
Size	P195/60R1587H		P205/60R1590S P205/60R1590H
Type	Steel belted radial, Tubeless		

I: CAPACITY

Model		AWD	
		5MT	4AT
Fuel tank	ℓ (US gal, Imp gal)	60 (15.9, 13.2)	
Engine oil	Upper level	ℓ (US qt, Imp qt)	4.0 (4.2, 3.5)
	Lower level	ℓ (US qt, Imp qt)	3.0 (3.2, 2.6)
Transmission gear oil	ℓ (US qt, Imp qt)	3.5 (3.7, 3.1)	—
Automatic transmission fluid	ℓ (US qt, Imp qt)	—	8.4 (8.9, 7.4)
AT differential gear oil	ℓ (US qt, Imp qt)	—	1.2 (1.3, 1.1)
AWD rear differential gear oil	ℓ (US qt, Imp qt)	0.8 (0.8, 0.6)	
Power steering fluid	ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)	
Engine coolant	ℓ (US qt, Imp qt)	5.8 (6.1, 5.1)	

J: WEIGHT

1. U.S. SPEC. VEHICLES

Model			2200			
			AWD			
			L		OUTBACK	
			5MT	4AT	5MT	4AT
Curb weight (C.W.)	Front	kg (lb)	721 (1,590)	741 (1,635)	730 (1,610)	751 (1,655)
	Rear	kg (lb)	565 (1,245)	565 (1,245)	567 (1,250)	576 (1,270)
	Total	kg (lb)	1,286 (2,835)	1,306 (2,880)	1,297 (2,860)	1,327 (2,925)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	885 (1,950)			
	Rear	kg (lb)	907 (2,000)			
	Total	kg (lb)	1,792 (3,950)			

2. CANADA SPEC. VEHICLES

Model			2200			
			AWD			
			Brighton		OUTBACK	
			5MT	4AT	5MT	4AT
Curb weight (C.W.)	Front	kg (lb)	703 (1,550)	723 (1,595)	730 (1,610)	753 (1,660)
	Rear	kg (lb)	558 (1,230)	561 (1,235)	567 (1,250)	571 (1,260)
	Total	kg (lb)	1,261 (2,780)	1,284 (2,830)	1,297 (2,860)	1,324 (2,920)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	885 (1,950)			
	Rear	kg (lb)	907 (2,000)			
	Total	kg (lb)	1,792 (3,950)			

1. General Precautions

A: BEFORE STARTING SERVICE

- 1) Be sure to perform the jobs listed in the Periodic Maintenance Schedule.
- 2) When a vehicle is brought in for maintenance, carefully listen to the owner's explanations of the symptoms exhibited by the vehicle. List the problems in your notebook, and refer to them when trying to diagnose the trouble.
- 3) All jewelry should be removed. Suitable work clothes should be worn.
- 4) Be sure to wear goggles.
- 5) Use fender, floor and seat covers to prevent the vehicle from being scratched or damaged.
- 6) Never smoke while working.
- 7) Before removing underfloor bolts (including the rear differential filler plug) coated with bituminous wax, remove old wax. Re-coat with new wax after reinstallation.

B: WHILE WORKING

- 1) When jacking up the vehicle, be sure to use safety stands.
- 2) When jacking up the front or rear end of the car body, be sure to chock the tires remaining in contact with the ground.
- 3) Keep the parking brake applied when working on the vehicle. Chock the tires remaining in contact with the ground (and set the selector lever to "P" position in AT vehicle), when the parking brake cannot be applied, such as when the brakes are being worked on.
- 4) Keep the ignition key turned "OFF" if at all possible.
- 5) Be cautious while working when the ignition key is "ON"; if the engine is hot, the cooling fan may start to operate.
- 6) While the engine is in operation, properly ventilate the workshop.
- 7) While the engine is in operation, be aware of any moving parts, such as the cooling fan and the drive belt.
- 8) Keep your hands off any metal parts such as the radiator, exhaust manifold, exhaust pipe, and muffler to prevent burning yourself.
- 9) When servicing the electrical system or the fuel system, disconnect the ground cable from the battery.
- 10) When disassembling, arrange the parts in the order that they were disassembled.

11) When removing a wiring connector, do not pull the wire but pull the connector itself.

12) When removing a hose or tube, remove the clip first. Then, pull the hose or tube while holding its end fitting.

13) Replace gaskets, O-rings, snap rings, lock washers, etc. with new ones.

14) When tightening a bolt or nut, tighten it to the specified torque.

15) When performing work requiring special tools, be sure to use the designated ones.

16) After completing work, make certain that the hoses, tubes and wiring harnesses are securely connected.

17) After completing work, be sure to wash the vehicle.

C: TREATMENT FOR USED ENGINE OIL

1. ENGINE OILS

Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer. Adequate means of skin protection and washing facilities should be provided.

2. HEALTH PROTECTION PRECAUTIONS

- 1) Avoid prolonged and repeated contact with oils, particularly used engine oils.
- 2) Wear protective clothing, including impervious gloves where practicable.
- 3) Do not put oily rags in pockets.
- 4) Avoid contaminating clothes, particularly underpants, with oil.
- 5) Overalls must be cleaned regularly. Discard unwashable clothing and oil impregnated footwear.
- 6) First aid treatment should be obtained immediately for open cuts and wounds.
- 7) Use barrier creams, applying them before each work period, to help the removal of oil from the skin.
- 8) Wash with soap and water to ensure all oil is removed (skin cleansers and nail brushes will help). Preparations containing lanolin replace the natural skin oils which have been removed.

9) Do not use petrol, kerosene, diesel fuel, gas oil, thinners or solvents for washing skin.

10) If skin disorders develop, obtain medical advice.

11) Where practicable, degrease components prior to handling.

12) Where there is a risk of eye contact, eye protection should be worn, for example, chemical goggles or face shields; in addition an eye wash facility should be provided.

3. ENVIRONMENTAL PROTECTION PRECAUTIONS

It is illegal to pour used oil on to the ground, down sewers or drains, or into water courses. The burning of used engine oil in small space heaters or boilers is not recommended unless emission control equipment is fitted. If in doubt, check with the Local Authority.

Dispose of used oil through authorized waste disposal contractors, licensed waste disposal sites, or to the waste oil reclamation trade. If in doubt, contact the Local Authority for advice on disposal facilities.

D: HANDLING AN AT VEHICLE

1) The engine cannot be started by pushing the vehicle, and also the vehicle cannot be moved by operating the starter motor.

2) Be sure to release the accelerator pedal before shifting from the "R" to the "N" range and from the "N" to the "D" range, or vice versa even when the vehicle is stopped.

3) Do not maintain the vehicle in a stall operation for more than five seconds as this may overheat the clutch excessively.

4) When the speedometer malfunctions, a vehicle-speed signal will no longer be emitted. Immediately have it repaired.

5) Use only genuine SUBARU AT fluid in the transmission.

E: FULL-TIME AWD MT MODELS

1. SPEEDOMETER TEST (Jack-up method)

WARNING:

- Secure a rope or wire to the front towing hook to prevent the lateral runout of front wheels.

- Do not abruptly depress/release clutch pedal or accelerator pedal during tests even

when engine is operating at low speeds since this may cause vehicle to jump off test machine.

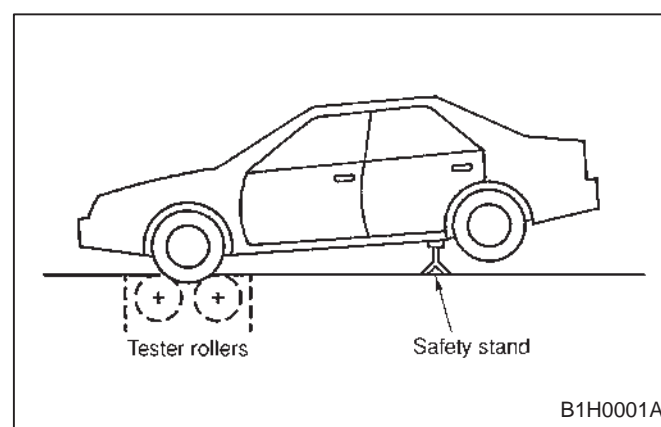
- Avoid abrupt braking after tests.

- In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the safety stands and the vehicle.

- Since the rear wheels will also be rotating, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.

1) Position vehicle so that front wheels are placed between rollers of speedometer test machine.

2) Jack up vehicle until rear wheels clear the floor, and support with safety stands.



3) Start engine with shift lever set in 2nd gear (for safety considerations). Perform speedometer tests.

2. SPEEDOMETER TEST (Free roller method)

WARNING:

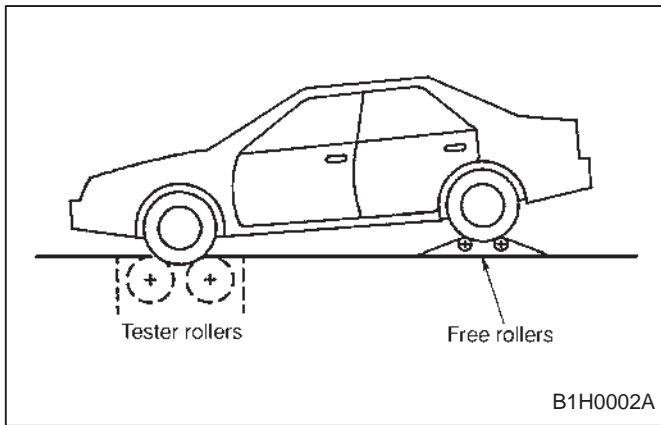
- Secure a rope or wire to the front towing hook to prevent the lateral runout of front wheels.

- Do not abruptly depress/release clutch pedal or accelerator pedal during tests even when engine is operating at low speeds since this may cause vehicle to jump off test machine.

- Avoid abrupt braking after tests.

1) Position vehicle so that front wheels are placed between rollers of test machine.

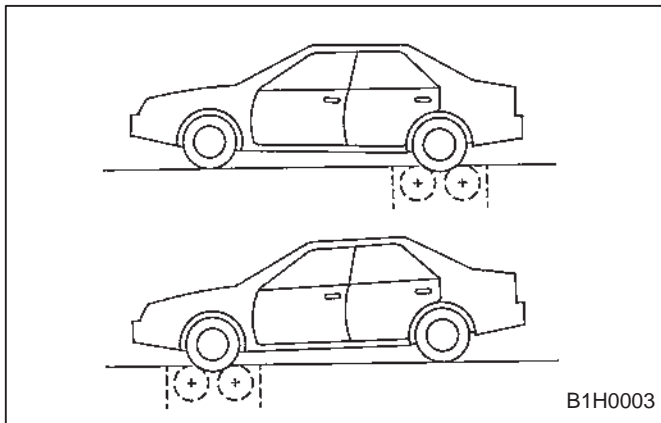
2) Scribe alignment mark corresponding with centerline of rear wheels on floor.



- 3) Back up vehicle so that centerline of free rollers are aligned with mark scribed in step 2 above.
- 4) Drive vehicle onto free rollers.
- 5) Perform speedometer tests.

3. BRAKE TEST

- 1) Drive vehicle for a distance of several kilometers (miles) to stabilize dragging force of viscous coupling.
- 2) Place vehicle onto brake tester.



- 3) Perform brake tests.

Effect of braking force on viscous coupling torque:

Approx. 245 N (25 kg, 55 lb)

NOTE:

If dragging force exceeds specifications, check brake pad or brake shoe for dragging. Abnormalities related to the viscous torque of viscous coupling unit may cause excessive dragging force. At this point, raise vehicle so that two front or rear wheels clear floor, remove cause of abnormality and check wheel rotation.

4. CHASSIS DYNAMOMETER TEST

WARNING:

- Do not abruptly depress/release clutch pedal or accelerator pedal during tests.
- Avoid abrupt braking tests after tests.

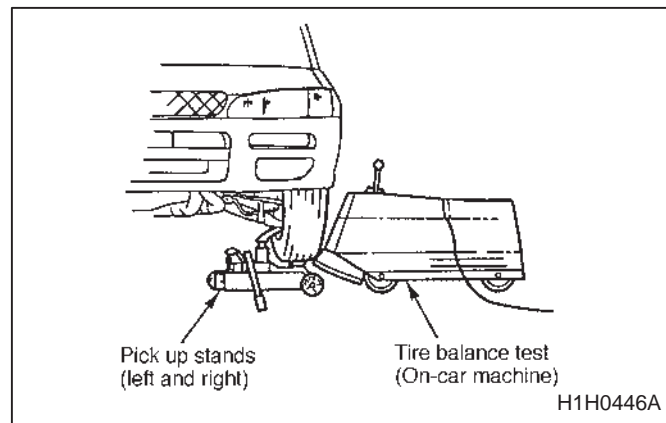
- 1) Locate vehicle onto chassis dynamometer tester.
- 2) Locate rear wheels onto free rollers.
- 3) Perform dynamic performance tests.

5. TIRE BALANCE TEST (ON-car machine)

CAUTION:

- Perform tire balance tests after each tire balance has been measured.
- Locate the vehicle so that its front and rear sides are equal in height.
- Release parking brake.
- Manually rotate each tire and check for drag.
- Do not operate clutch and do not accelerate the engine abruptly.
- If error occurs due to engine operation, do not operate balance's motor.

- 1) Raise vehicle so that left and right wheels to be checked clear the floor. Support wheels using pick-up stands.
- 2) Raise the other two wheels off the ground and support with a safety stand.
- 3) Attach on-car machine to wheels to be checked.



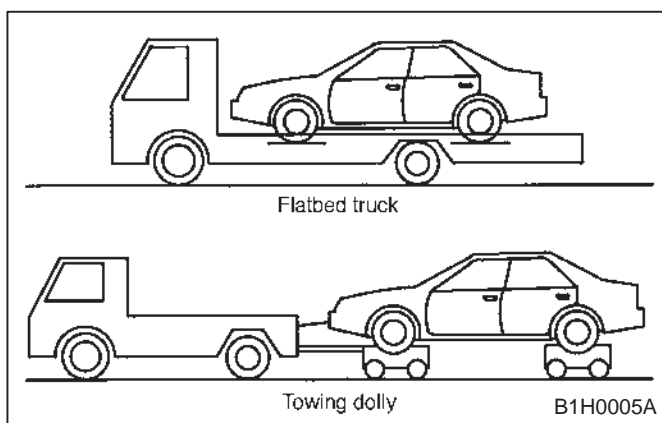
- 4) Drive wheel with engine and perform tire balance tests.

6. TOWING

1) Loading vehicle onto dolly or flat-bed truck

CAUTION:

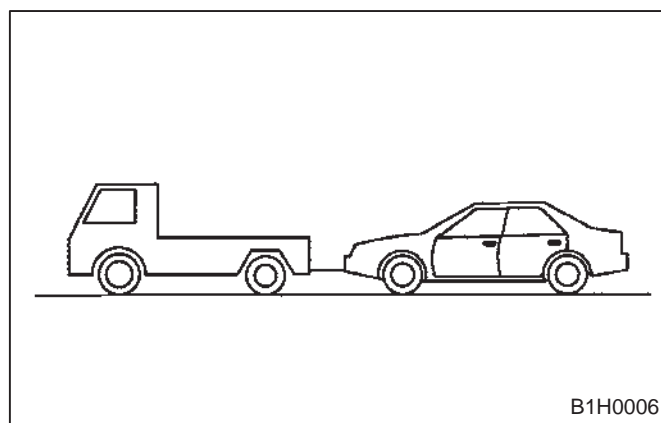
- Transport vehicle using a dolly or flat-bed truck whenever possible.
- Move shift lever to "1st" position and apply parking brake.



2) Towing with a rope

CAUTION:

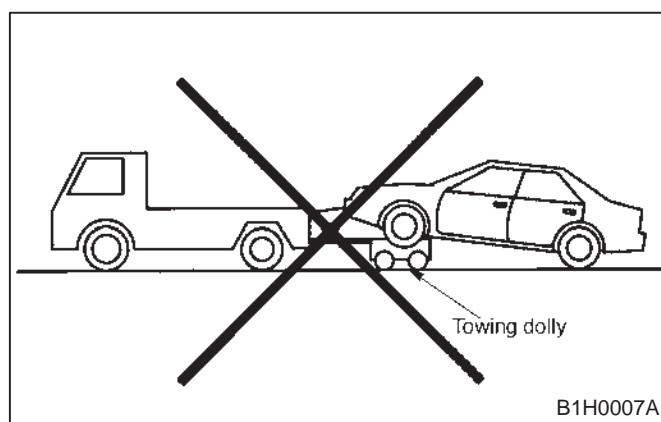
- Use a rope only when power train and all wheels are operating properly.
- The ignition switch should be in the "ACC" position. Never have the ignition switch on "LOCK" while the vehicle is being towed because steering will not be possible, since the direction of the wheels will be locked.
- Put the transmission in neutral.
- Never use the tie down hooks for towing.
- Remember that brake booster and power steering will not work when engine is "OFF". You will have to use greater effort for the brake pedal and steering wheel.
- Before towing, check transmission oil and differential oil levels and top up to the specified level if necessary.



3) Towing with front or rear wheels raised

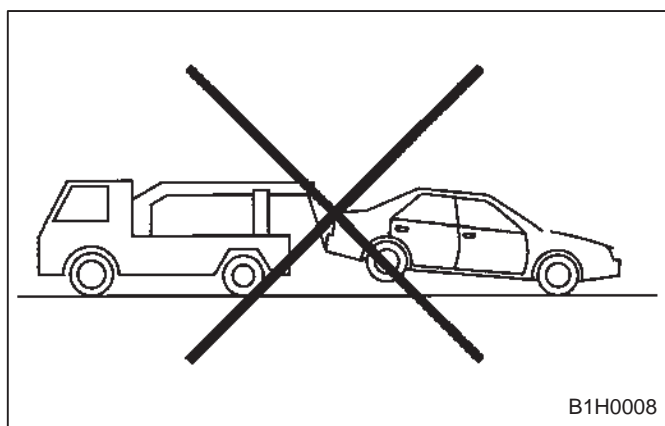
CAUTION:

- Do not tow vehicle with only front or rear wheels placed on towing dolly or flat-bed truck. This may degrade viscous coupling performance or cause vehicle to jump off dolly or truck.

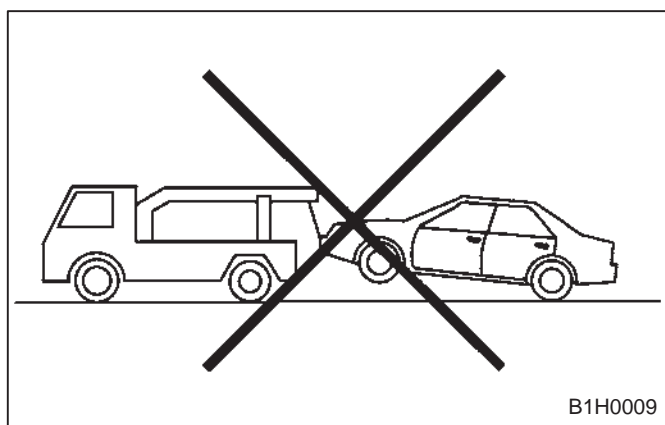


- Do not tow vehicle with rear wheels raised under any circumstances since this will damage bumper.

GENERAL INFORMATION



- Do not tow vehicle with front wheels raised under any circumstances since this will damage bumper.



F: FULL TIME AWD AT MODELS

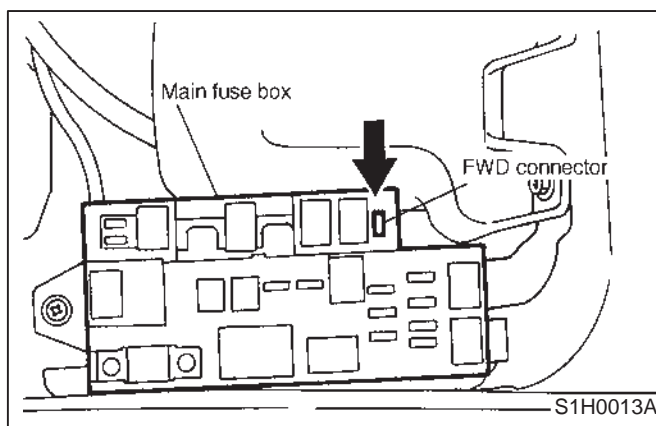
1. BEFORE CHECKING OR SERVICING CARS WITH THE FRONT WHEELS RAISED OR ON ROLLERS (BRAKE TESTER, CHASSIS DYNAMOMETER, ETC.)

CAUTION:

Ensure that the FWD pilot light is on. If the car is left in the AWD mode, it will surge abruptly when the wheels turn, possibly damaging the transfer clutch.

Always set the car in the FWD mode.

To set the car in the FWD mode, disconnect the AWD circuit by inserting a fuse in the FWD connector inside the main fuse box. Also chock the rear wheels firmly.

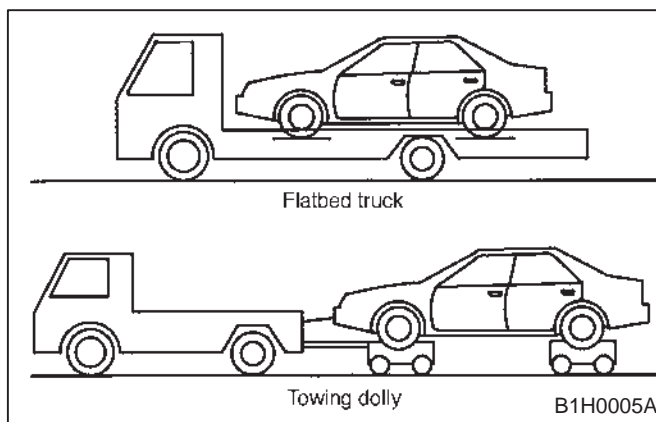


2. TOWING

1) Loading vehicle onto dolly or flat-bed truck

CAUTION:

- Transport vehicle using a dolly or flat-bed truck whenever possible.
- Place the selector lever in "P" position and apply the parking brake.



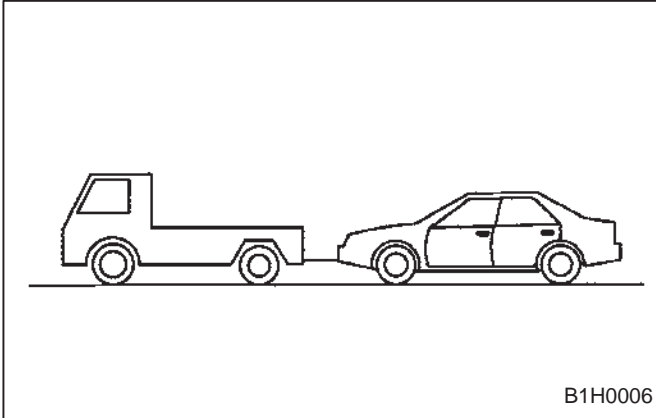
2) Towing with a rope

CAUTION:

- Tow vehicle with a rope only when power train and all wheels are operating properly.
- Put a spare fuse inside the FWD connector and never exceed 30 km/h (19 MPH). Also, do not tow for more than 50 km (31 miles).
- Place the selector lever in "N" position.
- The ignition switch should be in the "ACC" position while the vehicle is being towed.
- Never use the tie down hooks for towing.
- Remember that brake booster and power steering will not work when the engine is

“OFF”. You will have to use greater effort for the brake pedal and steering wheel.

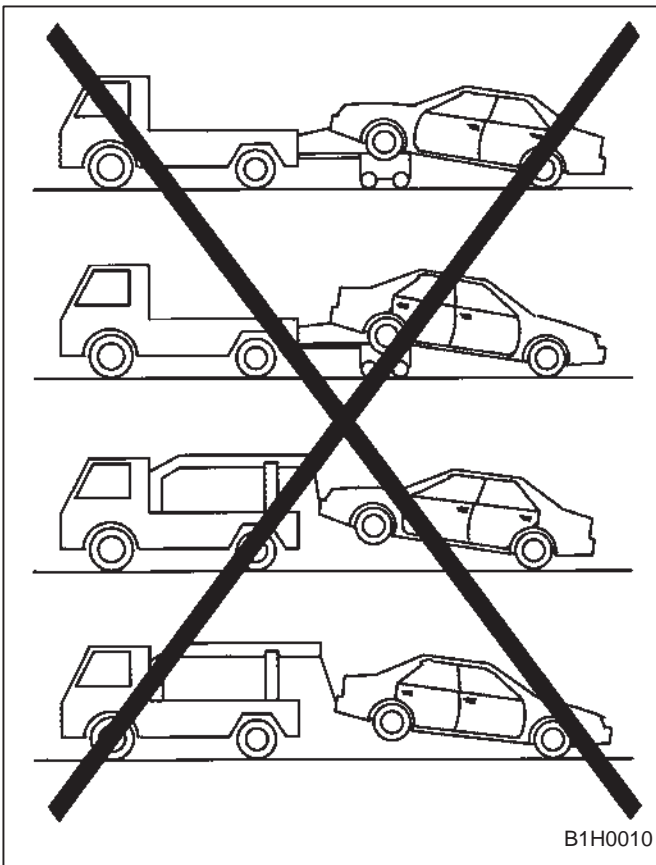
- Before towing, check transmission oil and differential oil levels and top up to the specified level if necessary.



3) Towing with front or rear wheels raised

CAUTION:

Do not tow vehicle with front or rear wheels raised under any circumstances since this will damage bumper.



2. Precaution for Supplemental Restraint System (Airbag)

The Supplemental Restraint System (Airbag) has been implemented in some Subaru vehicles. For proper and safe maintenance of this system, please ensure that you carefully read the precautionary notes given in "5-5 SUPPLEMENTAL RESTRAINT SYSTEM" in the Service Manual before servicing.

It should also be noted that in the SM table of contents, an AIRBAG mark is added to each of the items which do not directly concern the airbag system but need to be considered in their relationship to it. So, during the service work for such items, make sure you refer to "5-5 SUPPLEMENTAL RESTRAINT SYSTEM".

- **Take utmost care to follow faithfully the service procedures specified for the airbag, since otherwise it might deploy unexpectedly.**
- **With the airbag system, failures such as faulty connection of harness connectors or neglect of tightening sensor mounting bolts can lead to failure of deployment in an accident. Recheck each check point after maintenance work and use the on-board self-diagnosis to ensure there is nothing wrong with the system.**
- **All wire harnesses of the airbag system are encased in a yellow cover to make them distinct from those of other systems.**

- **The following are the parts involved in the airbag installation:**

- Steering wheel
- Steering column
- Toe-board (center, left & right ends)
- Front seat floor and side seal
- Front pillar (left, lower)
- Combination meter
- Installment panel (passenger side, with passenger airbag)

Care should be taken when servicing in areas where the above parts are installed since it can affect the airbag system.

- Examples of service work involving the airbag system:
 - Replacement of steering gear
 - Steering maintenance and repair of the area adjoining toe-board
 - Removal and installation of combination meter
 - Installation of car stereo and other optional extras
 - Replacement and repair of the installment panel (with passenger airbag)

3. Vehicle Identification Numbers (V.I.N.)

A: APPLICABLE V.I.N. IN THIS MANUAL

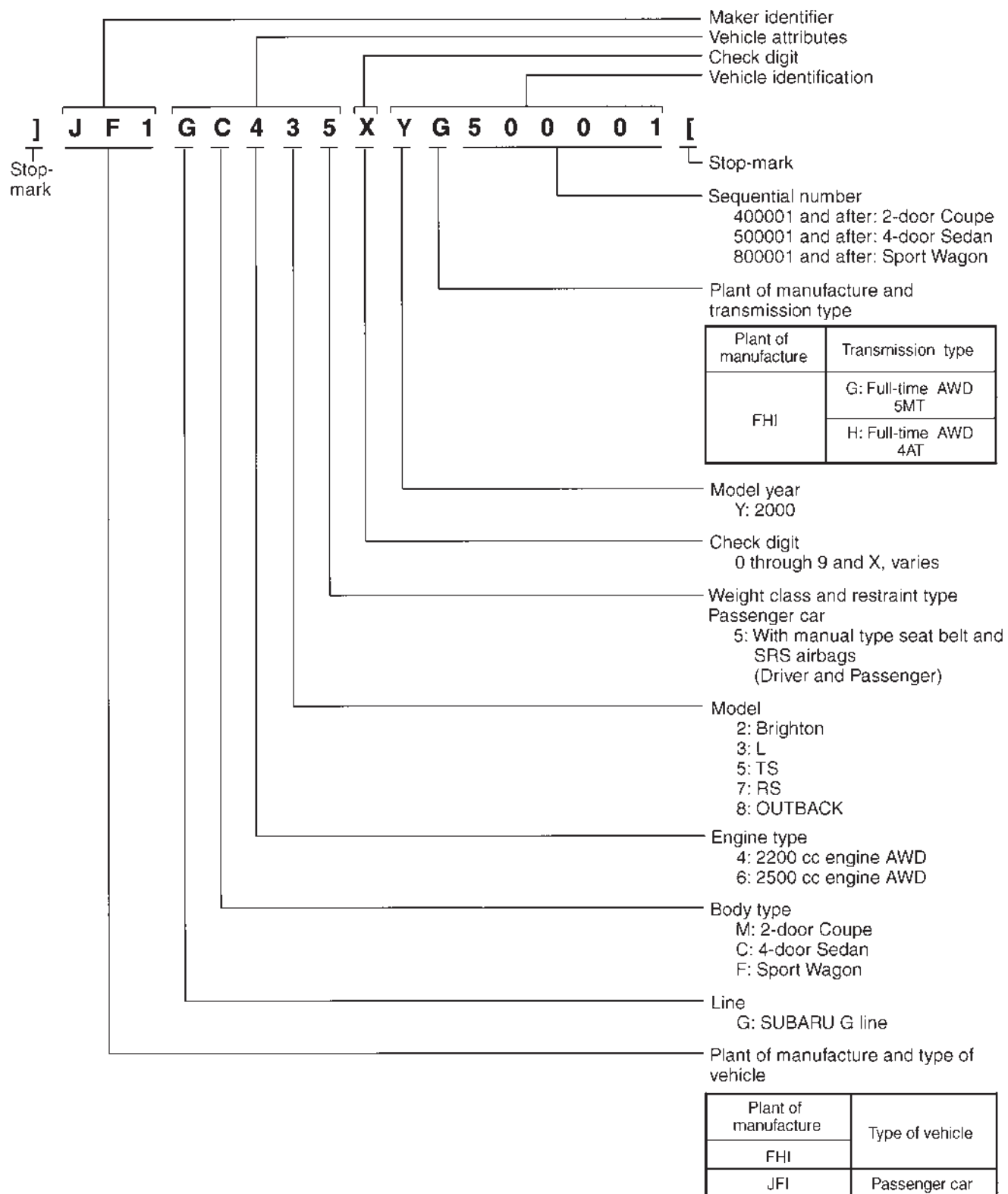
1. U.S. SPEC. VEHICLES

2-door Sedan	2200 cc engine	L	5MT	J	F	1	G	M	4	3	5	X	Y	G	4	0	0	0	0	1	and after
			4AT	J	F	1	G	M	4	3	5	X	Y	H	4	0	0	0	0	1	and after
	2500 cc engine	RS	5MT	J	F	1	G	M	6	7	5	X	Y	G	4	0	0	0	0	1	and after
			4AT	J	F	1	G	M	6	7	5	X	Y	H	4	0	0	0	0	1	and after
4-door Sedan	2200 cc engine	L	5MT	J	F	1	G	C	4	3	5	X	Y	G	5	0	0	0	0	1	and after
			4AT	J	F	1	G	C	4	3	5	X	Y	H	5	0	0	0	0	1	and after
	2500 cc engine	RS	5MT	J	F	1	G	C	6	7	5	X	Y	G	5	0	0	0	0	1	and after
			4AT	J	F	1	G	C	6	7	5	X	Y	H	5	0	0	0	0	1	and after
Sport Wagon	2200 cc engine	L	5MT	J	F	1	G	F	4	3	5	X	Y	G	8	0	0	0	0	1	and after
			4AT	J	F	1	G	F	4	3	5	X	Y	H	8	0	0	0	0	1	and after
		OUTBACK	5MT	J	F	1	G	F	4	8	5	X	Y	G	8	0	0	0	0	1	and after
			4AT	J	F	1	G	F	4	8	5	X	Y	H	8	0	0	0	0	1	and after

2. CANADA SPEC. VEHICLES

2-door Sedan	2500 cc engine	RS	5MT	J	F	1	G	M	6	7	5	X	Y	G	4	0	0	0	0	1	and after
			4AT	J	F	1	G	M	6	7	5	X	Y	H	4	0	0	0	0	1	and after
4-door Sedan	2200 cc engine	TS	5MT	J	F	1	G	C	4	5	5	X	Y	G	5	0	0	0	0	1	and after
			4AT	J	F	1	G	C	4	5	5	X	Y	H	5	0	0	0	0	1	and after
	2500 cc engine	RS	5MT	J	F	1	G	C	6	7	5	X	Y	G	5	0	0	0	0	1	and after
			4AT	J	F	1	G	C	6	7	5	X	Y	H	5	0	0	0	0	1	and after
Sport Wagon	2200 cc engine	Brighton	5MT	J	F	1	G	F	4	2	5	X	Y	G	8	0	0	0	0	1	and after
			4AT	J	F	1	G	F	4	2	5	X	Y	H	8	0	0	0	0	1	and after
		OUTBACK	5MT	J	F	1	G	F	4	8	5	X	Y	G	8	0	0	0	0	1	and after
			4AT	J	F	1	G	F	4	8	5	X	Y	H	8	0	0	0	0	1	and after

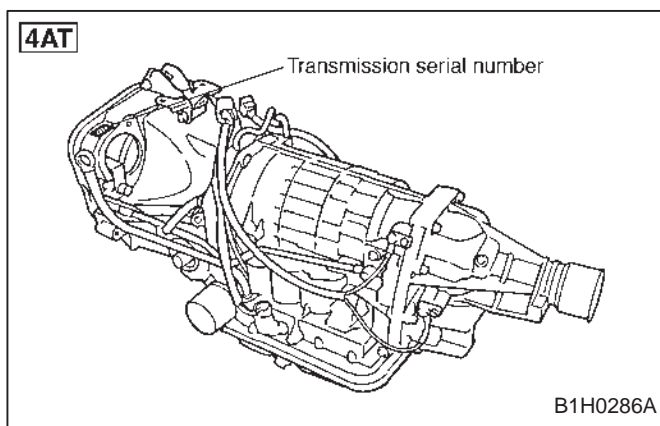
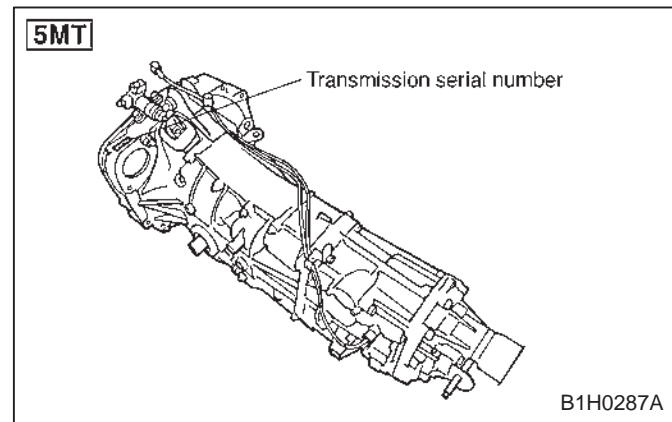
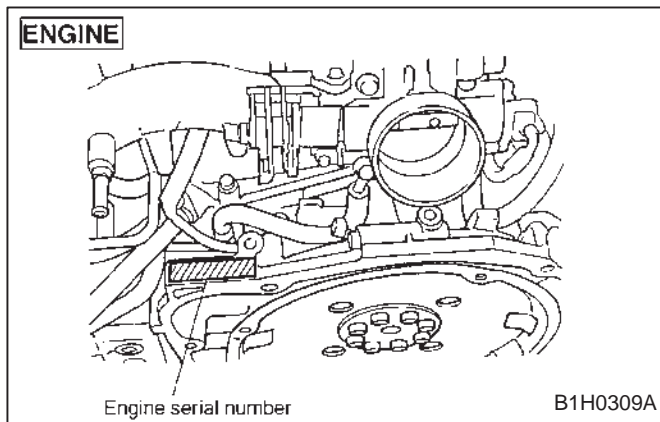
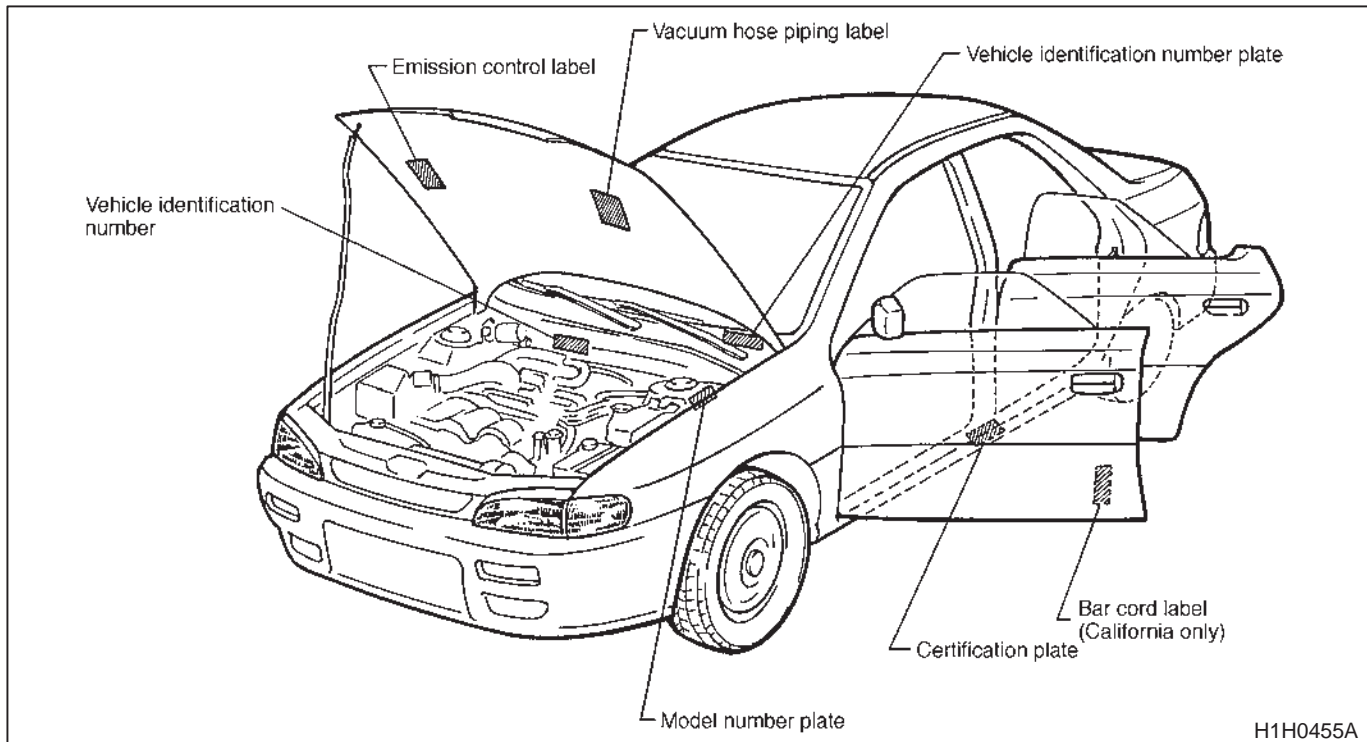
B: THE MEANING OF V.I.N.



H1H0493C

4. Identification Number and Label Locations

Engine, transmission and vehicle identification numbers are used for factory communications such as Technical Information, Service Bulletins and other information.



5. Recommended Fuel, Lubricants, Sealants and Adhesives

A: FUEL

1. FUEL OCTANE RATING

SUBARU engines are designed to use only unleaded gasoline with an octane rating of 87 AKI or higher. [This octane rating is the average of the Research Octane and Motor Octane numbers and is commonly referred to as the Anti-Knock Index (AKI).] Using a gasoline with a lower octane rating can cause persistent and heavy knocking, which can damage the engine. Do not be concerned if SUBARU vehicle sometimes knocks lightly when you drive up a hill or when you accelerate. See your dealer or a qualified service technician if you use a gasoline with the specified octane rating and SUBARU vehicle knocks heavily or persistently.

2. UNLEADED GASOLINE

The neck of the fuel filler pipe is designed to accept only an unleaded gasoline filler nozzle. Under no circumstances should leaded gasoline be used since it will damage the emission control system and may impair driveability and fuel economy.

3. GASOLINE FOR CALIFORNIA-CERTIFIED LEV

If SUBARU vehicle is a California-certified Low Emission Vehicle (LEV) as indicated on the underhood tune-up label, it is designed to optimize engine and emission control system performance with gasolines that meet California specifications.

B: FUELS CONTAINING ALCOHOL

Your use of gasoline with detergent additives will help prevent deposits from forming in your engine and fuel system. This helps keep your engine in tune and your emission control system working properly, and is a way of doing your part for cleaner air.

Many gasolines are now blended with materials called oxygenates. Use of these fuels can also help keep the air cleaner. SUBARU approves the use of oxygenated blend fuels, such as MTBE (Methyl Tertiary Butyl Ether) or ethanol (ethyl or grain alcohol). These blended fuels should contain no more than 15% MTBE or 10% ethanol for the proper operation of your SUBARU.

In addition, some gasoline suppliers are now producing reformulated gasolines, which are designed to reduce vehicle emissions. SUBARU approves the use of reformulated gasoline.

If you are not sure what the fuel contains, you should ask your service station operators if their gasolines contain detergents and oxygenates and if they have been reformulated to reduce vehicle emissions.

As additional guidance, only use fuels suited for your vehicle as explained below.

- Fuel should be unleaded and have an octane rating no lower than that specified in this manual.
- Methanol (methyl or wood alcohol) is sometimes mixed with unleaded gasoline. Methanol can be used in your vehicle **ONLY** if it does not exceed 5% of the fuel mixture **AND** if it is accompanied by sufficient quantities of the proper cosolvents and corrosion inhibitors required to prevent damage to the fuel system. Do not use fuel containing methanol **EXCEPT** under these conditions.
- If undesirable driveability problems are experienced and you suspect they may be fuel related, try a different brand of gasoline before seeking service at your SUBARU dealer.
- Fuel system damage or driveability problems which result from the use of improper fuel are not covered under the SUBARU Limited Warranty.

CAUTION:

Take care not to spill fuel during refueling. Fuels containing alcohol may cause paint damage.

C: LUBRICANTS

Lubricants	Specifications	Remarks
• Engine oil	<ul style="list-style-type: none"> • API Classification: SJ or SH with the words "Energy Conserving II" • New API Certified • CCMC Specification: G4 or G5 • ACEA Specification: A1, A2 or A3 	<ul style="list-style-type: none"> • For SAE viscosity number, refer to the following table. • If it is impossible to get SJ or SH grade, you may use SG grade.
• Transmission and differential gear oil	• API Classification: GL-5	• For SAE viscosity number, refer to the following table.
• AWD rear differential gear oil		
• Automatic transmission	• "DEXRON II, IIE" or "DEXRON III" type	—
• Power steering fluid	• "DEXRON II, IIE" or "DEXRON III" type	—
• Coolant	• Genuine SUBARU Coolant (Part No. 000016218) (Anti-freeze, anti-corrosive ethylene glycol base)	• For further coolant specifications, refer to the following table.
• Coolant Conditioner	• Subaru Coolant Conditioner SOA635071	—
• Brake fluid	• DOT3 or DOT4	<ul style="list-style-type: none"> • FMVSS NO. 116 • Avoid mixing brake fluid of different brands to prevent the fluid performance from degrading. • When brake fluid is added, be careful not to allow any dust into the reservoir.
• Clutch fluid	• DOT3 or DOT4	<ul style="list-style-type: none"> • FMVSS NO. 116 • Avoid mixing brake fluid of different brands to prevent the fluid performance from degrading. • When clutch fluid is added, be careful not to allow any dust into the reservoir.

Lubricants	Recommended	Application	Equivalent
• Spray lubricants	SUBARU CRC (P/N 004301003)	O ₂ sensor	—
	SUNLIGHT 2 N: glube R (P/N 003602010)	Steering shaft bearing, bushing for manual transmission gear shift system	—
	Valiant grease M-2 (P/N 003608001)	Steering gearbox	—
	Niglube RX-2 (P/N 003606000 or 725191040)	Piston boot of disc brake and sliding pin	—
	Molykote No. 7439 (P/N 725191460)	Contacting surfaces of drum brake shoes and shoe clearance adjuster	—
	Molylex No.2 (P/N 723223010)	BJ of rear axle shafts	—
	VU-3A702 (P/N 23223GA050)	DOJ of rear axle shafts	—
• Grease	NTG2218 (CP/N 28093AA020)	BJ of front axle shafts	—
	SSG-6003 (P/N 28093TA000)	SFJ of front axle shaft	—
	FX clutch grease (P/N 000040901)	Splines of transmission main shaft	—
	Slicolube G-30M (P/N 004404002)	Control cables and throttle linkages subject to cold weather, water-pump impeller, door latch, striker, battery terminals, etc.	—
	Slicolube G-40M (P/N 004404003)	Clutch master cylinder push rod end	—
	Molykote AS-880N (P/N 26298AC000)	Contacting surfaces of brake pad and inner shim	—

D: FLUID**CAUTION:**


- Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands (Except engine oil).
- When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API classification and SAE viscosity No. designated by SUBARU.

NOTE:

If vehicle is used in desert areas with very high temperatures or for other heavy duty applications, the following viscosity oils may be used:

API classification: SJ or SH

SAE Viscosity No: 30, 40, 10W-50, 20W-40, 20W-50

ITEM	API Classification	New API Certification Mark (Star burst mark)	CCMC Specification	ACEA Specification	SAE Viscosity No. and Applicable Temperature							
					(°C)	-30	-20	-15	0	15	30	40
Engine oil	SJ or SH with the words "Energy Conserving II"		G4 or G5	A1, A2 or A3	(°F)	-22	-4	5	32	59	86	104
•Transmission gear oil •AWD rear differential gear oil	GL-5	—	—	—								
•Front differential gear oil for automatic transmission	GL-5	—	—	—								

B1H04390

B1H0439C

E: COOLANT**CAUTION:**

- Avoid using any coolant or only water other than this designated type to prevent corrosion.
- SUBARU's engine is aluminum alloy, and so special care is necessary.
- To prevent cooling system leaks, always add Genuine Subaru Cooling System Conditioner (Part No. SOA635071) whenever the coolant is replaced.

Coolant Specifications							
Lowest anticipated atmospheric temperature	SUBARU coolant-to-water ratio (Volume) %	Specification gravity					Freezing point
		at 10°C (50°F)	at 20°C (68°F)	at 30°C (86°F)	at 40°C (104°F)	at 50°C (122°F)	
Above -30°C (-22°F)	50 — 50	1.084	1.079	1.074	1.068	1.062	-36°C (-33°F)
Above -15°C (5°F)	30 — 70	1.053	1.049	1.044	1.039	1.034	-16°C (3°F)

*: It is recommended that distilled water be used.

F: SEALANTS

	Recommended	Application	Equivalent
Sealant	Three Bond 1105 (P/N 004403010)	Rear differential oil drain plug, retainer bolt, etc.	Dow Corning's No. 7038
	Three Bond 1215 (P/N 004403007)	Matching surface of oil pump, transmission case, etc. Flywheel and drive plate tightening bolts, etc.	Dow Corning's No. 7038
	Starcalking B-33A (P/N 000018901)	Sealing against water and dust entry through weatherstrips, grommets, etc.	Butyl Rubber Sealant
	Three Bond 1102 (P/N 004403006)	Steering gear box adjust screw	—

G: ADHESIVES

Adhesive	Cemedine 5430L	Weatherstrips and other rubber parts, plastics and textiles except soft vinyl parts.	3M's EC-1770 EC-1368
	Cemedine 540	Soft vinyl parts, and other parts subject to gasoline, grease or oil, e.g. trim leather, door inner remote cover, etc.	3M's EC-776 EC-847 EC-1022 (Spray Type)
	Cemedine 3000	Bonding metals, glass, plastic and rubber parts. Repairing slightly torn weatherstrips, etc.	Armstrong's Eastman 910
	Essex Chemical Corp's Urethane E	Windshield to body panel.	Sunstar 580

6. Tightening Torque of Standard Bolts and Nuts







A: ENGINE AND TRANSMISSION

Dia. x Pitch (mm)	Unit: N.m (kg-m, ft-lb)			
	5T	7T	9T	10T
4 x 0.75	1.0 — 1.5 (0.105 — 0.155, 0.8 — 1.1)	1.5 — 2.0 (0.155 — 0.205, 1.1 — 1.5)	2.5 — 3.0 (0.255 — 0.305, 1.8 — 2.2)	3.0 — 3.5 (0.305 — 0.355, 2.2 — 2.6)
5 x 0.9	2.5 — 3.0 (0.255 — 0.305, 1.8 — 2.2)	2.9 — 3.9 (0.30 — 0.40, 2.2 — 2.9)	4.9 — 5.9 (0.50 — 0.60, 3.6 — 4.3)	5.4 — 6.4 (0.55 — 0.65, 4.0 — 4.7)
6 x 1.0	4.4 — 5.4 (0.45 — 0.55, 3.3 — 4.0)	5.9 — 6.9 (0.60 — 0.70, 4.3 — 5.1)	9.4 — 10.8 (0.955 — 1.105, 6.9 — 8.0)	10 — 12 (1.0 — 1.2, 7 — 9)
8 x 1.25	12 — 14 (1.2 — 1.4, 9 — 10)	14.2 — 17.2 (1.45 — 1.75, 10.5 — 12.7)	23 — 26 (2.3 — 2.7, 17 — 20)	25 — 28 (2.5 — 2.9, 18 — 21)
10 x 1.25	25 — 28 (2.5 — 2.9, 18 — 21)	30 — 36 (3.1 — 3.7, 22 — 27)	46 — 54 (4.7 — 5.5, 34 — 40)	49.5 — 58.4 (5.05 — 5.95, 36.5 — 43.0)
12 x 1.5	41 — 49 (4.2 — 5.0, 30 — 36)	53 — 63 (5.4 — 6.4, 39 — 46)	84 — 98 (8.6 — 10.0, 62 — 72)	88 — 106 (9.0 — 10.8, 65 — 78)
14 x 1.6	71 — 84 (7.2 — 8.6, 52 — 62)	88 — 106 (9.0 — 10.8, 65 — 78)	139 — 165 (14.2 — 16.8, 103 — 122)	147 — 175 (15.0 — 17.8, 108 — 129)

The mark is embossed on the bolt head as follows:

- 5T — 5
- 7T — 7
- 9T — 9
- 10T — 10

B: BODY

	Dia. (mm)	Unit: N.m (kg-m, ft-lb)		
		4T	7T	9T
   G1H0041	4	1.7 — 2.6 (0.17 — 0.27, 1.2 — 2.0)	—	—
	5	2.9 — 5.9 (0.30 — 0.60, 2.2 — 4.3)	—	—
	6	5.4 — 9.3 (0.55 — 0.95, 4.0 — 6.9)	—	—
	8	12.7 — 22.6 (1.30 — 2.30, 9.4 — 16.6)	22.6 — 42.2 (2.30 — 4.30, 16.6 — 31.1)	31.4 — 51.0 (3.20 — 5.20, 23.1 — 37.6)
	10	27.5 — 47.1 (2.80 — 4.80, 20.3 — 34.7)	51.0 — 86.3 (5.20 — 8.80, 37.6 — 63.7)	62.8 — 107.9 (6.40 — 11.00, 46.3 — 79.6)
	12	52.0 — 85.3 (5.30 — 8.70, 38.3 — 62.9)	88.3 — 156.9 (9.00 — 16.00, 65.1 — 115.7)	117.7 — 196.1 (12.00 — 20.00, 86.8 — 144.7)
In case bolt or nut with washer or spring washer    G1H0042	4	1.2 — 2.2 (0.12 — 0.22, 0.9 — 1.6)	—	—
	5	2.5 — 4.4 (0.25 — 0.45, 1.8 — 3.3)	—	—
	6	4.4 — 7.4 (0.45 — 0.75, 3.3 — 5.4)	—	—
	7	9.8 — 17.7 (1.10 — 1.80, 7.2 — 13.0)	17.7 — 31.4 (1.80 — 3.20, 13.0 — 23.1)	23.5 — 39.2 (2.40 — 4.00, 17.4 — 28.9)
	10	22.6 — 36.3 (2.30 — 3.70, 16.6 — 26.8)	37.3 — 66.7 (3.80 — 6.80, 27.5 — 49.2)	48.1 — 83.4 (4.90 — 8.50, 35.4 — 61.5)
	12	39.2 — 64.7 (4.00 — 6.60, 28.9 — 47.7)	68.6 — 117.7 (7.00 — 12.00, 50.6 — 86.8)	88.3 — 147.1 (9.00 — 15.00, 65.1 — 108.5)

The mark is embossed on the bolt head as follows:

- 4T — 4
- 7T — 7
- 9T — 9

7. Lifting, Towing and Tie-down Points

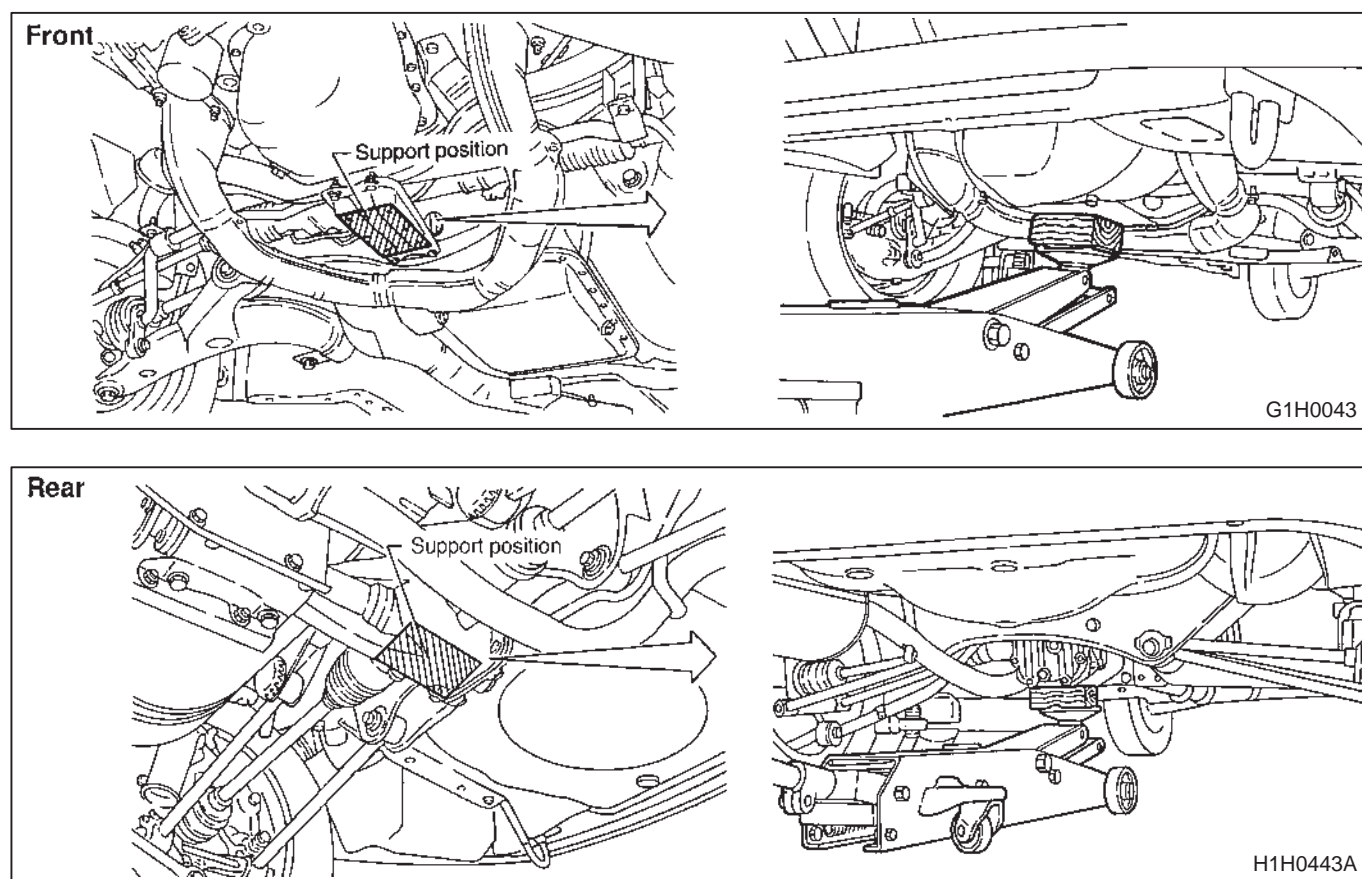
WARNING:

- Never get under the vehicle while it is supported by a jack.
- When jacking up the vehicle, place chocks to hold wheels.
- After jacking up the vehicle with garage jack, be sure to support the vehicle with stands for safety.
- Be sure to lift vehicle at the same four positions as those for pantograph jack.

CAUTION:

Be sure to lift, tow and tie-down the vehicle at the designated positions.

A: GARAGE JACK



B: PANTOGRAPH JACK, SAFETY STAND AND LIFT

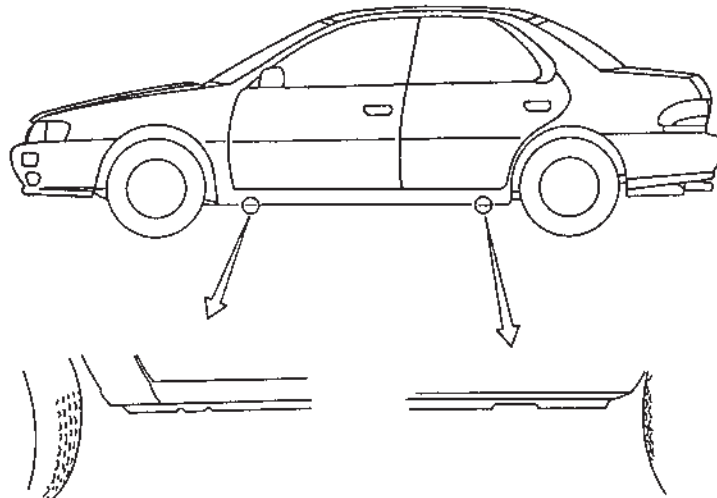
WARNING:

- Never get under the vehicle while it is supported only by the jack. Always use safety stands to support body when you have to get under the car.
- Block the wheels diagonally by wheel chocks.

CAUTION:

Make sure the jack is set at the correct position on the flange of side sill.

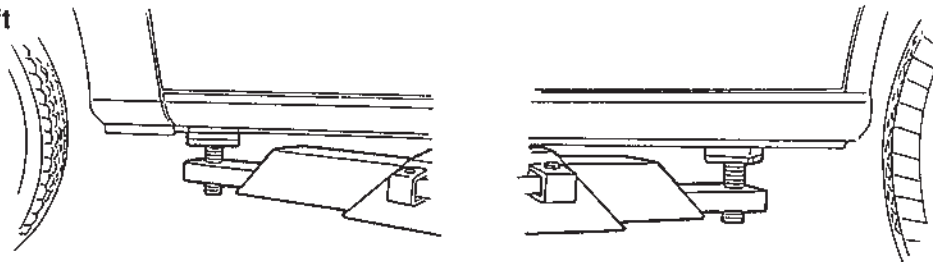
Support locations



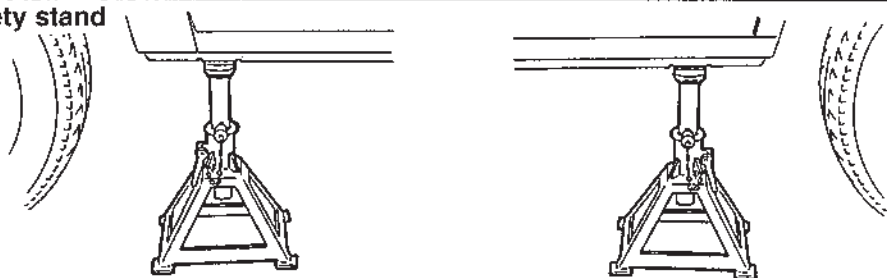
Pantograph jack



Lift



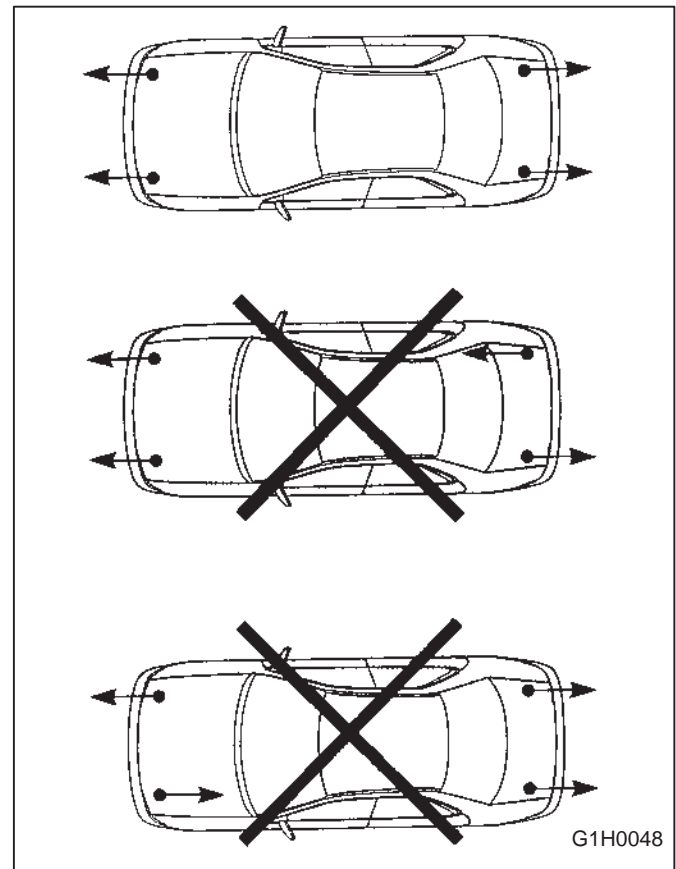
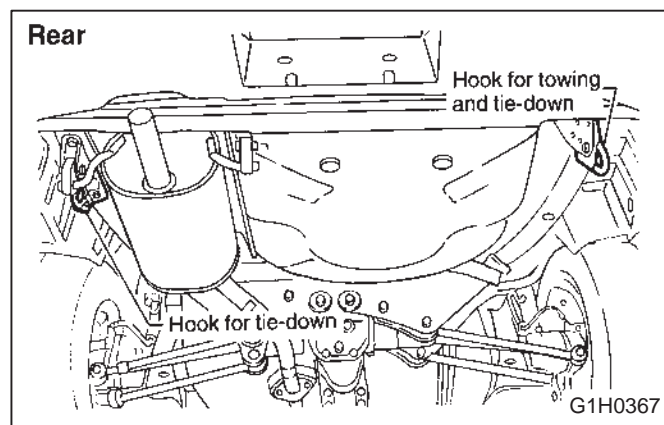
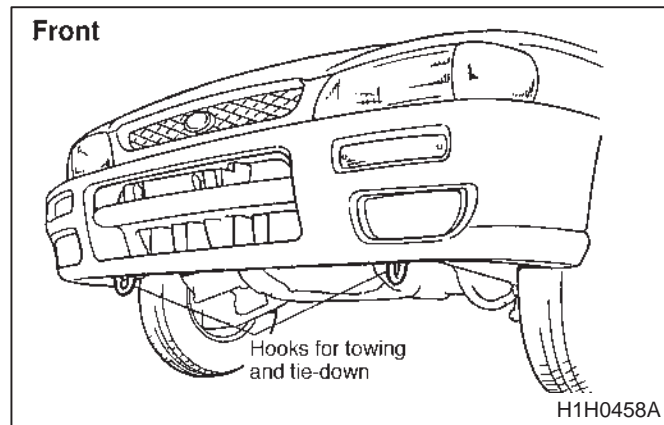
Safety stand



H1H0457A

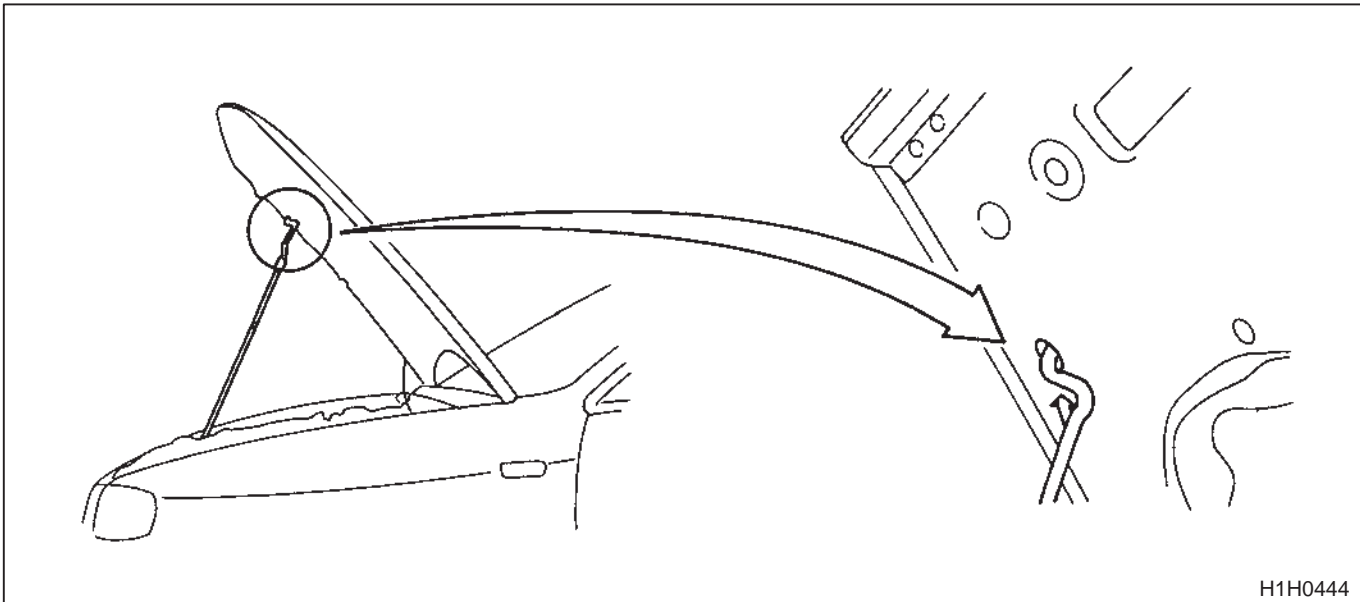
C: TOWING AND TIE-DOWN HOOKS**CAUTION:**

- Avoid towing another car with front towing hooks.
- Do not tow a vehicle which is heavier than towing vehicle.
- Do not apply excessive lateral load to towing hook.
- Wrap the towing rope with cloth to prevent damaging bumper, etc.
- Keep the vehicle level during towing.
- Tie the front and rear tie-down hooks in the same direction.



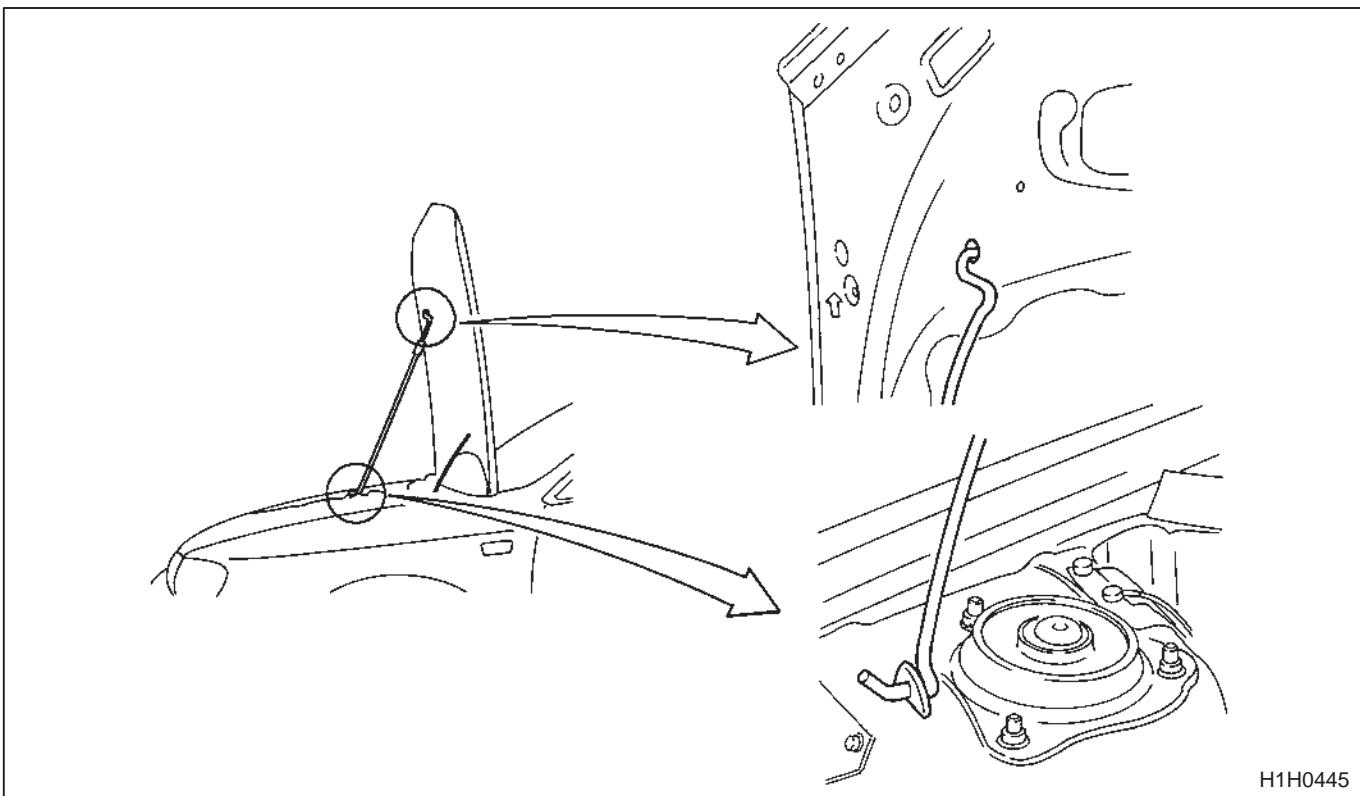
8. Front Hood Stay Installation

A: AT THE CHECK AND GENERAL MAINTENANCE



B: WHEN WIDER HOOD OPENING IS NECESSARY

Set stay into the hole of hood inner as shown in the figure below.



1. List of Pre-delivery Inspection

INSPECTION ITEM		CHECK POINTS
2. Pre-road Test Inspection		
A	HOOD OPERATION	1. Operation of hood release and lock 2. Condition of lock 3. Fitting of hood
B	DOOR OPERATION, DOOR LOCK AND REGULATOR	1. Door "Open-close" operation 2. Operation of door release and lock 3. Loose or damaged parts 4. Regulator handle operation 5. Position of door window glass 6. Operation of power window switches 7. Power door locking operation
C	TRUNK LID, REAR GATE AND FUEL LID OPERATION	1. Trunk lid, rear gate and fuel lid "open-close" operation 2. Operation of trunk lid and rear gate (release and lock) 3. Fitting of trunk lid, rear gate and fuel lid 4. Operation of trunk lid opener cancel lever
D	BRAKE FLUID LEVEL AND BRAKE PIPING INSTALLATION	1. Fluid level in reserve tank 2. Wiring of fluid leveller and its operation 3. Brake booster, master cylinder and pressure control valve for proper installation; brake pipe, brake hose and connectors for proper fitting 4. Leakage in any of the above
E	BATTERY FLUID LEVEL AND BATTERY INSTALLATION	1. External parts 2. Electrolyte level 3. Specific gravity
F	COOLANT LEVEL AND COOLING FAN INSTALLATION	1. Coolant level 2. Cooling fan motor and wiring 3. Water leakage and hose damage
G	ENGINE OIL LEVEL	1. Engine oil level 2. Engine oil leakage or contamination
H	TRANSMISSION AND DIFFERENTIAL GEAR OIL LEVEL	1. Level of transmission gear oil for manual transmission 2. Level of rear differential gear oil for AWD model 3. Level of front differential gear oil for automatic transmission
I	DRIVE BELT TENSION	1. Belt tension 2. Damage to belt
J	AIR CLEANER	1. Contamination of air cleaner element 2. Related parts
K	JACK INSTALLATION	1. Installed condition of jack
L	WASHER AND WIPERS	1. Installation of washer tank 2. Checking of washer fluid level 3. Direction and quantity of washer fluid sprayed 4. Operation of wiper and washer
M	REAR WINDOW WASHER AND WIPER	1. Quantity of washer fluid 2. Direction and quantity of washer fluid sprayed 3. Operation of rear window washer and wiper
N	WHEEL NUTS FOR LOOSENESS AND TIRE INFLATION PRESSURE	1. Wheel nut tightening torque 2. Tire inflation pressure and tire specification 3. Damage to tire and rim

PRE-DELIVERY INSPECTION

[G100] 1-4

1. List of Pre-delivery Inspection

INSPECTION ITEM		CHECK POINTS
O	SEAT ADJUSTER AND SEAT BELTS	<ol style="list-style-type: none"> 1. Front and rear seats, and their facing materials 2. Front seat operation 3. Rear seat folding operation 4. Seat belts and their fit 5. Installing procedure for child anchor
P	FUSES	<ol style="list-style-type: none"> 1. Fuse installation 2. Spare fuse
Q	LIGHTS AND SWITCHES	<ol style="list-style-type: none"> 1. Visual inspection of lights (installation, damage, dirty lenses, water inside, etc.) 2. Operation of all lights and switches 3. Horn operation 4. Operation of heater and ventilator 5. Removing the clip for room light switch
R	PREPARATION FOR UNDERSIDE INSPECTION	<ol style="list-style-type: none"> 1. Jacking up and lifting point
S	TEST MODE CONNECTOR	<ol style="list-style-type: none"> 1. Check engine light flashing 2. Test mode connector disconnection
T	INSTALLATION OF STEERING COMPONENTS	<ol style="list-style-type: none"> 1. Installation of universal joints 2. Steering gear box for looseness, play, or backlash, and boots for damage 3. Tie-rod and tie-rod end for proper installation, or damage
U	EXHAUST PIPE AND MUFFLER	<ol style="list-style-type: none"> 1. Installation of exhaust system 2. Exhaust gas leakage from parts or joints
V	FUEL SYSTEM FOR LEAKAGE	<ol style="list-style-type: none"> 1. Installation of fuel hose and pipe. And condition of clamps 2. Fuel system for leakage
W	PROTECTOR	<ol style="list-style-type: none"> 1. Protector removal
X	AIR CONDITIONING SYSTEM	<ol style="list-style-type: none"> 1. A/C compressor connector connection
Y	CLUTCH FLUID LEVEL	<ol style="list-style-type: none"> 1. Clutch fluid level
3. Road Test Inspection		
A	OPERATION OF INDICATOR LIGHTS AND GAUGES	<ol style="list-style-type: none"> 1. Operation of indicator lights 2. Operation of gauges
B	TACHOMETER, RADIO, ETC.	<ol style="list-style-type: none"> 1. Operation of tachometer, radio, cigarette lighter, etc.
C	STARTING CONDITION OF ENGINE	<ol style="list-style-type: none"> 1. Starting condition of engine
D	DRIVING TEST	<ol style="list-style-type: none"> 1. Operation of foot brake and parking brake 2. Inspect the clutch pedal free play 3. Operation of clutch and gear shift 4. Operation of selector lever (Automatic transmission) 5. Operation of starter interlock (Manual transmission) 6. Operation of steering and position of steering wheel 7. Operation of turn signal cancel cam 8. Operation of ventilation system and heater 9. Abnormal noises or vibration 10. Operation of cruise control
4. Post-road Test Inspection		
A	AUTOMATIC TRANSMISSION FLUID (ATF) LEVEL	<ol style="list-style-type: none"> 1. Level of ATF
B	POWER STEERING FLUID LEVEL	<ol style="list-style-type: none"> 1. Level of power steering fluid
C	WHEEL ALIGNMENT	<ol style="list-style-type: none"> 1. Toe of front and rear wheels 2. Camber of front wheels

1-4 [G100]**PRE-DELIVERY INSPECTION**1. List of Pre-delivery Inspection

INSPECTION ITEM		CHECK POINTS
D	UNDERSIDE	1. Leakage of engine oil, transmission gear oil, differential gear oil, etc. 2. Leakage of coolant 3. Leakage of brake fluid 4. Loose suspension mountings or steering mounting
E	WATER LEAKAGE	1. Water leakage by pouring water
F	EXTERNAL APPEARANCE AND EQUIPMENT	1. Paint 2. Scratches and damage to glass 3. Rust formation 4. Contamination of interior parts 5. Installation of equipment

2. Pre-road Test Inspection

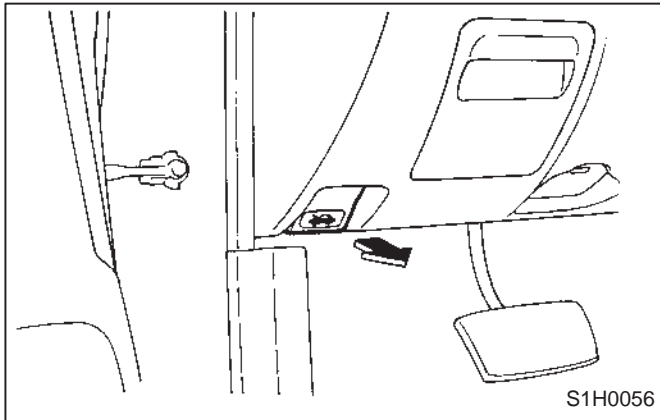
A: HOOD OPERATION

CHECK POINTS

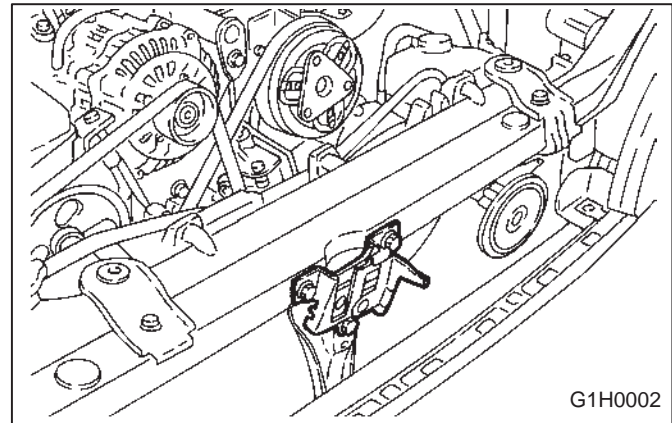
1. Operation of hood release and lock
2. Condition of lock
3. Fitting of hood

1. CHECK THE OPENING, CLOSING AND LOCKING OF HOOD.

1) Make sure the wiper arms are folded down properly. Pull the hood lock release knob under the instrument panel. (The hood will lift a step.) Check if the cable moves easily and lightly without dragging.



2) Release the lock by pushing the lock lever while pushing the hood down with slight pressure. Hold the hood open with the stay. Check the way the safety lock mechanism is released and that the hood opens and closes without any abnormal noise and does not contact the body.



3) Remove the stay and lower the hood slowly. Rest the hood near the body and push down the front end of the hood to see if the lock functions properly.

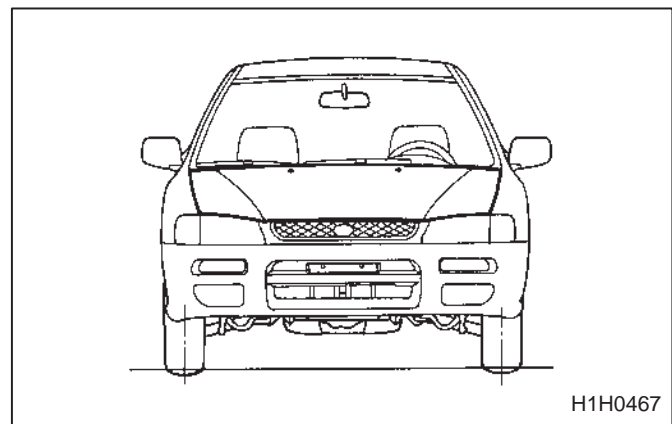
4) Confirm by repeating the above steps beginning with the first one two or three times.

2. CHECK THE INSTALLATION OF HOOD.

After having closed the hood, ensure the hood fits properly.

NOTE:

- The clearance between the hood and front fender is uniform.
- The hood's front end is parallel with the front fender.
- The slope of hood is the same as the parts of body surrounding it.
- The hood and weatherstrip stick fast to each other.

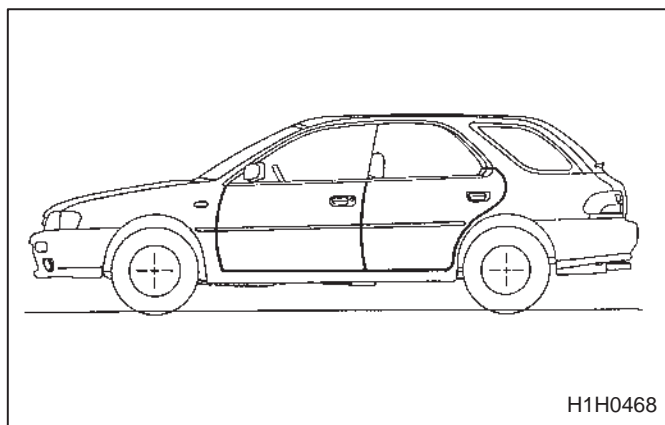


B: DOOR OPERATION, DOOR LOCK AND REGULATOR

CHECK POINTS

1. Door "Open-close" operation
2. Operation of door release and lock
3. Loose or damaged parts
4. Regulator handle operation
5. Position of door window glass
6. Operation of power window switches
7. Power door locking operation

1. CHECK THE OPENING AND CLOSING OF DOORS AND REAR GATE.



- 1) First open the door completely and then close it fully by operating the inside handle from the driver's seat.
- 2) Repeat the preceed step two or three times to see how the door opens and closes. Pay attention to the operating effort, any abnormal noise and positive operation.
- 3) Operate the outer handle from the outside and check how the door opens and closes. Also, check that there is an uniform clearance between the door and car body without any grade difference.

NOTE:

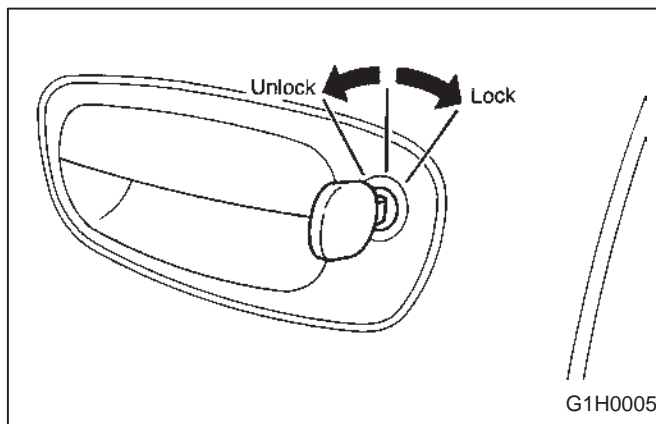
- To examine the closed state and sinking of the door, observe from the front right-hand door.
- If the striker drags during opening when the outer handle is pulled, adjust by relocating the striker.

2. CHECK THE OPERATION OF DOOR LOCKS.

- 1) Close the door completely, lock it with the key plate and pull the outside door handle to ensure the door does not open.

NOTE:

- Do not pull the outside door handle with greater force than necessary.
- While inspecting the door and lock, check the lock in the rear part of the door and the door striker attached to the pillar.

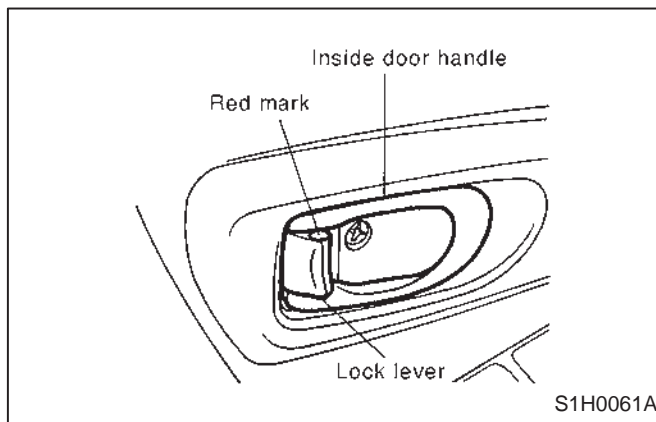


- 2) Again operate the key plate to ensure the door unlocks.

NOTE:

Replace the lock cylinder if it malfunctions. When the door lock seems to be operating slowly, lubricate the moving parts with grease or oil.

- 3) Sit in the driver seat, close the door completely, and move the lock lever to lock the door. Then, pull the inside door handle to ensure the door will not open.



3. CHECK THE LOOSENESS OF DOORS.

- 1) Open and close the door two or three times with a somewhat strong force.
- 2) Check the bolts or screws securing the door hinge, lock and striker for looseness. Retighten loose ones to the specified tightening torque.

4. CHECK THE OPERATION OF REGULATOR HANDLE AND POSITION OF DOOR WINDOW GLASS.

- 1) Operate the regulator handle to see if the window rises and lowers smoothly.
- 2) Make sure that the front of the glass stopper is simultaneously in contact with the glass when the glass is completely raised.
- 3) Also ensure the side windows and locks operate normally.

5. CHECK THE OPERATION OF POWER WINDOW.

- 1) Depress the power window switches to fully open the windows.
- 2) Depress the power window switches to fully close the windows.
- 3) Repeat the above steps beginning with the first one two or three times to see how the windows open and close.

6. CHECK THE OPERATION OF POWER DOOR LOCK.

- 1) Close the door completely.
- 2) Operate the power door locking switches on the front both side doors to lock and check that all the doors are locked.
- 3) Operate the power door locking switches on the front both side doors to unlock and check that all the doors are unlocked.
- 4) Repeat the above steps two or three times.

C: TRUNK LID, REAR GATE AND FUEL LID OPERATION**CHECK POINTS**

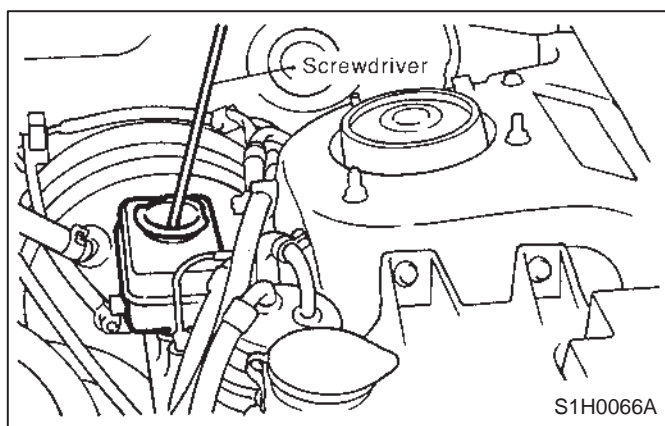
1. *Trunk lid, rear gate and fuel lid "open-close" operation*
2. *Operation of trunk lid and rear gate (release and lock)*
3. *Fitting of trunk lid, rear gate and fuel lid*
4. *Operation of trunk lid opener cancel lever*

D: BRAKE FLUID LEVEL AND BRAKE PIPING INSTALLATION**CHECK POINTS**

1. *Fluid level in brake reserve tank*
2. *Wiring of fluid leveller and its operation*
3. *Brake booster, master cylinder and pressure control valve for proper installation; brake pipe, brake hose and connectors for proper fitting*
4. *Leakage in any of the above*

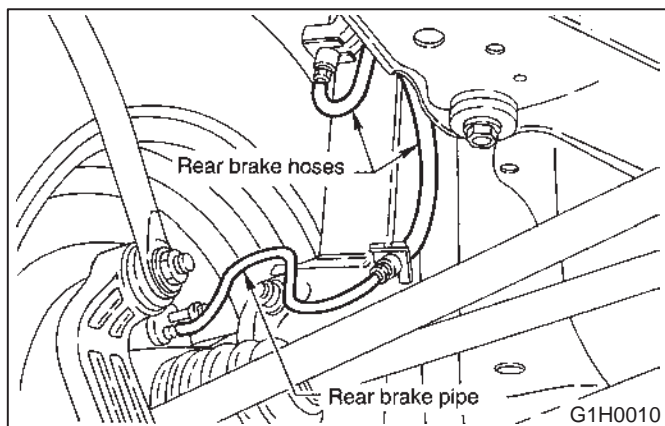
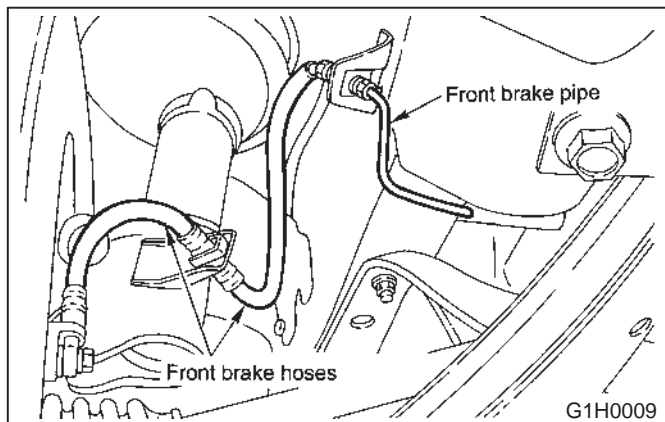
1. CHECK FLUID LEVELLER OPERATION WHILE PUSHING IT DOWN WITH A SCREW-DRIVER.**CAUTION:**

- The fluid level must be kept at "MAX" level.
- Do not mix different brands of brake fluid.
- When adding brake fluid, be careful not to allow any dirt, water, or oil around the fluid tank to enter it.
- Use special care not to spill any brake fluid on the vehicle's painted surfaces, because it will quickly erode them. In case of an accident, wipe it off as quickly and as cleanly as possible.
- Never use engine oil, gear oil, or any mineral oil.
- Use extreme care not to allow any water to get into the fluid; water in the brake fluid will lower the fluid's boiling point and cause vapor-lock.
- If too much brake fluid is missing, check the brake line for possible leakage.
- After adding brake fluid, any excess must be stored in a tightly sealed container.
- When checking the operation of leveller, use clean screwdriver or the like and be careful not to allow dirt or dust to get into the tank.



Recommended brake fluid
FMVSS No. 116, fresh DOT3 or DOT4
brake fluid

1) Check that the brake pipes, hoses and connectors are in good condition.



- (1) Brake fluid is not oozing or leaking from the brake fluid lines.
- (2) The connectors and clamps are not loose.
- (3) There is no possibility of the pipes and hoses contacting the body or other me-

chanical parts due to vibration during running.

E: BATTERY FLUID LEVEL AND BATTERY INSTALLATION

CHECK POINTS

1. External parts
2. Electrolyte level
3. Specific gravity

WARNING:

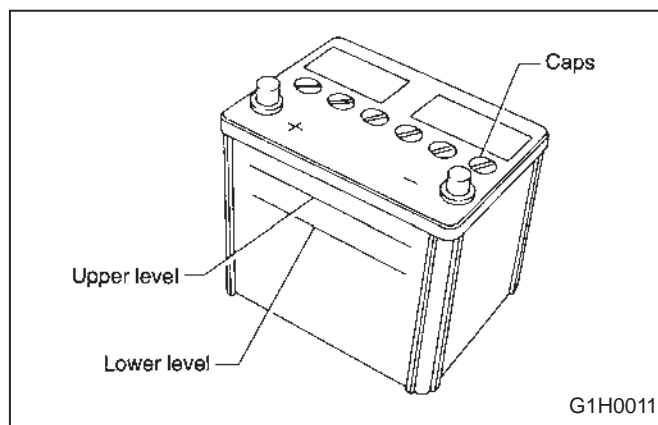
- Electrolyte has toxicity; be careful about handling the fluid.
- Avoid contact with skin, eyes or clothing. Especially in case of contact with eyes, flush with water for 15 minutes and get prompt medical attention.
- Batteries produce explosive gases. Keep sparks, flame, cigarettes away.
- Ventilate when charging or using in enclosed space.

1. CHECK THE EXTERNAL PARTS

Check for the existence of dirt or cracks on the battery case, top cover, vent plugs, and terminal posts. If necessary, clean with water and wipe with a dry cloth. Apply a thin coat of grease on the terminal posts to prevent corrosion.

2. CHECK THE ELECTROLYTE LEVEL

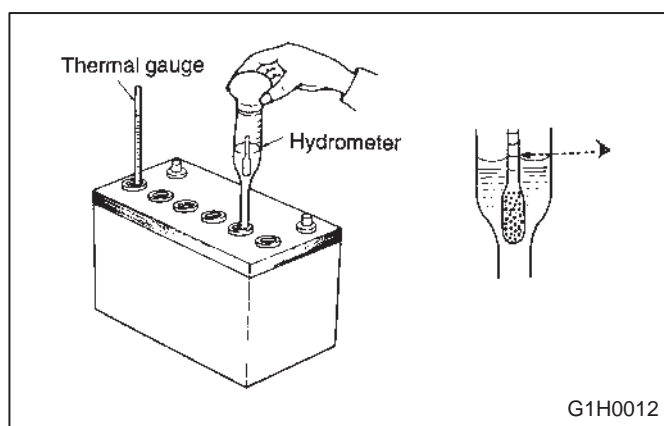
Check the electrolyte level in each cell. If the level is below MIN LEVEL, bring the level to MAX LEVEL by pouring distilled water into the battery cell. Do not fill beyond MAX LEVEL.



3. CHECK THE SPECIFIC GRAVITY

The specific gravity of electrolyte can be measured with a hydrometer. Holding the glass tube vertically, slowly draw the liquid into the tube. Take the reading on the float scale at the highest point of the liquid.

When reading, the eye should be level with the surface of the liquid.



Serviceable specific gravity
1.220 — 1.280 at 20°C (68°F)

If the specific gravity reading is below 1.220 at 20°C (68°F), the battery must be recharged and, if necessary, the specific gravity of the electrolyte must be adjusted. The specific gravity changes according to temperature. The standard temperature is considered to be 20°C (68°F).

When measuring the specific gravity, calculate as follows:

Serviceable specific gravity
 $S = St + 0.0007 (t - 20)$

S = Specific gravity corrected for 20°C (68°F)

St = Measured specific gravity at t°C

t = Electrolyte temperature on centigrade scale (°C)

0.0007 = Temperature coefficient

[EXAMPLE]

A hydrometer reading of 1.273 at 30°C (86°F) is corrected to 1.280 at 20°C (68°F), indicating that the battery is fully charged. On the other hand, a reading of 1.251 at -10°C (14°F) is corrected to 1.230 at 20°C (68°F), indicating that the battery is partially charged.

F: COOLANT LEVEL AND COOLING FAN INSTALLATION**CHECK POINTS**

1. **Coolant level**
2. **Cooling fan motor and wiring**
3. **Water leakage and hose damage**

WARNING:

The radiator is a high pressure type. Never attempt to open the radiator cap when the coolant's temperature is high; otherwise boiling water will spurt out. Be sure to wait until the engine cools down before opening the radiator cap.

CAUTION:

- The level must be kept at "FULL" level.
- Use only genuine SUBARU Coolant (P/N 000016218).
- Avoid using any coolant or only water other than this designated type to prevent corrosion.
- When retightening the hose clamps, be careful not to over-tighten them, as doing so could damage the hose.

NOTE:

- Always inspect and add at reserve tank when engine is cold.
- If reserve tank is empty, check coolant level in radiator. Add coolant up to filler neck of radiator too, if necessary.

G: ENGINE OIL LEVEL**CHECK POINTS**

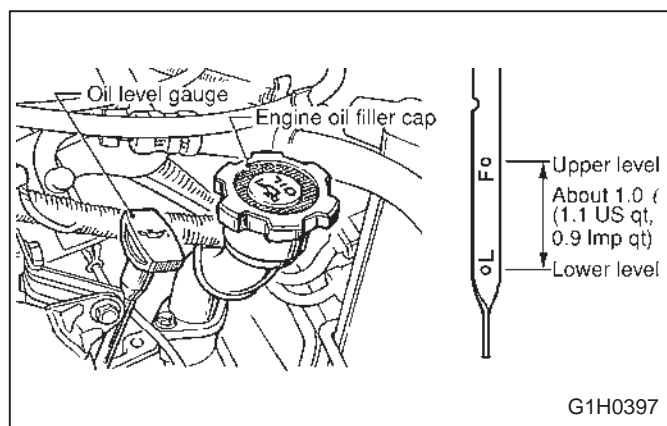
1. **Engine oil level**
2. **Engine oil leakage or contamination**

1. CHECK THE ENGINE OIL LEVEL

The level should be within the specified range marked on the gauge.

NOTE:

- Check engine oil level before starting the engine, when engine oil is cold, to obtain correct level reading. After stopping a hot engine, wait about 5 minutes until oil returns to oil pan before checking oil level. Oil level reading will be slightly higher than when engine is cold due to oil expansion. It is advisable to check oil level each time oil is replenished.
- Insert the oil level gauge into guide hole.



Recommended oil

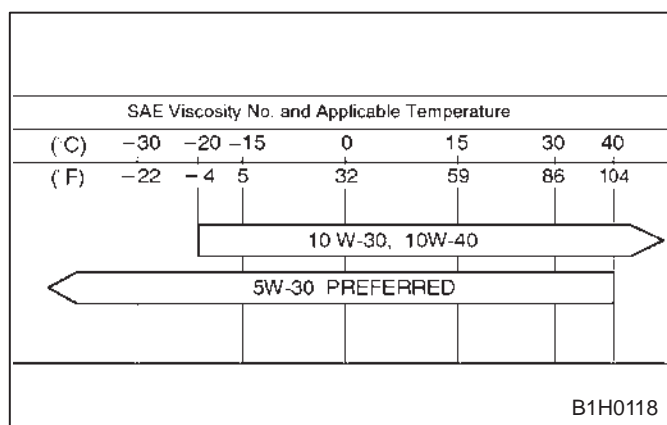
API classification: SJ or SH with the words "Energy Conserving II", CCMC specification G4 or G5, ACEA specification A1 or A2 or A3, or New API certification mark is displayed on the container

CAUTION:

When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API classification and SAE viscosity No. designated by SUBARU.

NOTE:

If vehicle is used in desert areas with very high temperatures or for other heavy duty applications, the following viscosity oils may be used:
API classification: SJ or SH
SAE Viscosity No.: 30, 40, 10W-50, 20W-40, 20W-50



H: TRANSMISSION AND DIFFERENTIAL GEAR OIL LEVEL

CHECK POINTS

1. Level of transmission gear oil for manual transmission
2. Level of rear differential gear oil for AWD model
3. Level of front differential gear oil for automatic transmission

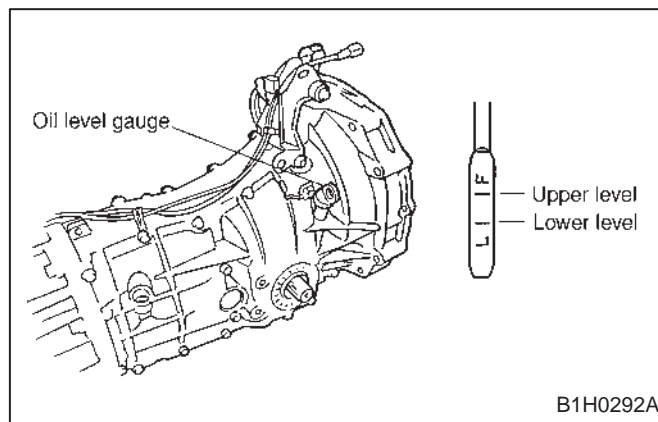
1. CHECK THE LEVEL OF TRANSMISSION GEAR OIL FOR MANUAL TRANSMISSION

CAUTION:

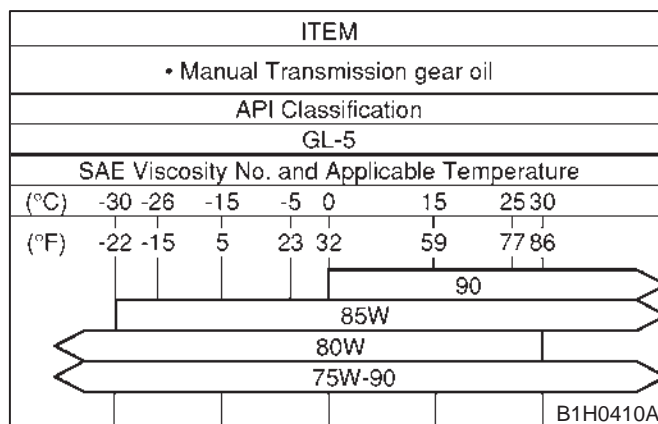
When inserting the level gauge into transmission, align the protrusion on the side of the top part of the level gauge with the notch in the gauge hole.

NOTE:

The level should be within the specified range marked on the gauge.



**Transmission gear oil
Recommended oil**



2. CHECK THE LEVEL OF REAR DIFFERENTIAL GEAR OIL**CAUTION:**

Each manufacturer uses different base oils and additives. Thus, do not mix brands.

- 1) The oil level must be kept above the bottom of the filler bolt or plug. If below that level, add oil up to the bottom line.
- 2) Install filler bolt or plug onto rear differential gear case firmly.

CAUTION:

- Always use a new aluminium gasket. (2200 cc AT model)
- Apply fluid packing to plug. (Except 2200 cc AT model)

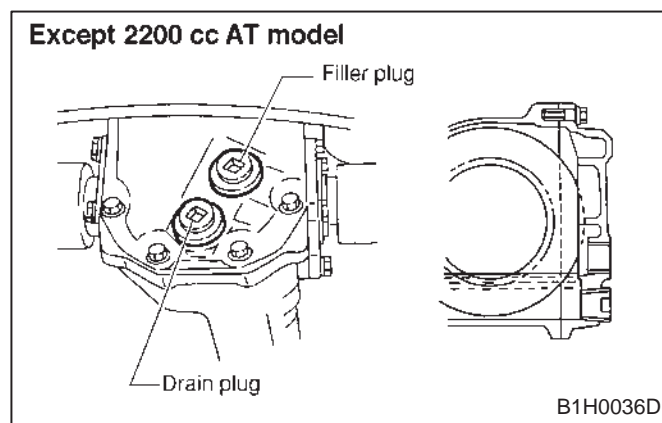
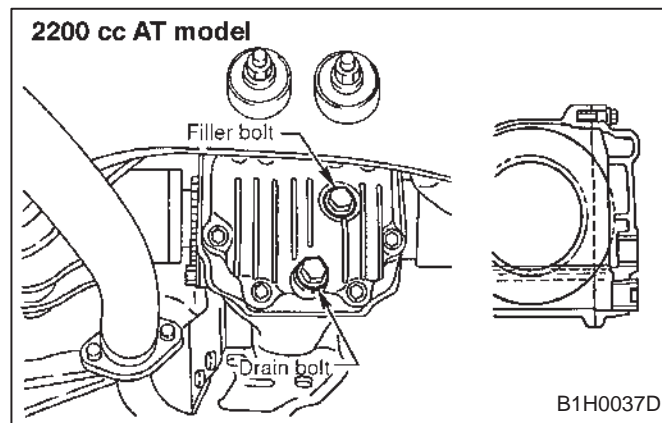
Fluid packing:

THREE BOND 1105 or equivalent

Tightening torque:

2200 cc AT model: 34 ± 4 N.m
(3.5 ± 0.4 kg-m, 25 ± 2.9 ft-lb)

Except 2200 cc AT model: 49 ± 9.8 N.m
(5 ± 1 kg-m, 36 ± 7.2 ft-lb)

**Rear differential gear oil
Recommended oil**

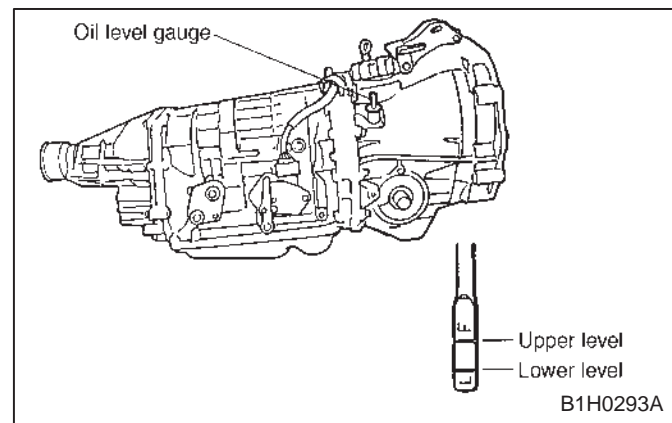
ITEM							
• Rear differential gear oil							
API Classification							
GL-5							
SAE Viscosity No. and Applicable Temperature							
(°C)	-30	-26	-15	-5	0	15	25 30
(°F)	-22	-15	5	23	32	59	77 86
B1H0411A							

3. CHECK THE LEVEL OF FRONT DIFFERENTIAL GEAR OIL FOR AUTOMATIC TRANSMISSION**CAUTION:**

When inserting the level gauge into differential gear, align the protrusion on the side of the top part of the level gauge with the notch in the gauge hole.

NOTE:

The level should be within the specified range marked on the gauge.



Front differential gear oil
Recommended oil

ITEM									
• Front differential gear oil									
API Classification									
GL-5									
SAE Viscosity No. and Applicable Temperature									
(°C)	-30	-26	-15	-5	0	15	25	30	
(°F)	-22	-15	5	23	32	59	77	86	
B1H0412A									

I: DRIVE BELT TENSION

CHECK POINTS

1. Belt tension
2. Damage to belt

<Ref. to 1-5 [G2A0].>

J: AIR CLEANER

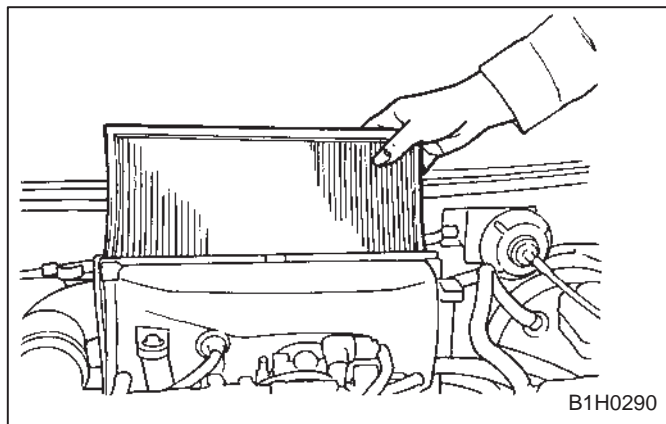
CHECK POINTS

1. Contamination of air cleaner element
2. Related parts

Check the air cleaner element for contamination or presence of foreign matter.

NOTE:

- The air cleaner element is a viscous type, which should not be washed or cleaned.
- If the air cleaner element is broken or damaged, replace it with a new one.



K: JACK INSTALLATION

CHECK POINT

1. Installed condition of jack

L: WASHER AND WIPERS

CHECK POINTS

1. Installation of washer tank
2. Checking of washer fluid level
3. Direction and quantity of washer fluid sprayed
4. Operation of wiper and washer

In areas where water freezes in winter, use SUBARU windshield washer fluid (003406401) or equivalent.

The relationship between fluid to water ratio and freezing point is as follows:

Fluid to water ratio (%)	Freezing point °C (°F)
30	-12 (10)
50	-20 (-4)
100	-45 (-49)

CAUTION:

- Do not operate the wipers before clean the window glass.
- In freezing weather, do not use the windshield washer until the windshield is sufficiently warmed by the defroster. Otherwise the washer fluid can freeze on the windshield, blocking your view.
- Be sure the wiper blades are not frozen to the windshield or rear window before operating the wipers. If the wiper operated with the wiper blades are frozen to the windshield or rear window, the wiper blades will be worn or damaged prematurely. Be sure to use defroster or rear window defogger.
- Do not operate the washer continuously for more than ten seconds, or when washer fluid tank is empty. This may cause overheating of the washer motor. Check the washer fluid level.
- Do not operate the wipers when the windshield or rear window is dry. This may cause overheating of the washer motor, wear of the wiper blades and scratch of the glass. Before operating the wiper on the dry windshield or rear window, always use the windshield washer.

- Do not clean the wiper blades with gasoline or a solvent, such as paint thinner or benzene. This will cause deterioration of the wiper blades.

NOTE:

- Before operating the wipers, be sure to eject washer fluid onto the window. If the window is dry, the wipers' operating speed and angle of operation will be different from when it is wet.
- If the position at which washer fluid is ejected is wrong: Using an eyelet or similar tool, adjust the direction of the nozzle, be careful not to damage the nozzle hole.
- Grease, wax, insects or other material on the windshield or the wiper blades results in jerky wiper operation and unclear frontal view. If you can not get clear view after operating the windshield washer or wiper operation is jerky, clean the outer surface of the windshield and wiper blades with a neutral detergent. Wiper blades, windshield and rear window should be cleaned with sponge, soft cloth or mild-abrasive cleaner. After cleaning, rinse the windshield and wiper blades with clean water. The windshield is clear if beads do not form when you rinse the windshield with water.

M: REAR WINDOW WASHER AND WIPER**CHECK POINTS**

1. Quantity of washer fluid
2. Direction and quantity of washer fluid sprayed
3. Operation of rear window washer and wiper

N: WHEEL NUTS FOR LOOSENESS AND TIRE INFLATION PRESSURE**CHECK POINTS**

1. Wheel nut tightening torque
2. Tire inflation pressure and tire specification
3. Damage to tire and rim

1. CHECK THE WHEEL NUT TIGHTENING TORQUE

NOTE:

- When checking the wheel nuts, be sure to use a torque wrench, and tighten the nuts to the specified torque.
- After inspecting and adjusting the tire pressure, be sure to put the valve cap back.

Tightening torque:

$88 \pm 10 \text{ N.m}$ ($9 \pm 1 \text{ kg-m}$, $65 \pm 7 \text{ ft-lb}$)

2. CHECK THE TIRE INFLATION PRESSURE AND TIRE SPECIFICATION**CAUTION:**

Check that all tires are adjusted to the specified tire inflation pressure.

Tire size	Tire inflation pressure kPa (kg/cm ² , psi)	
	Front	Rear
P195/60R15 87H	220 (2.2, 32)	200 (2.0, 29)
P205/55R16 87V	220 (2.2, 32)	200 (2.0, 29)
P205/60R15 90S* P205/60R15 90H*	220 (2.2, 32)	200 (2.0, 29)

*: OUTBACK model only

O: SEAT ADJUSTER AND SEAT BELTS

CHECK POINTS

1. Front and rear seats, and their facing materials
2. Front seat operation
3. Rear seat folding operation
4. Seat belts and their fit
5. Installing procedure for child anchor

1. MANUAL THREE-POINT TYPE

The seat belt warning light on the instrument panel comes on for approximately six seconds with the ignition switch "ON".

And the warning chime sounds if the driver's seat belt is not fastened.

Make sure that the warning system works normally.

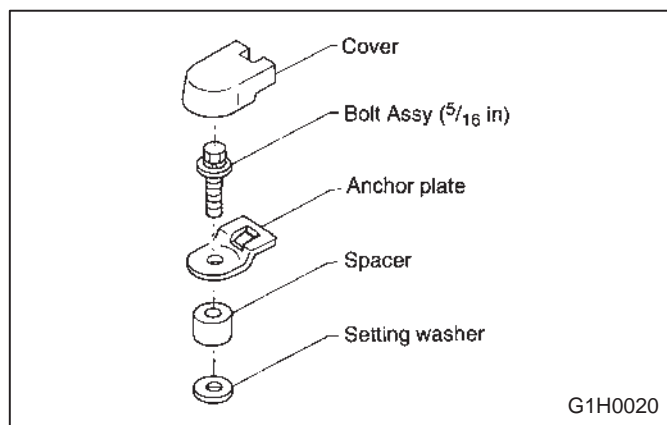
2. INSTALLING PROCEDURE FOR CHILD ANCHOR

CAUTION:

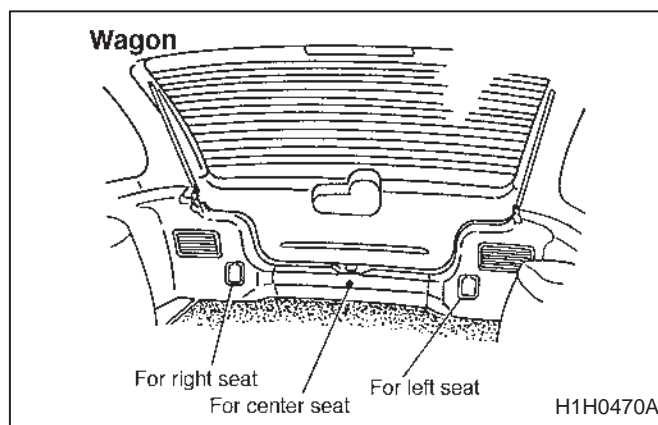
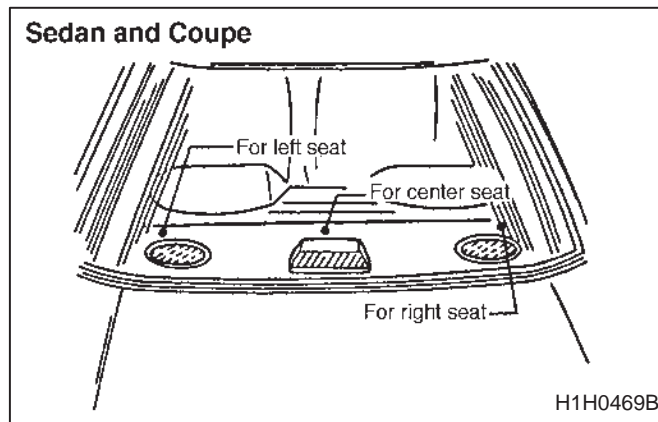
- Be sure to install the plate anchor set in the correct direction.
- Before tightening the plate anchor set, position the plate in the pawl of the cover. Do not allow the cover base to be caught between the plate anchor and spacer.
- Always use a genuine top strap anchor.

When top strap anchor is used for rear seat:

1) For Canada models, the anchor set is inside the glove box. Take it out and check that its components are assembled as shown in figure.



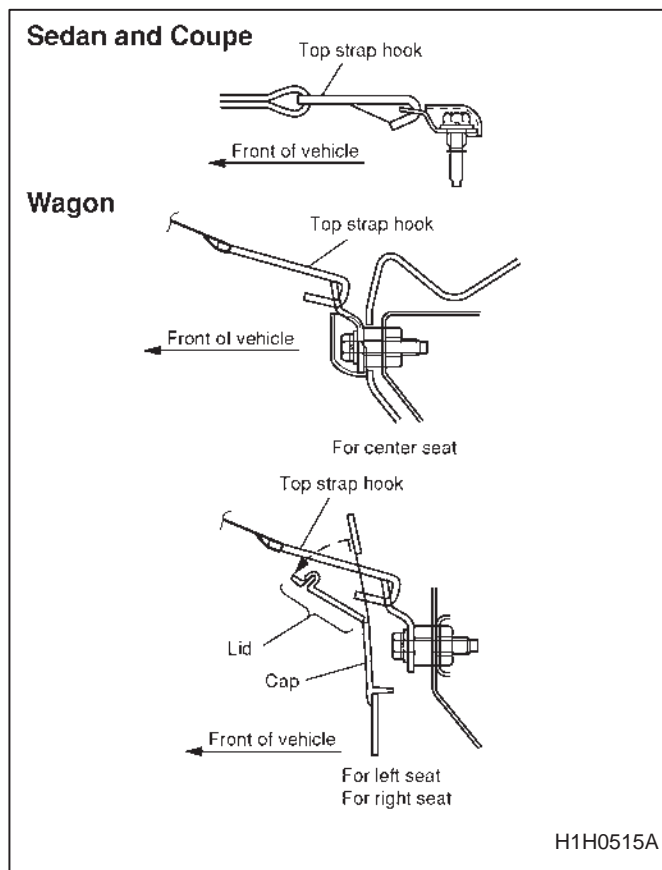
2) The anchor installation points are covered with caps. Remove the cap at the desired anchor installation points.



3) Install the anchor at the installation point. Tighten the bolt so that the anchor is completely secured.

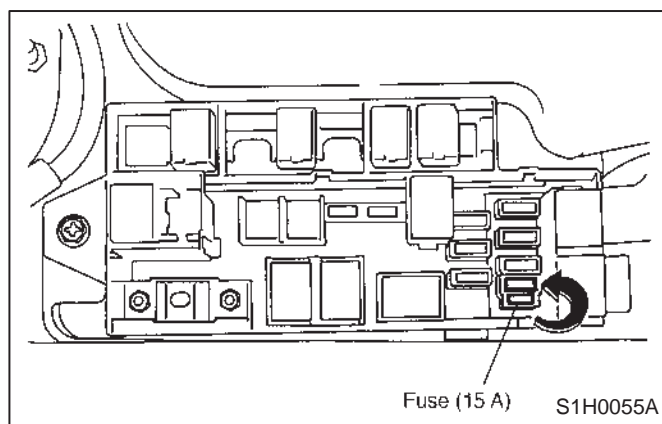
4) Attach the cover to the anchor plate.

5) Attach the hook of the top strap to the anchor.

**P: FUSES****CHECK POINTS**

1. Fuse installation
2. Spare fuse

Fuse as shown in figure is disconnected to avoid discharging the battery.
Insert fuse (15A) in the main fuse box inside the engine compartment.
Use fuse indicated by arrow in figure.

**Q: LIGHTS AND SWITCHES****CHECK POINTS**

1. Visual inspection of lights (installation, damage, dirty lenses, water inside, etc.)
2. Operation of all lights and switches
3. Horn operation
4. Operation of heater and ventilator
5. Removing the clip for room light switch

R: PREPARATION FOR UNDERSIDE INSPECTION**CHECK POINT**

1. Jacking up and lifting point

<Ref. to 1-3 [G700].>

S: TEST MODE CONNECTOR**CHECK POINTS**

1. Check engine light flashing
2. Test mode connector disconnection

1. CHECK THE MIL (CHECK ENGINE LIGHT) FLASHING

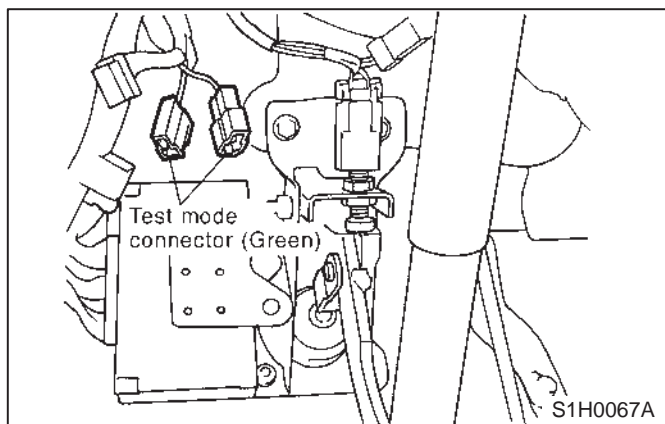
NOTE:

- When ignition switch is turned to ON (engine OFF) or to "START" with the test mode connector connected, the MIL (check engine light) blinks at a cycle of 3 Hz.
- If engine fails to turn over when the ignition switch is set to START, check the spark plugs.
<Ref. to 6-1 [W3B0].>

2. CHECK TEST MODE CONNECTOR DISCONNECTION

NOTE:

Disconnect test mode connector. If the MIL (check engine light) illuminates with engine ON, this indicates that a trouble has occurred. Check diagnostics for CHECK ENGINE malfunction indicator lamp (MIL). <Ref. to 2-7 [T700].>



T: INSTALLATION OF STEERING COMPONENTS

CHECK POINTS

1. *Installation of universal joints*
2. *Steering gear box for looseness, play, or backlash, and boots for damage*
3. *Tie-rod and tie-rod end for proper installation, or damage*

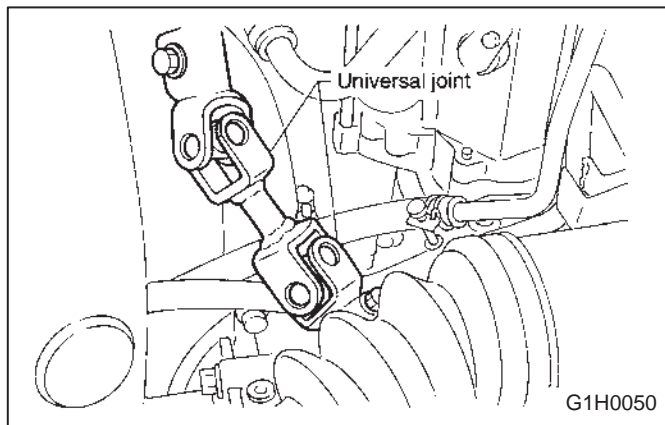
1. CHECK THE UNIVERSAL JOINT FOR LOOSENESS

NOTE:

When checking, turn ignition switch to "ACC" position.

Tightening torque:

$24 \pm 3 \text{ N.m}$ ($2.4 \pm 0.3 \text{ kg-m}$, $17 \pm 2.2 \text{ ft-lb}$)



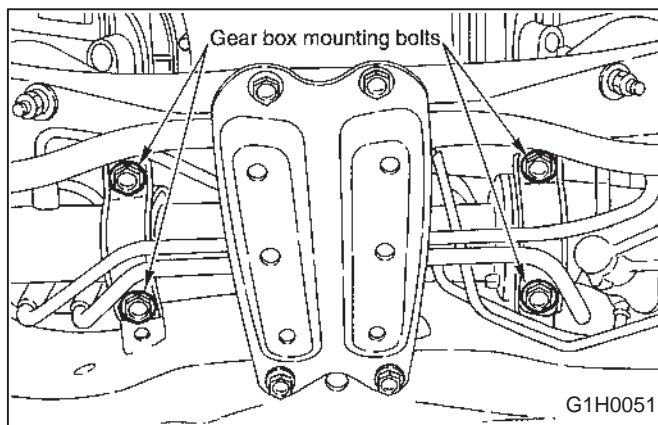
2. CHECK THE GEAR BOX MOUNTING BOLT FOR LOOSENESS

NOTE:

Carefully check the root portion of the boots, and the condition of the clips.

Tightening torque:

$59 \pm 12 \text{ N.m}$ ($6 \pm 1.2 \text{ kg-m}$, $43 \pm 9 \text{ ft-lb}$)



3. CHECK THE TIE-ROD END LOCK NUT FOR LOOSENESS

Tightening torque:

$83 \pm 5 \text{ N.m}$ ($8.5 \pm 0.5 \text{ kg-m}$, $61 \pm 3.6 \text{ ft-lb}$)

U: EXHAUST PIPE AND MUFFLER

CHECK POINTS

1. *Installation of exhaust system*
2. *Exhaust gas leakage from parts or joints*

Check the exhaust system's installation for looseness, damage and possible interference with other parts. <Ref. to 2-9 [C100].>

WARNING:

When the engine is running, and for a short time after it is stopped, the exhaust system remains very hot; use extreme care and don't get burnt during this evolution.

V: FUEL SYSTEM FOR LEAKAGE**CHECK POINTS**

1. Installation of fuel hose and pipe. And condition of clamps
2. Fuel system for leakage

1. CHECK THE INSTALLATION OF FUEL HOSE AND PIPE. AND CONDITION OF CLAMPS**WARNING:**

When checking the fuel system, use extreme care to prevent accidental fires.

- 1) Check the fuel hose's layout, and also search for interference with other parts, twists, or damage, check the condition of the clamps.
- 2) Check the fuel and air breather pipes visually or by feeling with your fingers from the underside. Retighten the clamps if necessary.

NOTE:

When retightening the clamps, do not tighten them excessively.

2. CHECK THE FUEL SYSTEM FOR LEAKAGE

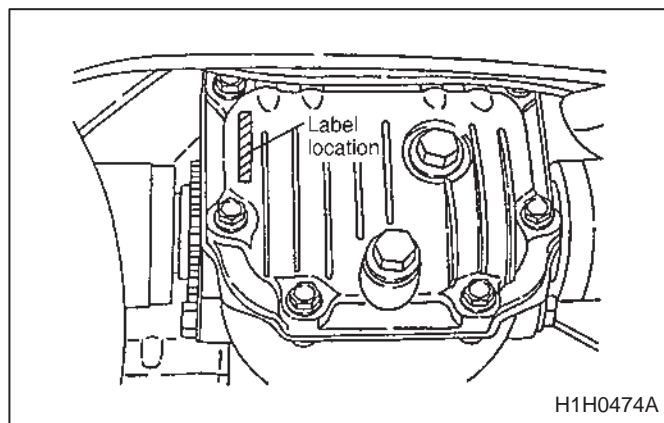
Without starting the engine, turn the ignition switch to the ON position, and operate the fuel pump to pressurize the fuel system. Then check the fuel system for leakage.

W: PROTECTOR**CHECK POINT****1. Protector removal**

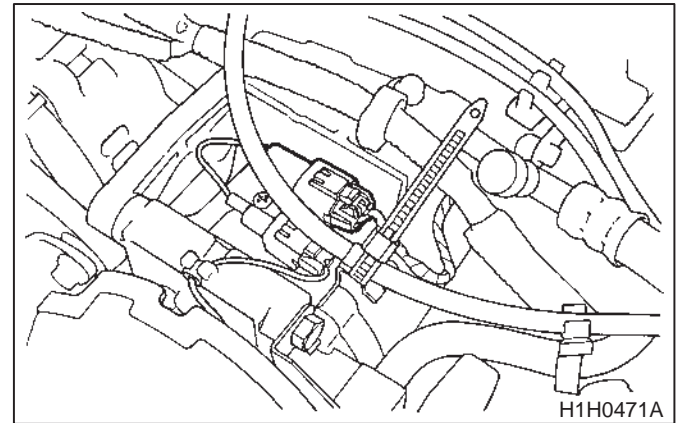
The following parts are covered to prevent splashing of wax. Remove protector.

NOTE:

Label of rear differential is covered by tape. Remove it.

**X: AIR CONDITIONING SYSTEM****CHECK POINT**

1. A/C compressor connector connection

**Y: CLUTCH FLUID LEVEL****CHECK POINT****1. Clutch fluid level**

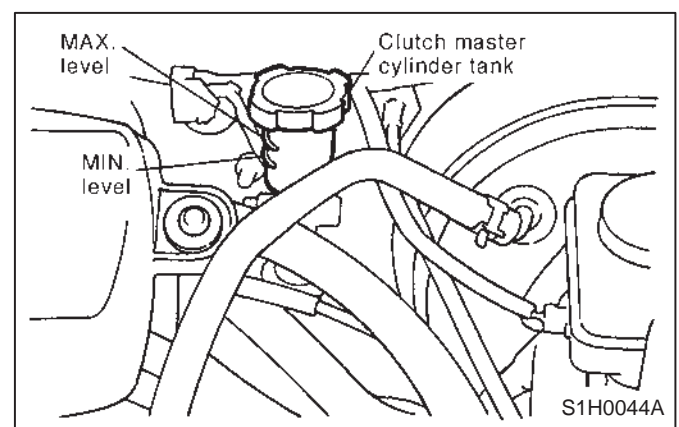
Check the fluid level using the scale on the outside of the clutch master cylinder tank. If the level is below "MIN", add clutch fluid to bring it up to "MAX".

CAUTION:

- Avoid mixing different brands of brake fluid to prevent degradation of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.
- Use fresh DOT 3 or DOT 4 brake fluid when refilling fluid.

Recommended clutch fluid:

FMVSS No. 116, fresh DOT 3 or DOT 4 brake fluid



3. Road Test Inspection

A: OPERATION OF INDICATOR LIGHTS AND GAUGES

CHECK POINTS

1. *Operation of indicator lights*
2. *Operation of gauges*

Check the operation according to the "Owner's manual".

NOTE:

- Perform this inspection with the gear shift lever in the neutral position.
(For automatic transmission models: Set the select lever in the "P" position.)
- Set the parking brake.
- Do not race the engine excessively.

B: TACHOMETER, RADIO, ETC.

CHECK POINTS

1. *Operation of tachometer, radio, cigarette lighter, etc.*

1. TACHOMETER

Race the engine two or three times, and check the tachometer's operation.

CAUTION:

Do not race the engine more than necessary.

2. RADIO

Check the operation according to the "Owner's manual".

3. CIGARETTE LIGHTER

To operate, push in the knob completely and wait for a moment. The lighter will click out of holder automatically when ready to use.

CAUTION:

- To avoid the possibility of being burned, do not hold the cigarette lighter in by hand. This may also cause damage to the lighter heating element.
- When replacing the knob, it is recommended that you use only a genuine part. If you use either non-genuine parts or any combination of parts different from original knob-and-socket combination, it may cause overheating due to a short circuit.

C: STARTING CONDITION OF ENGINE

CHECK POINT

1. *Starting condition of engine*

- 1) Check that the engine starts quickly and runs smoothly without any abnormal noise.

WARNING:

- Before starting the engine, make sure that there is nothing which will burn easily behind the car and that there is no dry grass near the exhaust pipe.
- Do not leave the engine running in a closed garage as there is the danger of poisoning from the exhaust gases.

- 2) From how it starts, judge if the spark plugs, distributor and auxiliary equipment (throttle body or air cleaner, etc.) are in good condition.

WARNING:

- The engine has already been operated for transportation purposes.
- For safety's sake, never touch the following parts while the engine is operating.
 - (1) Revolving parts such as the belt, fan, etc.
 - (2) High-temperature parts such as the exhaust pipe, radiator, etc.
 - (3) Electric system such as the plugs, cords, etc.
- Be careful not to leave inflammable paper or clothes in the engine compartment.
- Never try to disconnect hoses or wirings.

D: DRIVING TEST

CHECK POINTS

1. *Operation of foot brake and parking brake*
2. *Inspect the clutch pedal free play*
3. *Operation of clutch and gear shift*
4. *Operation of select lever (Automatic transmission)*
5. *Operation of starter interlock (Manual transmission)*
6. *Operation of steering and position of steering wheel*
7. *Operation of turn signal cancel cam*
8. *Operation of ventilation system and heater*
9. *Abnormal noises or vibration*
10. *Operation of cruise control*

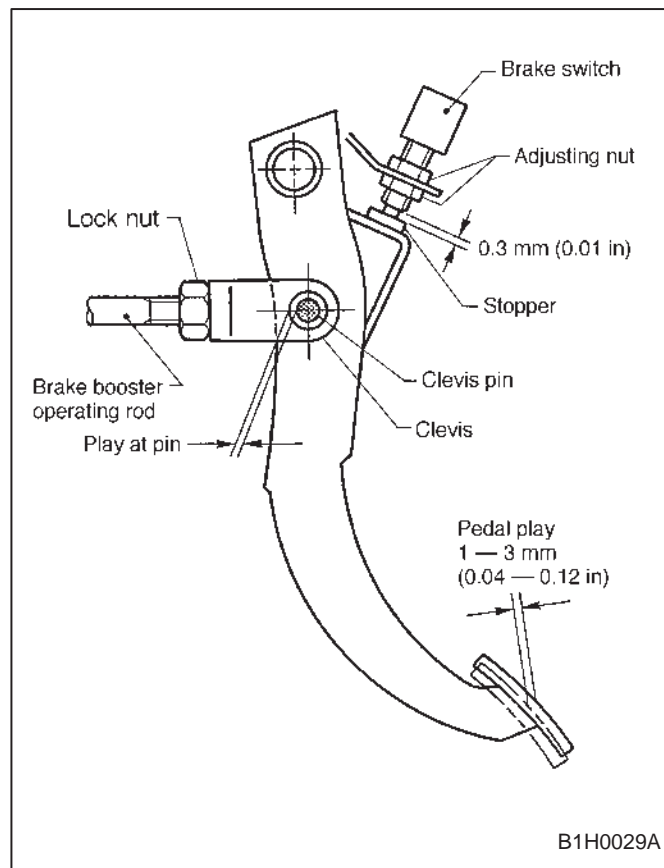
1. CHECK THE FOOT AND PARKING BRAKES' OPERATION

CAUTION:

Be sure to perform this test in a safe area.

- 1) Drive on a dry, level, paved road, and apply normal braking. Look for uneven or improper operation, or pulling to one side.
- 2) Press the brake pedal in two or three times, and keep it fully depressed. Make sure that the brake can be kept that way for at least five seconds. Also check for air in the brake system, or brake fluid leakage.
- 3) Perform the adjustment of operating rod assembly as follows:

- (1) Be sure engine is off. (No vacuum is applied to brake booster).
- (2) There should be play between brake booster clevis and pin at brake pedal installing portion.
[Depress brake pedal pad with a force of less than 10 N (1 kg, 2 lb) to a stroke of 1 to 3 mm (0.04 to 0.12 in).]

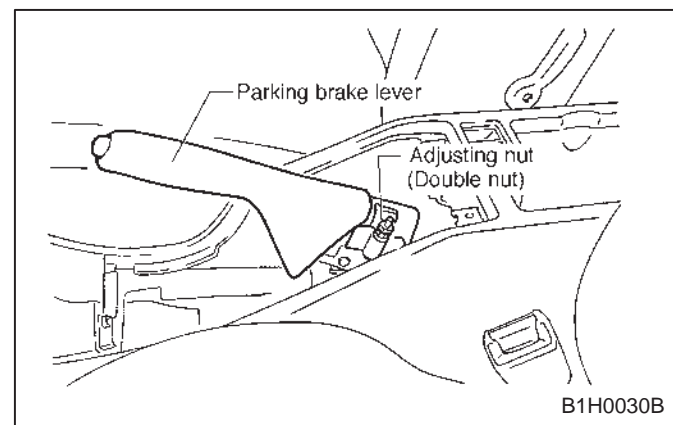


- (3) Depress the surface of brake pad by hand.

- (4) If there is no free play between clevis pin and clevis, turn brake switch adjusting nut until the clearance between stopper and screw of brake switch becomes 0.3 mm (0.01 in).
- (5) After adjustment, make sure there is no brake dragging.

- 4) Pull the parking brake lever completely out, and check its operation. Also check the ratchet for normal functioning. Check the parking brake lever stroke. If it is out of specification, adjust it by turning adjusting nut at parking brake lever.

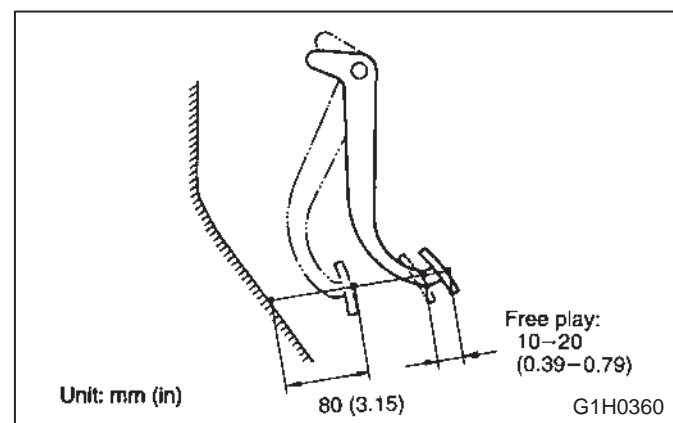
**Standard parking brake lever stroke:
7 — 8 notches/196 N (20 kg, 44 lb)**



2. INSPECT THE CLUTCH PEDAL FREE PLAY

- 1) Mechanical application type
(1) Lightly press the clutch pedal down with a finger to check the free play.

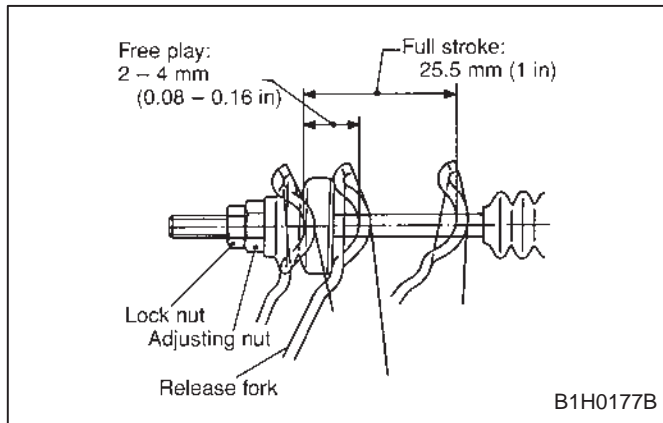
**Standard free play at clutch pedal:
10 — 20 mm (0.39 — 0.79 in)**



3. Road Test Inspection

(2) If it is out of specification, adjust it by turning adjusting nut on engine side end of clutch cable at release fork.

Fork lever free play allowance:
2 — 4 mm (0.08 — 0.16 in)



Tightening torque:
5.4 — 9.3 N.m
(0.55 — 0.95 kg-m, 4.0 — 6.9 ft-lb)

2) Hydraulic clutch type
 Inspection of the clutch free play is not required.

3. CHECK THE OPERATION OF CLUTCH AND GEAR SHIFTING

CAUTION:

- Be sure to perform this test in a safe area.
- Do not repeat this test.

1) With the engine idling and the shift lever in neutral, gradually depress the clutch pedal, to see if it generates any abnormal noise.

NOTE:

Carefully compare a normal clutch's operating sounds to the clutch being tested.

2) Pull the parking brake lever completely out, and place wheel chocks under the tires. Then depress the clutch pedal completely, and place the shift lever in 5th speed.

Raise engine rpm a little, gradually engage the clutch, and see if the engine stalls.

If the engine stalls, it means that the clutch is not slipping.

3) Remove the wheel chocks, and return the shift lever to neutral, then check the gear shifting mechanism for excessive play.

4) Drive the car at various speeds. While depressing the clutch pedal completely, move the gear shift lever into each position, and check for any unusual play or unusual resistance.

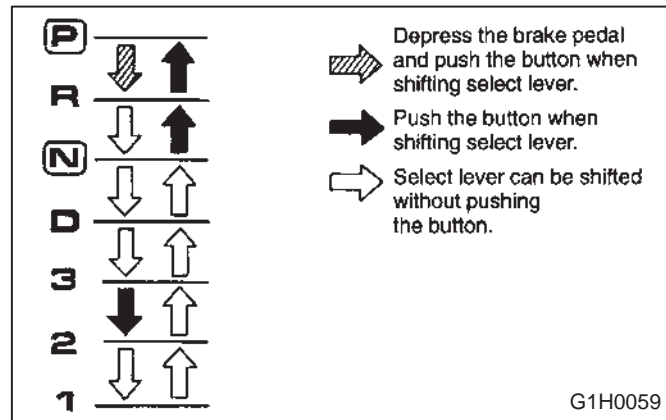
4. OPERATION OF SELECTOR LEVER (AUTOMATIC TRANSMISSION MODELS)

1) Check the operation of shift lock system and key interlock.

Ensure that select lever is shifted from "P" to any other position only after brake pedal is depressed.

Also ensure that ignition key is removed from key cylinder only when select lever is set to "P" position.

2) Place the selector lever in each position, and make sure that the pointer indicates the position of each range correctly.



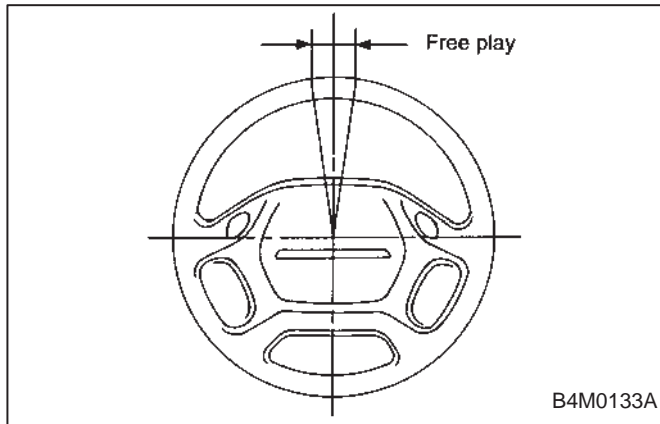
5. OPERATION OF STARTER INTERLOCK (MANUAL TRANSMISSION MODELS)

Ensure that engine starts only when after clutch pedal is depressed.

6. OPERATION OF STEERING AND POSITION OF STEERING WHEEL

- 1) Check the steering wheel for free play.

Steering wheel free play:
0 — 17 mm (0 — 0.67 in)



- 2) With the car moving straight ahead, check for hard steering, shimmy, or other abnormalities.
- 3) Make a turn, and check for hard or heavy steering wheel operation, or poor stability.

7. OPERATION OF TURN SIGNAL CANCEL CAM

Make a right or left turn with the turn signal on, and make sure that the turn signal switch returns automatically to the OFF position when the steering wheel is returned to the straight ahead position.

8. OPERATION OF VENTILATION SYSTEM AND HEATER

- 1) While driving, move the control lever and dial into each position, and check the ventilation system's operation. Also check for unusual vibration or noises.
- 2) Move the temperature control lever and fan switch, and make sure that warm air is discharged into the compartment.

9. ABNORMAL NOISES OR VIBRATION

- 1) When starting the engine, and while driving the vehicle, check the engine, transmission, body, suspension, and steering system for any unusual noises or vibration.
- Do this when idling the engine, accelerating, decelerating, and running at low, middle and high speeds.

- 2) Depress the accelerator pedal, and make sure that the engine rpm increase smoothly and that the vehicle accelerates smoothly.
- 3) While driving, turn the steering wheel right and left to test the vehicle's stability and response.

CAUTION:

Be sure to perform this test in a safe area.

10. CHECK THE OPERATION OF THE CRUISE CONTROL ACCORDING TO "OWNER'S MANUAL"**CAUTION:**

Be sure to conduct driving tests using a chassis dynamometer with front wheels set in operation, or tests on an authorized race course or similar place.

4. Post-road Test Inspection

A: AUTOMATIC TRANSMISSION FLUID (ATF) LEVEL

CHECK POINT

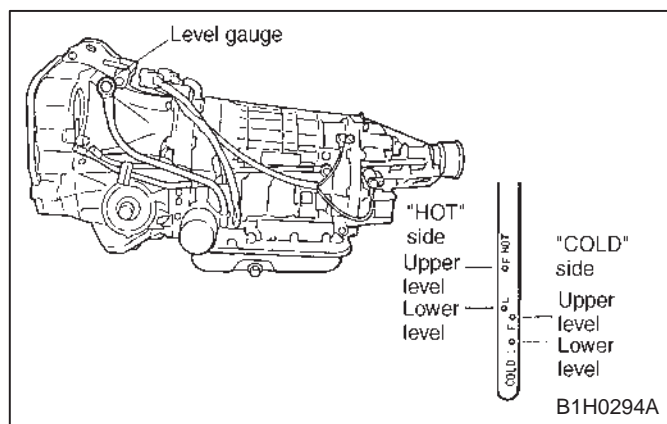
1. Level of ATF

CAUTION:

Do not fill above the high mark level.

NOTE:

If the fluid level is at the lower mark or below on the "HOT" side, add the recommended ATF to bring the level to the high mark. ATF is added through the level gauge hole. When the fluid level has to be checked without time to warm up the AT, check to see that the fluid level is within the marks on the "COLD" side. If it is below the marks, add fluid.



The ATF should be maintained at the proper level as follows:

- 1) Drive the car several miles to bring the transmission to the normal operating temperature. 60 to 80°C (140 to 176°F) is normal.
- 2) Park the car on a level surface.
- 3) While idling the engine, move selector lever to all ranges. Then return to the P range.
- 4) Remove the level gauge and wipe it clean.
- 5) Reinsert the level gauge completely.
- 6) Remove it again and note its reading.

Recommended automatic transmission fluid:

DEXRON II, IIE or III

B: POWER STEERING FLUID LEVEL

CHECK POINT

1. Level of power steering fluid

The power steering fluid should be maintained at a proper level.

CAUTION:

The available power steering fluid is ATF DEXRON II, IIE or III.

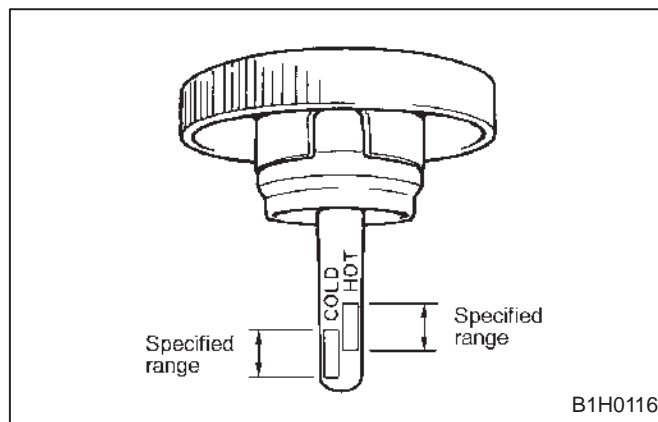
Be sure to use the recommended fluid.

When power steering fluid is added, be careful not to allow any dust into the tank.

Check level as follows:

- 1) Drive the car several miles or kilometers to bring power steering system up to the normal operating temperature of about 60°C (140°F).
- 2) Park the car on a level surface and stop the engine.
- 3) Remove the level gauge and wipe it clean.
- 4) Reinstall the level gauge firmly.
- 5) Remove it again and read the level on the "HOT" side.

If the fluid level is at lower level or below it, add recommended power steering fluid up to the high level. When the fluid level is to be checked without warming up the power steering system [at approximately 21°C (70°F)], read the fluid level at the "COLD" position of the level gauge.



C: WHEEL ALIGNMENT

CHECK POINTS

1. Toe of front and rear wheels
2. Camber of front wheels

Before check the toe and camber, make sure that the spare tire, floor mats and service tool are in place. No other weight should be present.

D: UNDERSIDE**CHECK POINTS**

- 1. Leakage of engine oil, transmission gear oil, differential gear oil, etc.**
- 2. Leakage of coolant**
- 3. Leakage of brake fluid**
- 4. Loose suspension mountings or steering mounting**

Raise the vehicle body and perform these checks from the underside.

- 1) Visually check for any signs of leakage of engine oil, transmission gear oil, differential gear oil, etc.
- 2) Visually check for any sign of coolant leakage.
- 3) Visually check for any sign of brake fluid leakage.
- 4) Check the suspension mounting and steering mounting for any loose or unconnected parts.

E: WATER LEAKAGE**CHECK POINT**

- 1. Water leakage by pouring water**

- 1) Before performing the water leakage test, remove anything that may obstruct the operation or which must be kept dry.
- 2) Close all of the windows completely, and then close all of the doors tightly. Close the hood and trunk lid before starting the test.
- 3) Connect a hose to a tap, and spray water on the vehicle. The rate of water discharge must be approx. 20 to 25 liters (5.3 to 6.6 US gal, 4.4 to 5.5 Imp gal) per minute. When spraying water on areas adjacent to the floor and wheel house, increase the pressure.

When directing water on areas other than the floor portion and wheel house, decrease the pressure. But the force of water must be made strong occasionally by pressing the end of the hose.

NOTE:

Be sure to keep the hose at least 10 cm (3.9 in) from the vehicle.

- 4) Check the following areas:

- (1) Front window and body framework mating portion
- (2) Door mating portions
- (3) Glass mating portions
- (4) Rear quarter window mating portions
- (5) Rear window and body framework mating portion
- (6) Trunk lid mating portion
- (7) Around roof drips

NOTE:

If any dampness in the compartments is discovered after the water has been applied, carefully check all areas that may have possibly contributed to the leak.

F: EXTERNAL APPEARANCE AND EQUIPMENT**CHECK POINTS**

- 1. Paint**
- 2. Scratches or damage to glass**
- 3. Rust formation**
- 4. Contamination of interior parts**
- 5. Installation of equipment**

- 1) Check the paint after removing the paint protective agent and washing the vehicle.

NOTE:

Before removing the protective agent, be sure to wash the vehicle, because the painted surface may be scratched if the surface is rubbed with sand or other hard particles which may be attached to the protective agent.

- 2) Check the whole vehicle body for stains, flaking, damage caused by transportation, rust, dirt, cracks, or blistering.

NOTE:

- It is better to determine an inspection pattern in order to avoid missing an area, since the total area is not small.
- It is desirable not to make corrections to the body paint unless absolutely needed. However, if any corrections are required to remove scratches or rust, the area to be corrected must be limited as much as possible. Re-painting and spray painting must be avoided whenever possible.

3) Carefully check each window glass for scratches. Slight damage may be removed by polishing with cerium oxide. (Half-fill a cup with cerium oxide, and add warm water to it. Then agitate the content until it turns to wax. Apply this wax to a soft cloth, and polish the glass.)

4) Check each portion of the vehicle body and underside components for the formation of rust. If rust is discovered, remove it with #80 — #180 emery paper, and treat the surface with rust preventive. After this treatment is completed, flush the portion thoroughly, and prepare the surface for repair painting.

5) Check each portion of the body and all of the chrome parts for deformation or distortion. Also check each lamp lens for cracks.

6) Check the following interior parts for contamination.

- (1) Instrument panel and meter glass
- (2) Glove box
- (3) Sun visor
- (4) Room mirror
- (5) Assist rail
- (6) Roof trim
- (7) Door trim
- (8) Inner trim
- (9) Front and rear seats
- (10) Luggage shelf
- (11) Floor mat
- (12) Others

NOTE:

- If the meter glass is contaminated, wipe it gently with a clean soft cloth that has been dampened with water.
- Do not rub the meter glass hard; otherwise, the transparent resin plate on it may become clouded due to the formation of scratches.

7) Check the interior and exterior equipment to make sure that they are installed securely. Also make sure that the equipment conforms to the vehicle's specifications.

Make sure that the spare tire, jack, spare key, tools, owner's manual, warranty & service booklet, etc. are all present.

1-5 [G100] PERIODIC MAINTENANCE SERVICES

1. Schedule of Inspection and Maintenance Services

1. Schedule of Inspection and Maintenance Services

Continue periodic maintenance beyond 192,000 km (120,000 miles) or 120 months by returning to the first column of the maintenance schedule and adding 192,000 km (120,000 miles) or 120 months to the column headings.

MAINTENANCE ITEM	MAINTENANCE INTERVAL (Number of months or km (miles), whichever occurs first)																		REMARKS
	Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120	
	× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	
	× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120	
1	Drive belt(s) [Except camshaft]					I				I				I		R			
2	Camshaft drive belt					I				I				I		R			
3	Engine oil	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	See NOTE 1)
4	Engine oil filter	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	See NOTE 1)
5	Replace engine coolant and inspect cooling system, hoses and connections					P				P				P				P	
6	Replace fuel filter and inspect fuel system, hoses and connections					(P)				(P)				(P)				P	See NOTE 2), 6) & 7)
7	Air cleaner element					R				R				R				R	See NOTE 8)
8	Spark plugs					R				R				R				R	
9	Transmission/Differential (Front & Rear) lubricants (Gear oil)					I				I				I				I	See NOTE 3)
10	Automatic transmission fluid					I				I				I				I	See NOTE 4) & 9)
11	Brake fluid					R				R				R				R	See NOTE 5)
12	Disc brake pads and discs, Front and rear axle boots and axle shaft joint portions			I		I		I		I		I		I		I		I	See NOTE 6)
13	Brake linings and drums					I				I				I				I	See NOTE 6)
14	Inspect brake line and check operation of parking and service brake system			P		P		P		P		P		P		P		P	See NOTE 6)
15	Clutch system			I		I		I		I		I		I		I		I	
16	Steering and suspension system			I		I		I		I		I		I		I		I	See NOTE 6)
17	Front and rear wheel bearing lubricant									(I)								(I)	
18	Supplemental restraint system	Inspect every 10 years																	
19	Valve clearance															I			

R: Replace

I: Inspect, correct or replace if necessary.

P: Perform

(I) or (P): Recommended service for safe vehicle operation

NOTE:

- 1) When the vehicle is used under severe driving conditions such as those mentioned below*, the engine oil and filter should be changed every 6,000 km (3,750 miles) or 3.5 months.
- 2) When the vehicle is used in extremely cold or hot weather areas, contamination of the filter may occur and filter replacement should be performed more often.
- 3) When the vehicle is frequently operated under severe driving conditions, replacement should be performed every 24,000 km (15,000 miles).
- 4) When the vehicle is frequently operated under severe driving conditions, such as mountain driving replacement should be performed every 24,000 km (15,000 miles).
- 5) When the vehicle is used in high humidity areas or in mountainous areas, change the brake fluid every 24,000 km (15,000 miles) or 15 months, whichever occurs first.
- 6) When the vehicle is used under severe driving conditions such as those mentioned below*, inspection should be performed every 12,000 km (7,500 miles) or 7.5 months, whichever occurs first.
- 7) This inspection is not required to maintain emission warranty eligibility and it does not affect the manufacturer's obligations under EPA's in-use compliance program.
- 8) When the vehicle is used in extremely dusty conditions, the air cleaner element should be replaced more often.
- 9) ATF filter is maintenance free part. ATF filter needs replacement, when it has physically damaged or ATF leaked.

- * Examples of severe driving conditions:
 - Repeated short distance driving. (Items 3, 12 and 13 only)
 - Driving on rough and/or muddy roads. (Items 12, 13 and 16 only)
 - Driving in dusty conditions.
 - Driving in extremely cold weather. (Items 3 and 16 only)
 - Driving in areas where roads salts or other corrosive materials are used. (Items 6, 12, 13, 14 and 16 only)
 - Living in coastal areas. (Items 6, 12, 13, 14 and 16 only)
 - Towing a trailer. (Items 3, 4, 9, 10, 12 and 13 only)

2. Drive Belt(s) [Except Camshaft] (Inspect drive belt tension)

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
					I				I				I		R		

A: INSPECTION

- 1) Replace belts, if cracks, fraying or wear is found.
- 2) Check drive belt tension and adjust it if necessary by changing generator installing position and/or idler pulley installing position.

Belt tension

(A)

replaced: 7 — 9 mm (0.276 — 0.354 in)

reused: 9 — 11 mm (0.354 — 0.433 in)

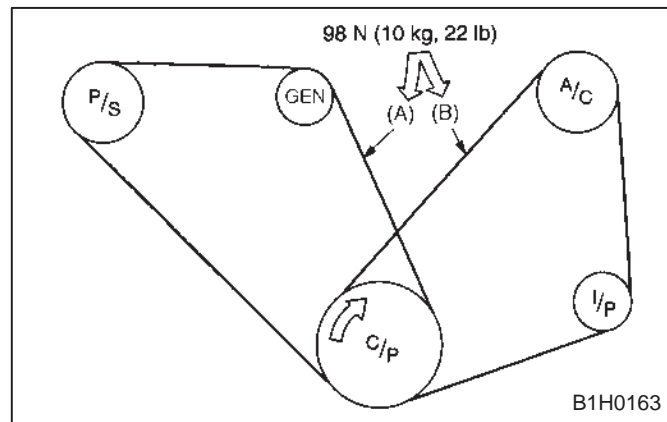
(B)*

replaced: 7.5 — 8.5 mm

(0.295 — 0.335 in)

reused: 9.0 — 10.0 mm (0.354 — 0.394 in)

*: There is no belt (B) on models without an air conditioning.

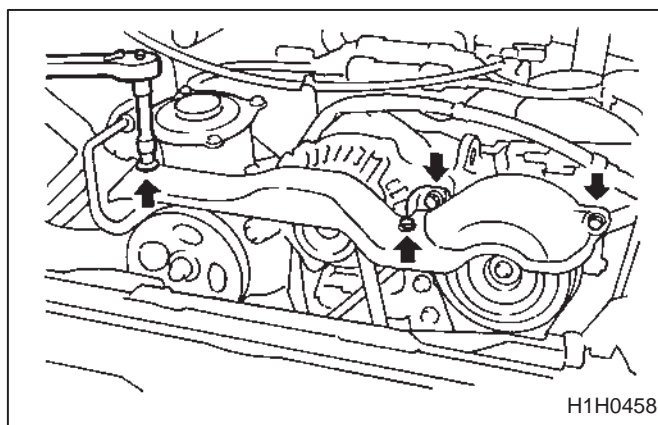


- C/P Crankshaft pulley
- GEN Generator
- P/S Power steering oil pump pulley
- A/C Air conditioning compressor pulley
- I/P Idler pulley

B: REPLACEMENT

1. V-BELT COVER

- 1) Remove V-belt cover.



2. FRONT SIDE BELT (Driving Power Steering Oil Pump and Generator)

CAUTION:

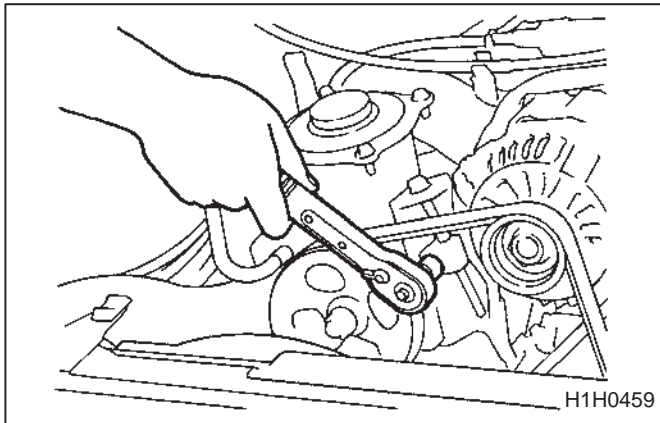
Wipe off any oil or water on the belt and pulley.

- 1) Loosen the lock bolt on the slider bolt.
- 2) Loosen the slider bolt and through bolt.
- 3) Remove the front side belt.
- 4) Install a new belt, and tighten the slider bolt so as to obtain the specified belt tension.
- 5) Tighten the lock bolt and through bolt.
- 6) Tighten the slider bolt.

Tightening torque:

Lock bolt, through bolt: 25 ± 2 N.m
(2.5 ± 0.2 kg-m, 18 ± 1.5 ft-lb)

Slider bolt: 8 ± 2 N.m
(0.8 ± 0.2 kg-m, 5.5 ± 1.5 ft-lb)



3. REAR SIDE BELT (Driving Air Conditioning)

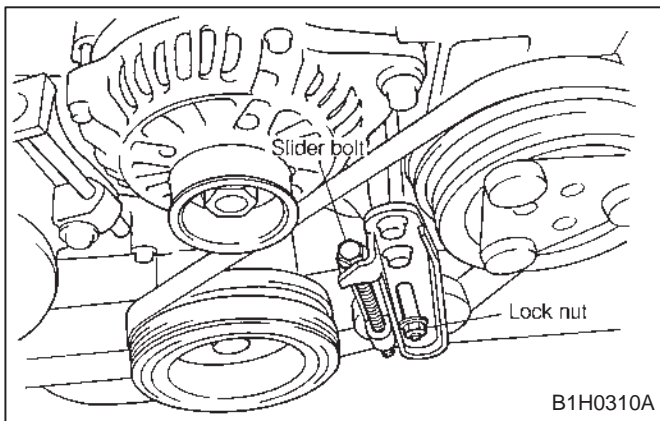
CAUTION:

- Wipe off any oil or water on the belt and pulley.
- Before removing the rear side belt, remove the front side belt.

- 1) Loosen the lock nut on the slider bolt.
- 2) Loosen the slider bolt.
- 3) Remove the rear side belt.
- 4) Install a new belt, and tighten the slider bolt so as to obtain the specified belt tension shown on the previous page.
- 5) Tighten the lock nut.
- 6) Tighten the slider bolt.

Tightening torque (Lock nut):

$20 \pm 3 \text{ N.m}$ ($2 \pm 0.3 \text{ kg-m}$, $14 \pm 2.2 \text{ ft-lb}$)



1-5 [G3A0] PERIODIC MAINTENANCE SERVICES

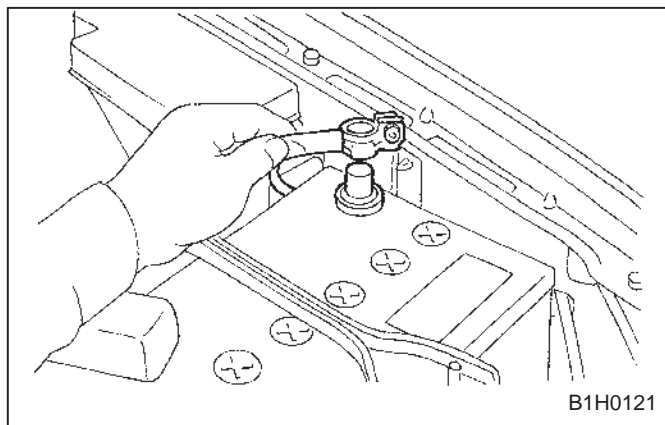
3. Camshaft Drive Belt (Timing Belt)

3. Camshaft Drive Belt (Timing Belt)

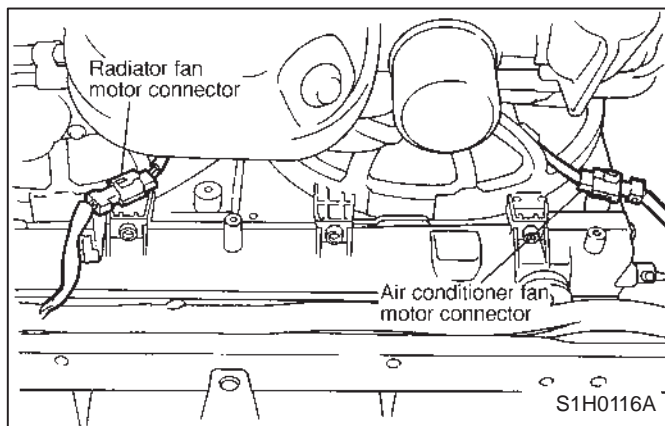
MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
					I				I				I		R		

A: REPLACEMENT

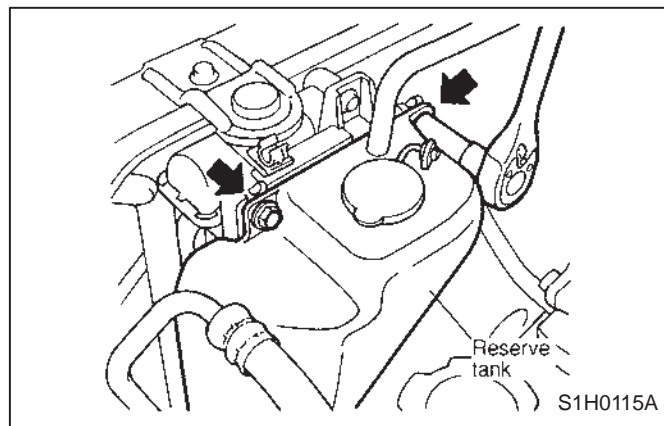
1) Disconnect ground cable (-) from battery.



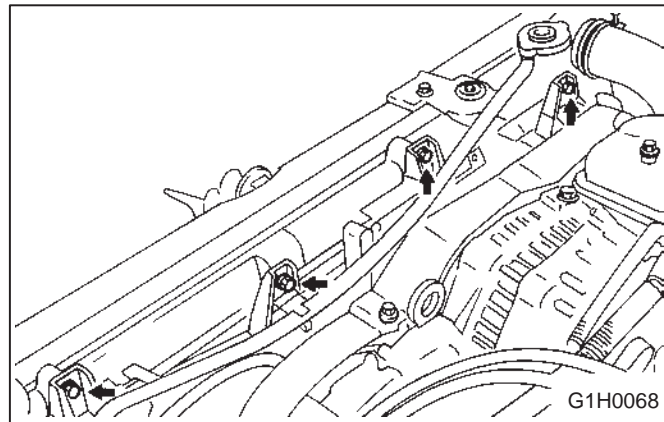
2) Disconnect radiator main fan motor connector and sub fan motor connector.



3) Remove reservoir tank.



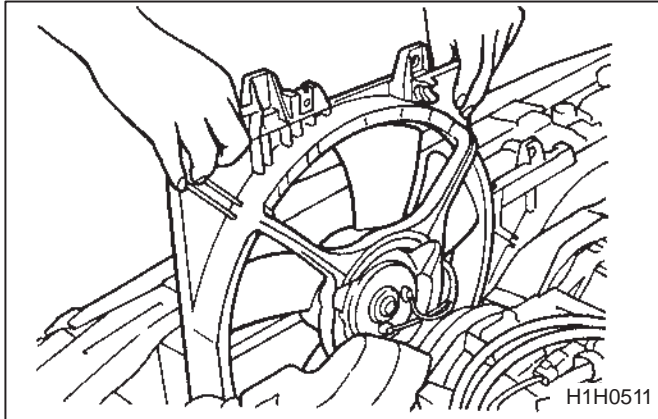
4) Remove four bolts holding shroud to radiator.



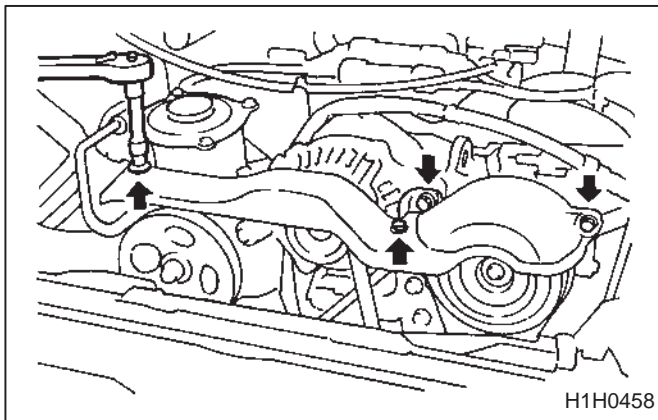
5) Remove radiator main fan and sub fan motor assembly.

CAUTION:

Remove radiator sub fan motor assembly in the same step described in the removal of radiator main fan motor assembly.



6) Remove V-belt cover.



7) Remove V-belts. <Ref. to 1-5 [G2B1].>

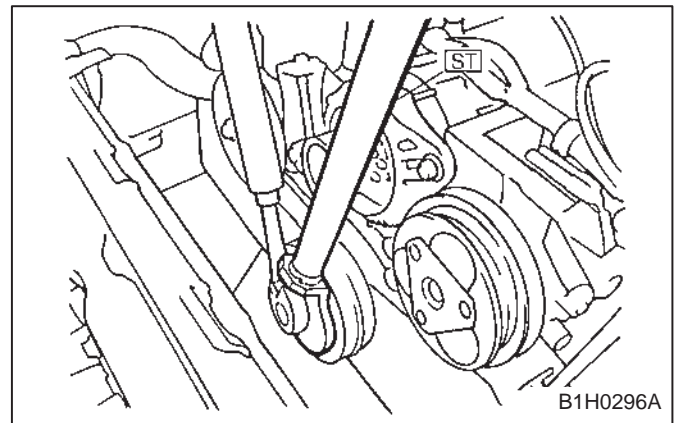
8) Remove pulley bolt. To lock crankshaft use ST.

2200 cc engine:

ST 499977300 CRANKSHAFT
PULLEY WRENCH

2500 cc engine:

ST 499977100 CRANKSHAFT
PULLEY WRENCH



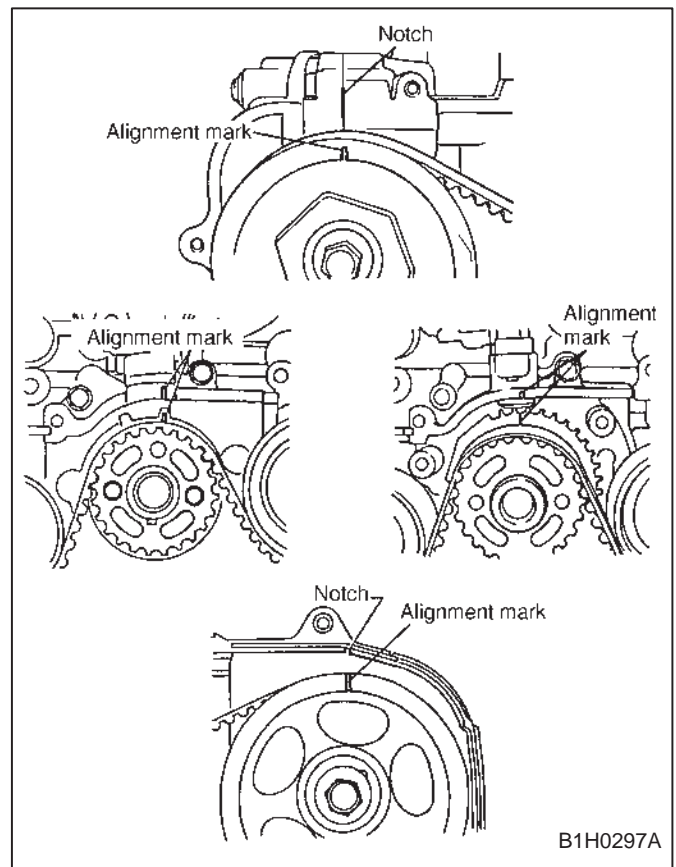
9) Remove crankshaft pulley.

10) Remove left side belt cover.

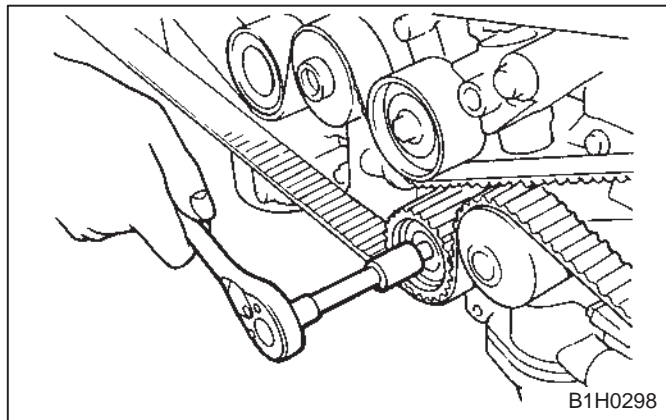
11) Remove front belt cover.

12) Turn crankshaft and align alignment marks on crankshaft, and left and right camshaft sprockets with notches of belt cover and cylinder block.

ST 499987500 CRANKSHAFT SOCKET

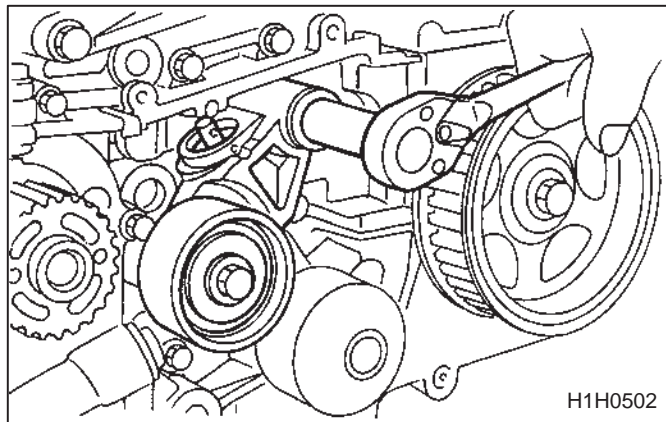


13) Remove belt idler No. 2.



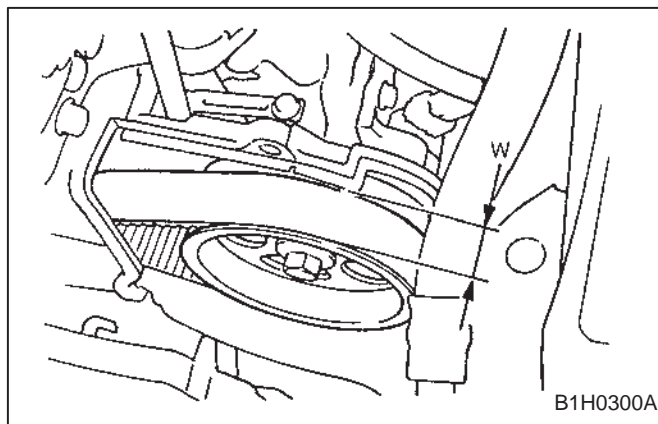
14) Remove timing belt.

15) Remove automatic belt tension adjuster assembly.



C: INSPECTION

- 1) Remove reservoir tank.
- 2) Remove left timing belt covers.
- 3) While cranking engine at least four rotations, check timing belt back surface for cracks or damage. Replace faulty timing belt as needed.
- 4) Measure timing belt width W. If it is less than 27 mm (1.06 in), check idlers, tensioner, water pump pulley and cam sprocket to determine idler alignment (squareness). Replace worn timing belt.



- 5) Install left timing belt covers.

B: INSTALLATION

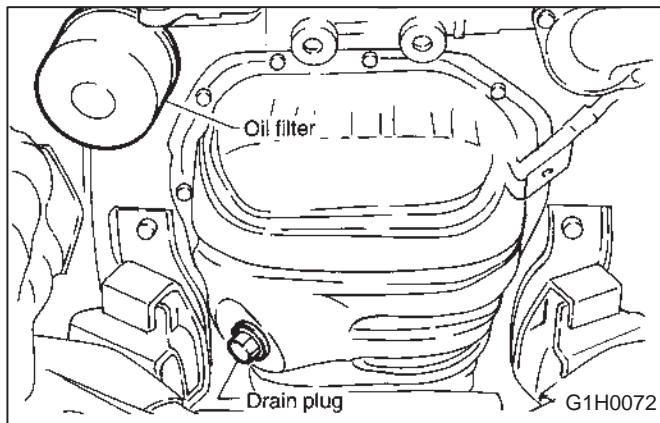
To install, reverse order of removal procedures.
<Ref. to 2-3 [W2C0].>

4. Engine Oil

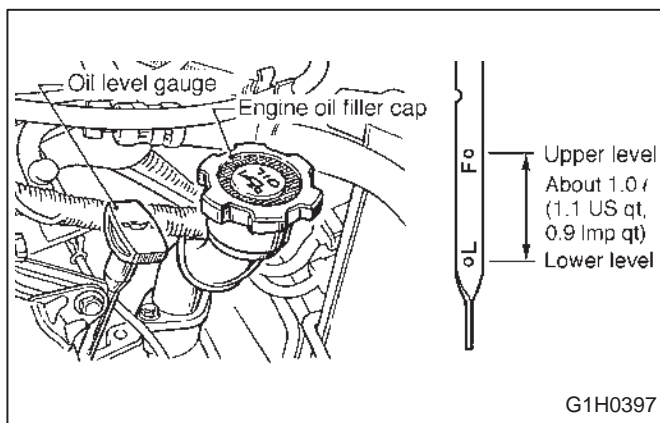
MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R

A: REPLACEMENT

1) Drain engine oil by loosening engine oil drain plug.



2) Open engine oil filler cap for quick draining of the engine oil.



3) Tighten engine oil drain plug after draining engine oil.

Tightening torque:

44 \pm 4.8% N.m (4.5 \pm 0.5% kg-m, 33 \pm 3.6% ft-lb)

NOTE:

Replace drain plug gasket with a new one.

4) Fill engine oil through filler pipe up to upper point on level gauge. Make sure that vehicle is placed level when checking oil level. Use engine oil of proper quality and viscosity, selected in accordance with the table in figure.

Recommended oil

API classification: SJ or SH with the words "Energy Conserving II", CCMC specification G4 or G5, ACEA specification A1 or A2 or A3, or New API mark displayed on the container (If it is impossible to get SJ or SH grade, you may use SG grade.)

Engine oil capacity:

Upper level

4.0 l (4.2 US qt, 3.5 Imp qt)

Lower level

3.0 l (3.2 US qt, 2.6 Imp qt)

SAE Viscosity No. and Applicable Temperature							
(°C)	-30	-20	-15	0	15	30	40
(°F)	-22	-4	5	32	59	86	104
B1H0118							

The proper viscosity helps car get good cold and hot starting by reducing viscous friction and thus increasing cranking speed.

CAUTION:

When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having

the API classification and SAE viscosity No. designated by SUBARU.

NOTE:

If vehicle is used in desert areas with very high temperatures or for other heavy duty applications, the following viscosity oils may be used:

API classification: SJ

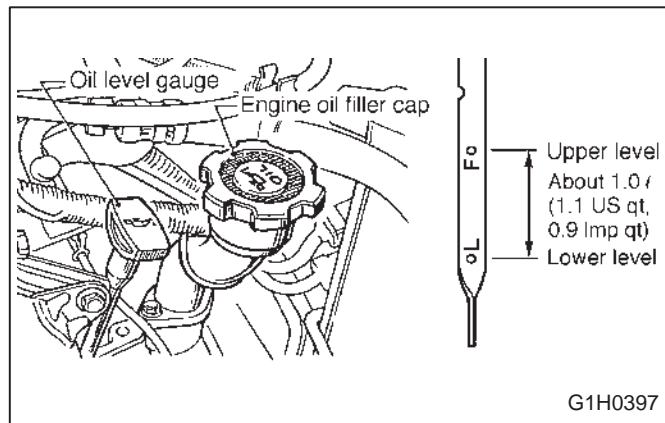
SAE Viscosity No.: 30, 40, 10W-50, 20W-40, 20W-50

5) Close engine oil filler cap.

6) Start engine and warm it up for a time.

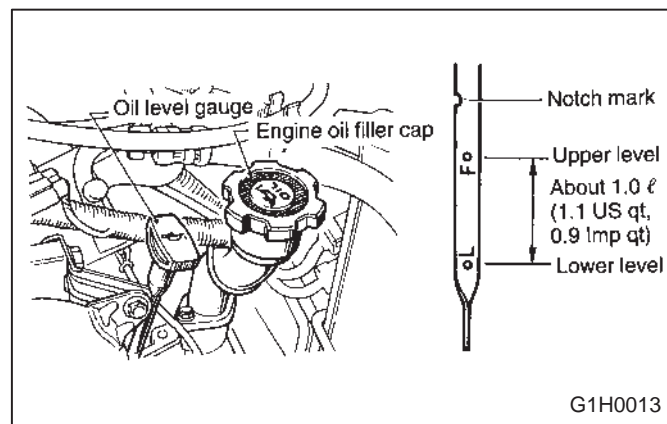
7) After engine stops, recheck the oil level.

If necessary, add engine oil up to upper level on level gauge.



B: INSPECTION

- 1) Park vehicle on a level surface.
- 2) Remove oil level gauge and wipe it clean.
- 3) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper orientation.
- 4) Remove it again and note the reading. If the engine oil level is below the "L" line, add oil to bring the level up to the "F" line.
- 5) After turning off the engine, wait a few minutes for the oil to drain back into the oil pan before checking the level.
- 6) Just after driving or while the engine is warm, engine oil level may show in the range between the "F" line and the notch mark. This is caused by thermal expansion of the engine oil.
- 7) To prevent overfilling the engine oil, do not add oil above the "F" line when the engine is cold.



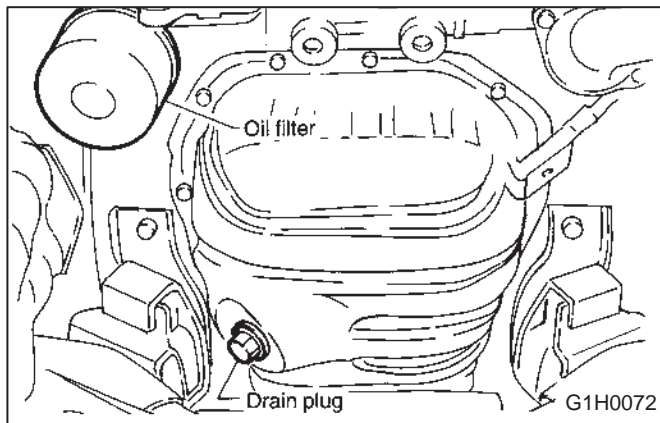
5. Engine Oil Filter

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R

A: REPLACEMENT

1) Remove oil filter with ST.

ST 498547000 OIL FILTER WRENCH



2) Get a new oil filter and apply a thin coat of engine oil to the seal rubber.

3) Install oil filter by turning it by hand, being careful not to damage seal rubber.

4) Tighten more (approximately 2/3 to 3/4 turn) after the seal rubber contacts the oil pump case. Do not tighten excessively, or oil may leak.

5) After installing oil filter, run engine and make sure that no oil is leaking around seal rubber.

NOTE:

The filter element and filter case are permanently joined; therefore, interior cleaning is not necessary.

6) Check the engine oil level. <Ref. to 1-5 [G4B0].>

6. Replace Engine Coolant and Inspect Cooling System, Hoses and Connections

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
					P				P				P				P

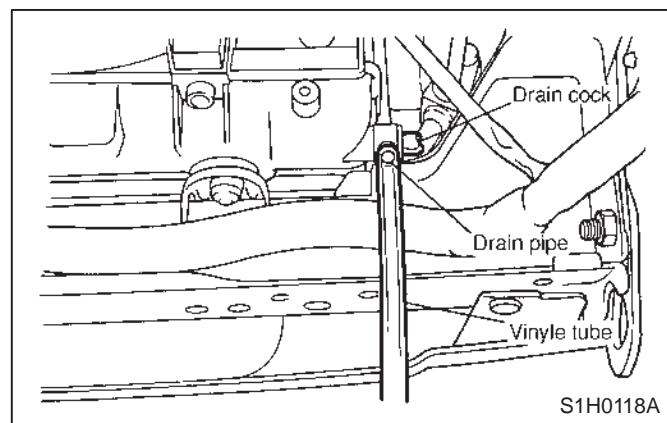
A: REPLACEMENT

1. REPLACEMENT OF COOLANT

WARNING:

The radiator is of the pressurized type. Do not attempt to open the radiator cap immediately after the engine has been stopped.

- 1) Lift up the vehicle.
- 2) Fit vinyl tube to drain pipe.

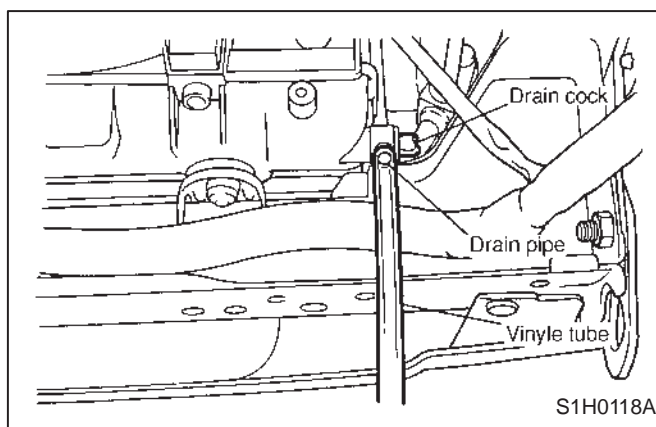


- 3) Place a container under vinyl tube.
- 4) Loosen drain cock to drain engine coolant into container.
- 5) For quick draining, open radiator cap.

CAUTION:

Be careful not to spill coolant on the floor.

- 6) Drain coolant from reservoir tank.
- 7) Tighten radiator drain cock securely after draining coolant. (Drain tube may face downward.)



- 8) Fill engine coolant into radiator up to filler neck position.
- 9) Fill engine coolant into reservoir tank up to "FULL" level.

Coolant capacity (fill up to "FULL" level)
Approx. 6.2 ℓ (6.6 US qt, 5.5 Imp qt)

CAUTION:

The SUBARU Genuine Coolant containing anti-freeze and anti-rust agents is especially made for SUBARU engine, which has an aluminum crankcase. Always use SUBARU Genuine Coolant, since other coolant may cause corrosion.

- 10) Securely install radiator cap and reservoir tank cap.
- 11) Run engine for more than five minutes at 2,000 to 3,000 rpm. (Run engine until radiator becomes hot in order to purge air trapped in cooling system.)
- 12) Stop engine and wait until coolant temperature lowers. Then open radiator cap to check coolant level and add coolant up to radiator fill-

er neck. Next, add coolant into reservoir tank up to "FULL" level.

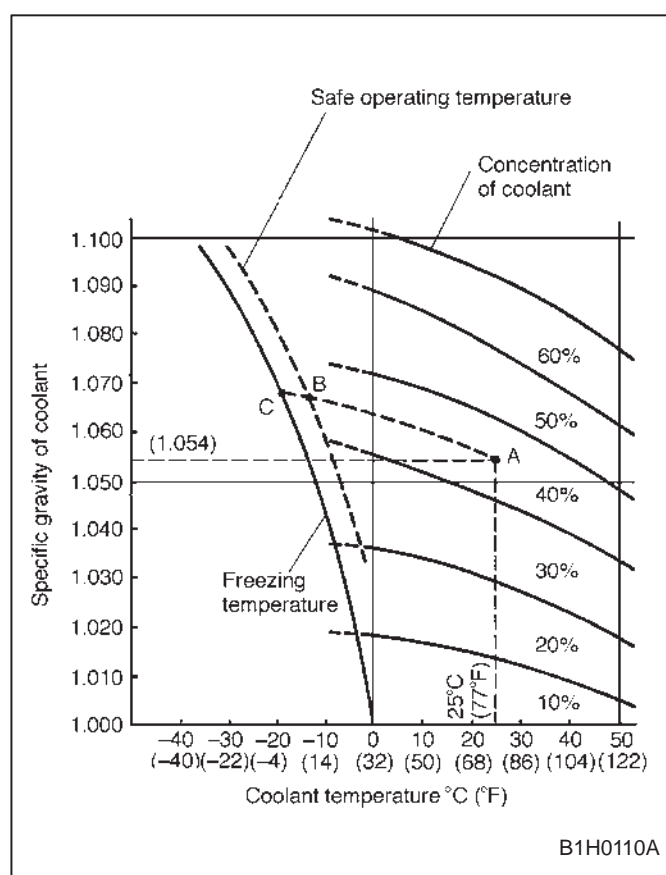
13) Securely install radiator and reservoir tank caps.

2. RELATIONSHIP OF SUBARU COOLANT CONCENTRATION AND FREEZING TEMPERATURE

The concentration and safe operating temperature of the SUBARU coolant is shown in the diagram. Measuring the temperature and specific gravity of the coolant will provide this information.

[Example]

If the coolant temperature is 25°C (77°F) and its specific gravity is 1.054, the concentration is 35% (point A), the safe operating temperature is -14°C (7°F) (point B), and the freezing temperature is -20°C (-4°F) (point C).



3. PROCEDURE TO ADJUST THE CONCENTRATION OF THE COOLANT

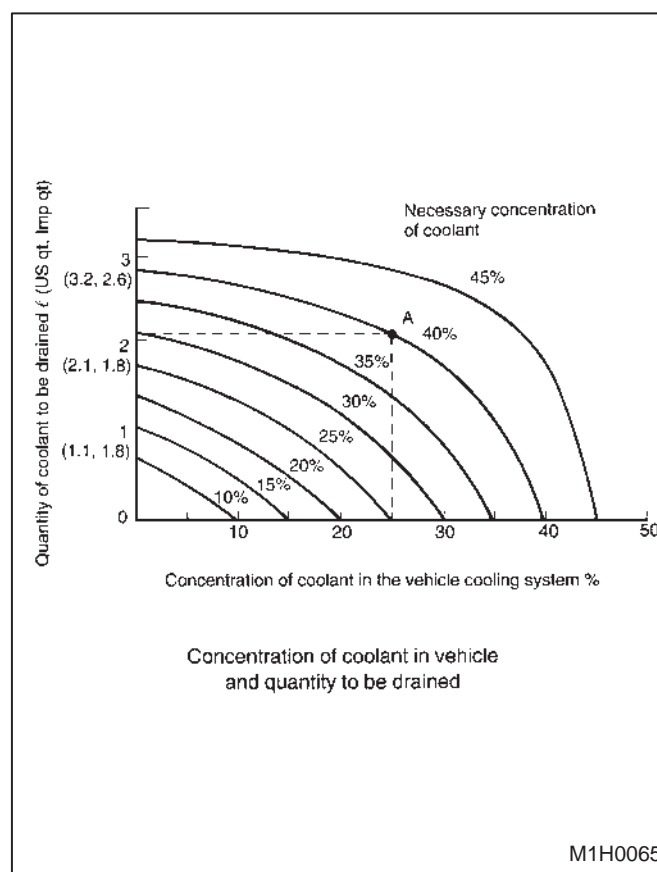
To adjust the concentration of the coolant according to temperature, find the proper fluid concentration in the above diagram and replace the necessary amount of coolant with an undiluted solution of SUBARU genuine coolant (concentration 50).

The amount of coolant that should be replaced can be determined using the diagram.

[Example]

Assume that the coolant concentration must be increased from 30% to 40%. Find point A, where the 30% line of coolant concentration intersects with the 40% curve of the necessary coolant concentration, and read the scale on the vertical axis of the graph at height A. The quantity of coolant to be drained is 3.0 liters (3.2 US qt, 2.6 Imp qt). Drain 3.0 liters (3.2 US qt, 2.6 Imp qt) of coolant from the cooling system and add 3.0 liters (3.2 US qt, 2.6 Imp qt) of the undiluted solution of SUBARU coolant.

If a coolant concentration of 50% is needed, drain all the coolant and refill with the undiluted solution only.



B: INSPECTION

1) Check radiator for leakage, filling it with coolant and attach radiator cap tester to the filler neck. Then apply a pressure of 157 kPa (1.6 kg/cm², 23 psi) and check the following points:

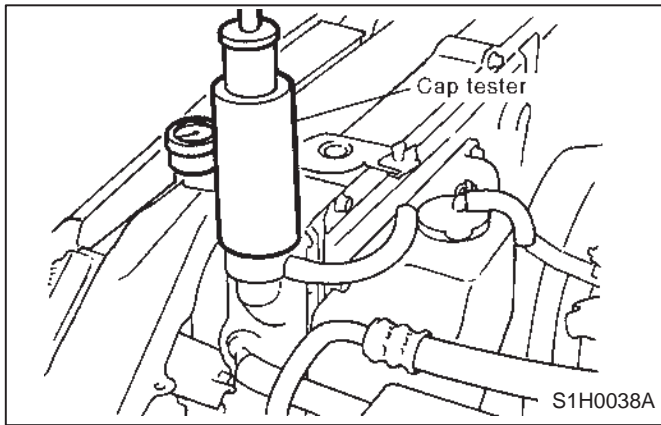
- Each portion of radiator for leakage
- Hose joints and other connections for leakage

CAUTION:

When attaching or detaching tester and when operating tester, use special care not to deform radiator filler neck.

NOTE:

- When performing this check, be sure to keep the engine stationary and fill radiator with coolant.
- Wipe off check points before applying pressure.
- Use care not to spill coolant when detaching tester from radiator.



2) Check the radiator cap valve open pressure using radiator cap tester.

CAUTION:

Rust or dirt on cap may prevent valve from functioning normally: be sure to clean cap before testing.

- Raise the pressure until the needle of gauge stops and see if the pressure can be retained for five to six seconds. The radiator cap is normal if a pressure above the service limit value has been maintained for this period.

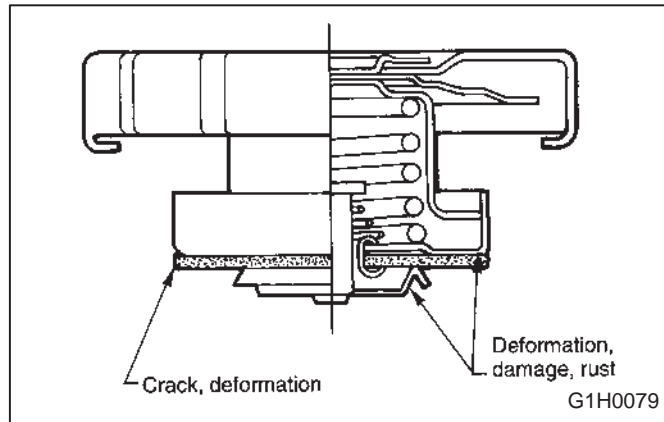
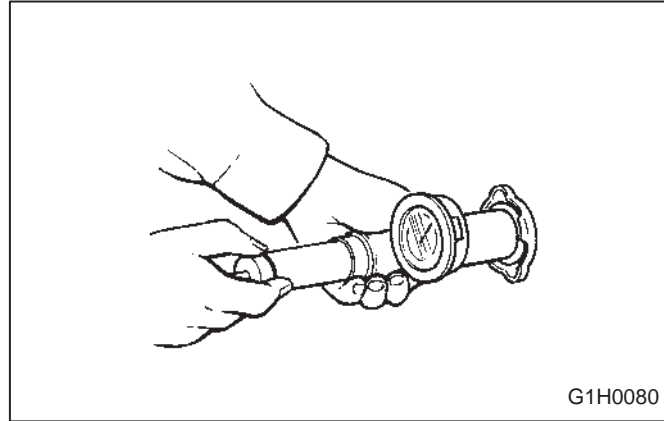
Radiator cap valve open pressure**Standard value:**

93 — 123 kPa

(0.95 — 1.25 kg/cm², 13.5 — 17.8 psi)

Service limit:

83 kPa (0.85 kg/cm², 12.0 psi)



3) If the coolant temperature exceeds 76.0 to 80.0°C (169 to 176°F) while radiator is not so hot, check thermostat. If thermostat does not open at 76.0 to 80.0°C (169 to 176°F), replace it with a new one.

4) If electric fan does not operate when coolant temperature exceeds 90 to 94°C (194 to 201°F), check thermoswitch or fan motor.

7. Replace Fuel Filter and Inspect Fuel System, Lines and Connections

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
					(P)				(P)				(P)				P

A: REPLACEMENT

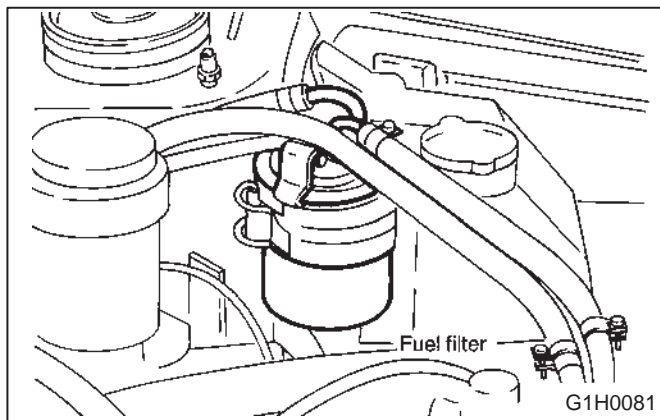
WARNING:

- Place “No fire” signs near the working area.
- Disconnect ground cable from battery.

CAUTION:

Be careful not to spill fuel on the floor.

- 1) Before removing the hose, filter, pump, etc., be sure to release the fuel pressure, as follows:
 - Disconnect the wiring connector of the fuel pump.
 - Crank the engine for more than five seconds. If the engine starts, let the engine run until it stops.
 - After turning IG switch OFF, connect the wiring connector of the fuel pump.
- 2) Loosen the screw of the hose clamp and pull off the hose from the filter.
- 3) Remove the filter from the holder.



- 4) Replace fuel filter with a new one.
- 5) Install the hoses as shown in the figure.

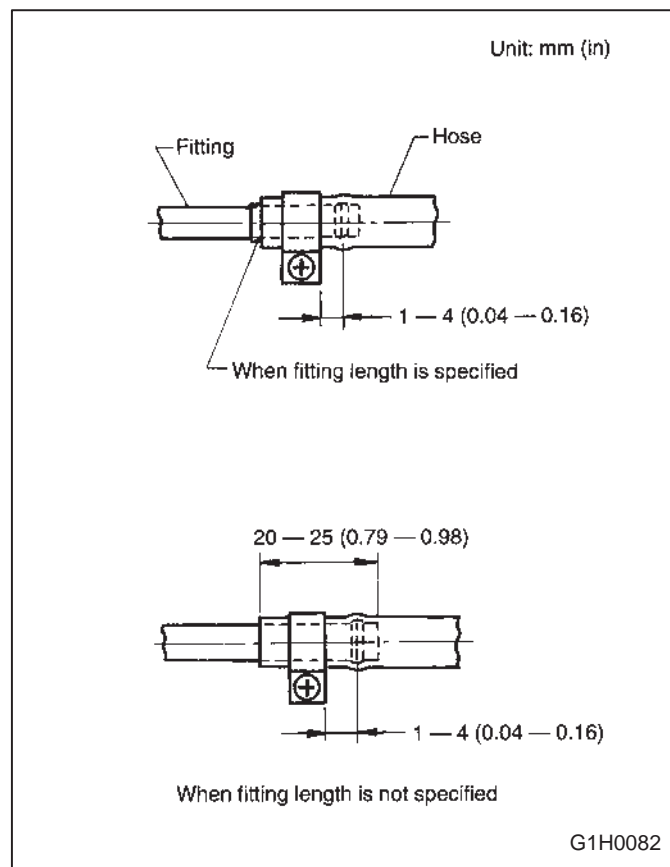
Tightening torque:

1.0 — 1.5 N.m

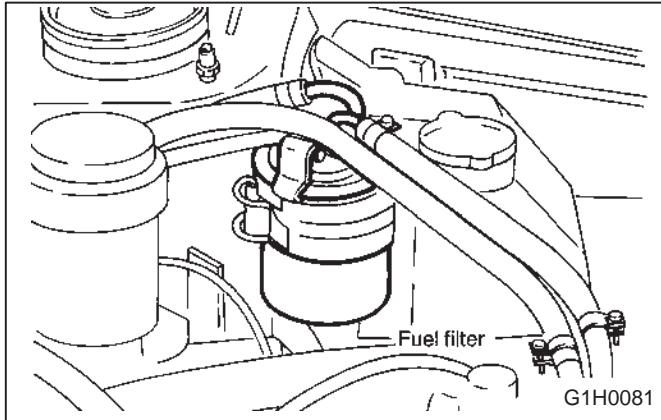
(0.1 — 0.15 kg-m, 0.7 — 1.1 ft-lb)

CAUTION:

- If the hose is damaged at the clamping portion, replace the hose with a new one.
- If the hose clamp is deformed too much, replace with a new one.
- Correct the hose position by removing any twist so that it will not interfere with the filter body or washer tank, before tightening the screw of the hose clamp.



6) Install the fuel filter bracket to the vehicle body. And tighten the bolts to the specified torque.

Tightening torque:***5.4 — 9.3 N.m******(0.55 — 0.95 kg-m, 4.0 — 6.9 ft-lb)*****CAUTION:****Make sure that the clamp screw is not loose.****B: INSPECTION****1. FUEL PIPING AND CONNECTIONS**

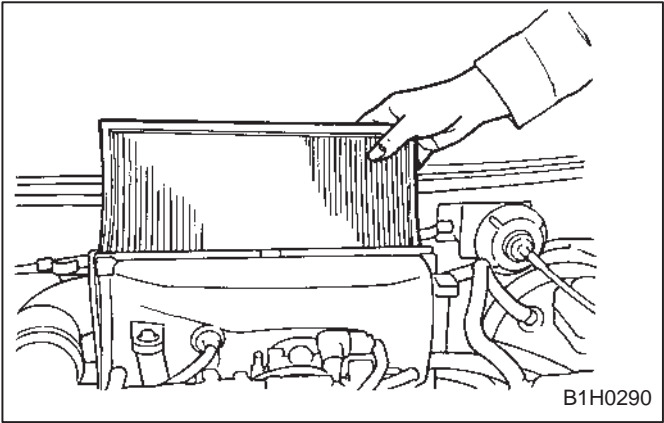
Check fuel piping and connections for leakage, scratches, swelling and corrosion.

8. Air Cleaner Element

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
					R				R				R				R

A: REPLACEMENT

Do not attempt to clean the air cleaner element. The filter paper of the element is wetted with a special non-inflammable slow-evaporating viscous liquid. It is resistant to cold weather and has a long service life. Dirt adhering to this filter paper forms porous laminations with the viscous liquid, which function as a filtration layer to reduce dust penetration into the filter paper. If this filter paper is cleaned, the filtration layer thus formed will be lost along with the viscous liquid.



9. Spark Plugs

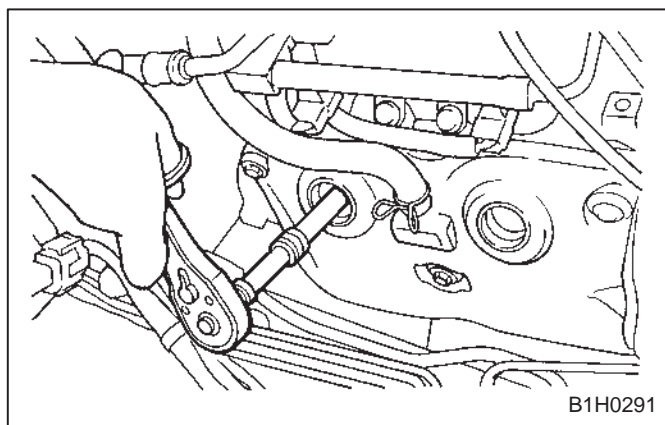
MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
					R				R				R				R

A: REPLACEMENT

- 1) Remove intake duct and intake chamber.
- 2) Remove washer tank and put it aside.
- 3) Disconnect spark plug cord.
- 4) Remove spark plug with a plug-wrench.

NOTE:

If torque wrench is not available, tighten spark plug until gasket contacts cylinder head; then tighten further 1/4 to 1/2 turns.



- 5) Set new spark plug.

Recommended spark plug:

CHAMPION: RC10YC4

NGK: BKR6E-11

CHAMPION: RC8YC4

NIPPONDENSO: K20PR-U11

Spark plug gap

1.0 — 1.1 mm (0.039 — 0.043 in)

- 6) Tighten spark plug lightly with hand, and then secure with a plug-wrench to the specified torque.

Tightening torque:

21 ± 3 N.m (2.1 ± 0.3 kg-m, 15 ± 2 ft-lb)

CAUTION:

Be sure to place the gasket between the cylinder head and spark plug.

10. Transmission/Differential (Front and rear) Lubricants (Gear oil)

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
					I				I				I				

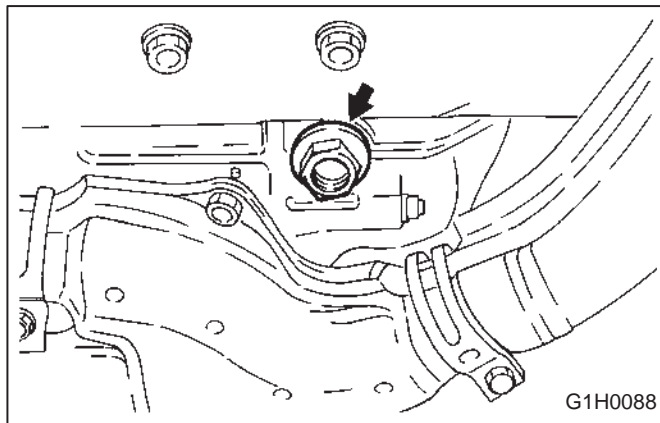
A: REPLACEMENT

1. MANUAL TRANSMISSION

1) Drain gear oil by removing drain plug after allowing the engine to cool for 3 to 4 hours.

CAUTION:

Before starting work, cool off the engine well.



2) Reinstall drain plug after draining gear oil and tighten it to the specified torque.

Tightening torque:

$44 \pm 3 \text{ N.m}$ ($4.5 \pm 0.3 \text{ kg-m}$, $32.5 \pm 2.2 \text{ ft-lb}$)

CAUTION:

- Be sure to place a gasket between the transmission case and drain plug.
- Replace the gasket with a new one.

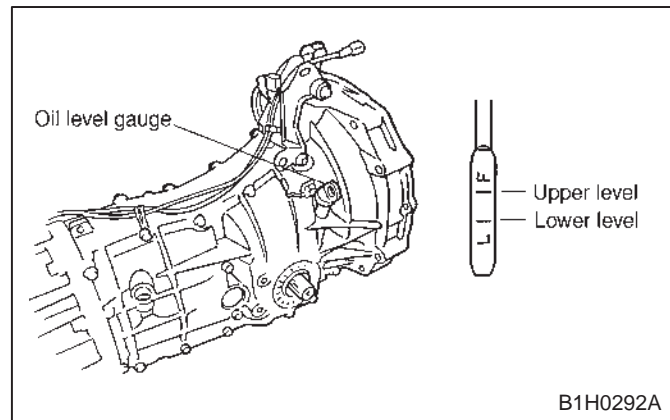
3) Fill transmission gear oil through the oil level gauge hole up to the upper point of level gauge.

Gear oil capacity:

3.5 l (3.7 US qt , 3.1 Imp qt)

Transmission gear oil Recommended oil

ITEM									
• Manual Transmission gear oil									
API Classification									
GL-5									
SAE Viscosity No. and Applicable Temperature									
(°C)	-30	-26	-15	-5	0	15	25	30	
(°F)	-22	-15	5	23	32	59	77	86	
B1H0410A									



11. Automatic Transmission Fluid

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
					I								I				

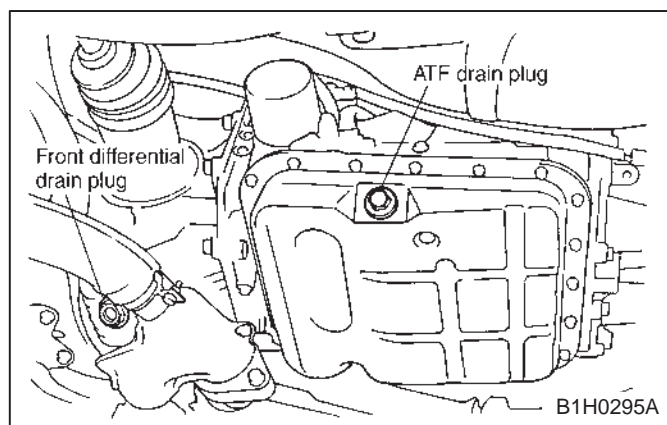
A: REPLACEMENT

1. AUTOMATIC TRANSMISSION FLUID

1) Drain ATF (Automatic Transmission Fluid) by removing drain plug after allowing the engine to cool for 3 to 4 hours.

CAUTION:

Before starting work, cool off the engine well.



2) Reinstall drain plug after draining ATF, and tighten it to the specified torque.

Tightening torque:

$25 \pm 2 \text{ N.m}$ ($2.5 \pm 0.2 \text{ kg-m}$, $18.1 \pm 1.4 \text{ ft-lb}$)

3) Fill ATF up to the middle of the "COLD" side on level gauge by using the gauge hole.

Recommended fluid:

Dexron II, IIE or Dexron III type automatic transmission fluid

Fluid capacity:

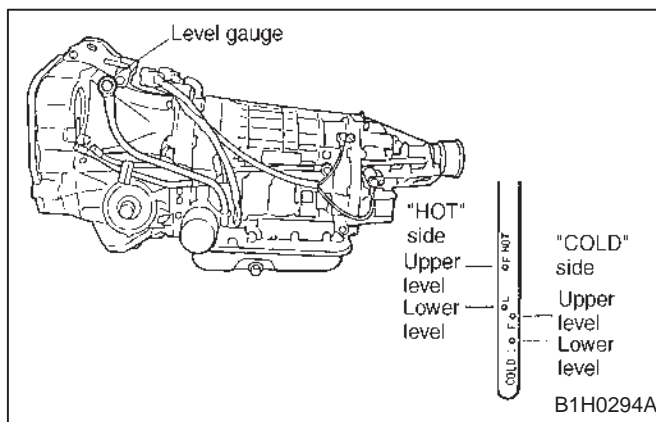
2200 cc: 8.4 — 8.7 ℓ

(8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)

2500 cc: 9.3 — 9.6 ℓ

(9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)

4) Run the vehicle until the ATF temperature rises to 60 to 80 °C (140 to 176 °F) and check the ATF level of the "HOT" side on level gauge.



2. ATF FILTER

NOTE:

ATF filter is maintenance free part. ATF filter needs replacement, when it has physically damaged or ATF leaked.

For the replacement procedures of the ATF filter, refer to "AUTOMATIC TRANSMISSION AND DIFFERENTIAL" section. <Ref. to 3-2 [W600].>

12. Brake Fluid

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
					R				R				R				R

A: REPLACEMENT

- 1) Either jack up vehicle and place a safety stand under it, or lift up vehicle.
- 2) Remove both front and rear wheels.
- 3) Draw out the brake fluid from master cylinder with syringe.
- 4) Refill reservoir tank with recommended brake fluid.

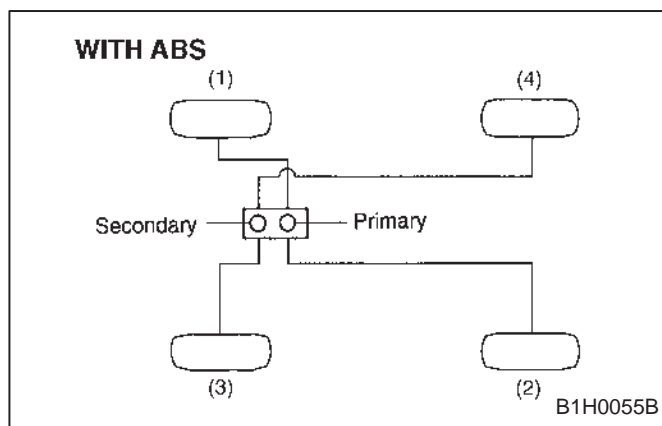
Recommended brake fluid:

FMVSS No. 116, fresh DOT3 or 4 brake fluid

CAUTION:

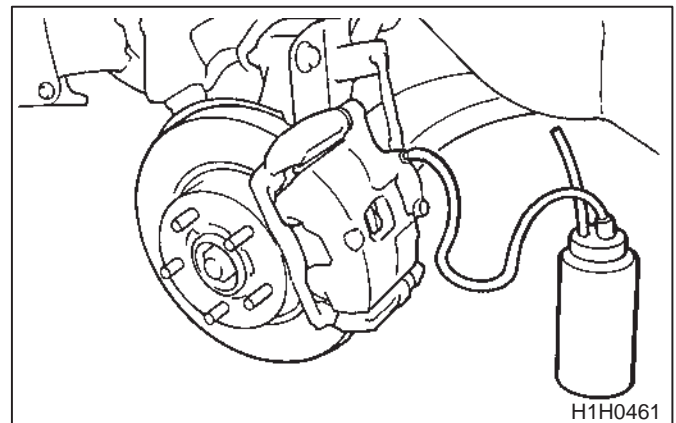
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

Bleeding sequence (1) → (2) → (3) → (4)



- (1) Front right
- (2) Rear left
- (3) Front left
- (4) Rear right

- 5) Install one end of a vinyl tube onto the air bleeder and insert the other end of the tube into a container to collect the brake fluid.



NOTE:

- Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
- During bleeding operation, keep the brake reserve tank filled with brake fluid to eliminate entry of air.
- Brake pedal operation must be very slow.
- For convenience and safety, it is advisable to have two men working.
- The amount of brake fluid required is approximately 330 ml (10.1 US fl oz, 10.6 Imp fl oz) for total brake system.

- 6) Instruct your co-worker to depress the brake pedal slowly two or three times and then hold it depressed.

- 7) Loosen bleeder screw approximately 1/4 turn until a small amount of brake fluid drains into container, and then quickly tighten screw.

- 8) Repeat the immediately preceding two steps until there are no air bubbles in drained brake fluid and new fluid flows through vinyl tube.

CAUTION:

Add brake fluid as necessary while performing the air bleed operation, in order to prevent the tank from running short of brake fluid.

9) After completing the bleeding operation, hold brake pedal depressed and tighten screw and install bleeder cap.

Tightening torque:

7 — 9 N.m (0.7 — 0.9 kg-m, 5.1 — 6.5 ft-lb)

10) Bleed air from each wheel cylinder using the same procedures as described in the immediately preceding five steps.

11) Depress brake pedal with a force of approximately 294 N (30 kg, 66 lb) and hold it there for approximately 20 seconds. At this time check pedal to see if it makes any unusual movement. Visually inspect bleeder screws and brake pipe joints to make sure that there is no fluid leakage.

12) Install wheels, and drive car for a short distance between 2 to 3 km (1 to 2 miles) to make sure that brakes are operating properly.

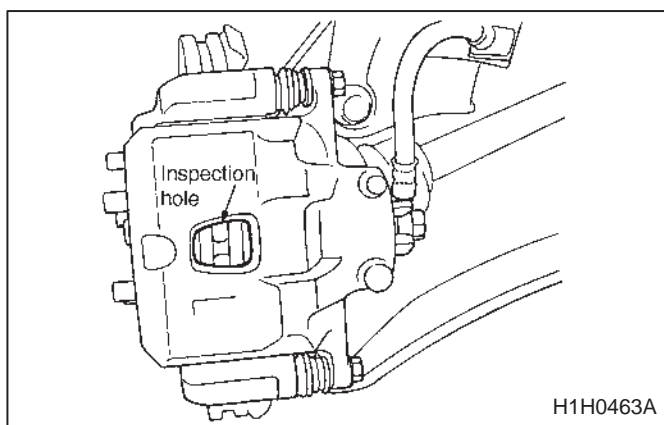
13. Disc Brake Pads and Discs/ Front and Rear Axle Boots and Axle Shaft Joint Portions

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
			I		I		I		I		I		I		I		I

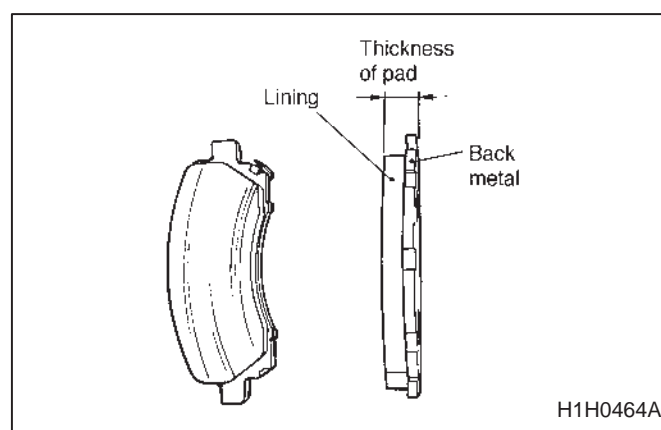
A: INSPECTION

1. DISC BRAKE PAD AND DISC

- 1) Jack up vehicle and support with rigid racks. Then remove wheels.
- 2) Visually check pad thickness through inspection hole of disc brake assembly. Replace pad if necessary.



Pad thickness including back metal mm (in)		
	Front	Rear
Standard	17 (0.67)	14 (0.55)
Service limit	7.5 (0.295)	6.5 (0.256)
Service limit (exclusive back metal)	1.5 (0.059)	1.5 (0.059)



- 3) Check the disc rotor, and correct or replace if it is damaged or worn.

Brake disc thickness mm (in)		
	Front	Rear
Standard	24 (0.94)	10 (0.39)
Wear limit	22 (0.87)	8.5 (0.335)

- 4) Measure the disc rotor runout at a point less than 5 mm (0.20 in) from the outer periphery of the rotor.

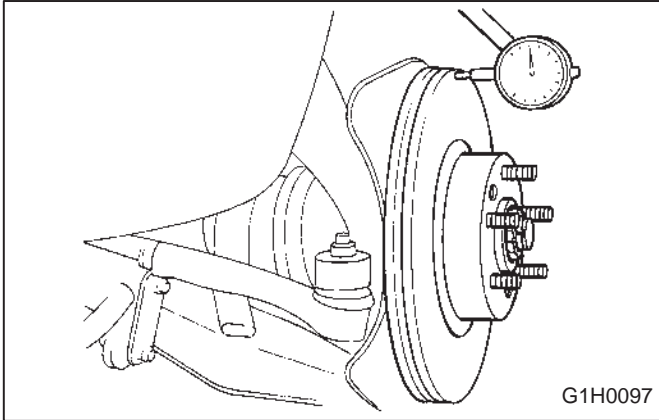
Disc rotor runout limit:

Front: 0.075 mm (0.00295 in)

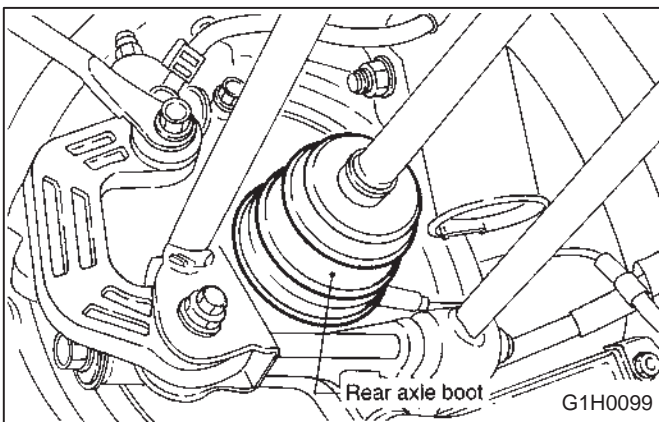
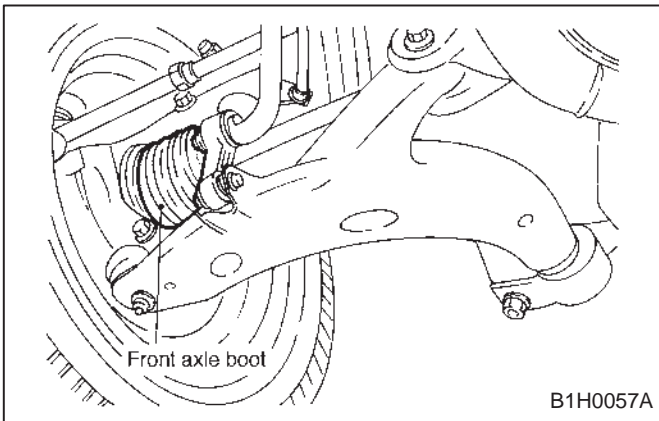
Rear: 0.070 mm (0.00276 in)

CAUTION:

When replacing a pad, always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.

**2. FRONT AND REAR AXLE BOOTS**

Inspect front and rear axle boots for deformation, damage or failure. If faulty, replace them with new ones.



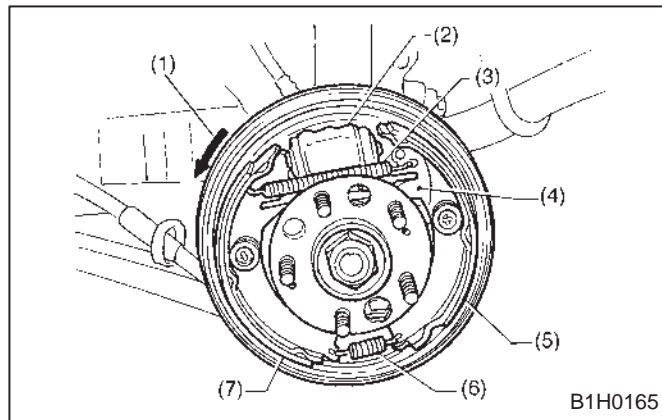
14. Brake Linings and Drums

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
					I				I				I				I

A: INSPECTION

1. REAR DRUM BRAKE

- 1) Remove brake drum, and check that there is no fluid leakage from wheel cylinder. If there is fluid leakage from wheel cylinder, replace it.
- 2) Inspect brake shoes for damage or deformities and check brake linings for wear.



- (1) Rotational direction of drum (Forward)
- (2) Wheel cylinder
- (3) Upper shoe return spring
- (4) Adjusting lever
- (5) Trailing shoe
- (6) Lower shoe return spring
- (7) Leading shoe

CAUTION:

- Always replace both leading and trailing brake shoes for the left and right wheels at the same time.
- When either the left or the right brake assembly is replaced, always replace the leading shoe and trailing shoe of the other.
- The cotter pin, once removed, cannot be reused.

Thickness of lining (except back metal)

Standard value: 4.1 mm (0.161 in)

Service limit: 1.5 mm (0.059 in)

To replace trailing shoe, remove cotter pin. Clevis pin should also be replaced if worn.

- 3) Check brake drum for wear, dents or other damage.

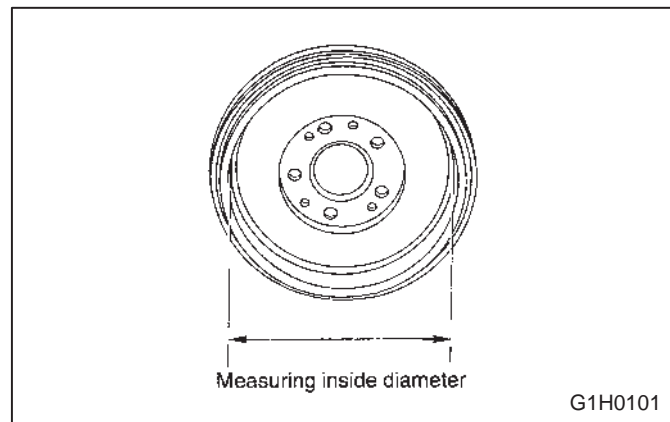
If the inside surface of brake drum is streaked, correct the surface with emery cloth (#200 or more). If it is unevenly worn, tapered, or the outside surface of brake drum is damaged, correct or replace it.

Brake drum inner diameter

Standard value: 228.6 mm (9.000 in)

Service limit: 230.6 mm (9.079 in)

If deformation or wear of back plate, shoe, etc. is noticeable, replace the affected parts.



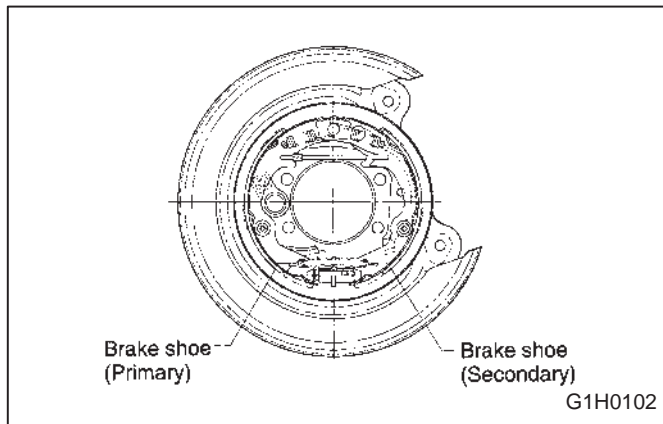
2. PARKING BRAKE (REAR DISC BRAKE)

1) Inspect brake shoes for damage or deformation and check brake linings for wear.

CAUTION:

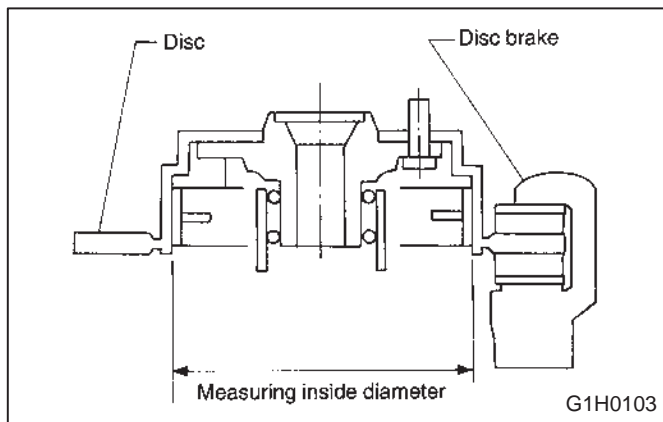
Always replace both primary and secondary brake shoes for the left and right wheels at the same time.

Brake lining thickness excluding back metal
Standard value: 3.2 mm (0.126 in)
Wear limit: 1.5 mm (0.059 in)



2) Check brake drum for wear, dents or other damage. If the inside surface of brake drum is streaked, correct the surface with emery cloth (#200 or more). If it is unevenly worn, tapered, or the outside surface of brake drum is damaged, correct or replace it.

Brake drum inside diameter
Standard value: 170 mm (6.69 in)
Wear limit: 171 mm (6.73 in)



3) If the deformation or wear of back plate, shoe, etc. is noticeable, replace them.

4) When the shoe return spring tension is excessively weakened, replace it, taking care to identify upper and lower springs.

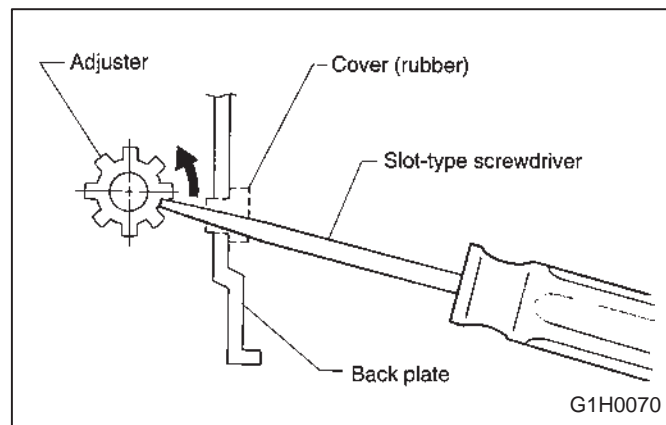
B: ADJUSTMENT**1. REAR DRUM BRAKE**

The main brake is adjusted automatically, and so there is no need to adjust it.

2. PARKING BRAKE (REAR DISC BRAKE)

1) Remove rear cover (rubber) installed at back plate.

2) Turn adjuster toward arrow mark (upward) until it is locked slightly, by using slot-type screwdriver as shown in illustration.



3) Turn back (downward) adjuster 3 to 4 notches.

4) Install cover (rubber) at original position correctly.

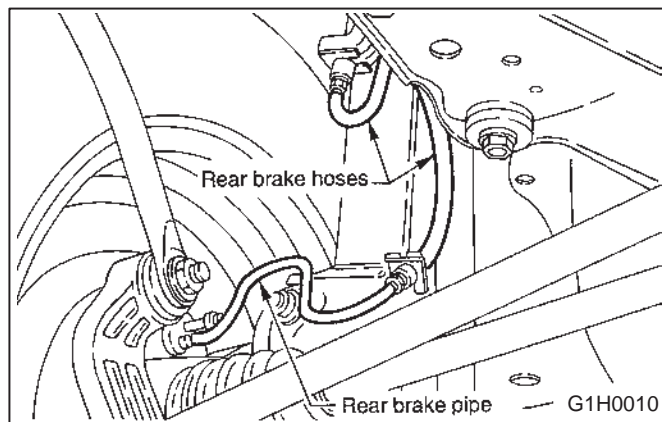
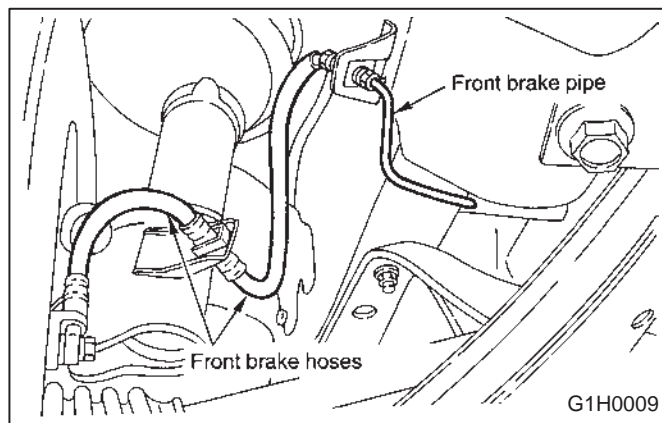
15. Inspect Brake Lines and Check Operation of Parking and Service Brake System

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
			P		P		P		P		P		P		P		P

A: INSPECTION

1. BRAKE LINE

- 1) Check scratches, swelling, corrosion and/or traces of fluid leakage on brake hoses or pipe joints.
- 2) Check the possibility of adjacent parts interfering with brake pipes/hoses during driving, and loose connections/clamps.
- 3) Check any trace of fluid leakage, scratches, etc. on master cylinder, wheel cylinder.



NOTE:

When the brake fluid level in the reservoir tank is lower than the specified limit, the brake fluid warning light on the combination meter will come on.

B: CHECKING

1. SERVICE BRAKE

- 1) Check the free play of brake pedal with a force of less than 10 N (1 kg, 2 lb).

Brake pedal free play:

1 — 3 mm (0.04 — 0.12 in)

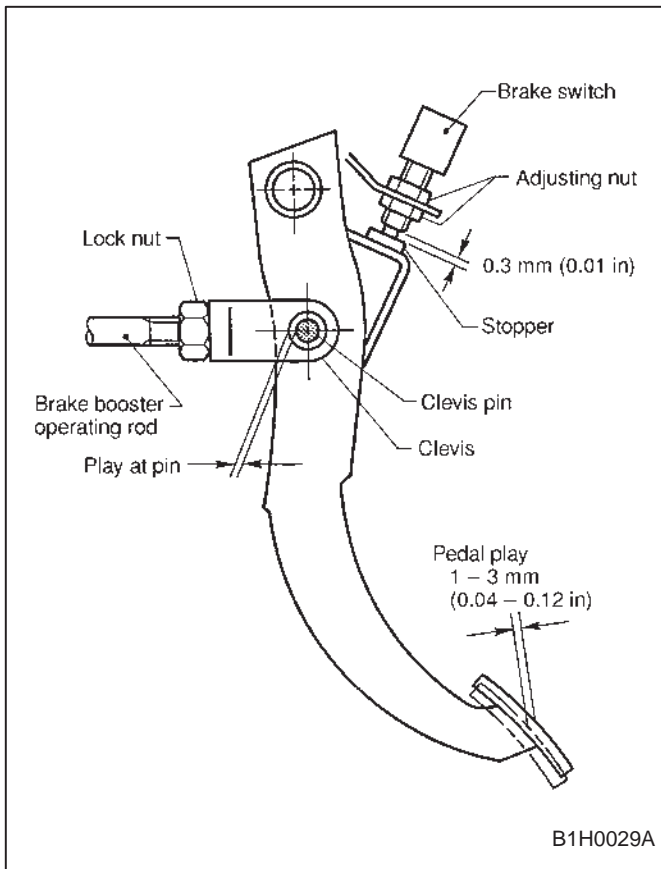
If the free play is out of specifications above, adjust the brake pedal as follows:

- (1) Be sure engine is off. (No vacuum is applied to brake booster.)
- (2) There should be play between brake booster clevis and pin at brake pedal installing portion.

[Depress brake pedal pad with a force of less than 10 N (1 kg, 2 lb) to a stroke of 1 to 3 mm (0.04 to 0.12 in).]

- (3) Depress the surface of brake pad by hand.

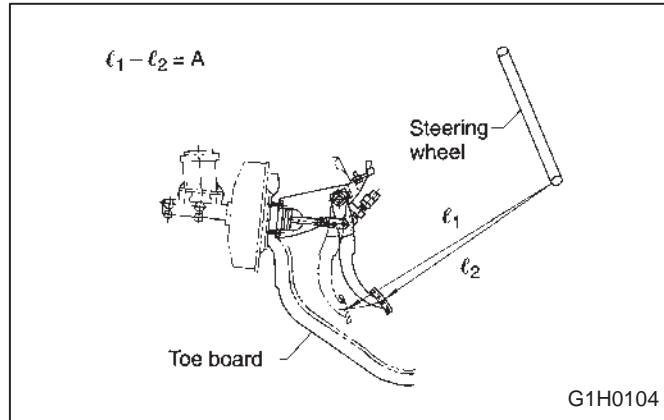
- (4) If there is no free play between clevis pin and clevis, turn brake switch adjusting nut until the clearance between stopper and screw of brake switch becomes 0.3 mm (0.01 in).



2) Check the pedal stroke.

While the engine is idling, depress the brake pedal with a 490 N (50 kg, 110 lb) load and measure the distance between the brake pedal and steering wheel. With the brake pedal released, measure the distance between the pedal and steering wheel again. The difference between the two measurements must be less than 95 mm (3.74 in). If the distance is more than specified, there is a possibility air is in the inside of the hydraulic unit.

Specified pedal stroke: A
less than 95 mm (3.74 in)/
490 N (50 kg, 110 lb)



3) Check to see if air is in the hydraulic brake line by the feel of pedal operation. If air appears to exist in the line, bleed it from the system.

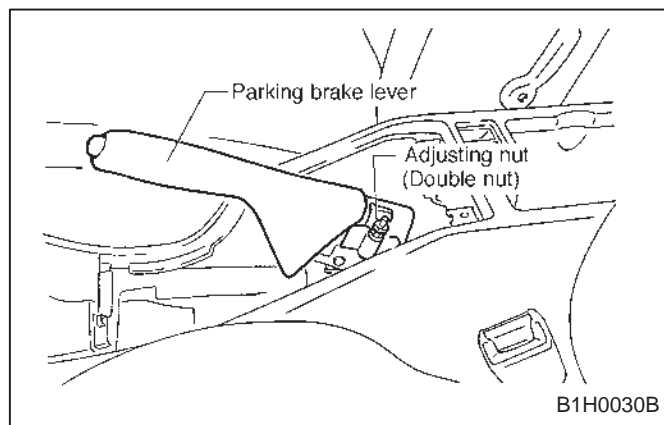
4) Check for even operation of all brakes, using a brake tester or by driving the vehicle for a short distance on a straight road.

2. PARKING BRAKE SYSTEM

1) Operation of parking brake is normal if is applied at sixth notch of ratchet when brake lever is pulled by force of about 196 N (20 kg, 44 lb). Total number of the notches is 21.

Parking brake lever stroke:
7 to 8th notch/196 N (20 kg, 44 lb)

2) Parking brake should be adjusted after adjusting the shoe clearance of rear brakes.
 3) Remove rear console cover.
 4) Adjust parking brake lever by turning adjusting nut (double nut) until parking brake lever stroke is set at 7 to 8 notches with operating force of 196 N (20 kg, 44 lb).



3. BRAKE SERVO SYSTEM

1) With the engine off, depress the brake pedal several times applying the same pedal force: Make sure the travel distance should not change.

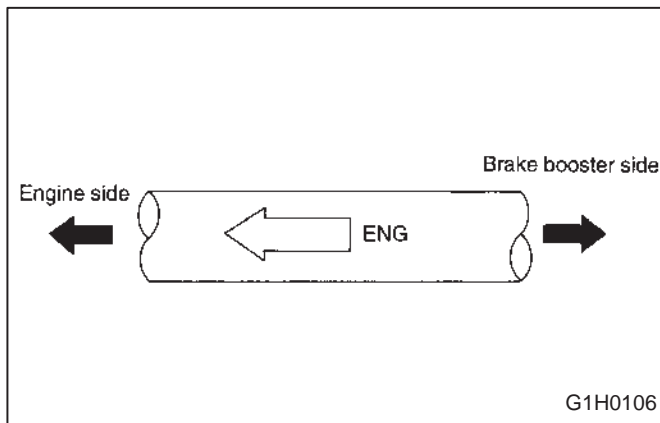
2) With the brake pedal depressed, start the engine: Make sure the pedal should move slightly toward the floor.

3) With the brake pedal depressed, stop the engine and keep the pedal depressed for 30 seconds: Make sure the pedal height should not change.

4) Check valve is built into vacuum hose. Disconnect vacuum hose to inspect function of check valve.

Blow air into vacuum hose from its brake booster side end: Air must flow out of engine side end of hose. Next blow air into hose from engine side: Air should not flow out of hose.

Replace both check valve and vacuum hose if check valve is faulty. Engine side of vacuum hose is indicated by marking "ENGINE" as shown.



5) Check vacuum hose for cracks or other damage.

NOTE:

When installing the vacuum hose on the engine and brake booster, do not use soapy water or lubricating oil on their connections.

6) Check vacuum hose to make sure it is tight and secure.

16. Clutch Operation

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
			I		I		I		I		I		I		I		I

A: INSPECTION AND ADJUSTMENT

1. MECHANICAL CLUTCH TYPE

1) Inspect free play of clutch pedal by operating pedal by hand.

If it is out of the specified value, adjust it by turning wing nut on engine side of clutch cable at release fork.

Tightening torque

(Adjusting nut on release fork):

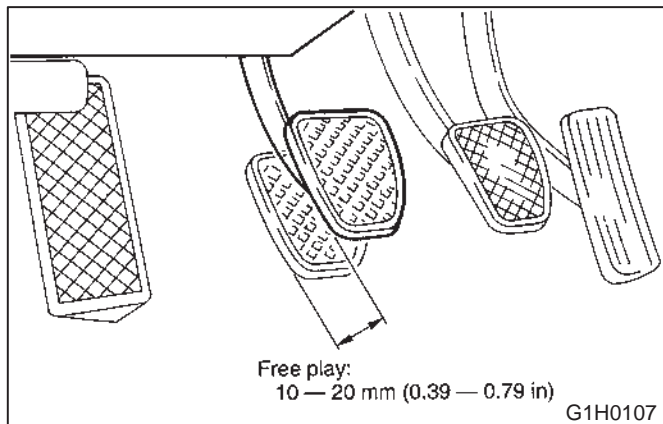
4.4 — 7.4 N.m

(0.45 — 0.75 kg-m, 3.3 — 5.4 ft-lb)

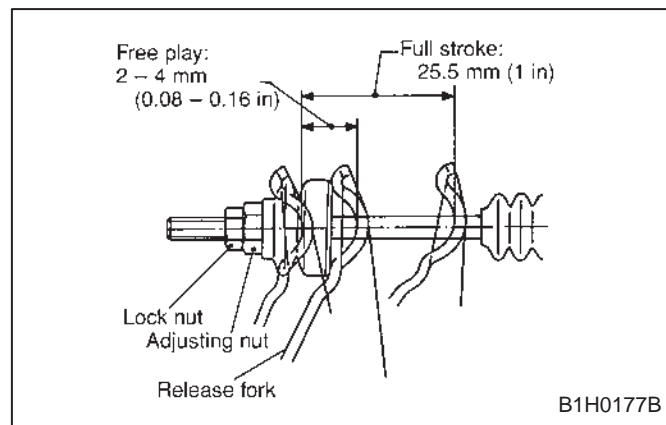
Standard free play:

At clutch pedal

10 — 20 mm (0.39 — 0.79 in)



Fork lever free play allowance:
2 — 4 mm (0.08 — 0.16 in)



2) Pedal-to-floor plate gap in disengaged position

(1) With the engine idling, pull parking brake lever completely.

(2) Slowly depress clutch pedal while moving shift lever into reverse.

(3) Stop depressing clutch pedal when gearshifting is complete. With clutch pedal in this position, measure the distance between the upper side of pedal pad and the lower end of front panel (intersection of front panel with floor). Check that the measured value is within the specified standard.

Standard:

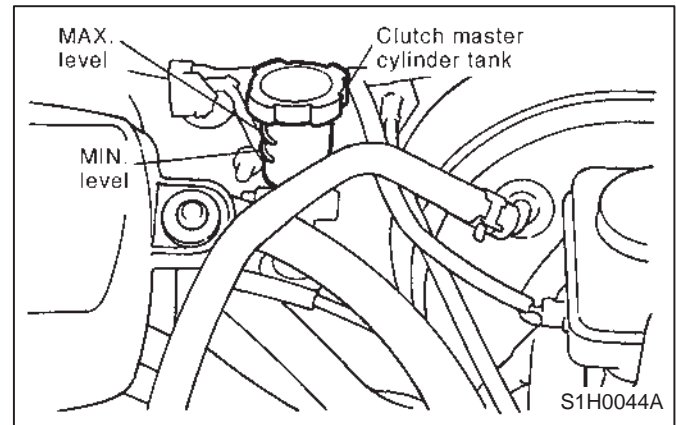
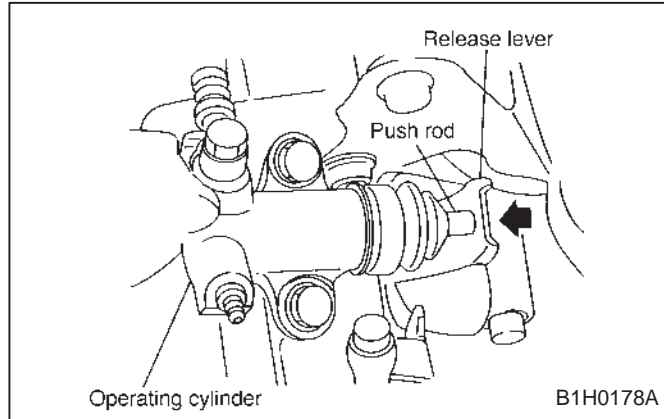
80 mm (3.15 in) or more

3) Pedal height

Check that the clutch pedal pad surface is level with or higher than brake pedal pad surface.

2. HYDRAULIC CLUTCH TYPE

1) Push the release fork to retract the push rod of the operating cylinder and check if the fluid level in the clutch reservoir tank rises or not.



2) If the fluid level rises, pedal free play is correct.

3) If the fluid level does not rise, or the push rod cannot be retracted, adjust the clutch pedal. <Ref. to 4-5 [W1F1].>

4) Inspect the underside of master cylinder, clutch damper and operating cylinder for clutch system, hoses, piping and their couplings for fluid leaks.

If fluid leaks are found, correct them by retightening their fitting bolt and/or replacing their parts.

5) Check the fluid level using the scale on the outside of the clutch master cylinder tank. If the level is below "MIN", add clutch fluid to bring it up to "MAX".

Recommended clutch fluid:

FMVSS No. 116, fresh DOT3 or DOT4 brake fluid

CAUTION:

- Avoid mixing different brakes of brake fluid to prevent degradation of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.
- Use fresh DOT3 or DOT4 brake fluid when refilling fluid.

17. Steering and Suspension System

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
			I		I		I		I		I		I		I		I

A: INSPECTION

1. STEERING WHEEL

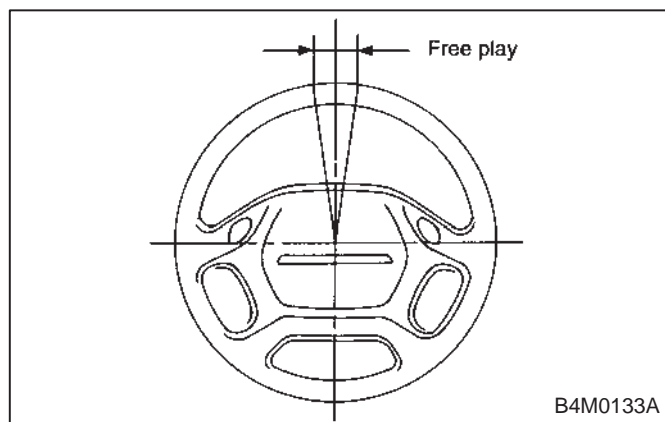
1) Set steering wheel in a straight-ahead position, and check wheel spokes to make sure they are correctly set in their specified positions.

2) Lightly turn steering wheel to the left and right to determine the point where front wheels start to move.

Measure the distance of the movement of steering wheel at the outer periphery of wheel.

Steering wheel free play:

0 — 17 mm (0 — 0.67 in)



Move steering wheel vertically toward the shaft to ascertain if there is play in the direction.

Maximum permissible play:

0.5 mm (0.020 in)

3) Drive vehicle and check the following items during operation.

(1) Steering force

The effort required for steering should be smooth and even at all points, and should not vary.

(2) Pull to one side

Steering wheel should not be pulled to either side while driving on a level surface.

(3) Wheel runout

Steering wheel should not show any sign of runout.

(4) Return factor

Steering wheel should return to its original position after it has been turned and then released.

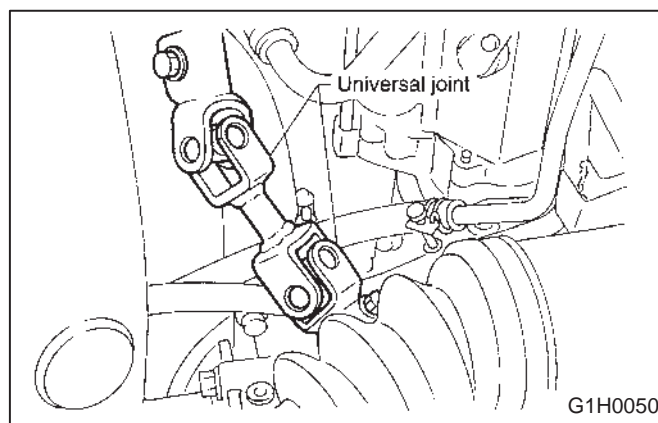
2. STEERING SHAFT JOINT

1) When steering wheel free play is excessive, disconnect universal joint of steering shaft and check it for any play and yawing torque (at the point of the crossing direction). Also inspect for any damage to sealing or worn serrations. If the joint is loose, retighten the mounting bolts to the specified torque.

Tightening torque:

21 — 26 N.m

(2.1 — 2.7 kg-m, 15 — 19 ft-lb)



3. GEARBOX

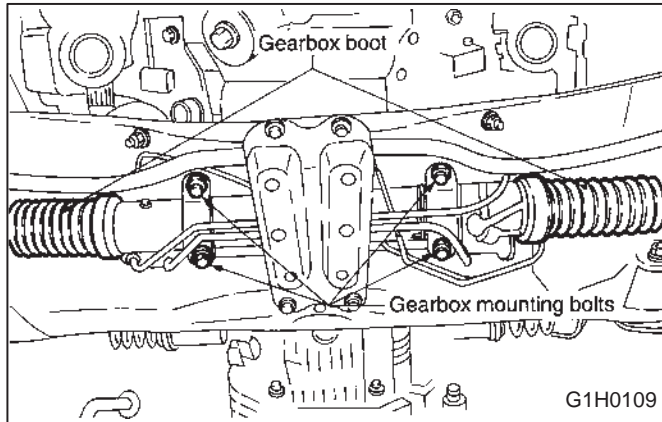
1) With wheels placed on a level surface, turn steering wheel 90° in both the left and right directions.

While wheel is being rotated, reach under vehicle and check for looseness in gearbox.

Tightening torque:

47 — 71 N.m

(4.8 — 7.2 kg-m, 35 — 52 ft-lb)



2) Check boot for damage, cracks or deterioration.

3) With vehicle on a level surface, quickly turn steering wheel to the left and right.

While steering wheel is being rotated, check the gear backlash. If any unusual noise is noticed, adjust the gear backlash in the following manner.

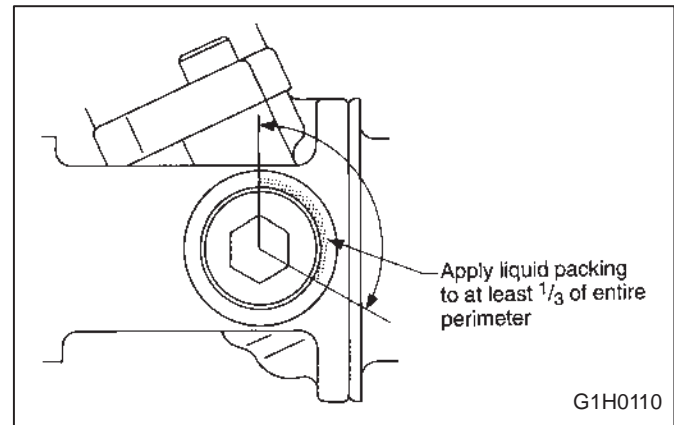
Liquid packing:

Three Bond 1102 or equivalent

(1) Tighten adjusting screw to 5 N.m (0.5 kg-m, 3.6 ft-lb) and then loosen. Repeat this operation twice.

(2) Retighten adjusting screw to 5 N.m (0.5 kg-m, 3.6 ft-lb) and back off 30°.

(3) Apply liquid packing to at least 1/3 of entire perimeter of adjusting screw thread.



(4) Install lock nut. While holding adjusting screw with a wrench, tighten lock nut using SPANNER (926230000).

Tightening torque (Lock nut):

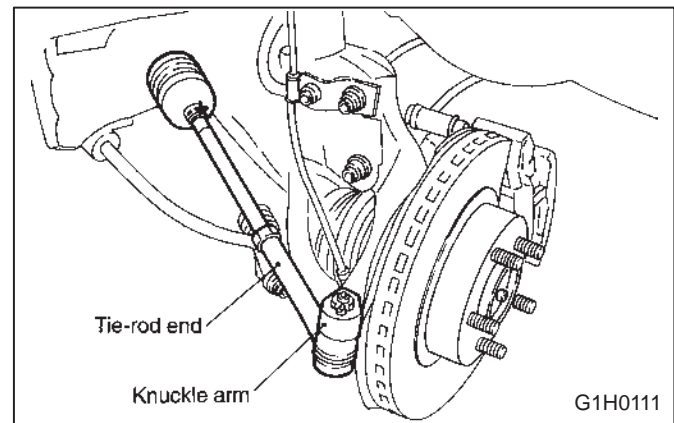
29 — 49 N.m

(3.0 — 5.0 kg-m, 22 — 36 ft-lb)

Hold the adjusting screw with a wrench to prevent it from turning while tightening the lock nut.

4. TIE-ROD

1) Check tie-rod and tie-rod ends for bends, scratches or other damage.



2) Check connections of knuckle ball joints for play, inspect for damage on dust seals, and check free play of ball studs. If castle nut is loose, retighten it to the specified torque, then tighten further up to 60° until cotter pin hole is aligned.

Tightening torque:

25 — 29 N.m

(2.5 — 3.0 kg-m, 18 — 22 ft-lb)

3) Check lock nut on the tie-rod end for tightness. If it is loose, retighten it to the specified torque.

Tightening torque:

78 — 88 N.m (8 — 9 kg-m, 58 — 65 ft-lb)

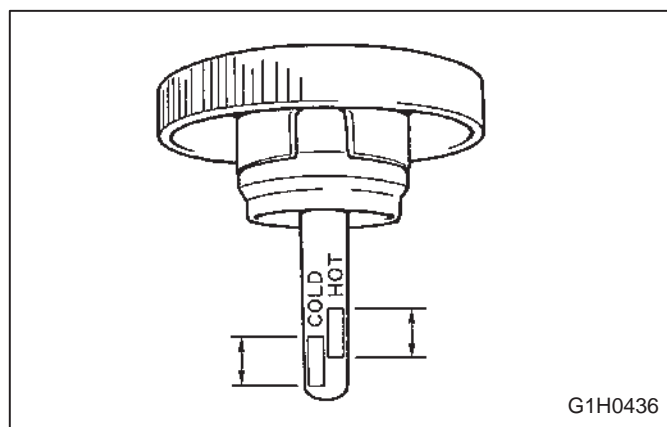
5. POWER STEERING FLUID LEVEL

1) Place vehicle with engine "off" on the flat and level surface.

2) Check the fluid level by removing filler cap of oil pump.

(1) Check at temperature 21°C (70°F) of fluid temperature, read the fluid level on the "COLD" side.

(2) Check at temperature 60°C (140°F) of fluid temperature, read the fluid level on the "HOT" side.



3) Fluid level should be maintained in the each specified range on the indicator of filler cap. If fluid level is at lower point or below, add fluid to keep the level in the specified range of indicator.

If fluid level is at upper point or above, drain fluid to keep the level in the specified range of indicator by using a syringe or the like.

Recommended fluid	Manufacturer
Dexron II, Dexron IIE or Dexron III type	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TEXACO

Fluid capacity:

0.7 ℓ (0.7 US qt, 0.6 Imp qt)

6. POWER STEERING FLUID FOR LEAKS

Inspect the underside of oil pump and gearbox for power steering system, hoses, piping and their couplings for fluid leaks.

If fluid leaks are found, correct them by retightening their fitting bolts (or nuts) and/or replacing their parts.

NOTE:

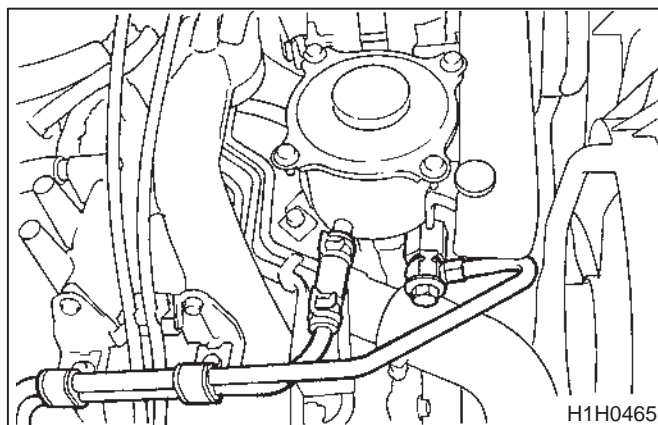
- Wipe the leakage fluid off after correcting fluid leaks, or a wrong diagnosis is taken later.
- Also pay attention to clearances between hoses (or pipings) and other parts when inspecting fluid leaks.

7. HOSES OF OIL PUMP FOR DAMAGES

Check pressure hose and return hose of oil pump for crack, swell or damage. Replace hose with new one if necessary.

NOTE:

Prevent hoses from revolving and/or turning when installing hoses.



8. POWER STEERING PIPES FOR DAMAGE

Check power steering pipes for corrosion and damage.

Replace pipes with new one if necessary.

9. GEARBOX BOOTS

Inspect both sides of gearbox boots as follows, and correct the defects if necessary.

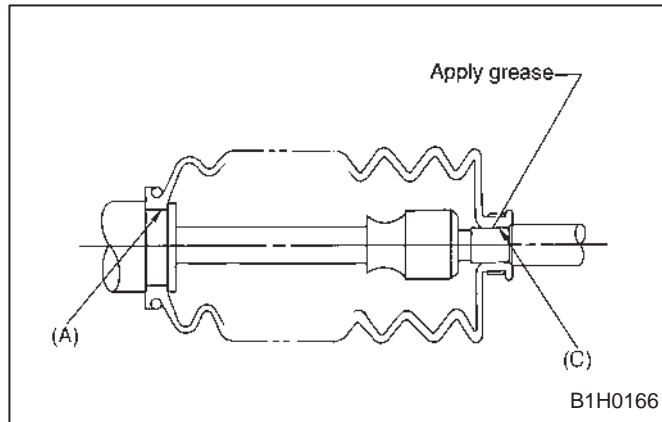
1) (A) and (C) positions of gearbox boot are fitted correspondingly in (A) and (C) grooves of gearbox and the rod.

2) Clips are fitted outside of (A) and (C) positions of boot.

3) Boot does not have crack and hole.

NOTE:

Rotate (C) position of gearbox boot against twist of it produced by adjustment of toe-in, etc.



10. FITTING BOLTS AND NUTS

Inspect fitting bolts and nuts of oil pump and bracket for looseness, and retighten them if necessary.

Inspect and/or retighten them when engine is cold. <Ref. to 4-3 [C200].>

11. SUSPENSION BALL JOINT

1) Play of front ball joint

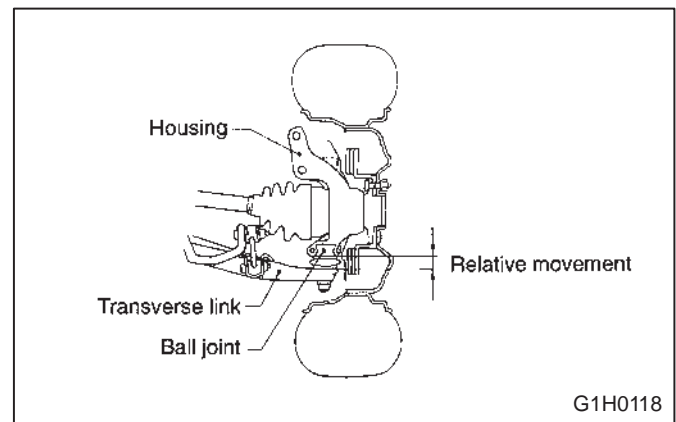
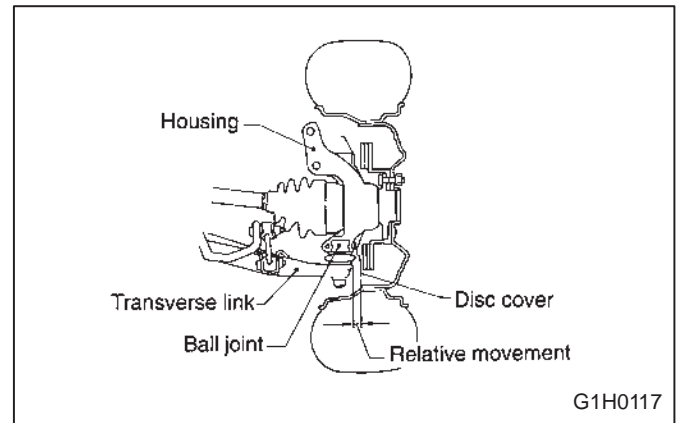
Inspect every 25,000 km (15,000 miles) or 12 month, whichever occurs first.

(1) Jack up vehicle until front wheels are off ground.

(2) Next, grasp bottom of tire and move it in and out. If relative movement is observed between brake disc cover and end of transverse link, ball joint may be excessively worn.

(3) Next, grasp end of transverse link and move it up and down. Relative movement between housing and transverse link boss indicates ball joint may be excessively worn.

(4) If relative movement is observed in the immediately preceding two steps, remove and inspect ball joint. If free play exceeds standard, replace ball joint. <Ref. to 4-1 [W3A0].>



2) Damage of dust seal

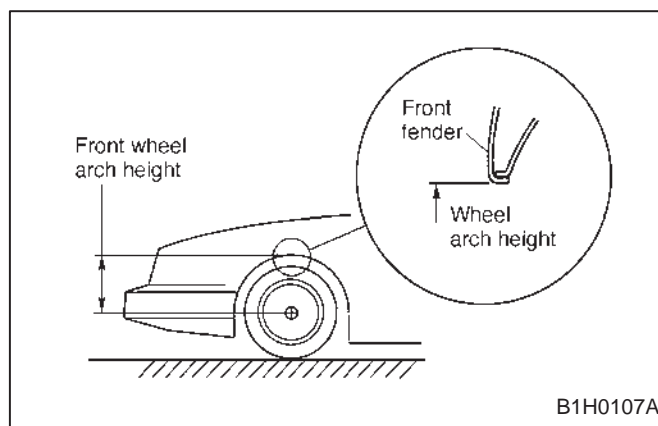
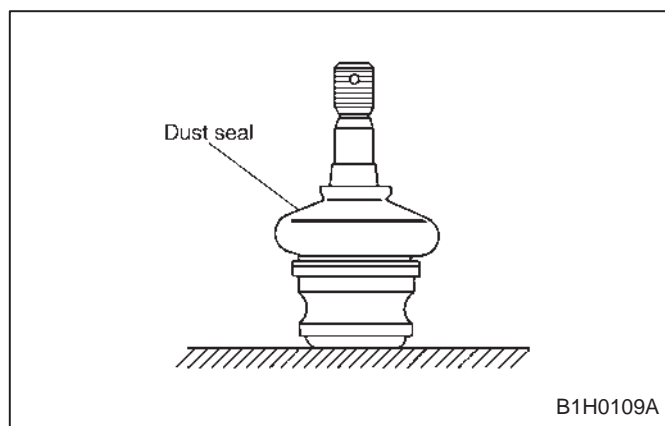
Inspect every 25,000 km (15,000 miles) or 12 months, whichever occurs first. Visually inspect ball joint dust seal. If it is damaged, remove transverse link. <Ref. to 4-1 [W2A0].> And measure free play of ball joint. <Ref. to 4-1 [W3B0].>

(1) When looseness exceeds standard value, replace ball joint.

(2) If the dust seal is damaged, replace with the new ball joint.

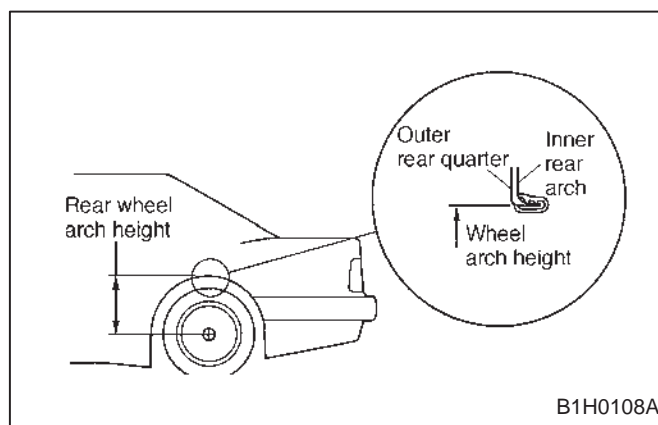
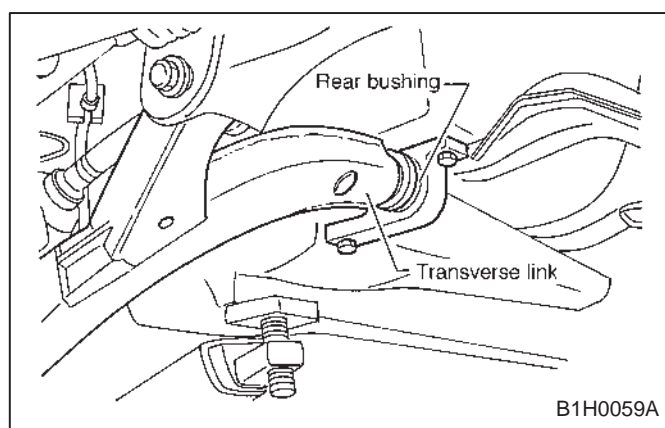
NOTE:

When transverse link ball joint has been removed or replaced, check toe-in of front wheel. If front wheel toe-in is not at specified value, adjust according to chapter 4-1 [W1A0] so that toe-in conforms to service standard.



12. TRANSVERSE LINK'S REAR BUSHING

Check oil leaks at around liquid-filled bushing. If oil leaks, replace bushing.



13. GROUND CLEARANCE (WHEEL ARCH HEIGHT)

Inspect every 50,000 km (30,000 miles) or 24 months, whichever occurs first.

- 1) Unload cargoes and set vehicle in curb weight (empty) condition.
- 2) Then, check ground clearance (wheel arch height) of front and rear suspensions to ensure that they are within specified values.

3) When ground clearance (wheel arch height) is out of standard, visually inspect following components and replace deformed parts.

- Suspension components [Front and rear: strut assembly]
- Body parts to which suspensions are installed.

4) When no components are deformed, adjust ground clearance (wheel arch height) by replacing coil spring in the suspension whose ground clearance is out of standard.

14. WHEEL ALIGNMENT OF REAR SUSPENSION

Inspect every 50,000 km (30,000 miles) or 24 months, whichever occurs first.

1) Check alignment of rear suspension to ensure that following items are within standard values.

- Toe-in
 - Camber angle
 - Thrust angle
- <Ref. to 4-1 [W1A0].>

2) When toe-in, camber angle or thrust angle does not conform to standard value, visually inspect parts listed below. If deformation is observed, replace damaged parts.

- Suspension components [Strut assembly, lateral links, trailing link, crossmember, etc.]
- Body parts to which suspensions are installed.

3) When no components are deformed, adjust toe-in, camber angle and thrust angle so that it conforms to service standard.

15. WHEEL ALIGNMENT OF FRONT SUSPENSION

Inspect every 50,000 km (30,000 miles) or 24 months, whichever occurs first.

1) Check alignment of front suspension to ensure that following items conform to standard values.

- Toe-in
 - Camber angle
 - Caster angle
 - Steering angle
- <Ref. to 4-1 [W1A0].>

2) When caster angle does not conform to standard value, visually inspect following components and replace deformed parts.

- Suspension components [Strut assembly, crossmember, transverse link, etc.]
- Body parts to which suspensions are installed.

3) When toe-in and camber is out of standard value adjust so that it conforms to service standard.

4) When right-and-left turning angles of tire are out of standard, adjust to standard value.

16. OIL LEAKAGE OF STRUT

Inspect every 50,000 km (30,000 miles) or 24 months, whichever occurs first.

Visually inspect strut for oil leakage as instructed in chapter 4-1 [W4C1]. Replace strut if oil leaks excessively.

17. TIGHTNESS OF BOLTS AND NUTS

Inspect every 50,000 km (30,000 miles) or 24 months, whichever occurs first. Check bolts shown in the figure for looseness. Retighten bolts to specified torque. If self-lock nuts and bolts are removed, replace them with new ones.

Tightening torque:

T1:

98 ± 15 N.m

(10 ± 1.5 kg-m, 72 ± 11 ft-lb)

T2:

245 ± 49 N.m

(25 ± 5 kg-m, 181 ± 36 ft-lb)

T3:

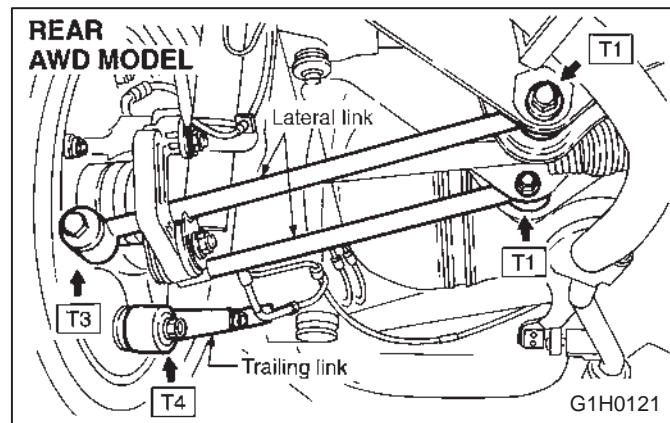
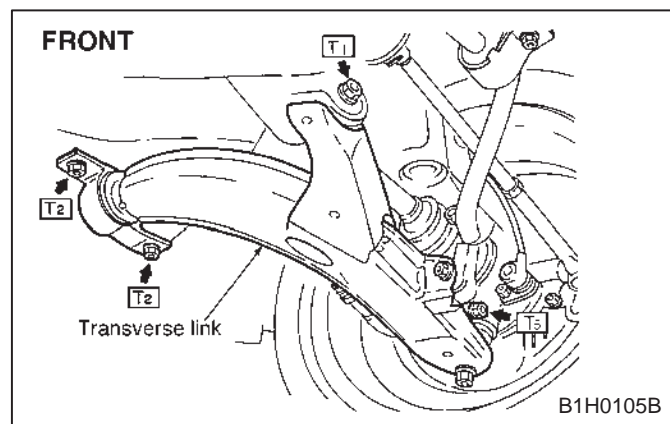
139 ± 21 N.m

(14 ± 2 kg-m, 101.5 ± 14.5 ft-lb)

T4:

112.5 ± 14.5 N.m

(11.5 ± 1.5 kg-m, 83 ± 11 ft-lb)



18. DAMAGE TO SUSPENSION PARTS

1) Check the following parts and the fastening portion of the car body for deformation or excessive rusting which impairs the suspension. If necessary, replace damaged parts with new ones. If minor rust formation, pitting, etc. are noted, remove rust and apply remedial anti-corrosion measures.

- Front suspension
- Transverse link

- Crossmember
- Strut
- Rear suspension
 - Crossmember
 - Lateral links
 - Trailing link
 - Strut
- In the district where salt is sprayed to melt snow on a road in winter, check suspension parts for damage caused by rust every 12 months after lapse of 60 months. Take rust prevention measure as required.

18. Front and Rear Wheel Bearing Lubricant

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
									(I)								(I)

A: INSPECTION

1. FRONT WHEEL BEARING

NOTE:

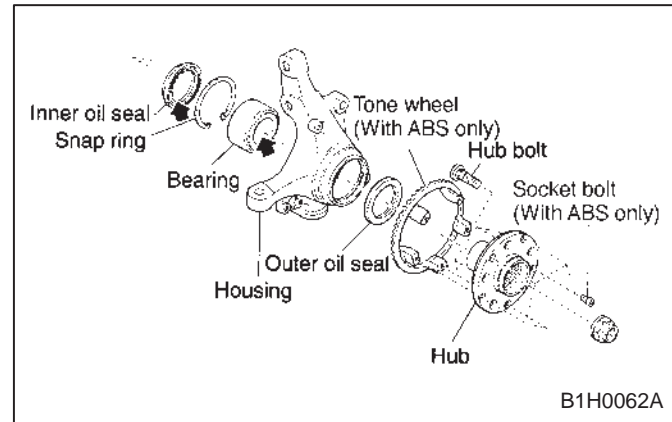
Inspect the condition of front wheel bearing grease.

- 1) Jack up the front of vehicle.
- 2) While holding front wheel by hand, swing it in and out to check bearing free play.
- 3) Loosen wheel nuts and remove front wheel.
- 4) If bearing free play exists, attach a dial gauge to hub and measure axial displacement in axial direction.

Service limit:

Straight-ahead position within 0.05 mm (0.0020 in)

- 5) Remove bolts and self-locking nuts, and extract transverse link from front crossmember.
 - 6) While lightly hammering spring pin which secures S.F.J. to transmission spindle, remove it.
 - 7) Extract S.F.J. from transmission spindle. <Ref. to 4-2 [W1A0].>
 - 8) While supporting front drive shaft horizontally with one hand, turn hub with the other to check for noise or binding.
- If hub is noisy or binds, disassemble front axle and check condition of oil seals, bearing, etc.



2. REAR WHEEL BEARING

NOTE:

Inspect the condition of rear wheel bearing grease.

- 1) Jack up the rear of vehicle.
- 2) While holding rear wheel by hand, swing it in and out to check bearing free play.
- 3) Loosen wheel nuts and remove rear wheel.
- 4) If bearing free play exists in step 2) above, attach a dial gauge to hub and measure axial displacement in axial direction.

Service limit:

Straight-ahead position within 0.05 mm (0.0020 in)

- 5) Turn hub by hand to check for noise or binding. If hub is noisy or binds, disassemble rear axle and check condition of oil seals, bearings, etc.
- 6) Remove bolts and self-locking nuts, and remove front lateral link from cross member.

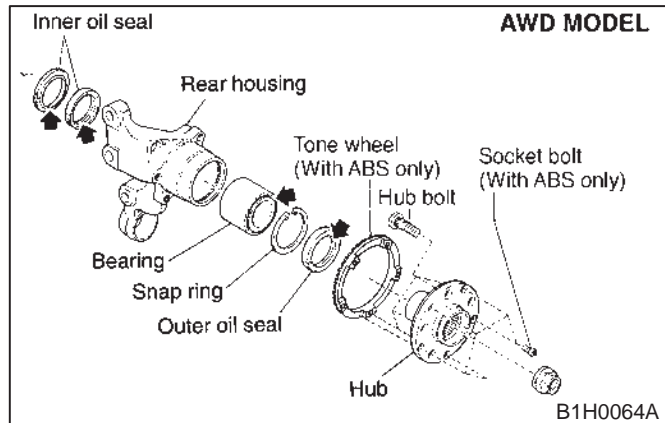
1-5 [G18A2] PERIODIC MAINTENANCE SERVICES

18. Front and Rear Wheel Bearing Lubricant

7) Remove the DOJ of rear drive shaft from rear differential. <Ref. to 4-2 [W2A0].>

8) While supporting rear drive shaft horizontally with one hand, turn hub with the other to check for noise or binding.

If hub is noisy or binds, disassemble rear axle and check condition of oil seals, bearings, etc.



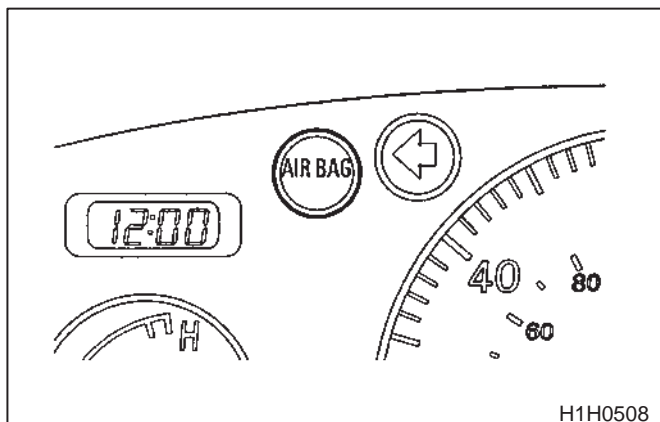
19. Supplemental Restraint System (Airbag)

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
×1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
×1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
	Inspect every 10 years																

A: INSPECTION

Check the airbag system in accordance with the result of the self-diagnosis. <Refer to 5-5 [T4A0].>

- 1) Ensure that airbag connectors are connected. If not, properly connect (also double lock the connector). When the ignition switch is turned ON with the connector(s) disconnected, the airbag warning light blinks to identify the fault.
- 2) Turn the ignition switch ON, and connect the airbag diagnosis terminal of the service connector (located below lower cover) to the ground terminal.
- 3) The warning light blinks to indicate a trouble code (a fault is identified). When the airbag system is in good order (no trouble codes are stored in the memory), the warning light blinks on and off at 0.6 second intervals (as long as the diagnosis terminal is connected to the ground terminal).
- 4) When the warning light indicates a trouble code, check the airbag system in accordance with the troubleshooting procedure. <Ref. to 5-5 [T4A0].>



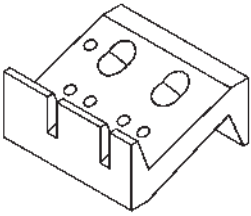
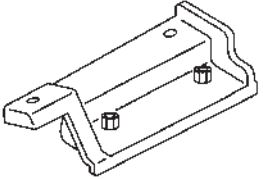
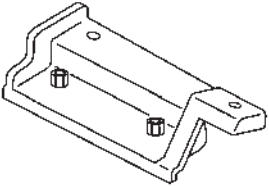
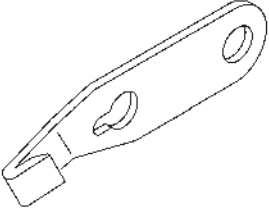
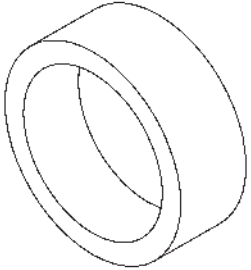
20. Valve Clearance

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
															I		

A: INSPECTION

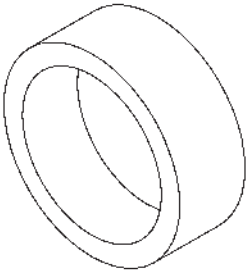
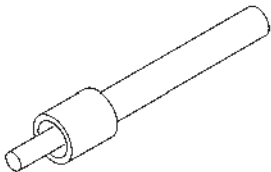
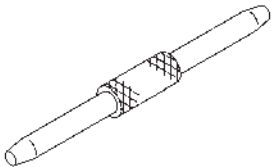
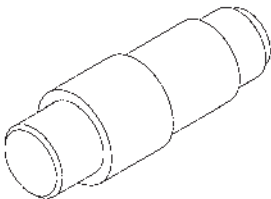
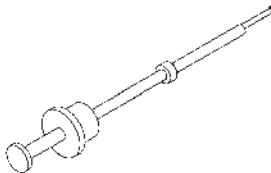
For the inspection procedures of the valve clearance on SOHC models, refer to "ON-CAR SERVICE". <Ref. to 2-2 [W800].>

1. Engine Tools

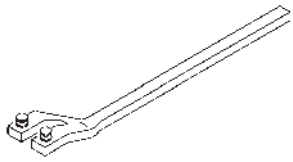
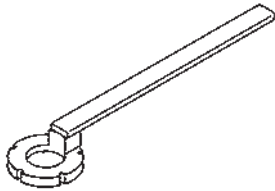
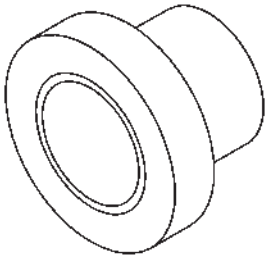
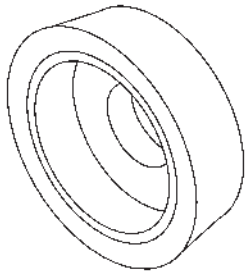
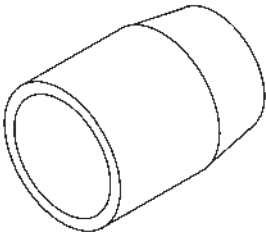
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0304	498267800	CYLINDER HEAD TABLE	<ul style="list-style-type: none"> Used for replacing valve guides. Used for removing and installing valve springs.
 G1H0128	498457000	ENGINE STAND ADAPTER RH	Used with ENGINE STAND (499817000).
 G1H0129	498457100	ENGINE STAND ADAPTER LH	Used with ENGINE STAND (499817000).
 B1H0194	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening and tightening crankshaft pulley bolt, etc.
 B1H0195	498747100	PISTON GUIDE	<ul style="list-style-type: none"> Used for installing piston in cylinder. For 2200 cc engine.

SPECIAL TOOLS

[G100] 1-6
1. Engine Tools

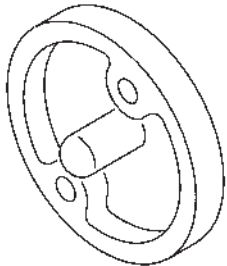
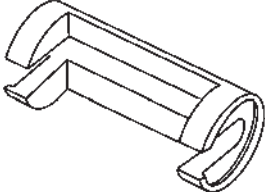
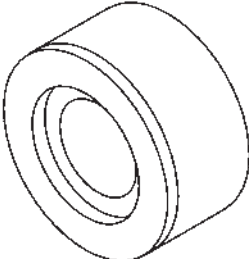
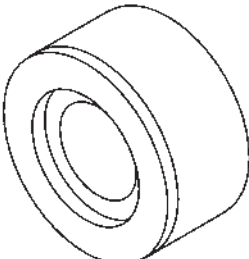
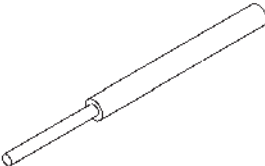
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0195	498747300	PISTON GUIDE	<ul style="list-style-type: none"> Used for installing piston in cylinder. For 2500 cc engine.
 B1H0197	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 B1H0198	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 B1H0199	499037100	CONNECTING ROD BUSHING REMOVER & INSTALLER	Used for removing and installing connecting rod bushing.
 B1H0200	499097700	PISTON PIN REMOVER ASSY	Used for removing piston pin.

1. Engine Tools

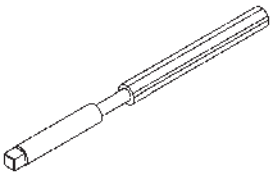
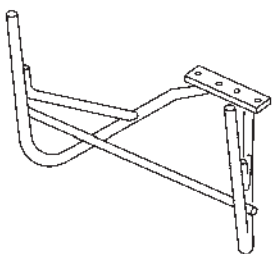
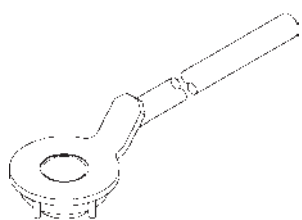
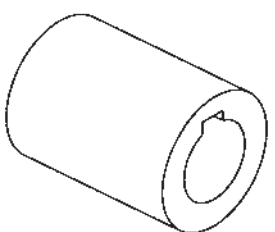
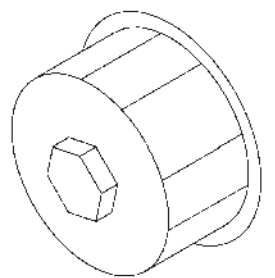
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0201	499207100	CAMSHAFT SPROCKET WRENCH	Used for removing and installing camshaft sprocket (left side).
 B1H0305	499207400	CAMSHAFT SPROCKET WRENCH	Used for removing and installing camshaft sprocket (right side).
 B1H0203	499587700	CAMSHAFT OIL SEAL INSTALLER	Used for installing cylinder head plug.
 B1H0204	499587200	CRANKSHAFT OIL SEAL INSTALLER	<ul style="list-style-type: none"> Used for installing crankshaft oil seal. Used with CRANKSHAFT OIL SEAL GUIDE (499597100).
 H1H0494	499597000	CAMSHAFT OIL SEAL GUIDE	<ul style="list-style-type: none"> Used for installing camshaft oil seal. Used with CAMSHAFT OIL SEAL INSTALLER (499587500).

SPECIAL TOOLS

[G100] 1-6
1. Engine Tools

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">H1H0495</p>	499597100	CRANKSHAFT OIL SEAL GUIDE	<ul style="list-style-type: none"> Used for installing crankshaft oil seal. Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).
 <p style="text-align: center;">G1H0142</p>	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 <p style="text-align: center;">H1H0496</p>	499767700	VALVE GUIDE ADJUSTER	Used for installing intake valve guides.
 <p style="text-align: center;">H1H0496</p>	499767800	VALVE GUIDE ADJUSTER	Used for installing exhaust valve guides.
 <p style="text-align: center;">B1H0205</p>	499767200	VALVE GUIDE REMOVER	Used for removing valve guides.

1. Engine Tools

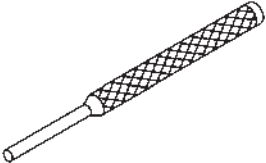
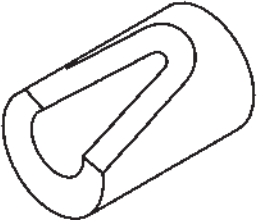
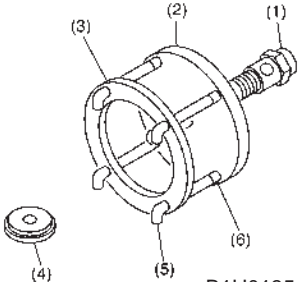
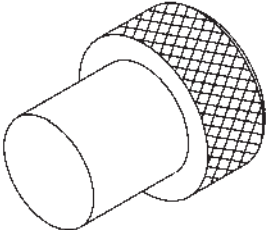
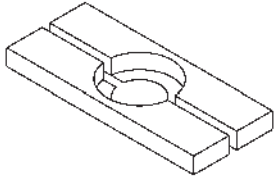
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B1H0206</p>	499767400	VALVE GUIDE REAMER	Used for reaming valve guides.
 <p>G1H0146</p>	499817000	ENGINE STAND	<ul style="list-style-type: none"> Stand used for engine disassembly and assembly. Used with ENGINE STAND ADAPTER RH (498457000) & LH (498457100).
 <p>B1H0274</p>	499977300	CRANK PULLEY WRENCH	<ul style="list-style-type: none"> Used for stopping rotation of crankshaft pulley when loosening and tightening crankshaft pulley bolts. For 2200 cc engine.
 <p>G1H0148</p>	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 <p>B1H0208</p>	498547000	OIL FILTER WRENCH	Used for removing and installing oil filter.

SPECIAL TOOLS

[G100] 1-6
1. Engine Tools

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
<p>B1H0207</p>	499977100	CRANK PULLEY WRENCH	<ul style="list-style-type: none"> Used for stopping rotation of crankshaft pulley when loosening and tightening crankshaft pulley bolts. For 2500 cc engine.
<p>B1H0286</p>	499497000	TORX PLUS	Used for removing and installing camshaft cap.
<p>B1H0203</p>	499587500	OIL SEAL INSTALLER	Used for installing front camshaft oil seal.

2. Manual Transmission and Differential Tools

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0209	398791700	REMOVER II	Used for removing and installing spring pin (6 mm).
 B1H0210	399411700	ACCENT BALL INSTALLER	Used for installing reverse shifter rail arm.
 B1H0135A	399527700	PULLER SET	Used for removing and installing roller bearing (Differential). (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) ADAPTER (398497701) (5) BOLT (899520107) (6) NUT (021008000)
 B1H0211	399780104	WEIGHT	Used for measuring preload on roller bearing.
 G1H0156	498077000	5TH DRIVEN GEAR REMOVER	Used for removing roller bearing of drive pinion shaft.

SPECIAL TOOLS

[G200] 1-6

2. Manual Transmission and Differential Tools

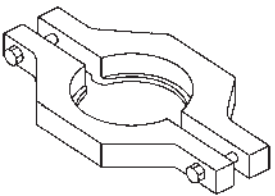
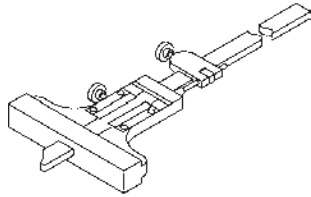
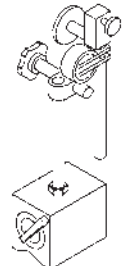
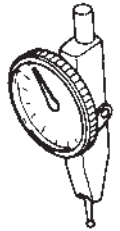
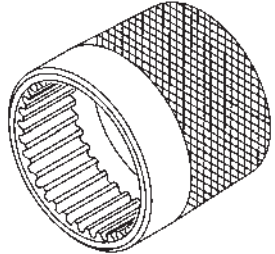
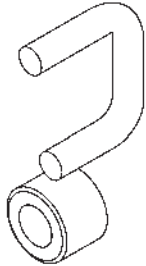
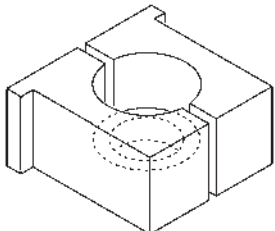
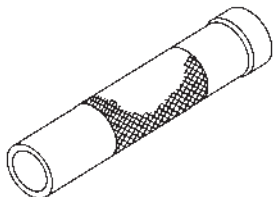
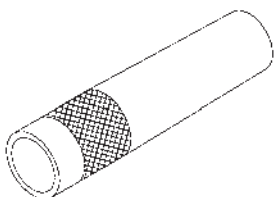
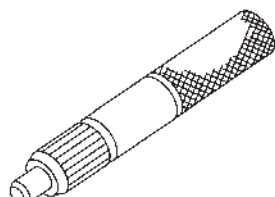
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>G1H0157</p>	498077300	CENTER DIFFERENTIAL BEARING REMOVER	Used for removing the center differential cover ball bearing.
 <p>B1H0136</p>	498147000	DEPTH GAUGE	Used for adjusting main shaft axial end play.
 <p>B1H0137</p>	498247001	MAGNET BASE	<ul style="list-style-type: none"> Used for measuring backlash between side gear and pinion, and hypoid gear. Used with DIAL GAUGE (498247100).
 <p>G1H0160</p>	498247100	DIAL GAUGE	<ul style="list-style-type: none"> Used for measuring backlash between side gear and pinion, and hypoid gear. Used with MAGNET BASE (498247001).
 <p>B1H0213</p>	498427100	STOPPER	Used for removing and installing drive pinion shaft assembly lock nut.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 G1H0163	498787100	MAIN SHAFT STOPPER	Used for removing and installing transmission main shaft.
 G1H0164	498937000	TRANSMISSION HOLDER	Used for removing and installing transmission main shaft lock nut.
 G1H0165	499277100	BUSH 1-2 INSTALLER	Used for installing 1st driven gear thrust plate and 1st-2nd driven gear bush.
 B1H0214	499277200	INSTALLER	Used for press-fitting the 2nd driven gear, roller bearings, & 5th driven gear onto the driven shaft (AWD).
 G1H0167	499747100	CLUTCH DISC GUIDE	Used when installing clutch disc to flywheel.

SPECIAL TOOLS

[G200] 1-6

2. Manual Transmission and Differential Tools

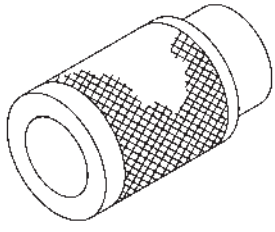
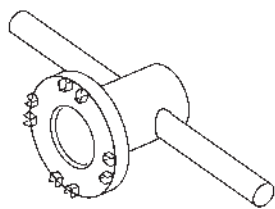
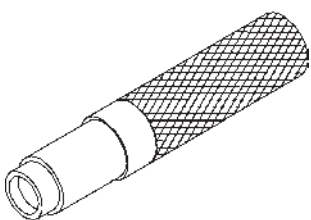
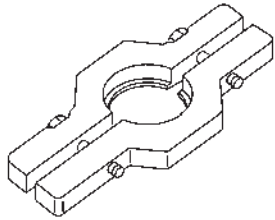
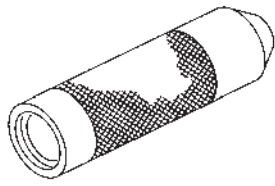
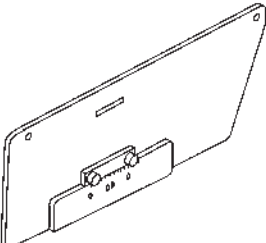
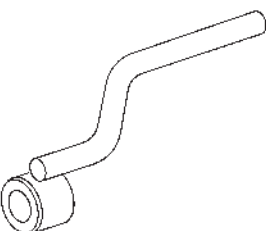
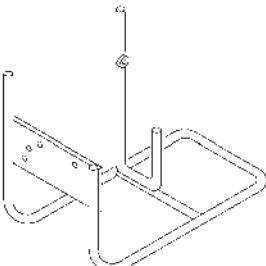
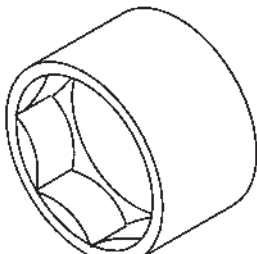
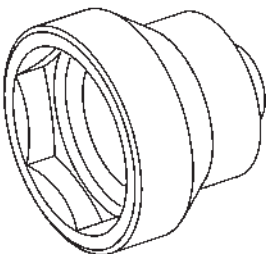
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 G1H0168	499757002	SNAP RING PRESS	Used for installing snap ring (OUT 25), and ball bearing (25 x 26 x 17).
 G1H0169	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.
 G1H0171	499827000	PRESS	Used for installing speedometer oil seal.
 G1H0172	499857000	5TH DRIVEN GEAR REMOVER	Used for removing 5th driven gear.
 G1H0173	499877000	RACE 4-5 INSTALLER	<ul style="list-style-type: none"> Used for installing 4th needle bearing race and ball bearing onto transmission main shaft. Used with REMOVER (899714110).

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 G1H0174	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting drive pinion shim.
 G1H0175	499927100	HANDLE	Used for fitting transmission main shaft.
 B1H0215	499937100	TRANSMISSION STAND	Stand used for transmission disassembly and assembly.
 B1H0216	499987003	SOCKET WRENCH (35)	Used for removing and installing driven pinion lock nut and main shaft lock nut.
 G1H0178	499987300	SOCKET WRENCH (50)	Used for removing and installing driven gear assembly lock nut.

SPECIAL TOOLS

[G200] 1-6

2. Manual Transmission and Differential Tools

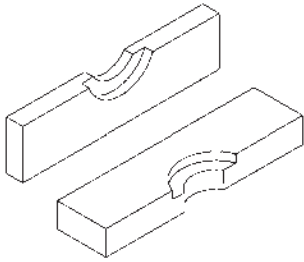
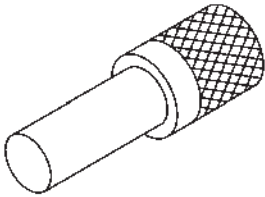
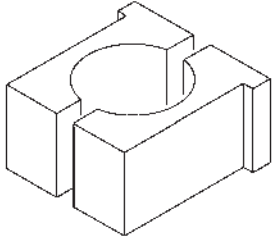
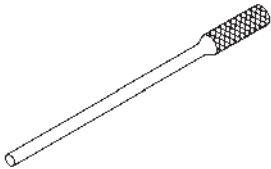
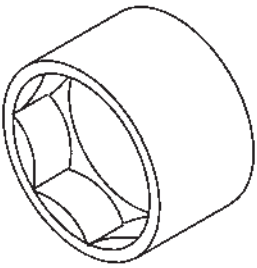
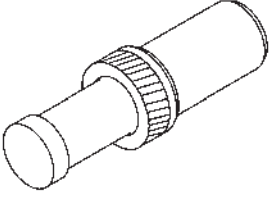
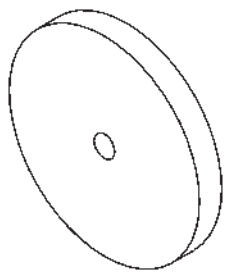
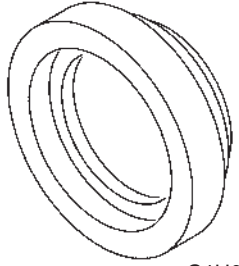
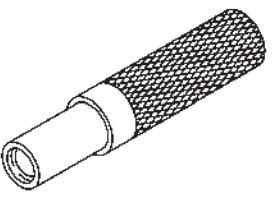
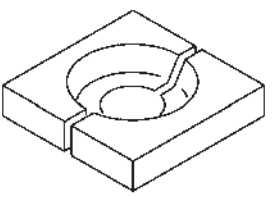
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B1H0217</p>	899714110	REMOVER	Used for fixing transmission main shaft, drive pinion, rear drive shaft.
 <p>B1H0218</p>	899864100	REMOVER	Used for removing parts on transmission main shaft and drive pinion.
 <p>B1H0219</p>	899884100	HOLDER	Used for tightening lock nut on sleeve.
 <p>B1H0220</p>	899904100	REMOVER	Used for removing and installing straight pin.
 <p>B1H0216</p>	899988608	SOCKET WRENCH (27)	Used for removing and installing drive pinion lock nut.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 G1H0184	499547300	INSTALLER SET	Used for installing adjusting washer of viscous coupling.
 B1H0222	398497701	ADAPTER	<ul style="list-style-type: none"> Used for installing roller bearing onto differential case. Used with INSTALLER (499277100).
 G1H0330	499587000	INSTALLER	Used for installing driven gears to driven shaft.
 G1H0328	899824100	PRESS	Used for installing speedometer shaft oil seal.
 G1H0379	498517000	REPLACER	Used for removing drive pinion thrust plate and roller bearing race.

SPECIAL TOOLS

[G200] 1-6

2. Manual Transmission and Differential Tools

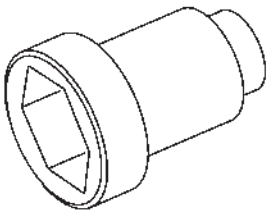
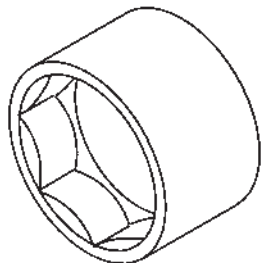
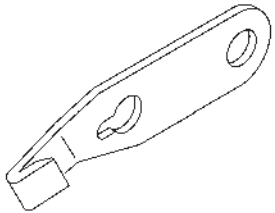
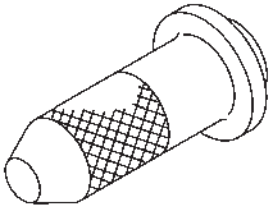
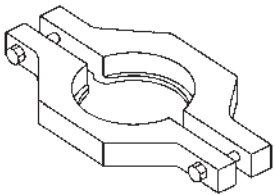
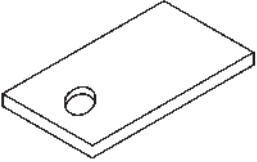
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0074	499987100	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.
 B1H0216	899984103	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.
 B1H0194	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening tightening bolt, etc.
 G1H0188	498057300	INSTALLER	Used for installing extension oil seal.
 G1H0157	498077400	SYNCHRONIZER CONE REMOVER	<ul style="list-style-type: none"> Used for removing synchronizer cone of main shaft. For 2500 cc engine.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B1H0285</p>	498255400	PLATE	Used for measuring backlash of hypoid gear.

3. Automatic Transmission and Differential Tools

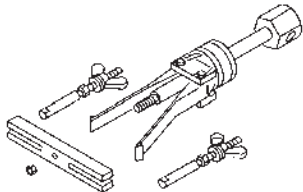
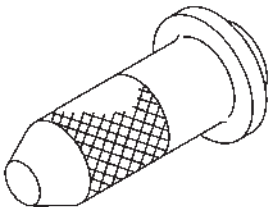
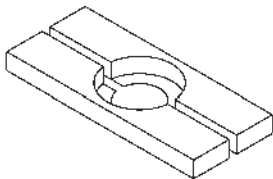
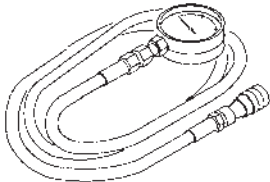
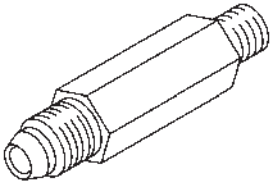
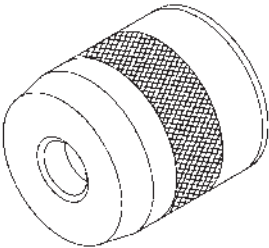
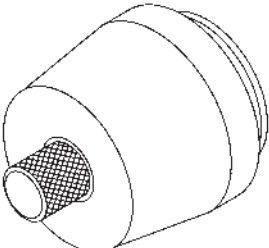
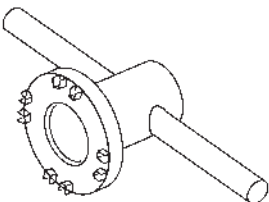
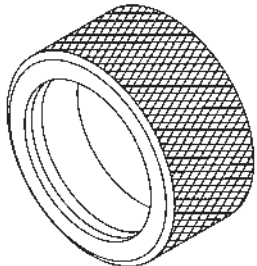
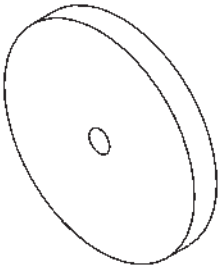
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B1H0138</p>	398527700	PULLER ASSY	Used for removing One-way clutch needle bearing.
 <p>G1H0188</p>	498057300	INSTALLER	Used for installing extension oil seal.
 <p>G1H0156</p>	498077000	REMOVER	Used for removing differential taper roller bearing.
 <p>B1H0139</p>	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 <p>G1H0194</p>	498897200	ADAPTER	Used on oil pump housing when measuring reverse clutch pressure and line pressure.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0227	499247400	INSTALLER	<ul style="list-style-type: none"> Used for installing transfer outer snap ring. Used with GUIDE (499257300).
 B1H0228	499257300	GUIDE	<ul style="list-style-type: none"> Used for installing transfer outer snap ring. Used with INSTALLER (499247400).
 G1H0169	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.
 G1H0200	398437700	DRIFT	Used for installing converter case oil seal.
 B1H0222	398497701	INSTALLER	Used for installing converter case oil seal.

SPECIAL TOOLS

[G300] 1-6

3. Automatic Transmission and Differential Tools

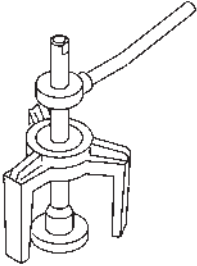
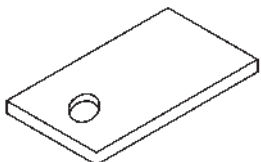
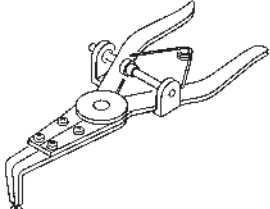

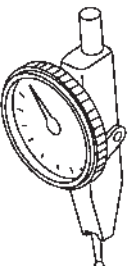
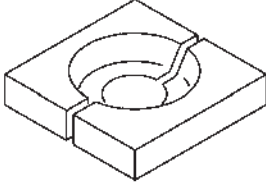
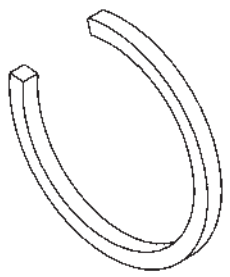
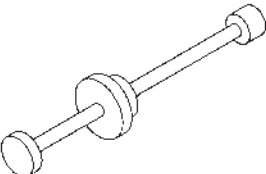
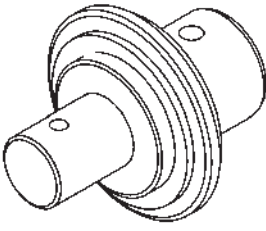
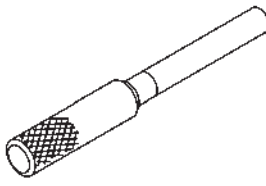
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B1H0140</p>	398673600	COMPRESSOR	Used for removing and installing clutch spring.
 <p>B1H0285</p>	498255400	PLATE	Used for measuring backlash of hypoid gear.
 <p>B1H0142</p>	399893600	PLIER	Used for removing and installing clutch spring.
 <p>B1H0137</p>	498247001	MAGNET BASE	<ul style="list-style-type: none"> Used for measuring gear backlash. Used with DIAL GAUGE (498247100).
 <p>G1H0160</p>	498247100	DIAL GAUGE	<ul style="list-style-type: none"> Used for measuring gear backlash. Used with MAGNET BASE (498247001).

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 G1H0379	498517000	REPLACER	Used for removing front roller bearing.
 B1H0231	398623600	SEAT	Used for removing snapping of transfer clutch piston.
 B1H0232	499095500	REMOVER ASSY	Used for removing axle shaft.
 G1H0209	499247300	INSTALLER	<ul style="list-style-type: none"> Used for removing axle shaft. Used with REMOVER (499095500).
 G1H0210	499267300	STOPPER PIN	Used for installing inhibitor switch.

SPECIAL TOOLS

[G300] 1-6

3. Automatic Transmission and Differential Tools

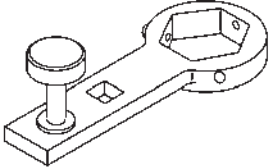
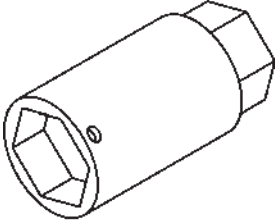
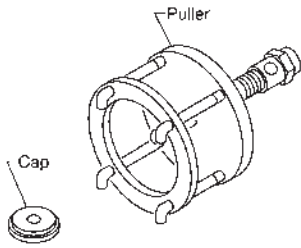
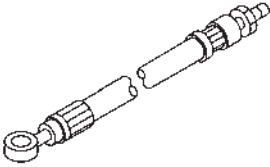
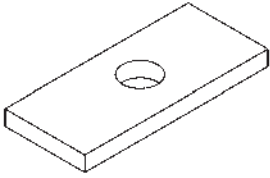
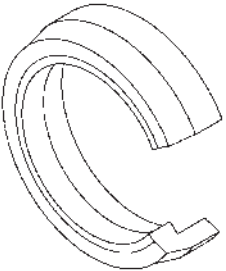
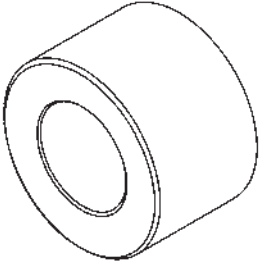
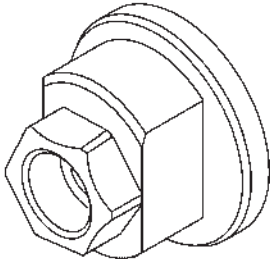
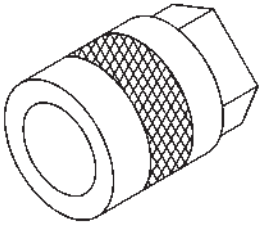
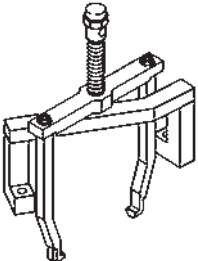
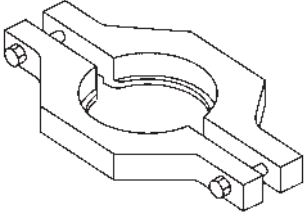
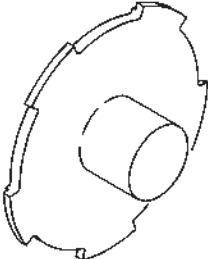
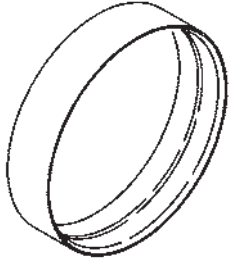
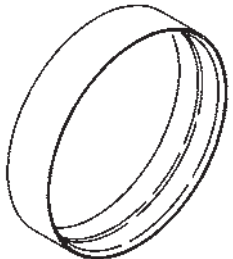
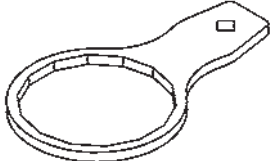
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>G1H0211</p>	499787700	WRENCH ASSY	Used for removing and installing drive pinion lock nut.
 <p>B1H0169</p>	499787500	ADAPTER ASSY	Used for removing and installing drive pinion lock nut.
 <p>B1H0135B</p>	899524100	PULLER SET	Used for removing reduction gear.
 <p>G1H0214</p>	498897700	ADAPTER SET	Used with PRESSURE GAUGE.
 <p>B1H0233</p>	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0234	498627100	SEAT	Used for holding low clutch piston retainer (return spring) when installing snap ring.
 B1H0068	499577000	GAUGE	Used for measuring the transmission case mating surface to the reduction gear end surface.
 G1H0207	498937110	HOLDER	Used for removing and installing drive pinion lock nut.
 B1H0284	499737000	PULLER	Used for removing driven gear assembly.
 B1H0281	499737100	PULLER SET	Used for removing reduction drive gear assembly.

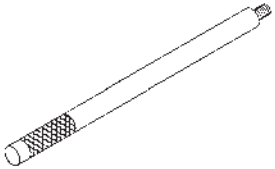
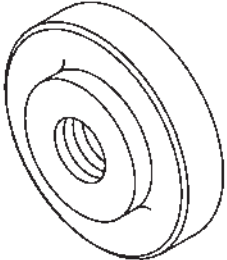
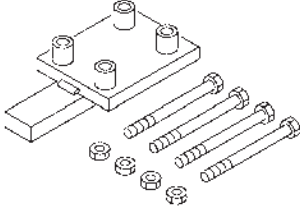
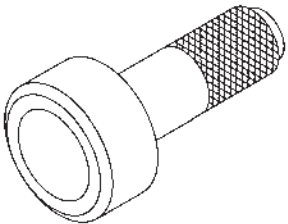
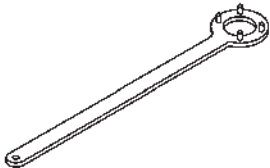
SPECIAL TOOLS

[G300] 1-6

3. Automatic Transmission and Differential Tools

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 G1H0157	498077600	REMOVER	Used for removing ball bearing.
 B1H0282	498677100	COMPRESSOR	Used for installing 2-4 brake snap ring.
 B1H0283	498437000	HIGH CLUTCH PISTON GUIDE	Used for installing high clutch piston.
 B1H0283	498437100	LOW CLUTCH PISTON GUIDE	Used for installing low clutch piston.
 B1H0289	498545400	FILTER WRENCH	Used for removing and installing ATF filter.

4. Rear Differential Tools (AWD Models)

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0230	398477701	HANDLE	Used for installing front and rear bearing cone.
 B1H0235	398477702	DRIFT	Used for press-fitting the bearing cone of differential carrier (front).
 B1H0143	398217700	ATTACHMENT SET	Stand for rear differential carrier disassembly and assembly.
 B1H0236	498447120	DRIFT	Used for installing front oil seal.
 G1H0222	498427200	FLANGE WRENCH	Used for stopping rotation of companion flange when loosening and tightening self-lock nut.

SPECIAL TOOLS

[G400] 1-6

4. Rear Differential Tools (AWD Models)

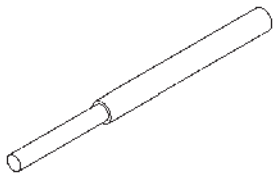
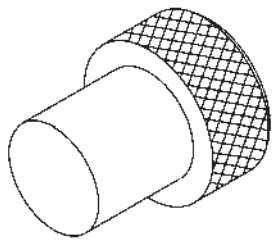
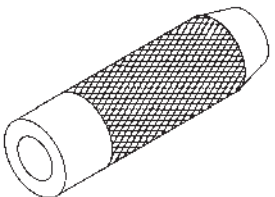
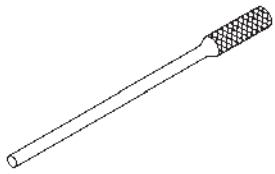
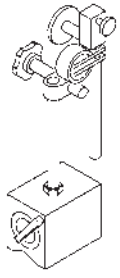
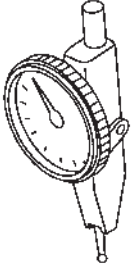
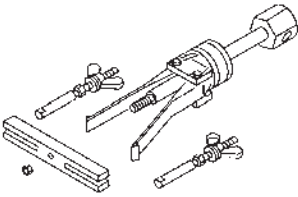
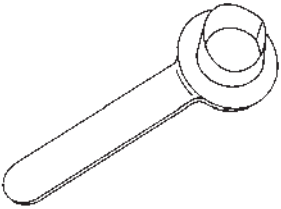
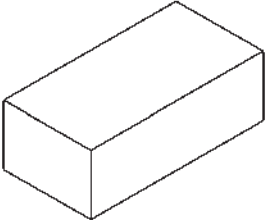
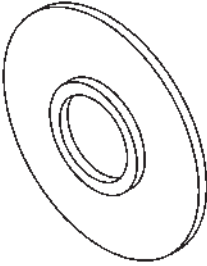
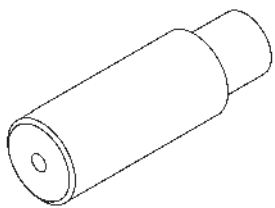
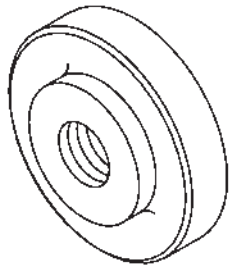
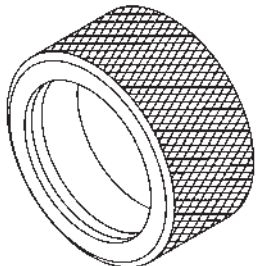
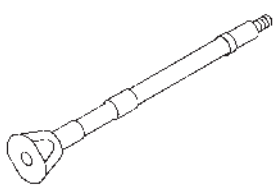
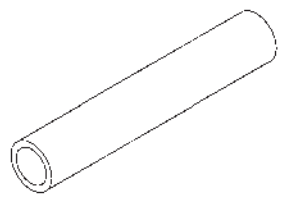
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B1H0237</p>	398467700	DRIFT	Used for removing drive pinion, pilot bearing and front bearing cone.
 <p>B1H0211</p>	399780104	WEIGHT	Used for installing front bearing cone, pilot bearing, companion flange.
 <p>B1H0238</p>	899580100	INSTALLER	Used for press-fitting the front bearing cone, pilot bearing.
 <p>B1H0220</p>	899904100	STRAIGHT PIN REMOVER	Used for driving out differential pinion shaft lock pin.
 <p>B1H0137</p>	498247001	MAGNET BASE	<ul style="list-style-type: none"> Used for measuring backlash between side gear and pinion, and hypoid gear. Used with DIAL GAUGE (498247100).

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 G1H0160	498247100	DIAL GAUGE	<ul style="list-style-type: none"> Used for measuring backlash between side gear and pinion, and hypoid gear. Used with MAGNET BASE (498247001).
 B1H0138	499705401	PULLER ASSY	Used for removing oil seal and side bearing cup.
 G1H0303	28099PA090	OIL SEAL PROTECTOR	<ul style="list-style-type: none"> Used for installing rear drive shaft into rear differential. For protecting oil seal.
 B1H0242	398507704	BLOCK	Used for adjusting pinion height and preload.
 B1H0223	398177700	INSTALLER	<ul style="list-style-type: none"> Used for installing rear bearing cone. For T-type.

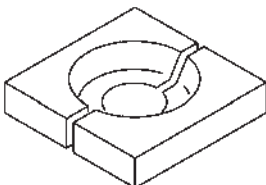
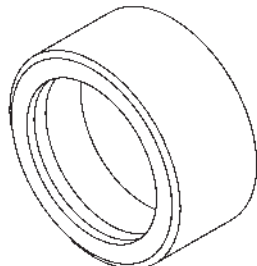
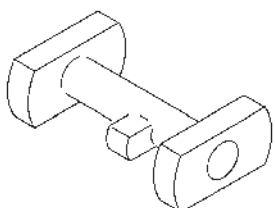
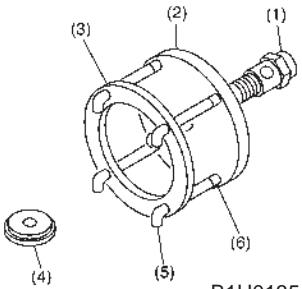
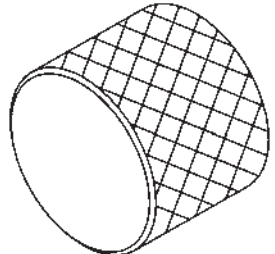
SPECIAL TOOLS

[G400] 1-6

4. Rear Differential Tools (AWD Models)

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0239	398457700	ATTACHMENT	<ul style="list-style-type: none"> Used for removing side bearing retainer. For T-type.
 B1H0235	398477703	DRIFT 2	<ul style="list-style-type: none"> Used for press-fitting the bearing race (rear) of differential carrier. For T-type.
 G1H0200	398437700	DRIFT	<ul style="list-style-type: none"> Used for installing said oil seal. For T-type.
 B1H0240	398507702	DUMMY SHAFT	<ul style="list-style-type: none"> Used for adjusting pinion height and preload. For T-type.
 B1H0241	398507703	DUMMY COLLAR	<ul style="list-style-type: none"> Used for adjusting pinion height and preload. For T-type.

1-6 [G400]
4. Rear Differential Tools (AWD Models)
SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 G1H0379	398517700	REPLACER	<ul style="list-style-type: none"> Used for removing rear bearing cone. For T-type.
 B1H0224	398487700	DRIFT	<ul style="list-style-type: none"> Used for press-fitting the side bearing cone. For T-type.
 B1H0156	398507701	GAUGE	<ul style="list-style-type: none"> Used for adjusting pinion height. For T-type.
 B1H0135A	399527700	PULLER SET	<ul style="list-style-type: none"> Used for extracking side bearing cone. (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) ADAPTER (398497701) (5) BOLT (899520107) (6) NUT (021008000) For T-type.
 B1H0243	398227700	WEIGHT	<ul style="list-style-type: none"> Used for installing side bearing. Used with GAUGE (398237700). For T-type.

SPECIAL TOOLS

[G400] 1-6

4. Rear Differential Tools (AWD Models)

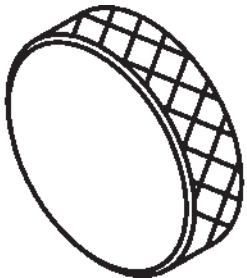
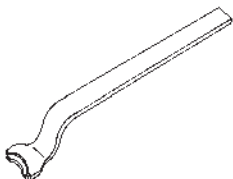
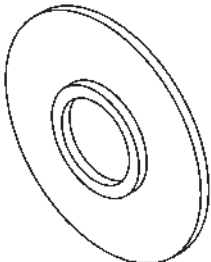
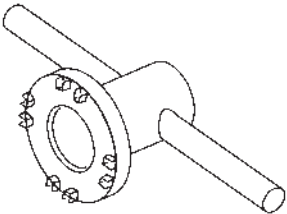
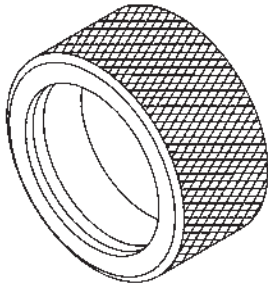
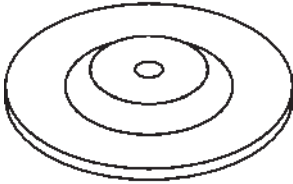
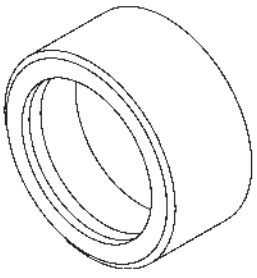
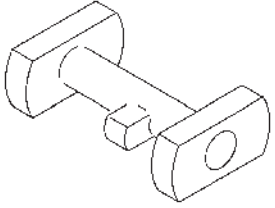
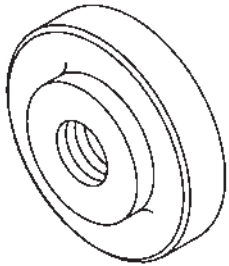
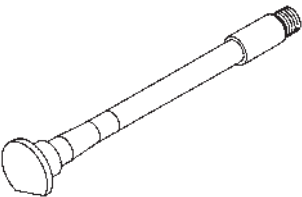
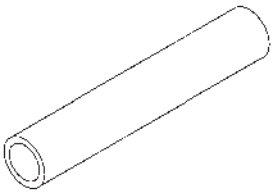
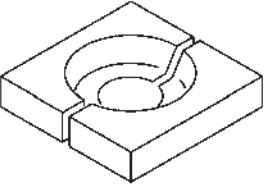
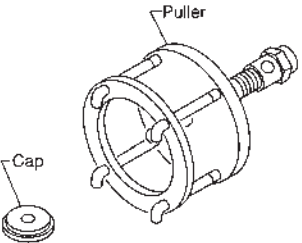
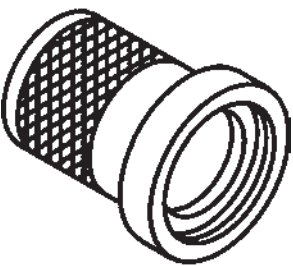
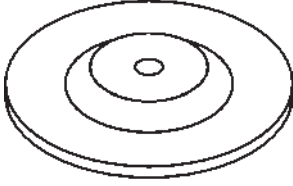
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>S1H0033</p>	398237700	GAUGE	<ul style="list-style-type: none"> Used for installing side bearing. Used with WEIGHT (398227700). For T-type.
 <p>G1H0338</p>	28099PA100	DRIVE SHAFT REMOVER	<ul style="list-style-type: none"> Used for removing rear drive shaft from rear differential. For T-type.
 <p>B1H0223</p>	498175500	INSTALLER	<ul style="list-style-type: none"> Used for installing rear bearing cone. For VA-type.
 <p>G1H0169</p>	399780111	WRENCH ASSY	<ul style="list-style-type: none"> Used for removing and installing side oil seal holder. For VA-type.
 <p>G1H0200</p>	498447100	DRIFT	<ul style="list-style-type: none"> Used for installing oil seal. For VA-type.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 H1H0498	399520105	SEAT	<ul style="list-style-type: none"> Used for removing side bearing cone. Used with PULLER SET (899524100). For VA-type.
 B1H0224	498485400	DRIFT	<ul style="list-style-type: none"> Used for installing side bearing cone. For VA-type.
 B1H0156	498505501	GAUGE	<ul style="list-style-type: none"> Used for adjusting pinion height. For VA-type.
 B1H0235	498447110	BEARING OUTER RACE DRIFT	<ul style="list-style-type: none"> Used for press-fitting the bearing race (front) of differential carrier. For VA-type.
 B1H0193	498447150	DUMMY SHAFT	<ul style="list-style-type: none"> Used for adjusting pinion height and preload. For VA-type.

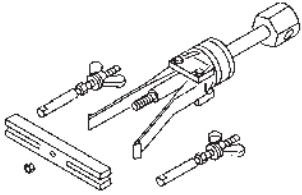
SPECIAL TOOLS

[G400] 1-6

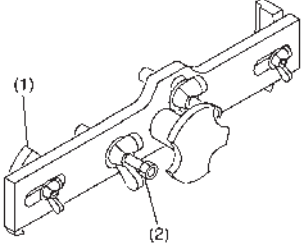
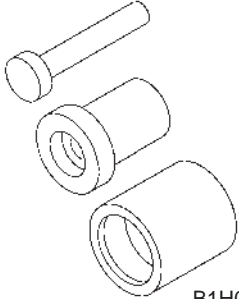
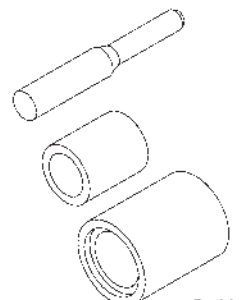
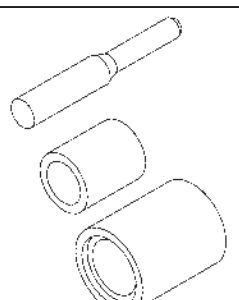
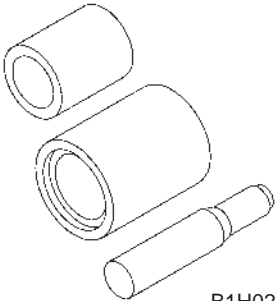
4. Rear Differential Tools (AWD Models)

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B1H0241</p>	32285AA000	DUMMY COLLAR	<ul style="list-style-type: none"> Used for adjusting pinion height and preload. For VA-type.
 <p>G1H0379</p>	498515500	REPLACER	<ul style="list-style-type: none"> Used for removing rear bearing cone. For VA-type.
 <p>B1H0135B</p>	899524100	PULLER SET	<ul style="list-style-type: none"> Used for removing side bearing cone. For VA-type.
 <p>H1H0497</p>	899874100	INSTALLER	<ul style="list-style-type: none"> Used for installing companion flange. For VA-type.
 <p>H1H0498</p>	499705404	SEAT	<ul style="list-style-type: none"> Used for removing side bearing race. Used with PULLEY ASSY (499705401). For VA-type.

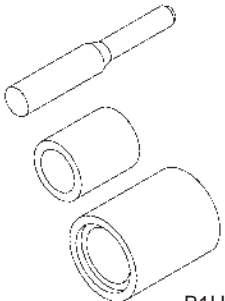
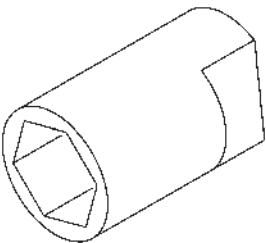
1-6 [G400]**SPECIAL TOOLS****4. Rear Differential Tools (AWD Models)**

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0138	499705401	PULLEY ASSY	<ul style="list-style-type: none">• Used for removing side bearing race.• Used with SEAT (499705404).• For VA-type.

5. Suspension Tools

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B1H0144A</p>	927380000	ADAPTER	Used as an adapter for camber & caster gauge when measuring camber and caster. (1) 28199AC000 PLATE (2) 28199AC010 BOLT
 <p>B1H0244</p>	927680000	INSTALLER & REMOVER	Used for replacing transverse link bushing (Front).
 <p>B1H0245</p>	927690000	INSTALLER & REMOVER	Used for replacing lateral link bushing (12 dia).
 <p>B1H0245</p>	927700000	INSTALLER & REMOVER	Used for replacing lateral link bushing (14 dia).
 <p>B1H0246</p>	927720000	INSTALLER & REMOVER	Used for replacing trailing link bushing.

SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0245	927730000	INSTALLER & REMOVER	Used for replacing rear housing bushing.
 B1H0247	927760000	STRUT MOUNT SOCKET	Used for disassembling and assembling strut mount.

6. Wheels and Axles Tools

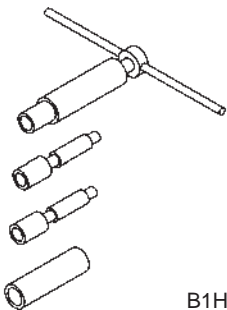
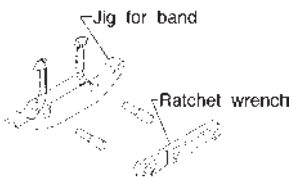
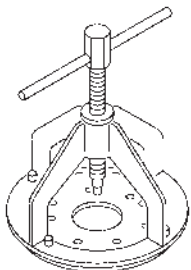
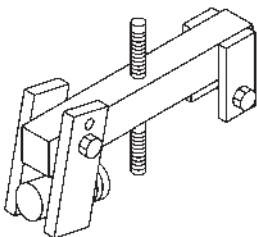
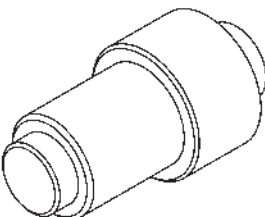
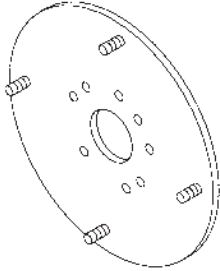
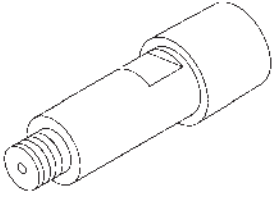
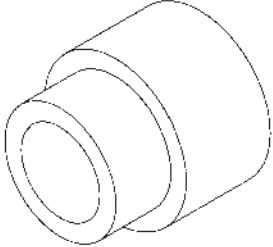
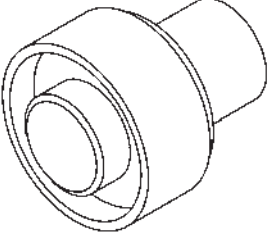
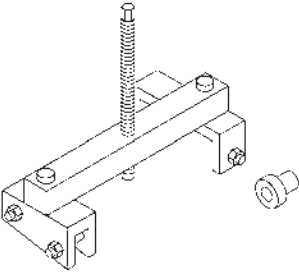
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B1H0145</p>	922431000	AXLE SHAFT INSTALLER	<ul style="list-style-type: none"> Used for installing axle shaft into housing. Used with ADAPTER (927390000).
 <p>B1H0146A</p>	925091000	BAND TIGHTENING TOOL	Used for tightening boot band.
 <p>H1H0503</p>	926470000	AXLE SHAFT PULLER	Used for removing front axle shaft.
 <p>G1H0250</p>	927060000	HUB REMOVER	<ul style="list-style-type: none"> Used for removing front hub. Used with HUB STAND (927080000).
 <p>G1H0252</p>	927100000	BEARING PULLER	<ul style="list-style-type: none"> Used for disassembling and assembling front housing bearing. Used with HOUSING STAND (927400000).

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0249	927140000	AXLE SHAFT PULLER PLATE	Same as plate 2 included in AXLE SHAFT PULLER (926470000).
 B1H0250	927390000	ADAPTER	Used as an adapter for AXLE SHAFT INSTALLER (922431000).
 B1H0251	927400000	HOUSING STAND	<ul style="list-style-type: none"> Used for disassembling and assembling front housing bearing. Used with BEARING PULLER (927100000).
 G1H0256	927410000	OIL SEAL INSTALLER	<ul style="list-style-type: none"> Used for installing oil seal into front housing. Used with HOUSING STAND (927400000).
 B1H0252	927420000	HUB REMOVER	<ul style="list-style-type: none"> Used for removing rear hub. Used with HUB STAND (927080000).

SPECIAL TOOLS

[G600] 1-6
6. Wheels and Axles Tools

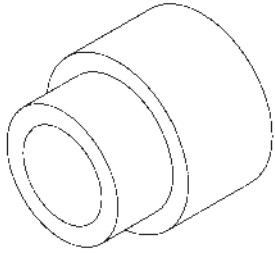
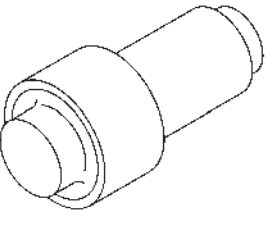
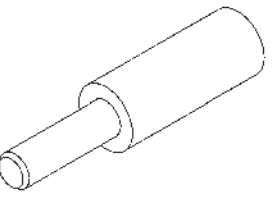
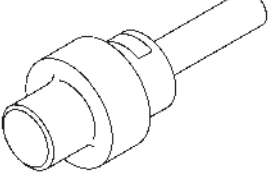
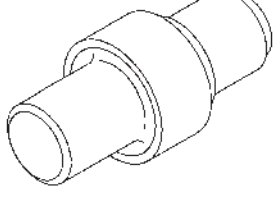
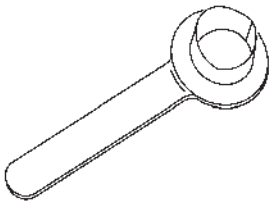
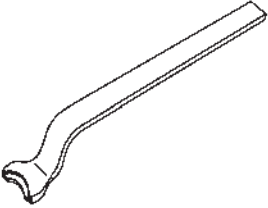
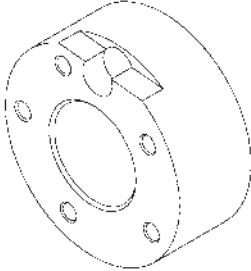
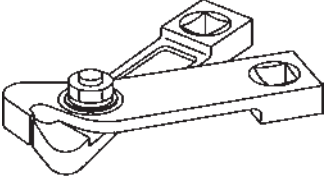
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B1H0251</p>	927430000	HOUSING STAND	<ul style="list-style-type: none"> Used for disassembling and assembling rear housing bearing. Used with BEARING PULLER (927440000).
 <p>B1H0254</p>	927440000	BEARING REMOVER	<ul style="list-style-type: none"> Used for disassembling and assembling rear housing bearing. Used with HOUSING STAND (927430000).
 <p>B1H0255</p>	927120000	HUB INSTALLER	<ul style="list-style-type: none"> Used for installing hub. Used with HUB STAND (927080000).
 <p>B1H0256</p>	927450000	HUB INSTALLER	<ul style="list-style-type: none"> Used for pressing rear hub into housing assembly. Used with HUB STAND (927080000).
 <p>B1H0257</p>	927460000	OIL SEAL INSTALLER	<ul style="list-style-type: none"> Used for installing outer bearing and sub bearing into housing. Used with HOUSING STAND (927430000).

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>G1H0303</p>	28099PA090	OIL SEAL PROTECTOR	<ul style="list-style-type: none"> Used for installing rear drive shaft into rear differential. For protecting oil seal.
 <p>G1H0338</p>	28099PA100	DRIVE SHAFT REMOVER	Used for removing rear drive shaft from rear differential.
 <p>B1H0248</p>	927080000	HUB STAND	<ul style="list-style-type: none"> Used for disassembling and assembling hub bolt in hub. Used for removing front and rear hub.
 <p>B1H0272</p>	28099AC000	BOOT BAND PLIER	Used for tightening boot band.

7. Steering System Tools

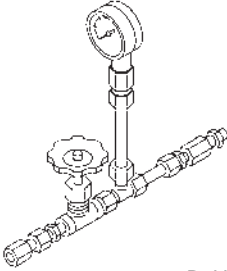
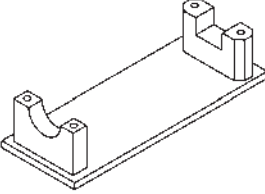
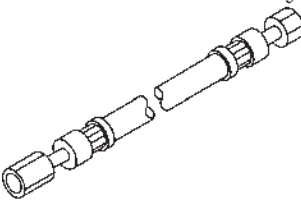
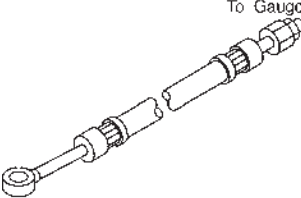
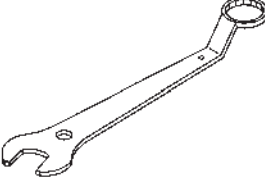
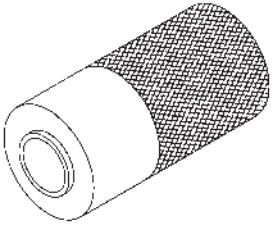
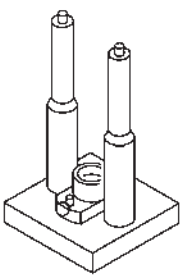
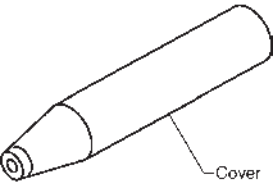
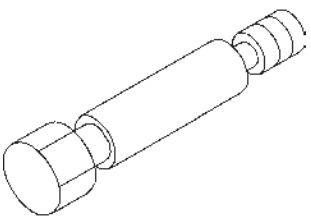
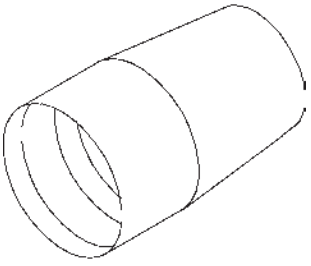
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0147	925711000	PRESSURE GAUGE	Used for measuring oil pump pressure.
 G1H0263	926200000	STAND	Used when inspecting characteristic of gearbox assembly and disassembling it. Vise this tool and secure gearbox assembly using gearbox clamp.
 B1H0172A	34099AC010	ADAPTER HOSE A	Used with PRESSURE GAUGE (925711000).
 B1H0185A	34099AC020	ADAPTER HOSE B	Used with PRESSURE GAUGE (925711000).
 G1H0265	926230000	SPANNER	<ul style="list-style-type: none"> For the lock nut when adjusting backlash of gearbox. Measurement of rotating resistance of gearbox assembly.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0261	927640000	INSTALLER B	Used for installing ball bearing into housing.
 G1H0267	926370000	INSTALLER A	<ul style="list-style-type: none"> Used for installing valve assembly into valve housing assembly. Used with STAND BASE (927630000).
 H1H0476A	926390001	COVER & REMOVER ASSY	Used for assembling rack assembly.
 B1H0069	926400000	GUIDE	<ul style="list-style-type: none"> Right side of rack when installing rack bush. Used with GUIDE (927660000).
 B1H0070	927660000	GUIDE	<ul style="list-style-type: none"> Right side of rack when installing rack bush. Used with GUIDE (926400000).

SPECIAL TOOLS

[G700] 1-6
7. Steering System Tools

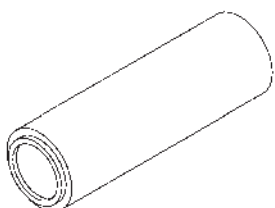
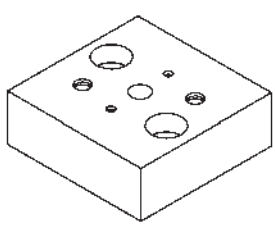
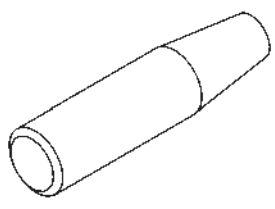
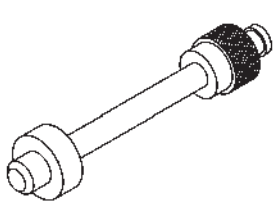
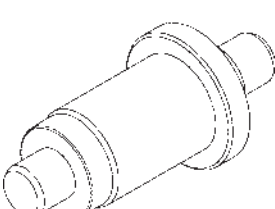
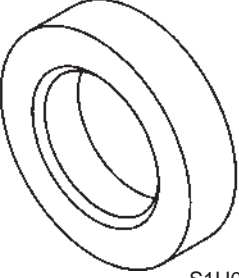
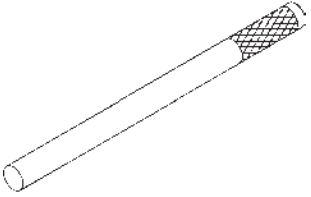
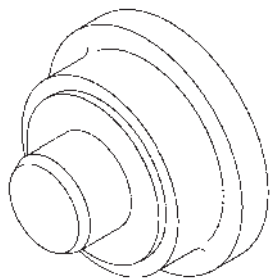
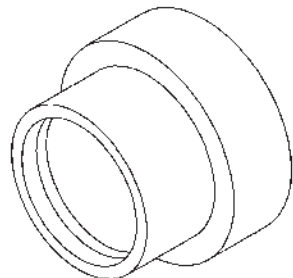
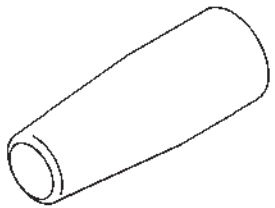
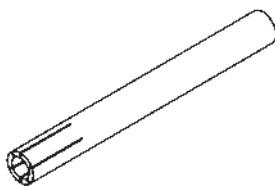
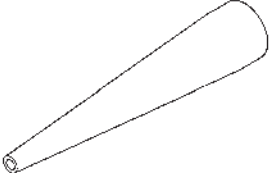
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0262	927620000	INSTALLER B	<ul style="list-style-type: none"> Oil seal of valve housing. Used with INSTALLER A (926360000).
 G1H0273	927630000	STAND BASE	Used for assembling power steering gearbox.
 B1H0263	926360000	INSTALLER A	<ul style="list-style-type: none"> Used as a guide to install oil seal. Used with INSTALLER B (927620000).
 G1H0275	34099FA110	INSTALLER	Used for installing oil seal.
 S1H0030	927610000	INSTALLER	Used for installing valve housing oil seal.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 S1H0031	34099FA130	INSTALLER SEAL	<ul style="list-style-type: none"> Used for installing valve housing oil seal. Used with INSTALLER AND REMOVER SEAL (34099FA120).
 S1H0054	34199AE050	REMOVER OIL SEAL	Used for removing oil seal.
 B1H0259	34099AA000	INSTALLER	Used for installing oil seal and shaft of oil pump.
 B1H0260	34099AA020	INSTALLER	Used for installing shaft of oil pump.
 H1H0513	34099AC030	INSTALLER A	<ul style="list-style-type: none"> Used for installing retaining ring. Used with INSTALLER B (34099AC040).

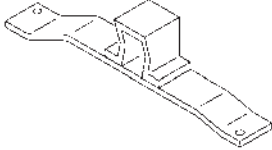
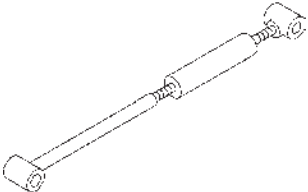
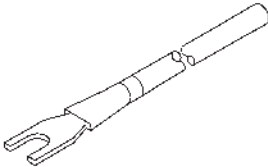
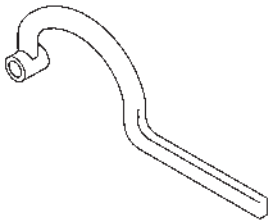
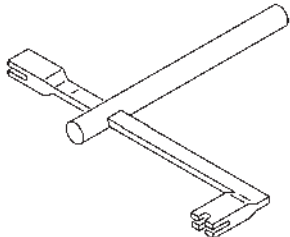
SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 H1H0514	34099AC040	INSTALLER B	<ul style="list-style-type: none">• Used for installing retaining ring.• Used with INSTALLER A (34099AC030).

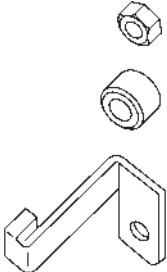
8. Brake Tools

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B1H0148</p>	926460000	WHEEL CYLINDER 3/4" ADAPTER	Used for installing cup onto wheel cylinder piston (Size 3/4 in).

9. Body Tools

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B1H0264</p>	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.
 <p>B1H0265</p>	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 <p>B1H0266</p>	925580000	PULLER	Used for removing trim clip.
 <p>B1H0267</p>	925610000	WRENCH	Used for adjusting door assembly.
 <p>B1H0268</p>	927780000	REMOVER	Used for removing and installing trunk torsion bar.

SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 H1H0492	498277200	STOPPER SET	Used for installing automatic transmission assembly .

10. Supplemental Restraint System Tools

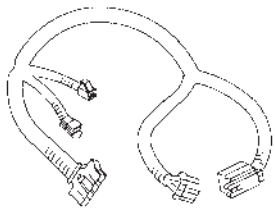
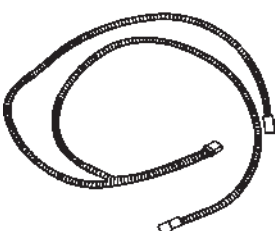
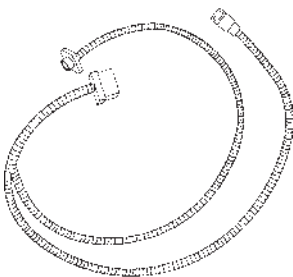
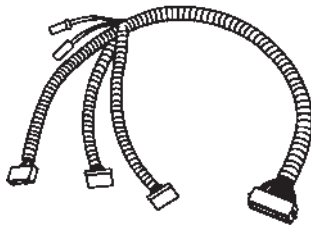

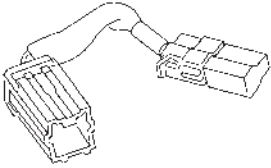

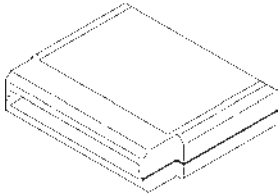
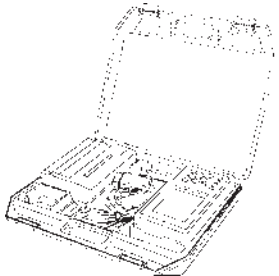
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 G1H0284	98299PA000	TEST HARNESS A	Used for checking the supplemental restraint system.
 S1H0002	98299FC010	TEST HARNESS F	Used for checking the supplemental restraint system.
 S1H0101	98299FA030	TEST HARNESS H	Used for checking the supplemental restraint system.
 B1H0469	98299FC041 (Newly adopted tool)	TEST HARNESS I 2	Used for checking the supplemental restraint system.
 G1H0287	98299PA030	DEPLOYMENT TOOL	Used for deploying the air bag module.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 G1H0389	98299PA040	AIR BAG RESISTOR	Used for checking the supplemental restraint system.
 S1H0028	98299FC030	ADAPTER A (DEPLOYMENT)	<ul style="list-style-type: none">• Used for deploying the air bag module.• Used with DEPLOYMENT TOOL (98299PA030).

11. Select Monitor and Cartridge

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>S1H0070</p>	24082AA130 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.
 <p>S1H0027</p>	22771AA020	SELECT MONITOR KIT	Troubleshooting for electrical systems. <ul style="list-style-type: none"> • English: 22771AA020 (With printer) 22771AA030 (Without printer) • German: 22771AA040 (With printer) 22771AA070 (Without printer) • French: 22771AA050 (With printer) 22771AA080 (Without printer) • Spanish: 22771AA060 (With printer) 22771AA090 (Without printer)

EMISSION CONTROL SYSTEM AND VACUUM FITTING

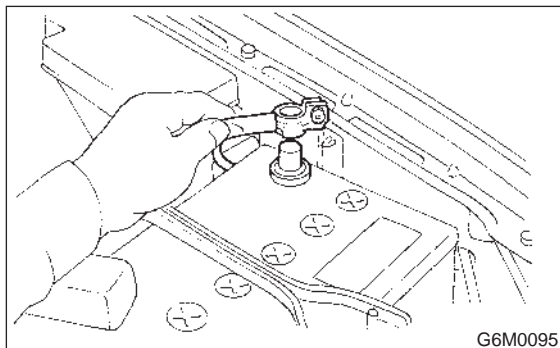
2-1

	Page
W SERVICE PROCEDURE	2
1. Front Catalytic Converter	2
2. Rear Catalytic Converter.....	4
3. Canister	5
4. Purge Control Solenoid Valve	5
5. Fuel Temperature Sensor.....	7
6. Fuel Tank Pressure Sensor.....	9
7. Pressure Control Solenoid Valve	10
8. Main Fuel Level Sensor	12
9. Air Filter	13
10. Sub Fuel Level Sensor.....	14
11. Vent Valve	15
12. Shut Valve	17
13. Drain Valve	18

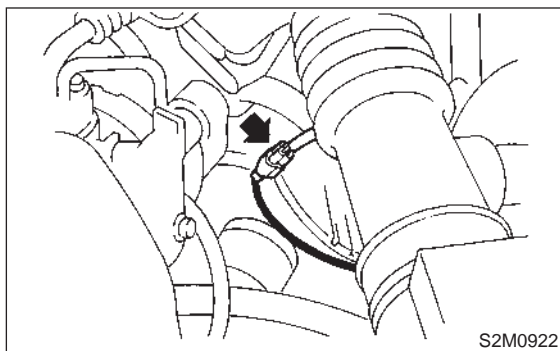
1. Front Catalytic Converter

A: REMOVAL

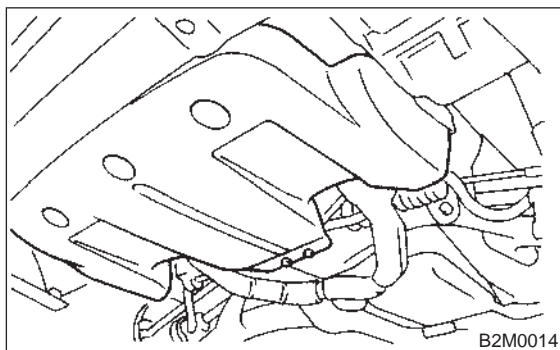
- 1) Disconnect battery ground cable.



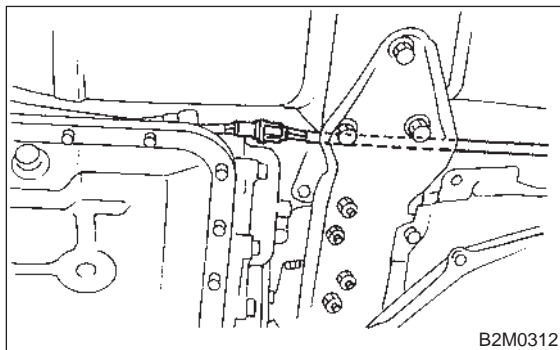
- 2) Disconnect front oxygen sensor connector.



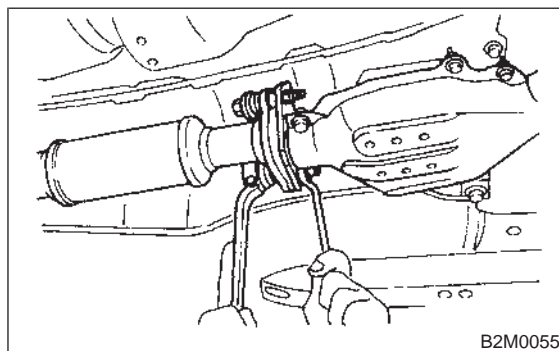
- 3) Lift-up the vehicle.
4) Remove under cover.



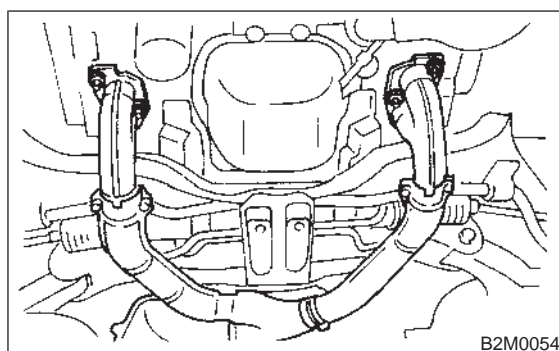
- 5) Disconnect rear oxygen sensor connector.



- 6) Separate front and rear catalytic converter assembly from rear exhaust pipe.



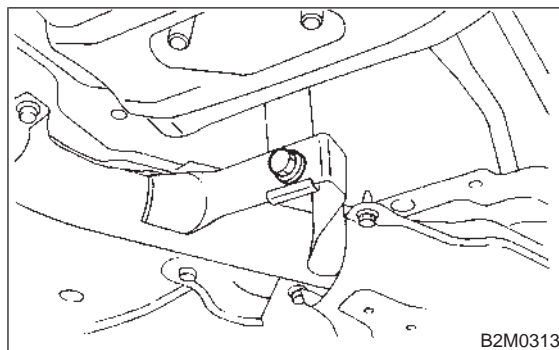
- 7) Remove front exhaust pipe from cylinder heads.



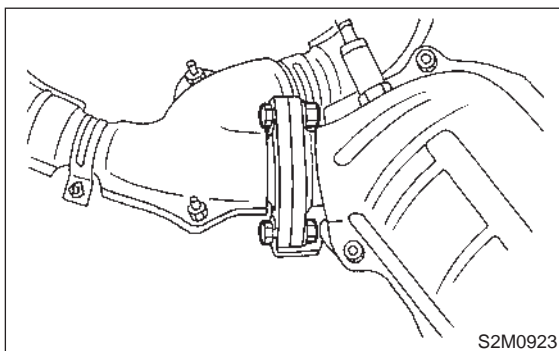
- 8) Remove front and rear catalytic converter assembly from hanger bracket.

CAUTION:

- Be careful not to pull down center exhaust pipe.
- After removing center exhaust pipe, do not apply excessive pulling force on rear exhaust pipe.



- 9) Separate front and rear catalytic converter assembly from front exhaust pipe.

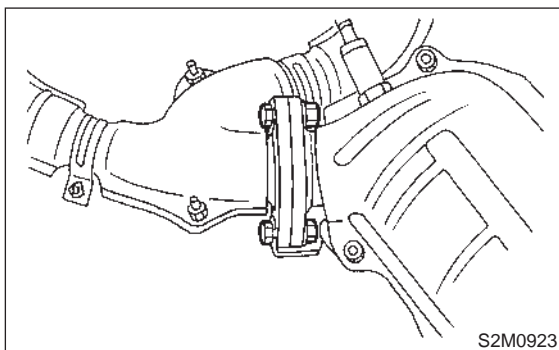


B: INSTALLATION

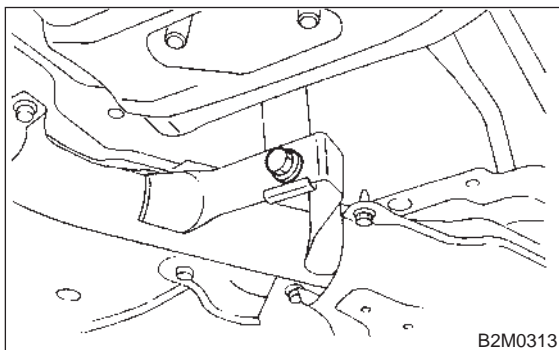
CAUTION:

Replace gaskets with new ones.

- 1) Install front and rear catalytic converter assembly to front exhaust pipe.



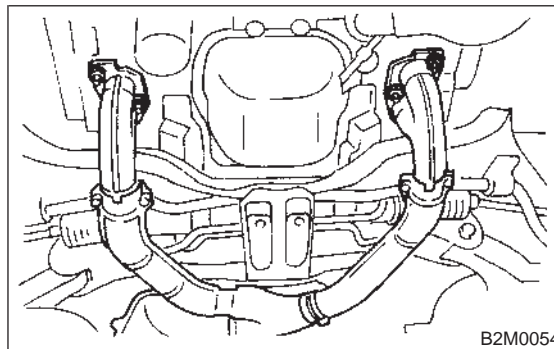
- 2) Install front and rear catalytic converter assembly.
Temporarily tighten bolt which installs center exhaust pipe to hanger bracket.



- 3) Install front exhaust pipe to cylinder heads.

Tightening torque:

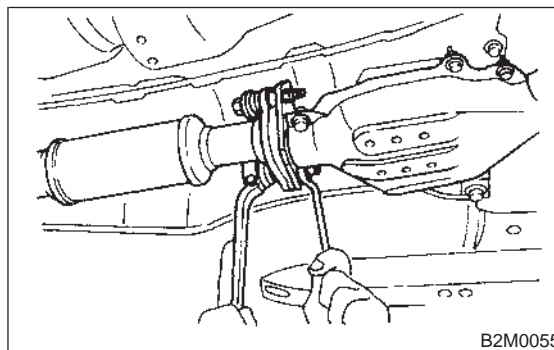
$30 \pm 5 \text{ N-m}$ ($3.1 \pm 0.5 \text{ kg-m}$, $22.4 \pm 3.6 \text{ ft-lb}$)



- 4) Install front and rear catalytic converter assembly to rear exhaust pipe.

Tightening torque:

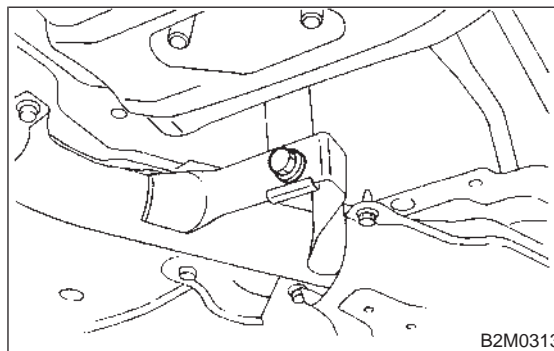
$18 \pm 5 \text{ N-m}$ ($1.8 \pm 0.5 \text{ kg-m}$, $13.0 \pm 3.6 \text{ ft-lb}$)



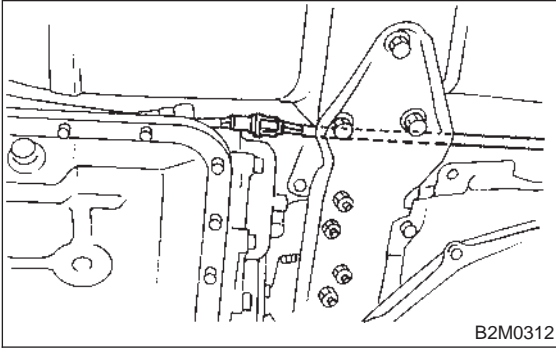
- 5) Tighten bolt which holds front and rear catalytic converter assembly to hanger bracket.

Tightening torque:

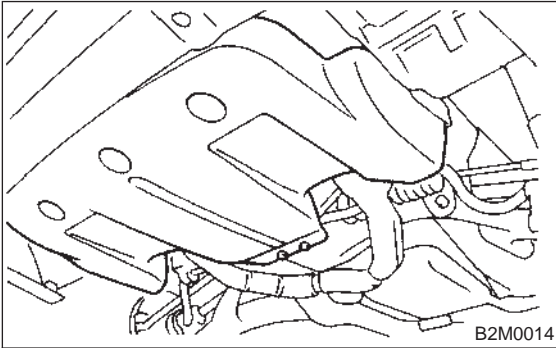
$35 \pm 5 \text{ N-m}$ ($3.6 \pm 0.5 \text{ kg-m}$, $26.0 \pm 3.6 \text{ ft-lb}$)



- 6) Connect rear oxygen sensor connector.

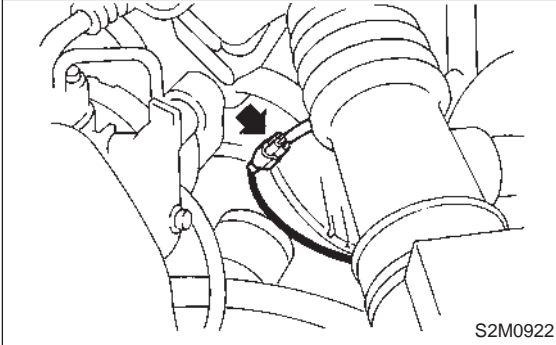


- 7) Install under cover.

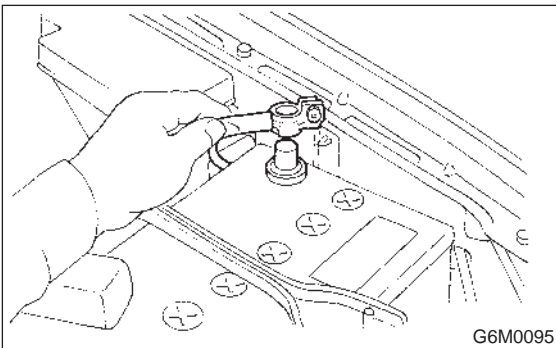


- 8) Lower the vehicle.

- 9) Connect connector to front oxygen sensor.



- 10) Connect battery ground cable.



2. Rear Catalytic Converter

A: REMOVAL

Remove rear catalytic converter. <Ref. to 2-1 [W1A0].>

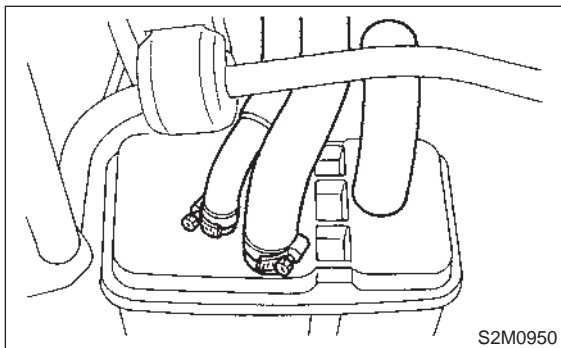
B: INSTALLATION

Install rear catalytic converter. <Ref. to 2-1 [W1B0].>

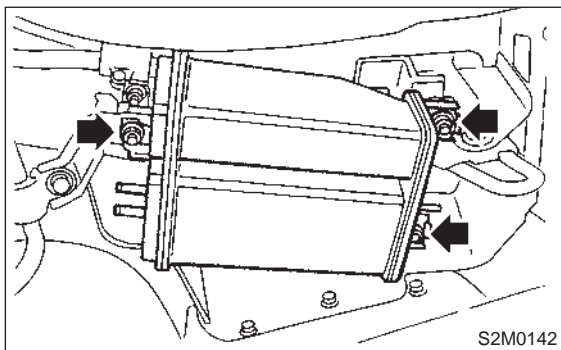
3. Canister

A: REMOVAL AND INSTALLATION

- 1) Lift-up the vehicle.
- 2) Disconnect evaporation hoses from canister.



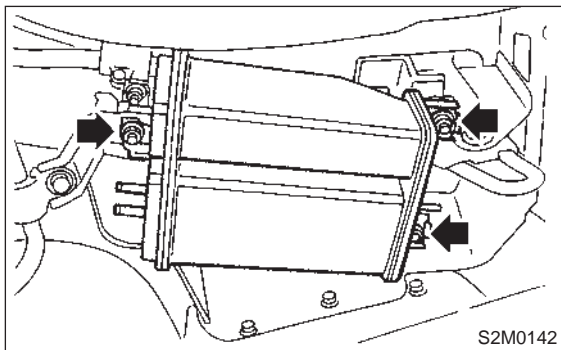
- 3) Remove canister from body.



- 4) Installation is in the reverse order of removal.

Tightening torque:

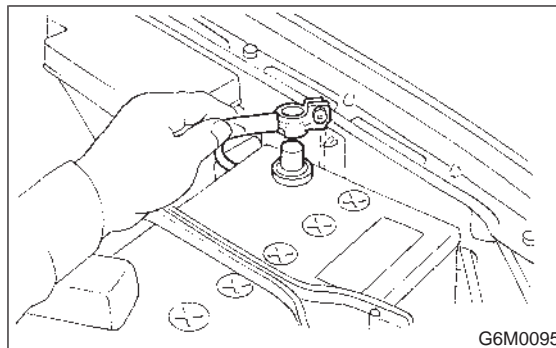
$22.5 \pm 7 \text{ N}\cdot\text{m}$ ($2.3 \pm 0.7 \text{ kg}\cdot\text{m}$, $16.6 \pm 5.1 \text{ ft}\cdot\text{lb}$)



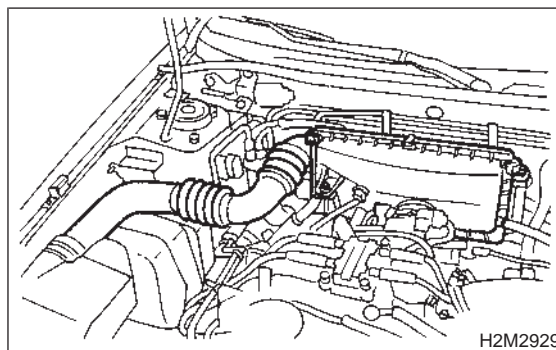
4. Purge Control Solenoid Valve

A: REMOVAL AND INSTALLATION

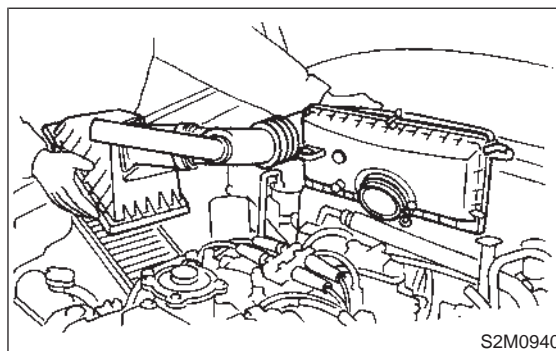
- 1) Disconnect battery ground cable.



- 2) Remove air cleaner case and air intake duct. (2200 cc California spec. vehicles) <Ref. to 2-7 [W1A0].>

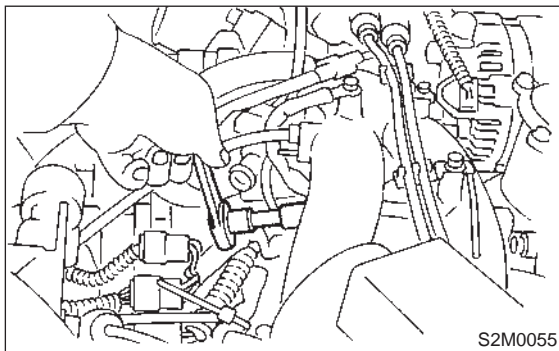


- 3) Remove air intake duct and air intake chamber. (Except 2200 cc California spec. vehicles) <Ref. to 2-7 [W18A0].>

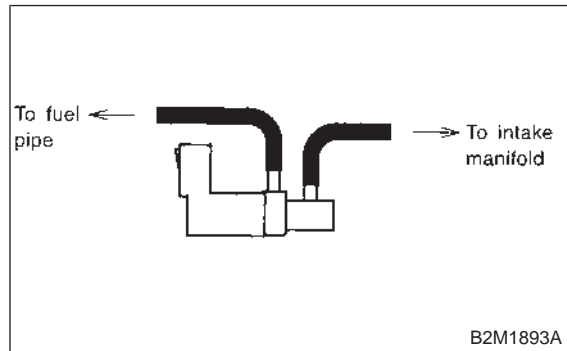


4. Purge Control Solenoid Valve

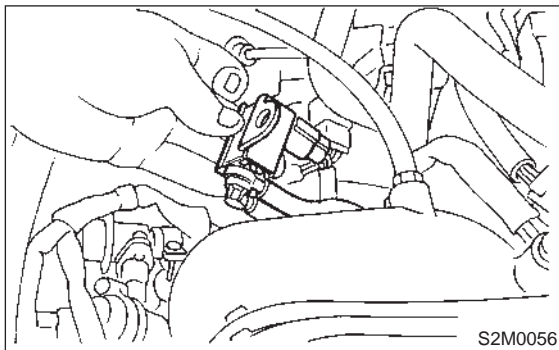
- 4) Remove bolt which installs purge control solenoid valve to intake manifold.



CAUTION:
Carefully connect the evaporation hoses.



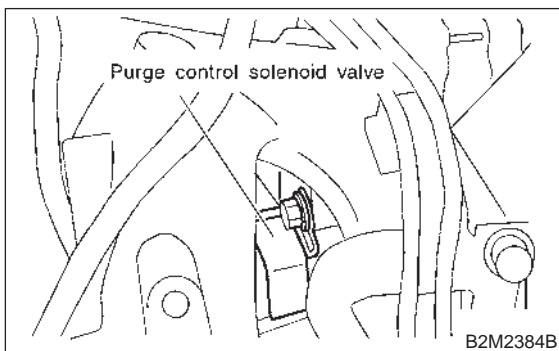
- 5) Take out purge control solenoid valve.
6) Disconnect connector from purge control solenoid valve.
7) Disconnect vacuum hoses from purge control solenoid valve.



- 8) Installation is in the reverse order of removal.

Tightening torque:

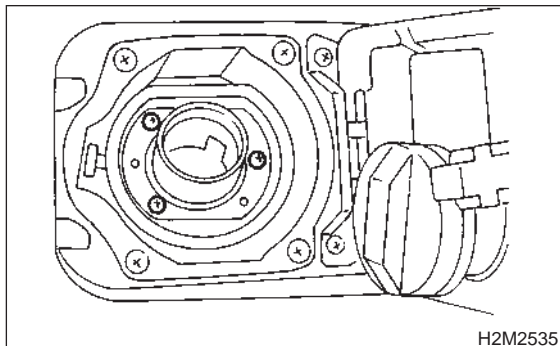
15.7±1.5 N·m (1.6±0.15 kg-m, 11.6±1.1 ft-lb)



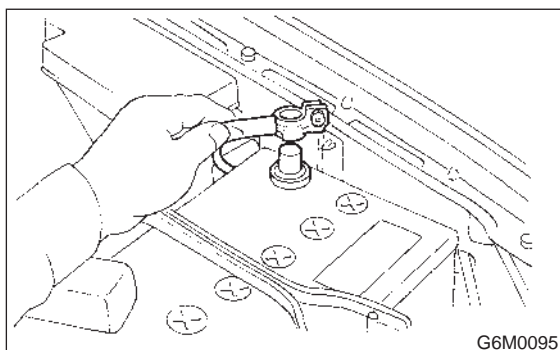
5. Fuel Temperature Sensor

A: REMOVAL

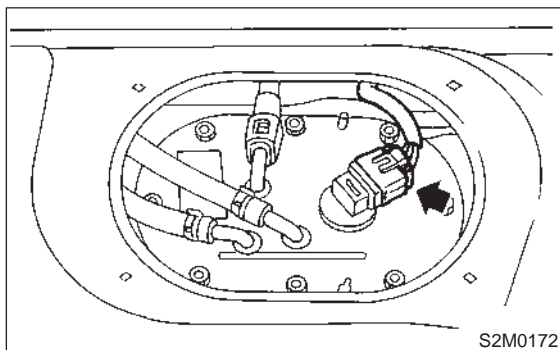
- 1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 2) Open fuel filler lid, and remove fuel filler cap.



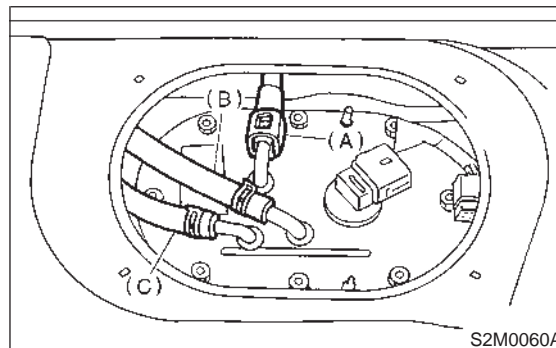
- 3) Disconnect battery ground cable.



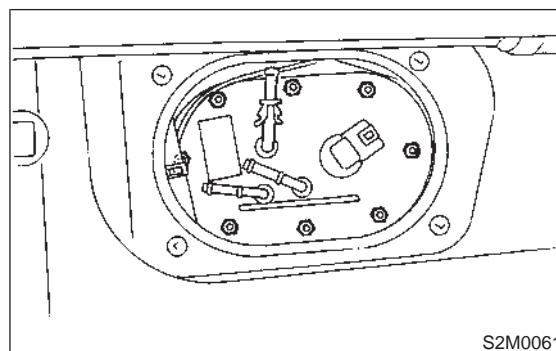
- 4) Disconnect connector from fuel pump.



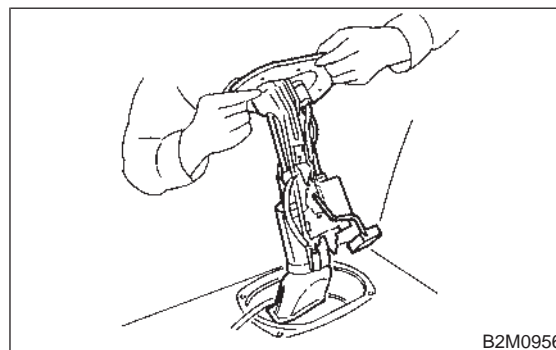
- 5) Move clips, and then disconnect fuel delivery hose (A), return hose (B) and jet pump hose (C).
- 6) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to 2-8 [W7A0].>



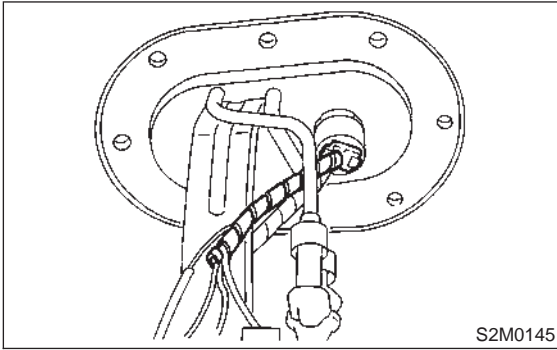
- 7) Remove nuts which install fuel pump assembly onto fuel tank.



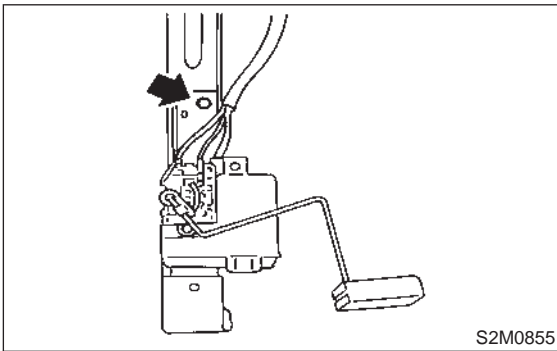
- 8) Take off fuel pump assembly from fuel tank.



- 9) Disconnect connector from fuel pump bracket.



- 10) Remove main fuel level sensor from fuel pump assembly. <Ref. to 2-1 [W8A0].>



NOTE:

Fuel temperature sensor is a unit with fuel pump. If replacing it, replace as a fuel pump.

B: INSTALLATION

CAUTION:

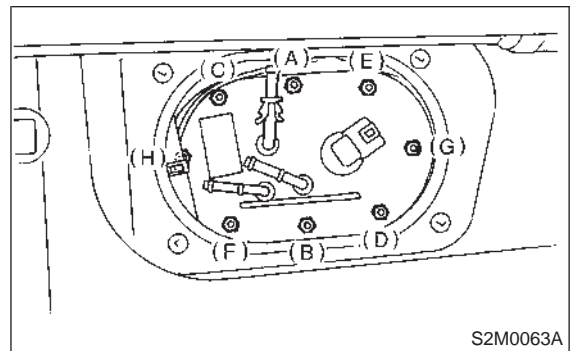
Leave fuel filler cap open when tightening nuts, to prevent fuel from flowing out through fuel delivery and return pipes. Close fuel filler cap after tightening nuts.

Installation is in the reverse order of removal. Do the following:

- (1) Always use new gaskets.
- (2) Ensure sealing portion is free from fuel or foreign particles before installation.
- (3) Tighten nuts in alphabetical sequence shown in figure to specified torque.

Tightening torque:

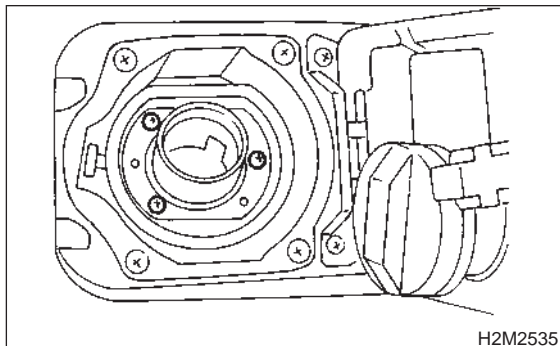
$4.4 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.45 \pm 0.15 \text{ kg}\cdot\text{m}$, $3.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)



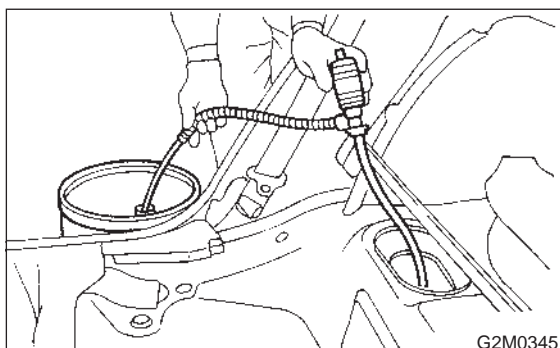
6. Fuel Tank Pressure Sensor

A: REMOVAL AND INSTALLATION

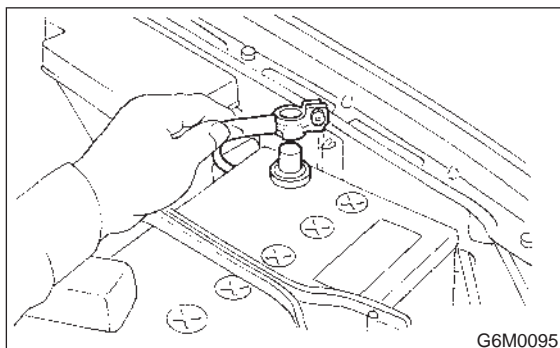
- 1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 2) Open fuel flap lid, and remove fuel filler cap.



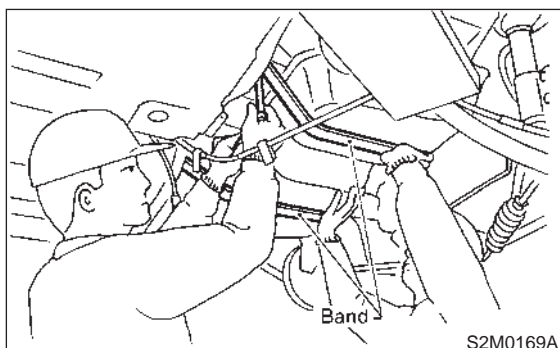
- 3) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>



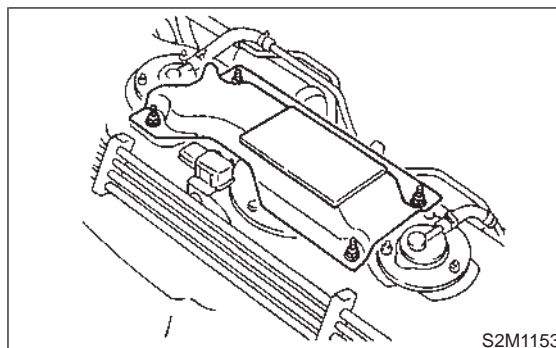
- 4) Disconnect battery ground cable.



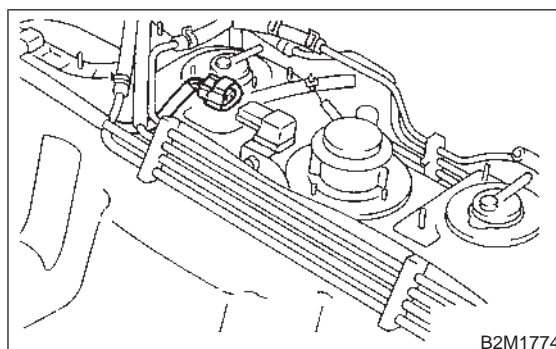
- 5) Remove fuel tank. <Ref. to 2-8 [W2A0].>



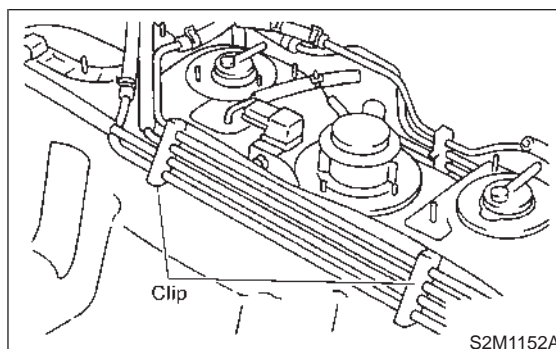
- 6) Remove protector cover.



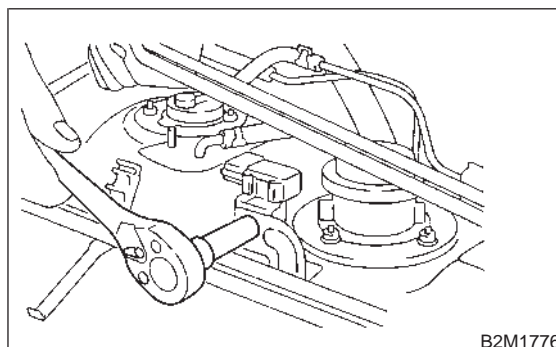
- 7) Disconnect connector from fuel tank pressure sensor.



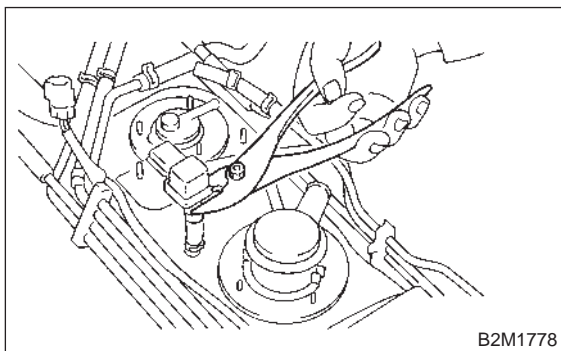
- 8) Release clips which hold fuel pipes onto fuel tank.



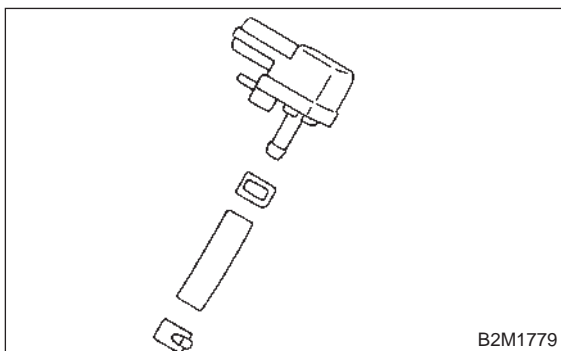
- 9) Move two fuel pipes to upper side, and remove bolt which install fuel tank pressure sensor to bracket.



10) Move clip, and disconnect pressure hose from fuel tank.



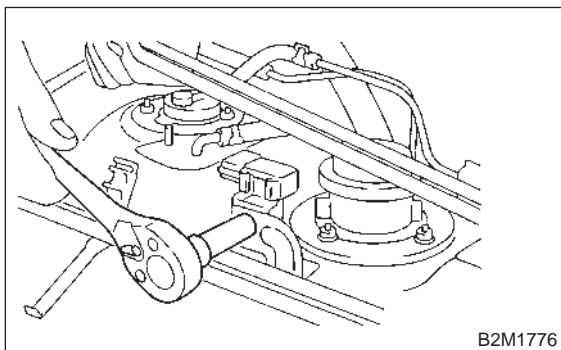
11) Disconnect pressure hose from fuel tank pressure sensor.



12) Installation is in the reverse order of removal.

Tightening torque:

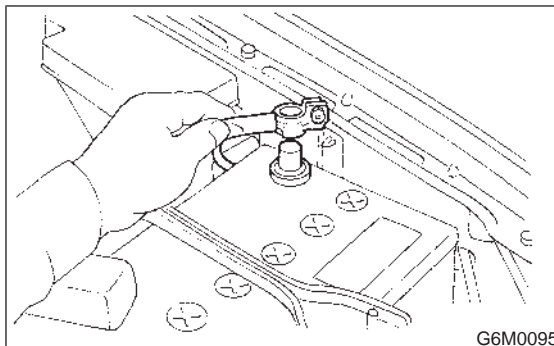
$7.35 \pm 1.96 \text{ N}\cdot\text{m}$ ($0.75 \pm 0.20 \text{ kg}\cdot\text{m}$, $5.4 \pm 1.4 \text{ ft}\cdot\text{lb}$)



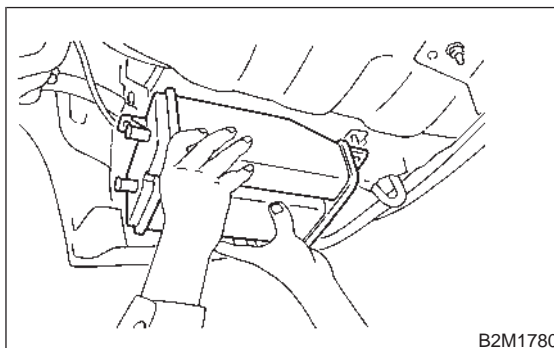
7. Pressure Control Solenoid Valve

A: REMOVAL AND INSTALLATION

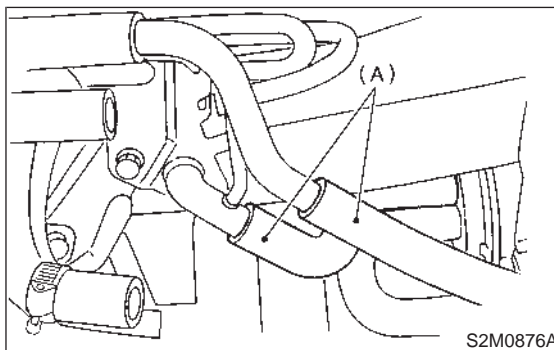
1) Disconnect battery ground cable.



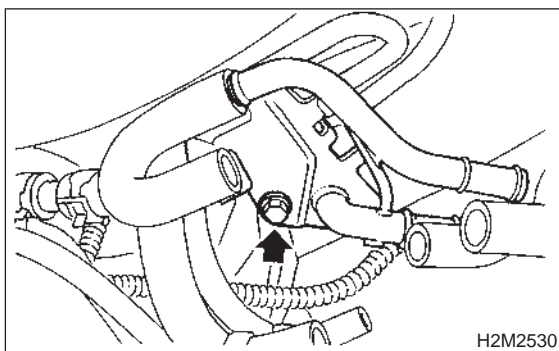
2) Remove canister. <Ref. to 2-1 [W3A0].>



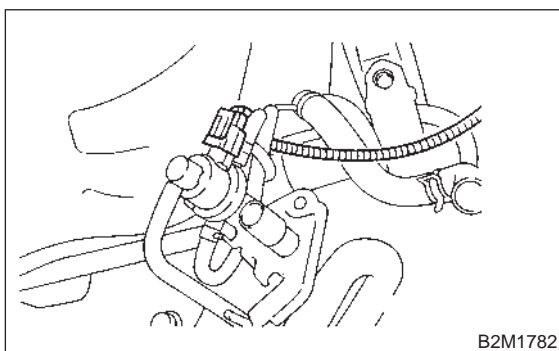
3) Disconnect evaporation hoses (A) from joint pipes.



4) Remove bolt which installs pressure control solenoid valve holding bracket on body.

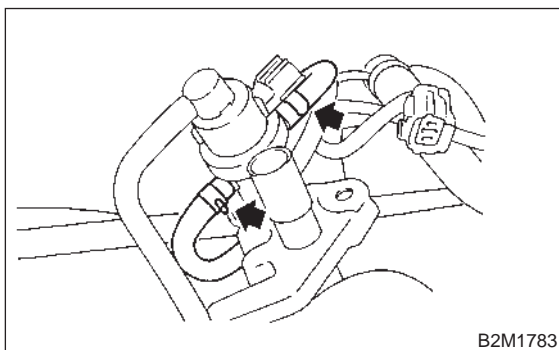


5) Disconnect connector from pressure control solenoid valve.

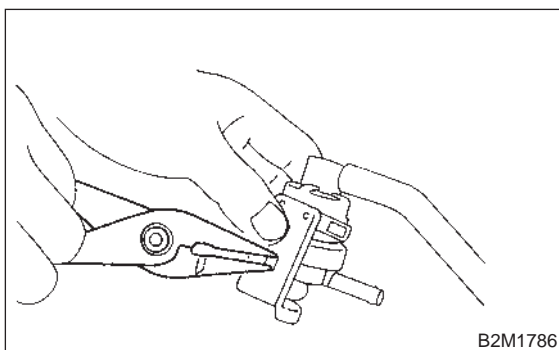


6) Disconnect two evaporation hoses from pressure control solenoid valve.

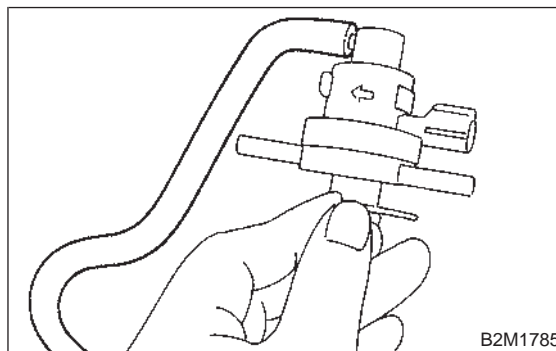
7) Remove pressure control solenoid valve with bracket.



8) Remove pressure control solenoid valve from bracket.



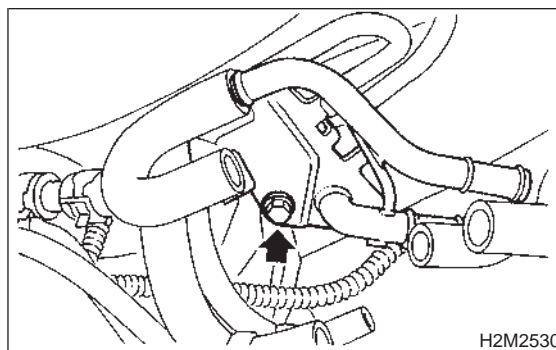
9) Disconnect vacuum hose from pressure control solenoid valve.



10) Installation is in the reverse order of removal.

Tightening torque:

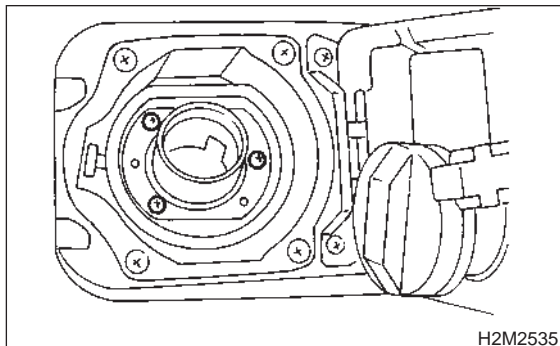
17.6 ± 5 N·m (1.8 ± 0.5 kg·m, 13.0 ± 3.6 ft·lb)



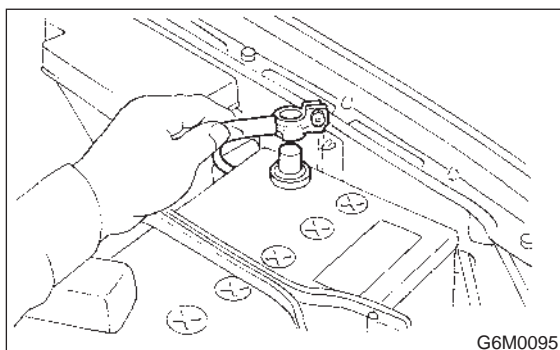
8. Main Fuel Level Sensor

A: REMOVAL

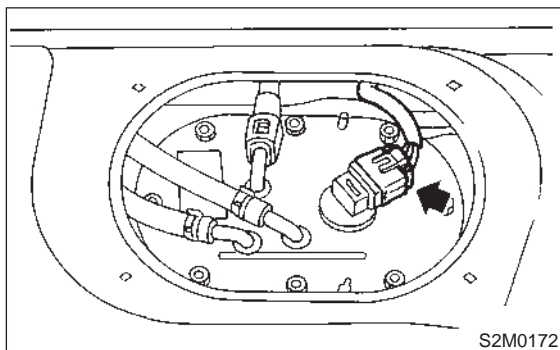
- 1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 2) Open fuel flap lid, and remove fuel filler cap.



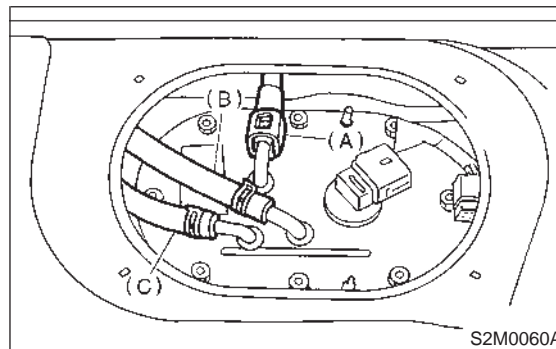
- 3) Disconnect battery ground cable.



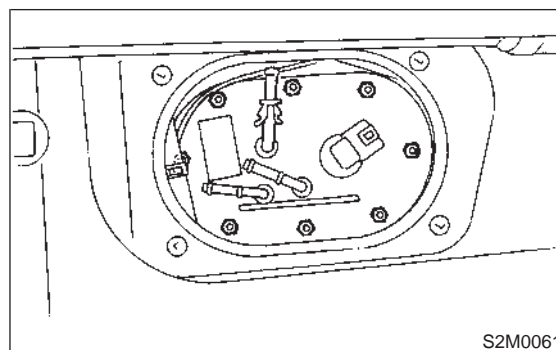
- 4) Disconnect connector from fuel pump.



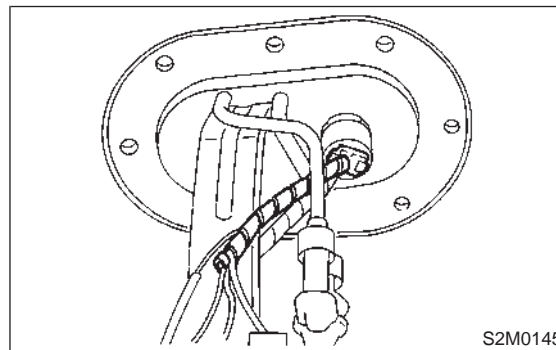
- 5) Move clips, and then disconnect fuel delivery hose (A), return hose (B) and jet pump hose (C).
- 6) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to 2-8 [W7A0].>



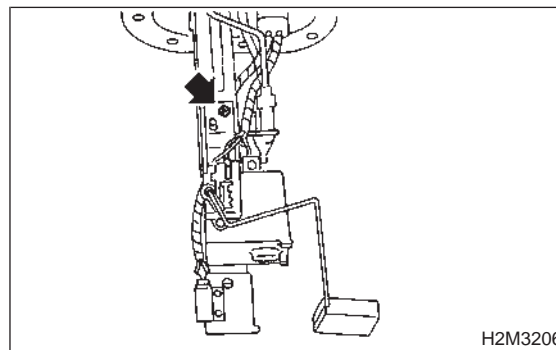
- 7) Remove nuts which install fuel pump assembly onto fuel tank.



- 8) Take off fuel pump assembly from fuel tank.
- 9) Disconnect connector from fuel pump bracket.



- 10) Remove bolt which installs fuel level sensor on mounting bracket.

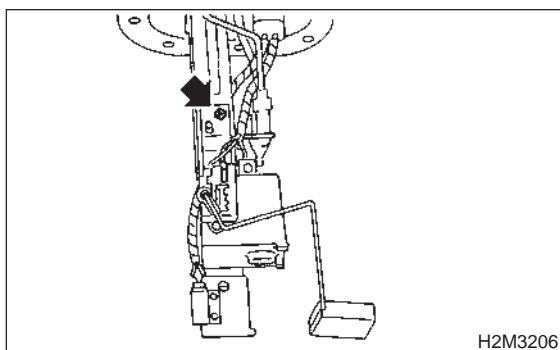


B: INSTALLATION**CAUTION:**

Leave fuel filler cap open when tightening nuts, to prevent fuel from flowing out through fuel delivery and return pipes. Close fuel filler cap after tightening nuts.

Installation is in the reverse order of removal. Do the following:

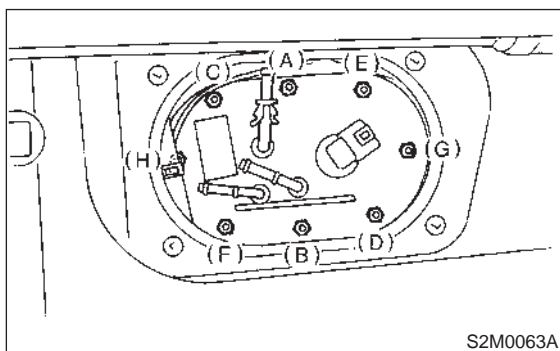
- 1) Install the fuel level sensor onto the mounting bracket.



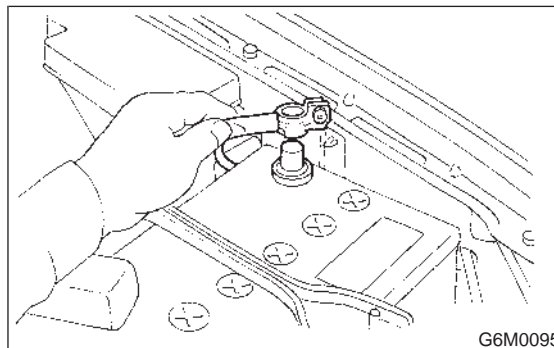
- 2) Always use new gaskets.
- 3) Ensure sealing portion is free from fuel or foreign particles before installation.
- 4) Tighten nuts in alphabetical sequence shown in figure to specified torque.

Tightening torque:

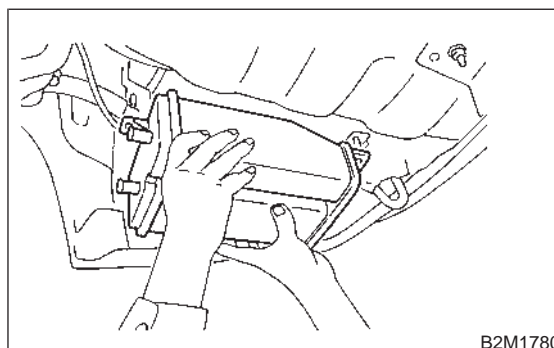
$4.4 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.45 \pm 0.15 \text{ kg}\cdot\text{m}$, $3.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)

**9. Air Filter****A: REMOVAL AND INSTALLATION**

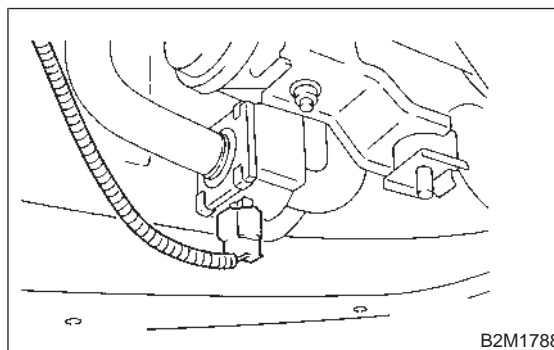
- 1) Disconnect battery ground cable.



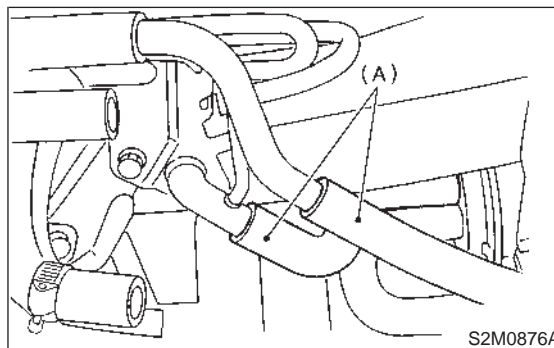
- 2) Lift-up the vehicle.
- 3) Remove canister. <Ref. to 2-1 [W3A0].>



- 4) Disconnect connector from drain valve.

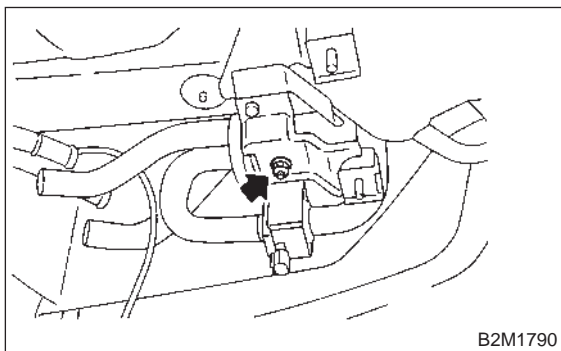


- 5) Disconnect evaporation hoses (A) from joint pipes.

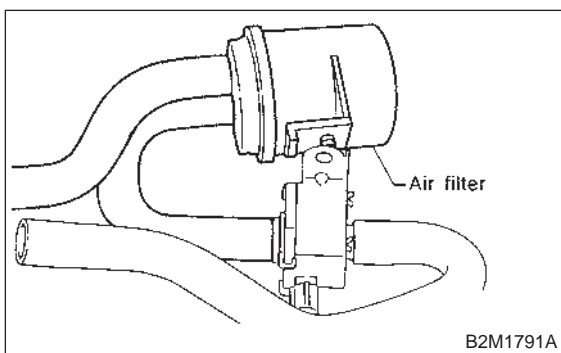


10. Sub Fuel Level Sensor

6) Remove nut which installs air filter and drain valve brackets on body, and remove them as a unit.



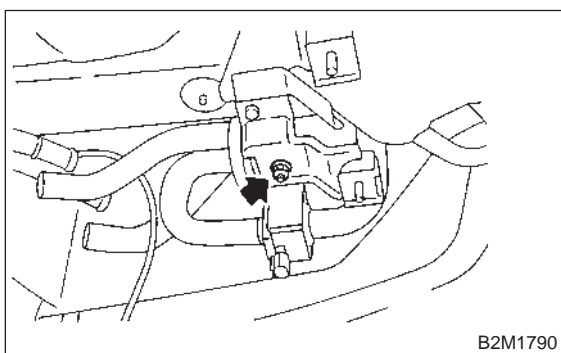
7) Disconnect evaporation hoses, and remove air filter.



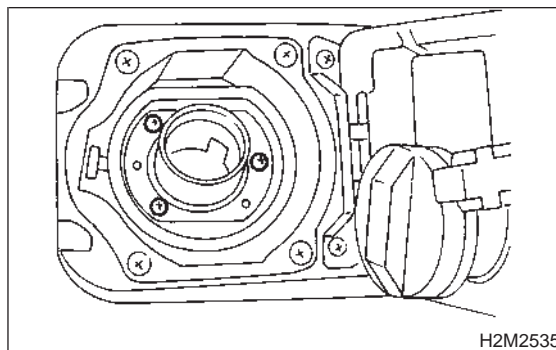
8) Installation is in the reverse order of removal.

Tightening torque:

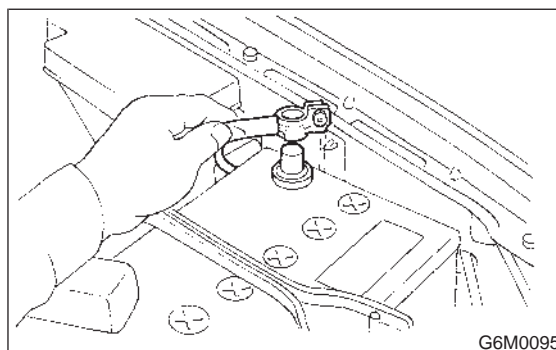
$22.5 \pm 7 \text{ N}\cdot\text{m}$ ($2.3 \pm 0.7 \text{ kg}\cdot\text{m}$, $16.6 \pm 5.1 \text{ ft}\cdot\text{lb}$)

**10. Sub Fuel Level Sensor****A: REMOVAL AND INSTALLATION**

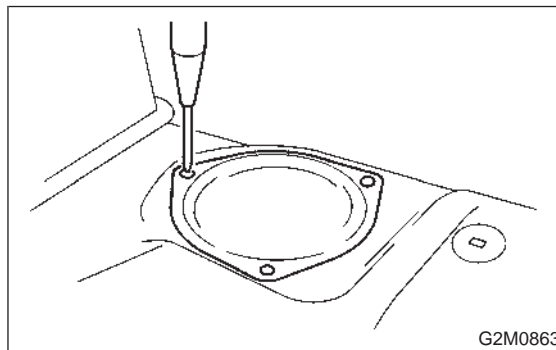
- 1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 2) Open fuel flap lid, and remove fuel filler cap.



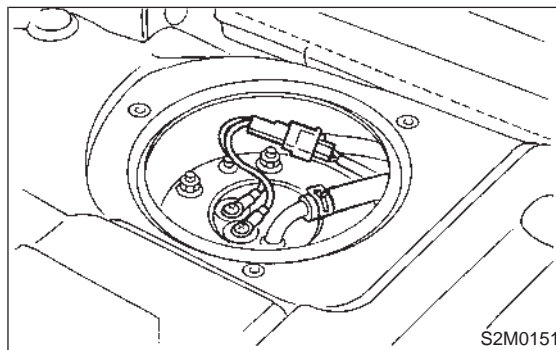
- 3) Disconnect battery ground cable.



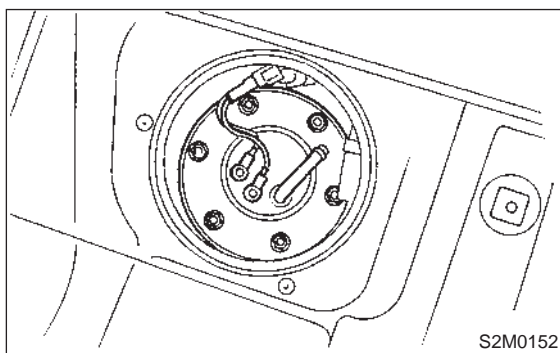
- 4) Remove service hole cover.



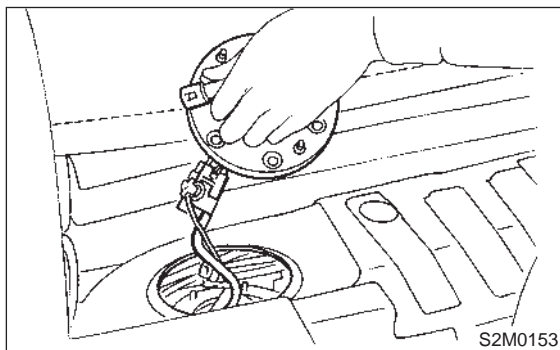
- 5) Disconnect connector from fuel sub meter, and disconnect jet pump hose.



- 6) Remove bolts which install sub fuel level sensor on fuel tank.



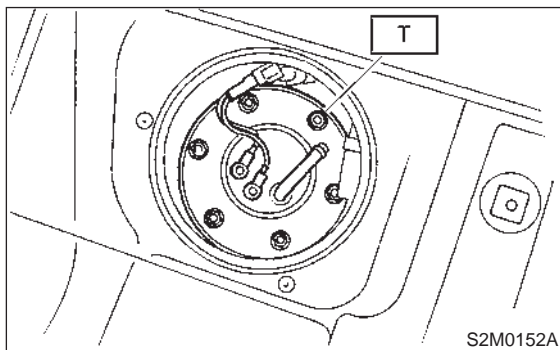
- 7) Remove sub fuel level sensor.



- 8) Installation is in the reverse order of removal.

Tightening torque:

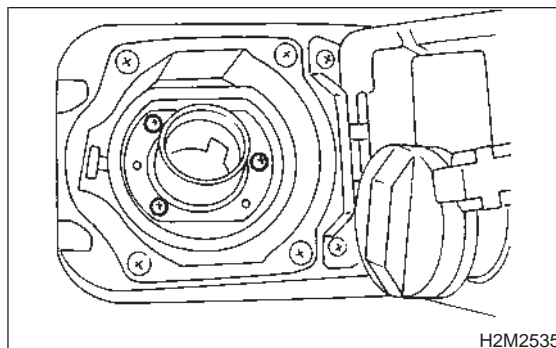
T: 4.4 ± 1.5 N·m (0.45 ± 0.15 kg·m, 3.3 ± 1.1 ft·lb)



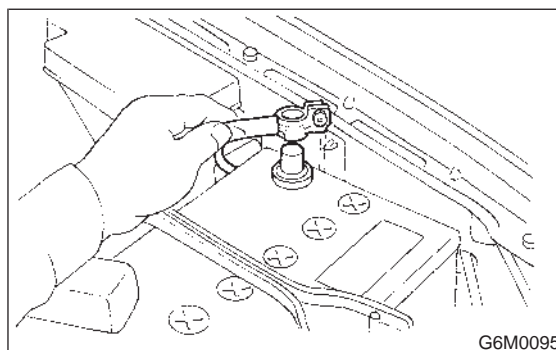
11. Vent Valve

A: REMOVAL AND INSTALLATION

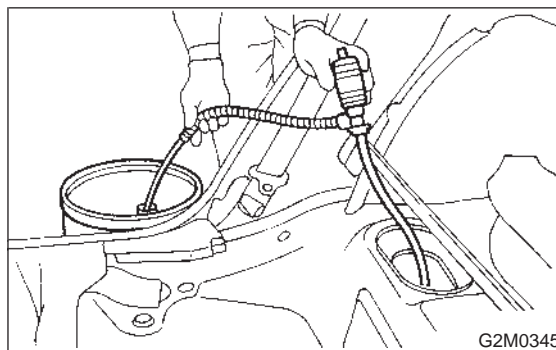
- 1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 2) Open fuel flap lid, and remove fuel filler cap.



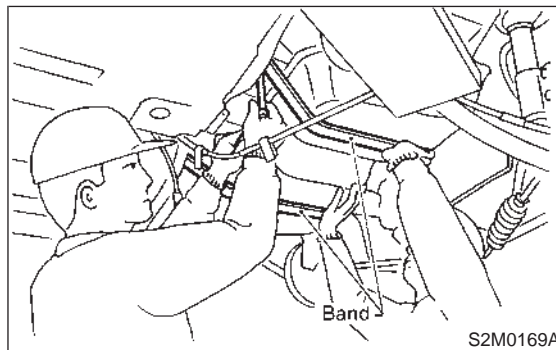
- 3) Disconnect battery ground cable.



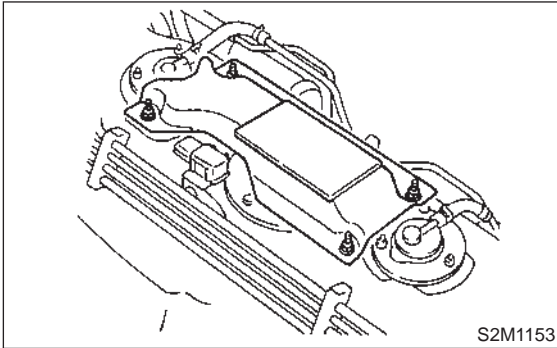
- 4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>



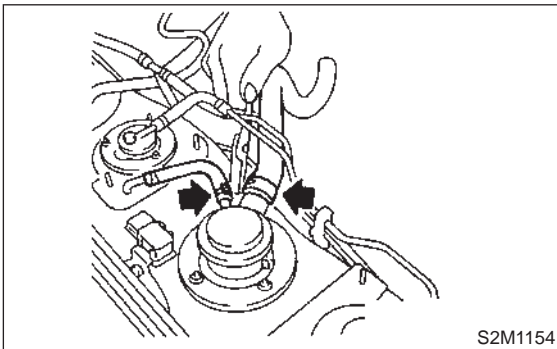
- 5) Remove fuel tank. <Ref. to 2-8 [W2A0].>



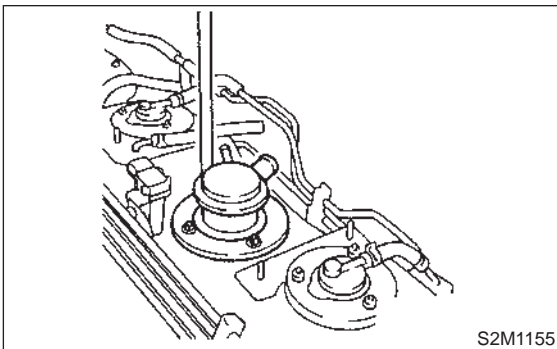
6) Remove protector cover.



7) Move clips, and disconnect hoses from vent valve.



8) Remove nuts which install vent valve on fuel tank.



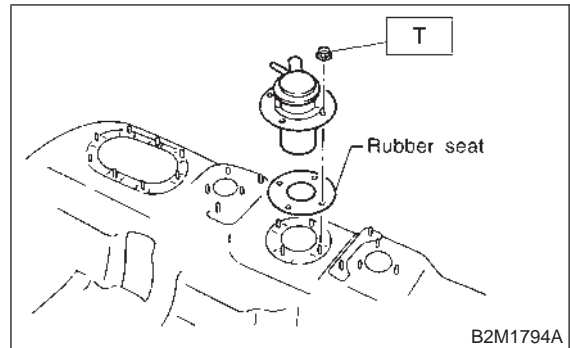
9) Installation is in the reverse order of removal.

CAUTION:

Replace rubber seat with a new one.

Tightening torque:

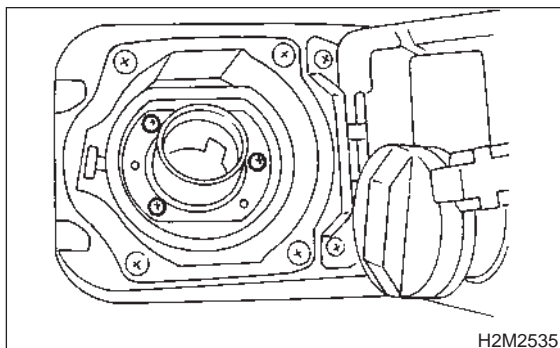
T: 4.4 ± 1.5 N·m (0.45 ± 0.15 kg·m, 3.3 ± 1.1 ft·lb)



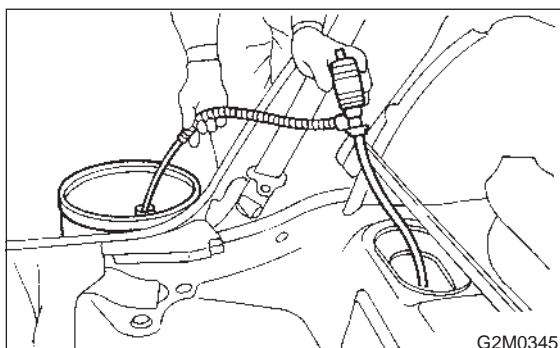
12. Shut Valve

A: REMOVAL AND INSTALLATION

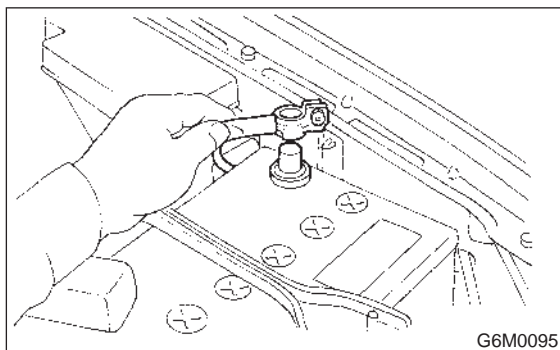
- 1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 2) Open fuel flap lid, and remove fuel filler cap.



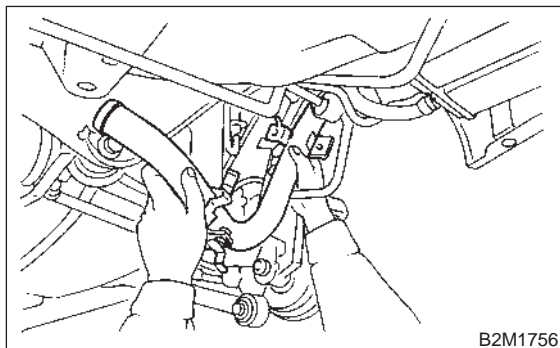
- 3) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>



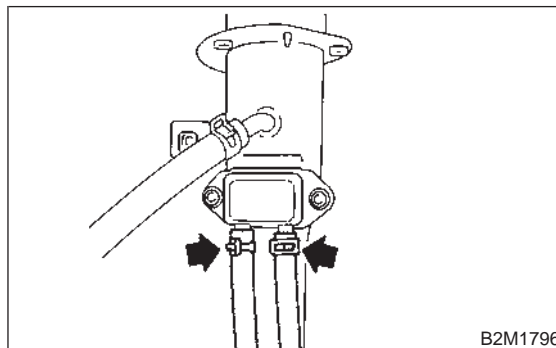
- 4) Disconnect battery ground cable.



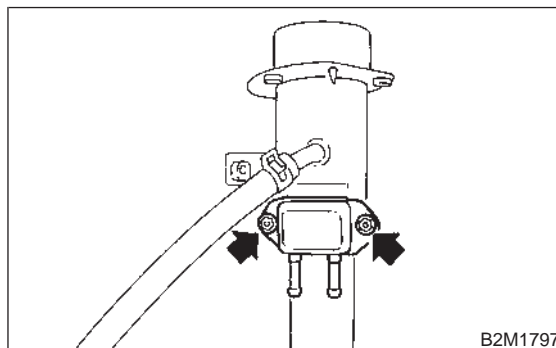
- 5) Remove fuel filler pipe. <Ref. to 2-8 [W1B0].>



- 6) Disconnect evaporation hoses from shut valve.



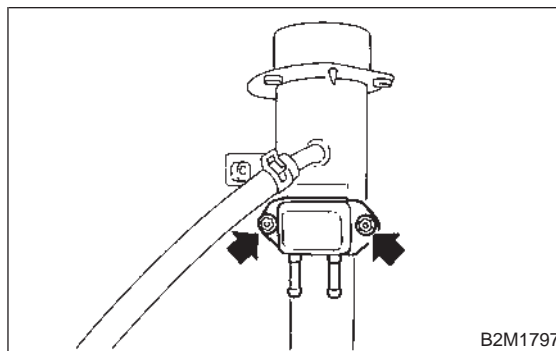
- 7) Remove shut valve from fuel filler pipe.



- 8) Installation is in the reverse order of removal.

Tightening torque:

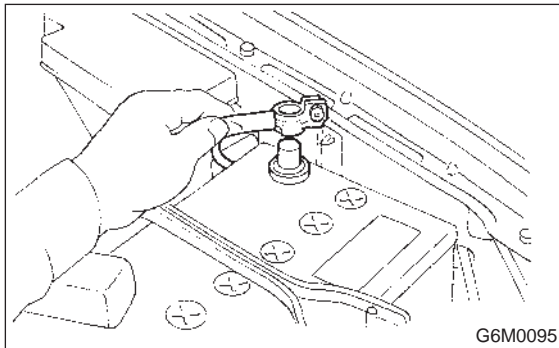
$4.4 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.45 \pm 0.15 \text{ kg}\cdot\text{m}$, $3.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)



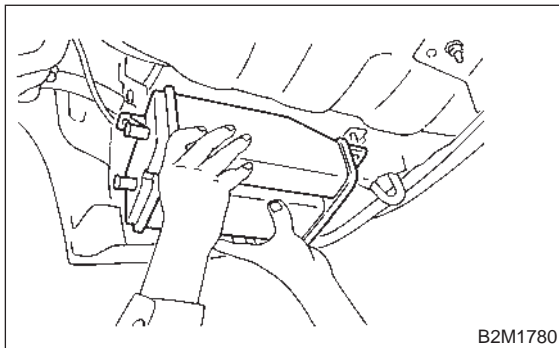
13. Drain Valve

A: REMOVAL AND INSTALLATION

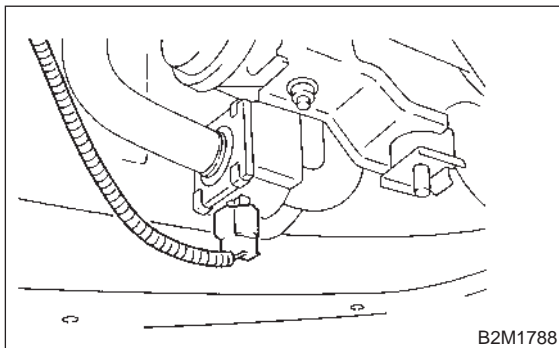
- 1) Disconnect battery ground cable.



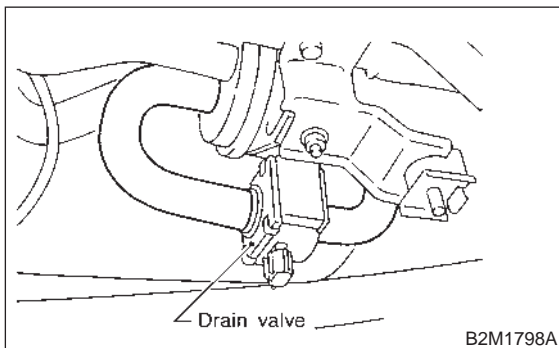
- 2) Lift-up the vehicle.
3) Remove canister. <Ref. to 2-1 [W3A0].>



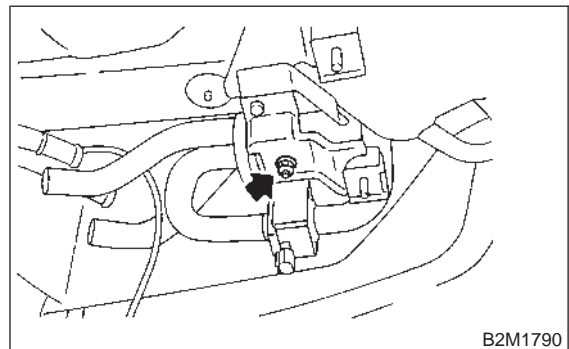
- 4) Disconnect connector from drain valve.



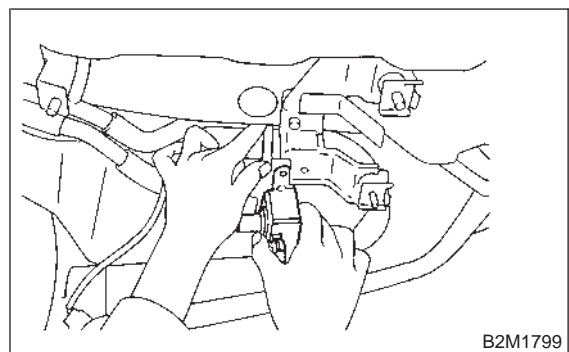
- 5) Disconnect evaporation hoses from drain valve.



- 6) Remove bolt which installs air filter and drain valve brackets on body.



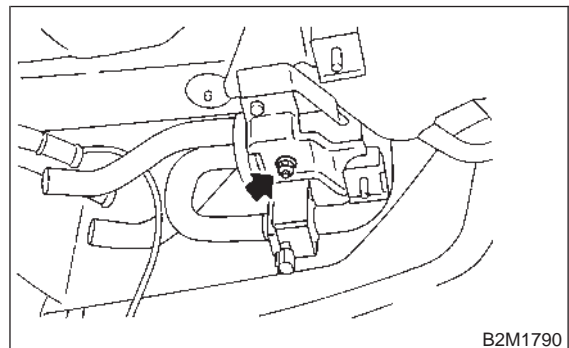
- 7) Move air filter to upper side, and remove drain valve with bracket.



- 8) Installation is in the reverse order of removal.

Tightening torque:

$22.5 \pm 7 \text{ N}\cdot\text{m}$ ($2.3 \pm 0.7 \text{ kg}\cdot\text{m}$, $16.6 \pm 5.1 \text{ ft}\cdot\text{lb}$)



ON-CAR SERVICES **2-2**

	Page
W SERVICE PROCEDURE	2
1. Foreword	2
2. Ignition Timing	2
3. Engine Idle Speed.....	3
4. Engine Compression.....	4
5. Intake Manifold Vacuum.....	5
6. Engine Oil Pressure	5
7. Valve Clearance	7

1. Foreword

This chapter describes major inspection and service procedures for the engine mounted on the body. For procedures not found in this chapter, refer to the service procedure section in the applicable chapter.

2. Ignition Timing

A: MEASUREMENT

CAUTION:

After warming-up, engine becomes very hot. Be careful not to burn yourself during measurement.

- 1) Warm-up the engine.
- 2) o check the ignition timing, connect a timing light to #1 cylinder spark plug cord, and illuminate the timing mark with the timing light.
- 3) Start the engine at idle speed and check the ignition timing.

Ignition timing [BTDC/rpm]:

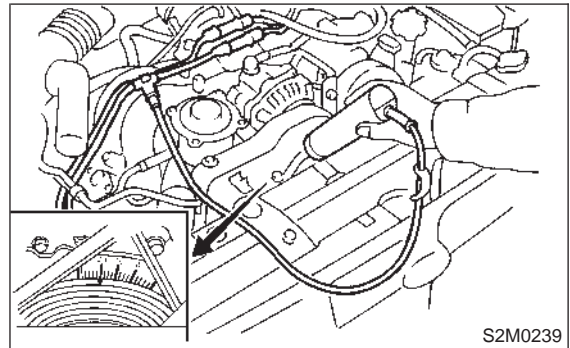
2200 cc California spec. vehicles

$15^{\circ} \pm 8^{\circ} / 700$

Except 2200 cc California spec. vehicles

$10^{\circ} \pm 8^{\circ} / 700$ (MT model)

$15^{\circ} \pm 8^{\circ} / 700$ (AT model)



If the timing is not correct, check the ignition control system.

<Ref. to 2-7 [T6A0]>

3. Engine Idle Speed

A: MEASUREMENT

1) Before checking idle speed, check the following:

(1) Ensure that air cleaner element is free from clogging, ignition timing is correct, spark plugs are in good condition, and that hoses are connected properly.

(2) Ensure that malfunction indicator light (CHECK ENGINE light) does not illuminate.

2) Warm-up the engine.

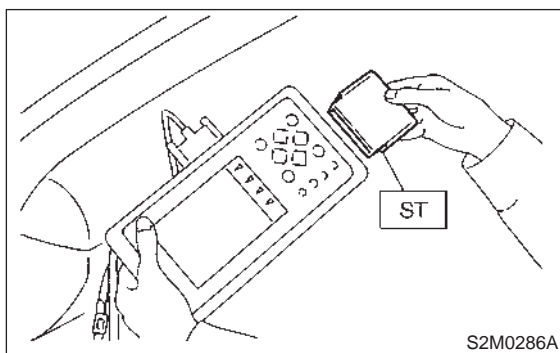
3) Stop the engine, and turn ignition switch to OFF.

4) When using SUBARU SELECT MONITOR;

NOTE:

For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

(1) Insert the cartridge to SUBARU SELECT MONITOR. <Ref. to 1-6 [G1100].>



(2) Connect SUBARU SELECT MONITOR to the data link connector.

(3) Turn ignition switch to ON, and SUBARU SELECT MONITOR switch to ON.

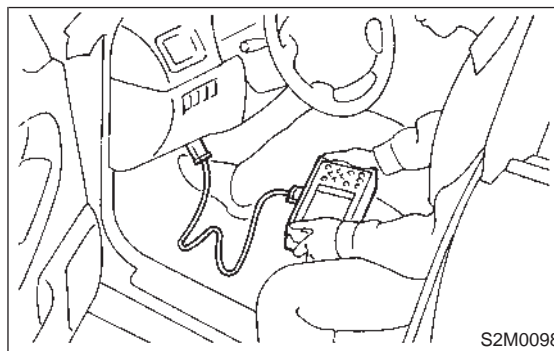
(4) Select {2. Each System Check} in Main Menu.

(5) Select {Engine Control System} in Selection Menu.

(6) Select {1. Current Data Display & Save} in EGI/EMPI Diagnosis.

(7) Select {1.12 Data Display} in Data Display Menu.

(8) Start the engine, and read engine idle speed.



5) When using tachometer (Secondary pick-up type).

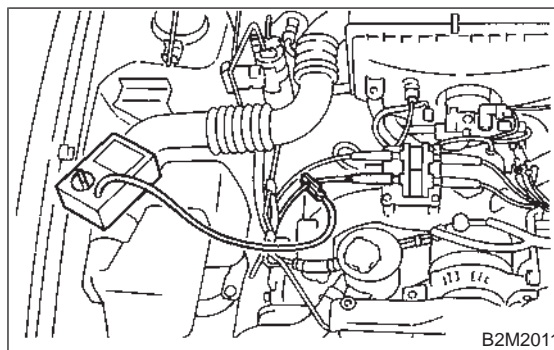
(1) Attach the pick-up clip to No. 1 cylinder spark plug cord.

(2) Start the engine, and read engine idle speed.

NOTE:

- When using the OBD-II general scan tool, carefully read its operation manual.

- This ignition system provides simultaneous ignition for #1 and #2 plugs. It must be noted that some tachometers may register twice that of actual engine speed.



6) Check idle speed when unloaded. (With headlights, heater fan, rear defroster, radiator fan, air conditioning, etc. OFF)

Idle speed (No load and gears in neutral (MT), or N or P (AT) position):

700±100 rpm

7) Check idle speed when loaded. (Turn air conditioning switch to "ON" and operate compressor for at least one minute before measurement.)

Idle speed [A/C "ON", no load and gears in neutral (MT) or N or P (AT) position]:

850±50 rpm

CAUTION:

Never rotate idle adjusting screw. If idle speed is out of specifications, refer to General On-board Diagnosis Table under "2-7 On-Board Diagnostics II System".

4. Engine Compression

A: MEASUREMENT

CAUTION:

After warming-up, engine becomes very hot. Be careful not to burn yourself during measurement.

- 1) After warming-up the engine, turn ignition switch to OFF.
- 2) Make sure that the battery is fully charged.
- 3) Disconnect battery ground cable.
- 4) Remove all the spark plugs. <Ref. to 6-1 [W3A0].>
- 5) Disconnect connectors from fuel injectors.
- 6) Connect battery ground cable.
- 7) Fully open throttle valve.
- 8) Check the starter motor for satisfactory performance and operation.
- 9) Hold the compression gauge tight against the spark plug hole.

CAUTION:

When using a screw-in type compression gauge, the screw (put into cylinder head spark plug hole) should be less than 18 mm (0.71 in) long.

- 10) Crank the engine by means of the starter motor, and read the maximum value on the gauge when the pointer is steady.

- 11) Perform at least two measurements per cylinder, and make sure that the values are correct.

Compression (350 rpm and fully open throttle):

Standard;

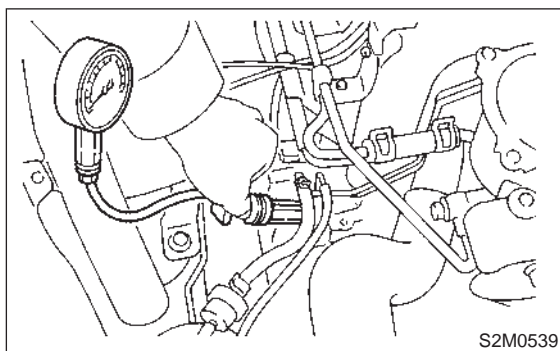
1,216 kPa (12.4 kg/cm², 176 psi)

Limit;

941 kPa (9.6 kg/cm², 137 psi)

Difference between cylinders;

49 kPa (0.5 kg/cm², 7 psi), or less



S2M0539

5. Intake Manifold Vacuum

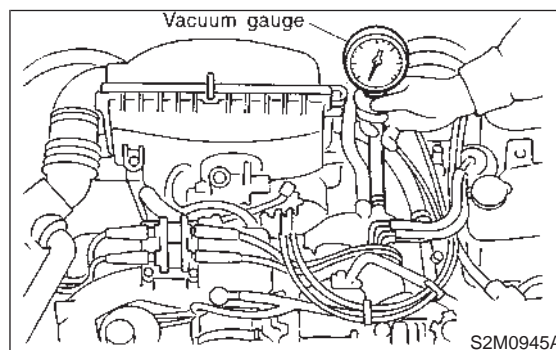
A: MEASUREMENT

- 1) Warm-up the engine.
- 2) Disconnect the brake vacuum hose and install the vacuum gauge to the hose fitting on the manifold.

- 3) Keep the engine at the idle speed and read the vacuum gauge indication.

By observing the gauge needle movement, the internal condition of the engine can be diagnosed as described below.

Vacuum pressure (at idling, A/C "OFF"):
Less than -60.0 kPa (-450 mmHg, -17.72 inHg)

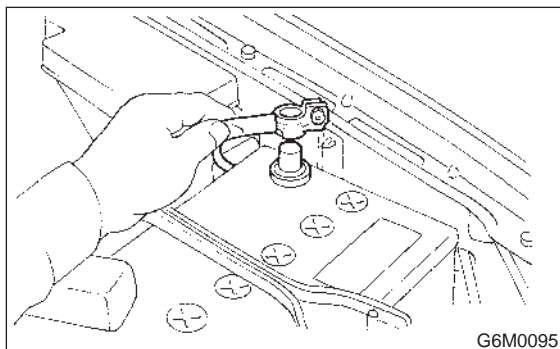


Diagnosis of engine condition by measurement of manifold vacuum	
Vacuum gauge indication	Possible engine condition
1. Needle is steady but lower than normal position. This tendency becomes more evident as engine temperature rises.	Leakage around intake manifold gasket or disconnection or damaged vacuum hose
2. When engine speed is reduced slowly from higher speed, needle stops temporarily when it is lowering or becomes steady above normal position.	Back pressure too high, or exhaust system clogged
3. Needle intermittently drops to position lower than normal position.	Leakage around cylinder
4. Needle drops suddenly and intermittently from normal position.	Sticky valves
5. When engine speed is gradually increased, needle begins to vibrate rapidly at certain speed, and then vibration increases as engine speed increases.	Weak or broken valve springs
6. Needle vibrates above and below normal position in narrow range.	Defective ignition system or throttle chamber idle adjustment

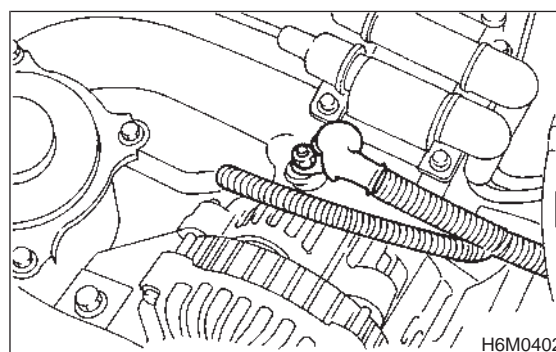
6. Engine Oil Pressure

A: MEASUREMENT

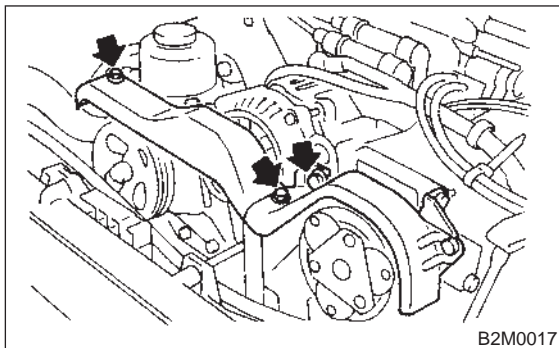
- 1) Disconnect battery ground cable.



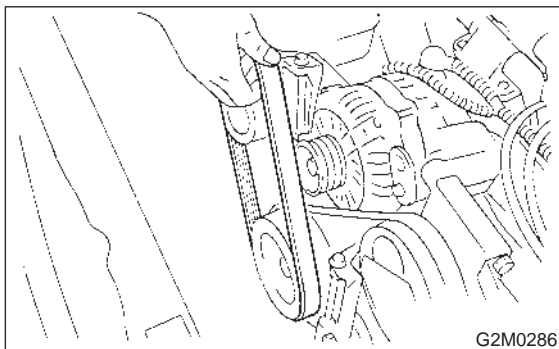
- 2) Remove generator from bracket.
 (1) Disconnect connector and terminal from generator.



- (2) Remove V-belt cover

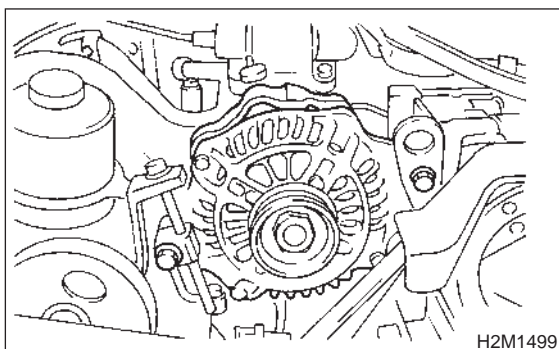


- (3) Loosen lock bolt and slider bolt, and remove front side V-belt.

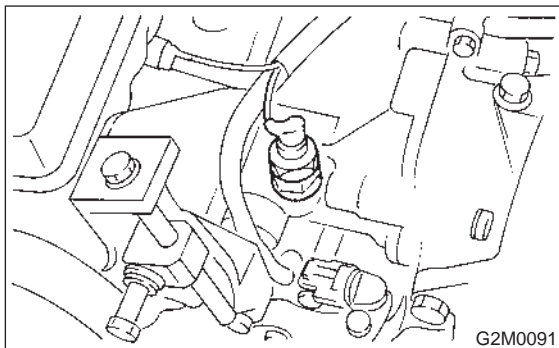


- (4) Remove generator lock bolt.

- (5) Remove bolt which install generator on bracket.

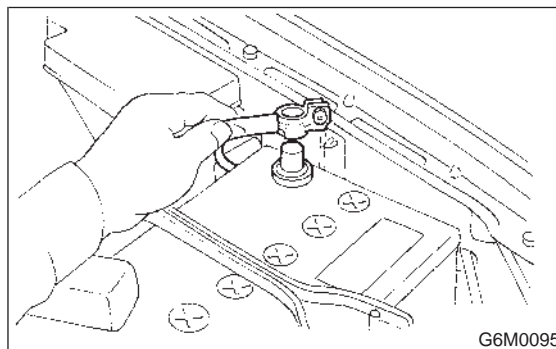


- 3) Disconnect connector from oil pressure switch.
4) Remove oil pressure switch from engine cylinder block. <Ref. to 2-4 [W3A0].>

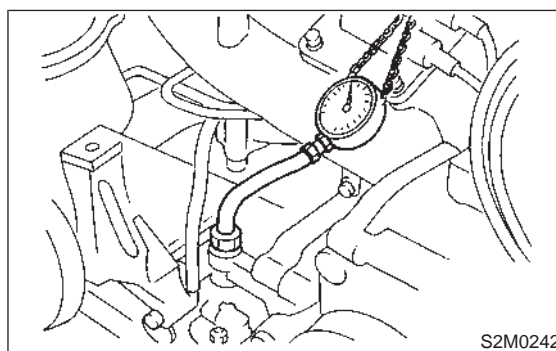


- 5) Connect oil pressure gauge hose to cylinder block.

- 6) Connect battery ground cable.



- 7) Start the engine, and measure oil pressure.



Oil pressure:

98 kPa (1.0 kg/cm², 14 psi) or more at 800 rpm

294 kPa (3.0 kg/cm², 43 psi) or more at 5,000 rpm

CAUTION:

- If oil pressure is out of specification, check oil pump, oil filter and lubrication line. <Ref. to 2-4 ENGINE LUBRICATION SYSTEM.>
- If oil pressure warning light is turned ON and oil pressure is in specification, replace oil pressure switch. <Ref. to 2-4 ENGINE LUBRICATION SYSTEM.>

NOTE:

The specified data is based on an engine oil temperature of 80°C (176°F).

- 8) After measuring oil pressure, install oil pressure switch. <Ref. to 2-4 [W3B0].>

Tightening torque:

25±3 N·m (2.5±0.3 kg-m, 18.1±2.2 ft-lb)

- 9) Install generator and V-belt in the reverse order of removal, and adjust the V-belt deflection. <Ref. to 1-5 [G2A0].>

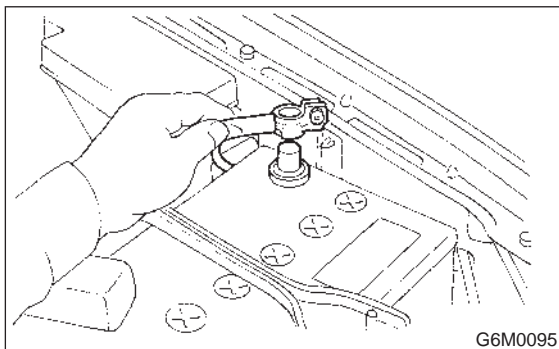
7. Valve Clearance

A: INSPECTION

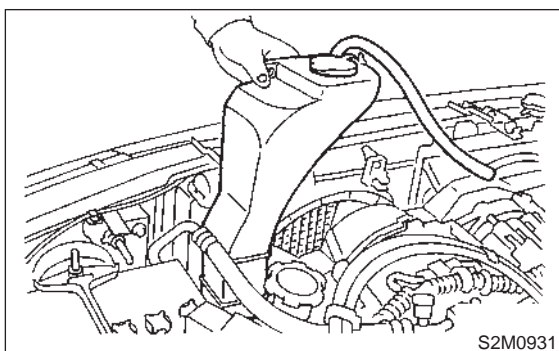
CAUTION:

Inspection and adjustment of valve clearance should be performed while engine is cold.

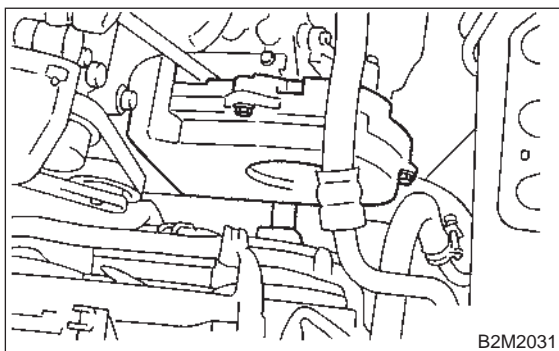
- 1) Set the vehicle onto the lift.
- 2) Disconnect battery ground cable.



- 3) Remove engine coolant reservoir tank.
<Ref. to 2-5 [W9A0].>

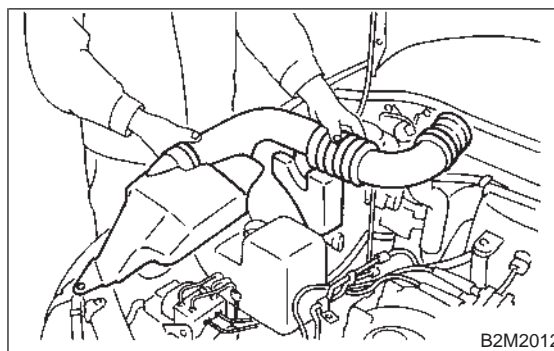


- 4) Remove timing belt cover (LH).

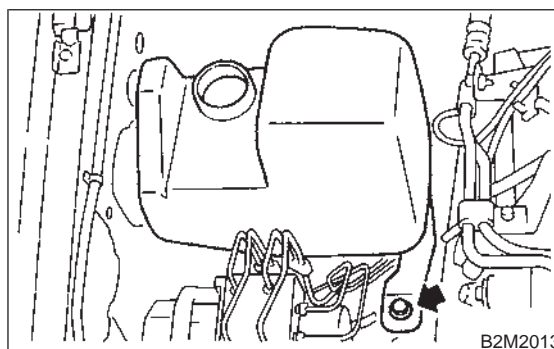


- 5) Remove rocker cover.
- 6) When inspecting #1 and #3 cylinders:

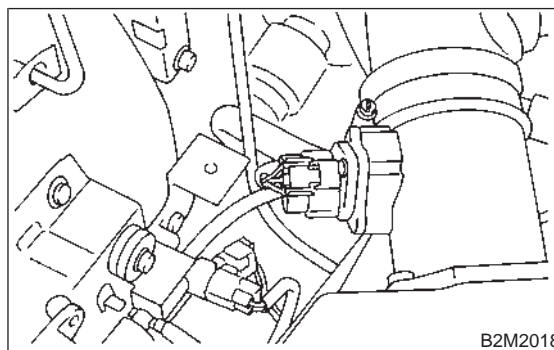
- (1) Remove air intake duct as a unit (2200 cc California spec. vehicles).



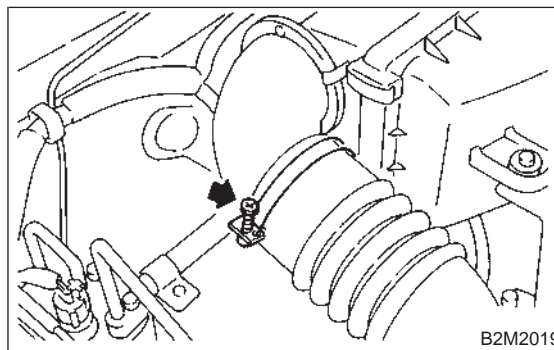
- (2) Remove resonator chamber (2200 cc California spec. vehicles).



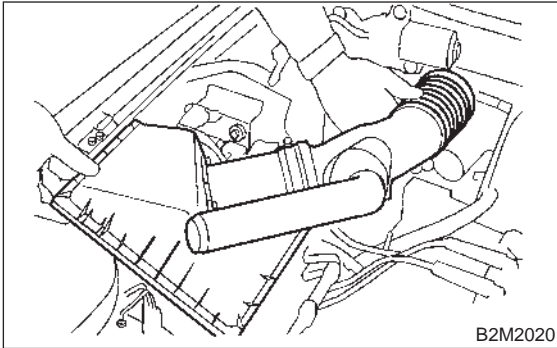
- (3) Disconnect connector from mass air flow sensor (Except 2200 cc California spec. vehicles).



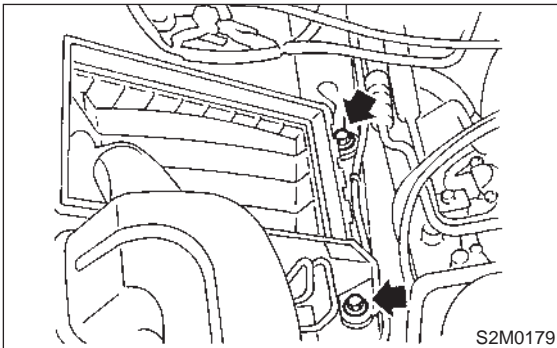
- (4) Loosen clamp which connects air intake duct and air intake chamber (Except 2200 cc California spec. vehicles).



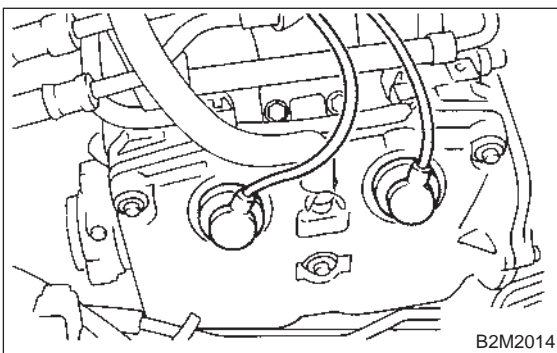
- (5) Remove clips of air cleaner upper cover (Except 2200 cc California spec. vehicles).
- (6) Remove air intake duct and air cleaner upper cover as a unit (Except 2200 cc California spec. vehicles).



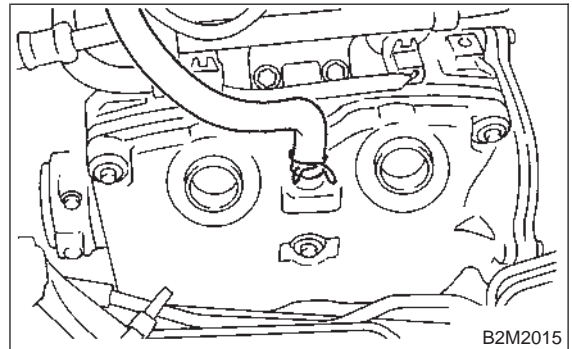
- (7) Remove air cleaner element (Except 2200 cc California spec. vehicles).
- (8) Remove air cleaner lower case (Except 2200 cc California spec. vehicles).



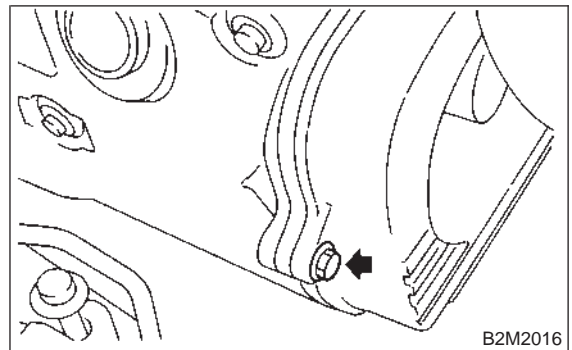
- (9) Disconnect spark plug cords from spark plugs (#1 and #3 cylinders).



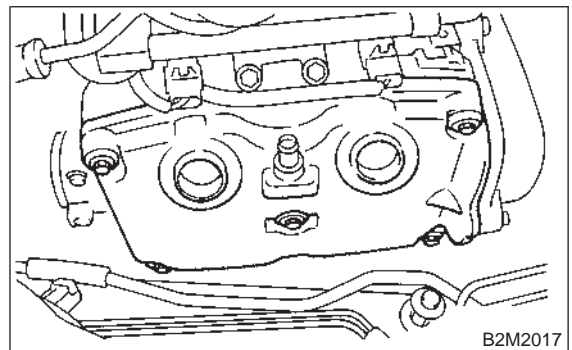
- (10) Disconnect blow-by hose from rocker cover (RH).



- (11) Lift-up the vehicle.
- (12) Remove under cover (RH).
- (13) Place suitable container under the vehicle.
- (14) Lower the vehicle.
- (15) Remove the timing belt cover (RH) bolt.



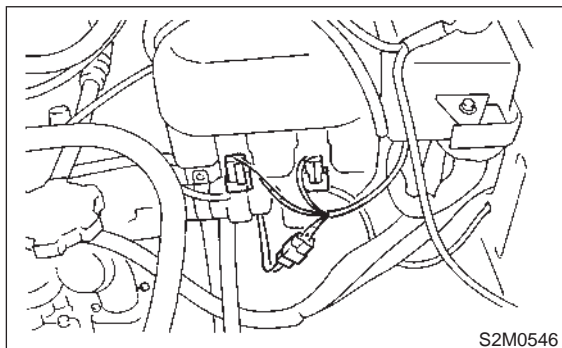
- (16) Remove rocker cover bolts, then remove rocker cover (RH).



- 7) When inspecting #2 and #4 cylinders:
 - (1) Disconnect battery cables, and then remove battery and battery carrier.

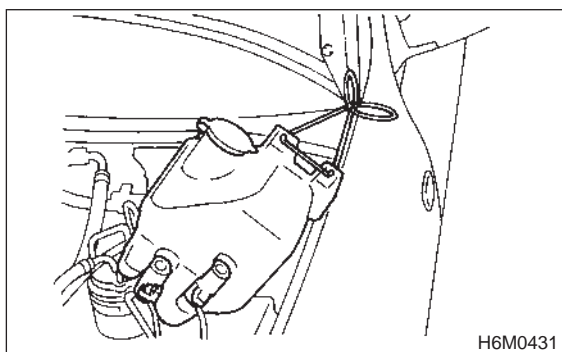
(2) Disconnect front window washer motor connector.

(3) Disconnect rear gate glass washer motor connector. (Wagon only)

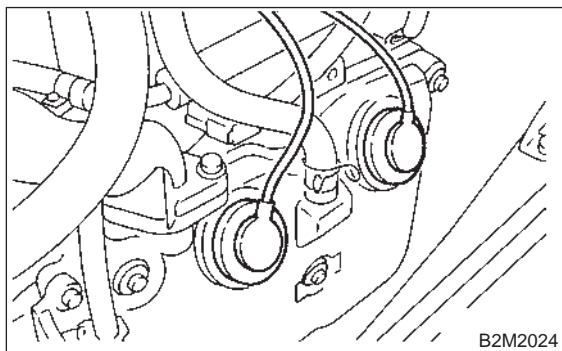


(4) Disconnect rear gate glass washer hose from washer motor, then plug connection with a suitable cap. (Wagon only)

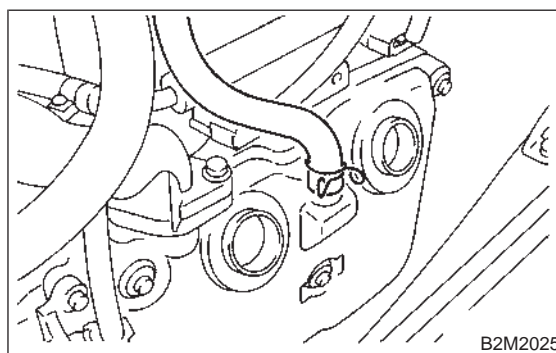
(5) Remove the two bolts which hold washer tank, then secure the tank away from working area.



(6) Disconnect spark plug cords from spark plugs (#2 and #4 cylinders).



(7) Disconnect blow-by hose from rocker cover (LH).

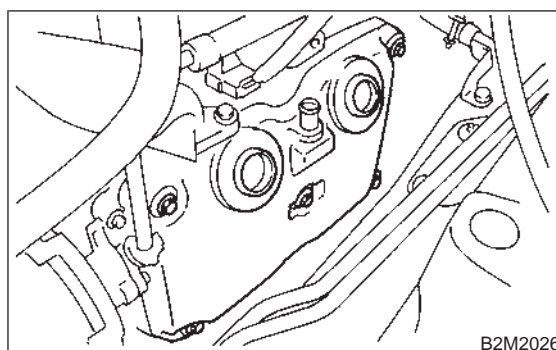


(8) Lift-up the vehicle.

(9) Remove under cover (LH).

(10) Place suitable container under the vehicle.

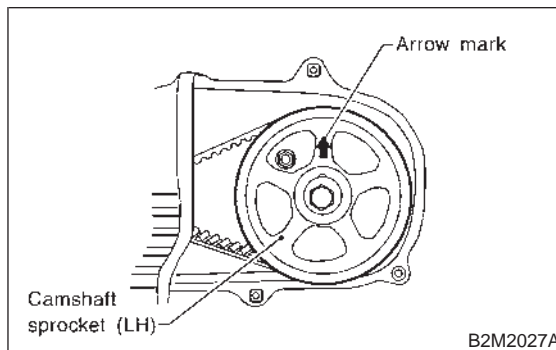
(11) Remove rocker cover bolts, then remove rocker cover (LH).



8) Set #1 cylinder piston to top dead center of compression stroke by rotating crankshaft pulley clockwise.

NOTE:

When arrow mark on camshaft sprocket (LH) comes exactly to the top, #1 cylinder piston is brought to the top dead center of the compression stroke.



9) Measure #1 cylinder valve clearance by using thickness gauge.

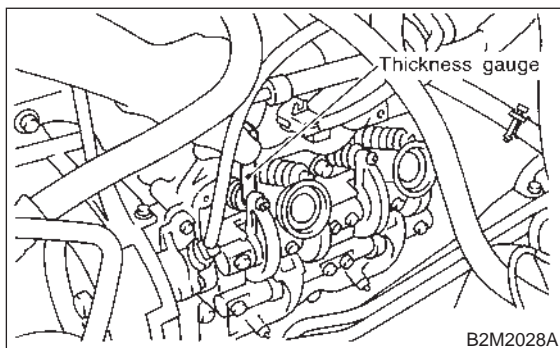
CAUTION:

- Insert the thickness gauge in at as horizontal a direction as a possible with respect to the valve stem end face.
- Measure exhaust valve clearances while lifting-up the vehicle.

Valve clearance:

Intake: 0.20 ± 0.02 mm (0.0079 ± 0.0008 in)

Exhaust: 0.25 ± 0.02 mm (0.0098 ± 0.0008 in)

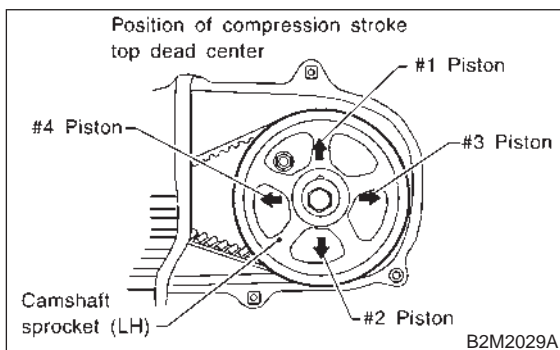


10) If necessary, adjust the valve clearance. <Ref. to 2-2 [W7B0].>

11) Similar to measurement procedures used for #1 cylinder, measure #2, #3 and #4 cylinder valve clearances.

NOTE:

- Be sure to set cylinder pistons to their respective top dead centers on the compression stroke before measuring valve clearances.
- To set #3, #2 and #4 cylinder pistons to their top dead centers on the compression stroke, turn crankshaft pulley clockwise 90° at a time starting with arrow mark on left-hand camshaft sprocket facing up.



12) After inspection, install the related parts in the reverse order of removal.

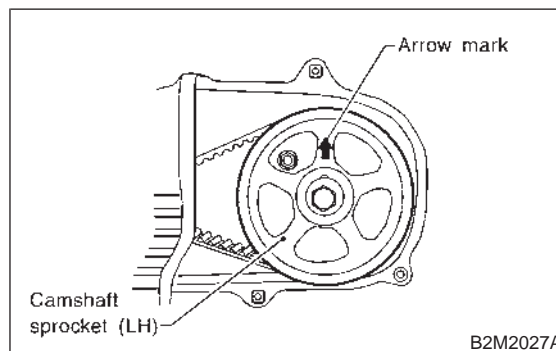
B: ADJUSTMENT**CAUTION:**

Adjustment of valve clearance should be performed while engine is cold.

1) Set #1 cylinder piston to top dead center of compression stroke by rotating crankshaft pulley clockwise.

NOTE:

When arrow mark on camshaft sprocket (LH) comes exactly to the top, #1 cylinder piston is brought to the top dead center of the compression stroke.



2) Adjust the #1 cylinder valve clearance.

- (1) Loosen the valve rocker nut and screw.
- (2) Place suitable thickness gauge.
- (3) While noting valve clearance, tighten valve rocker adjust screw.
- (4) When specified valve clearance is obtained, tighten valve rocker nut.

Tightening torque:

10 ± 1 N·m (1.0 ± 0.1 kg·m, 7.2 ± 0.7 ft·lb)

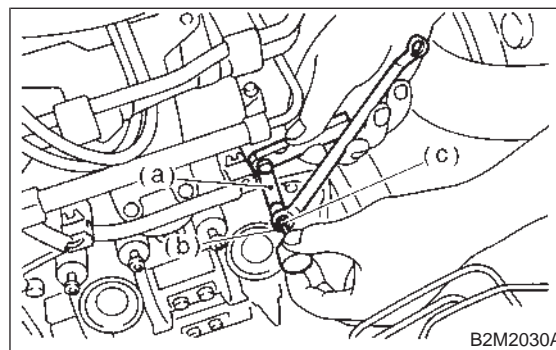
CAUTION:

- Insert the thickness gauge in at as horizontal a direction as possible with respect to the valve stem end face.
- Adjust exhaust valve clearances while lifting-up the vehicle.

Valve clearance:

Intake: 0.20 ± 0.02 mm (0.0079 ± 0.0008 in)

Exhaust: 0.25 ± 0.02 mm (0.0098 ± 0.0008 in)



- Thickness gauge
- Valve rocker nut
- Valve rocker screw

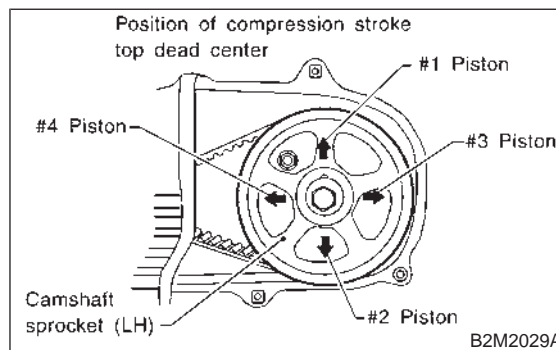
3) Ensure that valve clearances are within specifications.

- 4) Turn crankshaft two complete rotations until #1 cylinder piston is again set to top dead center on compression stroke.
- 5) Ensure that valve clearances are within specifications. If necessary, re-adjust valve clearances.

- 6) Similar to adjustment procedures used for #1 cylinder, adjust #2, #3 and #4 cylinder valve clearances.

NOTE:

- Be sure to set cylinder pistons to their respective top dead centers on the compression stroke before adjusting valve clearances.
- To set #3, #2 and #4 cylinder pistons to their top dead centers on the compression stroke, turn crankshaft pulley clockwise 90° at a time starting with arrow mark on left-hand camshaft sprocket facing up.



MEMO:

ENGINE 2-3

	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Specifications	2
2. Service Data.....	3
C COMPONENT PARTS	7
1. Timing Belt	7
2. Cylinder Head and Camshaft.....	8
3. Cylinder Head and Valve Assembly	9
4. Cylinder Block	10
5. Crankshaft and Piston	11
6. Valve Rocker Assembly.....	12
W SERVICE PROCEDURE	13
1. General Precautions.....	13
2. Timing Belt	14
3. Valve Rocker Assembly.....	29
4. Camshaft	34
5. Cylinder Head.....	42
6. Cylinder Block	53
K DIAGNOSTICS	76
1. Engine Trouble in General	76
2. Engine Noise	83

1. Specifications

Engine	Model		2200 cc	2500 cc
	Type		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine	
	Valve arrangement		Belt driven, single over-head camshaft, 4-valve/cylinder	
	Bore x Stroke		mm (in)	mm (in)
			96.9 × 75.0 (3.815 × 2.953)	99.5 × 79.0 (3.917 × 3.110)
	Displacement		cm ³ (cu in)	cm ³ (cu in)
			2,212 (135)	2,457 (150)
	Compression ratio		9.7	
	Compression pressure (at 200 — 300 rpm)		kPa (kg/cm ² , psi)	kPa (kg/cm ² , psi)
			1,079 — 1,275 (11.0 — 13.0, 156 — 185)	
	Number of piston rings		Pressure ring: 2, Oil ring: 1	
	Intake valve timing	Opening	2° BTDC	1° BTDC
		Closing	50° ABDC	51° ABDC
	Exhaust valve timing	Opening	46° BBDC	50° BBDC
		Closing	6° ATDC	6° ATDC
	Valve clearance	Intake	mm (in)	mm (in)
		Exhaust	mm (in)	mm (in)
			0.20±0.02 (0.0079±0.0008)	0.25±0.02 (0.0098±0.0008)
	Idling speed [At neutral position on MT, or "P" or "N" position on AT]		rpm	rpm
			700±100 (No load) 850±50 (A/C switch ON)	
	Firing order		1 → 3 → 2 → 4	
	Ignition timing		BTDC/rpm	BTDC/rpm
			14°±8°/700 (MT), 20°±8°/700 (AT)	

2. Service Data

NOTE:

STD: Standard, I.D.: Inner Diameter, O.D.: Outer Diameter, OS: Oversize, US: Undersize

Belt tensioner adjuster	Protrusion of adjuster rod			5.2 — 6.2 mm	(0.205 — 0.244 in)	
Belt tensioner	Spacer O.D.			17.955 — 17.975 mm	(0.7069 — 0.7077 in)	
	Tensioner bush I.D			18.00 — 18.08 mm	(0.7087 — 0.7118 in)	
	Clearance between spacer and bush		STD	0.025 — 0.125 mm	(0.0010 — 0.0049 in)	
			Limit	0.175 mm	(0.0069 in)	
	Side clearance of spacer		STD	0.2 — 0.55 mm	(0.0079 — 0.0217 in)	
			Limit	0.81 mm	(0.0319 in)	
Valve rocker arm	Clearance between shaft and arm		STD	0.020 — 0.054 mm	(0.0008 — 0.0021 in)	
			Limit	0.10 mm	(0.0039 in)	
Camshaft	Bend limit			0.020 mm	(0.0008 in)	
	Thrust clearance		STD	0.030 — 0.090 mm	(0.0012 — 0.0035 in)	
			Limit	0.11 mm	(0.0043 in)	
	Cam lobe height (2200 cc)	Intake	STD	38.732 — 38.832 mm	(1.5249 — 1.5288 in)	
			Limit	38.632 mm	(1.5209 in)	
		Exhaust	STD	39.257 — 39.357 mm	(1.5455 — 1.5495 in)	
			Limit	39.157 mm	(1.5416 in)	
	Cam lobe height (2500 cc)	Intake	STD	39.485 — 39.585 mm	(1.5545 — 1.5585 in)	
			Limit	39.385 mm	(1.5506 in)	
		Exhaust	STD	39.257 — 39.357 mm	(1.5455 — 1.5495 in)	
			Limit	39.157 mm	(1.5416 in)	
	Camshaft journal O.D.			31.928 — 31.945 mm	(1.2570 — 1.2577 in)	
	Camshaft journal hole I.D.			32.000 — 32.018 mm	(1.2598— 1.2605 in)	
Oil clearance		STD	0.055 — 0.090 mm	(0.0022 — 0.0035 in)		
		Limit	0.118 mm	(0.0046 in)		
Cylinder head	Surface warpage limit			0.05 mm	(0.0020 in)	
	Surface grinding limit			0.3 mm	(0.012 in)	
	Standard height			127.5 mm	(5.02 in)	
Valve set	Refacing angle			90°		
	Contacting width		Intake	STD	1.0 mm	(0.039 in)
				Limit	1.7 mm	(0.067 in)
			Exhaust	STD	1.4 mm	(0.055 in)
				Limit	2.1 mm	(0.083 in)
	Valve guide	Inner diameter			6.000 — 6.012 mm	(0.2362 — 0.2367 in)
Protrusion above head		Intake	20.0 — 20.5 mm	(0.787 — 0.807 in)		
		Exhaust	16.5 — 17.0 mm	(0.650 — 0.669 in)		

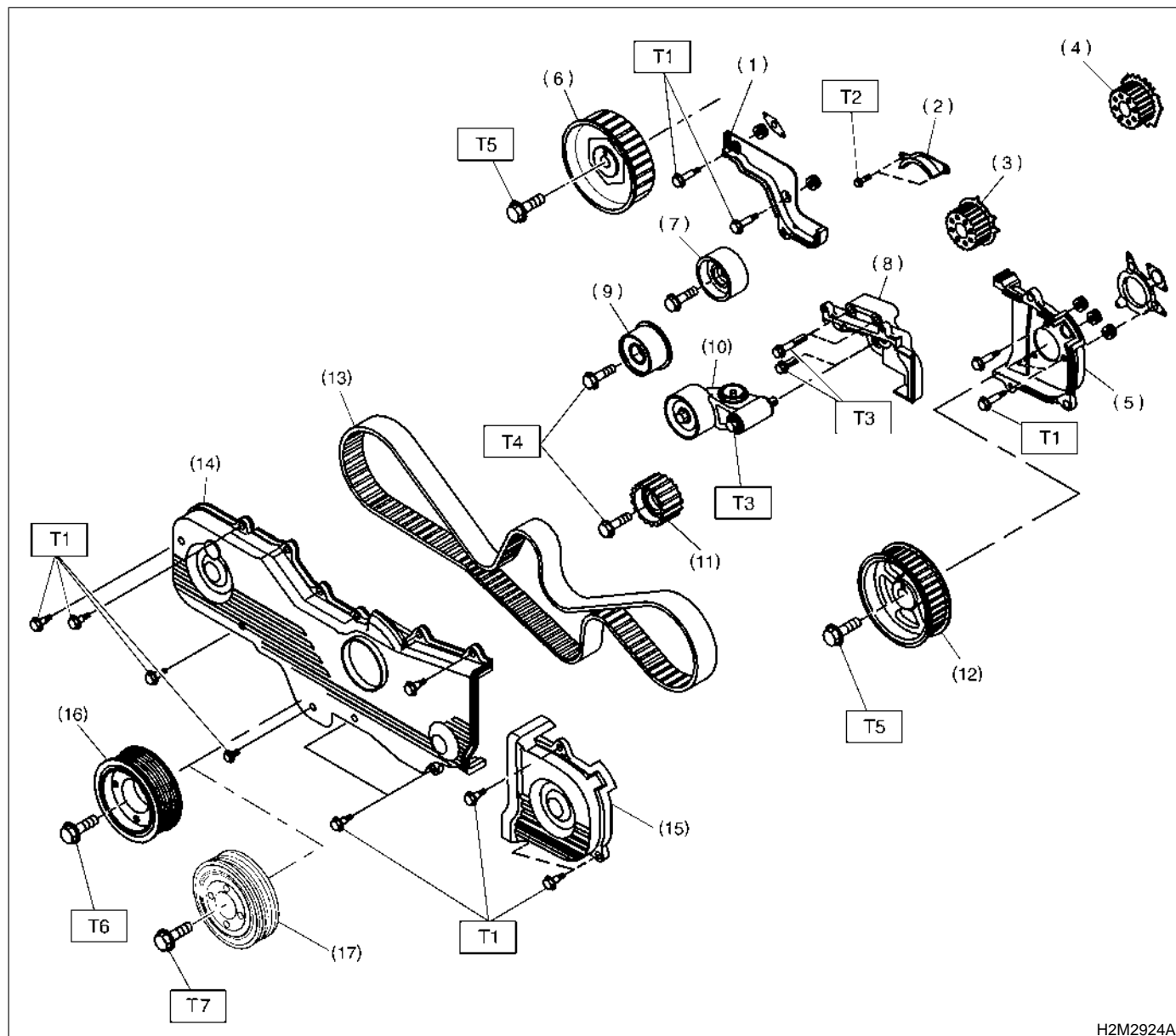
Valve	Head edge thickness	Intake	STD	1.0 mm	(0.039 in)	
			Limit	0.6 mm	(0.024 in)	
		Exhaust	STD	1.2 mm	(0.047 in)	
			Limit	0.6 mm	(0.024 in)	
	Stem diameter	Intake	5.950 — 5.965 mm		(0.2343 — 0.2348 in)	
		Exhaust	5.945 — 5.960 mm		(0.2341 — 0.2346 in)	
	Stem oil clearance	STD	Intake	0.035 — 0.062 mm		(0.0014 — 0.0024 in)
			Exhaust	0.040 — 0.067 mm		(0.0016 — 0.0026 in)
		Limit	—		0.15 mm	(0.0059 in)
Overall length	Intake	120.6 mm		(4.75 in)		
	Exhaust	121.7 mm		(4.79 in)		
Valve spring	Free length			54.30 mm	(2.1378 in)	
	Squareness			2.5°, 2.4 mm	(0.094 in)	
	Tension/spring height			214.8 — 246.2 N (21.9 — 25.1 kg, 48.3 — 55.3 lb)/45.0 mm (1.772 in) 526.6 — 581.6 N (53.7 — 59.3 kg, 118.4 — 130.8 lb)/34.7 mm (1.366 in)		
Cylinder block	Surface warpage limit (mating with cylinder head)			0.05 mm	(0.0020 in)	
	Surface grinding limit			0.1 mm	(0.004 in)	
	Cylinder bore (2200 cc)	STD	A	96.905 — 96.915 mm	(3.8151 — 3.8155 in)	
			B	96.895 — 96.905 mm	(3.8148 — 3.8151 in)	
	Cylinder bore (2500 cc)	STD	A	99.505 — 99.515 mm	(3.9175 — 3.9179 in)	
			B	99.495 — 99.505 mm	(3.9171 — 3.9175 in)	
	Taper	STD	0.015 mm	(0.0006 in)		
		Limit	0.050 mm	(0.0020 in)		
	Out-of-roundness	STD	0.010 mm	(0.0004 in)		
		Limit	0.050 mm	(0.0020 in)		
	Piston clearance	STD	0.010 — 0.030 mm	(0.0004 — 0.0012 in)		
Limit		0.050 mm	(0.0020 in)			
Enlarging (boring) limit			0.5 mm	(0.020 in)		
Piston	Outer diameter (2200 cc)	STD	A	96.885 — 96.895 mm	(3.8144 — 3.8148 in)	
			B	96.875 — 96.885 mm	(3.8140 — 3.8144 in)	
		0.25 mm (0.0098 in) OS		97.125 — 97.135 mm	(3.8238 — 3.8242 in)	
		0.50 mm (0.0197 in) OS		97.375 — 97.385 mm	(3.8337 — 3.8340 in)	
	Outer diameter (2500 cc)	STD	A	99.485 — 99.495 mm	(3.9167 — 3.9171 in)	
			B	99.475 — 99.485 mm	(3.9163 — 3.9167 in)	
		0.25 mm (0.0098 in) OS		99.725 — 99.735 mm	(3.9262 — 3.9266 in)	
0.50 mm (0.0197 in) OS		99.975 — 99.985 mm	(3.9360 — 3.9364 in)			
Piston pin	Standard clearance between piston pin and hole in piston	STD	0.004 — 0.008 mm		(0.0002 — 0.0003 in)	
		Limit	0.020 mm		(0.0008 in)	
	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).		

Piston ring	Piston ring gap	Top ring	STD	0.20 — 0.35 mm	(0.0079 — 0.0138 in)
			Limit	1.0 mm	(0.039 in)
		Second ring	STD	0.37 — 0.52 mm	(0.0146 — 0.0205 in)
			Limit	1.0 mm	(0.039 in)
	Oil ring	STD	0.20 — 0.50 mm	(0.0079 — 0.0197 in)	
		Limit	1.0 mm	(0.039 in)	
	Clearance between piston ring and piston ring groove	Top ring	STD	0.040 — 0.080 mm	(0.0016 — 0.0031 in)
			Limit	0.15 mm	(0.0059 in)
Second ring		STD	0.030 — 0.070 mm	(0.0012 — 0.0028 in)	
		Limit	0.15 mm	(0.0059 in)	
Con-necting rod	Bend twist per 100 mm (3.94 in) in length		Limit	0.10 mm	(0.0039 in)
	Side clearance		STD	0.070 — 0.330 mm	(0.0028 — 0.0130 in)
			Limit	0.4 mm	(0.016 in)
Con-necting rod bearing	Oil clearance (2200 cc)		STD	0.010 — 0.038 mm	(0.0004 — 0.0015 in)
			Limit	0.05 mm	(0.0020 in)
	Oil clearance (2500 cc)		STD	0.020 — 0.046 mm	(0.0008 — 0.0018 in)
			Limit	0.050 mm	(0.0020 in)
	Thickness at center portion (2200 cc)		STD	1.492 — 1.501 mm	(0.0587 — 0.0591 in)
			0.03 mm (0.0012 in) US	1.510 — 1.513 mm	(0.0594 — 0.0596 in)
			0.05 mm (0.0020 in) US	1.520 — 1.523 mm	(0.0598 — 0.0600 in)
			0.25 mm (0.0098 in) US	1.620 — 1.623 mm	(0.0638 — 0.0639 in)
	Thickness at center portion (2500 cc)		STD	1.486 — 1.498 mm	(0.0585 — 0.0590 in)
			0.03 mm (0.0012 in) US	1.504 — 1.512 mm	(0.0592 — 0.0595 in)
0.05 mm (0.0020 in) US			1.514 — 1.522 mm	(0.0596 — 0.0599 in)	
0.25 mm (0.0098 in) US			1.614 — 1.622 mm	(0.0635 — 0.0639 in)	
Con-necting rod bushing	Clearance between piston pin and bushing		STD	0 — 0.022 mm	(0 — 0.0009 in)
			Limit	0.030 mm	(0.0012 in)

SPECIFICATIONS AND SERVICE DATA

Crankshaft	Bend limit			0.035 mm	(0.0014 in)	
	Crankpin and crank journal		Out-of-roundness	0.030 mm (0.0012 in) or less		
			Grinding limit	0.250 mm	(0.0098 in)	
	Crankpin outer diameter		STD	51.984 — 52.000 mm	(2.0466 — 2.0472 in)	
			0.03 mm (0.0012 in) US	51.954 — 51.970 mm	(2.0454 — 2.0461 in)	
			0.05 mm (0.0020 in) US	51.934 — 51.950 mm	(2.0446 — 2.0453 in)	
			0.25 mm (0.0098 in) US	51.734 — 51.750 mm	(2.0368 — 2.0374 in)	
	Crank journal outer diameter		#1, #5, #3	STD	59.992 — 60.008 mm	(2.3619 — 2.3625 in)
				0.03 mm (0.0012 in) US	59.962 — 59.978 mm	(2.3607 — 2.3613 in)
				0.05 mm (0.0020 in) US	59.942 — 59.958 mm	(2.3599 — 2.3605 in)
				0.25 mm (0.0098 in) US	59.742 — 59.758 mm	(2.3520 — 2.3527 in)
			#2, #4	STD	59.992 — 60.008 mm	(2.3619 — 2.3625 in)
				0.03 mm (0.0012 in) US	59.962 — 59.978 mm	(2.3607 — 2.3613 in)
				0.05 mm (0.0020 in) US	59.942 — 59.958 mm	(2.3599 — 2.3605 in)
				0.25 mm (0.0098 in) US	59.742 — 59.758 mm	(2.3520 — 2.3527 in)
	Thrust clearance		STD	0.030 — 0.115 mm	(0.0012 — 0.0045 in)	
Limit			0.25 mm	(0.0098 in)		
Oil clearance		STD	0.010 — 0.030 mm	(0.0004 — 0.0012 in)		
		Limit	0.040 mm	(0.0016 in)		
Crankshaft bearing	Crankshaft bearing thickness		#1, #3	STD	1.998 — 2.011 mm	(0.0787 — 0.0792 in)
				0.03 mm (0.0012 in) US	2.017 — 2.020 mm	(0.0794 — 0.0795 in)
				0.05 mm (0.0020 in) US	2.027 — 2.030 mm	(0.0798 — 0.0799 in)
				0.25 mm (0.0098 in) US	2.127 — 2.130 mm	(0.0837 — 0.0839 in)
			#2, #4, #5	STD	2.000 — 2.013 mm	(0.0787 — 0.0793 in)
				0.03 mm (0.0012 in) US	2.019 — 2.022 mm	(0.0795 — 0.0796 in)
				0.05 mm (0.0020 in) US	2.029 — 2.032 mm	(0.0799 — 0.0800 in)
				0.25 mm (0.0098 in) US	2.129 — 2.132 mm	(0.0838 — 0.0839 in)

1. Timing Belt



H2M2924A

- | | |
|--|---|
| (1) Belt cover No. 2 (RH) | (9) Belt idler (No. 2) |
| (2) Timing belt guide (MT vehicles only) | (10) Automatic belt tension adjuster ASSY |
| (3) Crankshaft sprocket (Except 2200 cc California spec. vehicles) | (11) Belt idler No. 2 |
| (4) Crankshaft sprocket (2200 cc California spec. vehicles) | (12) Camshaft sprocket No. 2 |
| (5) Belt cover No. 2 (LH) | (13) Timing belt |
| (6) Camshaft sprocket No. 1 | (14) Front belt cover |
| (7) Belt idler (No. 1) | (15) Belt cover (LH) |
| (8) Tensioner bracket | (16) Crankshaft pulley (2200 cc model) |
| | (17) Crankshaft pulley (2500 cc model) |

Tightening torque: N-m (kg-m, ft-lb)

T1: 5±1 (0.5±0.1, 3.6±0.7)

T2: 9.8±1.0 (1.0±0.1, 7.2±0.7)

T3: 25±3 (2.5±0.3, 18.1±2.2)

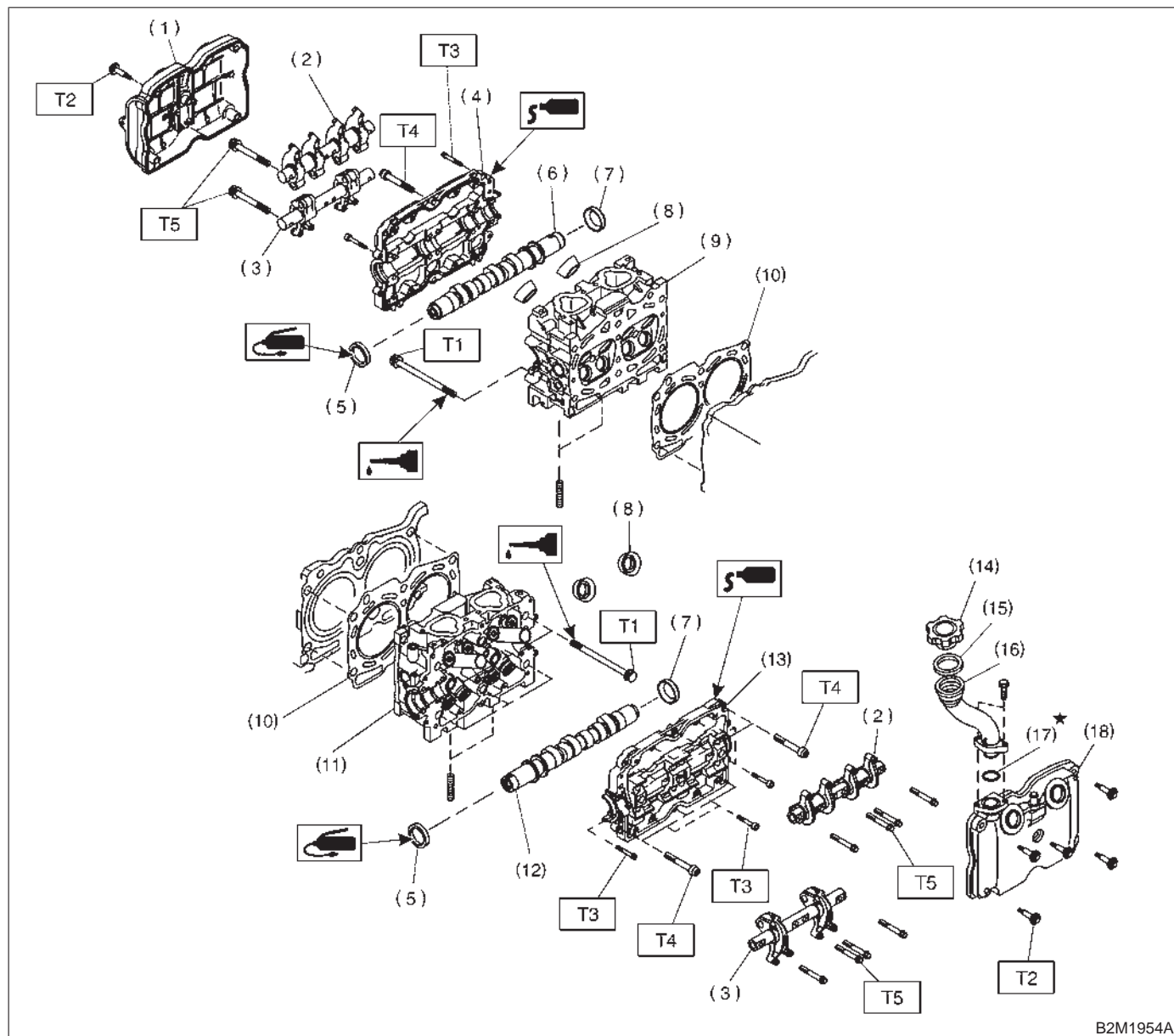
T4: 39±4 (4.0±0.4, 28.9±2.9)

T5: 78±5 (8.0±0.5, 57.9±3.6)

T6: 127±5 (13.0±0.5, 94±3.6)

T7: 177±5 (18.0±0.5, 130.2±3.6)

2. Cylinder Head and Camshaft



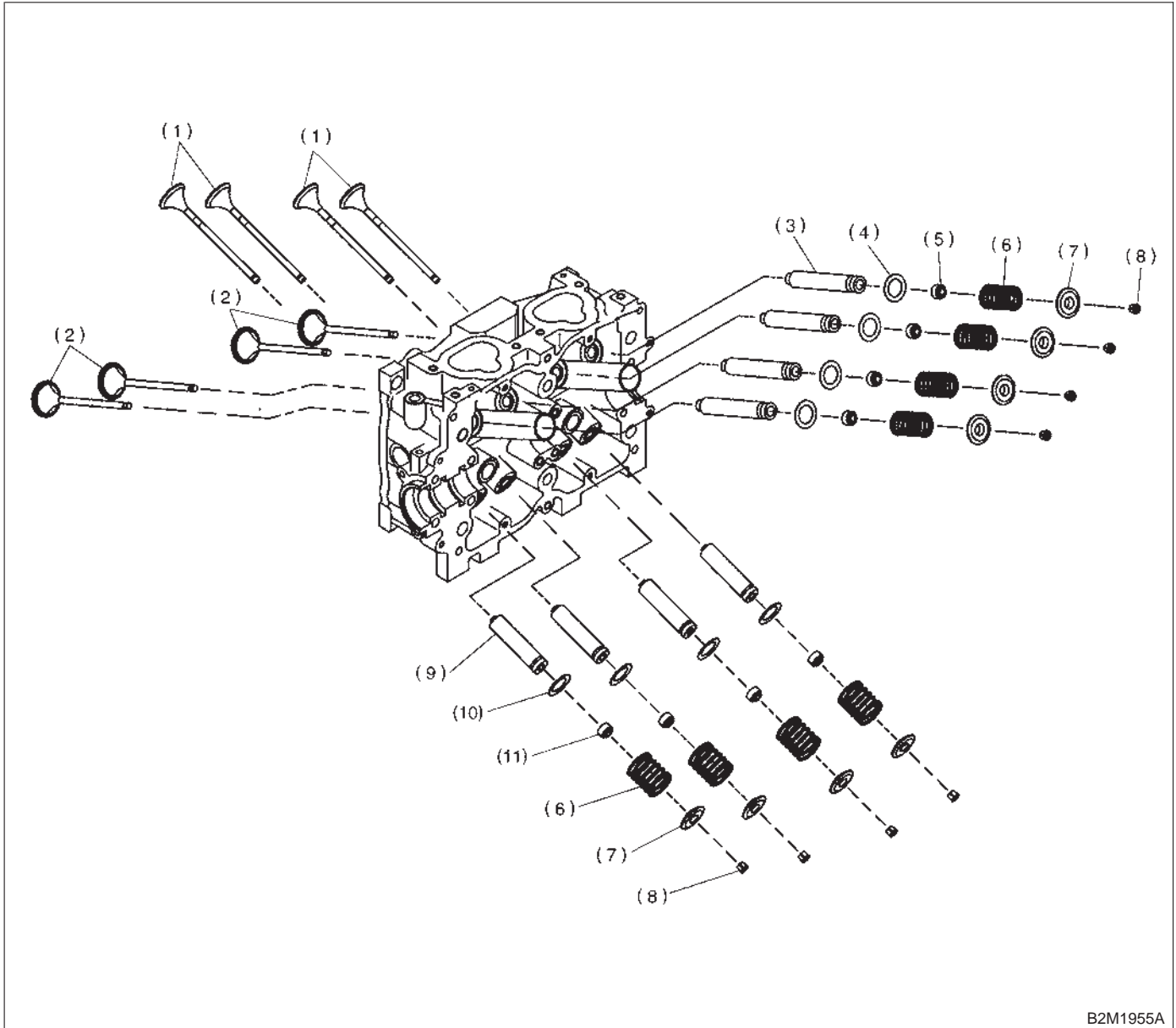
B2M1954A

- | | |
|-------------------------------|---------------------------|
| (1) Rocker cover (RH) | (10) Cylinder head gasket |
| (2) Intake valve rocker ASSY | (11) Cylinder head (LH) |
| (3) Exhaust valve rocker ASSY | (12) Camshaft (LH) |
| (4) Camshaft cap (RH) | (13) Camshaft cap (LH) |
| (5) Oil seal | (14) Oil filler cap |
| (6) Camshaft (RH) | (15) Gasket |
| (7) Plug | (16) Oil filler pipe |
| (8) Spark plug pipe gasket | (17) O-ring |
| (9) Cylinder head (RH) | (18) Rocker cover (LH) |

- (19) Stud bolt

Tightening torque: N·m (kg-m, ft-lb)**T1: <Ref. to 2-3 [W5E1].>****T2: 5 ± 1 (0.5 ± 0.1 , 3.6 ± 0.7)****T3: 10 ± 2 (1.0 ± 0.2 , 7.2 ± 1.4)****T4: 18 ± 2 (1.8 ± 0.2 , 13.0 ± 1.4)****T5: 25 ± 2 (2.5 ± 0.2 , 18.1 ± 1.4)**

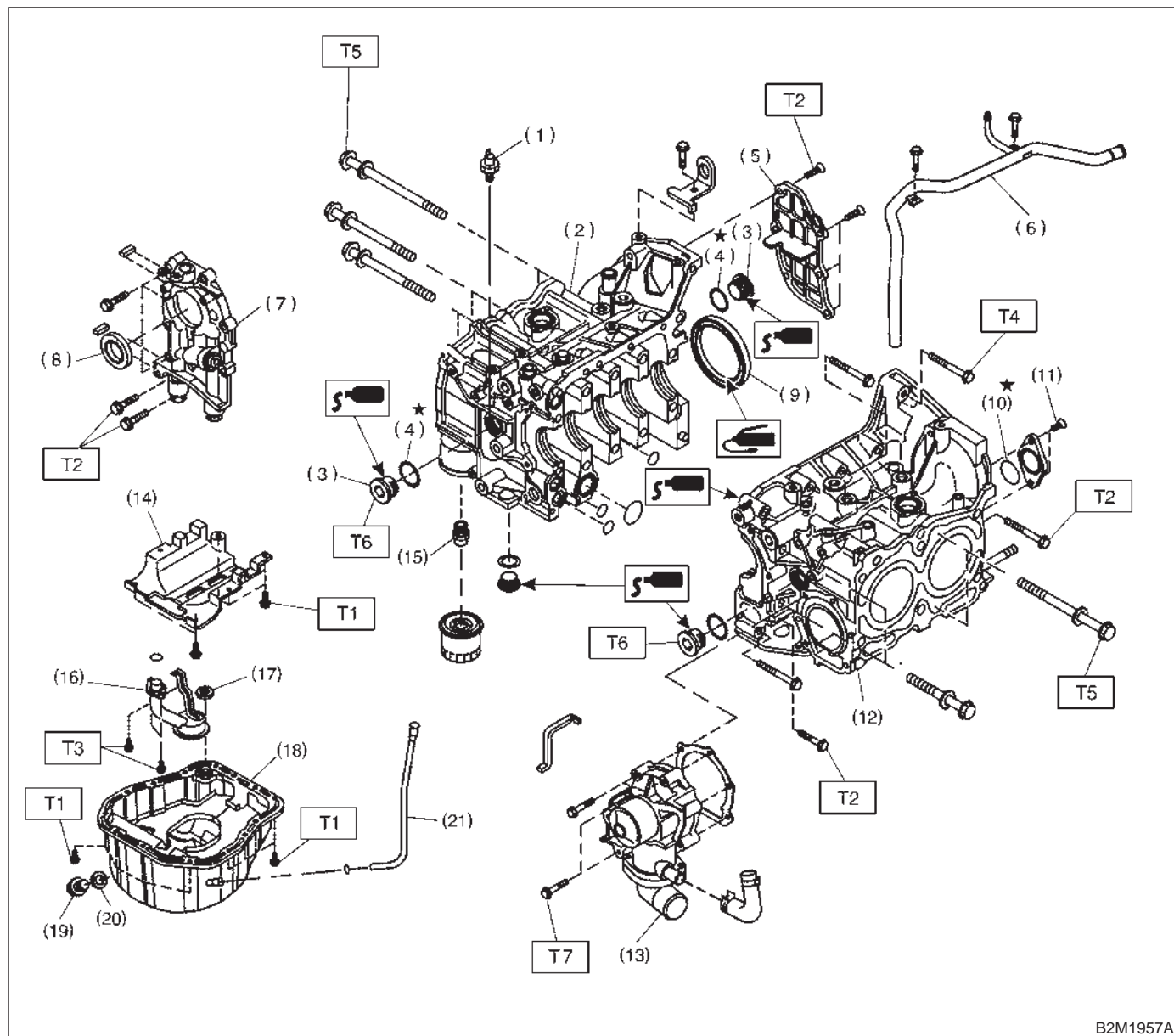
3. Cylinder Head and Valve Assembly



B2M1955A

- | | | |
|------------------------------|---------------------------|--------------------------------|
| (1) Exhaust valve | (5) Intake valve oil seal | (9) Exhaust valve guide |
| (2) Intake valve | (6) Valve spring | (10) Exhaust valve spring seat |
| (3) Intake valve guide | (7) Retainer | (11) Exhaust valve oil seal |
| (4) Intake valve spring seat | (8) Retainer key | |

4. Cylinder Block

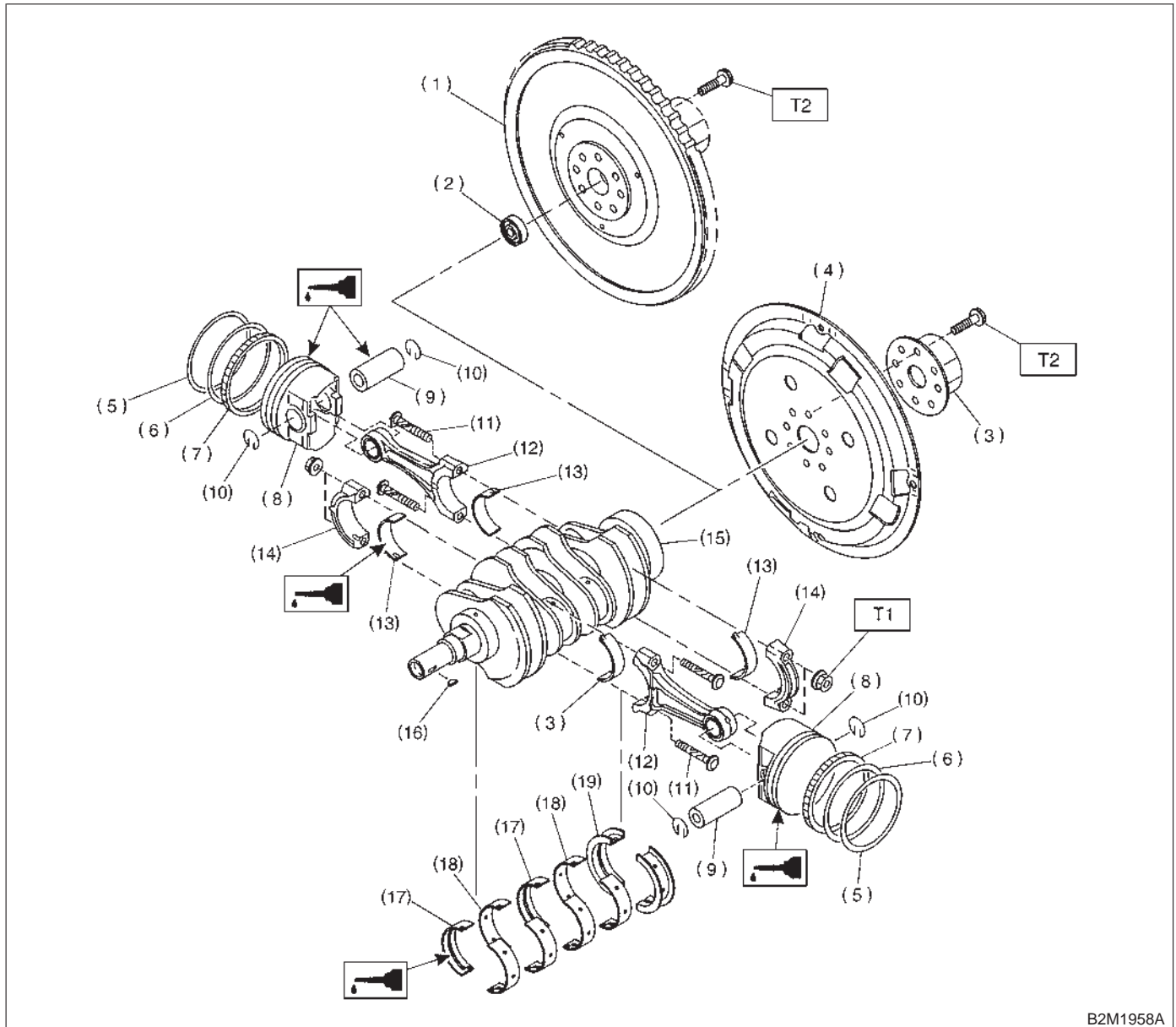


B2M1957A

- | | |
|-------------------------|----------------------------|
| (1) Oil pressure switch | (12) Cylinder block (LH) |
| (2) Cylinder block (RH) | (13) Water pump |
| (3) Service hole plug | (14) Baffle plate |
| (4) Gasket | (15) Oil filter connector |
| (5) Oil separator cover | (16) Oil strainer |
| (6) Water by-pass pipe | (17) Gasket |
| (7) Oil pump | (18) Oil pan |
| (8) Front oil seal | (19) Drain plug |
| (9) Rear oil seal | (20) Metal gasket |
| (10) O-ring | (21) Oil level gauge guide |
| (11) Service hole cover | |

Tightening torque: N-m (kg-m, ft-lb)**T1: 5 (0.5, 3.6)****T2: 6.4 (0.65, 4.7)****T3: 10 (1.0, 7)****T4: 25±2 (2.5±0.2, 18.1±1.4)****T5: 47±3 (4.8±0.3, 34.7±2.2)****T6: 69±7 (7.0±0.7, 50.6±5.1)****T7: First 12±2 (1.2±0.2, 8.7±1.4)****Second 12±2 (1.2±0.2, 8.7±1.4)**

5. Crankshaft and Piston



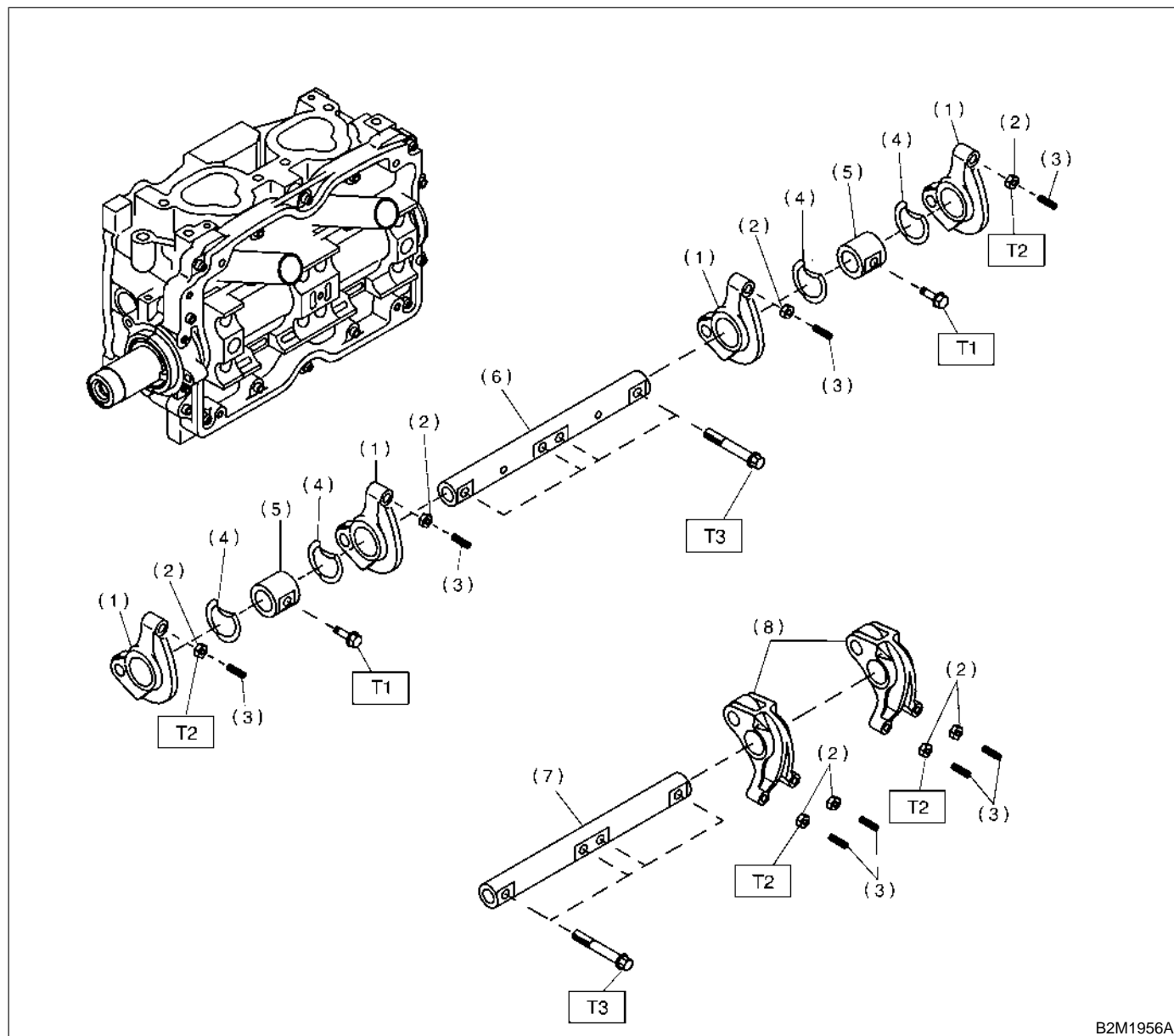
- | | | |
|------------------------|-----------------------------|--------------------------------|
| (1) Flywheel (MT) | (9) Piston pin | (17) Crankshaft bearing #1, #3 |
| (2) Ball bearing (MT) | (10) Circlip | (18) Crankshaft bearing #2, #4 |
| (3) Reinforcement (AT) | (11) Connecting rod bolt | (19) Crankshaft bearing #5 |
| (4) Drive plate (AT) | (12) Connecting rod | |
| (5) Top ring | (13) Connecting rod bearing | |
| (6) Second ring | (14) Connecting rod cap | |
| (7) Oil ring | (15) Crankshaft | |
| (8) Piston | (16) Woodruff key | |

Tightening torque: N·m (kg·m, ft·lb)

T1: 44±2 (4.5±0.2, 32.5±1.4)

T2: 72±3 (7.3±0.3, 52.8±2.2)

6. Valve Rocker Assembly



- | | |
|-------------------------------|------------------------------|
| (1) Intake valve rocker arm | (6) Intake rocker shaft |
| (2) Valve rocker nut | (7) Exhaust rocker shaft |
| (3) Valve rocker adjust screw | (8) Exhaust valve rocker arm |
| (4) Spring | |
| (5) Rocker shaft support | |

Tightening torque: N·m (kg·m, ft·lb)

T1: 5 ± 1 (0.5 ± 0.1 , 3.6 ± 0.7)

T2: 10 ± 1 (1.0 ± 0.1 , 7.2 ± 0.7)

T3: 25 ± 2 (2.5 ± 0.2 , 18.1 ± 1.4)

1. General Precautions

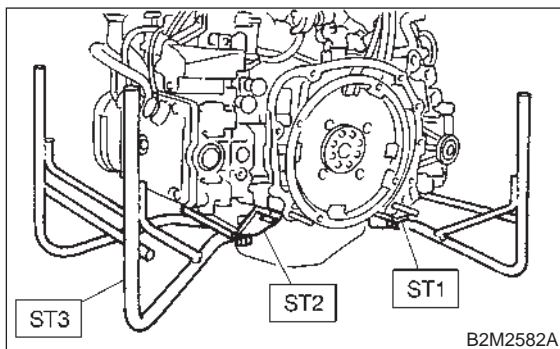
A: GENERAL PRECAUTIONS

1) Before disassembling engine, place it on ST3.

ST1 498457000 ENGINE STAND ADAPTER
RH

ST2 498457100 ENGINE STAND ADAPTER
LH

ST3 499817000 ENGINE STAND



2) All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.

3) Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.

4) Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.

5) All removed parts, if to be reused, should be reinstalled in the original positions and directions.

6) All removed parts, if to be reused, should be reinstalled in the original positions and directions.

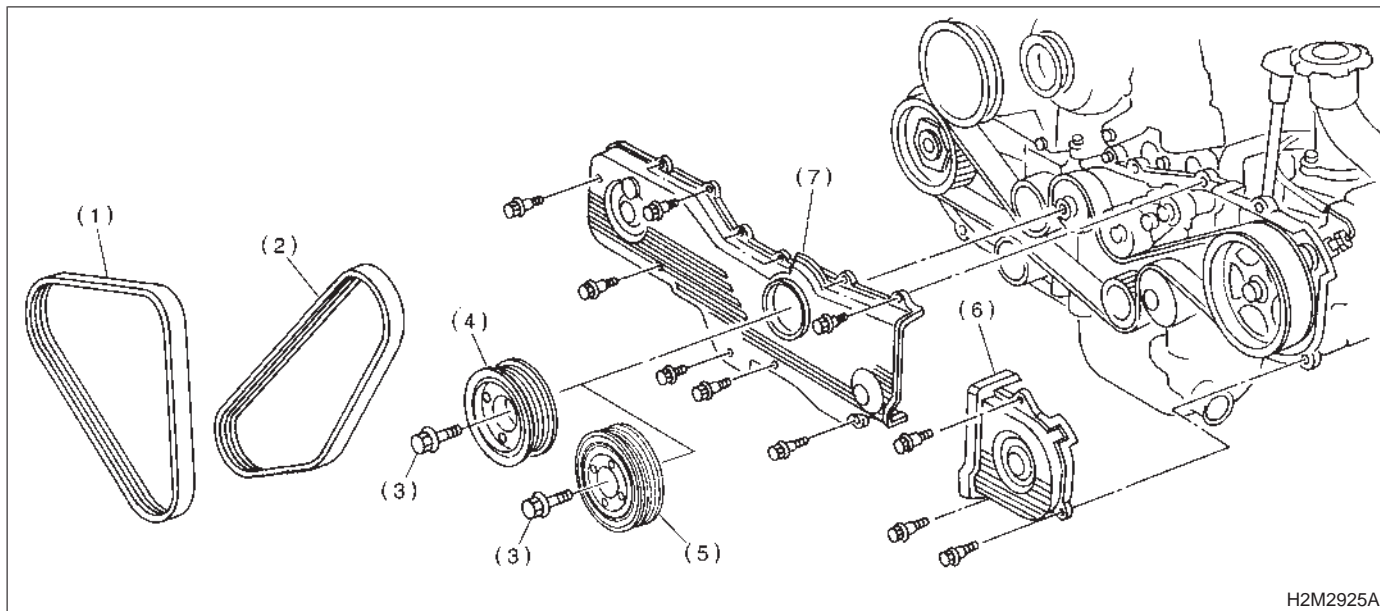
7) Bolts, nuts and washers should be replaced with new ones as required.

8) Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.

2. Timing Belt

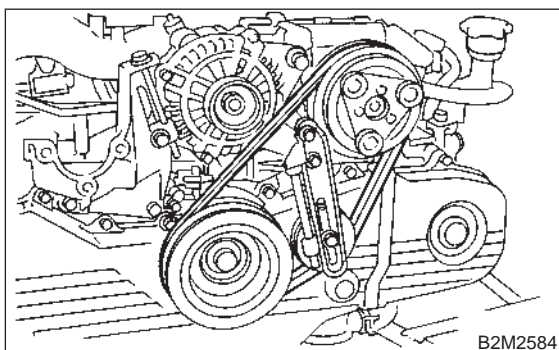
A: REMOVAL

1. CRANKSHAFT PULLEY AND BELT COVER

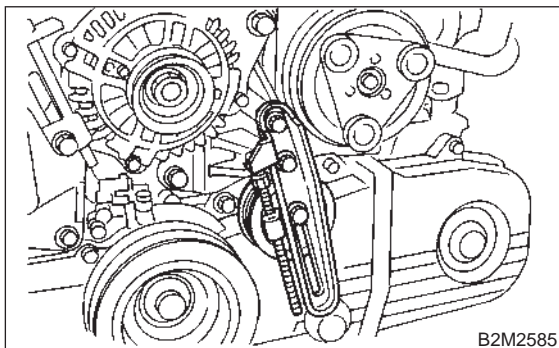


- | | | |
|---------------------------------------|---------------------------------------|--------------------------------------|
| (1) Front side V-belt | (4) Crankshaft Pulley (2200 cc model) | (6) Belt cover (LH) |
| (2) Rear side V-belt (With A/C model) | (5) Crankshaft pulley (2500 cc model) | (7) Front belt cover (2500 cc model) |
| (3) Crankshaft pulley bolt | | |

1) Remove A/C belt. (With A/C model)



2) Remove A/C belt tensioner. (With A/C model)

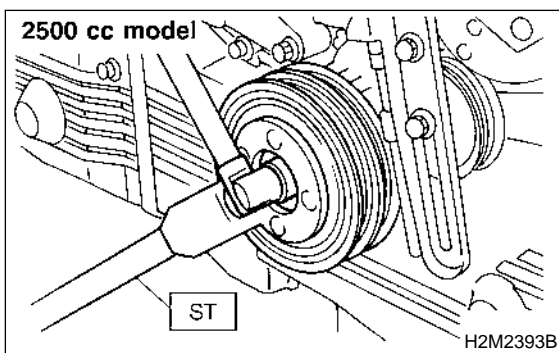
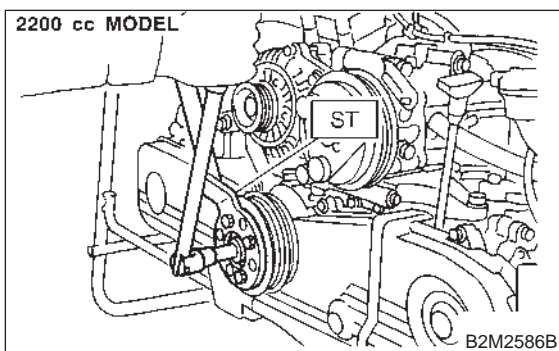


3) Remove crankshaft pulley bolt. To lock crankshaft, use ST.

ST 499977000 (2200 cc model)

ST 499977100 (2500 cc model)

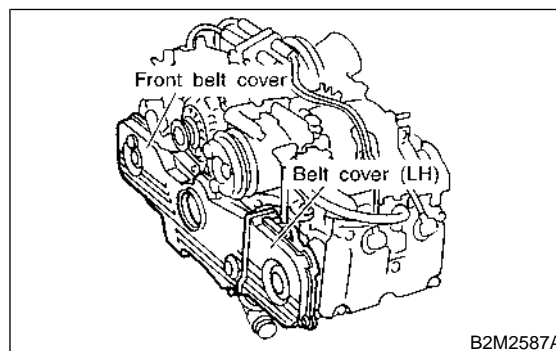
CRANKSHAFT PULLEY WRENCH



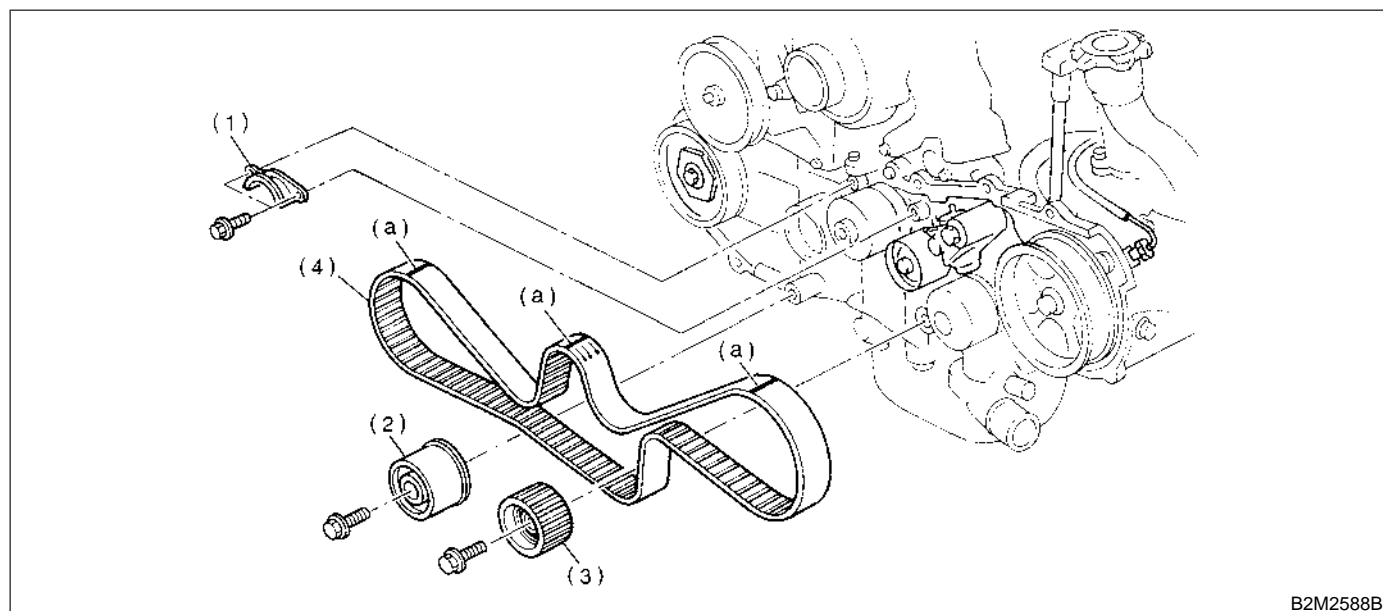
4) Remove crankshaft pulley.

5) Remove belt cover (LH).

6) Remove front belt cover.



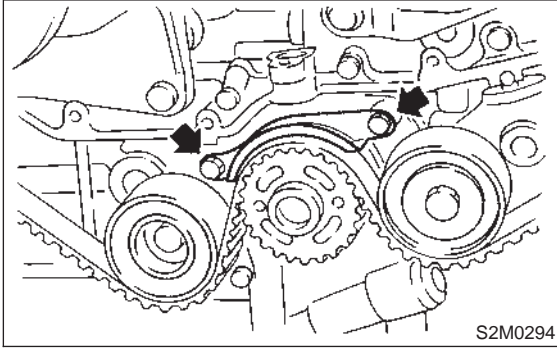
2. TIMING BELT



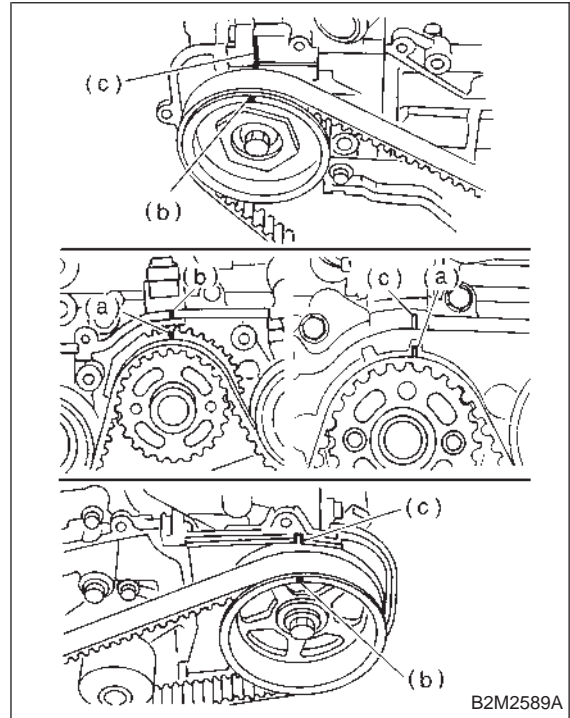
(a) Alignment mark
(1) Timing belt guide (MT vehicles only)

(2) Belt idler (No. 2)
(3) Belt idler No. 2
(4) Timing belt

- 1) Remove timing belt guide. (MT vehicles only)

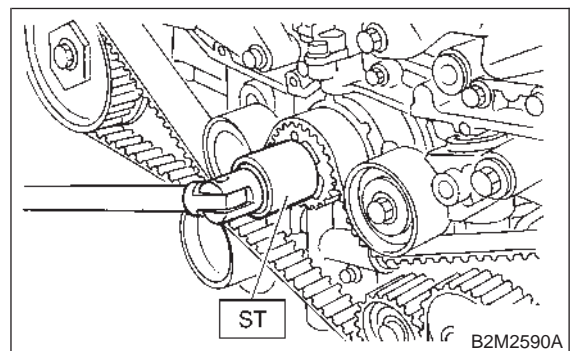


- 2) If alignment mark (a) and/or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing timing belt as shown in figure:

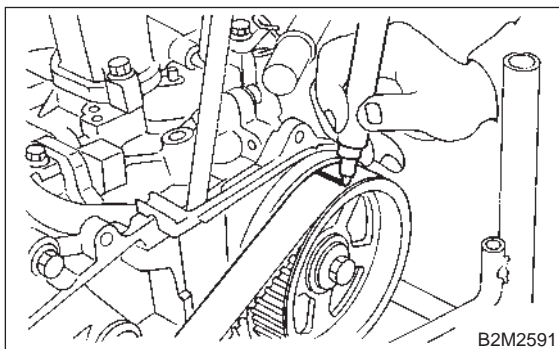


- (1) Turn crankshaft using ST, and align alignment marks (c) on crankshaft sprocket, and left side camshaft sprocket with notch (c) of belt cover, and align the right side camshaft sprocket with notch (c) on the mating surface of camshaft cap and cylinder head.

ST 499987500 CRANKSHAFT SOCKET



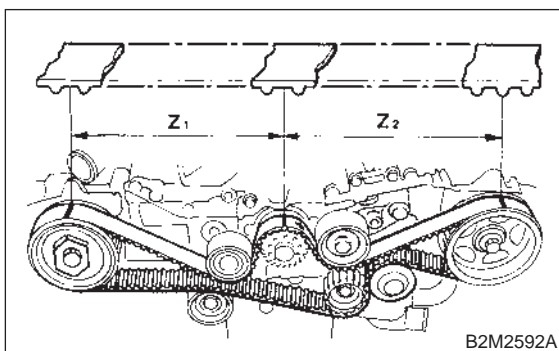
(2) Using white paint, put alignment and/or arrow marks on timing belts in relation to the sprockets.



Specified data:

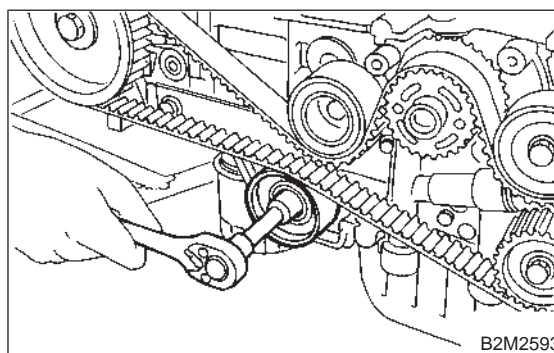
Z_1 : 44 tooth length

Z_2 : 40.5 tooth

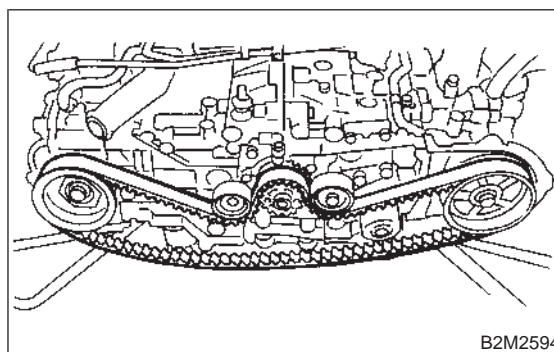


3) Remove belt idler (No. 2).

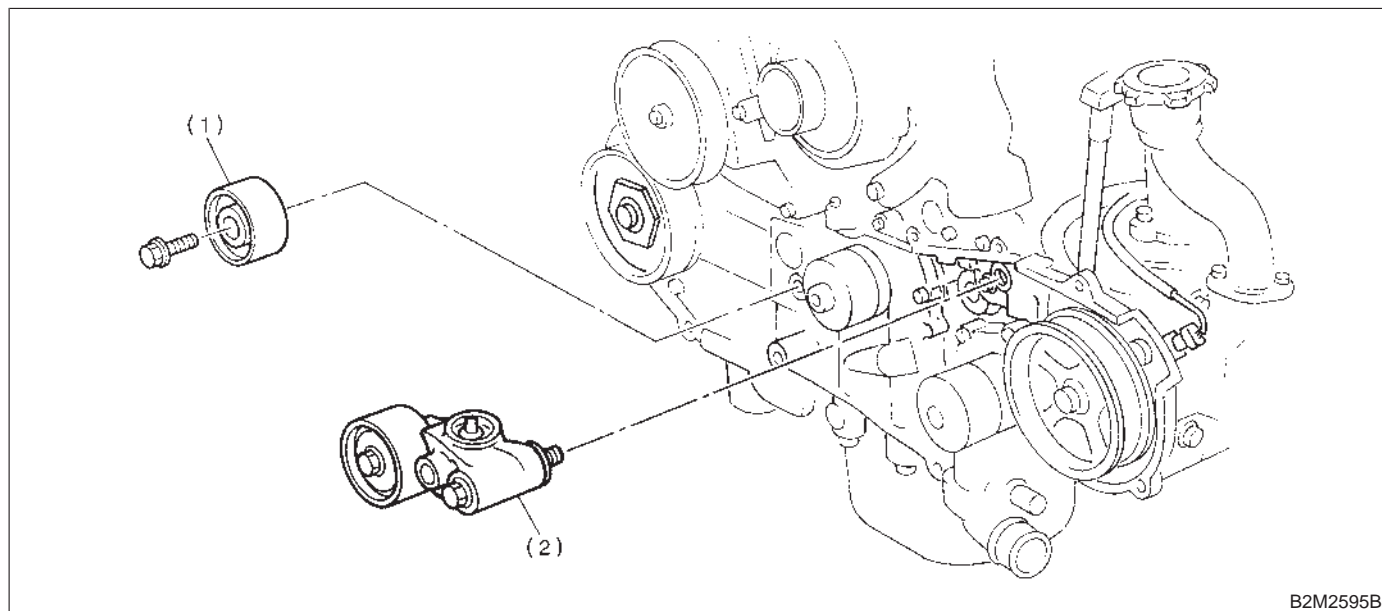
4) Remove belt idler No. 2.



5) Remove timing belt.



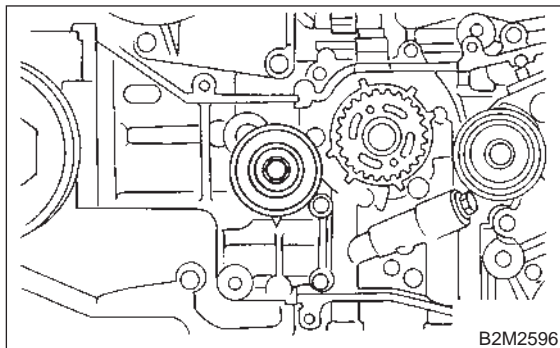
3. BELT IDLER AND AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY



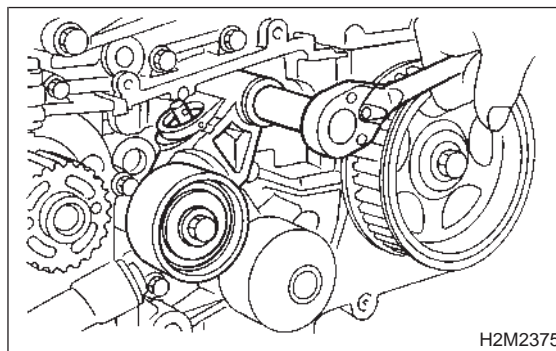
(1) Belt idler (No. 1)

(2) Automatic belt tension adjuster
ASSY

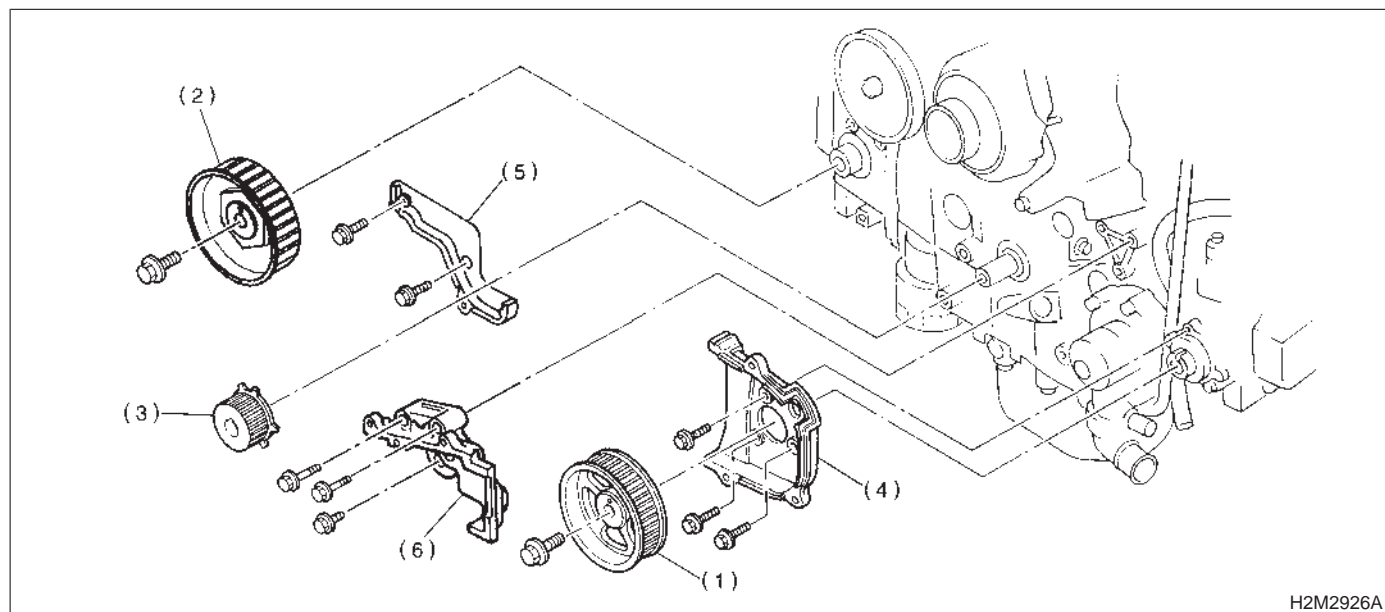
1) Remove belt idler (No. 1).



2) Remove automatic belt tension adjuster assembly.

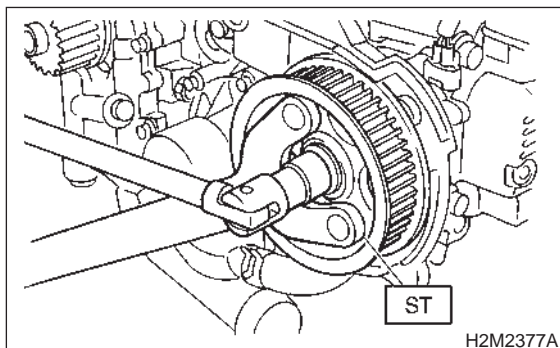


4. CAMSHAFT AND CRANKSHAFT SPROCKET

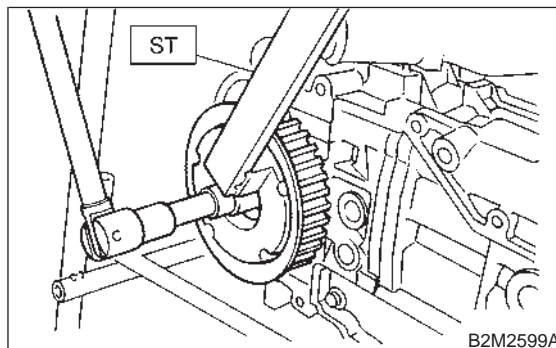


- | | |
|---|---------------------------|
| (1) Camshaft sprocket No. 2 | (4) Belt cover No. 2 (LH) |
| (2) Camshaft sprocket No. 1 | (5) Belt cover No. 2 (RH) |
| (3) Crankshaft sprocket (California spec. vehicles) | (6) Tensioner bracket |

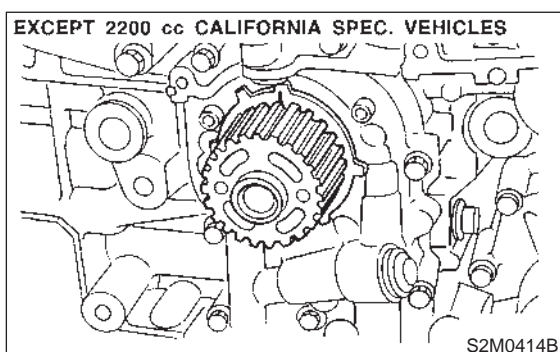
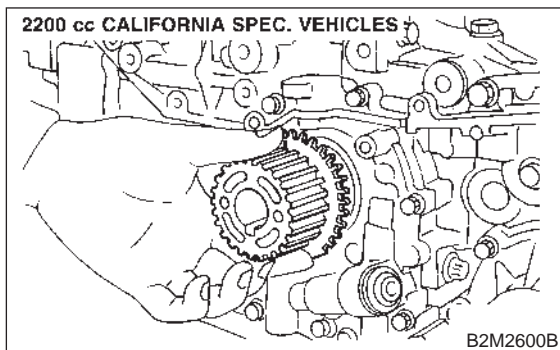
1) Remove camshaft sprocket No. 2. To lock camshaft, use ST.
ST 499207100 CAMSHAFT SPROCKET WRENCH



2) Remove camshaft sprocket No. 1. To lock camshaft, use ST.
ST 499207400 CAMSHAFT SPROCKET WRENCH



3) Remove crankshaft sprocket.

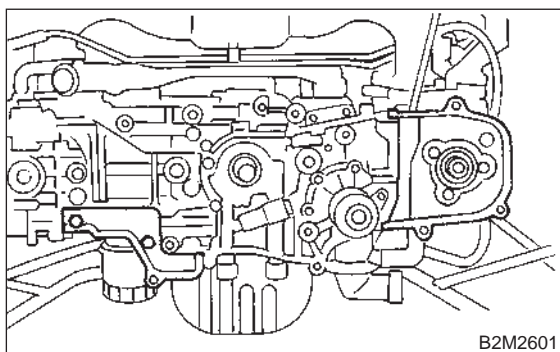


4) Remove belt cover No. 2 (LH).

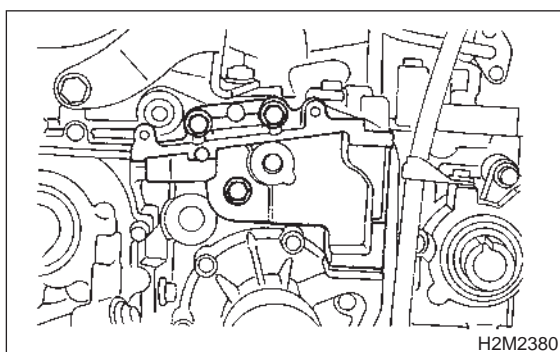
5) Remove belt cover No. 2 (RH).

CAUTION:

Do not damage or lose the seal rubber when removing belt covers.



6) Remove tensioner bracket.

**B: INSPECTION****1. TIMING BELT**

1) Check timing belt teeth for breaks, cracks, and wear. If any fault is found, replace belt.

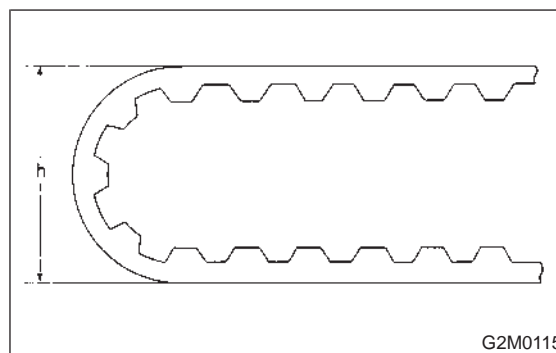
2) Check the condition of back side of belt; if any crack is found, replace belt.

CAUTION:

- Be careful not to let oil, grease or coolant contact the belt. Remove quickly and thoroughly if this happens.
- Do not bend the belt sharply.

Bending radius: h

60 mm (2.36 in) or more

**2. AUTOMATIC BELT TENSION ADJUSTER**

1) Visually check oil seals for leaks, and rod ends for abnormal wear or scratches. If necessary, replace faulty parts.

CAUTION:

Slight traces of oil at rod's oil seal does not indicate a problem.

2) Check that the adjuster rod does not move when a pressure of 294 N (30 kg, 66 lb) is applied to it. This is to check adjuster rod stiffness.

3) If the adjuster rod is not stiff and moves freely when applying 294 N (30 kg, 66 lb), check it using the following procedures:

(1) Slowly press the adjuster rod down to the end surface of the cylinder. Repeat this motion 2 or 3 times.

(2) With the adjuster rod moved all the way up, apply a pressure of 294 N (30 kg, 66 lb) to it. Check adjuster rod stiffness.

(3) If the adjuster rod is not stiff and moves down, replace the automatic belt tension adjuster assembly with a new one.

CAUTION:

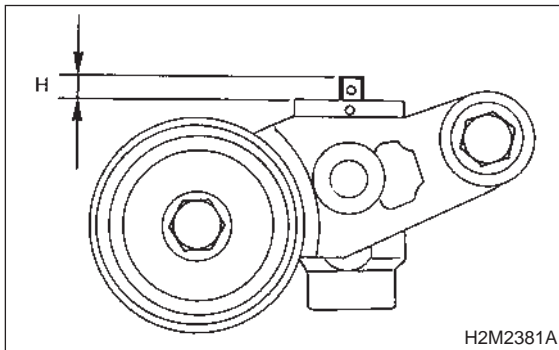
- Always use a vertical type pressing tool to move the adjuster rod down.
- Do not use a lateral type vise.
- Push adjuster rod vertically.

- Press-in the push adjuster rod gradually taking more than three minutes.
- Do not allow press pressure to exceed 9,807 N (1,000 kg, 2,205 lb).
- Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.

4) Measure the extension of rod beyond the body. If it is not within specifications, replace with a new one.

Rod extension: H

$5.7 \pm 0.5 \text{ mm (0.224} \pm 0.020 \text{ in)}$



3. BELT TENSION PULLEY

- 1) Check mating surfaces of timing belt and contact point of adjuster rod for abnormal wear or scratches. Replace automatic belt tension adjuster assembly if faulty.
- 2) Check tension pulley for smooth rotation. Replace if noise or excessive play is noted.
- 3) Check tension pulley for grease leakage.

4. BELT IDLER

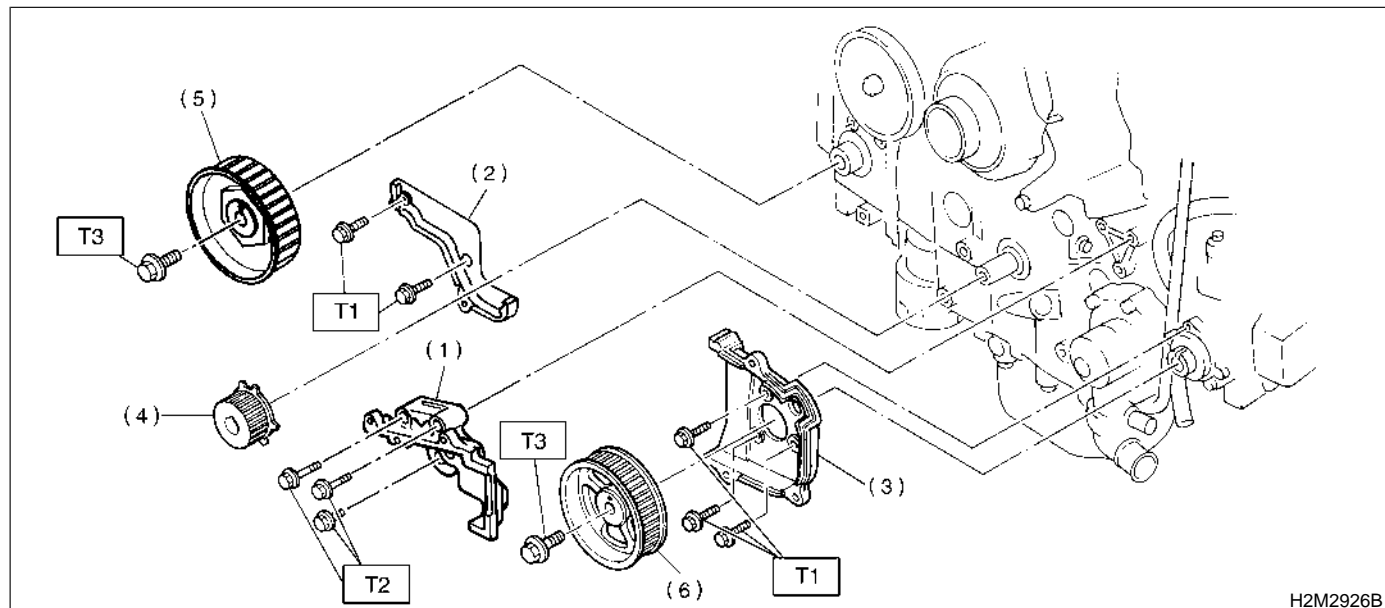
- 1) Check belt idler for smooth rotation. Replace if noise or excessive play is noted.
- 2) Check belt outer contacting surfaces of idler pulley for abnormal wear and scratches.
- 3) Check belt idler for grease leakage.

5. CAMSHAFT AND CRANKSHAFT SPROCKET

- 1) Check sprocket teeth for abnormal wear and scratches.
- 2) Make sure there is no free play between sprocket and key.
- 3) Check crankshaft sprocket notch for sensor for damage and contamination of foreign matter.

C: INSTALLATION

1. CAMSHAFT AND CRANKSHAFT SPROCKET



- | | |
|---------------------------|-----------------------------|
| (1) Tensioner bracket | (5) Camshaft sprocket No. 1 |
| (2) Belt cover No. 2 (RH) | (6) Camshaft sprocket No. 2 |
| (3) Belt cover No. 2 (LH) | |
| (4) Crankshaft sprocket | |

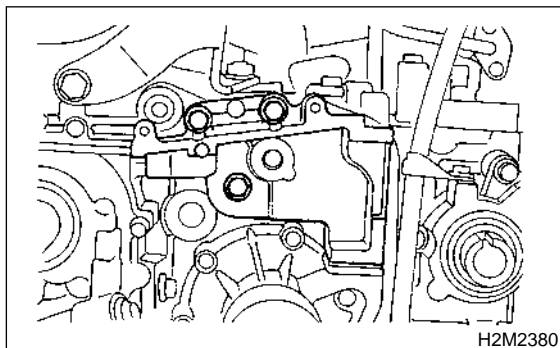
Tightening torque: N·m (kg·m, ft·lb)

T1: 5 ± 1 (0.5 ± 0.1 , 3.6 ± 0.7)

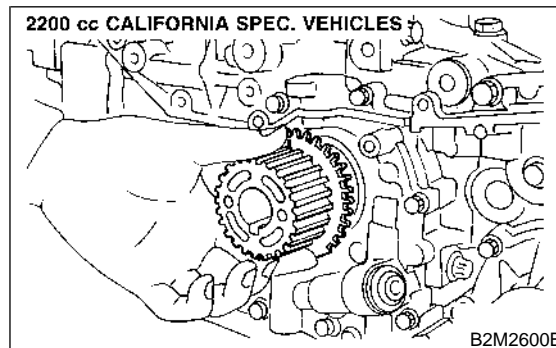
T2: 25 ± 3 (2.5 ± 0.3 , 18.1 ± 2.2)

T3: 78 ± 5 (8.0 ± 0.5 , 57.9 ± 3.6)

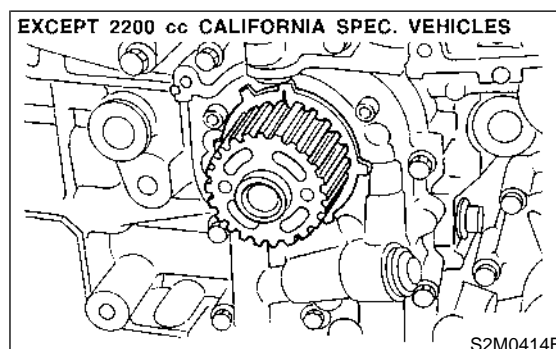
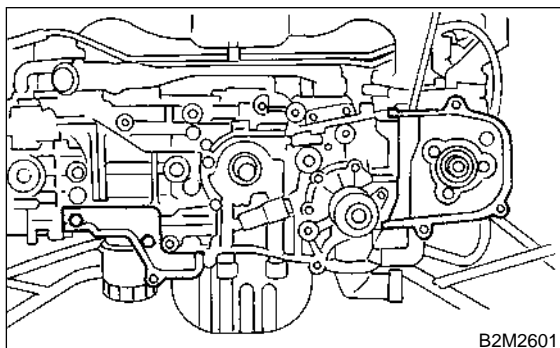
1) Install tensioner bracket.



4) Install crankshaft sprocket.

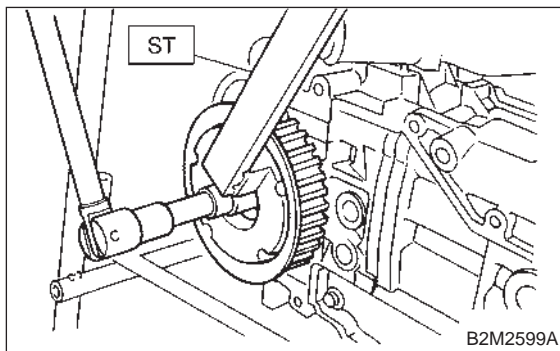


- 2) Install belt cover No. 2 (RH).
- 3) Install belt cover No. 2 (LH).



5) Install camshaft sprocket No. 1. To lock camshaft, use ST.

ST 499207400 CAMSHAFT SPROCKET
WRENCH

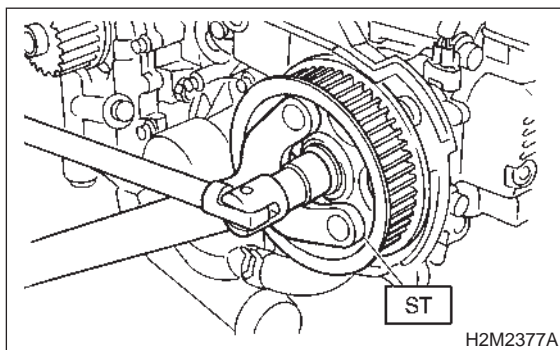


6) Install camshaft sprocket No. 2. To lock camshaft, use ST.

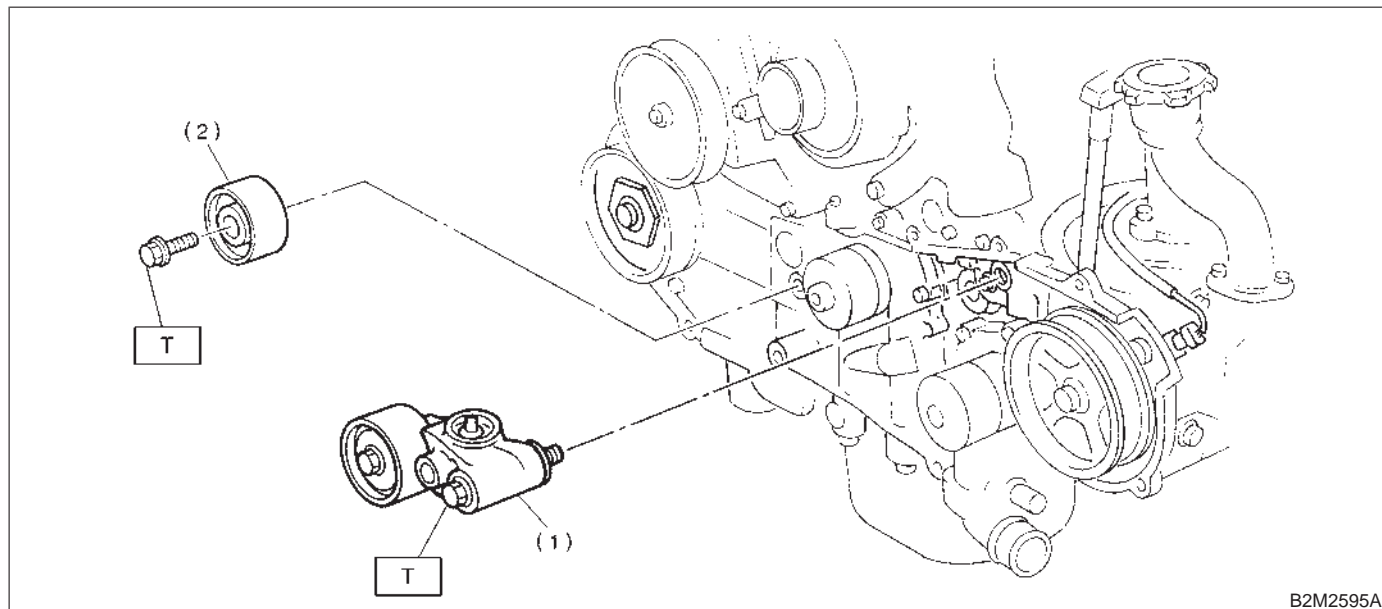
ST 499207100 CAMSHAFT SPROCKET
WRENCH

CAUTION:

Do not confuse left and right side camshaft sprockets during installation. The camshaft sprocket No. 2 is identified by a projection used to monitor camshaft position sensor.



2. AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER



B2M2595A

(1) Automatic belt tension adjuster
ASSY

(2) Belt idler (No. 1)

Tightening torque: N·m (kg·m, ft·lb)

T: 39±4 (4.0±0.4, 28.9±2.9)

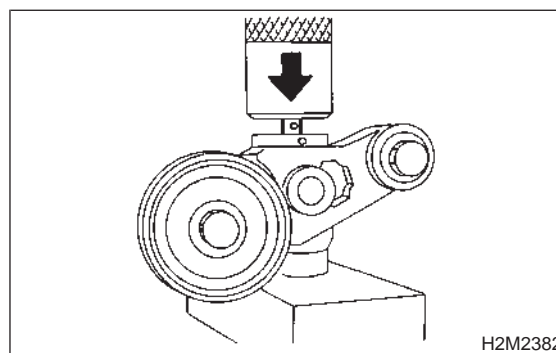
1) Preparation for installation of automatic belt tension adjuster assembly;

CAUTION:

- Always use a vertical type pressing tool to move the adjuster rod down.
- Do not use a lateral type vise.
- Push adjuster rod vertically.
- Be sure to slowly move the adjuster rod down applying a pressure of 294 N (30 kg, 66 lb).
- Press-in the push adjuster rod gradually taking more than three minutes.
- Do not allow press pressure to exceed 9,807 N (1,000 kg, 2,205 lb).
- Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.
- Do not release press pressure until stopper pin is completely inserted.

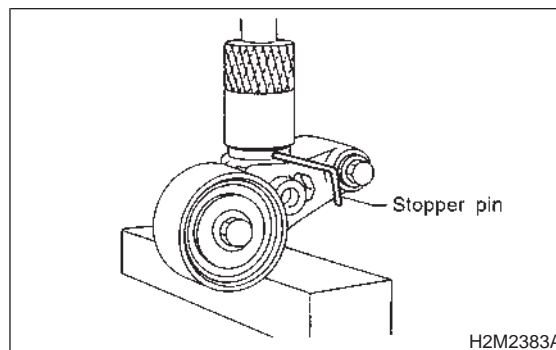
(1) Attach the automatic belt tension adjuster assembly to the vertical pressing tool.

(2) Slowly move the adjuster rod down with a pressure of 294 N (30 kg, 66 lb) until the adjuster rod is aligned with the stopper pin hole in the cylinder.



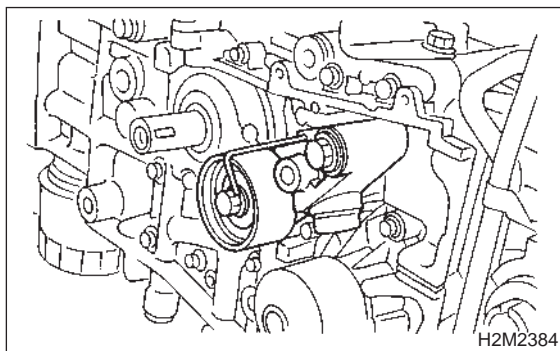
H2M2382

(3) With a 2 mm (0.08 in) dia. stopper pin or a 2 mm (0.08 in) (nominal) dia. hex bar wrench inserted into the stopper pin hole in the cylinder, secure the adjuster rod.

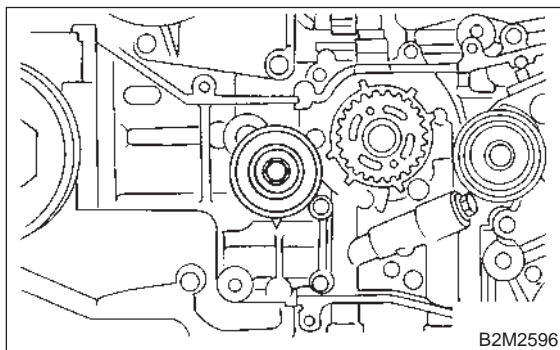


H2M2383A

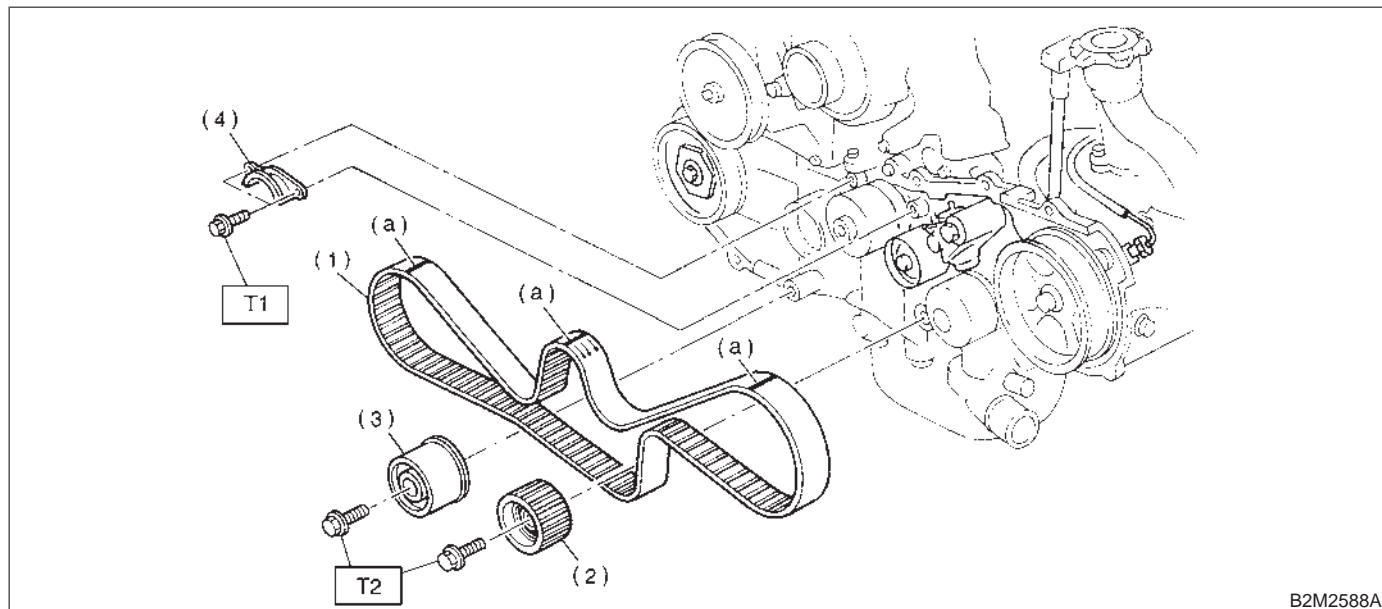
- 2) Install automatic belt tension adjuster assembly.



- 3) Install belt idler (No. 1).



3. TIMING BELT



- (a) Alignment mark
- (1) Timing belt
- (2) Belt idler No. 2
- (3) Belt idler (No. 2)
- (4) Timing belt guide (MT vehicles only)

Tightening torque: N·m (kg·m, ft·lb)

T1: 9.8±1.0 (1.0±0.1, 7.2±0.7)

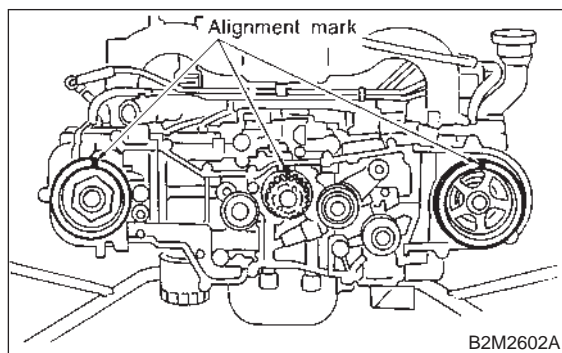
T2: 39±4 (4.0±0.4, 28.9±2.9)

1) Installation of timing belt

(1) Turn camshaft sprocket No. 2 using ST1, and turn camshaft sprocket No. 1 using ST2 so that their alignment marks come to top positions.

ST1 499207100 CAMSHAFT SPROCKET WRENCH

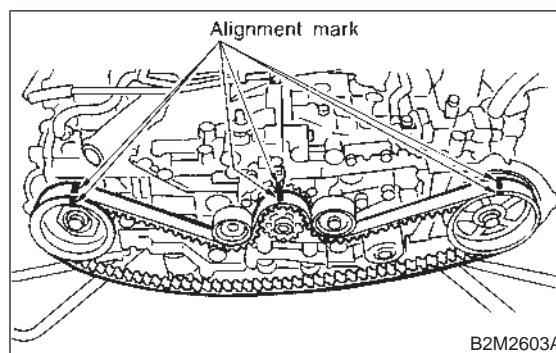
ST2 499207400 CAMSHAFT SPROCKET WRENCH



(2) While aligning alignment mark on timing belt with marks on sprockets, position timing belt properly.

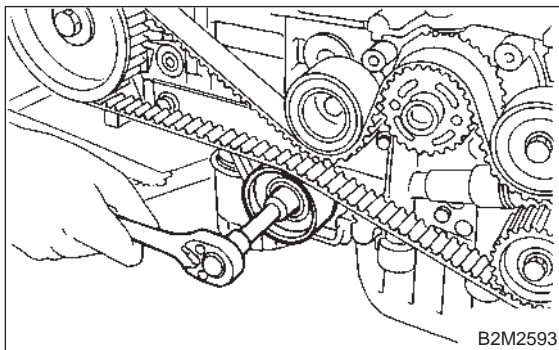
CAUTION:

Ensure belt's rotating direction is correct.



2) Install belt idler No. 2.

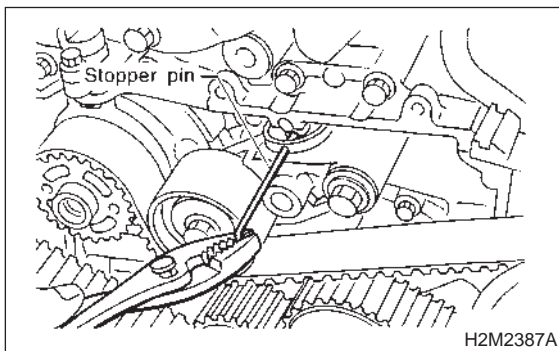
- 3) Install belt idler (No. 2).



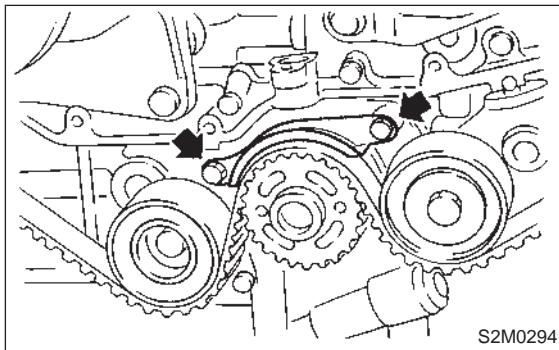
- 4) After ensuring that the marks on timing belt and camshaft sprockets are aligned, remove stopper pin from belt tensioner adjuster.

CAUTION:

After properly installing timing belt, remove rocker cover and ensure that the valve lash adjuster contains no air.



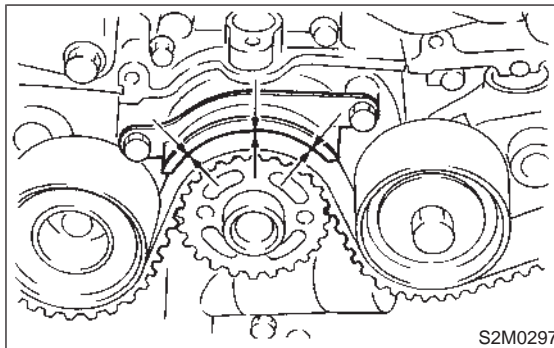
- 5) Install timing belt guide. (MT vehicles only)
(1) Temporarily tighten remaining bolts.



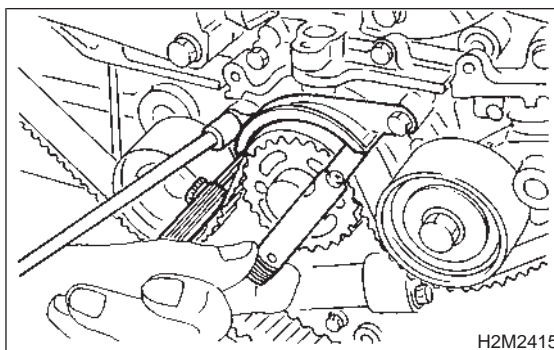
- (2) Check and adjust clearance between timing belt and timing belt guide.

Clearance:

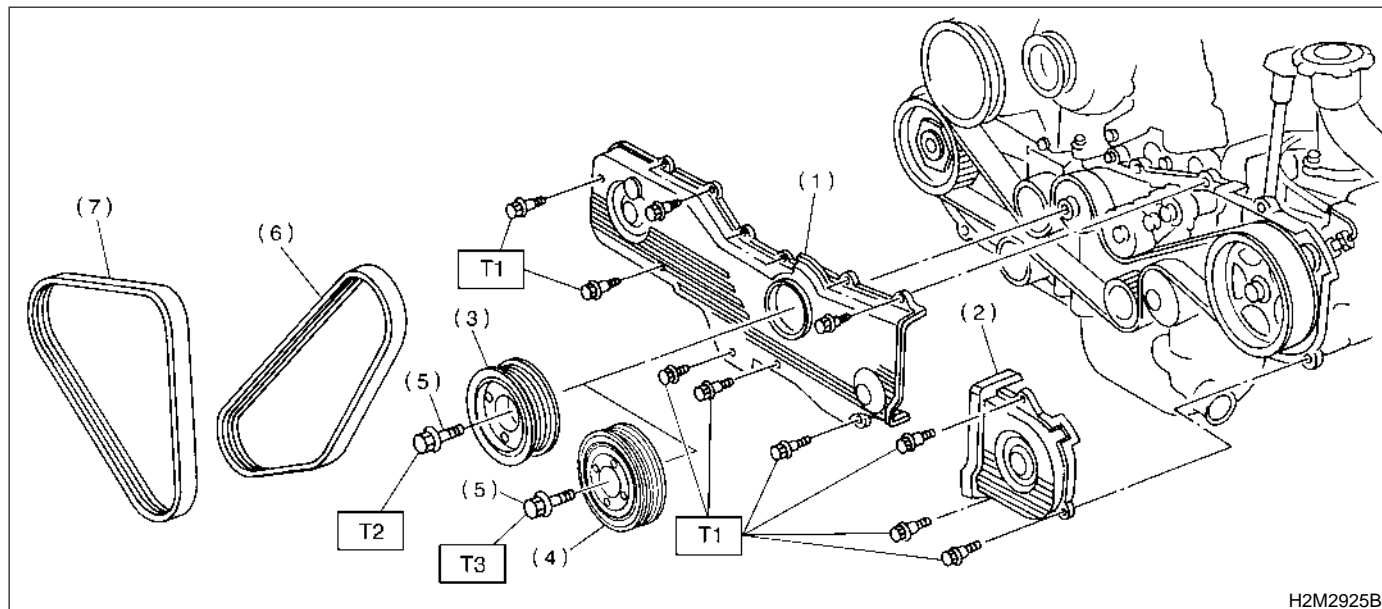
$1.0 \pm 0.5 \text{ mm}$ ($0.039 \pm 0.020 \text{ in}$)



- (3) Tighten remaining bolts.



4. CRANKSHAFT PULLEY AND BELT COVER



H2M2925B

- | | |
|---------------------------------------|---------------------------------------|
| (1) Front belt cover | (5) Crankshaft pulley bolt |
| (2) Belt cover (LH) | (6) Rear side V-belt (With A/C model) |
| (3) Crankshaft pulley (2200 cc model) | (7) Front side V-belt |
| (4) Crankshaft pulley (2500 cc model) | |

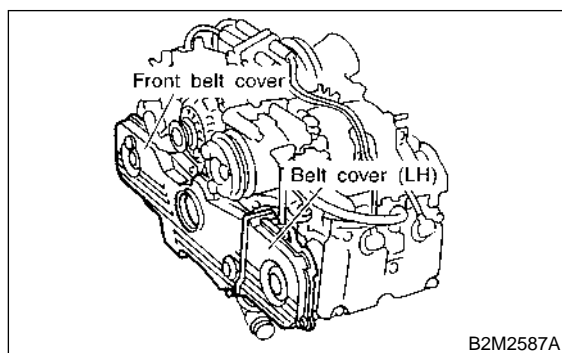
Tightening torque: N·m (kg·m, ft·lb)

T1: 5 ± 1 (0.5 ± 0.1 , 3.6 ± 0.7)

T2: 127 ± 5 (13.0 ± 0.5 , 94 ± 3.6)

T3: 177 ± 5 (18.0 ± 0.5 , 130.2 ± 3.6)

- 1) Install front belt cover.
- 2) Install belt cover (LH).



B2M2587A

- 3) Install crankshaft pulley.

- 4) Install pulley bolt. (2200 cc model)

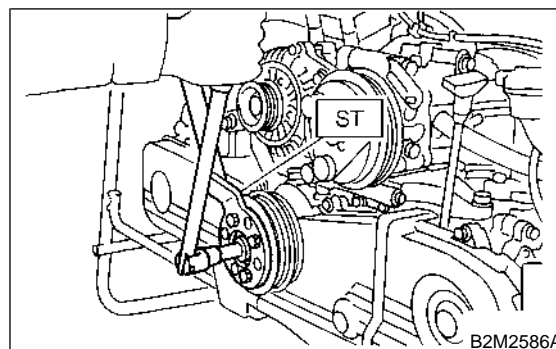
To lock crankshaft, use ST.

ST 499977000 CRANKSHAFT PULLEY WRENCH

- (1) Clean the crankshaft pulley thread using an air gun.
- (2) Apply engine oil to the crankshaft pulley bolt seat and thread.
- (3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kg·m, 33 ft·lb).
- (4) Tighten the crankshaft pulley bolts.

Tightening torque:

127 ± 5 N·m (13.0 ± 0.5 kg·m, 94.0 ± 3.6 ft·lb)



B2M2586A

- 5) Confirm that the tightening angle of the crankshaft pulley bolt is 45 degrees or more. If not, conduct the following procedures (1) through (4).

- (1) Replace the crankshaft pulley bolts and clean them.

Crankshaft pulley bolt:
12369AA011

- (2) Clean the crankshaft thread using an air gun.
- (3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kg-m, 33 ft-lb).
- (4) Tighten the crankshaft pulley bolts keeping them in an angle between 45 degrees and 60 degrees.

CAUTION:

Conduct the tightening procedures by confirming the turning angle of the crankshaft pulley bolt referring to the gauge indicated on the belt cover.

- 6) Install pulley bolt. (2500 cc model)

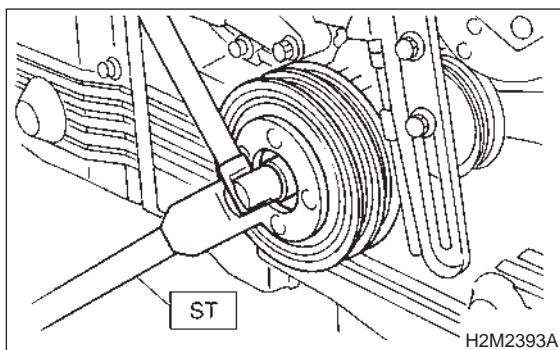
To lock crankshaft, use ST.

ST 499977100 CRANKSHAFT PULLEY
WRENCH

- (1) Clean the crankshaft pulley thread using an air gun.
- (2) Apply engine oil to the crankshaft pulley bolt seat and thread.
- (3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kg-m, 33 ft-lb).
- (4) Tighten the crankshaft pulley bolts.

Tightening torque:

177±5 N·m (18.0±0.5 kg-m, 130.2±3.6 ft-lb)



- 7) Confirm that the tightening angle of the crankshaft pulley bolt is 65 degrees or more. If not, conduct the following procedures (1) through (4).

- (1) Replace the crankshaft pulley bolts and clean them.

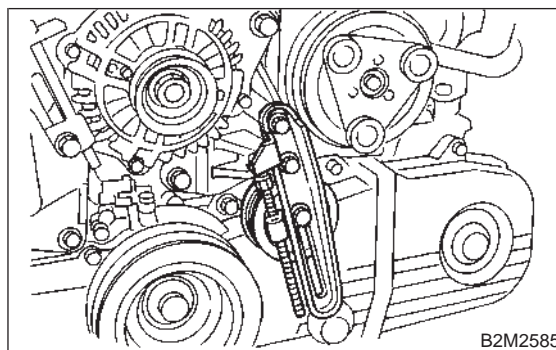
Crankshaft pulley bolt:
12369AA011

- (2) Clean the crankshaft thread using an air gun.
- (3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kg-m, 33 ft-lb).
- (4) Tighten the crankshaft pulley bolts keeping them in an angle between 65 degrees and 75 degrees.

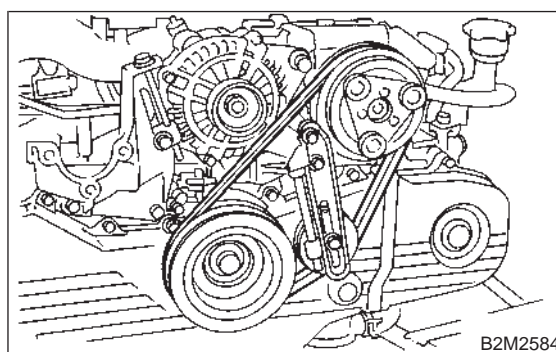
CAUTION:

Conduct the tightening procedures by confirming the turning angle of the crankshaft pulley bolt referring to the gauge indicated on the belt cover.

- 8) Install A/C belt tensioner. (With A/C model)

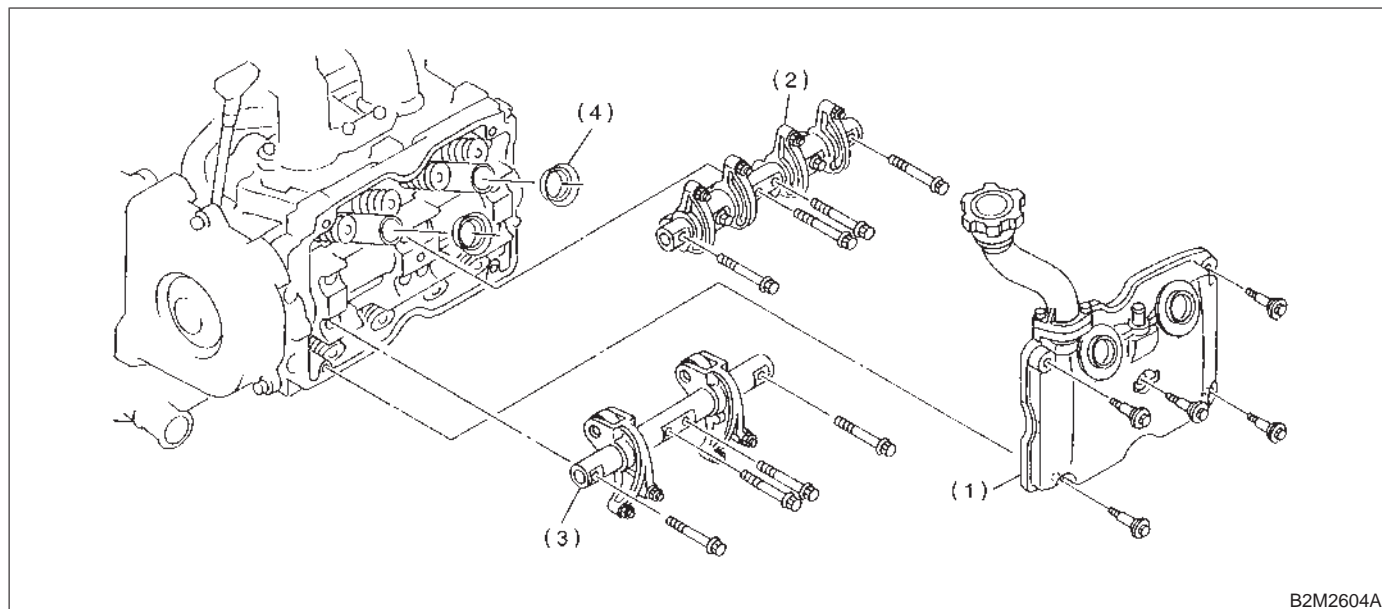


- 9) Install A/C belt. (With A/C model)



3. Valve Rocker Assembly

A: REMOVAL



B2M2604A

- (1) Rocker cover
 (2) Intake valve rocker ASSY
 (3) Exhaust valve rocker ASSY
 (4) Spark plug pipe gasket

1) Disconnect PCV hose and remove rocker cover.

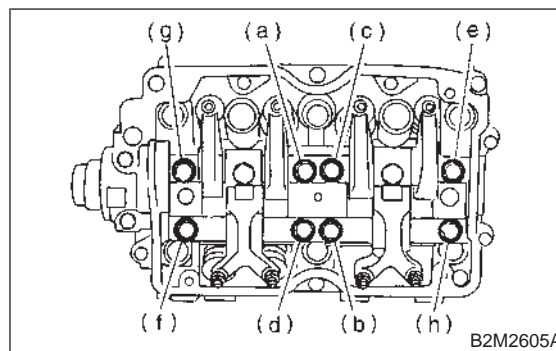
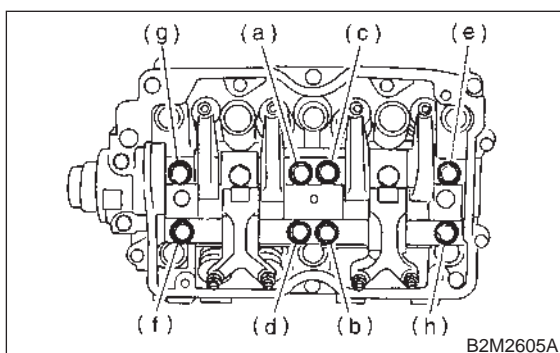
2) Removal of valve rocker assembly

- (1) Remove bolts (a) through (b) in alphabetical sequence.

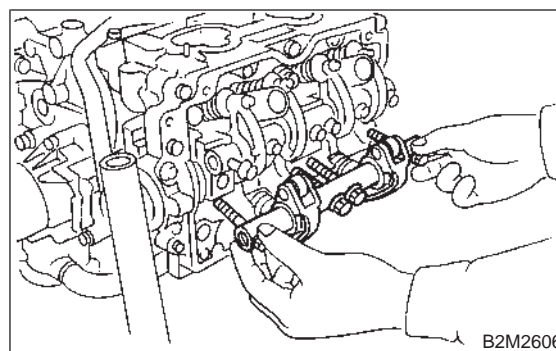
(2) Equally loosen bolts (e) through (h) all the way, being careful that knock pin is not gouged.

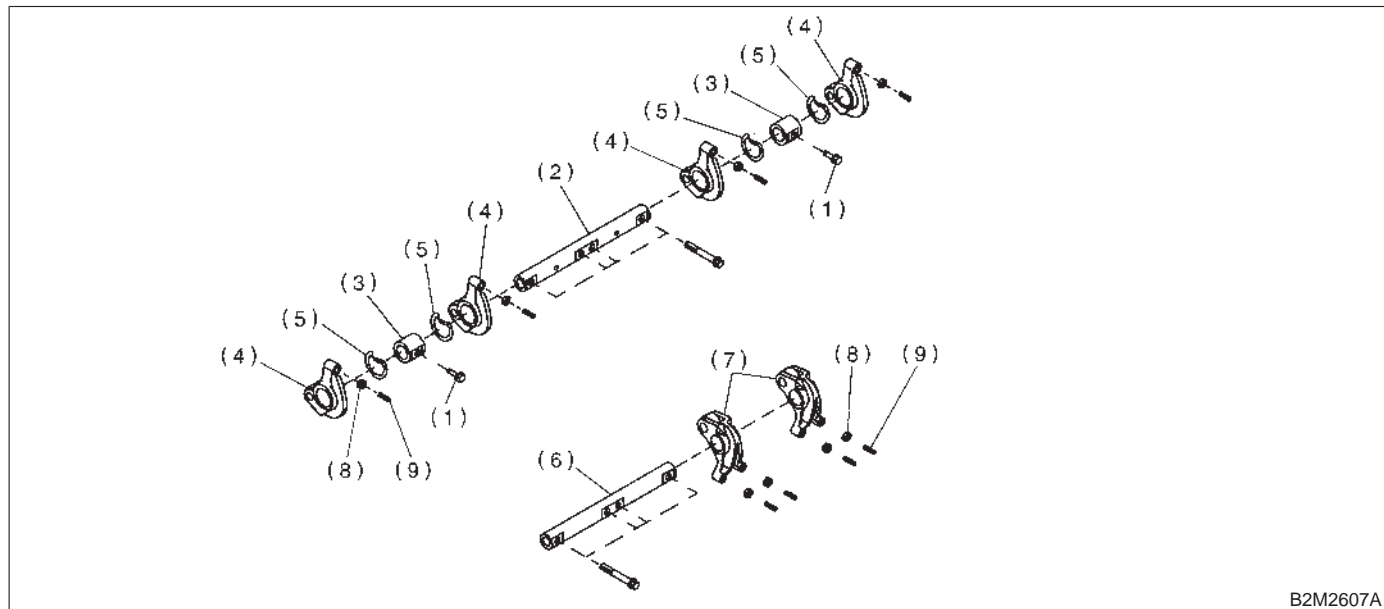
CAUTION:

Leave two or three threads of bolt (a) engaged to retain valve rocker assembly.



(3) Remove valve rocker assembly.



B: DISASSEMBLY

B2M2607A

- | | | |
|-------------------------------|--------------------------------|-------------------------------|
| (1) Bolt | (4) Intake valve rocker arm | (7) Exhaust valve rocker arm |
| (2) Intake valve rocker shaft | (5) Spring | (8) Valve rocker nut |
| (3) Rocker shaft support | (6) Exhaust valve rocker shaft | (9) Valve rocker adjust screw |

- 1) Remove bolts which secure rocker shaft.
- 2) Extract rocker shaft. Remove valve rocker arms, springs, plates and shaft supports from rocker shaft.

CAUTION:

Arrange all removed parts in order so that they can be installed in their original positions.

- 3) Remove nut and adjuster screw from valve rocker.

C: INSPECTION**1. VALVE ROCKER ARM**

1) Measure inside diameter of valve rocker arm and outside diameter of valve rocker shaft, and determine the difference between the two (= oil clearance).

Clearance between arm and shaft:

Standard

0.020 — 0.054 mm (0.0008 — 0.0021 in)

Limit

0.10 mm (0.0039 in)

- If oil clearance exceeds specifications, replace valve rocker arm or shaft.

NOTE:

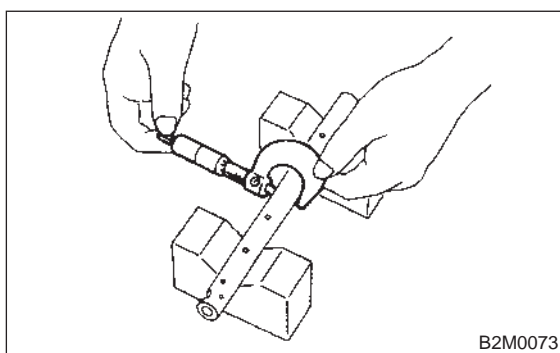
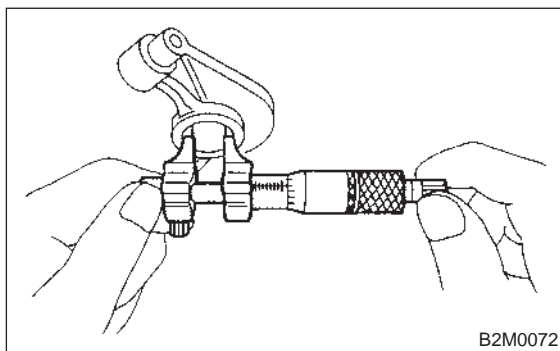
Replace valve rocker arm or shaft, whichever shows greater amount of wear.

Rocker arm inside diameter:

22.020 — 22.041 mm (0.8669 — 0.8678 in)

Rocker shaft diameter:

21.987 — 22.000 mm (0.8656 — 0.8661 in)



2) Measure inside diameter of rocker shaft support and outside diameter of valve rocker shaft, and determine the difference between the two (= oil clearance).

Clearance between support and shaft:

Standard

0.005 — 0.039 mm (0.0002 — 0.0015 in)

Limit

0.05 mm (0.0020 in)

- If oil clearance exceeds specifications, replace

rocker shaft support or shaft.

NOTE:

Replace rocker shaft support or shaft, whichever shows greater amount of wear.

Rocker shaft support inside diameter:

22.005 — 22.026 mm (0.8663 — 0.8672 in)

Rocker shaft diameter:

21.987 — 22.000 mm (0.8656 — 0.8661 in)

3) If cam or valve contact surface of valve rocker arm is worn or dented excessively, replace valve rocker arm.

4) Check that valve rocker arm roller rotates smoothly. If not, replace valve rocker arm.

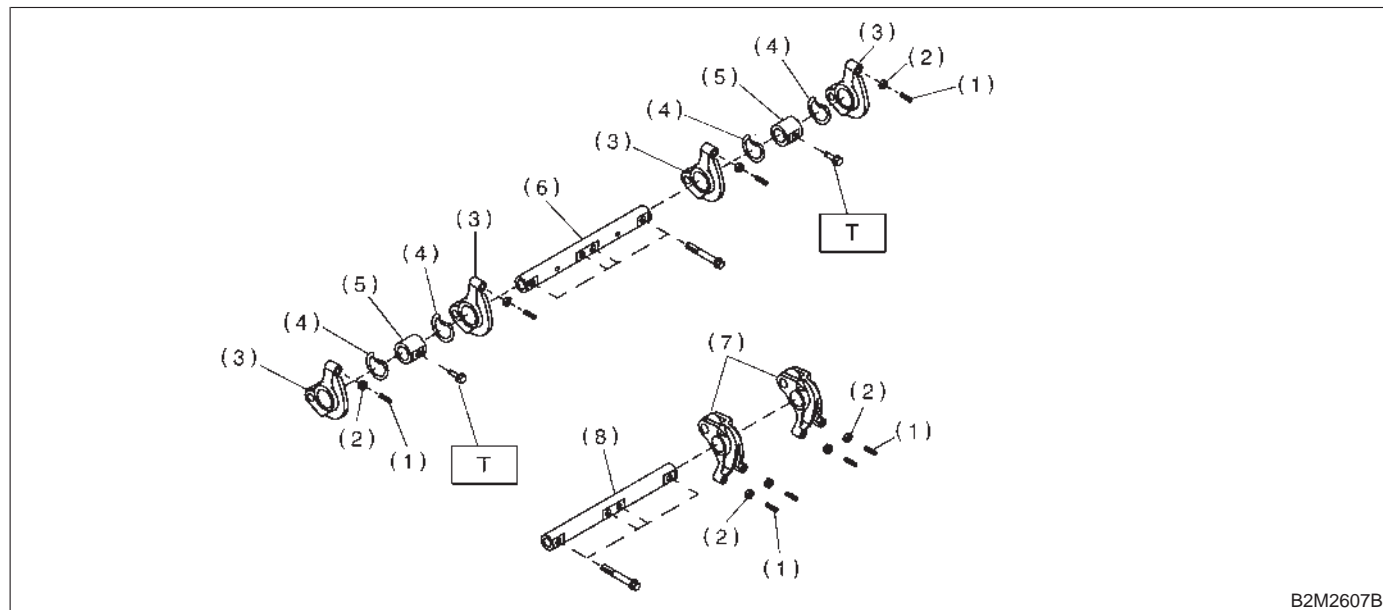
2. INTAKE AND EXHAUST VALVE ROCKER SHAFT

Visually check oil relief valve of shaft end for any of the following abnormalities.

- Breaks in check ball body
- Foreign particles caught in valve spring
- Oil leakage at check ball

CAUTION:

Repair or replace valve rocker shaft as necessary.

D: ASSEMBLY

- | | |
|-------------------------------|--------------------------------|
| (1) Valve rocker adjust screw | (5) Rocker shaft support |
| (2) Valve rocker nut | (6) Intake valve rocker shaft |
| (3) Intake valve rocker arm | (7) Exhaust valve rocker arm |
| (4) Spring | (8) Exhaust valve rocker shaft |

Tightening torque: N-m (kg-m, ft-lb)
T: 5±1 (0.5±0.1, 3.6±0.7)

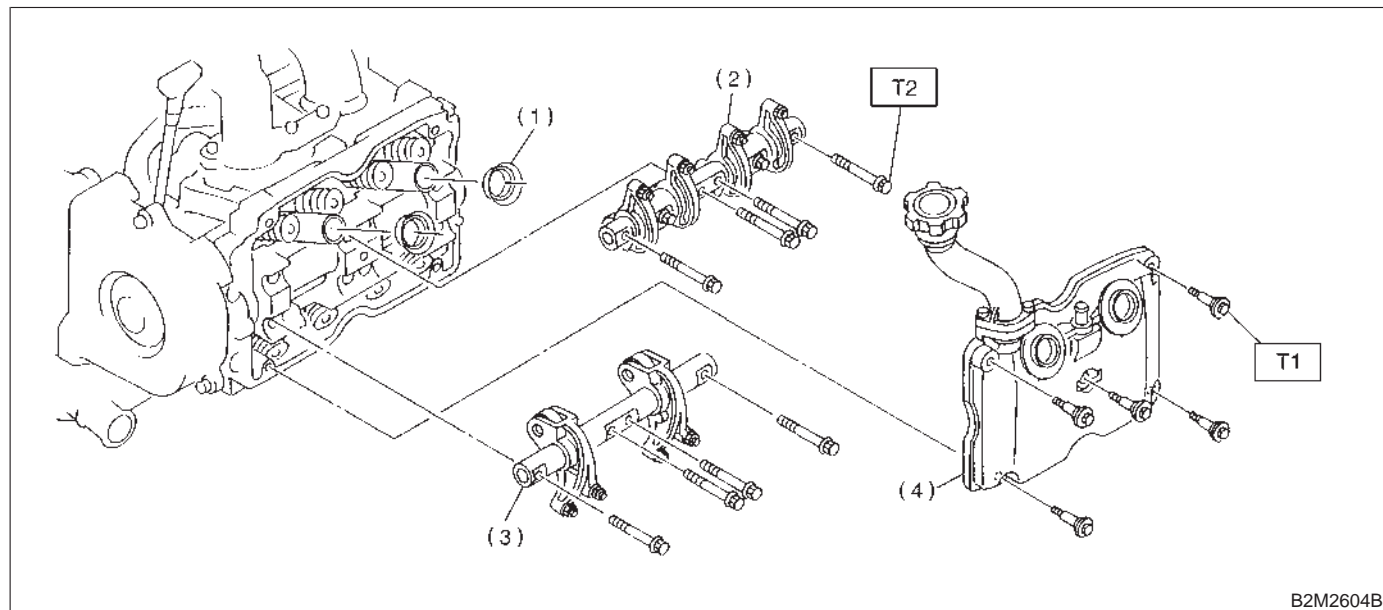
- 1) Install adjuster screw and nut to valve rocker.
- 2) Arrange valve rocker arms, springs and shaft supports in assembly order and insert valve rocker shaft.

CAUTION:

Valve rocker arms, rocker shaft and shaft supports have identification marks. Ensure parts with same markings are properly assembled.

- 3) Install valve rocker shaft securing bolts.

E: INSTALLATION



B2M2604B

- (1) Spark plug pipe gasket
- (2) Intake valve rocker ASSY
- (3) Exhaust valve rocker ASSY
- (4) Rocker cover

Tightening torque: N-m (kg-m, ft-lb)

T1: 5 ± 1 (0.5 ± 0.1 , 3.6 ± 0.7)

T2: 25 ± 2 (2.5 ± 0.2 , 18.1 ± 1.4)

- 1) Installation of valve rocker assembly
(1) Temporarily tighten bolts (a) through (d) equally as shown in figure.

- 2) Adjust the valve clearances. <Ref. to 2-2 [W7B0].>
- 3) Install rocker cover and connect PCV hose.

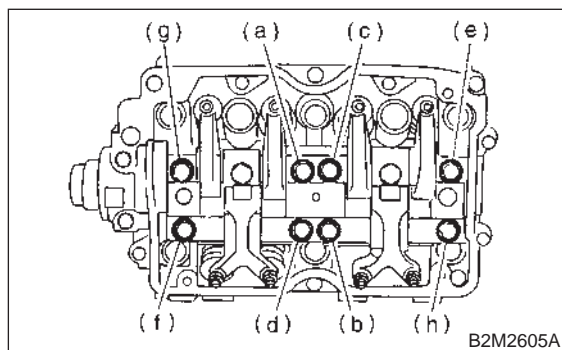
CAUTION:

Do not allow valve rocker assembly to gouge knock pins.

- (2) Tighten bolts (e) through (h) to specified torque.
- (3) Tighten bolts (a) through (d) to specified torque.

Tightening torque:

25 ± 2 N-m (2.5 ± 0.2 kg-m, 18.1 ± 1.4 ft-lb)



B2M2605A

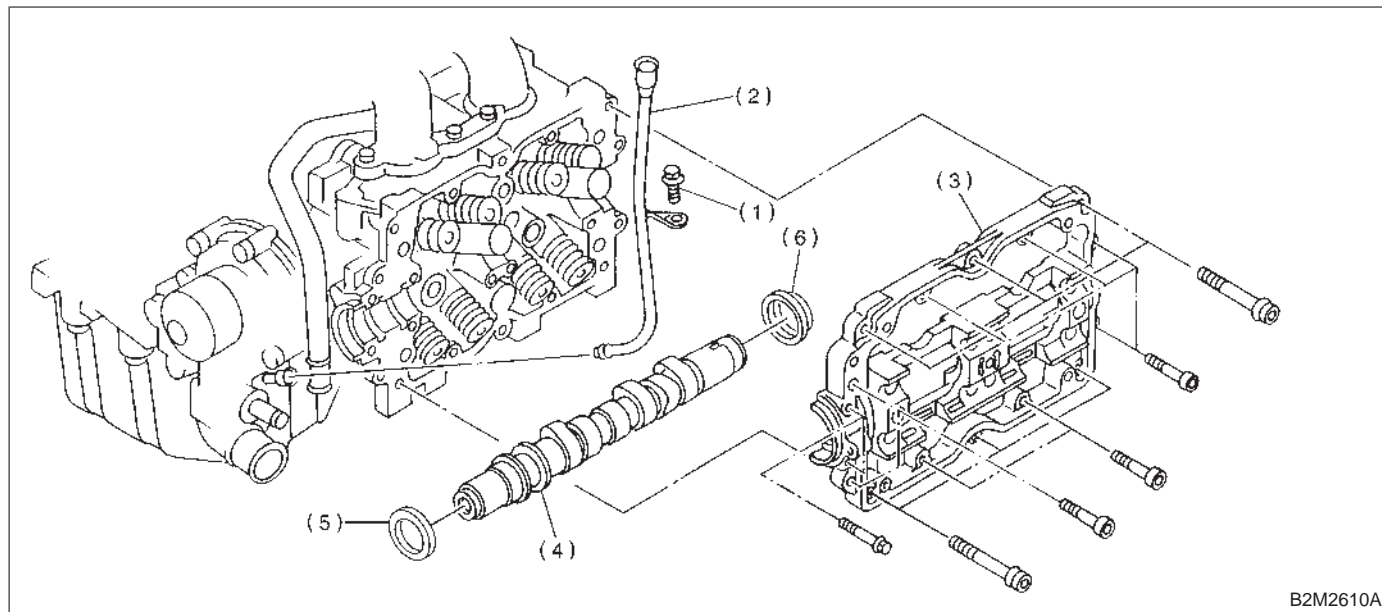
4. Camshaft

A: REMOVAL

1. RELATED PARTS

Remove timing belt, camshaft sprockets and related parts. <Ref. to 2-3 [W2A0].>

2. CAMSHAFT (LH)



B2M2610A

- | | |
|---------------------------|-------------------|
| (1) Bolt | (3) Camshaft cap |
| (2) Oil level gauge guide | (4) Camshaft (LH) |

- | |
|--------------|
| (5) Oil seal |
| (6) Plug |

1) Remove camshaft position sensor.

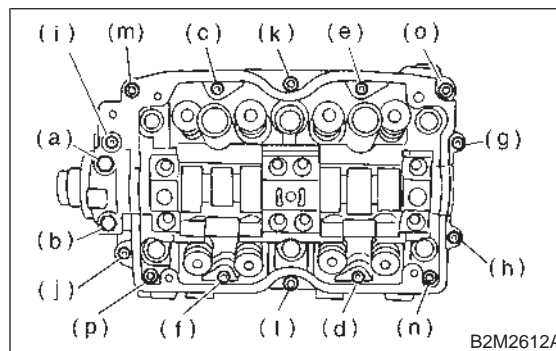
CAUTION:

Do not damage the camshaft position sensor.

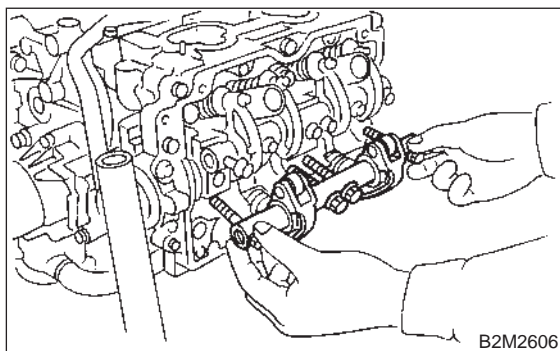
- 2) Remove oil level gauge guide attaching bolt.
- 3) Remove oil level gauge guide.
- 4) Remove camshaft position sensor support.
- 5) Remove camshaft cap.

(1) Remove valve rocker assembly.
<Ref. to 2-3 [W3A0].>

(2) Remove bolts (a) through (b) in alphabetical sequence.

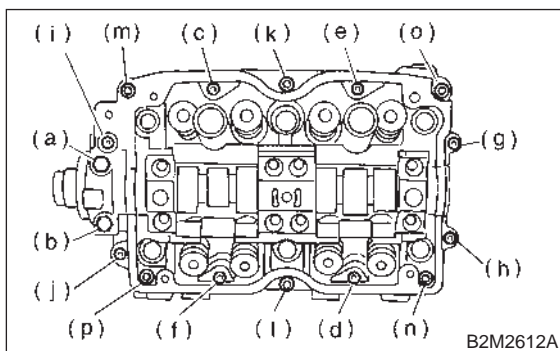


B2M2612A



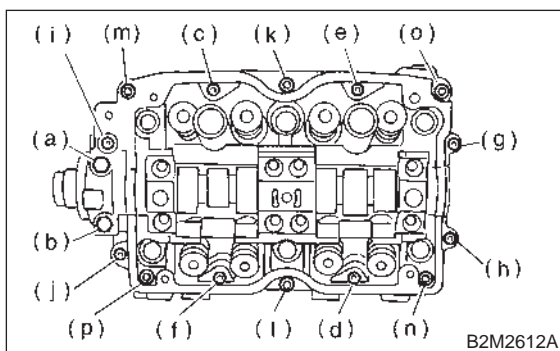
B2M2606

(3) Equally loosen bolts (c) through (j) all the way in alphabetical sequence.

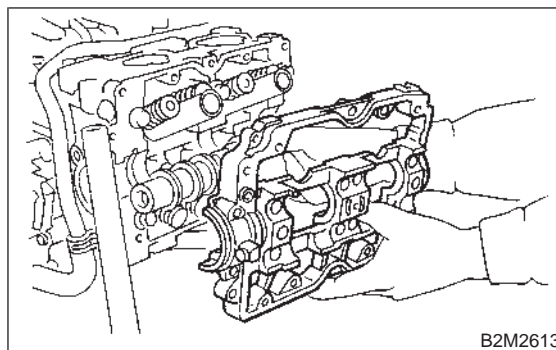


(4) Remove bolts (k) through (p) in alphabetical sequence using ST.

ST 499497000 TORX PLUS



(5) Remove camshaft cap.



6) Remove camshaft (LH).

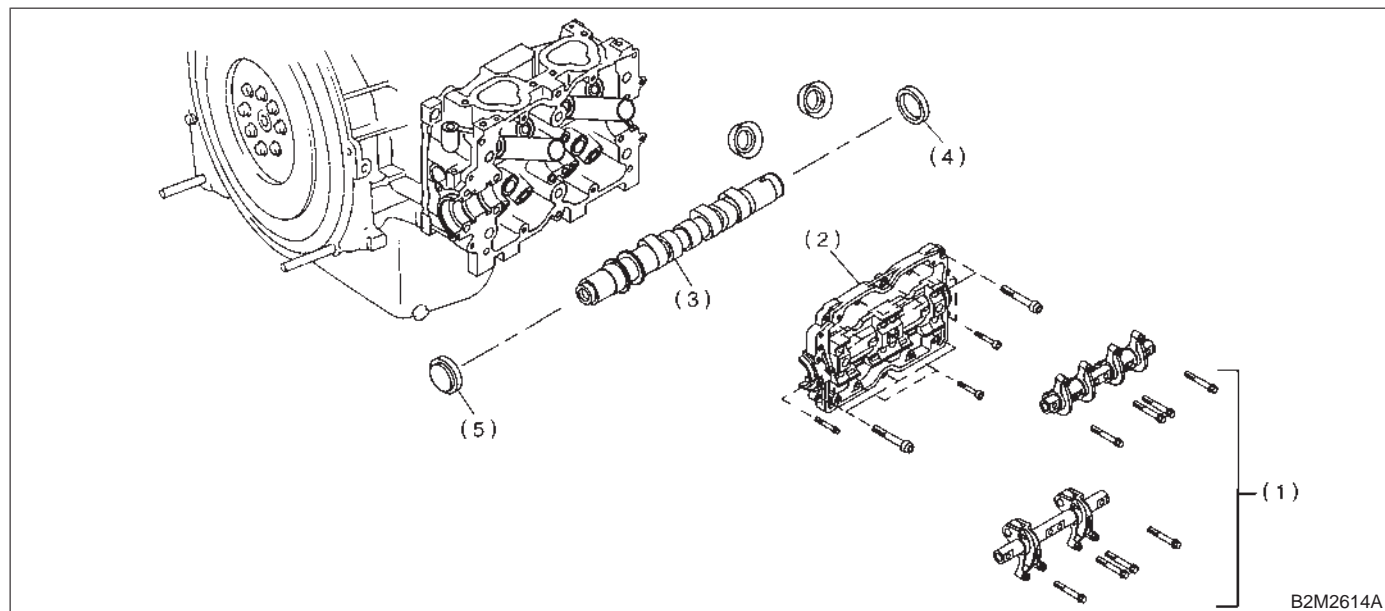
7) Remove oil seal.

8) Remove plug from rear side of camshaft (LH).

CAUTION:

- Do not remove oil seal unless necessary.
- Do not scratch journal surface when removing oil seal.

3. CAMSHAFT (RH)



(1) Camshaft (RH)

(2) Camshaft cap

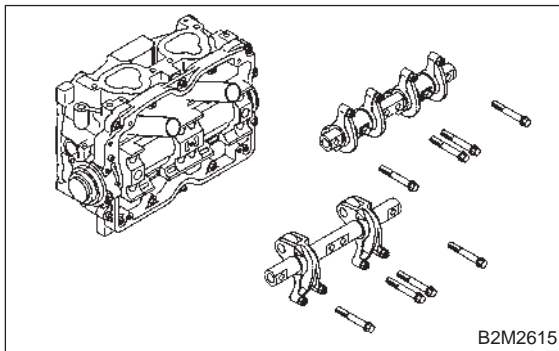
(3) Valve rocker ASSY

(4) Oil seal

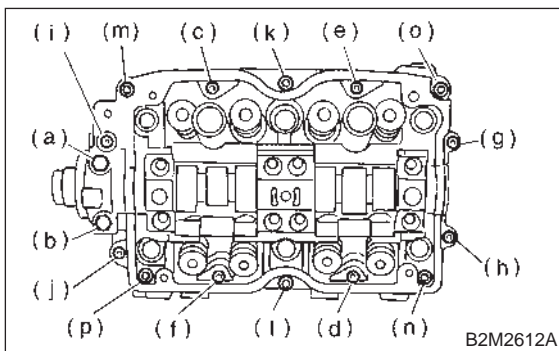
(5) Plug

1) Remove camshaft cap.

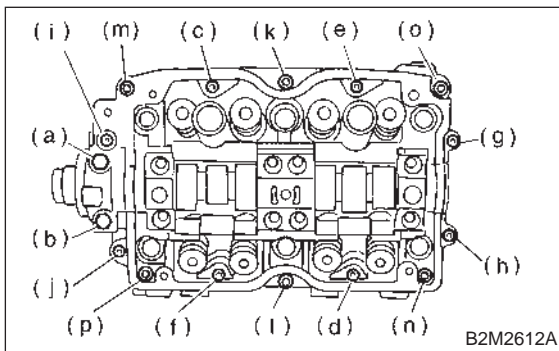
- (1) Remove valve rocker assembly RH.
<Ref. to 2-3 [W3A0].>



- (2) Remove bolts (a) through (b) in alphabetical sequence.

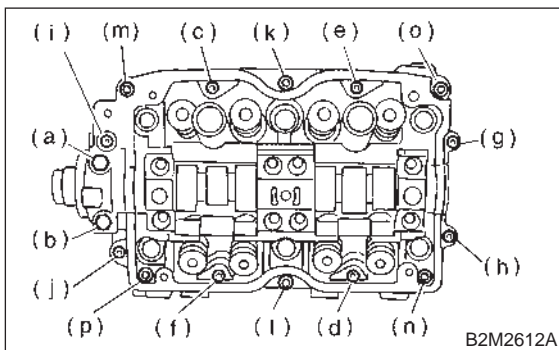


- (3) Equally loosen bolts (c) through (j) all the way in alphabetical sequence.

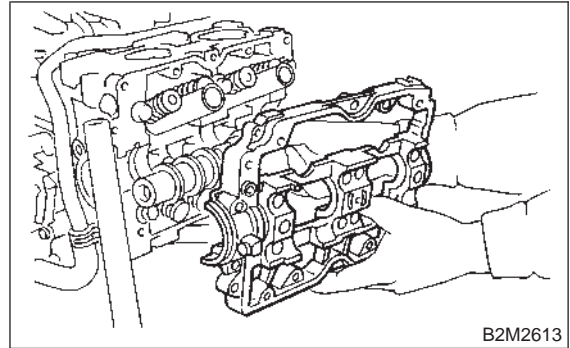


- (4) Remove bolts (k) through (p) in alphabetical sequence using ST.

ST 499497000 TORX PLUS



- (5) Remove camshaft cap.



- 2) Remove camshaft (RH).
3) Remove oil seal.
4) Remove plug from rear side of camshaft (RH).

CAUTION:

- Do not remove oil seal unless necessary.
- Do not scratch journal surface when removing oil seal.

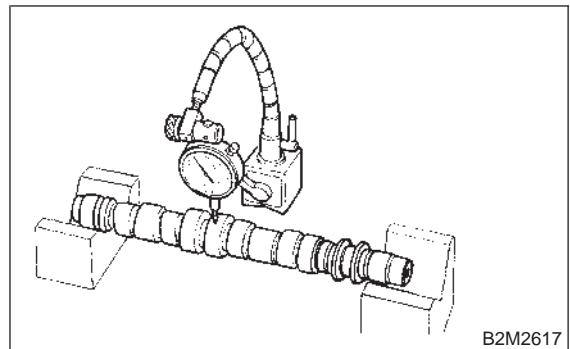
B: INSPECTION

1. CAMSHAFT

- 1) Measure the bend, and repair or replace if necessary.

Limit:

0.020 mm (0.0008 in)



- 2) Check journal for damage and wear. Replace if faulty.

- 3) Measure outside diameter of camshaft journal and inside diameter of cylinder head journal, and determine the difference between the two (= oil clearance). If oil clearance exceeds specifications, replace camshaft or cylinder head as necessary.

Unit: mm (in)		
Clearance at journal	Standard	0.055 — 0.090 (0.0022 — 0.0035)
	Limit	0.118 (0.0046)
Camshaft journal O.D.		31.928 — 31.945 (1.2570 — 1.2577)
Journal hole I.D.		32.000 — 32.018 (1.2598 — 1.2605)

4) Check cam face condition; remove minor faults by grinding with oil stone. Measure the cam height H; replace if the limit has been exceeded.

Cam height: H

● 2200 cc

Unit: mm (in)		
Item	Standard	Limit
Intake	38.732 — 38.832 (1.5249 — 1.5288)	38.632 (1.5209)
Exhaust	39.257 — 39.357 (1.5455 — 1.5495)	39.157 (1.5416)

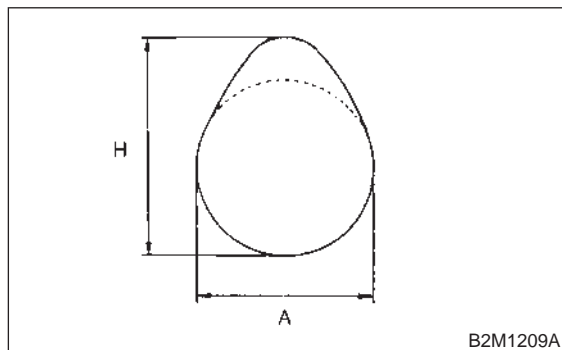
● 2500 cc

Unit: mm (in)		
Item	Standard	Limit
Intake	39.485 — 39.585 (1.5545 — 1.5585)	39.385 (1.5506)
Exhaust	39.257 — 39.357 (1.5455 — 1.5495)	39.157 (1.5416)

Cam base circle diameter A:

IN: 34.0 mm (1.339 in)

EX: 34.0 mm (1.339 in)



2. CAMSHAFT SUPPORT

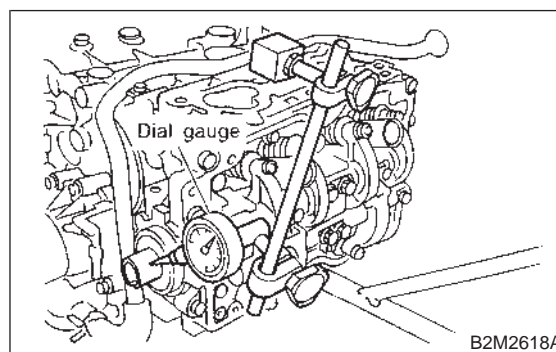
Measure the thrust clearance of camshaft with dial gauge. If the clearance exceeds the limit, replace camshaft support.

Standard:

0.030 — 0.090 mm (0.0012 — 0.0035 in)

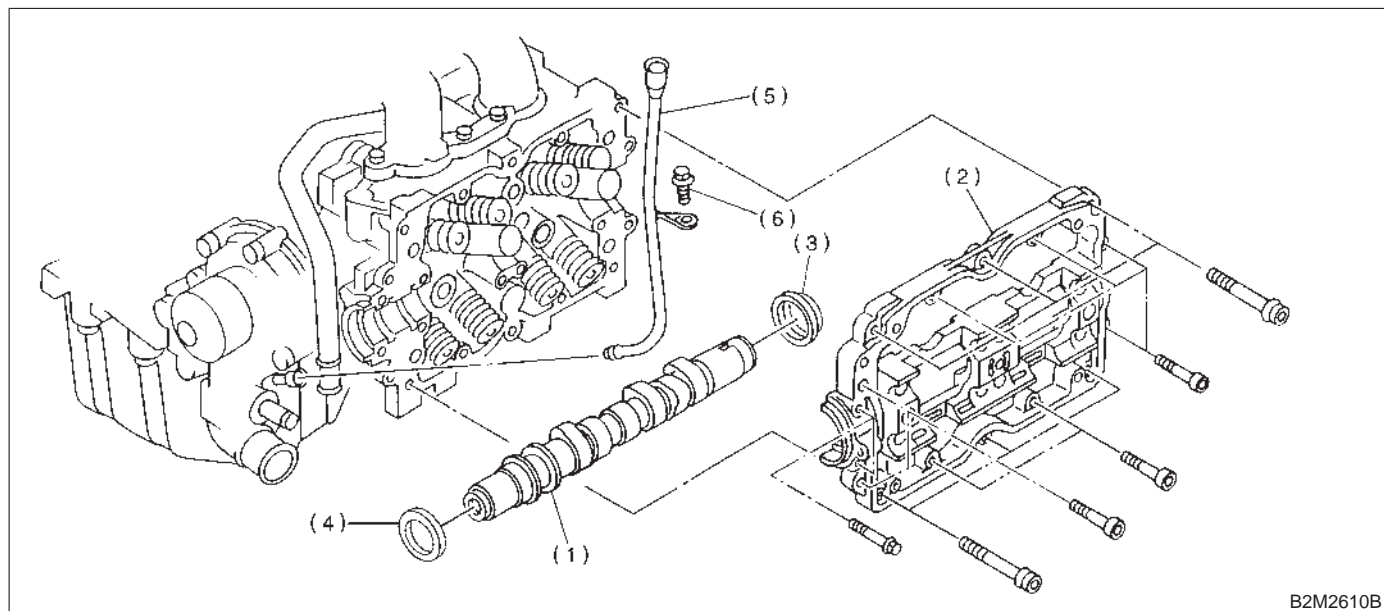
Limit:

0.11 mm (0.0043 in)



C: INSTALLATION

1. CAMSHAFT (LH)



(1) Camshaft (LH)

(2) Camshaft cap

(3) Plug

(4) Oil seal

(5) Oil level gauge guide

(6) Bolt

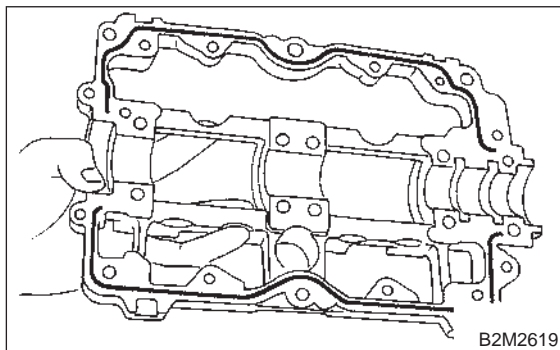
1) Apply a coat of engine oil to camshaft journals and install camshaft (LH).

2) Install camshaft cap.

(1) Apply liquid gasket on the around of camshaft cap.

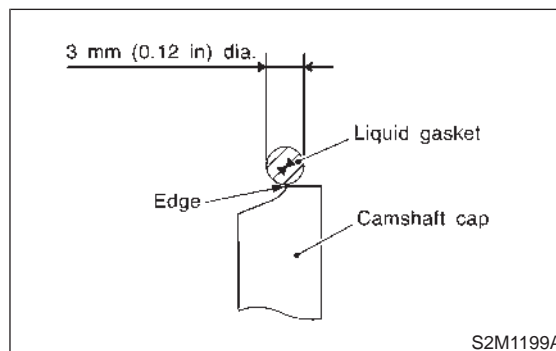
Liquid gasket:

THREE BOND 1280B

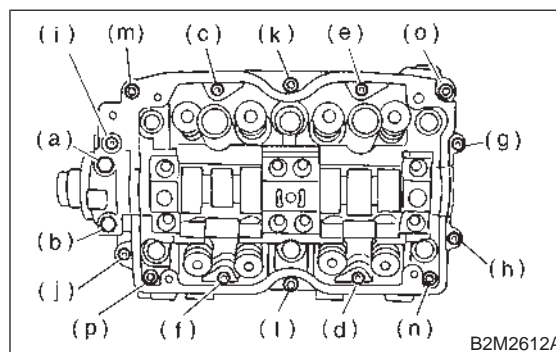


NOTE:

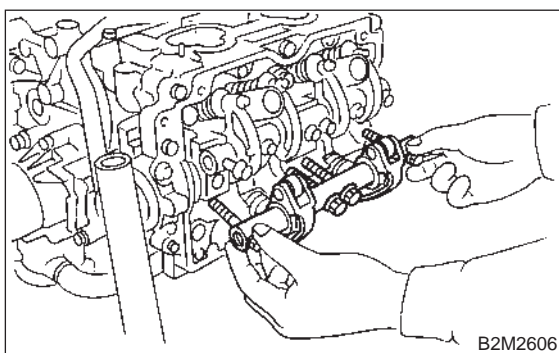
Apply a coat of 3 mm (0.12 in) dia. liquid gasket along edge of cam cap mating surface.



(2) Temporarily tighten bolts (g) through (j) in alphabetical sequence.



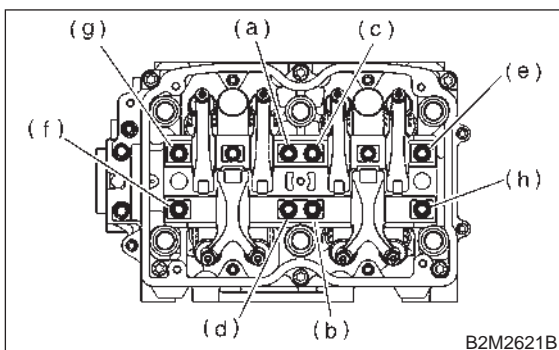
- (3) Install valve rocker assembly.
<Ref. to 2-3 [W3E0].>



- (4) Tighten bolts (a) through (h) in alphabetical sequence.

Tightening torque:

$25 \pm 2 \text{ N-m}$ ($2.5 \pm 0.2 \text{ kg-m}$, $18.1 \pm 1.4 \text{ ft-lb}$)

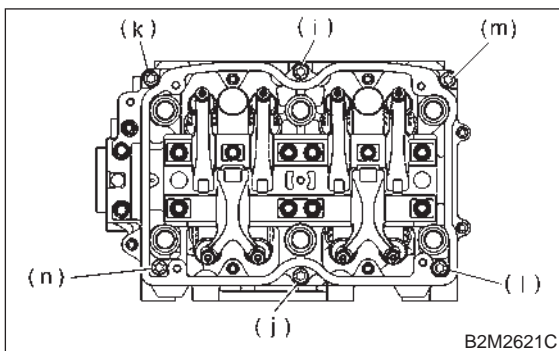


- (5) Tighten TORX bolts (i) through (n) in alphabetical sequence using ST.

ST 499497000 TORX PLUS

Tightening torque:

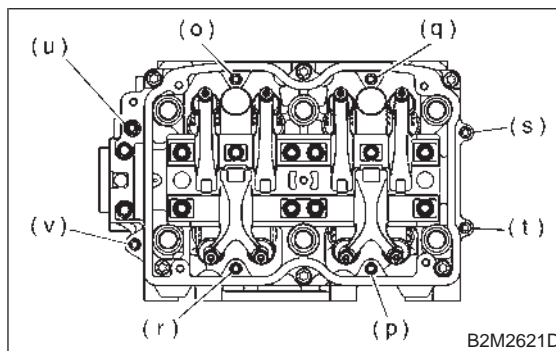
$18 \pm 2 \text{ N-m}$ ($1.8 \pm 0.2 \text{ kg-m}$, $13.0 \pm 1.4 \text{ ft-lb}$)



- (6) Tighten bolts (o) through (v) in alphabetical sequence.

Tightening torque:

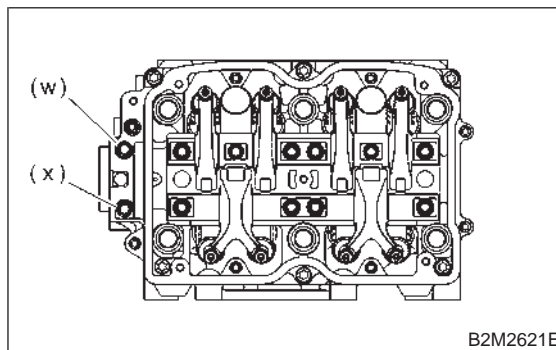
$10 \pm 2 \text{ N-m}$ ($1.0 \pm 0.2 \text{ kg-m}$, $7.2 \pm 1.4 \text{ ft-lb}$)



- (7) Tighten bolts (w) through (x) in alphabetical sequence.

Tightening torque:

$10 \pm 2 \text{ N-m}$ ($1.0 \pm 0.2 \text{ kg-m}$, $7.2 \pm 1.4 \text{ ft-lb}$)



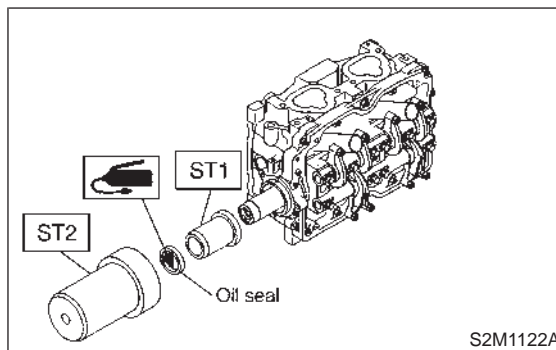
- 3) Apply a coat of grease to oil seal lips and install oil seal (A) on camshaft using ST1 and ST2.

CAUTION:

Use a new oil seal.

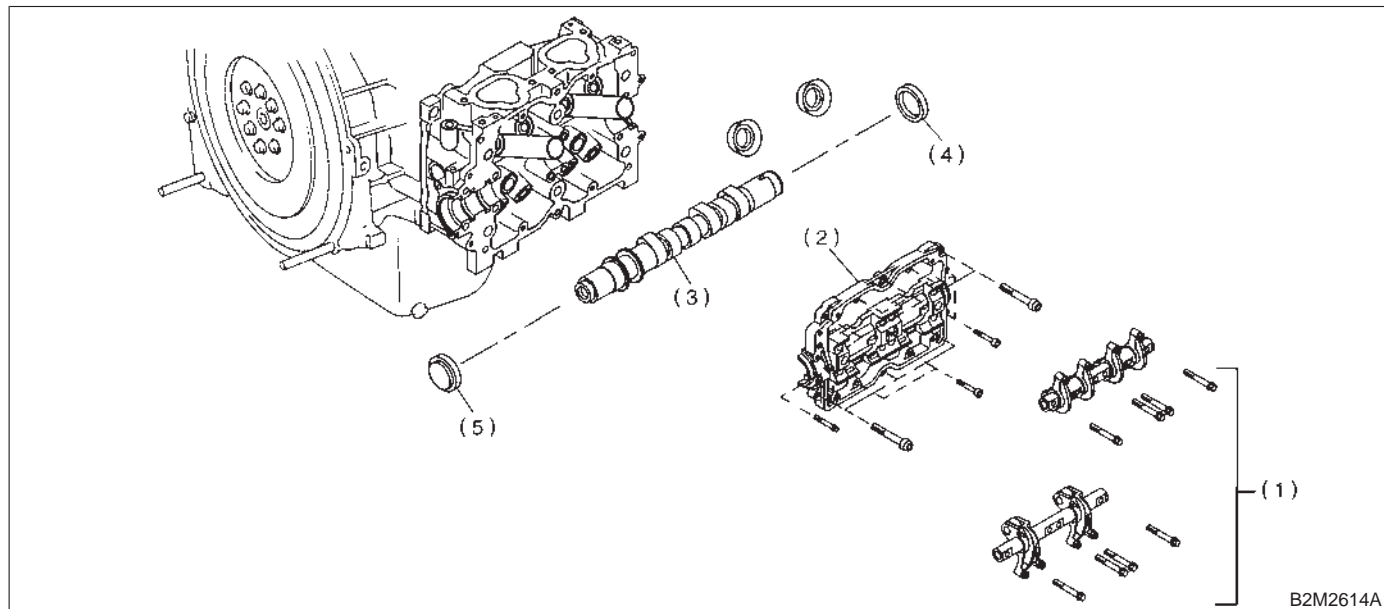
ST1 499597000 OIL SEAL GUIDE

ST2 499587500 OIL SEAL INSTALLER



- 4) Install plug using ST.
ST 499587700 OIL SEAL INSTALLER
5) Install oil level gauge guide.
6) Install camshaft position sensor support.

2. CAMSHAFT (RH)



(1) Camshaft support (RH)

(3) Camshaft (RH)

(5) Plug

(2) O-ring

(4) Oil seal

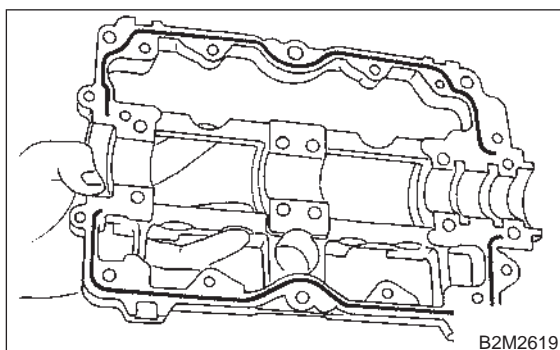
1) Apply a coat of engine oil to camshaft journals and install camshaft (RH).

2) Install camshaft cap.

(1) Apply liquid gasket on the around of camshaft cap.

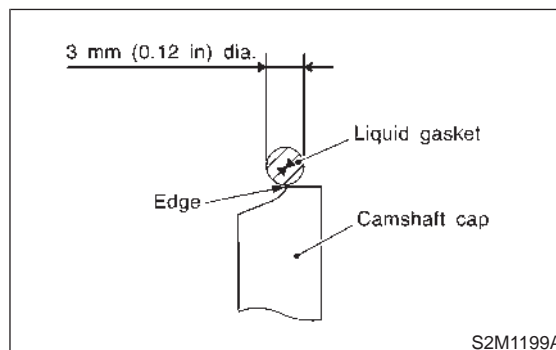
Liquid gasket:

THREE BOND 1280B

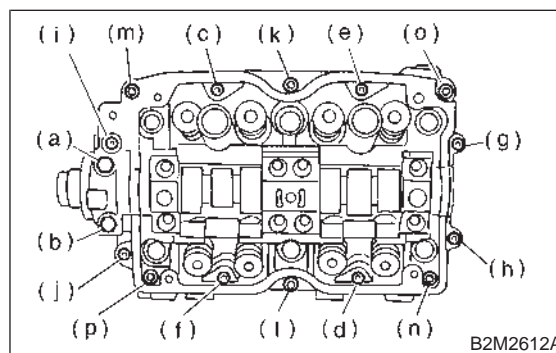


NOTE:

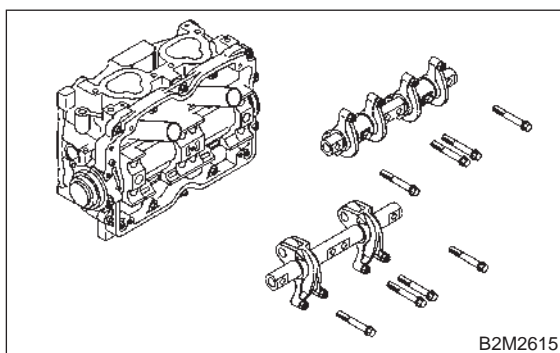
Apply a coat of 3 mm (0.12 in) dia. liquid gasket along edge of cam cap mating surface.



(2) Temporarily tighten bolts (g) through (j) in alphabetical sequence.



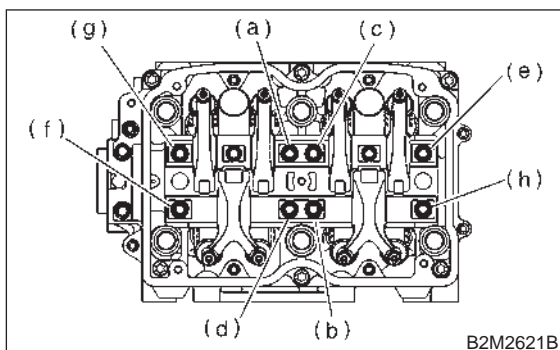
- (3) Install valve rocker assembly.
<Ref. to 2-3 [W3E0].>



- (4) Tighten bolts (a) through (h) in alphabetical sequence.

Tightening torque:

25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)

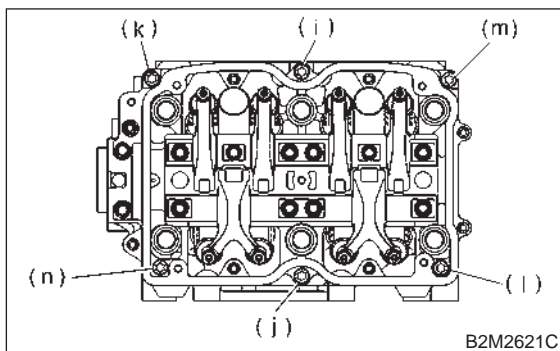


- (5) Tighten TORX bolts (i) through (n) in alphabetical sequence using ST.

ST 499427000 TORX PLUS

Tightening torque:

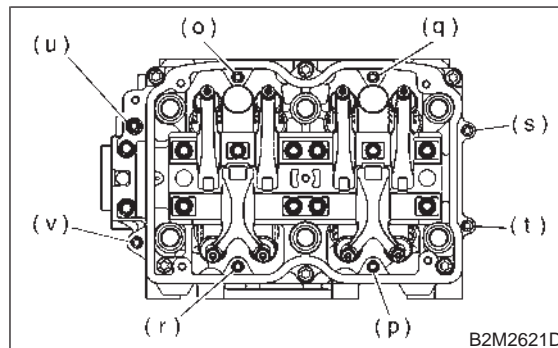
18±2 N·m (1.8±0.2 kg-m, 13.0±1.4 ft-lb)



- (6) Tighten bolts (o) through (v) in alphabetical sequence.

Tightening torque:

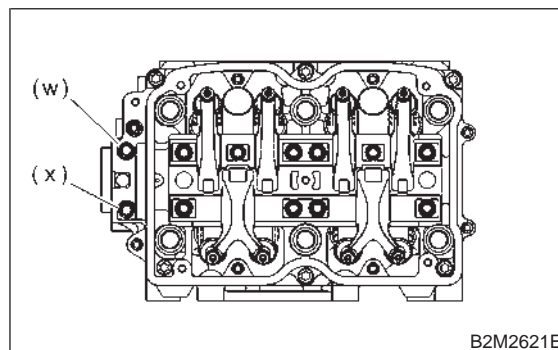
10±2 N·m (1.0±0.2 kg-m, 7.2±1.4 ft-lb)



- (7) Tighten bolts (o) through (p) in alphabetical sequence.

Tightening torque:

10±2 N·m (1.0±0.2 kg-m, 7.2±1.4 ft-lb)



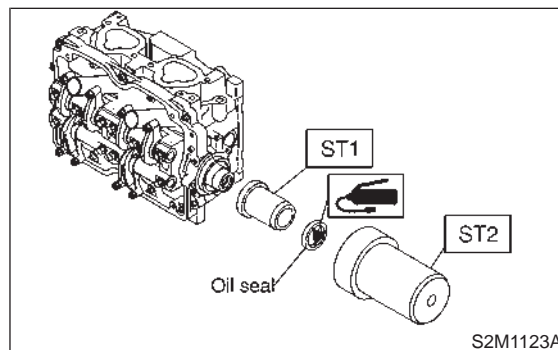
- 3) Apply a coat of grease to oil seal lips and install oil seal (A) on camshaft using ST1 and ST2.

CAUTION:

Use a new oil seal.

ST1 499597000 OIL SEAL GUIDE

ST2 499587500 OIL SEAL INSTALLER



- 4) Install plug using ST.

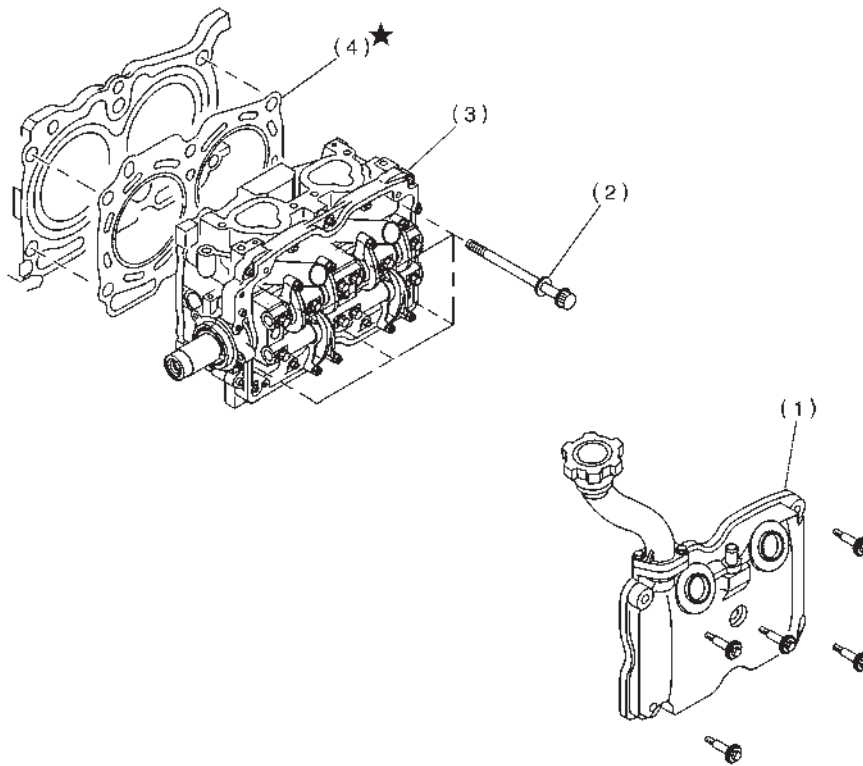
ST 499587700 OIL SEAL INSTALLER

3. RELATED PARTS

Install timing belt, camshaft sprockets and related parts.

<Ref. to 2-3 [W2C0].>

2. CYLINDER HEAD



B2M2627A

- | | |
|------------------------|--------------------------|
| (1) Rocker cover | (3) Cylinder head |
| (2) Cylinder head bolt | (4) Cylinder head gasket |

1) Remove timing belt, camshaft sprocket and related parts.

<Ref. to 2-3 [W2A0].>

2) Remove oil level gauge guide attaching bolt (left hand only) and oil level gauge guide.

3) Remove rocker cover.

5. Cylinder Head

A: REMOVAL

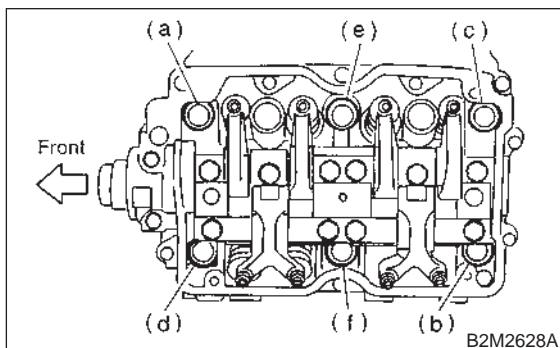
1. RELATED PARTS

- 1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 2) Drain engine coolant. <Ref. to 2-5 [W1A0].>
- 3) Remove V-belt(s).
- 4) Remove generator and bracket.
- 5) Remove A/C compressor and bracket. (With A/C model)
- 6) Disconnect spark plug cords.
- 7) Remove connector bracket attaching bolt.
- 8) Remove camshaft position sensor and camshaft position sensor support.
- 9) Disconnect oil pressure switch connector.
- 10) Disconnect blow-by hose.
- 11) Remove intake manifold. <Ref. to 2-7 [W4A0].>

4) Remove cylinder head bolts in alphabetical sequence shown in figure.

CAUTION:

Leave bolts (a) and (c) engaged by three or four threads to prevent cylinder head from falling.



7) Remove cylinder head gasket.

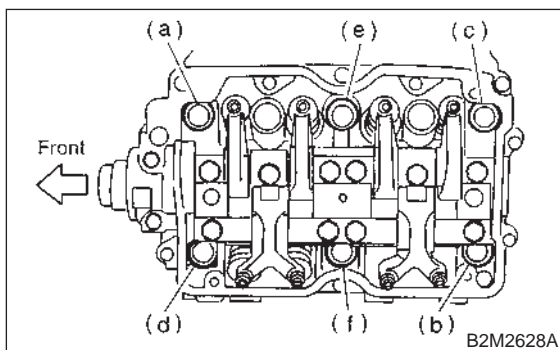
CAUTION:

Do not scratch the mating surface of cylinder head and cylinder block.

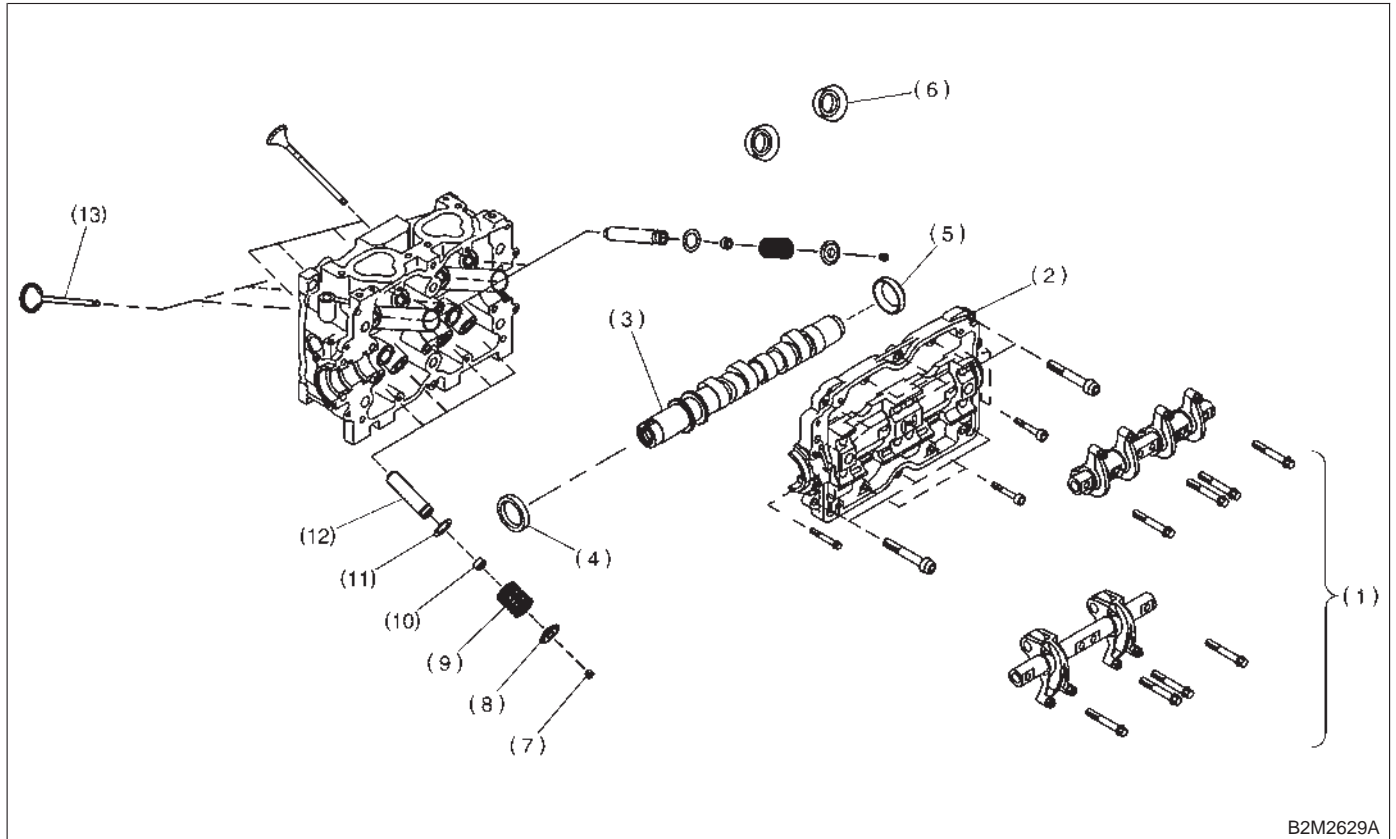
8) Similarly, remove right side cylinder head.

5) While tapping cylinder head with a plastic hammer, separate it from cylinder block.

6) Remove bolts (a) and (b) to remove cylinder head.



B: DISASSEMBLY



B2M2629A

- | | | |
|-----------------------|----------------------------|------------------------|
| (1) Valve rocker ASSY | (6) Spark plug pipe gasket | (11) Valve spring seat |
| (2) Camshaft cap | (7) Retainer key | (12) Valve guide |
| (3) Camshaft | (8) Retainer | (13) Valve |
| (4) Oil seal | (9) Valve spring | |
| (5) Plug | (10) Oil seal | |

1) Remove valve rocker assembly, camshaft cap and camshaft. <Ref. to 2-3 [W3A0].>

2) Remove oil seal.

3) Remove plug.

4) Place cylinder head on ST.

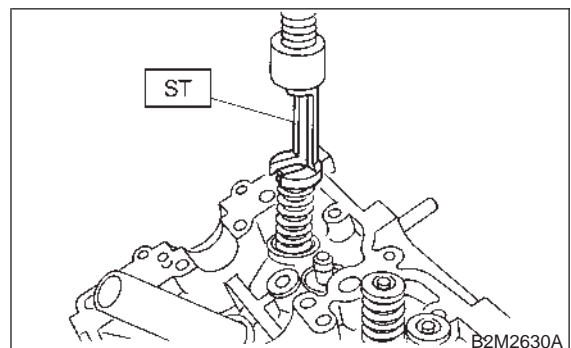
ST 498267800 CYLINDER HEAD TABLE

5) Set ST on valve spring. Compress valve spring and remove the valve spring retainer key. Remove each valve and valve spring.

ST 499718000 VALVE SPRING REMOVER

CAUTION:

- Mark each valve to prevent confusion.
- Use extreme care not to damage the lips of the intake valve oil seals and exhaust valve oil seals.



C: INSPECTION**1. CYLINDER HEAD**

1) Make sure that no crack or other damage exists. In addition to visual inspection, inspect important areas by means of red lead check.

Also make sure that gasket installing surface shows no trace of gas and water leaks.

2) Place cylinder head on ST.

ST 498267800 CYLINDER HEAD TABLE

3) Measure the warping of the cylinder head surface that mates with crankcase using a straight edge and thickness gauge.

If the warping exceeds 0.05 mm (0.0020 in), regrind the surface with a surface grinder.

Warping limit:

0.05 mm (0.0020 in)

Grinding limit:

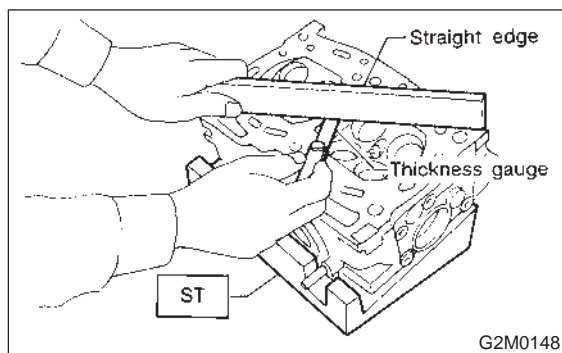
0.3 mm (0.012 in)

Standard height of cylinder head:

97.5 mm (3.839 in)

CAUTION:

Uneven torque for the cylinder head bolts can cause warping. When reassembling, pay special attention to the torque so as to tighten evenly.

**2. VALVE SEAT**

Inspect intake and exhaust valve seats, and correct the contact surfaces with valve seat cutter if they are defective or when valve guides are replaced.

Valve seat width: W

Intake

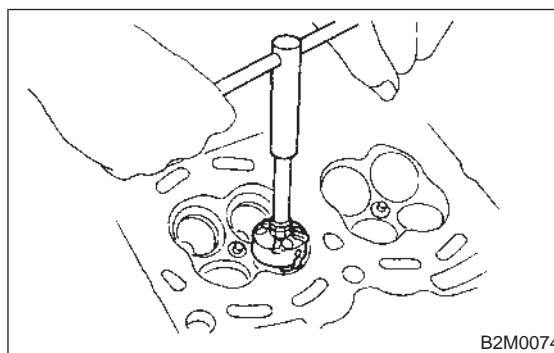
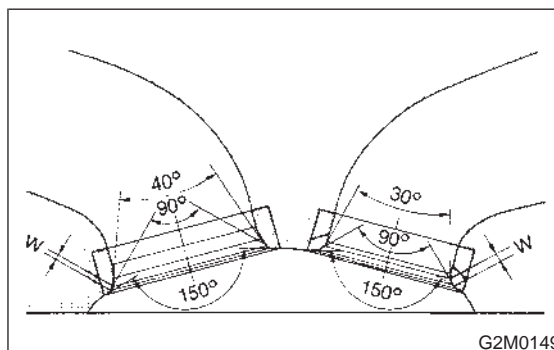
Standard 1.0 mm (0.039 in)

Limit 1.7 mm (0.067 in)

Exhaust

Standard 1.4 mm (0.055 in)

Limit 2.1 mm (0.083 in)



3. VALVE GUIDE

1) Check the clearance between valve guide and stem. The clearance can be checked by measuring the outside diameter of valve stem and the inside diameter of valve guide with outside and inside micrometers respectively.

Clearance between the valve guide and valve stem:

Standard

Intake 0.035 — 0.062 mm (0.0014 — 0.0024 in)

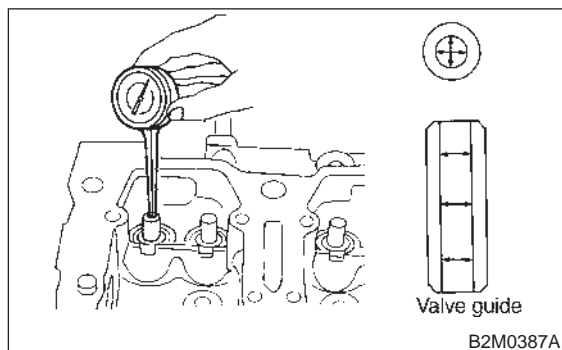
Exhaust 0.040 — 0.067 mm (0.0016 — 0.0026 in)

Limit

0.15 mm (0.0059 in)

Valve guide inner diameter:

6.000 — 6.012 mm (0.2362 — 0.2367 in)



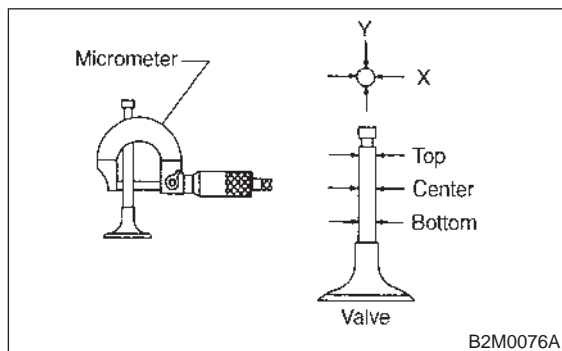
Valve stem outer diameters:

Intake

5.950 — 5.965 mm (0.2343 — 0.2348 in)

Exhaust

5.945 — 5.960 mm (0.2341 — 0.2346 in)

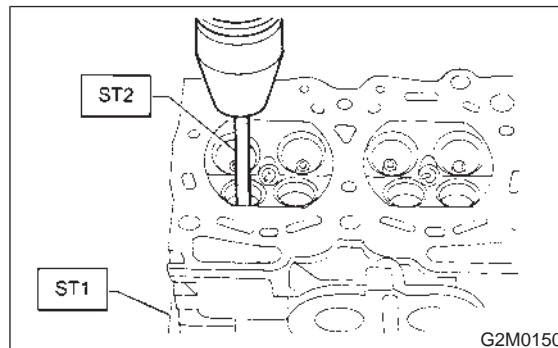


2) If the clearance between valve guide and stem exceeds the specification, replace guide as follows:

(1) Place cylinder head on ST1 with the combustion chamber upward so that valve guides enter the holes in ST1.

(2) Insert ST2 into valve guide and press it down to remove valve guide.

ST1 498267800 CYLINDER HEAD TABLE
ST2 499767400 VALVE GUIDE REMOVER



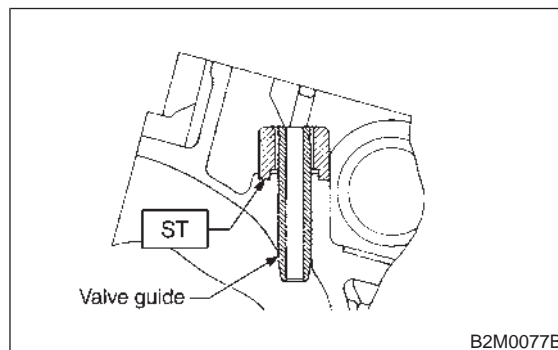
(3) Turn cylinder head upside down and place ST as shown in the figure.

Intake side:

ST 499767700 VALVE GUIDE ADJUSTER

Exhaust side:

ST 499767800 VALVE GUIDE ADJUSTER



(4) Before installing new oversize valve guide, make sure that neither scratches nor damages exist on the inside surface of the valve guide holes in cylinder head.

(5) Put new valve guide, coated with sufficient oil, in cylinder, and insert ST1 into valve guide. Press in until the valve guide upper end is flush with the upper surface of ST2.

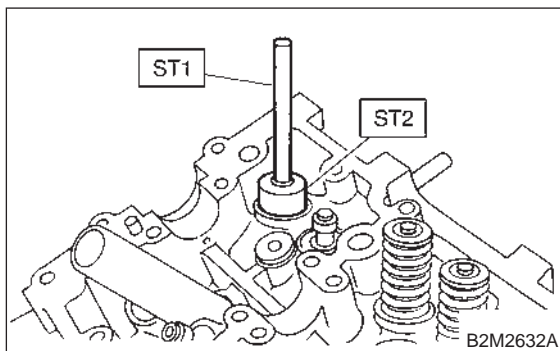
ST1 499767400 VALVE GUIDE REMOVER

Intake side:

ST2 499767700 VALVE GUIDE ADJUSTER

Exhaust side:

ST2 499767800 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

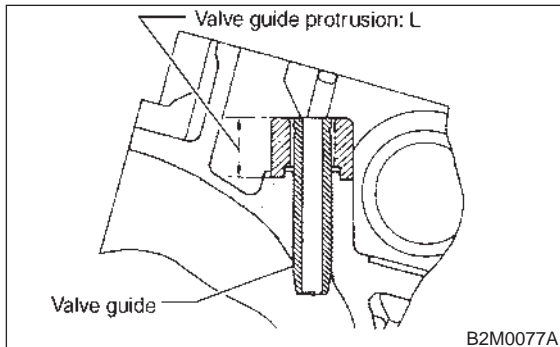
Valve guide protrusion: L

Intake

20.0 — 20.5 mm (0.787 — 0.807 in)

Exhaust

16.5 — 17.0 mm (0.650 — 0.669 in)

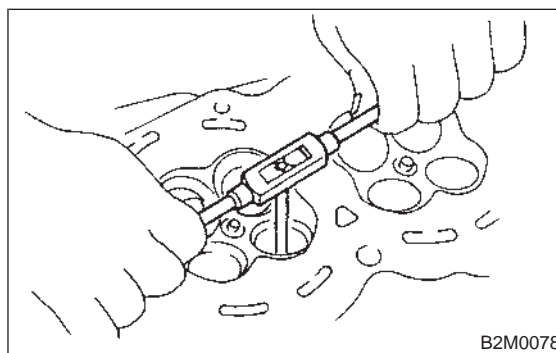


(7) Ream the inside of valve guide with ST. Gently rotate the reamer clockwise while pressing it lightly into valve guide, and return it also rotating clockwise. After reaming, clean valve guide to remove chips.

CAUTION:

- Apply engine oil to the reamer when reaming.
- If the inner surface of the valve guide is torn, the edge of the reamer should be slightly ground with an oil stone.
- If the inner surface of the valve guide becomes lustrous and the reamer does not chips, use a new reamer or remedy the reamer.

ST 499767400 VALVE GUIDE REAMER



(8) Recheck the contact condition between valve and valve seat after replacing valve guide.

4. INTAKE AND EXHAUST VALVE

1) Inspect the flange and stem of valve, and replace if damaged, worn, or deformed, or if "H" is less than the specified limit.

H:

Intake

Standard 1.0 mm (0.039 in)

Limit 0.6 mm (0.024 in)

Exhaust

Standard 1.2 mm (0.047 in)

Limit 0.6 mm (0.024 in)

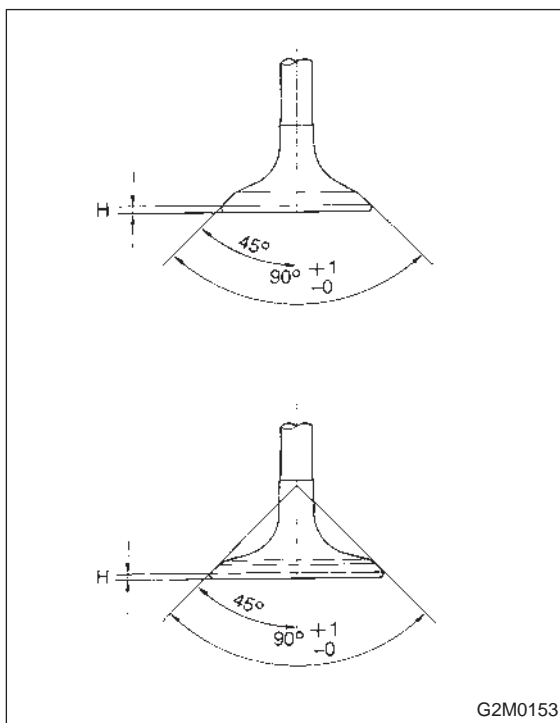
Valve overall length:

Intake

120.6 mm (4.75 in)

Exhaust

121.7 mm (4.79 in)



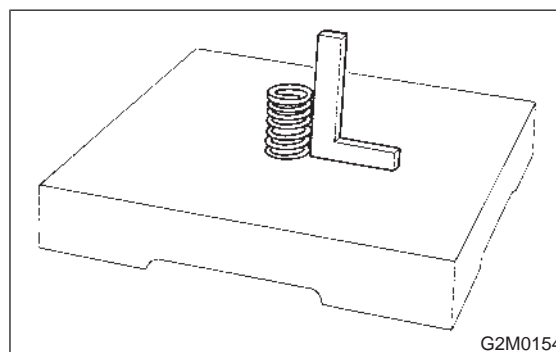
2) Put a small amount of grinding compound on the seat surface and lap the valve and seat surface. <Ref. to 2-3 [W6C2].> Install a new intake valve oil seal after lapping.

5. VALVE SPRING

1) Check valve springs for damage, free length, and tension. Replace valve spring if it is not to the specifications presented below.

2) To measure the squareness of the valve spring, stand the spring on a surface plate and measure its deflection at the top using a try square.

Free length	54.30 mm (2.1378 in)
Squareness	2.5°, 2.4 mm (0.094 in)
Tension/spring height	214.8 — 246.2 N (21.9 — 25.1 kg, 48.3 — 55.3 lb) / 45.0 mm (1.772 in)
	526.6 — 581.6 N (53.7 — 59.3 kg, 118.4 — 130.8 lb) / 34.7 mm (1.366 in)



6. INTAKE AND EXHAUST VALVE OIL SEAL

Replace oil seal with new one, if lip is damaged or spring out of place, or when the surfaces of intake valve and valve seat are reconditioned or intake valve guide is replaced.

- 1) Place cylinder head on ST1.
- 2) Press-fit oil seal to the specified dimension indicated in the figure using ST2.

CAUTION:

- Apply engine oil to oil seal before press-fitting.
- When press-fitting oil seal, do not use hammer or strike in.
- Differentiate between intake valve oil seal and exhaust valve oil seal by noting their difference in color.

ST1 498267800 CYLINDER HEAD TABLE
ST2 498857100 VALVE OIL SEAL GUIDE

Color of rubber part:

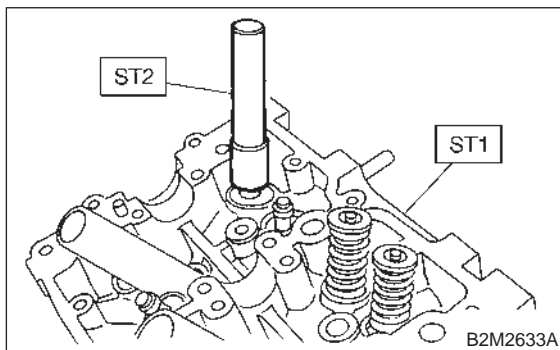
Intake [Black]

Exhaust [Brown]

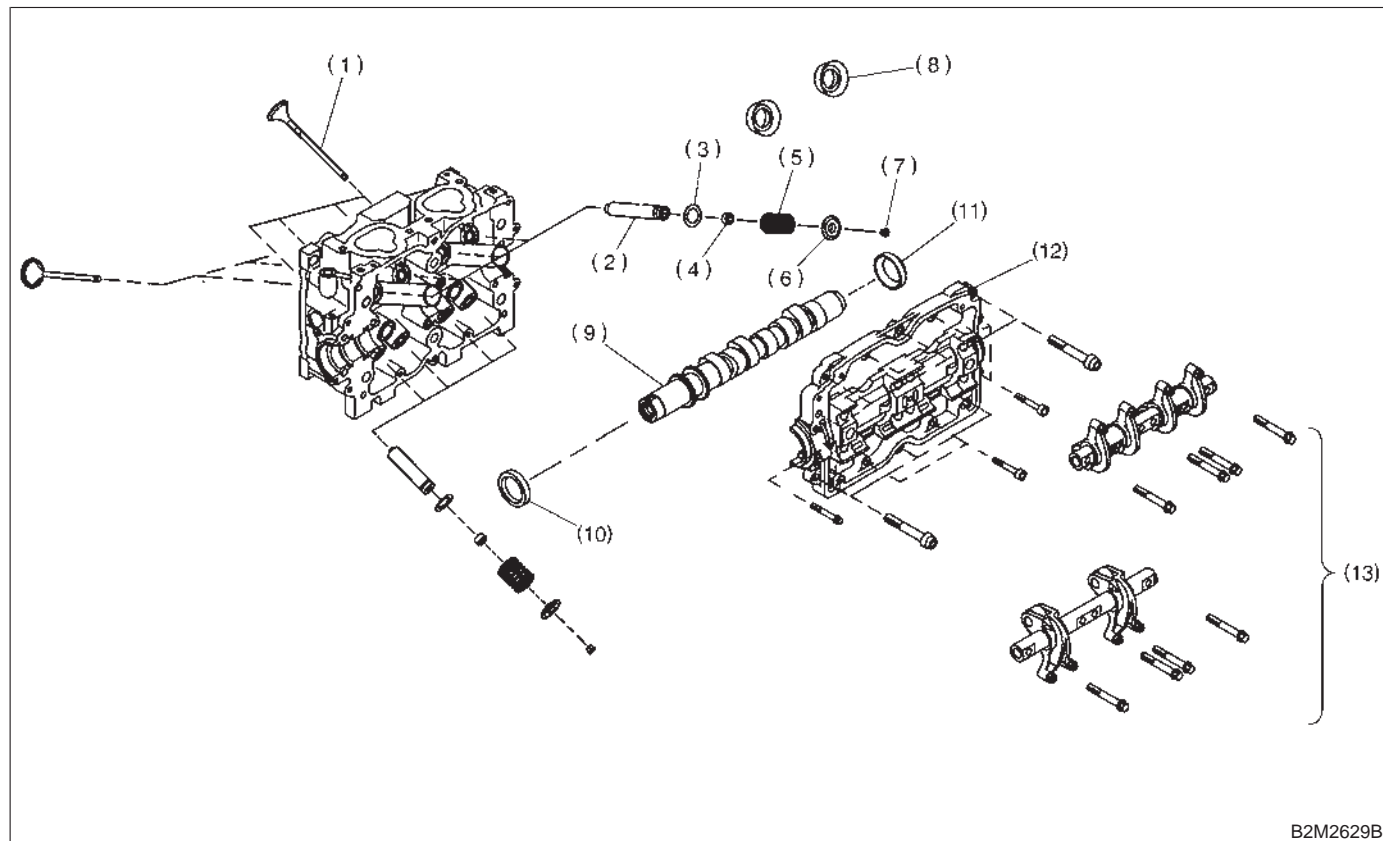
Color of spring part:

Intake [Silver]

Exhaust [Silver]



D: ASSEMBLY



B2M2629B

- | | | |
|-----------------------|-----------------------|------------------------|
| (1) Valve | (6) Retainer | (11) Plug |
| (2) Valve guide | (7) Retainer key | (12) Camshaft cap |
| (3) Valve spring seat | (8) Spark plug gasket | (13) Valve rocker ASSY |
| (4) Oil seal | (9) Camshaft | |
| (5) Valve spring | (10) Oil seal | |

- 1) Installation of valve spring and valve
 (1) Place cylinder head on ST.
 ST 498267400 CYLINDER HEAD TABLE
 (2) Coat stem of each valve with engine oil and insert valve into valve guide.

CAUTION:

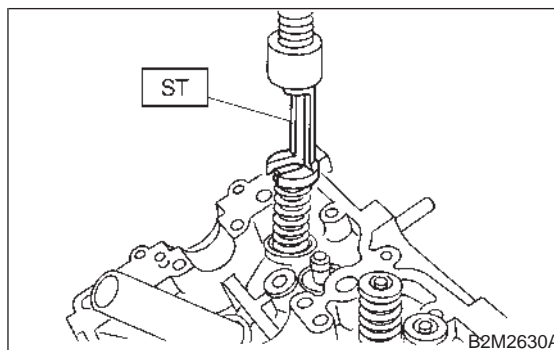
When inserting valve into valve guide, use special care not to damage the oil seal lip.

- (3) Install valve spring and retainer.

CAUTION:

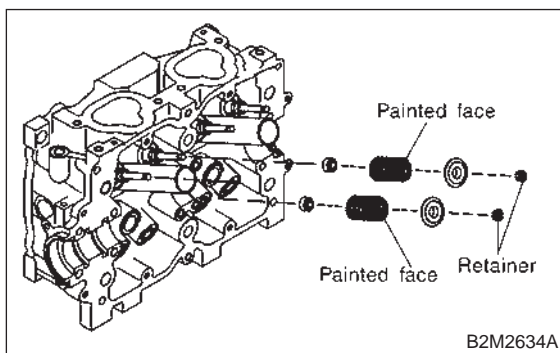
Be sure to install the valve springs with their close-coiled end facing the seat on the cylinder head.

- (4) Set ST on valve spring.
 ST 499718000 VALVE SPRING REMOVER



B2M2630A

(5) Compress valve spring and fit valve spring retainer key.



(6) After installing, tap valve spring retainers lightly with wooden hammer for better seating.

2) Install plug.

3) Install camshaft, camshaft cap and valve rocker assembly.

<Ref. to 2-3 [W3C0].>

4) Install plug using ST.

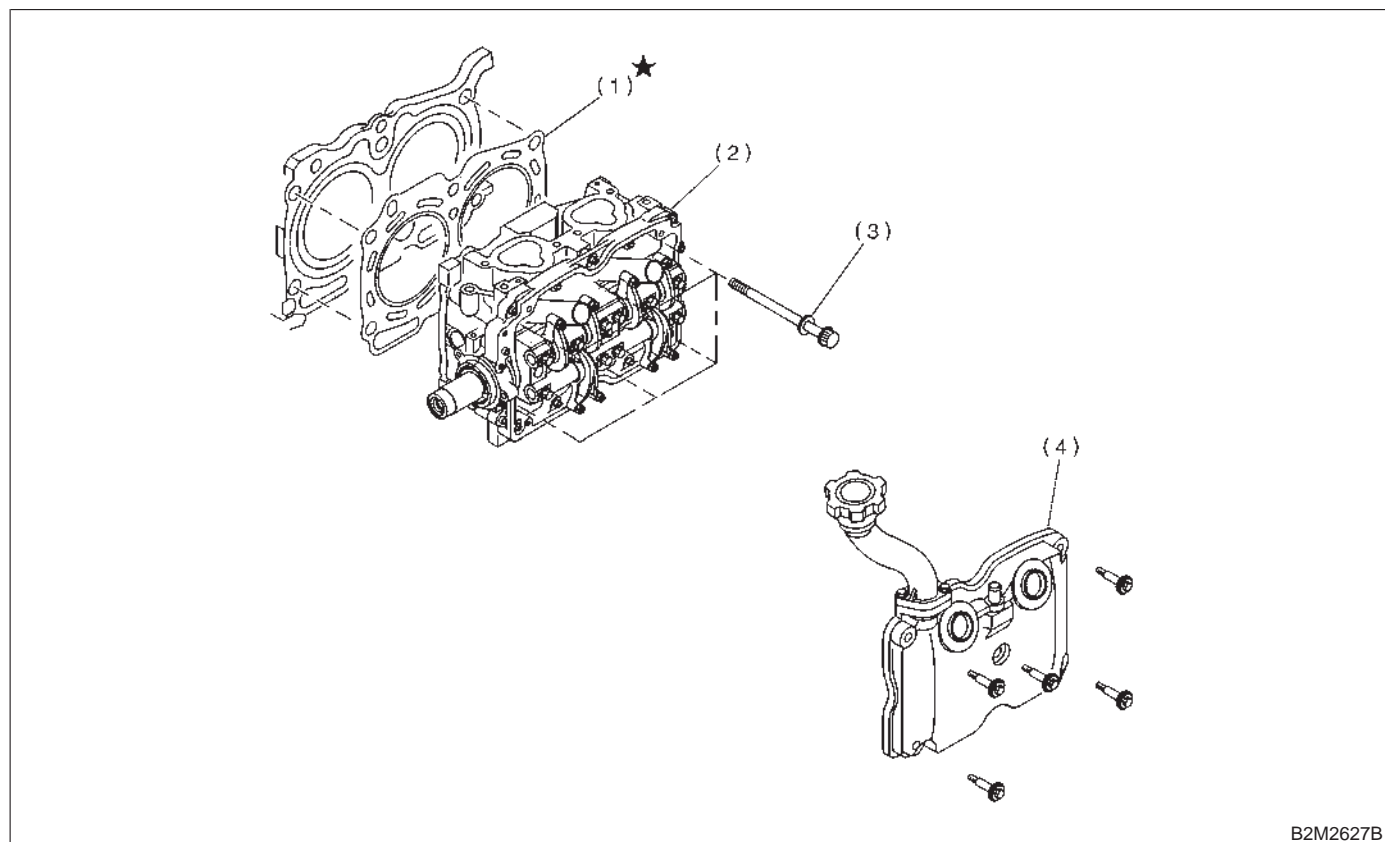
ST 499587100 OIL SEAL INSTALLER

5) Install oil seal using ST.

ST 499587500 OIL SEAL INSTALLER

E: INSTALLATION

1. CYLINDER HEAD



(1) Cylinder head gasket

(2) Cylinder head

(3) Cylinder head bolt

(4) Rocker cover

1) Install cylinder head and gaskets on cylinder block.

CAUTION:

Use new cylinder head gaskets.

- 2) Tighten cylinder head bolts.
 - (1) Apply a coat of engine oil to washers and bolt threads.
 - (2) Tighten all bolts to 29 N·m (3.0 kg-m, 22 ft-lb) in alphabetical sequence.
 - Then tighten all bolts to 69 N·m (7.0 kg-m, 51 ft-lb) in alphabetical sequence.
 - (3) Back off all bolts by 180° first; back them off by 180° again.
 - (4) Tighten bolts (a) and (b) to 34 N·m (3.5 kg-m, 25 ft-lb).
 - (5) Tighten bolts (c), (d), (e) and (f) to 15 N·m (1.5 kg-m, 11 ft-lb).
 - (6) Tighten all bolts by 80 to 90° in alphabetical sequence.

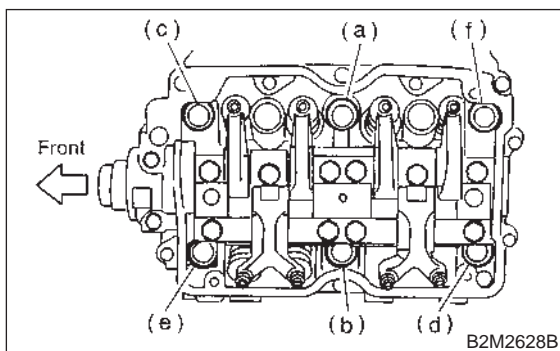
CAUTION:

Do not tighten bolts more than 90°.

- (7) Further tighten all bolts by 80 to 90° in alphabetical sequence.

CAUTION:

Ensure that the total “re-tightening angle” [in the former two steps], do not exceed 180°.



- 3) Install oil level gauge guide and tighten attaching bolt (left side only).
 - 4) Install timing belt, camshaft sprocket and related parts.
- <Ref. to 2-3 [W2C0].>

2. RELATED PARTS**CAUTION:**

Be careful not to scratch the mating surface of cylinder block and oil pump.

- 1) Install engine coolant pipe.
- 2) Install intake manifold. <Ref. to 2-7 [W4D0].>
- 3) Connect blow-by hose.
- 4) Connect oil pressure switch connector.
- 5) Install camshaft position sensor and camshaft position sensor support.
- 6) Install connector bracket attaching bolt.
- 7) Connect spark plug cords.
- 8) Install generator and bracket.
- 9) Install A/C compressor and bracket. (With A/C model)
- 10) Install V-belt(s).

- 11) Remove ENGINE STAND (ST).

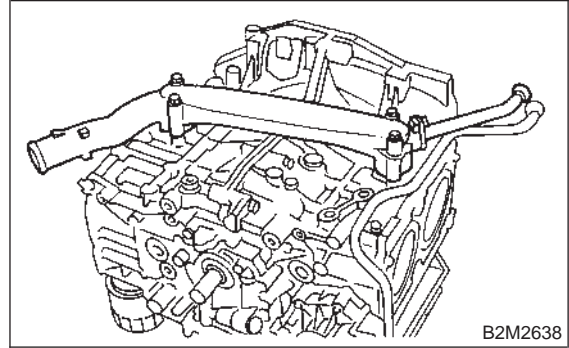
6. Cylinder Block

A: REMOVAL

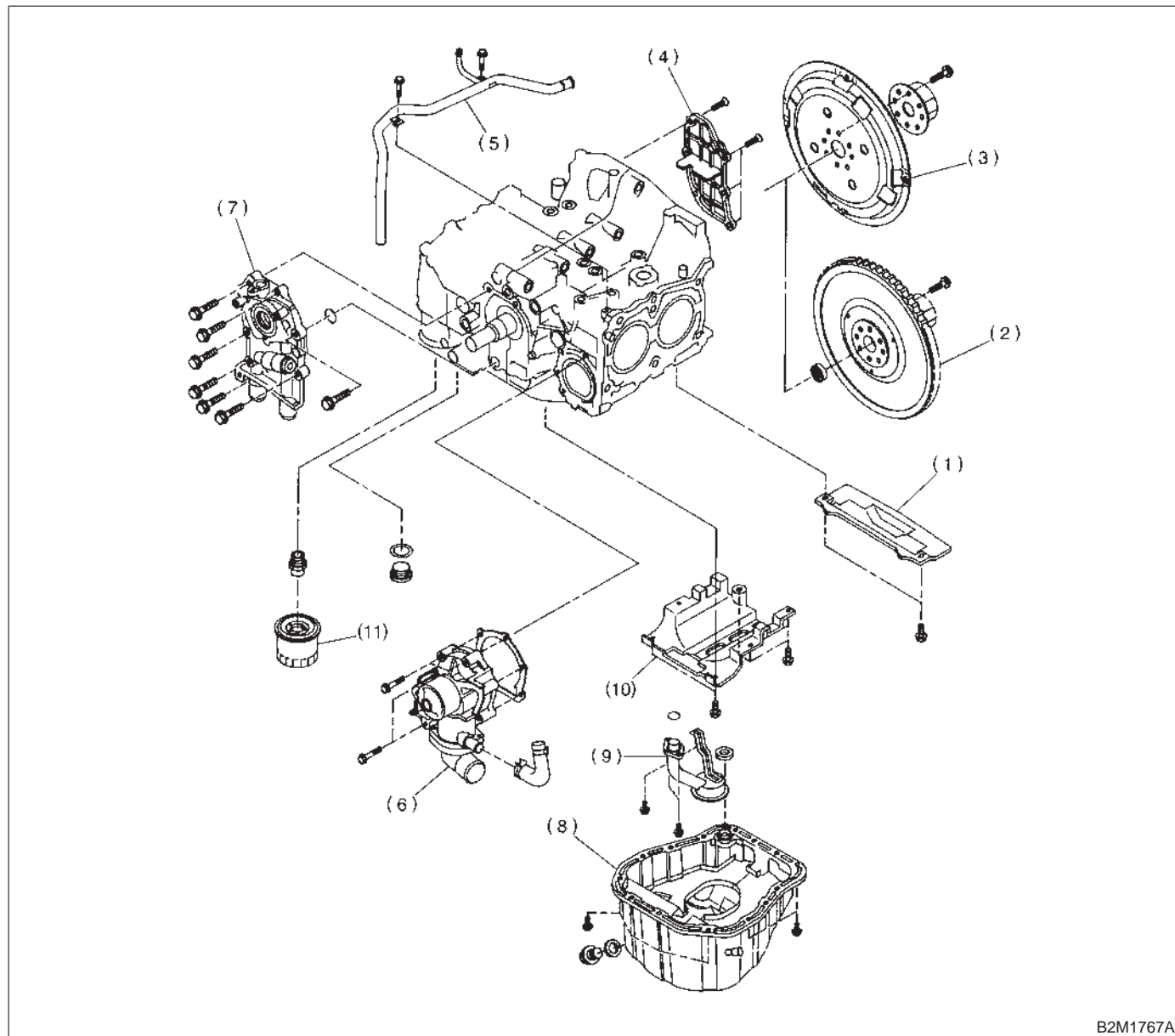
1. RELATED PARTS

- 1) Remove timing belt, camshaft sprockets and related parts.
<Ref. to 2-3 [W2A0].>
- 2) Remove cylinder heads. <Ref. to 2-3 [W5A0].>

- 3) Remove water pipe. <Ref. to 2-5 [W8A0].>



2. OIL PUMP AND WATER PUMP

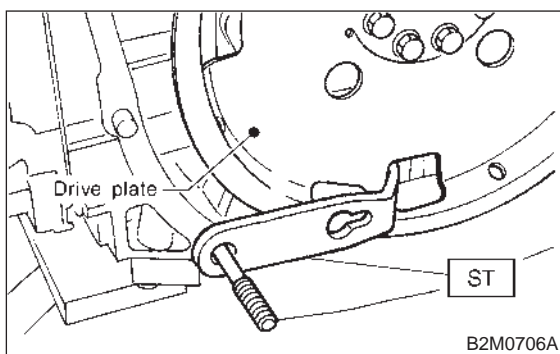
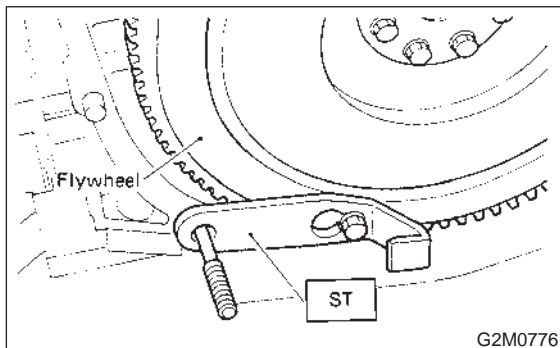


B2M1767A

- | | | |
|---|-------------------------|-------------------|
| (1) Clutch housing cover (MT vehicles only) | (4) Oil separator cover | (8) Oil pan |
| (2) Flywheel (MT vehicles only) | (5) Water by-pass pipe | (9) Oil strainer |
| (3) Drive plate (AT vehicles only) | (6) Water pump | (10) Baffle plate |
| | (7) Oil pump | (11) Oil filter |

1) Remove clutch housing cover (MT vehicles only).

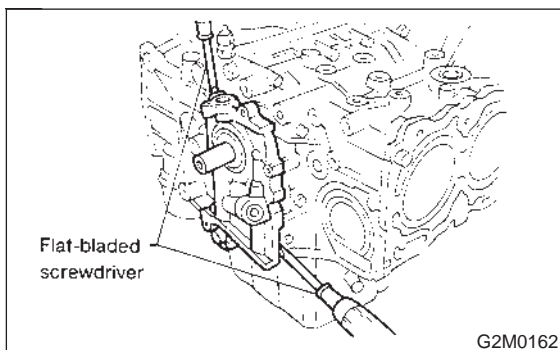
- 2) Remove flywheel (MT vehicles only) or drive plate (AT vehicles only).
Using ST, lock crankshaft.
ST 498497100 CRANKSHAFT STOPPER



- 3) Remove oil separator cover.
- 4) Remove water by-pass pipe for heater.
- 5) Remove water pump.
- 6) Remove oil pump from cylinder block.
Use a flat-bladed screwdriver as shown in figure when removing oil pump.

CAUTION:

Be careful not to scratch the mating surface of cylinder block and oil pump.

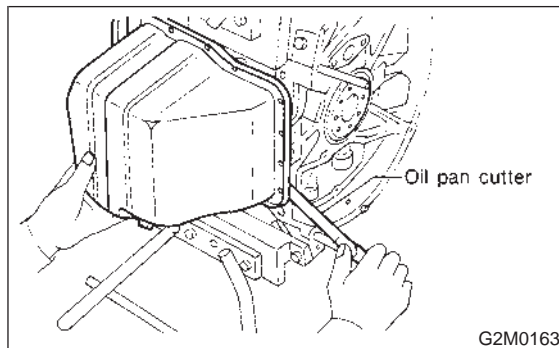


- 7) Removal of oil pan
 - (1) Turn cylinder block with #2 and #4 piston sides facing upward.
 - (2) Remove bolts which secure oil pan to cylinder block.

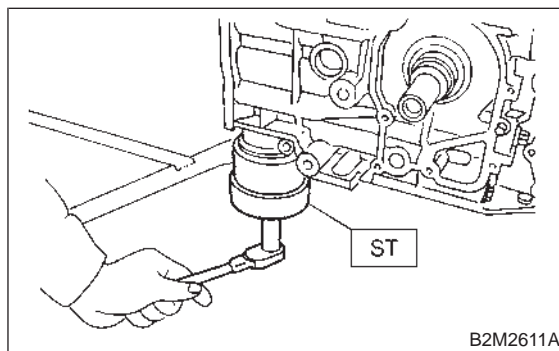
- (3) Insert a oil pan cutter blade between cylinder block-to-oil pan clearance and remove oil pan.

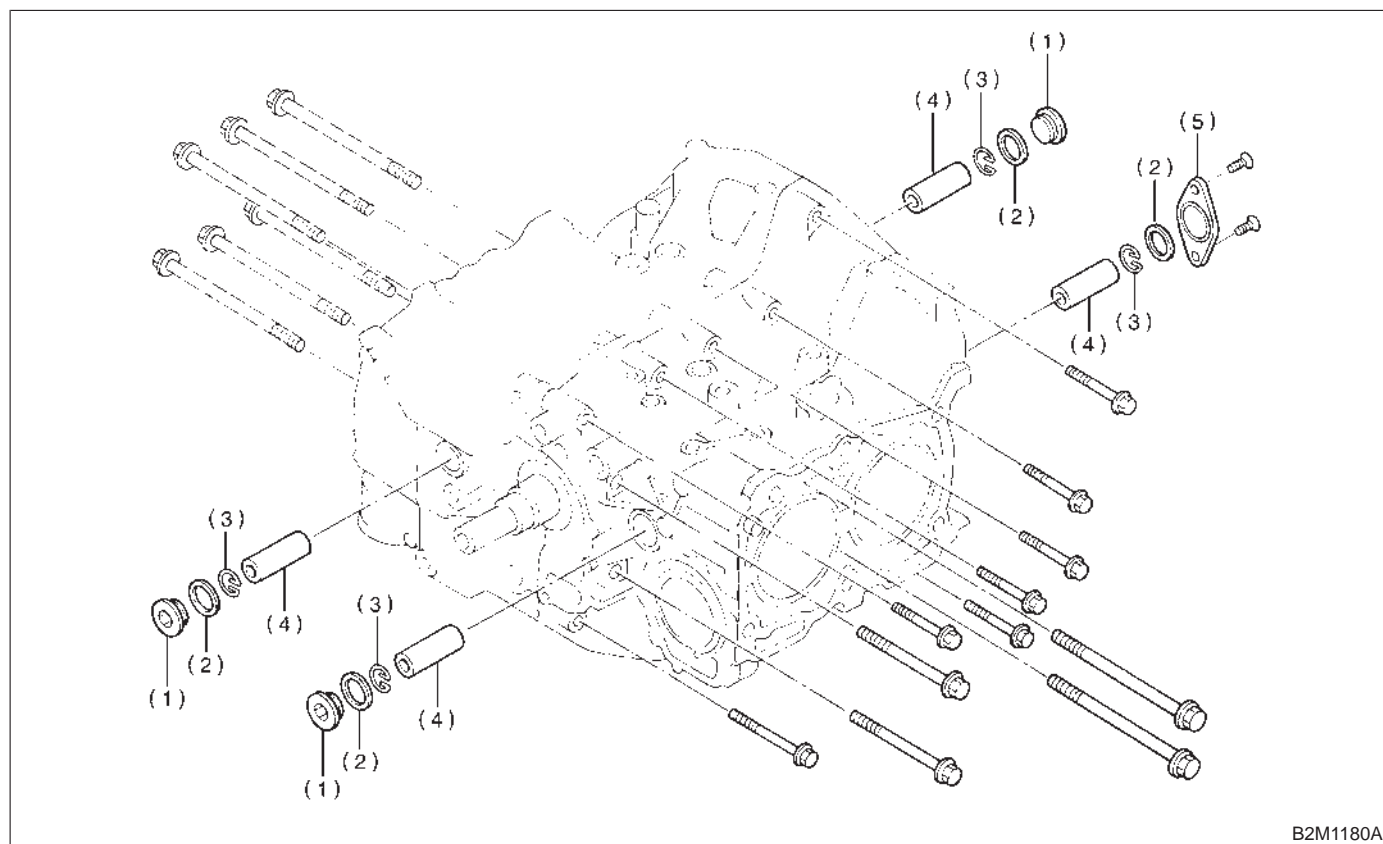
CAUTION:

Do not use a screwdriver or similar tool in place of oil pan cutter.



- 8) Remove oil strainer stay.
- 9) Remove oil strainer.
- 10) Remove baffle plate.
- 11) Remove oil filter using ST.
ST 498187300 OIL FILTER WRENCH



B: DISASSEMBLY**1. PISTON PIN AND CYLINDER BLOCK CONNECTING BOLT**

B2M1180A

(1) Service hole plug

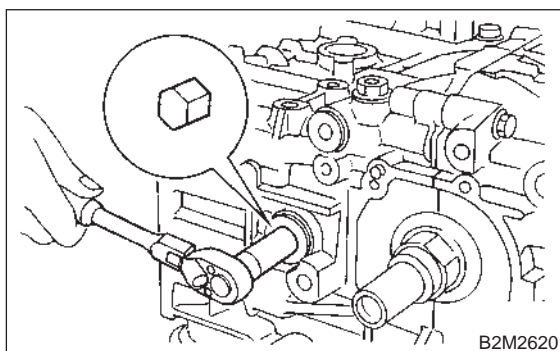
(2) Gasket

(3) Circlip

(4) Piston pin

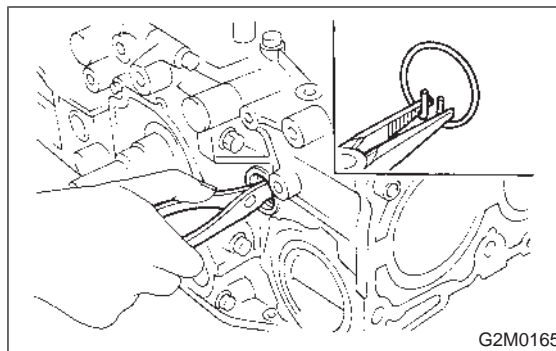
(5) Service hole cover

1) Remove service hole cover and service hole plugs using hexagon wrench [14 mm (0.55 in)].



B2M2620

2) Rotate crankshaft to bring #1 and #2 pistons to bottom dead center position, then remove piston circlip through service hole of #1 and #2 cylinders.



G2M0165

3) Draw out piston pin from #1 and #2 pistons using ST.

ST 499097700 PISTON PIN REMOVER

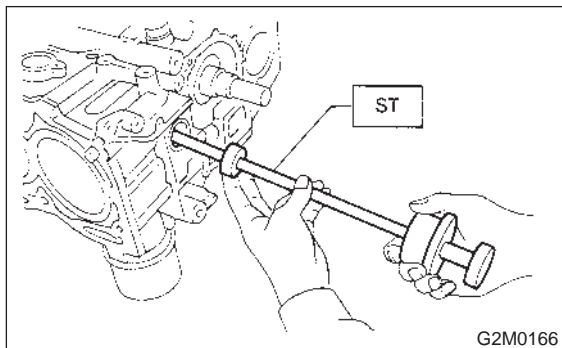
CAUTION:

Be careful not to confuse original combination of piston, piston pin and cylinder.

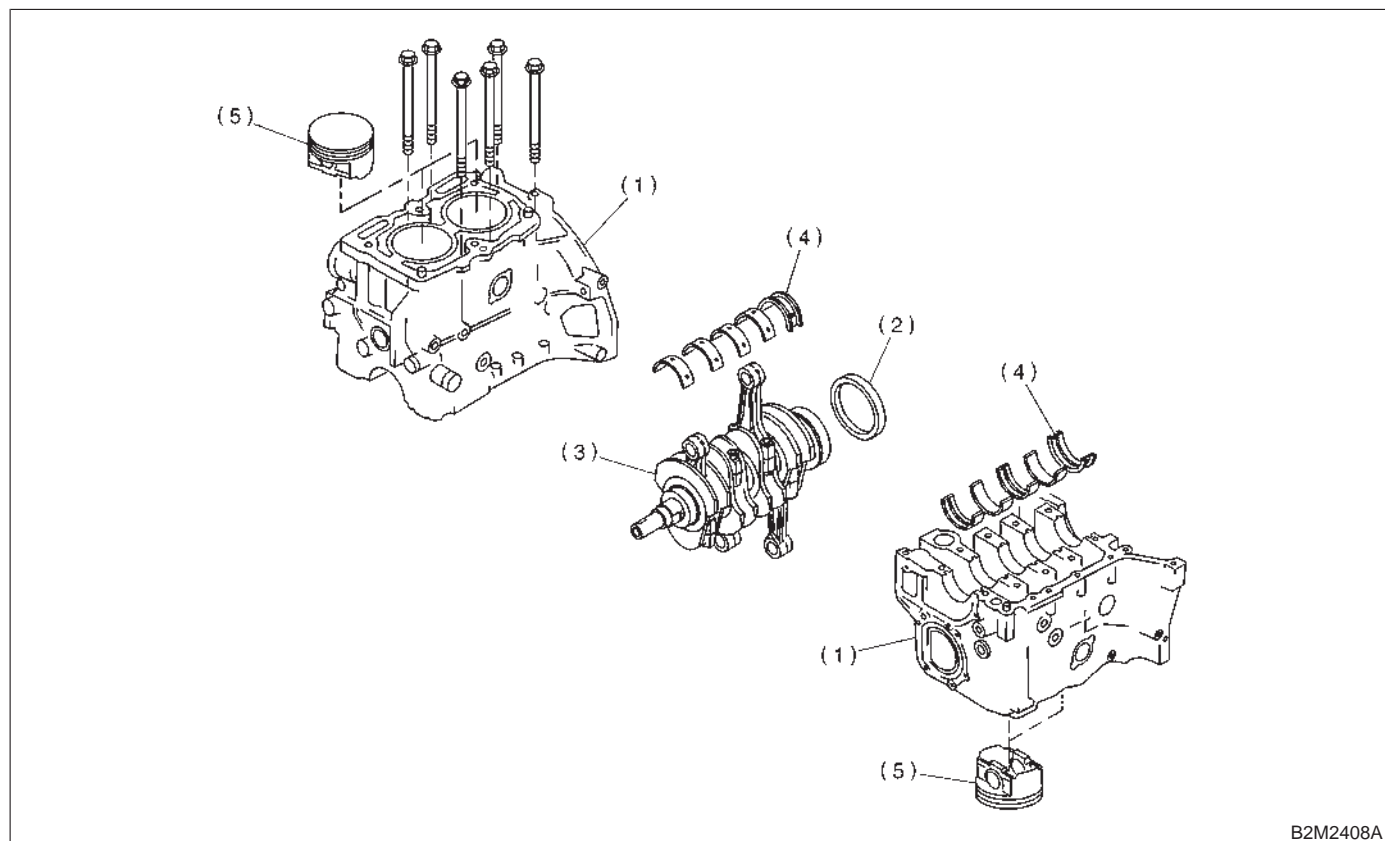
4) Similarly remove piston pins from #3 and #4 pistons.

5) Remove bolts which connect cylinder block on the side of #2 and #4 cylinders.

6) Back off bolts which connect cylinder block on the side of #1 and #3 cylinders two or three turns.



2. CYLINDER BLOCK



(1) Cylinder block

(2) Rear oil seal

(3) Crankshaft

(4) Crankshaft bearing

(5) Piston

1) Set up cylinder block so that #1 and #3 cylinders are on the upper side, then remove cylinder block connecting bolts.

2) Separate left-hand and right-hand cylinder blocks.

CAUTION:

When separating cylinder block, do not allow the connecting rod to fall and damage the cylinder block.

3) Remove rear oil seal.

- 4) Remove crankshaft together with connecting rod.
- 5) Remove crankshaft bearings from cylinder block using hammer handle.

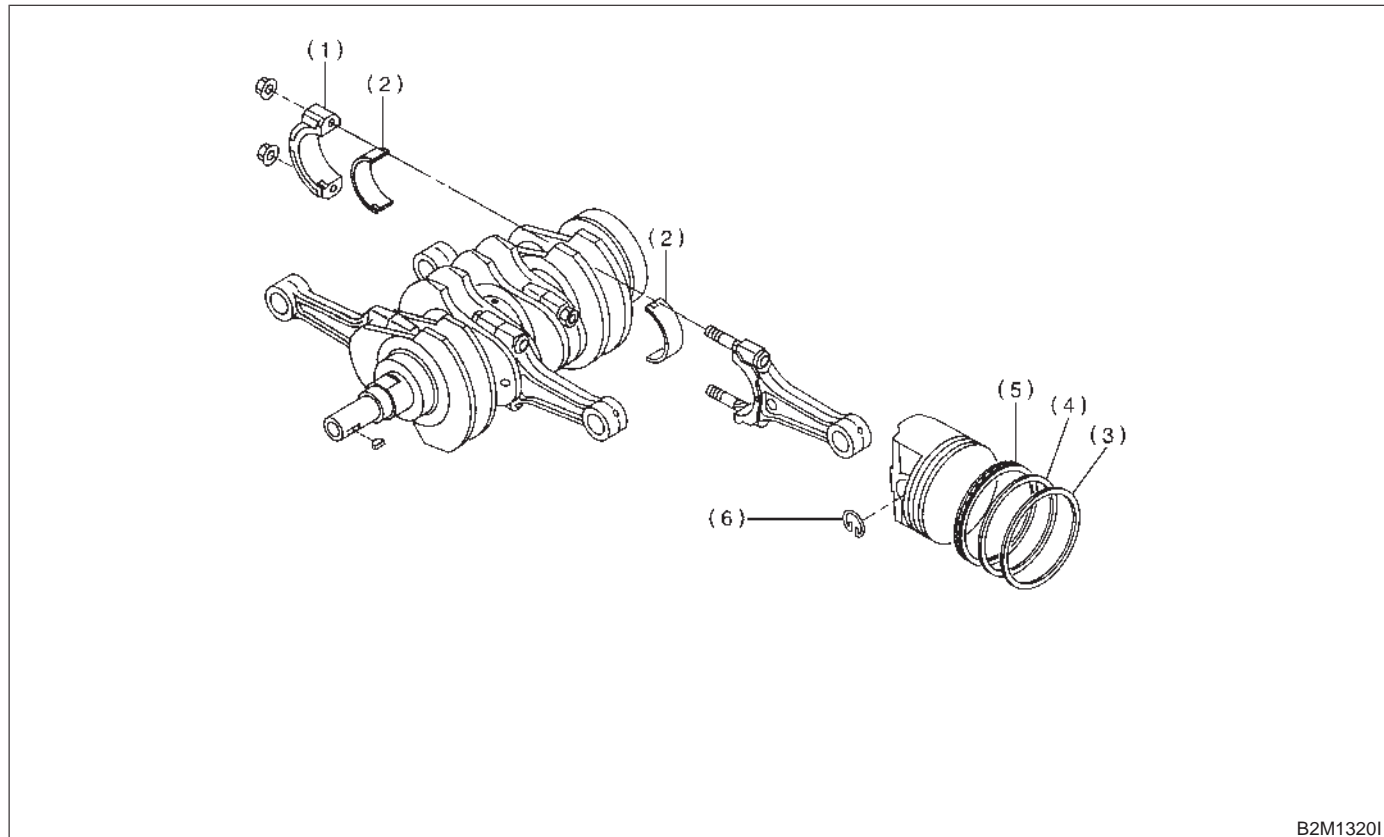
CAUTION:

Do not confuse combination of crankshaft bearings. Press bearing at the end opposite to locking lip.

- 6) Draw out each piston from cylinder block using wooden bar or hammer handle.

CAUTION:

Do not confuse combination of piston and cylinder.

3. CRANKSHAFT AND PISTON

B2M1320I

- (1) Connecting rod cap
- (2) Connecting rod bearing
- (3) Top ring
- (4) Second ring
- (5) Oil ring
- (6) Circlip

- 1) Remove connecting rod cap.
- 2) Remove connecting rod bearing.

CAUTION:

Arrange removed connecting rod, connecting rod cap and bearing in order to prevent confusion.

- 3) Remove piston rings using the piston ring expander.
- 4) Remove the oil ring by hand.

CAUTION:

Arrange the removed piston rings in good order to prevent confusion.

- 5) Remove circlip.

C: INSPECTION**1. CYLINDER BLOCK**

- 1) Visually check for cracks and damage. Especially, inspect important parts by means of red lead check.
- 2) Check the oil passages for clogging.
- 3) Inspect crankcase surface that mates with cylinder head for warping by using a straight edge, and correct by grinding if necessary.

Warping limit:
0.05 mm (0.0020 in)

Grinding limit:
0.1 mm (0.004 in)

Standard height of cylinder block:
201.0 mm (7.91 in)

2. CYLINDER AND PISTON

1) The cylinder bore size is stamped on the cylinder block's front upper surface.

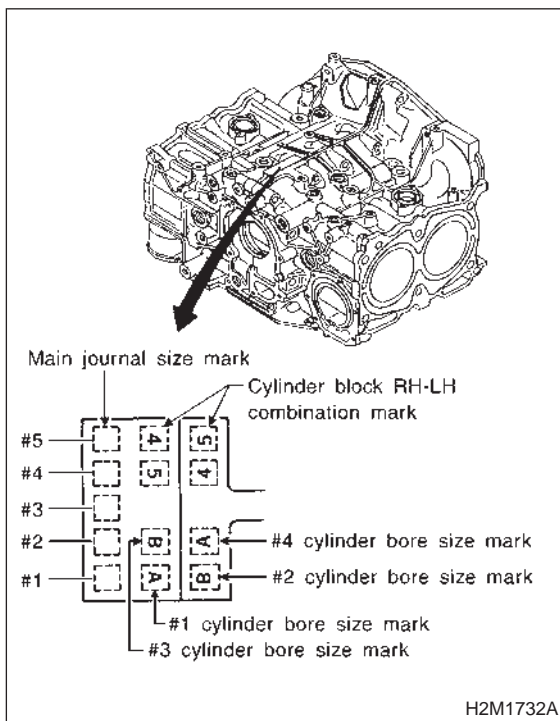
CAUTION:
Measurement should be performed at a temperature 20°C (68°F).

NOTE:

Standard sized pistons are classified into two grades, "A" and "B". These grades should be used as a guide line in selecting a standard piston.

Standard diameter (2200 cc)
A: 96.905 — 96.915 mm (3.8151 — 3.8155 in)
B: 96.895 — 96.905 mm (3.8148 — 3.8151 in)

Standard diameter (2500 cc)
A: 99.505 — 99.515 mm (3.9175 — 3.9179 in)
B: 99.495 — 99.505 mm (3.9171 — 3.9175 in)



2) How to measure the inner diameter of each cylinder

Measure the inner diameter of each cylinder in both the thrust and piston pin directions at the heights shown in the figure, using a cylinder bore gauge.

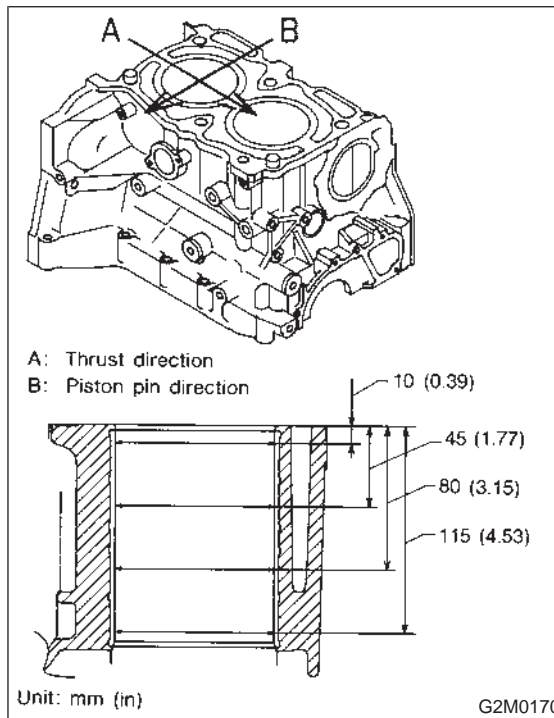
CAUTION:
Measurement should be performed at a temperature 20°C (68°F).

Taper:

Standard
0.015 mm (0.0006 in)
Limit
0.050 mm (0.0020 in)

Out-of-roundness:

Standard
0.010 mm (0.0004 in)
Limit
0.050 mm (0.0020 in)



3) When piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.

4) How to measure the outer diameter of each piston

Measure the outer diameter of each piston at the height shown in the figure. (Thrust direction)

CAUTION:

Measurement should be performed at a temperature of 20°C (68°F).

Piston grade point H:

2200 cc: 40.0 mm (1.575 in)

2500 cc: 37.0 mm (1.457 in)

Piston outer diameter:

2200 cc:

Standard

A: 96.885 — 96.895 mm (3.8144 — 3.8148 in)

B: 96.875 — 96.885 mm (3.8140 — 3.8144 in)

0.25 mm (0.0098 in) oversize

97.125 — 97.135 mm (3.8238 — 3.8242 in)

0.50 mm (0.0197 in) oversize

97.375 — 97.385 mm (3.8337 — 3.8340 in)

2500 cc:

Standard

A: 99.485 — 99.495 mm (3.9167 — 3.9171 in)

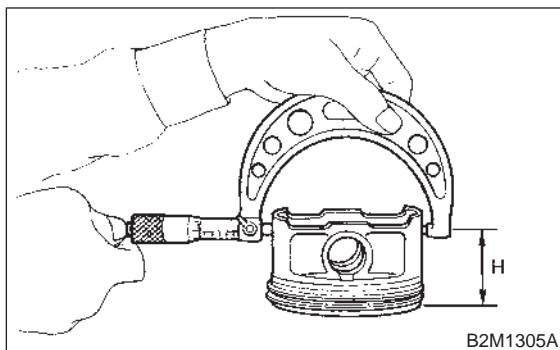
B: 99.475 — 99.485 mm (3.9163 — 3.9167 in)

0.25 mm (0.0098 in) oversize

99.725 — 99.735 mm (3.9262 — 3.9266 in)

0.50 mm (0.0197 in) oversize

99.975 — 99.985 mm (3.9360 — 3.9364 in)



5) Calculate the clearance between cylinder and piston.

CAUTION:

Measurement should be performed at a temperature of 20°C (68°F).

Cylinder to piston clearance at 20°C (68°F):

Standard

0.010 — 0.030 mm (0.0004 — 0.0012 in)

Limit

0.050 mm (0.0020 in)

6) Boring and honing

(1) If the value of taper, out-of-roundness, or cylinder- to-piston clearance measured exceeds the specified limit or if there is any damage on the cylinder wall, rebore it to use an oversize piston.

CAUTION:

When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only, nor use an oversize piston for one cylinder only.

(2) If the cylinder inner diameter exceeds the limit after boring and honing, replace the crankcase.

CAUTION:

Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

Limit of cylinder enlarging (boring):

0.5 mm (0.020 in)

3. PISTON AND PISTON PIN

1) Check pistons and piston pins for damage, cracks, and wear and the piston ring grooves for wear and damage. Replace if defective.

2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to 2-3 [W6C2].> If any of the clearances is not to specification, replace the piston or bore the cylinder to use an oversize piston.

3) Make sure that piston pin can be inserted into the piston pin hole with a thumb at 20°C (68°F). Replace if defective.

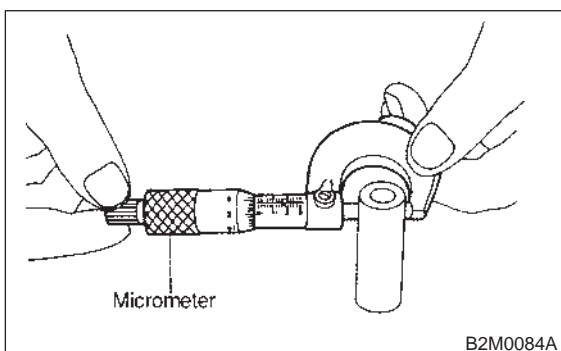
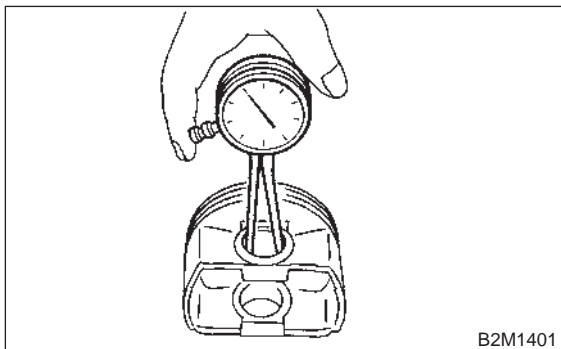
Standard clearance between piston pin and hole in piston:

Standard

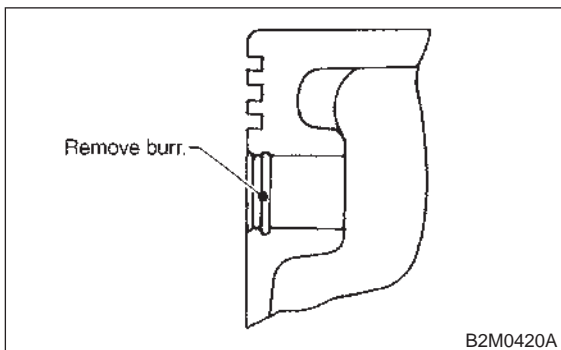
0.004 — 0.008 mm (0.0002 — 0.0003 in)

Limit

0.020 mm (0.0008 in)



4) Check circlip installation groove on the piston for burr. If necessary, remove burr from the groove so that piston pin can lightly move.



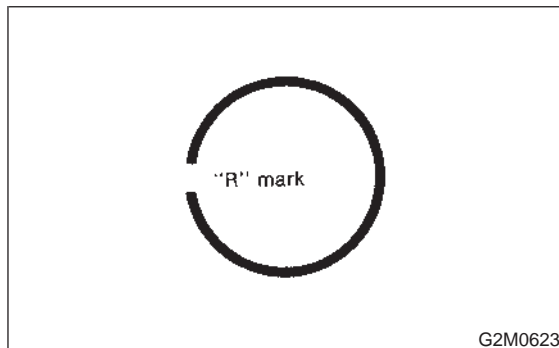
5) Check piston pin circlip for distortion, cracks and wear.

4. PISTON RING

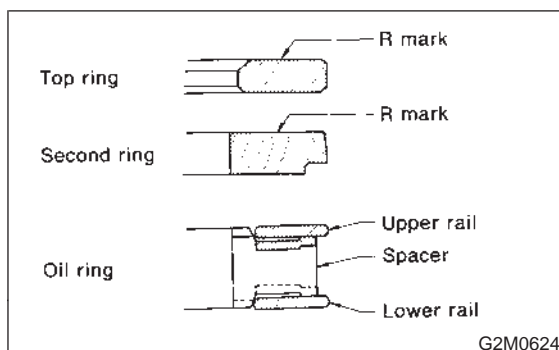
1) If piston ring is broken, damaged, or worn, or if its tension is insufficient, or when the piston is replaced, replace piston ring with a new one of the same size as the piston.

CAUTION:

● “R” is marked on the end of the top and second rings. When installing the rings to the piston, face this mark upward.

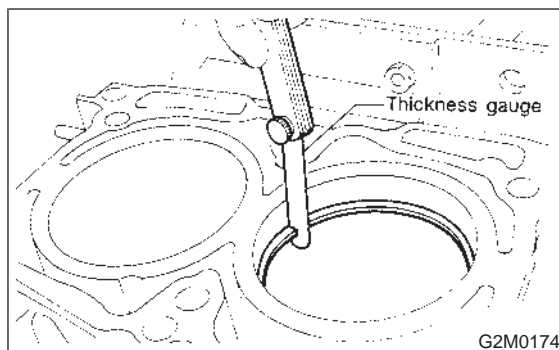


● The oil ring is a combined ring consisting of two rails and a spacer in between. When installing, be careful to assemble correctly.



2) Squarely place piston ring and oil ring in cylinder, and measure the piston ring gap with a thickness gauge.

		Unit: mm (in)	
		Standard	Limit
Piston ring gap	Top ring	0.20 — 0.35 (0.0079 — 0.0138)	1.0 (0.039)
	Second ring	0.37 — 0.52 (0.0146 — 0.0205)	1.0 (0.039)
	Oil ring rail	0.20 — 0.50 (0.0079 — 0.0197)	1.0 (0.039)

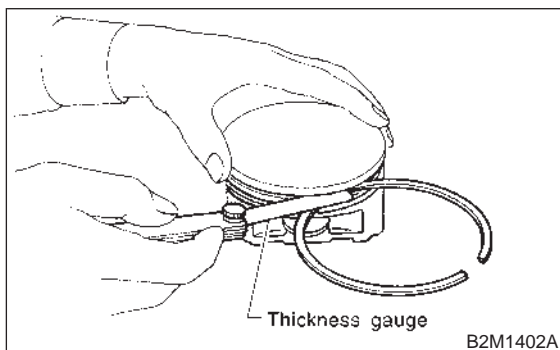


- 3) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

CAUTION:

Before measuring the clearance, clean the piston ring groove and piston ring.

		Unit: mm (in)	
		Standard	Limit
Clearance between piston ring and piston ring groove	Top ring	0.040 — 0.080 (0.0016 — 0.0031)	0.15 (0.0059)
	Second ring	0.030 — 0.070 (0.0012 — 0.0028)	0.15 (0.0059)

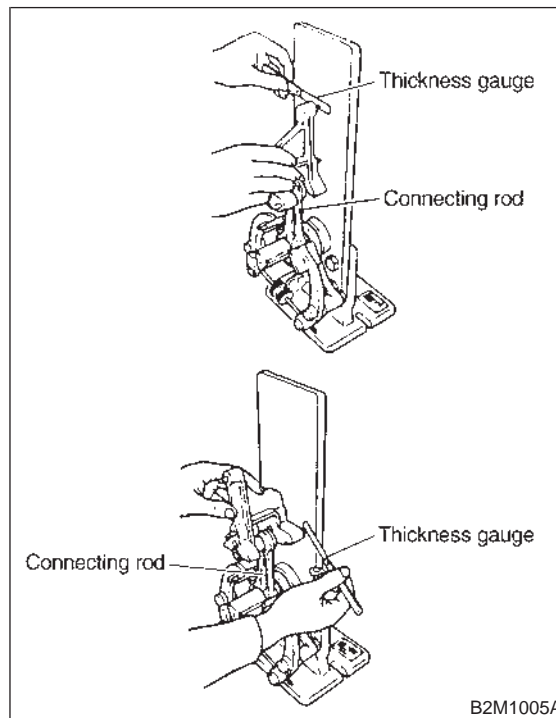
**5. CONNECTING ROD**

- 1) Replace connecting rod, if the large or small end thrust surface is damaged.

- 2) Check for bend or twist using a connecting rod aligner. Replace connecting rod if the bend or twist exceeds the limit.

Limit of bend or twist per 100 mm (3.94 in) in length:

0.10 mm (0.0039 in)



- 3) Install connecting rod fitted with bearing to crankshaft and measure the side clearance (thrust clearance). Replace connecting rod if the side clearance exceeds the specified limit.

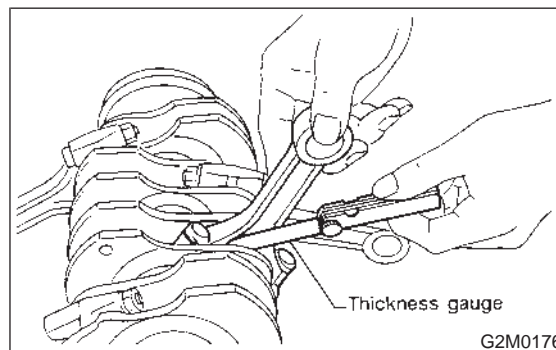
Connecting rod side clearance:

Standard

0.070 — 0.330 mm (0.0028 — 0.0130 in)

Limit

0.4 mm (0.016 in)



- 4) Inspect connecting rod bearing for scar, peeling, seizure, melting, wear, etc.

5) Measure the oil clearance on individual connecting rod bearings by means of plastigauge. If any oil clearance is not within specification, replace the defective bearing with a new one of standard size or undersize as necessary. (See the table below.)

Connecting rod oil clearance:

● **2200 cc**

Standard

0.010 — 0.038 mm (0.0004 — 0.0015 in)

Limit

0.05 mm (0.0020 in)

Unit: mm (in)		
Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.492 — 1.501 (0.0587 — 0.0591)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.510 — 1.513 (0.0594 — 0.0596)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.520 — 1.523 (0.0598 — 0.0600)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 (0.0098) undersize	1.620 — 1.623 (0.0638 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

Connecting rod oil clearance:

● **2500 cc**

Standard

0.020 — 0.046 mm (0.0008 — 0.0018 in)

Limit

0.050 mm (0.0020 in)

Unit: mm (in)		
Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.486 — 1.498 (0.0585 — 0.0590)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.504 — 1.512 (0.0592 — 0.0595)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.514 — 1.522 (0.0596 — 0.0599)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 (0.0098) undersize	1.614 — 1.622 (0.0635 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

6) Inspect bushing at connecting rod small end, and replace if worn or damaged. Also measure the piston pin clearance at the connecting rod small end.

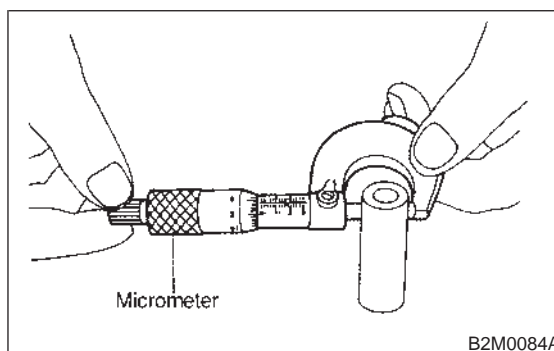
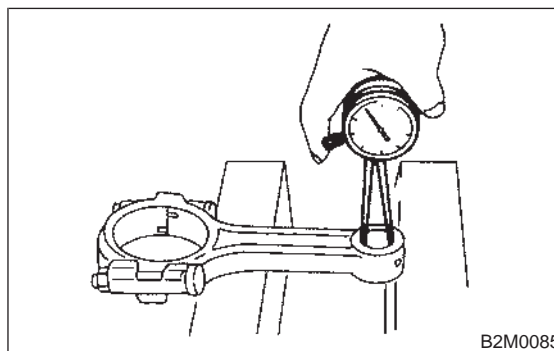
Clearance between piston pin and bushing:

Standard

0 — 0.022 mm (0 — 0.0009 in)

Limit

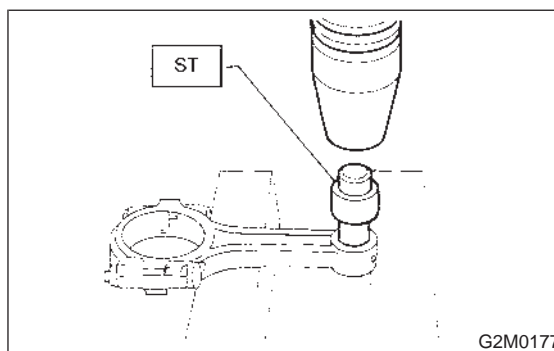
0.030 mm (0.0012 in)



7) Replacement procedure is as follows.

- (1) Remove bushing from connecting rod with ST and press.
- (2) Press bushing with ST after applying oil on the periphery of bushing.

ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



(3) Make two 3 mm (0.12 in) holes in bushing. Ream the inside of bushing.

(4) After completion of reaming, clean bushing to remove chips.

6. CRANKSHAFT AND CRANKSHAFT BEARING

1) Clean crankshaft completely and check for cracks by means of red lead check etc., and replace if defective.

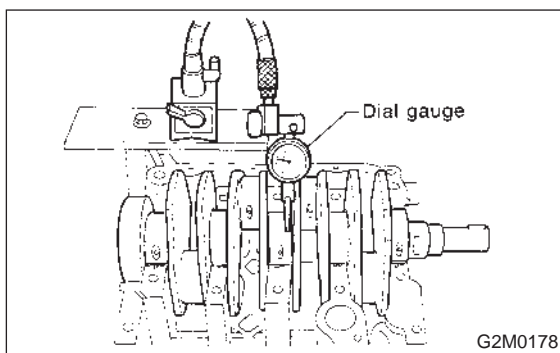
2) Measure the crankshaft bend, and correct or replace if it exceeds the limit.

CAUTION:

If a suitable V-block is not available, install #1 and #5 crankshaft bearing on cylinder block, position crankshaft on these bearings and measure crankshaft bend using a dial gauge.

Crankshaft bend limit:

0.035 mm (0.0014 in)



3) Inspect the crank journal and crank pin for wear. If not to specifications, replace bearing with an undersize one, and replace or recondition crankshaft as necessary. When grinding crank journal or crank pin, finish them to the specified dimensions according to the undersize bearing to be used.

Crank pin and crank journal:

Out-of-roundness

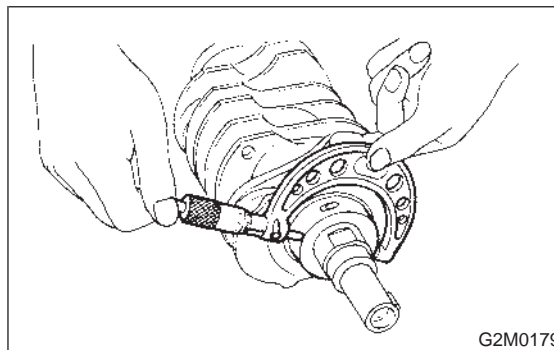
0.030 mm (0.0012 in) or less

Taper limit

0.07 mm (0.0028 in)

Grinding limit

0.250 mm (0.0098 in)



Unit: mm (in)				
		Crank journal diameter		Crank pin diameter
		#1, #3	#2, #4, #5	
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	1.492 — 1.501 (0.0587 — 0.0591)
0.03 (0.0012) undersize	Journal O.D.	59.962 — 59.978 (2.3607 — 2.3613)	59.962 — 59.978 (2.3607 — 2.3613)	51.954 — 51.970 (2.0454 — 2.0461)
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.022 (0.0795 — 0.0796)	1.510 — 1.513 (0.0594 — 0.0596)
0.05 (0.0020) undersize	Journal O.D.	59.942 — 59.958 (2.3599 — 2.3605)	59.942 — 59.958 (2.3599 — 2.3605)	51.934 — 51.950 (2.0446 — 2.0453)
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)	1.520 — 1.523 (0.0598 — 0.0600)
0.25 (0.0098) undersize	Journal O.D.	59.742 — 59.758 (2.3520 — 2.3527)	59.742 — 59.758 (2.3520 — 2.3527)	51.734 — 51.750 (2.0368 — 2.0374)
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)	1.620 — 1.623 (0.0638 — 0.0639)

O.D. ... Outer Diameter

4) Measure the thrust clearance of crankshaft at center bearing. If the clearance exceeds the limit, replace bearing.

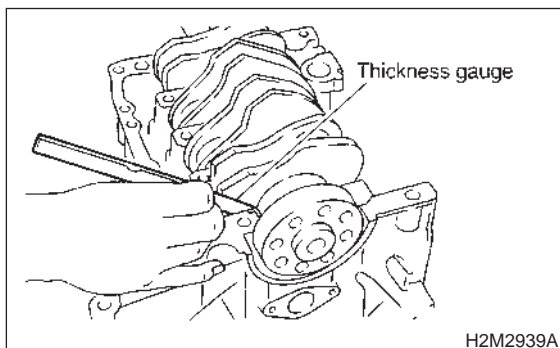
Crankshaft thrust clearance:

Standard

0.030 — 0.115 mm (0.0012 — 0.0045 in)

Limit

0.25 mm (0.0098 in)



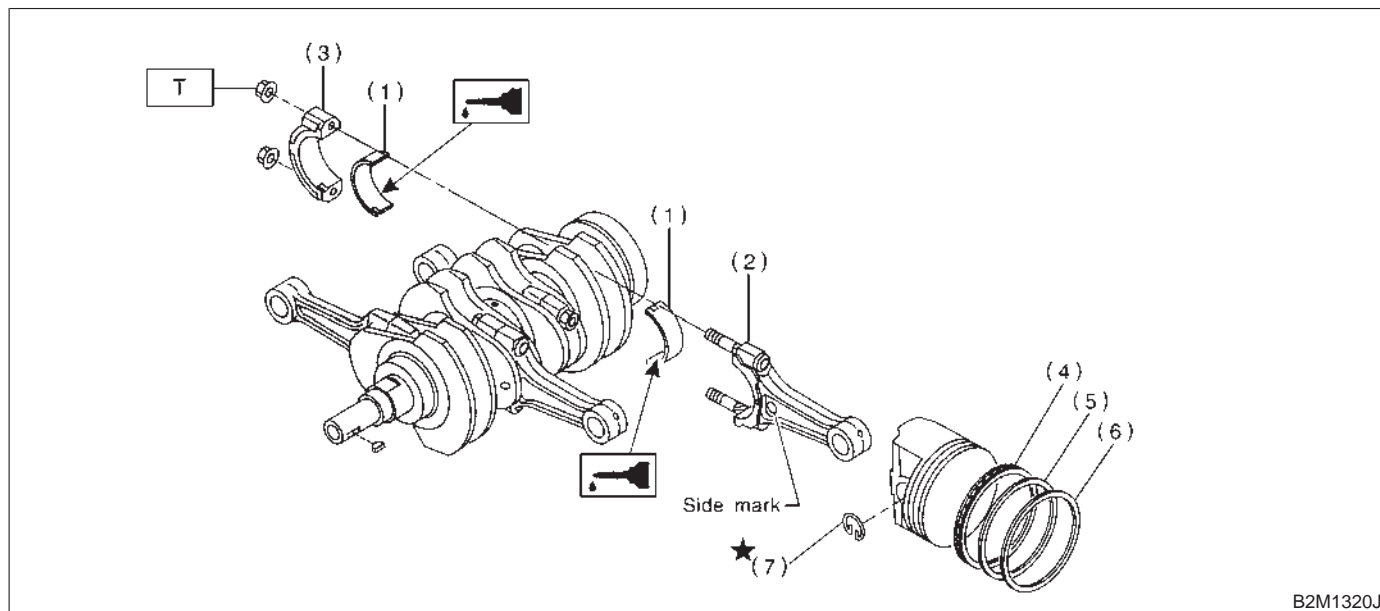
5) Inspect individual crankshaft bearings for signs of flaking, seizure, melting, and wear.

6) Measure the oil clearance on each crankshaft bearing by means of plastigauge. If the measurement is not within the specification, replace defective bearing with an undersize one, and replace or recondition crankshaft as necessary.

Unit: mm (in)	
Crankshaft oil clearance	
Standard	0.010 — 0.030 (0.0004 — 0.0012)
Limit	0.040 (0.0016)

D: ASSEMBLY

1. CRANKSHAFT AND PISTON



- (1) Connecting rod bearing
- (2) Connecting rod
- (3) Connecting rod cap
- (4) Oil ring

- (5) Second ring
- (6) Top ring
- (7) Circlip

Tightening torque: N·m (kg·m, ft·lb)
T: 44±2 (4.5±0.2, 32.5±1.4)

1) Install connecting rod bearings on connecting rods and connecting rod caps.

CAUTION:

Apply oil to the surfaces of the connecting rod bearings.

2) Install connecting rod on crankshaft.

CAUTION:

Position each connecting rod with the side marked facing forward.

3) Install connecting rod cap with connecting rod nut.

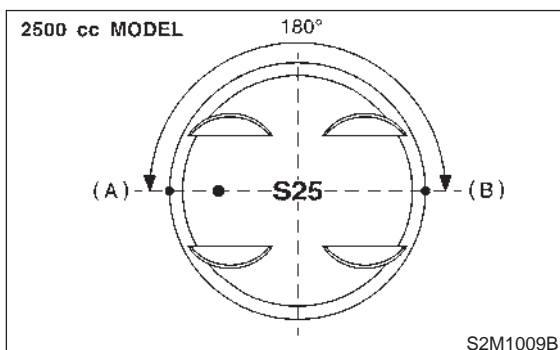
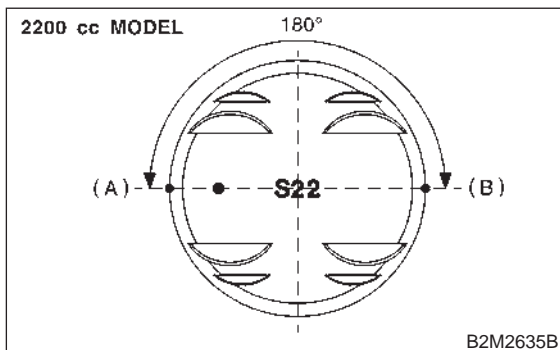
Ensure the arrow on connecting rod cap faces the front during installation.

CAUTION:

- Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.
- When tightening the connecting rod nuts, apply oil on the threads.

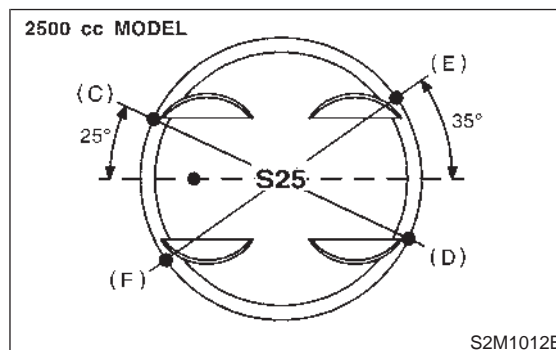
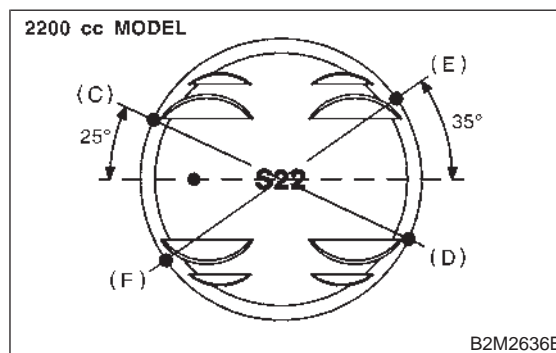
4) Installation of piston rings and oil ring

- (1) Install oil ring spacer, upper rail and lower rail in this order by hand. Then install second ring and top ring with a piston ring expander.
- (2) Position the top ring gap at (A) or (B) in the figure.



- (3) Position the second ring gap at 180° on the reverse side for the top ring gap.

- (4) Position the upper rail gap at (C) or (D) in the figure.

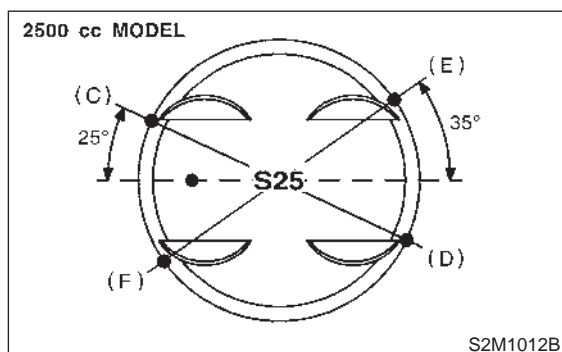
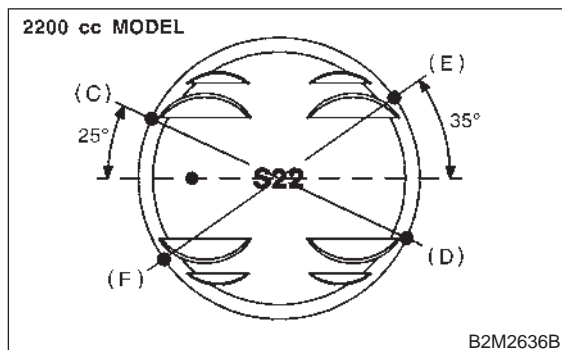


- (5) Position the expander gap at 180° of the reverse side for the upper rail gap.

(6) Position the lower rail gap at (E) or (F) in the figure.

CAUTION:

- Ensure ring gaps do not face the same direction.
- Ensure ring gaps are not within the piston skirt area.

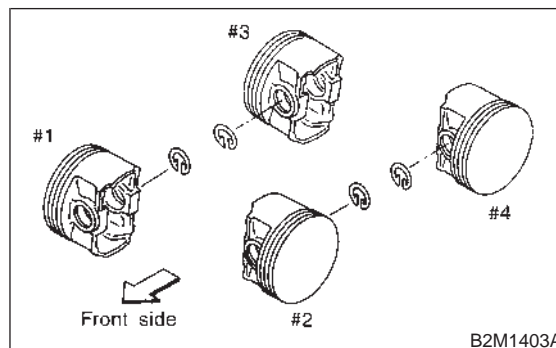


5) Install circlip.

Install circlips in piston holes located opposite service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

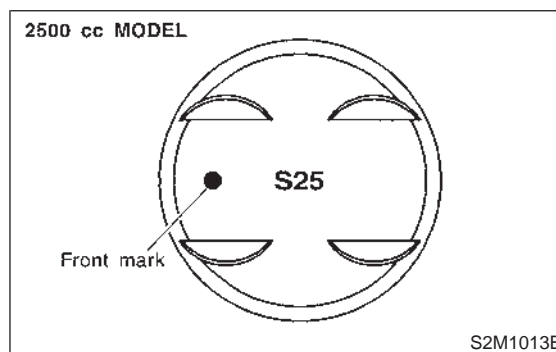
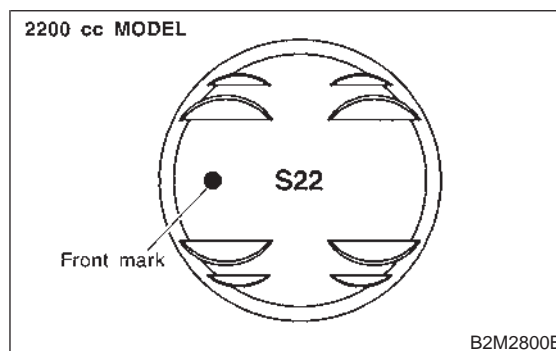
CAUTION:

Use new circlips.

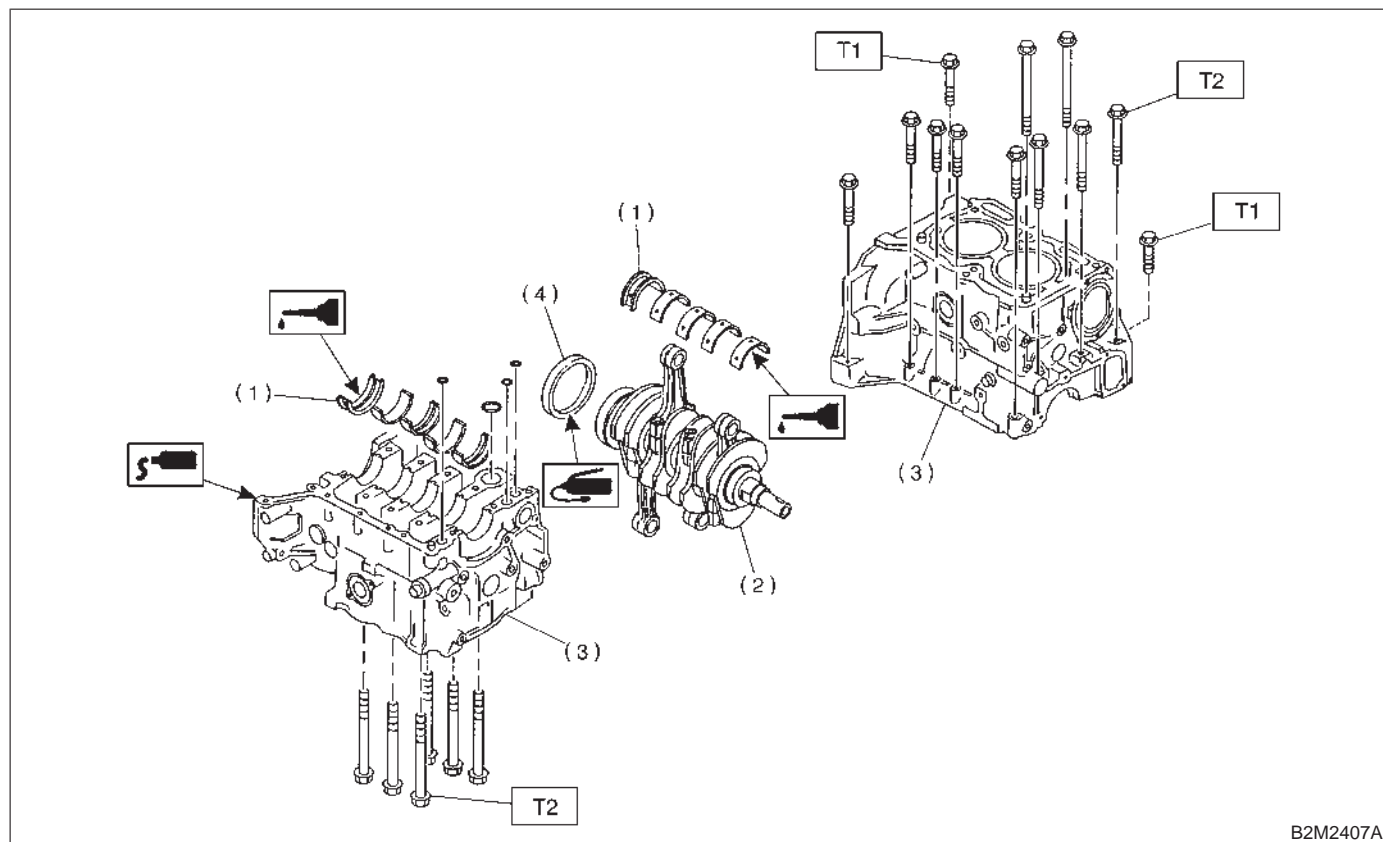


CAUTION:

Piston front mark faces towards the front of the engine.



2. CYLINDER BLOCK



B2M2407A

- (1) Crankshaft bearing
 (2) Crankshaft
 (3) Cylinder block
 (4) Rear oil seal

Tightening torque: N·m (kg·m, ft·lb)
T1: 25±2 (2.5±0.2, 18.1±1.4)
T2: 47±3 (4.8±0.3, 34.7±2.2)

1) Install ST to cylinder block, then install crankshaft bearings.

ST 499817000 ENGINE STAND

CAUTION:

Remove oil in the mating surface of bearing and cylinder block before installation. Also apply a coat of engine oil to crankshaft pins.

2) Position crankshaft on the #2 and #4 cylinder block.

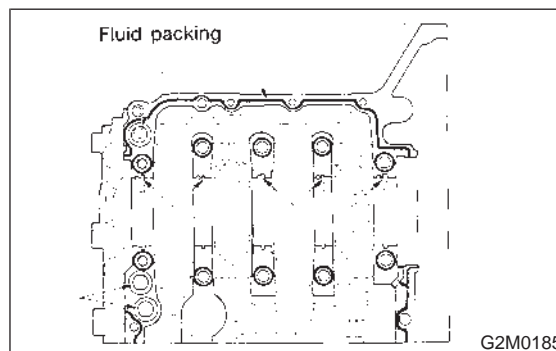
3) Apply fluid packing to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

Fluid packing:

THREE BOND 1215 or equivalent

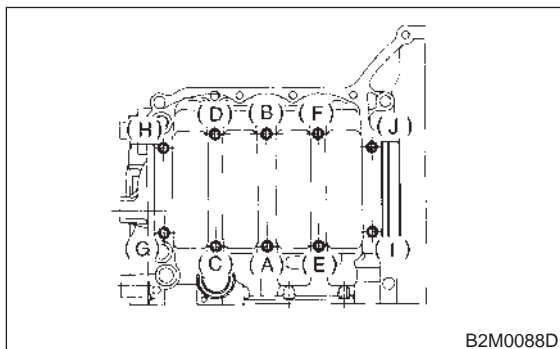
CAUTION:

Do not allow fluid packing to jut into O-ring grooves, oil passages, bearing grooves, etc.

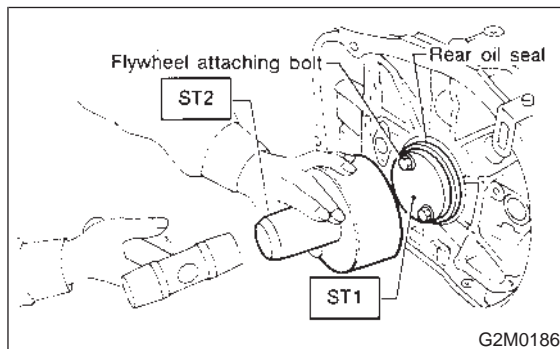


G2M0185

4) Temporarily tighten 10 mm cylinder block connecting bolts in alphabetical sequence shown in figure.



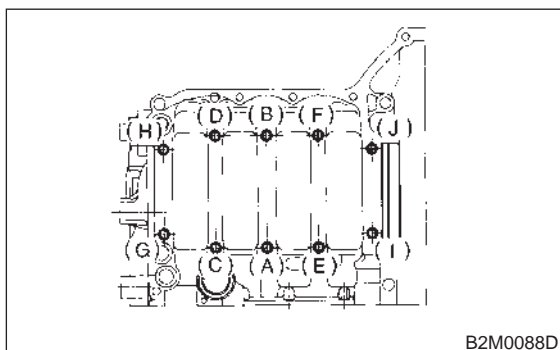
7) Install rear oil seal using ST1 and ST2.
ST1 499597100 OIL SEAL GUIDE
ST2 499587200 OIL SEAL INSTALLER



5) Tighten 10 mm cylinder block connecting bolts in alphabetical sequence.

Tightening torque:

47 ± 3 N·m (4.8 ± 0.3 kg·m, 34.7 ± 2.2 ft·lb)

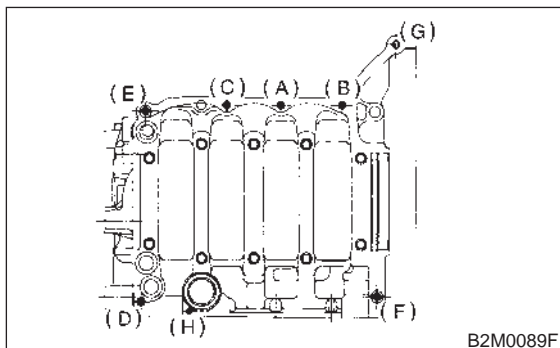


6) Tighten 8 mm and 6 mm cylinder block connecting bolts in alphabetical sequence shown in figure.

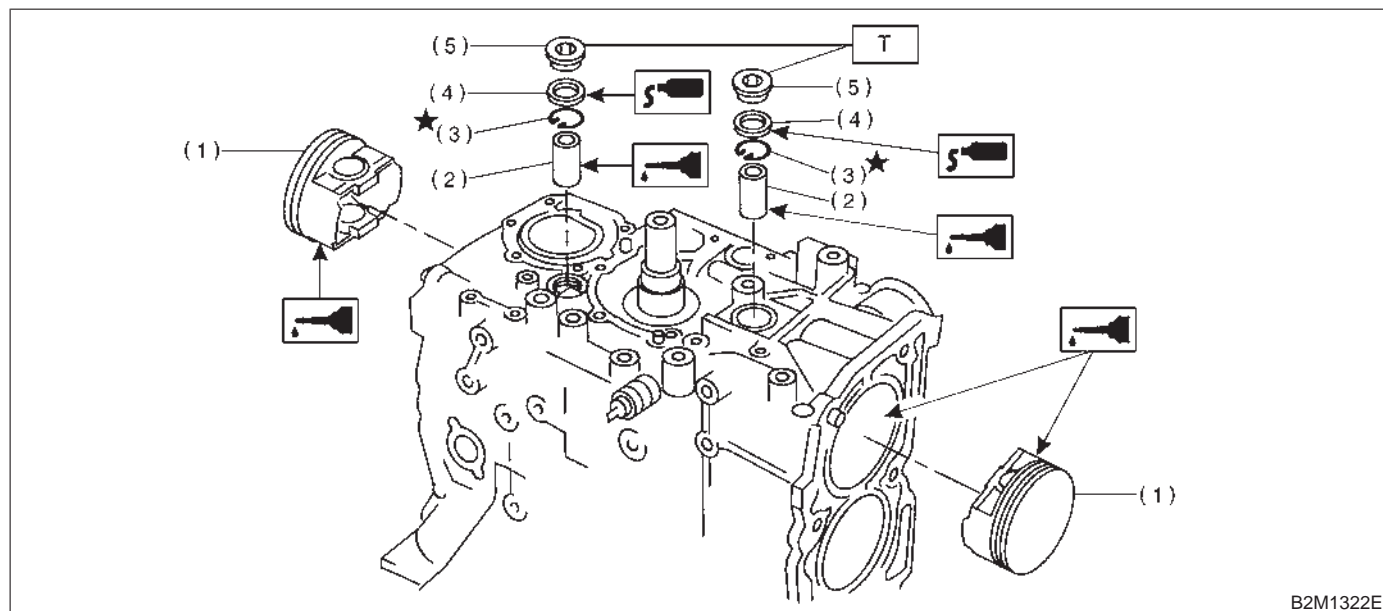
Tightening torque:

(A) — (G): 25 ± 2 N·m (2.5 ± 0.2 kg·m, 18.1 ± 1.4 ft·lb)

(H): 6.4 N·m (0.65 kg·m, 4.7 ft·lb)



3. PISTON AND PISTON PIN (#1 AND #2)



B2M1322E

- | | |
|----------------|-----------------------|
| (1) Piston | (4) Gasket |
| (2) Piston pin | (5) Service hole plug |
| (3) Circlip | |

Tightening torque: N·m (kg·m, ft·lb)

T: 69±7 (7.0±0.7, 50.6±5.1)

1) Installing piston

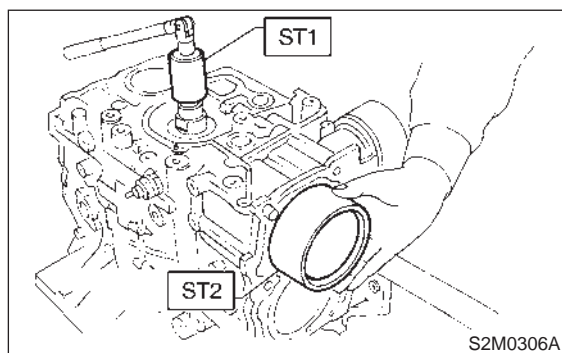
(1) Turn cylinder block so that #1 and #2 cylinders face upward.

(2) Using ST1, turn crankshaft so that #1 and #2 connecting rods are set at bottom dead center.

ST1 499987500 CRANKSHAFT SOCKET

(3) Apply a coat of engine oil to pistons and cylinders and insert pistons in their cylinders using ST2.

ST2 498747100 PISTON GUIDE



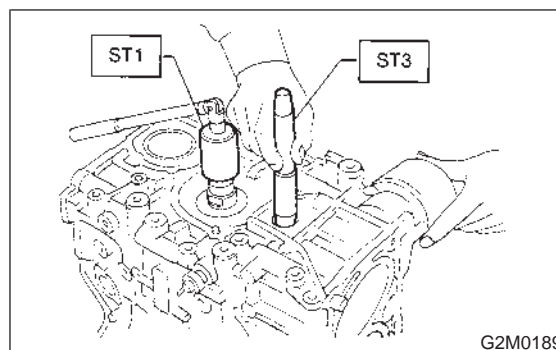
2) Installing piston pin

(1) Insert ST3 into service hole to align piston pin hole with connecting rod small end.

CAUTION:

Apply a coat of engine oil to ST3 before insertion.

ST3 499017100 PISTON PIN GUIDE

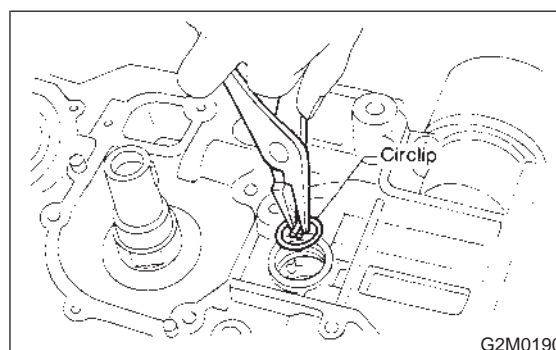


(2) Apply a coat of engine oil to piston pin and insert piston pin into piston and connecting rod through service hole.

(3) Install circlip.

CAUTION:

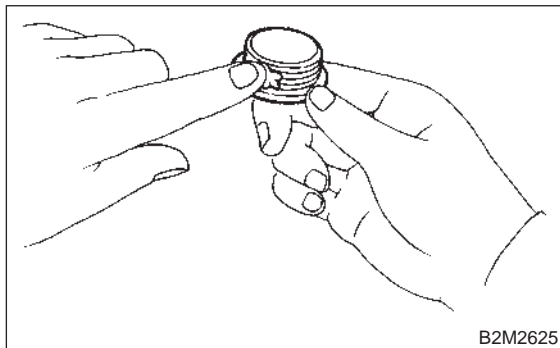
Use new circlips.



- (4) Apply fluid packing around the service hole plug.

Fluid packing:

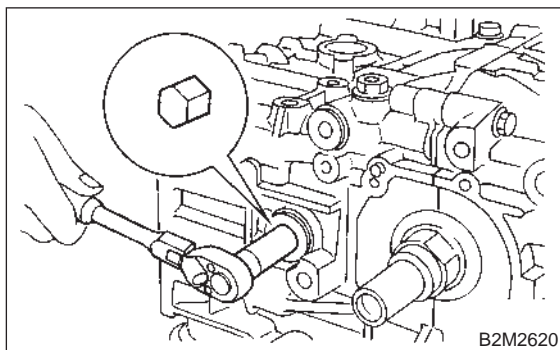
THREE BOND 1215 or equivalent



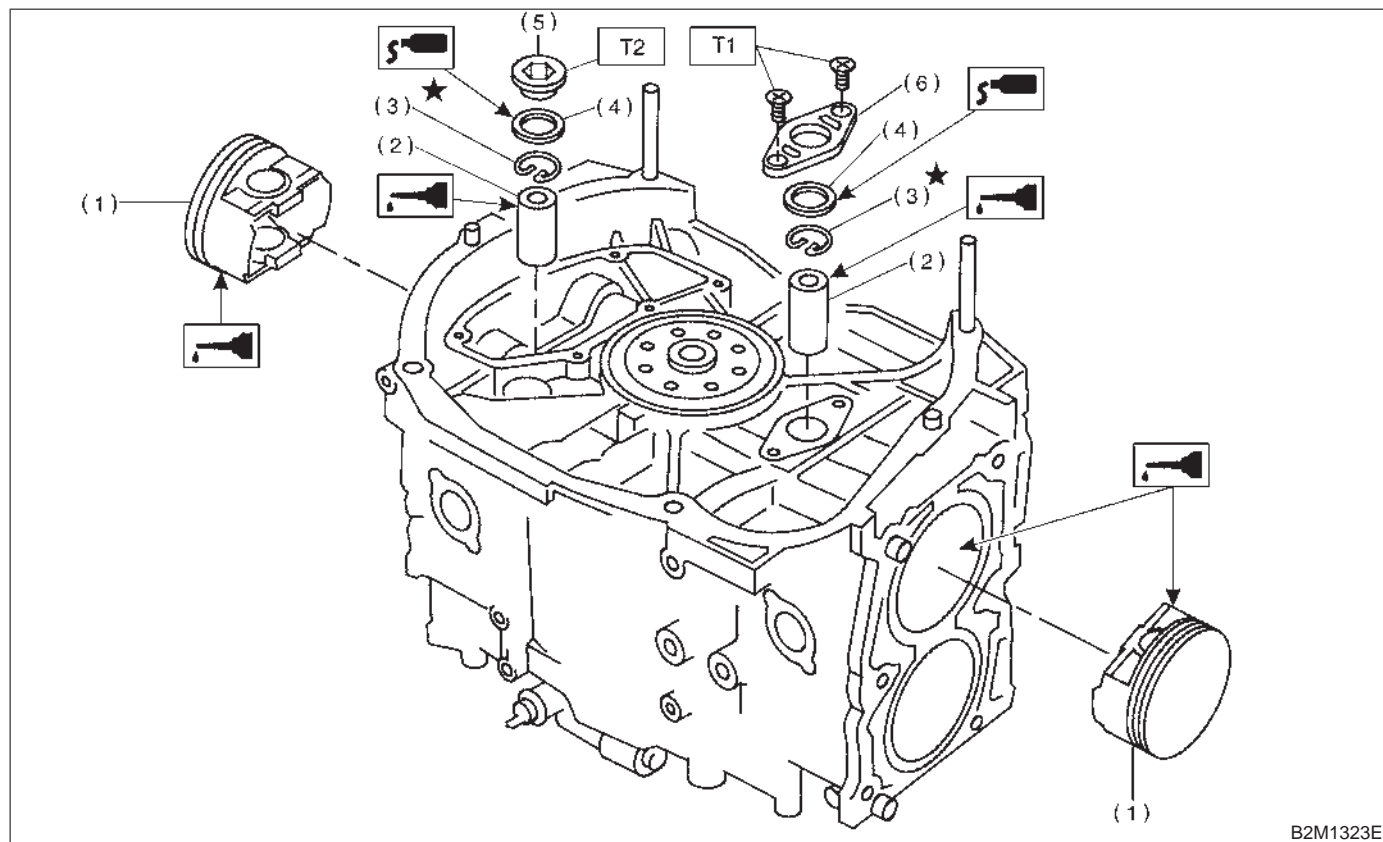
- (5) Install service hole plug and gasket.

CAUTION:

Use a new gasket.



4. PISTON AND PISTON PIN (#3 AND #4)



B2M1323E

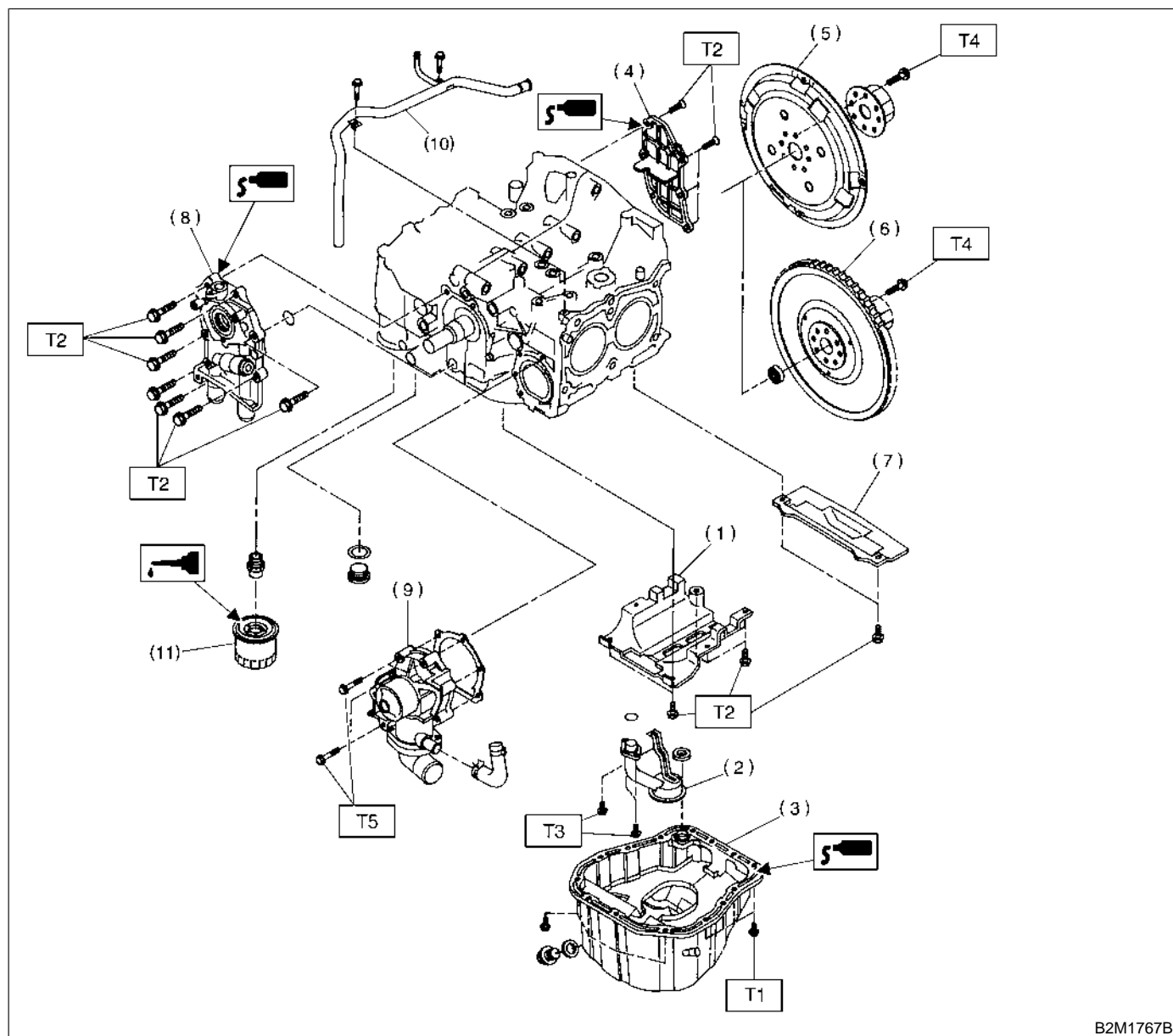
- | | |
|----------------|------------------------|
| (1) Piston | (5) Service hole plug |
| (2) Piston pin | (6) Service hole cover |
| (3) Circlip | |
| (4) Gasket | |

Tightening torque: N·m (kg·m, ft·lb)
T1: 6.4 (0.65, 4.7)
T2: 69±7 (7.0±0.7, 50.6±5.1)

Turn cylinder block so that #3 and #4 cylinders face upward. Using the same procedures as used for #1 and #2 cylinders, install pistons and piston pins.

E: INSTALLATION

1. OIL PUMP AND WATER PUMP



B2M1767B

- | | |
|---|-------------------------|
| (1) Baffle plate | (8) Oil pump |
| (2) Oil strainer | (9) Water pump |
| (3) Oil pan | (10) Water by-pass pipe |
| (4) Oil separator cover | (11) Oil filter |
| (5) Drive plate (AT vehicles only) | |
| (6) Flywheel (MT vehicles only) | |
| (7) Clutch housing cover (MT vehicles only) | |

Tightening torque: N·m (kg·m, ft·lb)

T1: 5 (0.5, 3.6)

T2: 6.4 (0.65, 4.7)

T3: 10 (1.0, 7)

T4: 72±3 (7.3±0.3, 52.8±2.2)

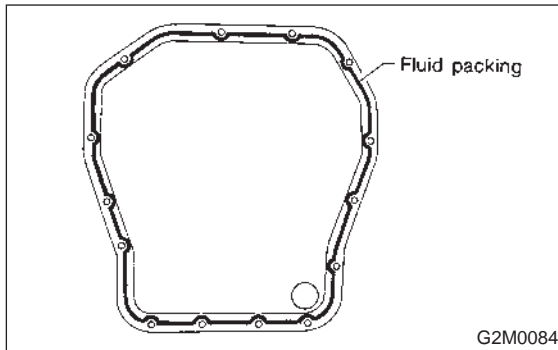
T5: First 12±2 (1.2±0.2, 8.7±1.4)
Second 12±2 (1.2±0.2, 8.7±1.4)

- 1) Install baffle plate.
- 2) Install oil strainer and O-ring
- 3) Install oil strainer stay.

4) Apply fluid packing to matching surfaces and install oil pan.

Fluid packing:

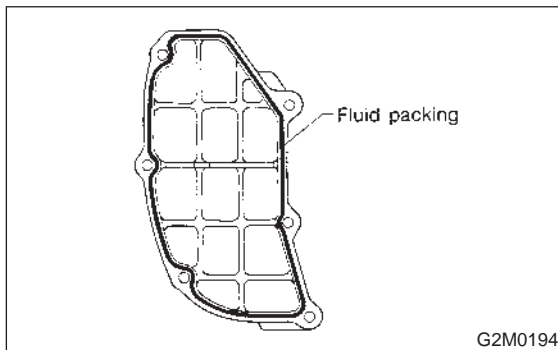
THREE BOND 1215 or equivalent



5) Apply fluid packing to matching surfaces and install oil separator cover.

Fluid packing:

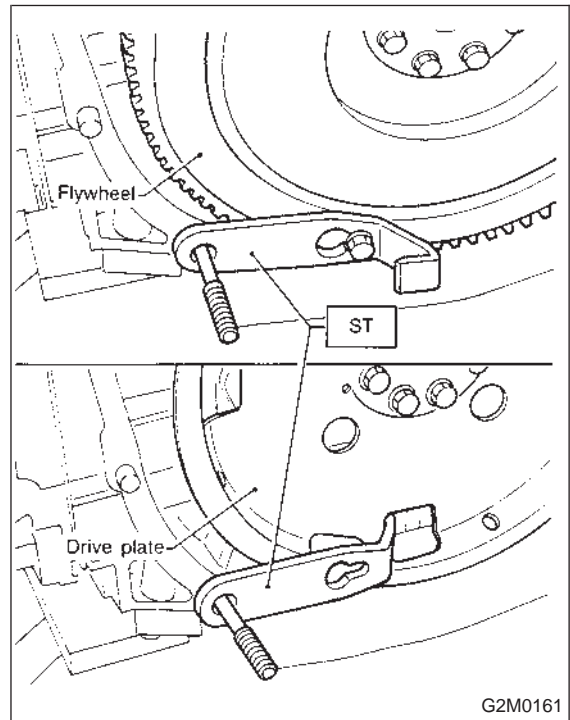
THREE BOND 1215 or equivalent



6) Install flywheel or drive plate.

To lock crankshaft, use ST.

ST 498497100 CRANKSHAFT STOPPER

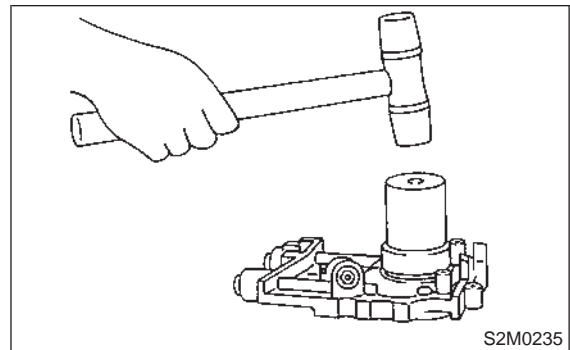


7) Install housing cover.

8) Installation of oil pump

(1) Discard front oil seal after removal. Replace with a new one using ST.

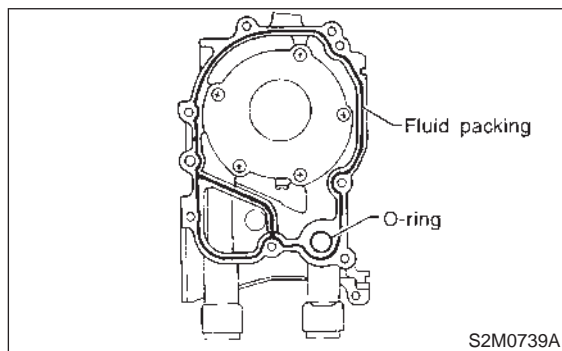
ST 499587100 OIL SEAL INSTALLER



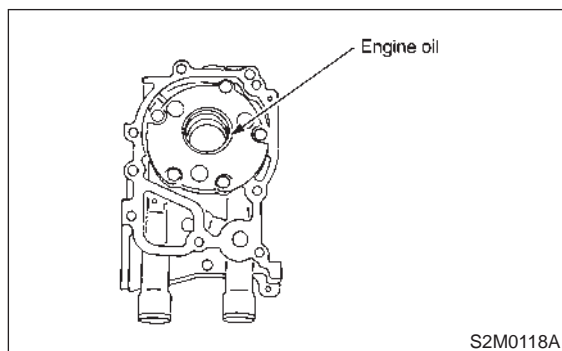
- (2) Apply fluid packing to matching surface of oil pump.

Fluid packing:

THREE BOND 1215 or equivalent



- (3) Apply a coat of engine oil to the inside of the oil seal.



- (4) Install oil pump on cylinder block. Be careful not to damage oil seal during installation.

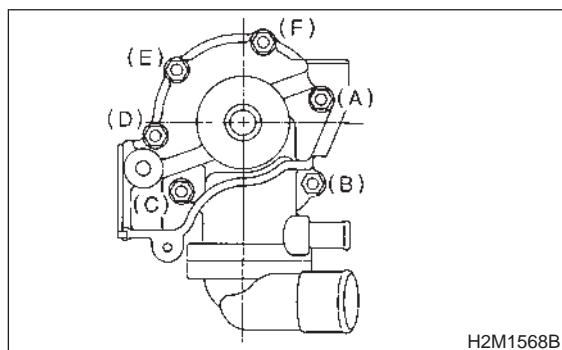
CAUTION:

- Do not forget to install O-ring and seal when installing oil pump.
- Align flat surface of oil pump's inner rotor with crankshaft before installation.

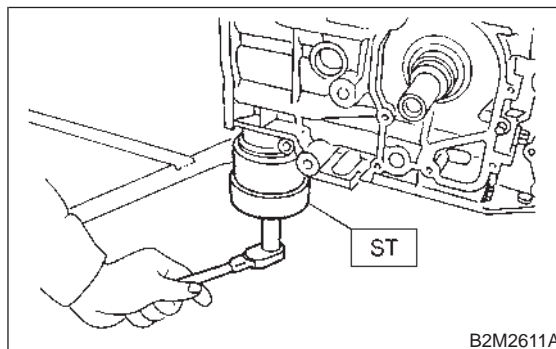
- 9) Install water pump and gasket.

CAUTION:

- Be sure to use a new gasket.
- When installing water pump, tighten bolts in two stages in alphabetical sequence as shown in figure.



- 10) Install water by-pass pipe for heater.
11) Install oil filter using ST.
ST 498187300 OIL FILTER WRENCH



2. RELATED PARTS

- 1) Install cylinder head, valve rocker assembly and rocker cover.
<Ref. to 2-3 [W5E0].>
- 2) Install timing belt and camshaft sprocket.
<Ref. to 2-3 [W2C0].>
- 3) Install water pipe. <Ref. to 2-5 [W8B0].>
- 4) Install intake manifold. <Ref. to 2-7 [W4D0].>

1. Engine Trouble in General

NOTE:

“RANK” shown in the chart refer to the possibility of reason for the trouble in order (“Very often” to “Rarely”)

A — Very often

B — Sometimes

C — Rarely

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
1. Engine will not start.			
1) Starter does not turn.	● Starter	● Defective battery-to-starter harness	B
		● Defective starter switch	C
		● Defective inhibitor switch or neutral switch	C
		● Defective starter	B
	● Battery	● Poor terminal connection	A
		● Run-down battery	A
		● Defective charging system	B
	● Friction	● Seizure of crankshaft and connecting rod bearing	C
		● Seized camshaft	C
		● Seized or stuck piston and cylinder	C
2) Initial combustion does not occur.	● Starter	● Defective starter	C
	● Fuel injection system <Ref. to 2-7 [T6A0].>		A
	● Fuel line	● Defective fuel pump and relay	A
		● Lack of or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
3) Initial combustion occur.	● Fuel injection system <Ref. to 2-7 [T6A0].>		A
	● Intake system	● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
	● Fuel line	● Defective fuel pump and relay	C
		● Clogged fuel line	C
		● Lack of or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B
4) Engine stalls after initial combustion.	Fuel injection system <Ref. to 2-7 [T6A0].>		A
	● Intake system	● Loosened or cracked intake duct	B
		● Loosened or cracked PCV hose	C
		● Loosened or cracked vacuum hose	C
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Dirty air cleaner element	C
	● Fuel line	● Clogged fuel line	C
		● Lack of or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
2. Rough idle and engine stall	Fuel injection system <Ref. to 2-7 [T6A0].>		A
	● Intake system	● Loosened or cracked intake duct	A
		● Loosened or cracked PCV hose	A
		● Loosened or cracked vacuum hose	A
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Defective PCV valve	C
		● Loosened oil filter cap	B
		● Dirty air cleaner element	C
	● Fuel line	● Defective fuel pump and relay	C
		● Clogged fuel line	C
		● Lack of or insufficient fuel	B
	● Belt	● Defective timing	C
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	B
		● Loosened cylinder head bolts or defective gasket	B
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	B
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Lubrication system	● Incorrect oil pressure	B
		● Defective rocker cover gasket	C
	● Cooling system	● Overheating	C
	● Others	● Malfunction of evaporative emission control system	A
		● Stuck or damaged throttle valve	B
		● Accelerator cable out of adjustment	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
3. Low output, hesitation and poor acceleration	● Fuel injection system <Ref. to 2-7 [T6A0].>		A
	● Intake system	● Loosened or cracked intake duct	A
		● Loosened or cracked PCV hose	A
		● Loosened or cracked vacuum hose	B
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Defective PCV valve	B
		● Loosened oil filter cap	B
		● Dirty air cleaner element	A
	● Fuel line	● Defective fuel pump and relay	B
		● Clogged fuel line	B
		● Lack of or insufficient fuel	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	B
		● Loosened cylinder head bolts or defective gasket	B
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Lubrication system	● Incorrect oil pressure	B
	● Cooling system	● Overheating	C
		● Over cooling	C
	● Others	● Malfunction of evaporative emission control system	A

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
4. Surging	● Fuel injection system <Ref. to 2-7 [T6A0].>		A
	● Intake system	● Loosened or cracked intake duct	A
		● Loosened or cracked PCV hose	A
		● Loosened or cracked vacuum hose	A
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Defective PCV valve	B
		● Loosened oil filter cap	B
		● Dirty air cleaner element	B
	● Fuel line	● Defective fuel pump and relay	B
		● Clogged fuel line	B
		● Lack of or insufficient fuel	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	C
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Cooling system	● Overheating	B
	● Others	● Malfunction of evaporative emission control system	C
5. Engine does not return to idle.	Fuel injection system <Ref. to 2-7 [T6A0].>		A
	● Intake system	● Loosened or cracked vacuum hose	A
	● Others	● Stuck or damaged throttle valve	A
		● Accelerator cable out of adjustment	B
6. Dieseling (Run-on)	● Fuel injection system <Ref. to 2-7 [T6A0].>		A
	● Cooling system	● Overheating	B
	● Others	● Malfunction of evaporative emission control system	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
7. After burning in exhaust system	● Fuel injection system <Ref. to 2-7 [T6A0].>		A
	● Intake system	● Loosened or cracked intake duct	C
		● Loosened or cracked PCV hose	C
		● Loosened or cracked vacuum hose	B
		● Defective PCV valve	B
		● Loosened oil filter cap	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	C
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
	● Lubrication system	● Incorrect oil pressure	C
	● Cooling system	● Over cooling	C
	● Others	● Malfunction of evaporative emission control system	C
8. Knocking	● Fuel injection system <Ref. to 2-7 [T6A0].>		A
	● Intake system	● Loosened oil filter cap	B
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Incorrect valve timing	B
	● Cooling system	● Overheating	A
9. Excessive engine oil consumption	● Intake system	● Loosened or cracked PCV hose	A
		● Defective PCV valve	B
		● Loosened oil filter cap	C
	● Compression	● Defective valve stem	A
		● Worn or stuck piston rings, cylinder and piston	A
	● Lubrication system	● Loosened oil pump attaching bolts and defective gasket	B
		● Defective oil filter seal	B
		● Defective crankshaft oil seal	B
		● Defective rocker cover gasket	B
		● Loosened oil drain plug or defective gasket	B
		● Loosened oil pan fitting bolts or defective oil pan	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
10. Excessive fuel consumption	● Fuel injection system <Ref. to 2-7 [T6A0].>		A
	● Intake system	● Dirty air cleaner element	A
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	C
		● Worn or stuck piston rings, cylinder and piston	B
		● Incorrect valve timing	B
	● Lubrication system	● Incorrect oil pressure	C
	● Cooling system	● Over cooling	C
	● Others	● Accelerator cable out of adjustment	B

2. Engine Noise

Type of sound	Condition	Possible cause
Regular clicking sound	Sound increases as engine speed increases.	<ul style="list-style-type: none"> Valve mechanism is defective. Incorrect valve clearance Worn valve rocker Worn camshaft Broken valve spring
Heavy and dull clank	Oil pressure is low.	<ul style="list-style-type: none"> Worn crankshaft main bearing Worn connecting rod bearing (big end)
	Oil pressure is normal.	<ul style="list-style-type: none"> Loose flywheel mounting bolts Damaged engine mounting
High-pitched clank (Spark knock)	Sound is noticeable when accelerating with an overload.	<ul style="list-style-type: none"> Ignition timing advanced Accumulation of carbon inside combustion chamber Wrong spark plug Improper gasoline
Clank when engine speed is medium (1,000 to 2,000 rpm).	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	<ul style="list-style-type: none"> Worn crankshaft main bearing Worn bearing at crankshaft end of connecting rod
Knocking sound when engine is operating under idling speed and engine is warm	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	<ul style="list-style-type: none"> Worn cylinder liner and piston ring Broken or stuck piston ring Worn piston pin and hole at piston end of connecting rod
	Sound is not reduced if each fuel injector connector is disconnected in turn. (NOTE*)	<ul style="list-style-type: none"> Unusually worn valve lifter Worn cam gear Worn camshaft journal bore in crankcase
Squeaky sound	—	<ul style="list-style-type: none"> Insufficient generator lubrication
Rubbing sound	—	<ul style="list-style-type: none"> Defective generator brush and rotor contact
Gear scream when starting engine	—	<ul style="list-style-type: none"> Defective ignition starter switch Worn gear and starter pinion
Sound like polishing glass with a dry cloth	—	<ul style="list-style-type: none"> Loose drive belt Defective engine coolant pump shaft
Hissing sound	—	<ul style="list-style-type: none"> Loss of compression Air leakage in air intake system, hoses, connections or manifolds
Timing belt noise	—	<ul style="list-style-type: none"> Loose timing belt Belt contacting case/adjacent part
Valve tappet noise	—	<ul style="list-style-type: none"> Incorrect valve clearance

NOTE*:

When disconnecting fuel injector connector, Malfunction Indicator Light (CHECK ENGINE light) illuminates and trouble code is stored in ECM memory.

Therefore, carry out the CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].> after connecting fuel injector connector.

MEMO:

ENGINE LUBRICATION SYSTEM

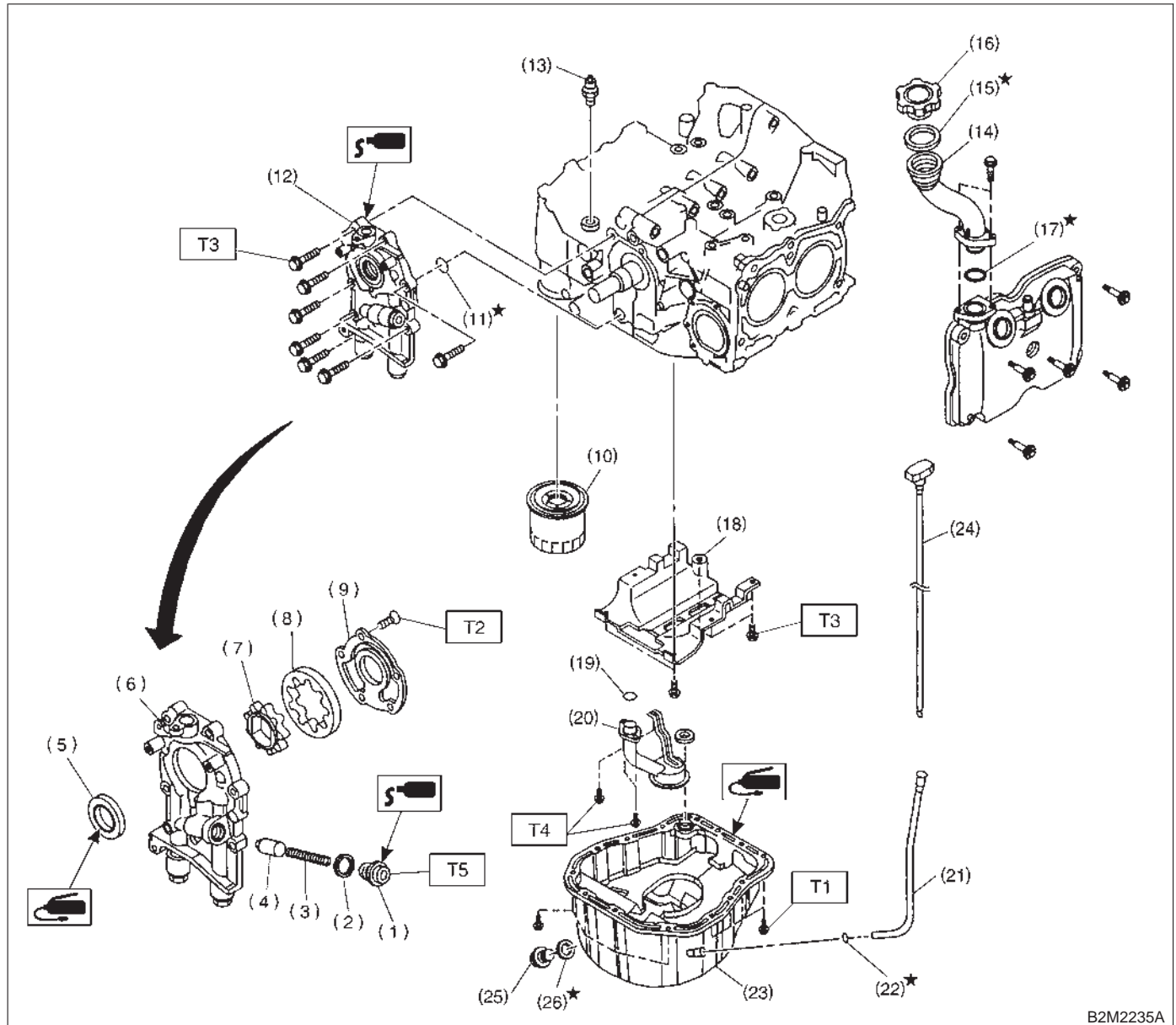
2-4

	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Specifications	2
C COMPONENT PARTS	3
1. Lubrication System.....	3
W SERVICE PROCEDURE	4
1. Oil Pump.....	4
2. Oil Pan and Oil Strainer	8
3. Oil Pressure Switch.....	14
K DIAGNOSTICS	16
1. Engine Lubrication System Trouble in General	16

1. Specifications

Lubrication method					Forced lubrication			
Oil pump	Pump type				Trochoid type			
	Number of teeth		Inner rotor		9			
			Outer rotor		10			
	Outer rotor diameter × thickness				78 × 9 mm (3.07 × 0.35 in)			
	Tip clearance between inner and outer rotor		STANDARD		0.04 — 0.14 mm (0.0016 — 0.0055 in)			
			LIMIT		0.18 mm (0.0071 in)			
	Side clearance between inner rotor and pump case		STANDARD		0.02 — 0.07 mm (0.0008 — 0.0028 in)			
			LIMIT		0.15 mm (0.0059 in)			
	Case clearance between outer rotor and pump case		STANDARD		0.10 — 0.175 mm (0.0039 — 0.0069 in)			
			LIMIT		0.20 mm (0.0079 in)			
	Capacity at 80°C (176°F)	600 rpm	Discharge	- pressure	98 kPa (1.0 kg/cm ² , 14 psi) or more			
				- quantity	2200 cc	4.2 ℓ (4.4 US qt, 3.7 Imp qt)/min.		
			5,000 rpm		Discharge	- quantity	2500 cc	4.6 ℓ (4.9 US qt, 4.0 Imp qt)/min.
				- pressure			294 kPa (3.0 kg/cm ² , 43 psi) or more	
	Relief valve operation pressure				2200 cc	490 kPa (5.0 kg/cm ² , 71 psi)		
2500 cc					588 kPa (6.0 kg/cm ² , 85 psi)			
Oil filter	Type				Full-flow filter type			
	Filtration area				1,000 cm ² (155 sq in)			
	By-pass valve opening pressure				156 kPa (1.6 kg/cm ² , 23 psi)			
	Outer diameter × width				80 × 70 mm (3.15 × 2.76 in)			
	Oil filter to engine thread size				M 20 × 1.5			
Relief valve (on rocker shaft) operation pressure					69 kPa (0.7 kg/cm ² , 10 psi)			
Oil pressure switch	Type				Immersed contact point type			
	Working voltage — wattage				12 V — 3.4 W or less			
	Warning light activation pressure				14.7 kPa (0.15 kg/cm ² , 2.1 psi)			
	Proof pressure				More than 981 kPa (10 kg/cm ² , 142 psi)			
Oil capacity (at replacement)					4.0 ℓ (4.2 US qt, 3.5 Imp qt)			

1. Lubrication System



B2M2235A

- | | |
|-------------------------|----------------------------|
| (1) Plug | (13) Oil pressure switch |
| (2) Washer | (14) Oil filler duct |
| (3) Relief valve spring | (15) O-ring |
| (4) Relief valve | (16) Oil filler cap |
| (5) Oil seal | (17) O-ring |
| (6) Oil pump case | (18) Baffle plate |
| (7) Inner rotor | (19) O-ring |
| (8) Outer rotor | (20) Oil strainer |
| (9) Oil pump cover | (21) Oil level gauge guide |
| (10) Oil filter | (22) O-ring |
| (11) O-ring | (23) Oil pan |
| (12) Oil pump ASSY | (24) Oil level gauge |

- | |
|-------------------|
| (25) Drain plug |
| (26) Metal gasket |

Tightening torque: N·m (kg-m, ft-lb)

T1: 5 (0.5, 3.6)

T2: 5^{+1}_{-0} ($0.5^{+0.1}_{-0}$, $3.6^{+0.7}_{-0}$)

T3: 6.4 (0.65, 4.7)

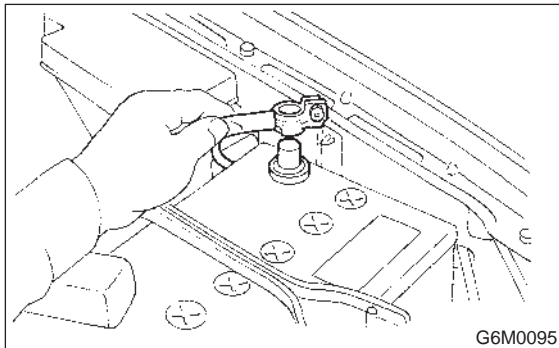
T4: 10 (1.0, 7.2)

T5: 44.1 ± 3.4 (4.5 ± 0.35 , 32.5 ± 2.5)

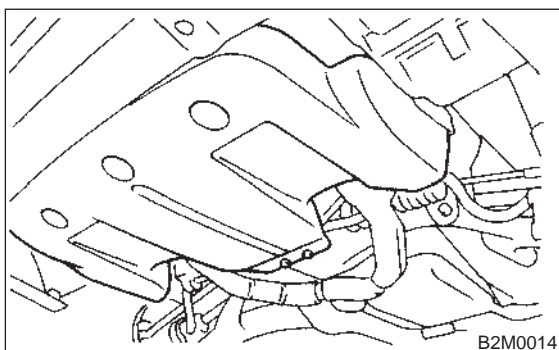
1. Oil Pump

A: REMOVAL

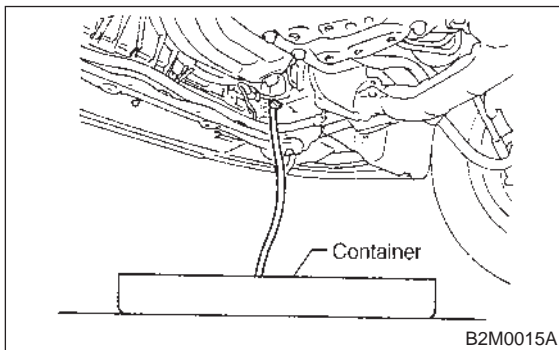
- 1) Disconnect battery ground cable.



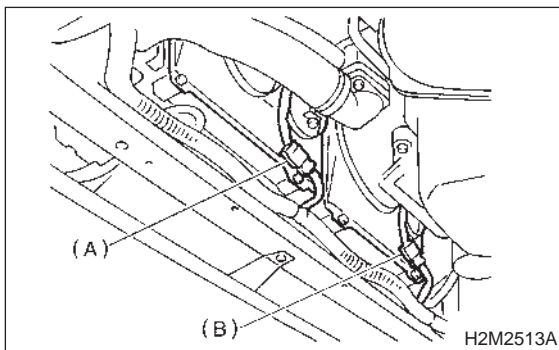
- 2) Lift-up the vehicle.
3) Remove under cover.



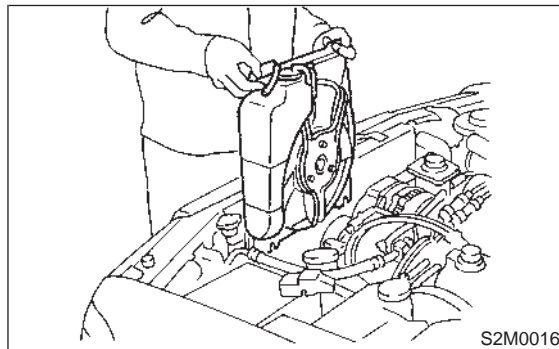
- 4) Drain coolant. <Ref. to 2-5 [W1A0].>



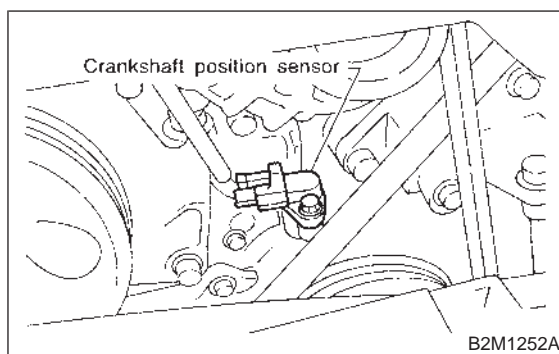
- 5) Disconnect connectors from radiator main fan (A) and sub fan (B) motors.



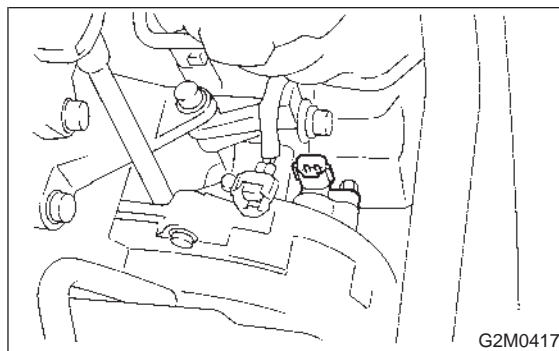
- 6) Lower the vehicle.
7) Remove radiator main fan and sub fan assemblies. <Ref. to 2-5 [W7A0].>



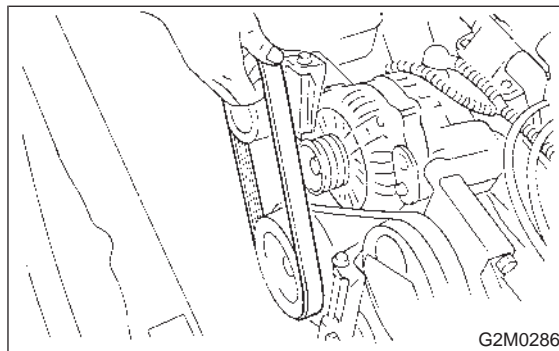
- 8) Remove crankshaft position sensor.



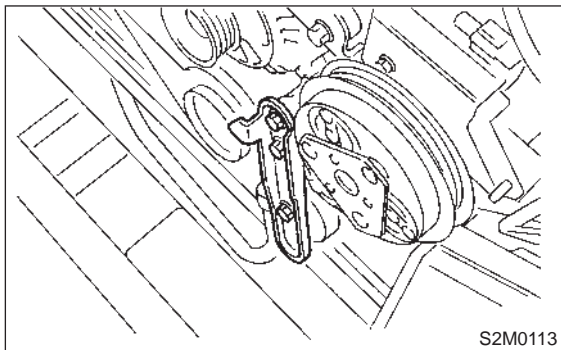
- 9) Remove camshaft position sensor.



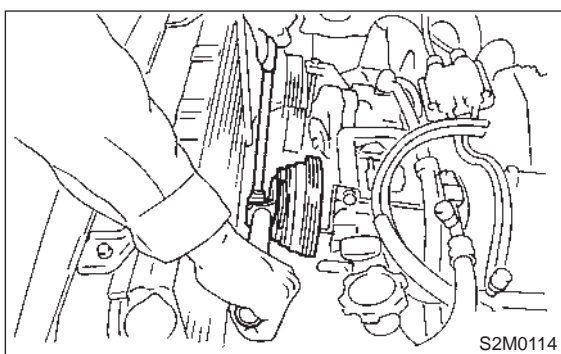
- 10) Remove V-belts. <Ref. to 1-5 [G200].>



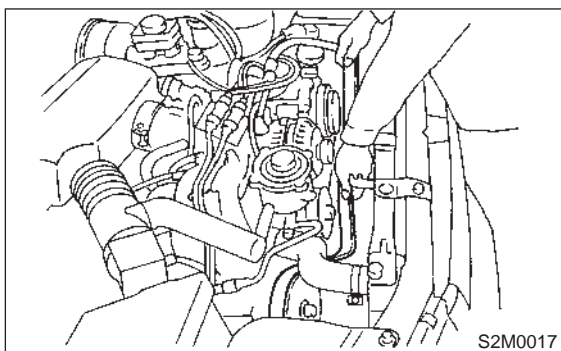
- 11) Remove rear side V-belt tensioner.



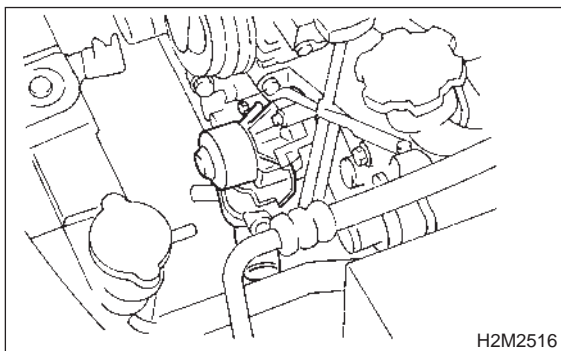
- 12) Remove crankshaft pulley by using ST.
ST 49997700 CRANKSHAFT PULLEY
WRENCH



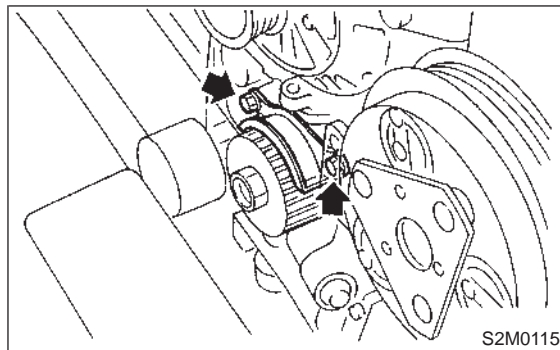
- 13) Remove timing belt.
<Ref. to 2-3 [W2A0].>



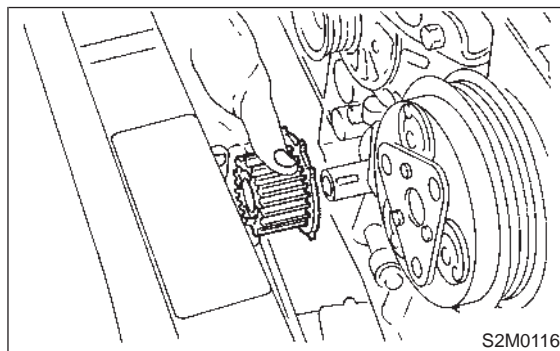
- 14) Remove water pump. <Ref. to 2-5 [W2A0].>



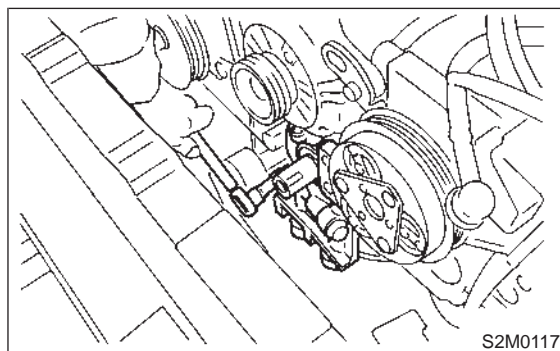
- 15) Remove timing belt guide. (MT vehicles only)



- 16) Remove crankshaft sprocket.

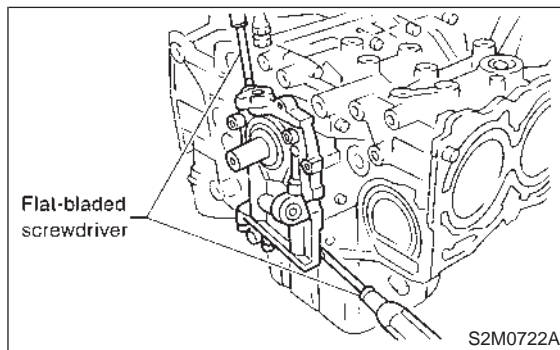


- 17) Remove bolts which install oil pump onto cylinder block.



- 18) Remove oil pump by using flat bladed screwdriver.

CAUTION:
Be careful not to scratch mating surfaces of cylinder block and oil pump.



1. Oil Pump

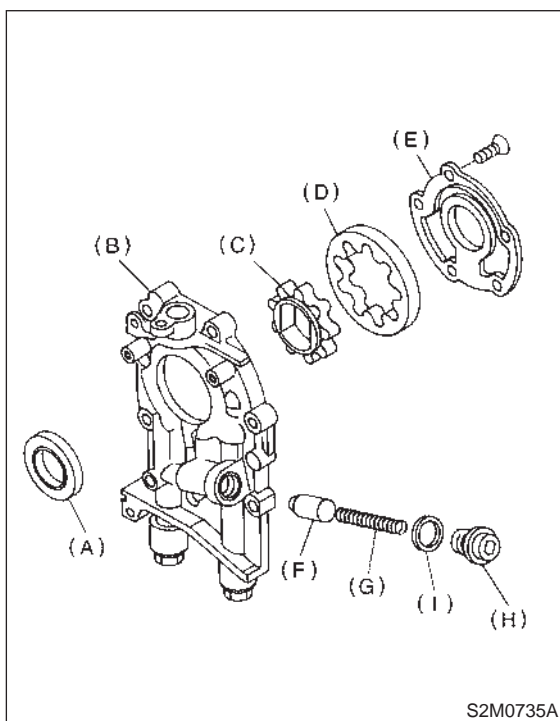
B: DISASSEMBLY

Remove screws which secure oil pump cover and disassemble oil pump.

Inscribe alignment marks on inner and outer rotors so that they can be replaced in their original positions during reassembly.

CAUTION:

Before removing relief valve, loosen plug when removing oil pump from cylinder block.



S2M0735A

- (A) Oil seal
- (B) Pump case
- (C) Inner rotor
- (D) Outer rotor
- (E) Pump cover
- (F) Relief valve
- (G) Relief spring
- (H) Plug
- (I) Washer

C: INSPECTION**1. TIP CLEARANCE**

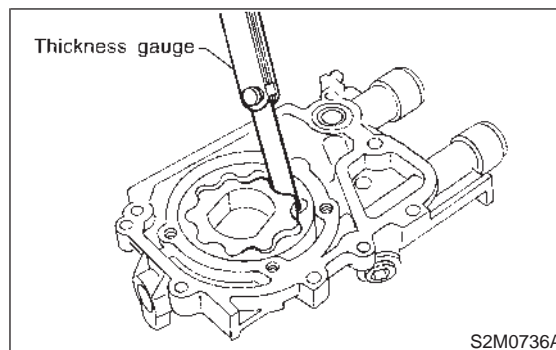
Measure the tip clearance of rotors. If the clearance exceeds the limit, replace rotors as a matched set.

Tip clearance:**Standard**

0.04 — 0.14 mm (0.0016 — 0.0055 in)

Limit

0.18 mm (0.0071 in)



S2M0736A

2. CASE CLEARANCE

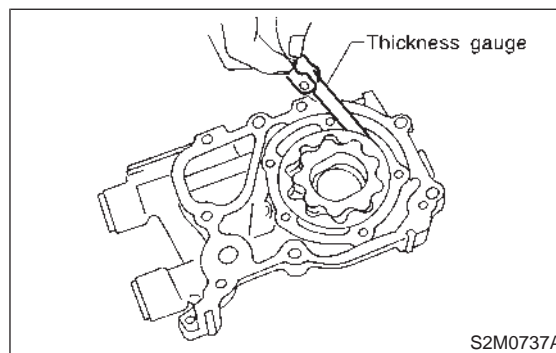
Measure the clearance between the outer rotor and the cylinder block rotor housing. If the clearance exceeds the limit, replace the rotor.

Case clearance:**Standard**

0.10 — 0.175 mm (0.0039 — 0.0069 in)

Limit

0.20 mm (0.0079 in)



S2M0737A

3. SIDE CLEARANCE

Measure clearance between oil pump inner rotor and pump cover. If the clearance exceeds the limit, replace rotor or pump body.

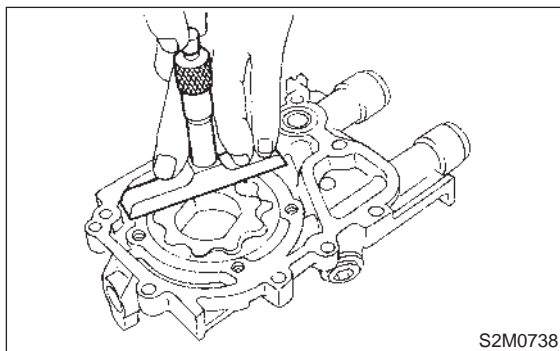
Side clearance:

Standard

0.02 — 0.07 mm (0.0008 — 0.0028 in)

Limit

0.15 mm (0.0059 in)



4. OIL RELIEF VALVE

Check the valve for fitting condition and damage, and the relief valve spring for damage and deterioration. Replace the parts if defective.

Relief valve spring:

Free length; 71.8 mm (2.827 in)

Installed length; 54.7 mm (2.154 in)

Load when installed; 77.08 N (7.86 kg, 17.33 lb)

5. OIL PUMP CASE

Check the oil pump case for worn shaft hole, clogged oil passage, worn rotor chamber, cracks, and other faults.

6. OIL SEAL

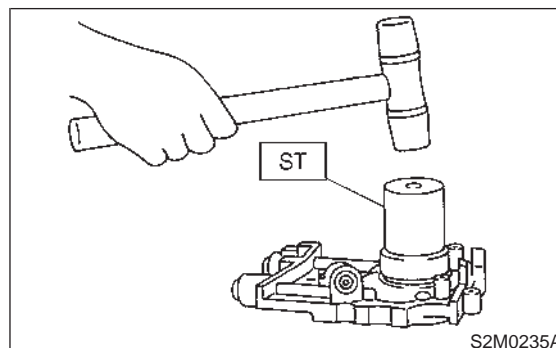
Check the oil seal lips for deformation, hardening, wear, etc. and replace if defective.

D: ASSEMBLY

- 1) Install front oil seal by using ST.
ST 499587100 OIL SEAL INSTALLER

CAUTION:

Use a new oil seal.

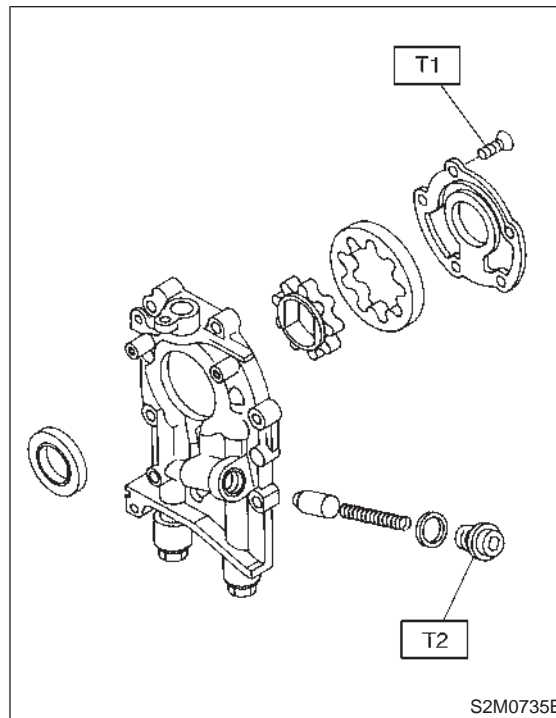


- 2) Install inner and outer rotors in their original positions.
- 3) Install oil relief valve and relief spring.
- 4) Install oil pump cover.

Tightening torque:

T1: 5 — 6 N·m (0.5 — 0.6 kg·m, 3.6 — 4.3 ft·lb)

T2: 40.7 — 47.6 N·m (4.15 — 4.85 kg·m, 30.0 — 35.1 ft·lb)



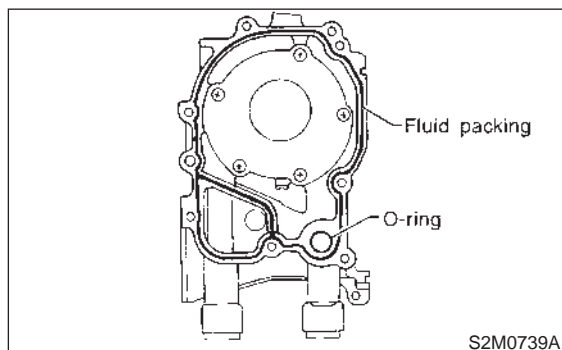
E: INSTALLATION

Installation is in the reverse order of removal.
Observe the following:

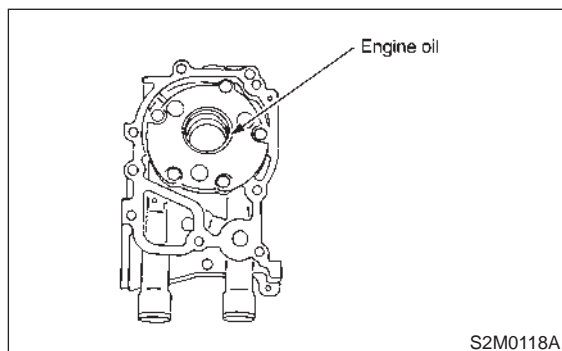
- 1) Apply fluid packing to matching surfaces of oil pump.

Fluid packing:

THREE BOND 1215 or equivalent



- 2) Replace O-ring with a new one.
- 3) Apply a coat of engine oil to the inside of the oil seal.



- 4) Be careful not to scratch oil seal when installing oil pump on cylinder block.
- 5) Position the oil pump, aligning the notched area with the crankshaft, and push the oil pump straight.

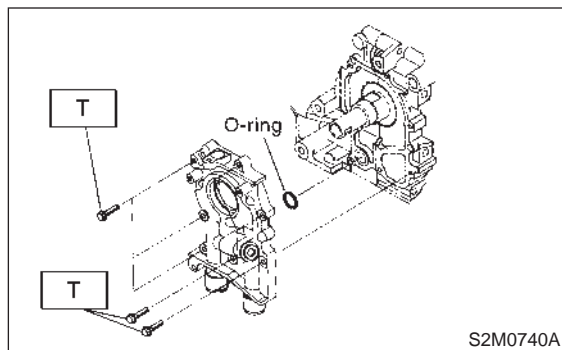
CAUTION:

Make sure the oil seal lip is not folded.

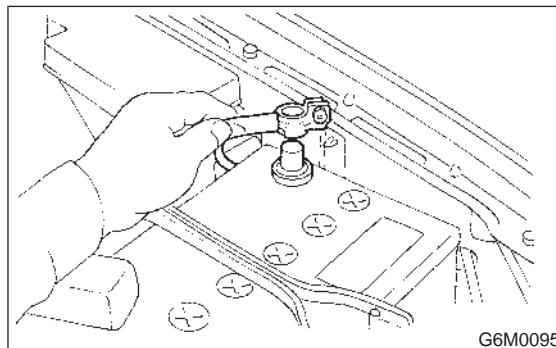
- 6) Install oil pump.

Tightening torque:

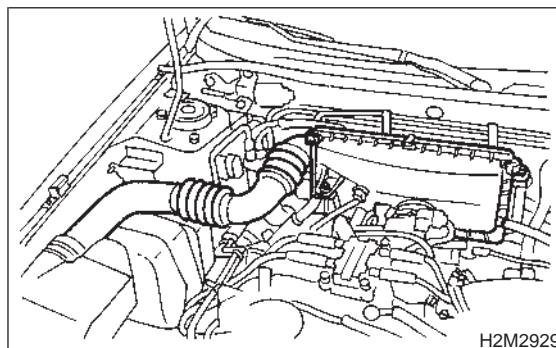
6.4 N·m (0.65 kg·m, 4.7 ft·lb)

**2. Oil Pan and Oil Strainer****A: REMOVAL**

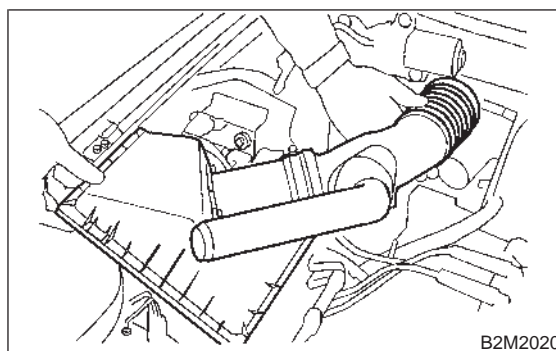
- 1) Disconnect battery ground cable.



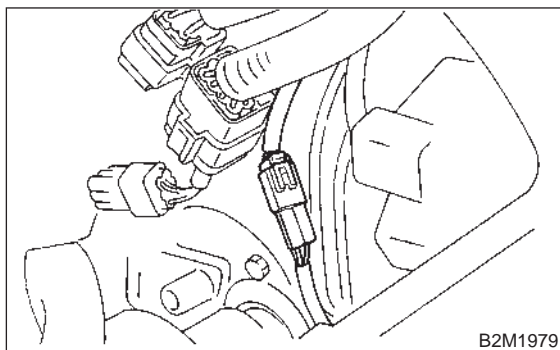
- 2) Remove front wheels.
- 3) Remove air intake duct and air cleaner assembly. (2200 cc California spec. vehicles) <Ref. to 2-7 [W1A1].>



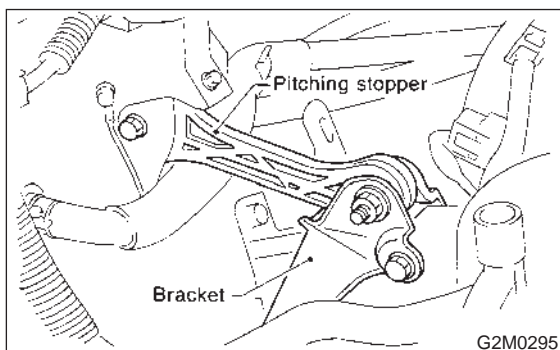
- 4) Remove air intake duct and air cleaner upper cover. (Except 2200 cc California spec. vehicles) <Ref. to 2-7 [W1A2].>



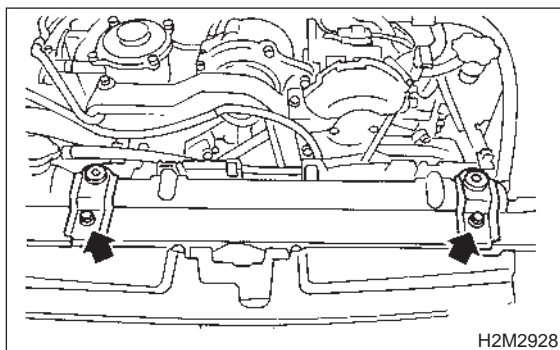
5) Disconnect front oxygen sensor connector.



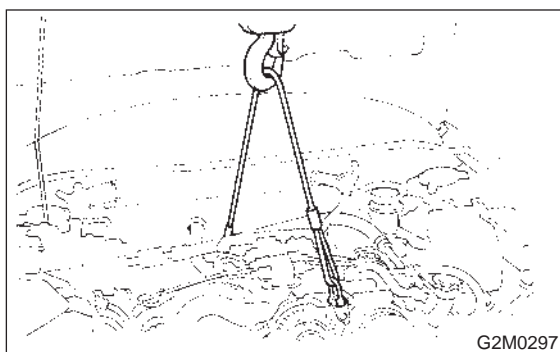
6) Remove pitching stopper.



7) Remove radiator upper bracket.



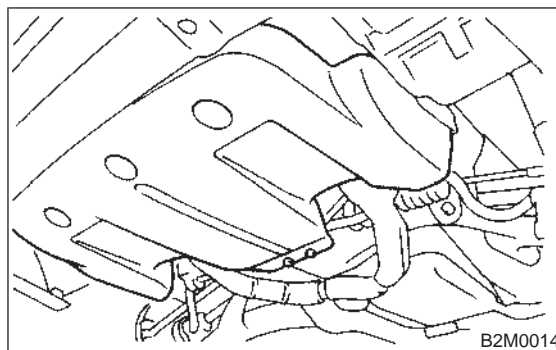
8) Support engine with a lifting device and wire ropes.



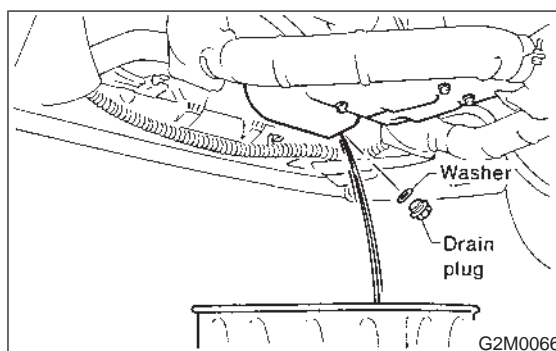
9) Lift-up the vehicle.

CAUTION:
At this time, raise up wire ropes.

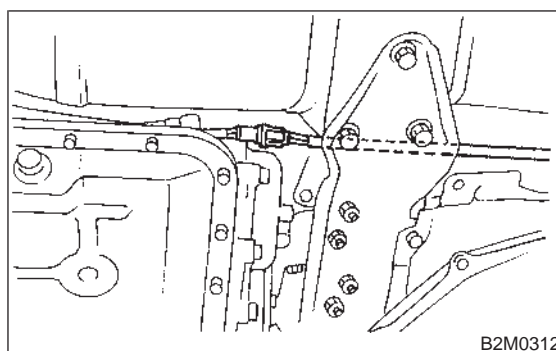
10) Remove under cover.



11) Drain engine oil.
Set container under the vehicle, and remove drain plug from oil pan.



12) Disconnect connector from rear oxygen sensor.

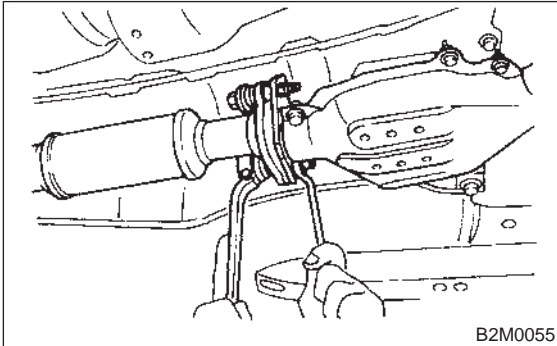


13) Remove front and center exhaust pipe assembly.

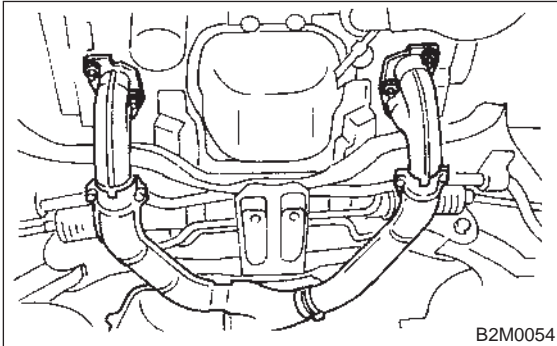
- (1) Separate front and center exhaust assembly pipe from rear exhaust pipe.

CAUTION:

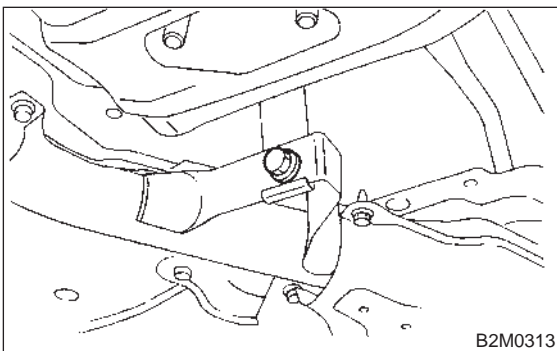
Be careful, exhaust pipe is hot.



- (2) Remove front and center exhaust pipe assembly from engine.

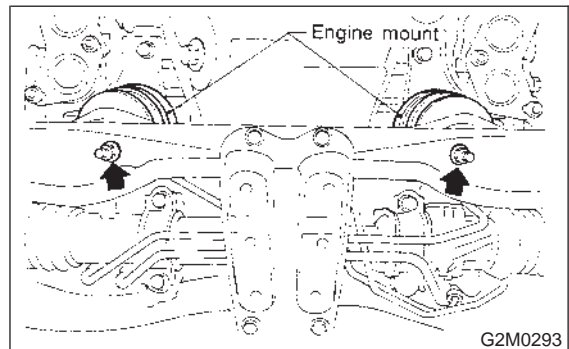


- (3) Remove front and center exhaust pipe assembly from hanger bracket.

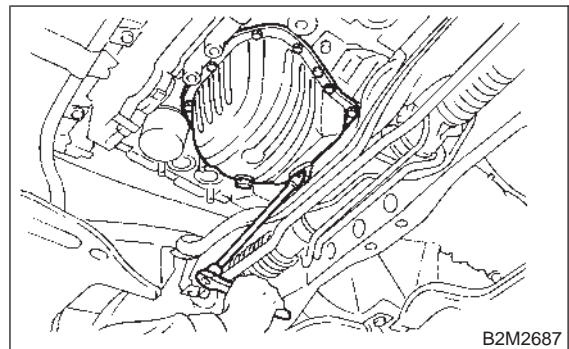


- (4) Remove bolt which installs front and center exhaust pipe assembly on bracket.

- 14) Remove nuts which install front cushion rubber onto front crossmember.



- 15) Remove bolts which install oil pan on cylinder block while raising up engine.

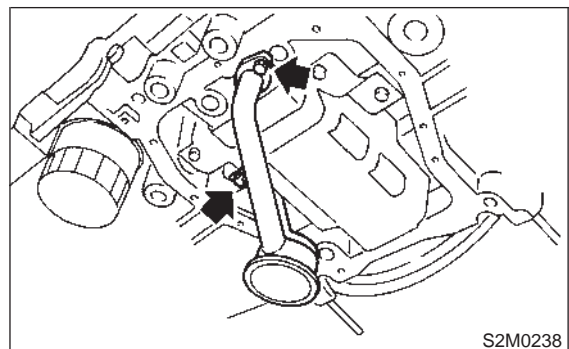


- 16) Insert oil pan cutter blade between cylinder block-to-oil pan clearance.

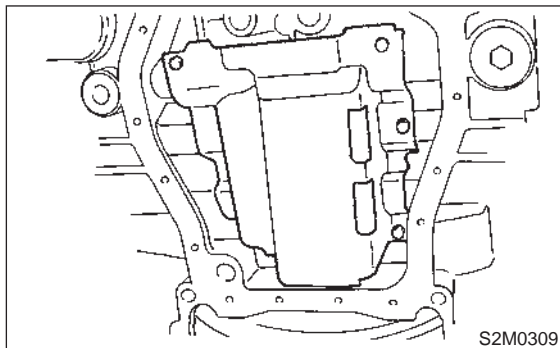
CAUTION:

Do not use a screwdriver or similar tool in place of oil pan cutter.

- 17) Remove oil strainer.



- 18) Remove baffle plate.



B: INSPECTION

By visual check make sure oil pan, oil strainer and baffle plate are not damaged.

C: INSTALLATION

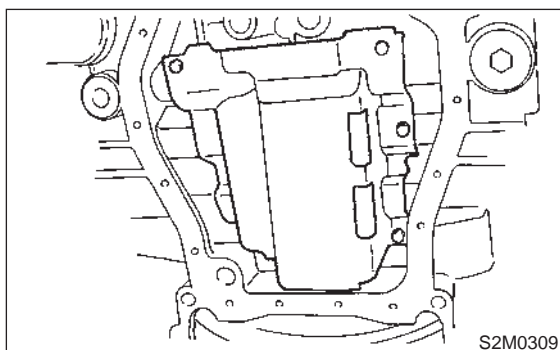
CAUTION:

Before installing oil pan, clean sealant from oil pan and engine block.

- 1) Install baffle plate.

Tightening torque:

6.4 N-m (0.65 kg-m, 4.7 ft-lb)



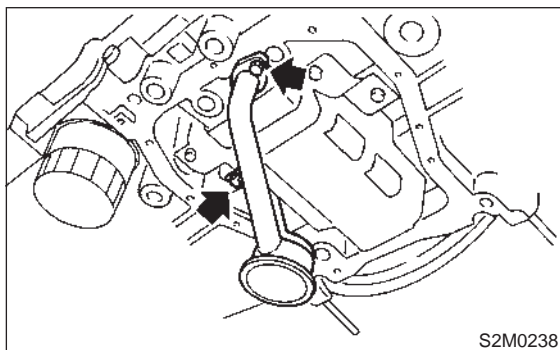
- 2) Install oil strainer onto baffle plate.

CAUTION:

Replace O-ring with a new one.

Tightening torque:

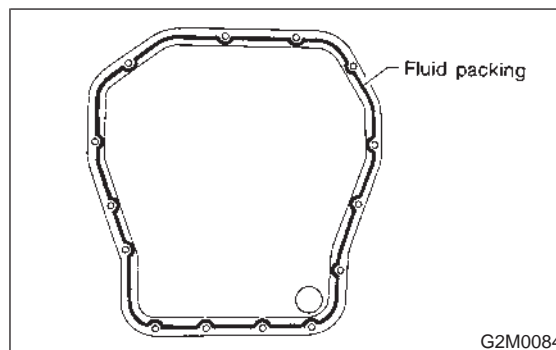
10 N-m (1.0 kg-m, 7.2 ft-lb)



- 3) Apply fluid packing to mating surfaces and install oil pan.

Fluid packing:

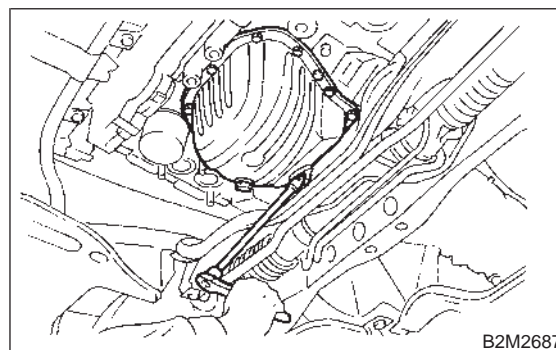
THREE BOND 1215 or equivalent



- 4) Tighten bolts which install oil pan onto engine block.

Tightening torque:

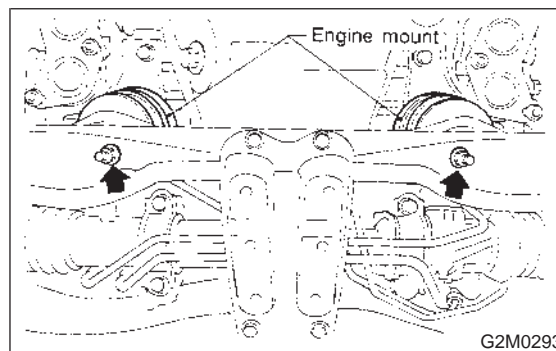
5 N-m (0.5 kg-m, 3.6 ft-lb)



- 5) Lower engine onto front crossmember.
6) Tighten nuts which install front cushion rubber onto front crossmember.

Tightening torque:

69±15 N-m (7.0±1.5 kg-m, 51±11 ft-lb)



7) Install front and center exhaust pipe assembly.

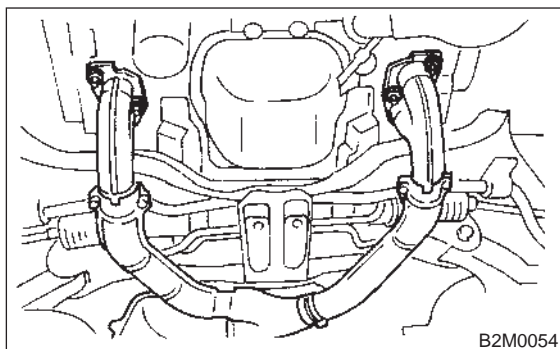
CAUTION:

Always use the new gaskets.

- (1) Place front and center exhaust pipe assembly on bracket.
- (2) Tighten nuts which install front and center exhaust pipe assembly on engine.

Tightening torque:

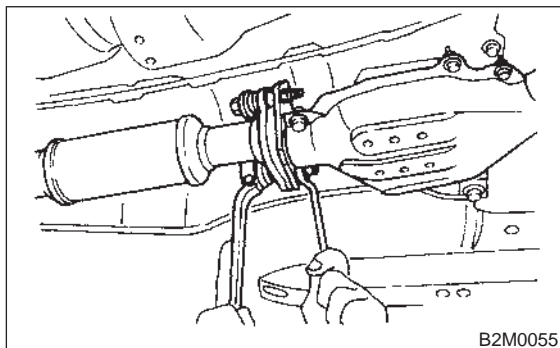
$30 \pm 5 \text{ N}\cdot\text{m}$ ($3.1 \pm 0.5 \text{ kg}\cdot\text{m}$, $22.4 \pm 3.6 \text{ ft}\cdot\text{lb}$)



- (3) Tighten nuts which install front and center exhaust pipe assembly to rear exhaust pipe.

Tightening torque:

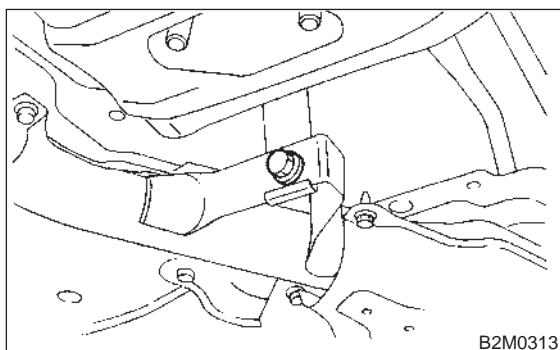
$18 \pm 5 \text{ N}\cdot\text{m}$ ($1.8 \pm 0.5 \text{ kg}\cdot\text{m}$, $13.0 \pm 3.6 \text{ ft}\cdot\text{lb}$)



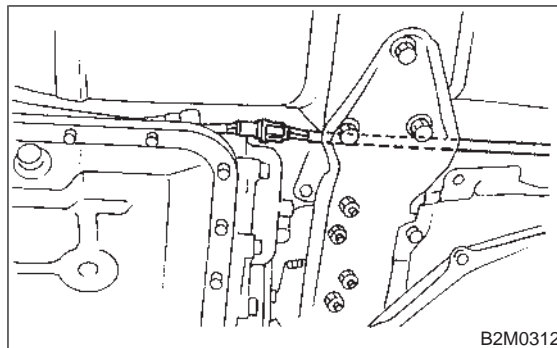
- (4) Tighten bolt which installs front and center exhaust pipe assembly on bracket.

Tightening torque:

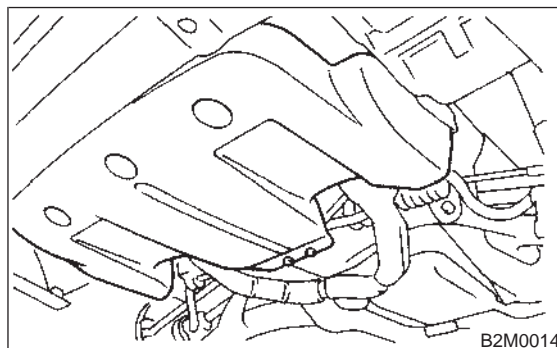
$24 \pm 3 \text{ N}\cdot\text{m}$ ($2.4 \pm 0.3 \text{ kg}\cdot\text{m}$, $17.4 \pm 2.2 \text{ ft}\cdot\text{lb}$)



8) Connect connector to rear oxygen sensor.



9) Install under cover.

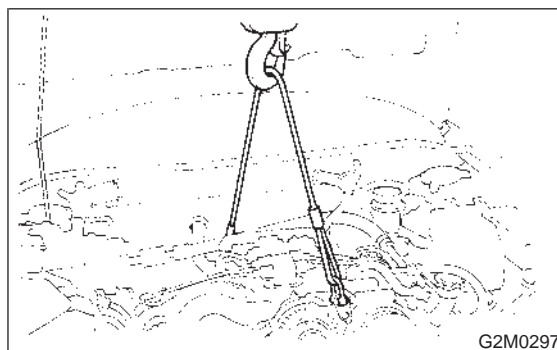


10) Lower the vehicle.

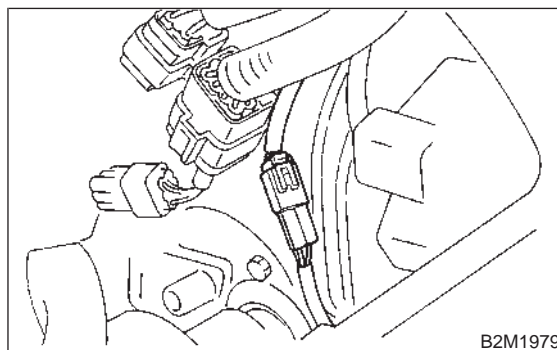
CAUTION:

At this time, lower lifting device and release steel cables.

11) Remove lifting device and steel cables.



12) Connect connector to front oxygen sensor.

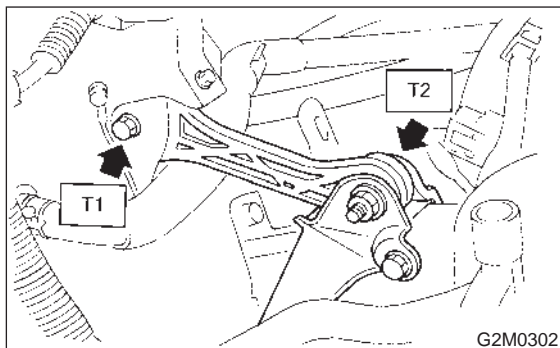


13) Install pitching stopper.

Tightening torque:

T1: 49 ± 5 N·m (5.0 ± 0.5 kg·m, 36.2 ± 3.6 ft·lb)

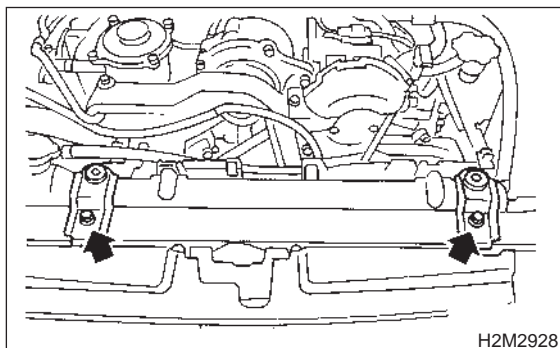
T2: 57 ± 10 N·m (5.8 ± 1.0 kg·m, 42 ± 7 ft·lb)



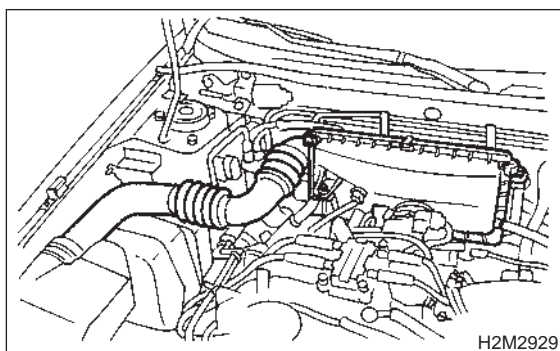
14) Install radiator upper brackets.

Tightening torque:

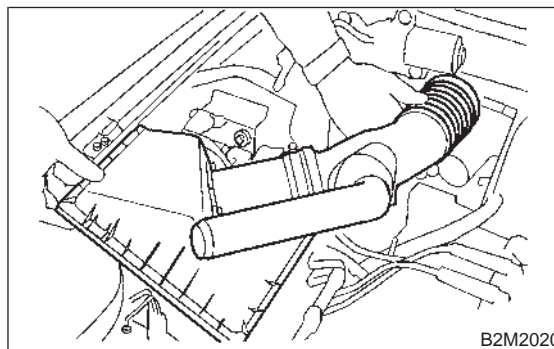
18 ± 5 N·m (1.8 ± 0.5 kg·m, 13 ± 4 ft·lb)



15) Install air intake duct and air cleaner assembly. (2200 cc California spec. vehicles) <Ref. to 2-7 [W1A1].>



16) Install air intake duct and air cleaner upper cover. (Except 2200 cc California spec. vehicles) <Ref. to 2-7 [W1A2].>



17) Fill engine oil through filler pipe up to upper point of level gauge. <Ref. to 1-5 [G4A0].>

Engine oil capacity:

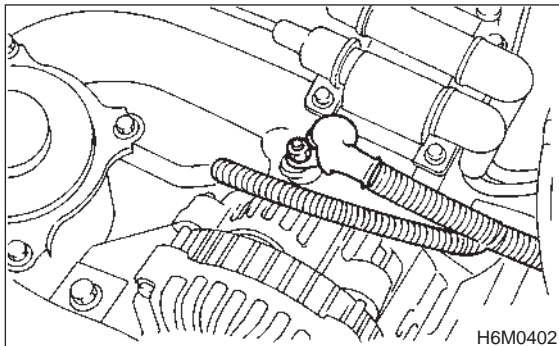
Upper level; 4.0 ℓ (4.2 US qt, 3.5 Imp qt)

Lower level; 3.0 ℓ (3.2 US qt, 2.6 Imp qt)

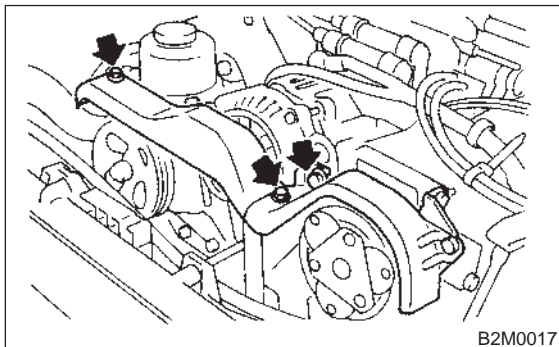
3. Oil Pressure Switch

A: REMOVAL

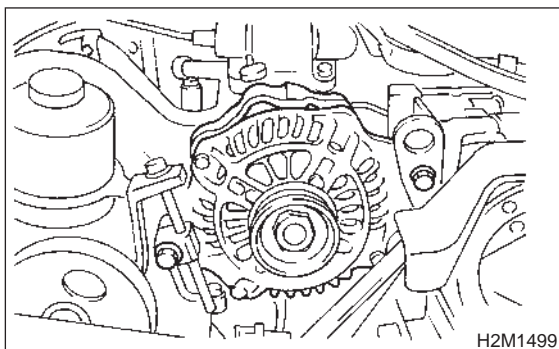
- 1) Remove alternator from bracket.
 - (1) Disconnect connector and terminal from generator.



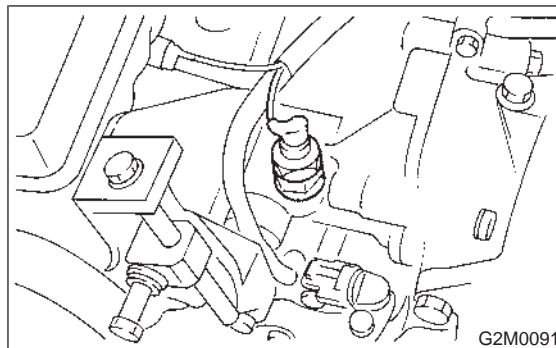
- (2) Remove V-belt cover.



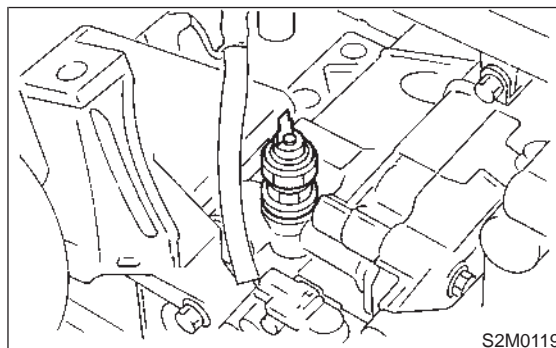
- (3) Loosen lock bolt and slider bolt, and remove front side V-belt.
 - (4) Remove bolts which install generator on bracket.



- 2) Disconnect terminal from oil pressure switch.



- 3) Remove oil pressure switch.

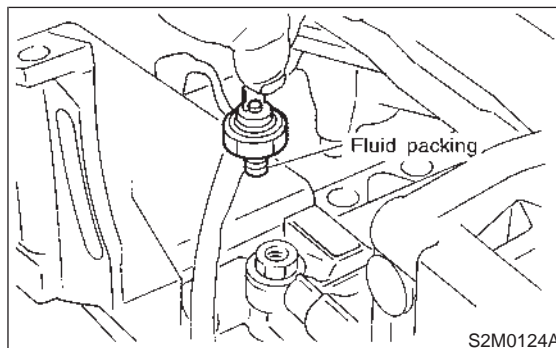


B: INSTALLATION

- 1) Apply fluid packing to oil pressure switch threads before installation.

Fluid packing:

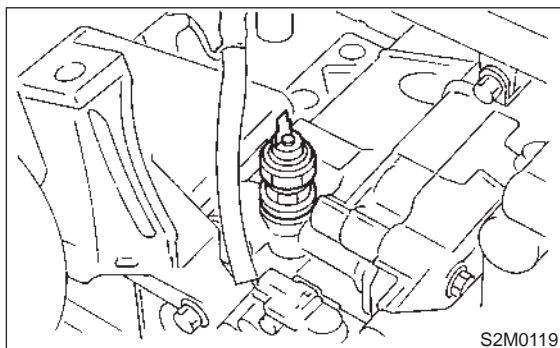
THREE BOND 1215 or equivalent



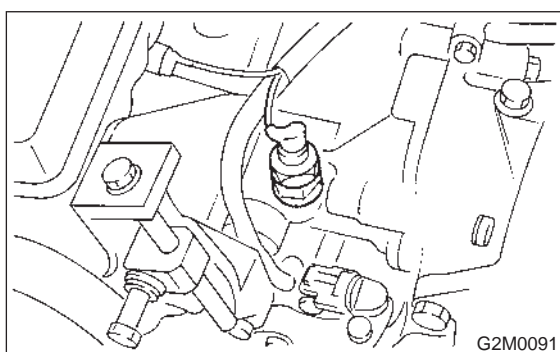
2) Install oil pressure switch onto engine block.

Tightening torque:

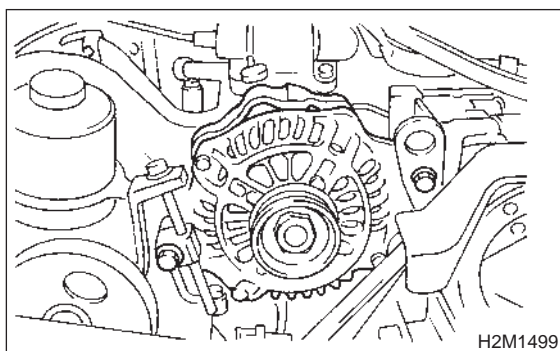
$25 \pm 3 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.3 \text{ kg}\cdot\text{m}$, $18.1 \pm 2.2 \text{ ft}\cdot\text{lb}$)



3) Connect terminal of oil pressure switch.

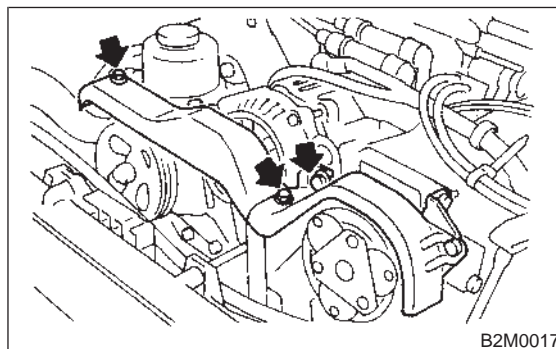


4) Install generator on bracket and temporary tighten installing bolts.

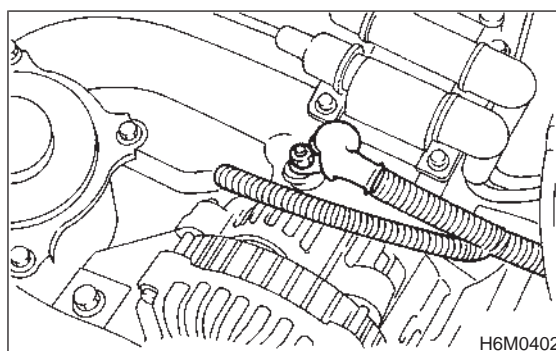


5) Install front side V-belt and adjust it. <Ref. to 1-5 [G200].>

6) Install V-belt cover.



7) Connect connector and terminal to generator.



1. Engine Lubrication System Trouble in General

NOTE:

Before troubleshooting, make sure that the engine oil level is correct and no oil leakage exists.

Trouble	Possible cause		Corrective action
1. Warning light remains on.	1) Oil pressure switch failure	Cracked diaphragm or oil leakage within switch	Replace.
		Broken spring or seized contacts	Replace.
	2) Low oil pressure	Clogged oil filter	Replace.
		Malfunction of oil by-pass valve of oil filter	Clean or replace.
		Malfunction of oil relief valve of oil pump	Clean or replace.
		Clogged oil passage	Clean.
		Excessive tip clearance and side clearance of oil pump rotor and gear	Replace.
		Clogged oil strainer or broken pipe	Clean or replace.
	3) No oil pressure	Insufficient engine oil	Replenish.
		Broken pipe of oil strainer	Replace.
		Stuck oil pump rotor	Replace.
2. Warning light does not go on.	1) Burn-out bulb		Replace.
	2) Poor contact of switch contact points		Replace.
	3) Disconnection of wiring		Repair.
3. Warning light flickers momentarily.	1) Poor contact at terminals		Repair.
	2) Defective wiring harness		Repair.
	3) Low oil pressure		Check for the same possible causes as listed in 1.—2)

ENGINE COOLING SYSTEM **2-5**

	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Specifications	2
2. Service Data.....	2
C COMPONENT PARTS	3
1. Water Pump	3
2. Radiator and Radiator Fan.....	4
3. Water Pipe.....	5
W SERVICE PROCEDURE	6
1. On-car Services.....	6
2. Water Pump	7
3. Thermostat	10
4. Radiator	11
5. Radiator Cap	14
6. Radiator Main Fan and Fan Motor.....	15
7. Radiator Sub Fan and Fan Motor	17
8. Water Pipe.....	19
9. Reservoir Tank	22
K DIAGNOSTICS	23
1. Engine Cooling System Trouble in General.....	23

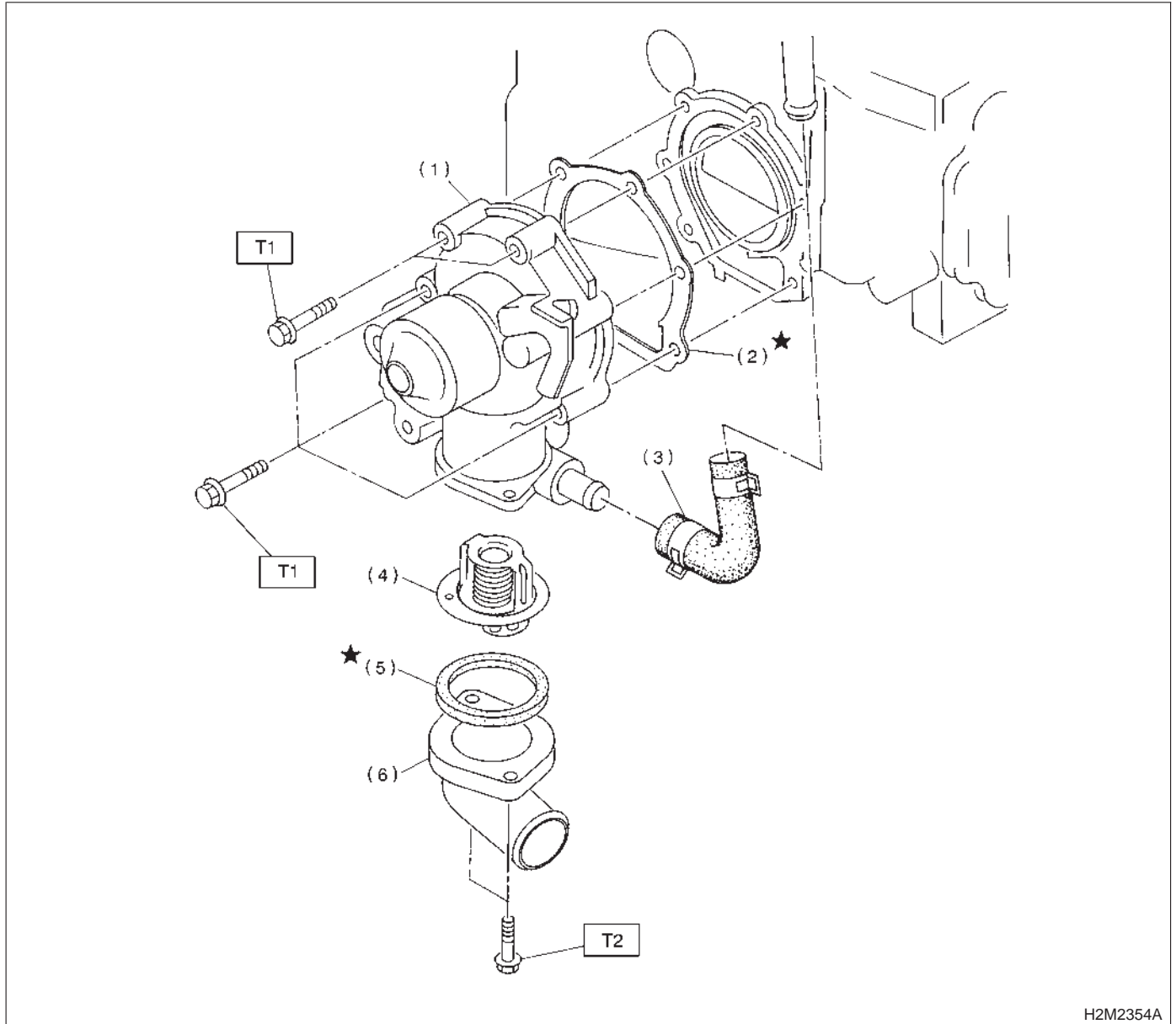
1. Specifications

Cooling system			Electric fan + Forced engine coolant circulation system
Total engine coolant capacity ℓ (US qt, Imp qt)			6.2 (6.6, 5.5)
Water pump	Type		Centrifugal impeller type
	Discharge performance I	Discharge	20 ℓ (5.3 US gal, 4.4 Imp gal)/min.
		Pump speed—total engine coolant head	760 rpm — 0.3 mAq (1.0 ftAq)
		Engine coolant temperature	85°C (185°F)
	Discharge performance II	Discharge	100 ℓ (26.4 US gal, 22.0 Imp gal)/min.
		Pump speed—total engine coolant head	3,000 rpm — 5.0 mAq (16.4 ftAq)
		Engine coolant temperature	85°C (185°F)
	Discharge performance III	Discharge	200 ℓ (52.8 US gal, 44.0 Imp gal)/min.
		Pump speed—total engine coolant head	6,000 rpm — 23.0 mAq (75.5 ftAq)
		Engine coolant temperature	85°C (185°F)
	Impeller diameter		76 mm (2.99 in)
	Number of impeller vanes		8
Pump pulley diameter		60 mm (2.36 in)	
Thermostat	Type		Wax pellet type
	Starts to open		76 — 80°C (169 — 176°F)
	Fully opened		91°C (196°F)
	Valve lift		9.0 mm (0.354 in) or more
	Valve bore		35 mm (1.38 in)
Radiator fan	Motor		70 W (main fan) 70 W (sub fan)
	Fan diameter × Blade		320 mm (12.60 in) × 5 (main fan) 320 mm (12.60 in) × 7 (sub fan)
Radiator	Type		Down flow, pressure type
	Core dimensions		691 × 340 × 16 mm (27.20 × 13.39 × 0.63 in)
	Pressure range in which cap valve is open		Above: 108±15 kPa (1.1±0.15 kg/cm ² , 15.6±2.1 psi) Below: −9.8 to −4.9 kPa (−0.1 to −0.05 kg/cm ² , −1.4 to −0.7 psi)
	Fins		Corrugated fin type
Reservoir tank	Capacity		0.45 ℓ (0.5 US qt, 0.4 Imp qt)

2. Service Data

Water pump	Clearance between impeller and case	Standard	0.5 — 0.7 mm (0.020 — 0.028 in)
		Limit	1.0 mm (0.039 in)
	"Thrust" runout of impeller end		0.5 mm (0.020 in)

1. Water Pump



H2M2354A

- (1) Water pump ASSY
- (2) Gasket
- (3) Heater hose
- (4) Thermostat
- (5) Gasket
- (6) Thermostat case

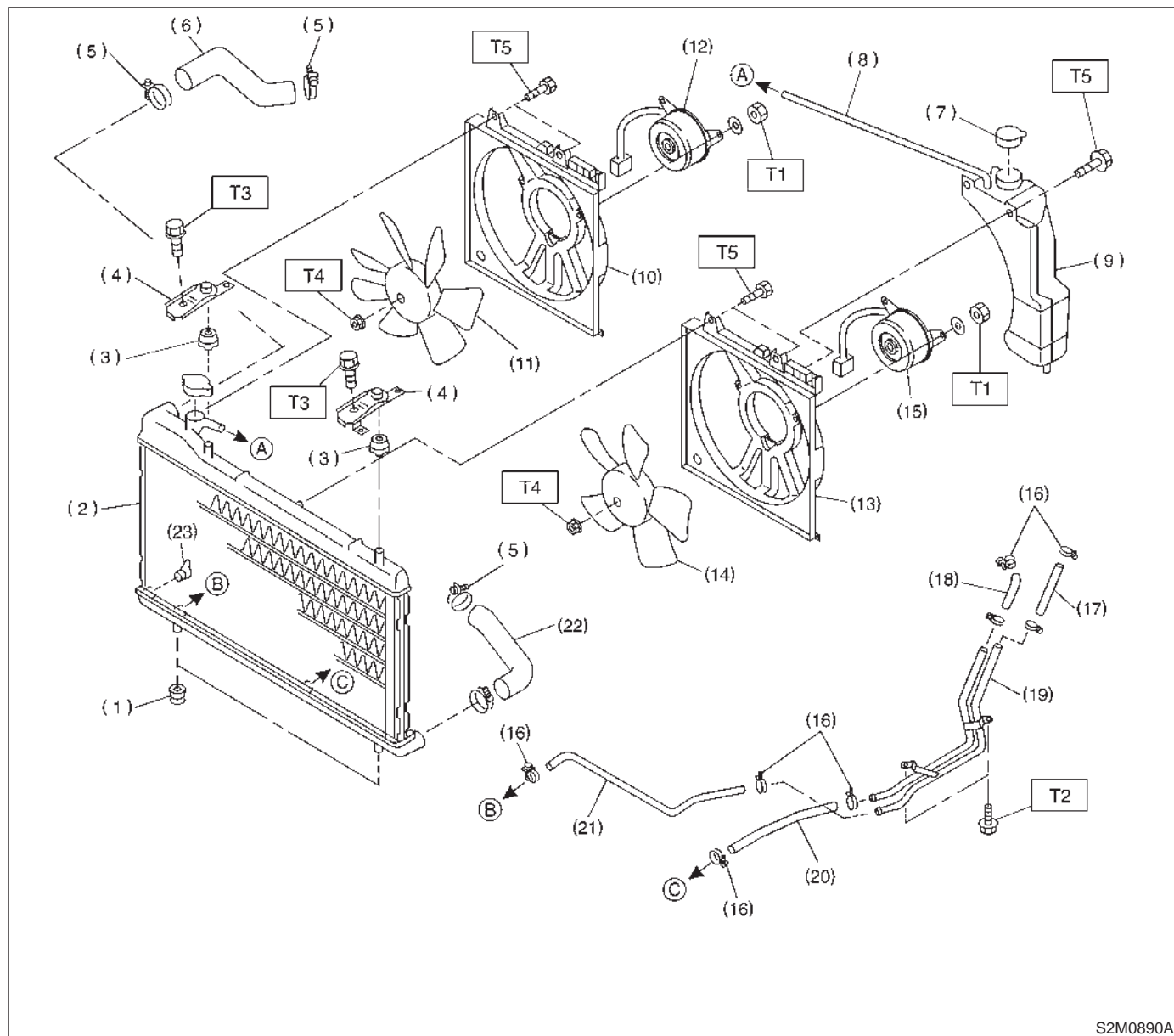
Tightening torque: N·m (kg·m, ft·lb)

**T1: First 10^{+4}_{-0} ($1.0^{+0.4}_{-0}$,
 $7.2^{+2.9}_{-0}$)**

**Second 10^{+4}_{-0} ($1.0^{+0.4}_{-0}$,
 $7.2^{+2.9}_{-0}$)**

T2: 6.4 ± 0.5 (0.65 ± 0.05 , 4.7 ± 0.4)

2. Radiator and Radiator Fan



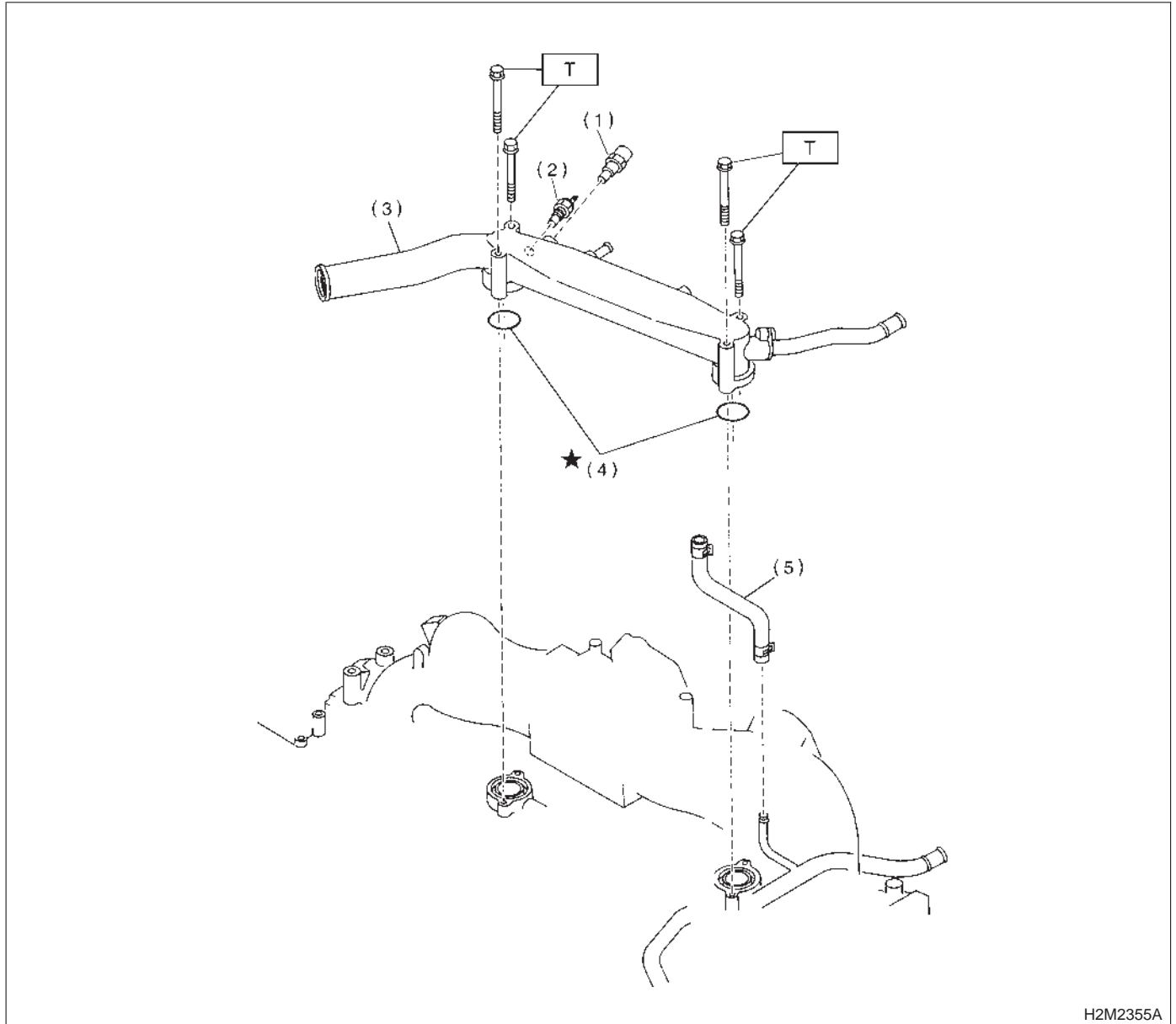
S2M0890A

- | | |
|---------------------------------------|---|
| (1) Radiator lower cushion | (13) Radiator main fan shroud |
| (2) Radiator | (14) Radiator main fan |
| (3) Radiator upper cushion | (15) Radiator main fan motor |
| (4) Radiator upper bracket | (16) ATF hose clamp (AT vehicles only) |
| (5) Clamp | (17) ATF inlet hose A (AT vehicles only) |
| (6) Radiator inlet hose | (18) ATF outlet hose A (AT vehicles only) |
| (7) Engine coolant reservoir tank cap | (19) ATF pipe (AT vehicles only) |
| (8) Over flow hose | (20) ATF outlet hose B (AT vehicles only) |
| (9) Engine coolant reservoir tank | |
| (10) Radiator sub fan shroud | |
| (11) Radiator sub fan | |
| (12) Radiator sub fan motor | |

- | |
|--|
| (21) ATF inlet hose B (AT vehicles only) |
| (22) Radiator outlet hose |
| (23) Radiator drain plug |

Tightening torque: N·m (kg·m, ft·lb)**T1: 4.4±0.5 (0.45±0.05, 3.3±0.4)****T2: 12±3 (1.2±0.3, 8.7±2.2)****T3: 18±5 (1.8±0.5, 13.0±3.6)****T4: 3.4±0.5 (0.35±0.05, 2.5±0.4)****T5: 4.9±1.5 (0.50±0.15, 3.6±1.1)**

3. Water Pipe



H2M2355A

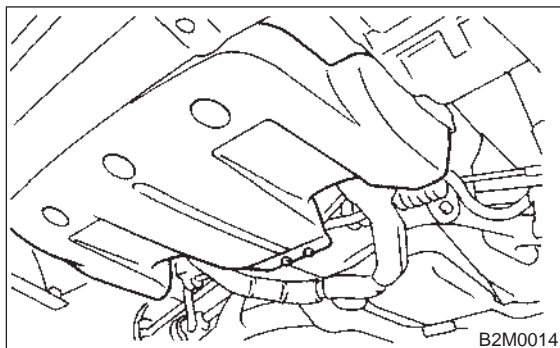
- | | |
|---------------------------------------|------------------|
| (1) Engine coolant temperature sensor | (3) Water pipe |
| (2) Engine coolant temperature gauge | (4) O-ring |
| | (5) By-pass hose |

Tightening torque: N-m (kg-m, ft-lb)
T: 6.4±0.5 (0.65±0.05, 4.7±0.4)

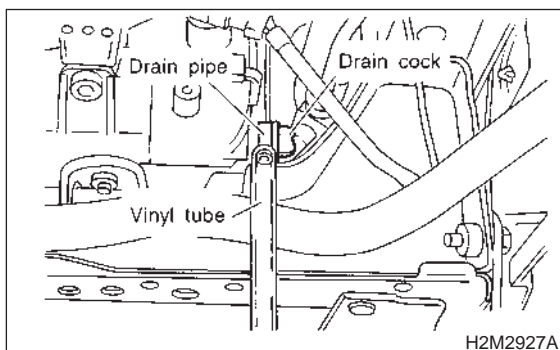
1. On-car Services

A: DRAINING OF ENGINE COOLANT

- 1) Lift-up the vehicle.
- 2) Remove under cover.



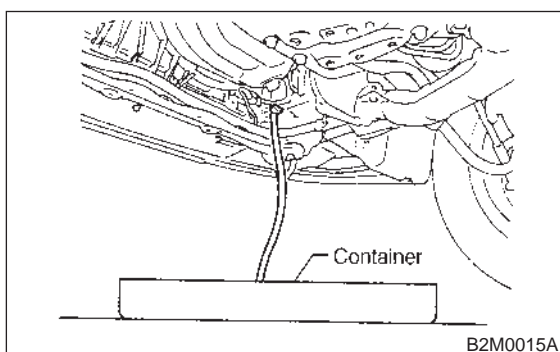
- 3) Fit vinyl tube to drain pipe.



- 4) Loosen drain cock to drain engine coolant into container.

NOTE:

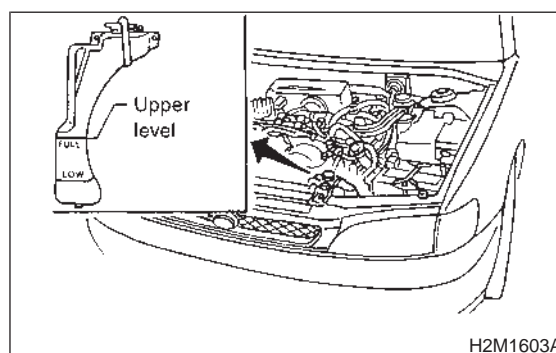
Remove radiator cap so that engine coolant will drain faster.



B: FILLING OF ENGINE COOLANT

- 1) Fill engine coolant into radiator up to filler neck position.

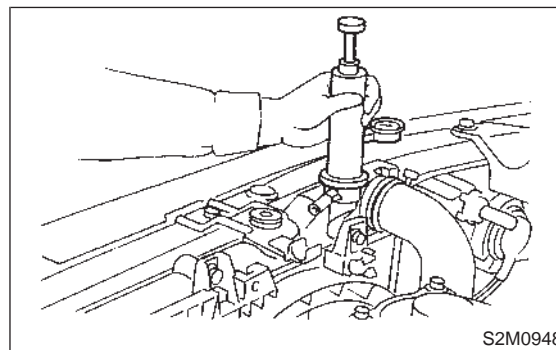
- 2) Fill engine coolant into reservoir tank up to upper level.



- 3) Attach radiator cap and reservoir tank cap properly.
- 4) Warm-up engine completely for more than five minutes at 2,000 to 3,000 rpm.
- 5) Stop engine and wait until temperature drops to a safe level.
- 6) If engine coolant level drops in radiator, add engine coolant to filler neck position.
- 7) If engine coolant level drops from upper level of reservoir tank, add engine coolant to upper level.
- 8) Attach radiator cap and reservoir tank cap properly.

C: CHECKING OF COOLING SYSTEM

- 1) Remove radiator cap, top off radiator, and attach tester to radiator in place of cap.
- 2) Apply a pressure of 157 kPa (1.6 kg/cm², 23 psi) to radiator to check if:
 - (1) Engine coolant leaks at/around radiator.
 - (2) Engine coolant leaks at/around hoses or connections.



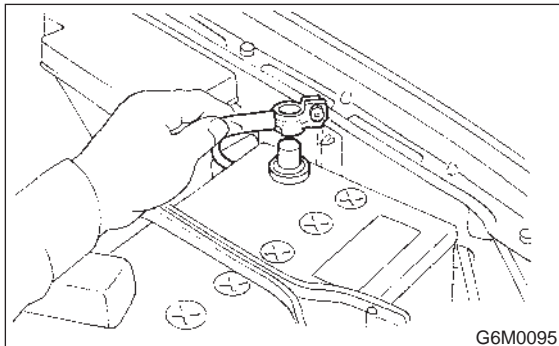
CAUTION:

- Engine should be off.
- Wipe engine coolant from check points in advance.
- Be careful to prevent engine coolant from spurting out when removing tester.
- Be careful also not to deform filler neck of radiator when installing or removing tester.

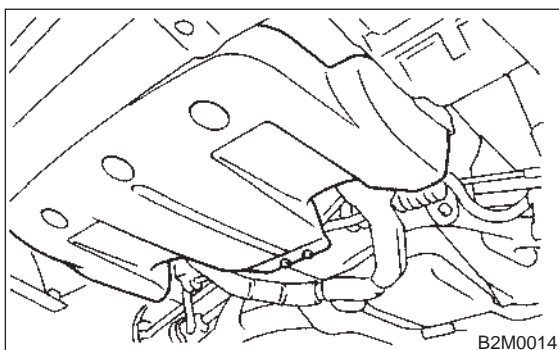
2. Water Pump

A: REMOVAL AND INSTALLATION

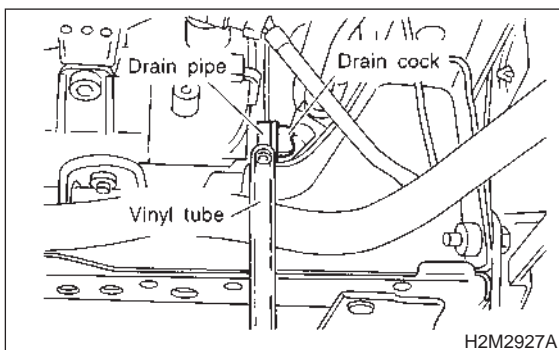
- 1) Disconnect ground cable from battery.



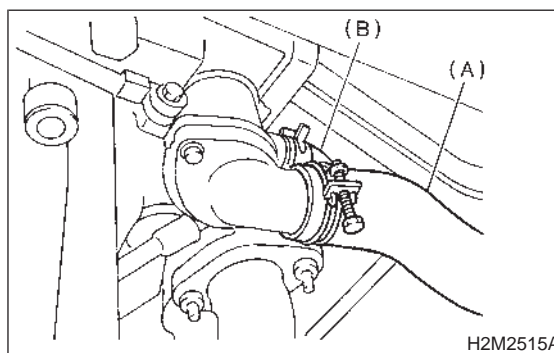
- 2) Lift-up the vehicle.
3) Remove under cover.



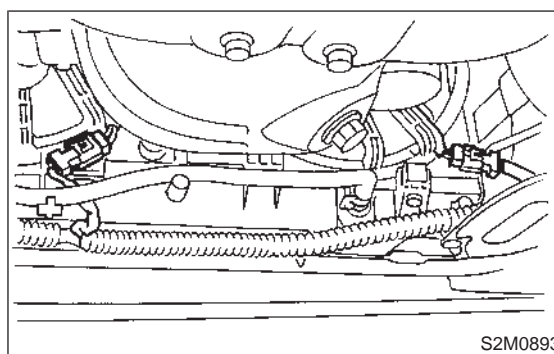
- 4) Drain engine coolant completely. <Ref. to 2-5 [W1A0].>



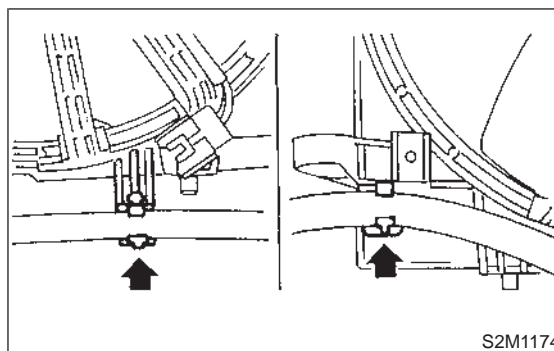
- 5) Disconnect radiator outlet hose (A) and heater by-pass hose (B) from water pump.



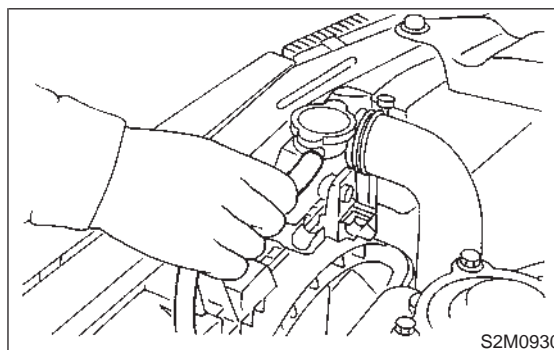
- 6) Disconnect connectors from radiator main fan (A) and sub fan (B) motors.



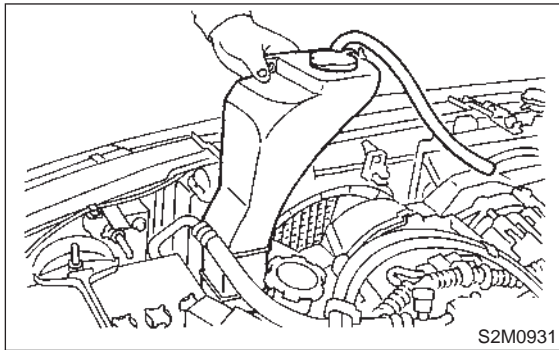
- 7) Detach ATF cooler hose attached to 2 clips under the radiator main fan shroud.



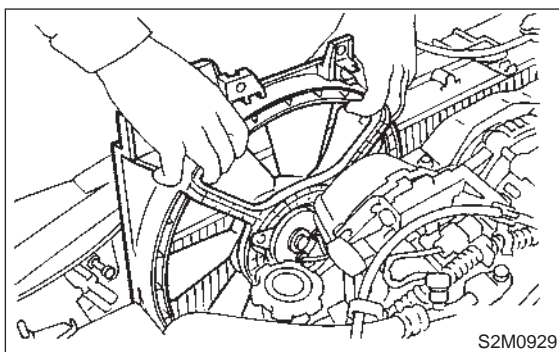
- 8) Lower the vehicles.
9) Disconnect over flow hose.



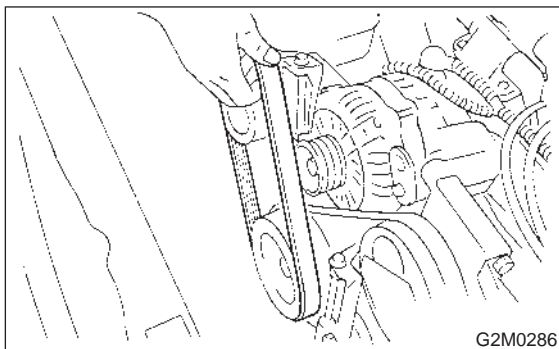
10) Remove reservoir tank.



11) Remove radiator main fan and sub fan motor assembly.
<Ref. to 2-5 [W6A0].> and <Ref. to 2-5 [W7A0].>

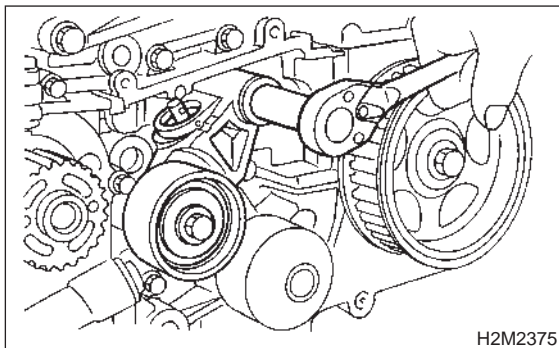


12) Remove V-belts.
<Ref. to 1-5 [G200].>

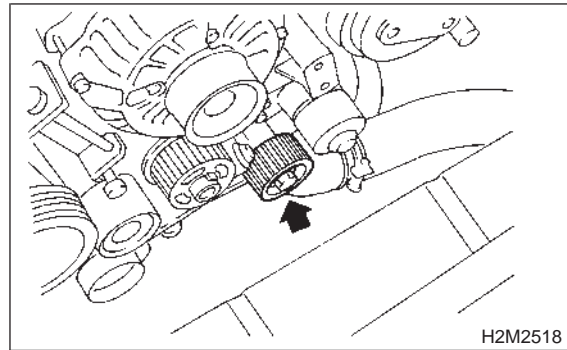


13) Remove timing belt.
<Ref. to 2-3 [W2A0].>

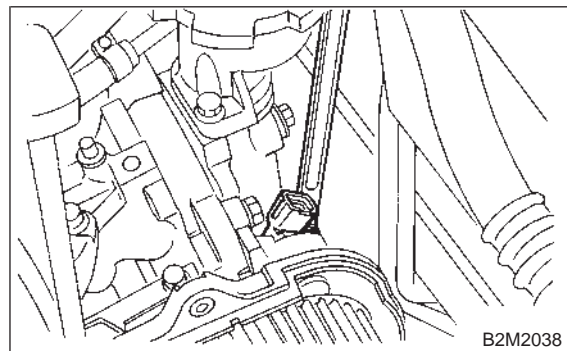
14) Remove automatic belt tension adjuster.



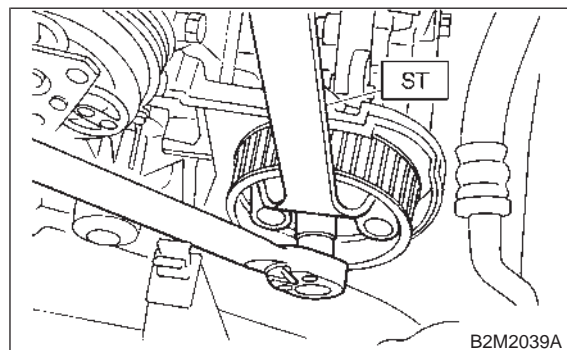
15) Remove belt idler No. 2.



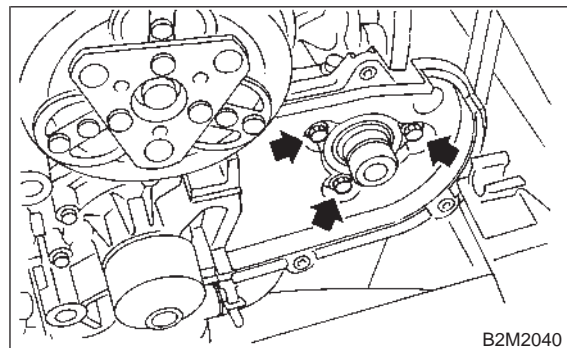
16) Remove camshaft position sensor.
<Ref. to 2-7 [W10A0].>



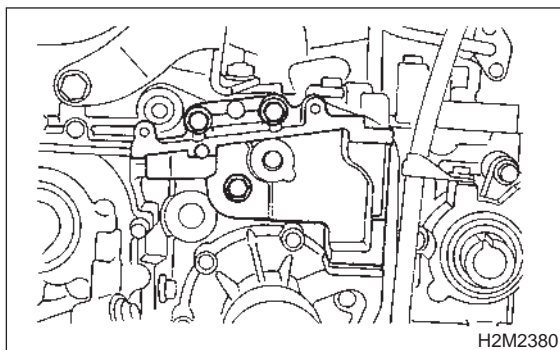
17) Remove left-hand camshaft sprocket by using
ST.
ST 499207100 CAMSHAFT SPROCKET
WRENCH



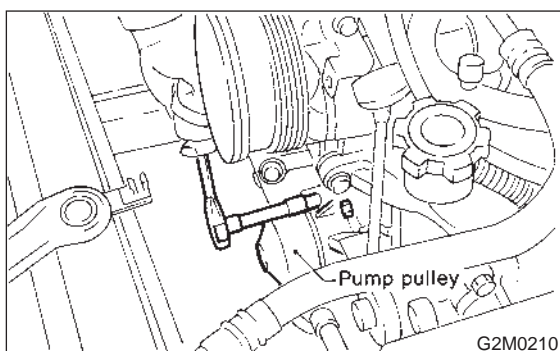
18) Remove left-hand belt cover No. 2.



- 19) Remove tensioner bracket.



- 20) Remove tensioner bracket.
21) Disconnect heater hose from water pump.
22) Remove water pump.



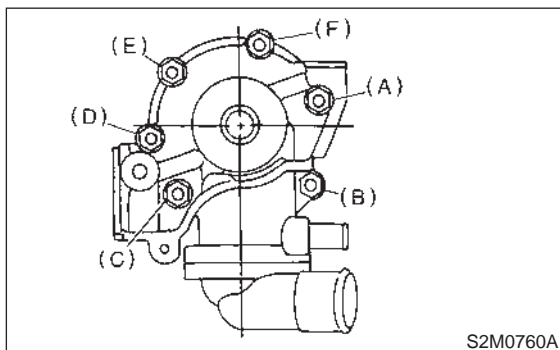
- 23) Installation is in the reverse order of removal.

CAUTION:

- Replace gasket with a new one.
- When installing water pump, tighten bolts in two stages in alphabetical sequence as shown in figure.

Tightening torque:

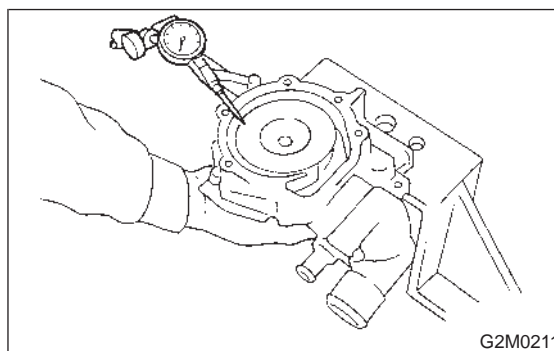
10^{+4}_{-0} N·m ($1.0^{+0.4}_{-0}$ kg-m, $7.2^{+2.9}_{-0}$ ft-lb)



B: INSPECTION

- 1) Check water pump bearing for smooth rotation.
- 2) Check water pump pulley for abnormalities.
- 3) Using a dial gauge, measure impeller runout in thrust direction while rotating the pulley.

“Thrust” runout limit:
0.5 mm (0.020 in)



- 4) Check clearance between impeller and pump case.

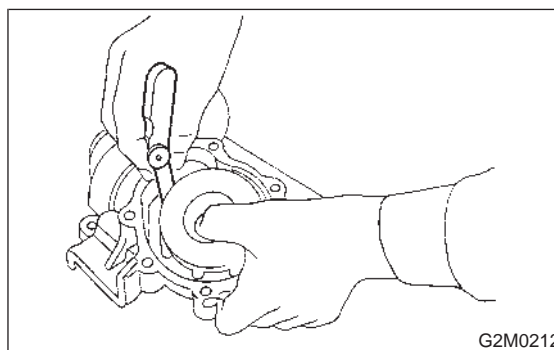
Clearance between impeller and pump case:

Standard

0.5 — 0.7 mm (0.020 — 0.028 in)

Limit

1.0 mm (0.039 in)

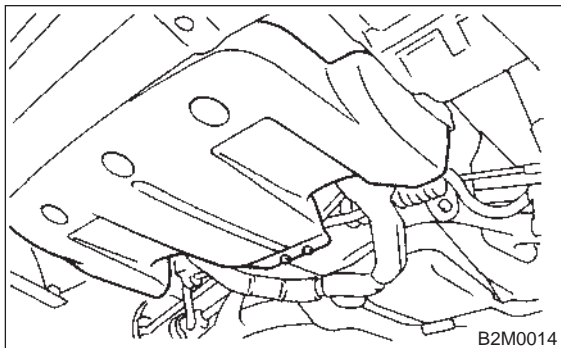


- 5) After water pump installation, check pulley shaft for engine coolant leaks. If leaks are noted, replace water pump assembly.

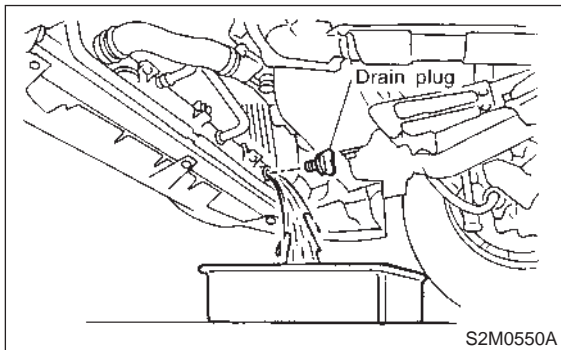
3. Thermostat

A: REMOVAL AND INSTALLATION

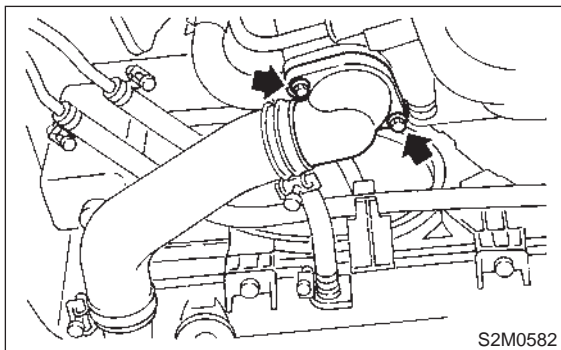
- 1) Lift-up the vehicle.
- 2) Remove under cover.



- 3) Drain engine coolant completely. <Ref. to 2-5 [W1A0].>



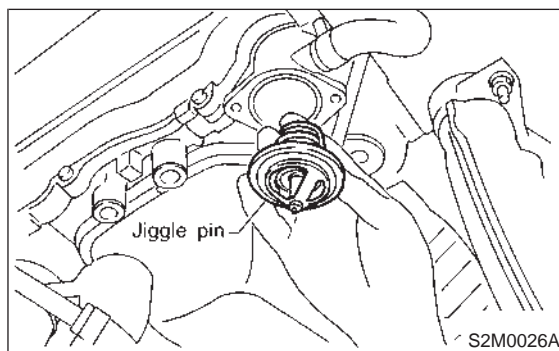
- 4) Remove thermostat cover and gasket, and pull out the thermostat.



- 5) Install the thermostat in the intake manifold, and install the thermostat cover together with a gasket.

CAUTION:

- When reinstalling the thermostat, use a new gasket.
- The thermostat must be installed with the jiggle pin upward.
- In this time, set the jiggle pin of thermostat for front side.



B: INSPECTION

Replace the thermostat if the valve does not close completely at an ambient temperature or if the following test shows unsatisfactory results.

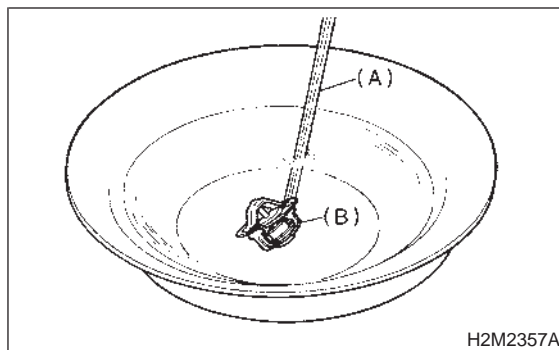
Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and measure the temperature and valve lift when the valve begins to open and when the valve is fully opened. During the test, agitate the water for even temperature distribution. The measurement should be to the specification.

Starts to open:

76.0 — 80.0°C (169 — 176°F)

Fully opens:

91°C (196°F)

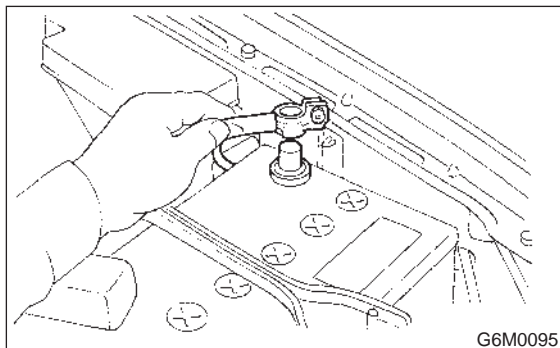


- (A) Thermometer
(B) Thermostat

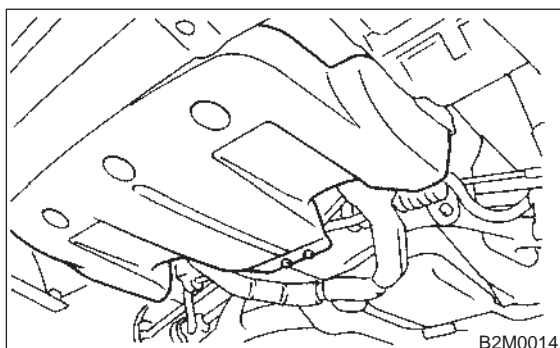
4. Radiator

A: REMOVAL

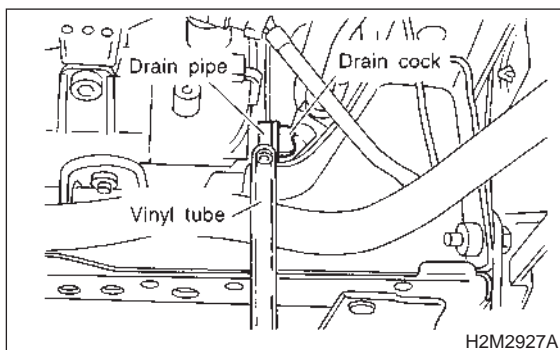
- 1) Disconnect battery ground cable.



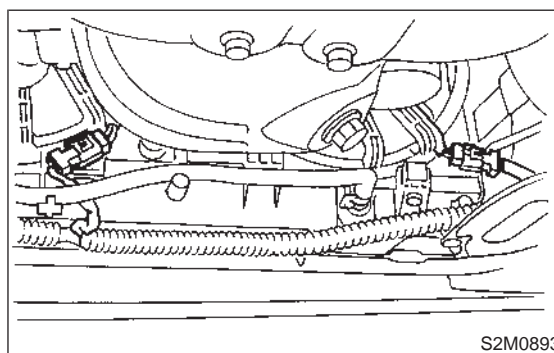
- 2) Lift-up the vehicle.
- 3) Remove under cover.



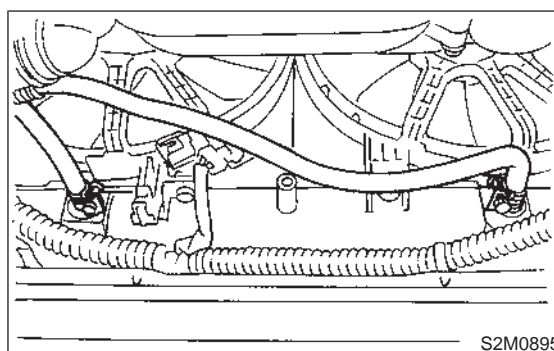
- 4) Drain engine coolant completely. <Ref. to 2-5 [W1A0].>



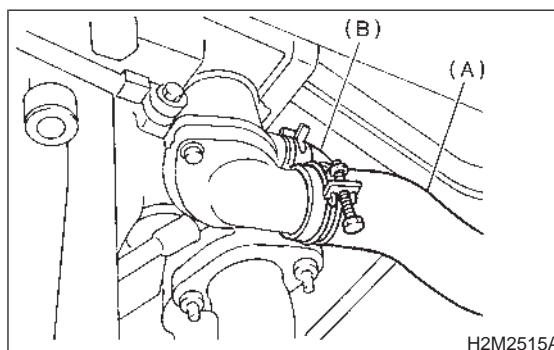
- 5) Disconnect connectors of radiator main fan and sub fan motor.



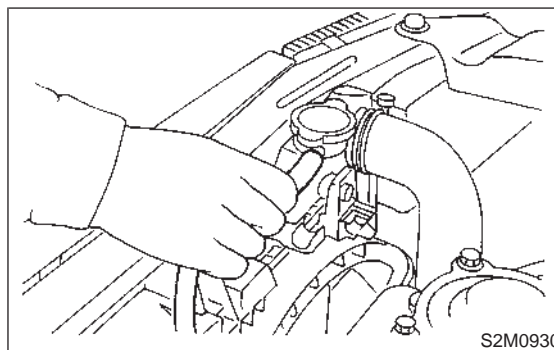
- 6) Disconnect ATF cooler hoses from radiator. (AT vehicles only)



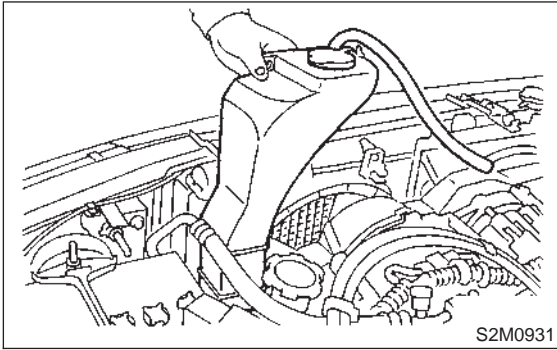
- 7) Disconnect radiator outlet hose (A) and water by-pass hose (B) (AT vehicles) from thermostat cover.



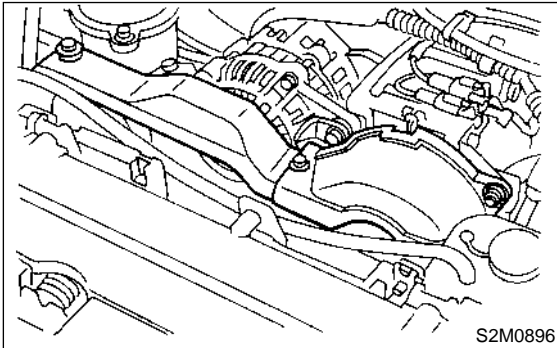
- 8) Lower the vehicle.
- 9) Disconnect over flow hose.



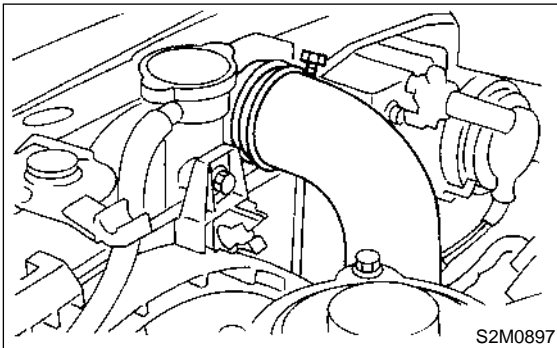
- 10) Remove reservoir tank.



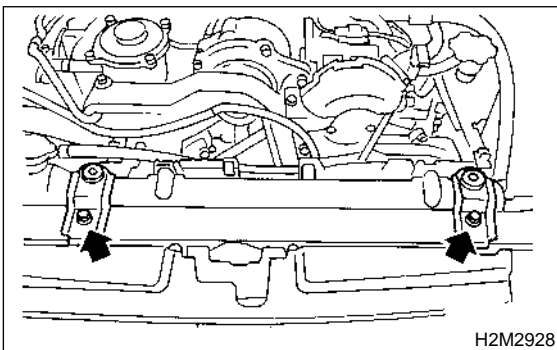
- 11) Remove V-belt covers.



- 12) Disconnect radiator inlet hose from radiator.

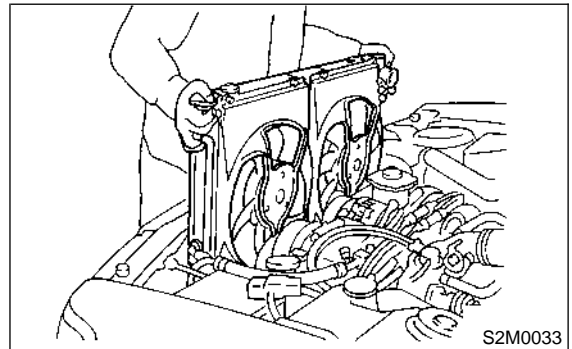


- 13) Remove radiator upper brackets.



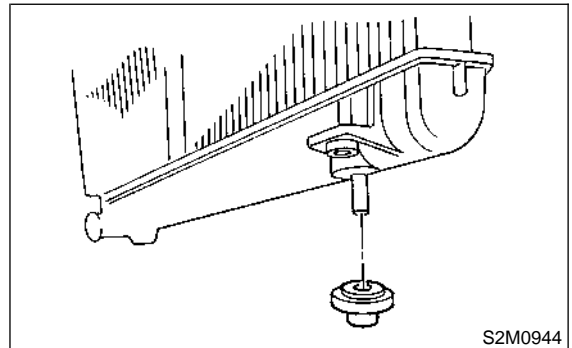
- 14) While slightly lifting radiator, slide it to left.

- 15) Lift radiator up and away from vehicle.



B: INSTALLATION

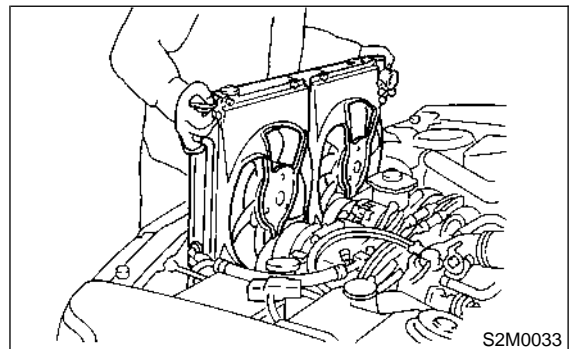
- 1) Attach radiator mounting cushions to pins on the lower side of radiator.



- 2) Install radiator while fitting radiator pins to cushions.

NOTE:

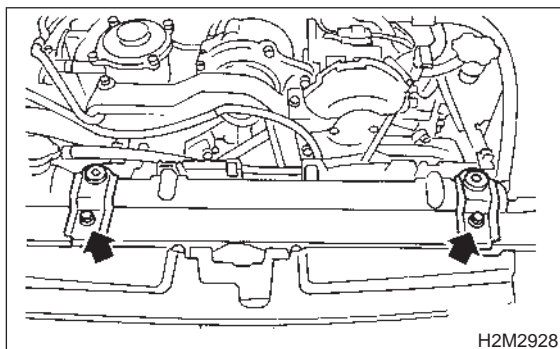
Fit cushion on lower side of radiator into holes on body side.



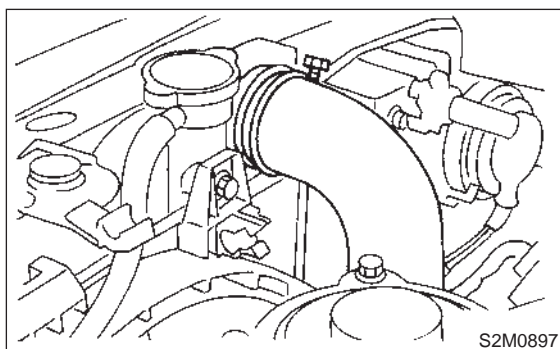
- 3) Install radiator brackets and tighten bolts.

Tightening torque:

$18 \pm 5 \text{ N}\cdot\text{m}$ ($1.8 \pm 0.5 \text{ kg}\cdot\text{m}$, $13.0 \pm 3.6 \text{ ft}\cdot\text{lb}$)



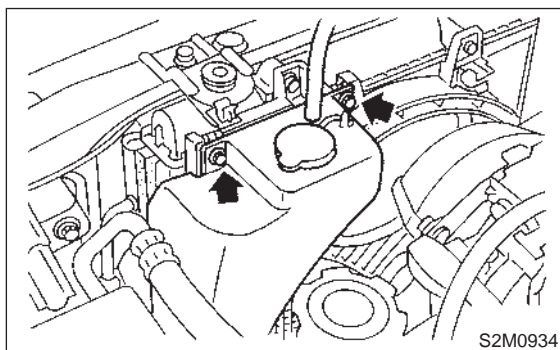
- 4) Connect radiator inlet hose.



- 5) Install reservoir tank.

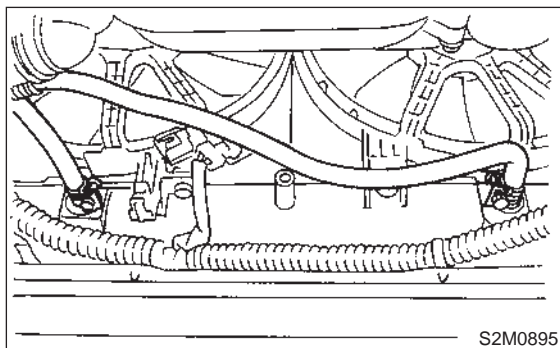
Tightening torque:

$4.9 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.50 \pm 0.15 \text{ kg}\cdot\text{m}$, $3.6 \pm 1.1 \text{ ft}\cdot\text{lb}$)

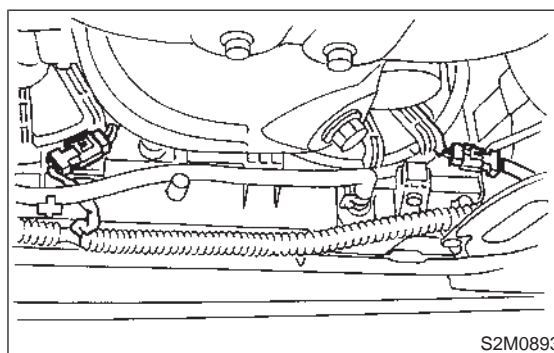


- 6) Lift-up the vehicle.

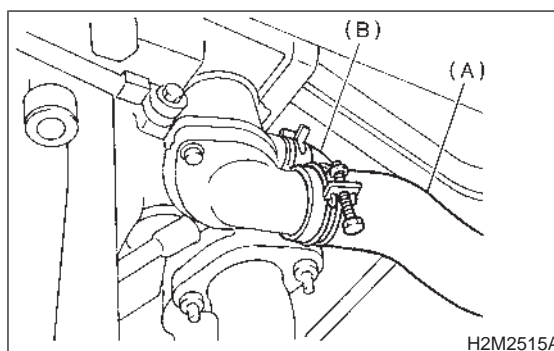
- 7) Connect ATF cooler hoses. (AT vehicles only)



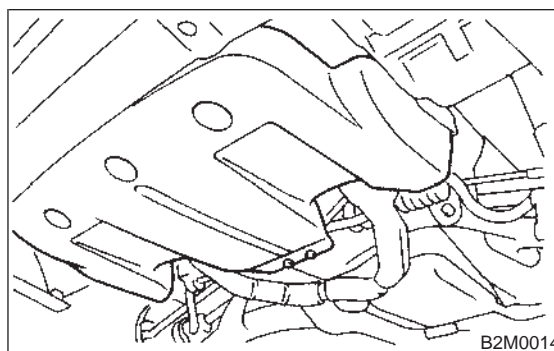
- 8) Connect connectors to radiator main fan motor and sub fan motor.



- 9) Connect radiator outlet hose (A) and water by-pass hose (B) (AT vehicles)

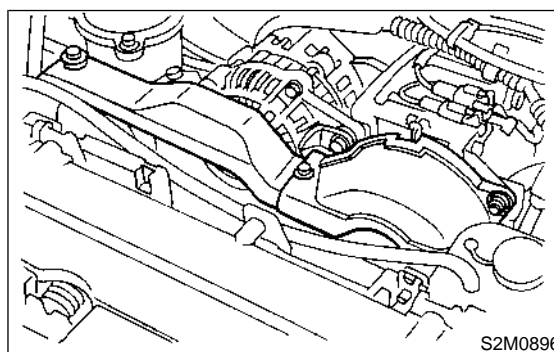


- 10) Install under cover.

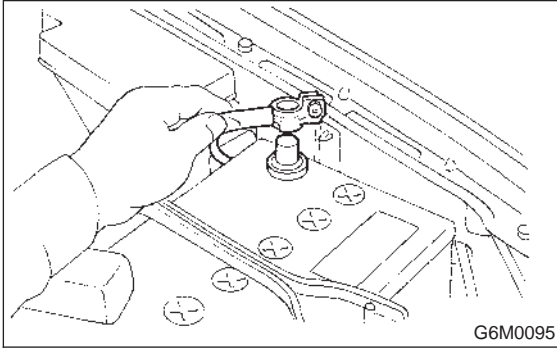


- 11) Lower the vehicle.

- 12) Install V-belt covers.



13) Connect battery ground cable.

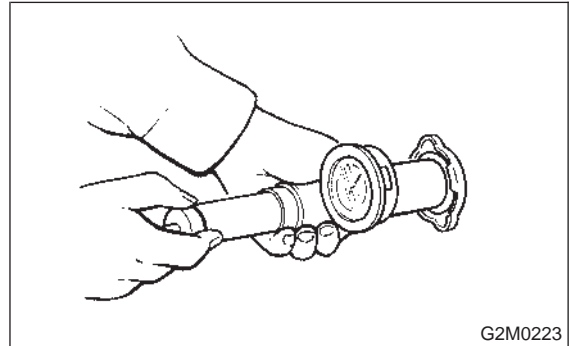


14) Fill coolant. <Ref. to 2-5 [W1B0].>

5. Radiator Cap

A: INSPECTION

1) Attach radiator cap to tester.



2) Increase pressure until tester gauge pointer stops. Radiator cap is functioning properly if it holds the service limit pressure for five to six seconds.

Standard pressure:

93 — 123 kPa (0.95 — 1.25 kg/cm², 14 — 18 psi)

Service limit pressure:

83 kPa (0.85 kg/cm², 12 psi)

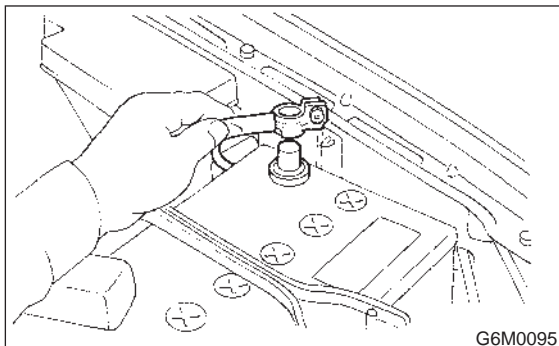
CAUTION:

Be sure to remove foreign matter and rust from the cap in advance; otherwise, results of pressure test will be incorrect.

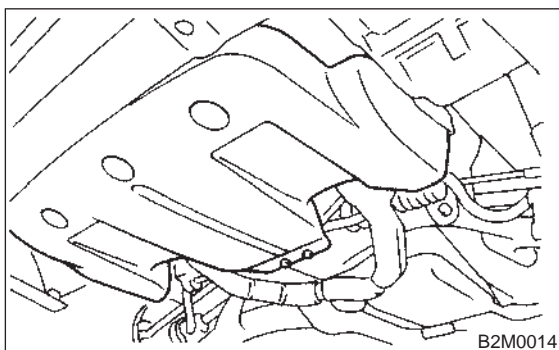
6. Radiator Main Fan and Fan Motor

A: REMOVAL AND INSTALLATION

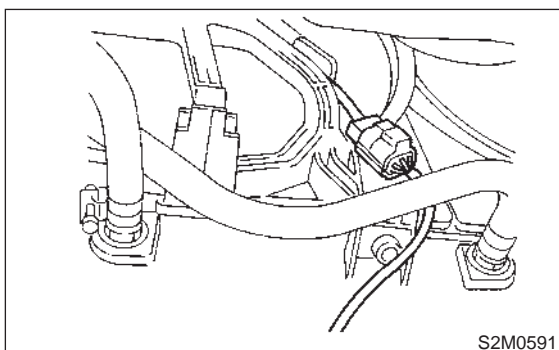
- 1) Disconnect battery ground cable.



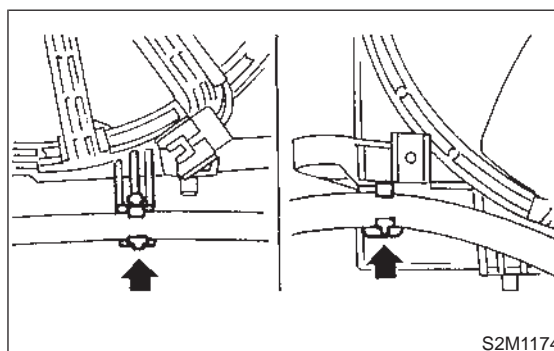
- 2) Lift-up the vehicle.
- 3) Remove under cover.



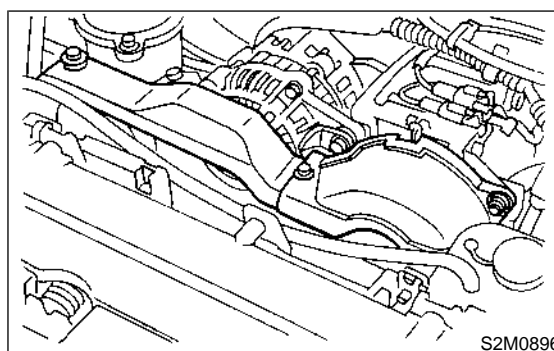
- 4) Disconnect connector of main fan motor.



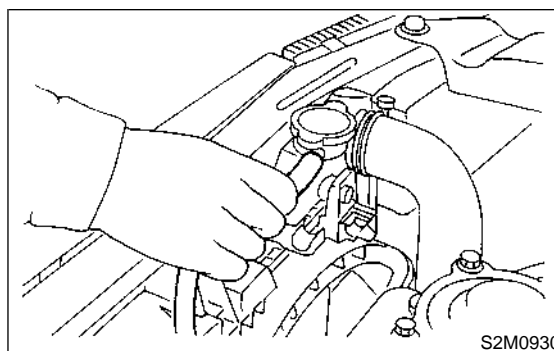
- 5) Detach ATF cooler hose attached to 2 clips under the radiator main fan shroud.



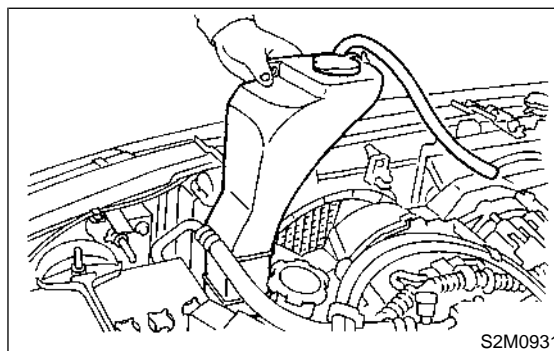
- 6) Lower the vehicle.
- 7) Remove V-belt covers.



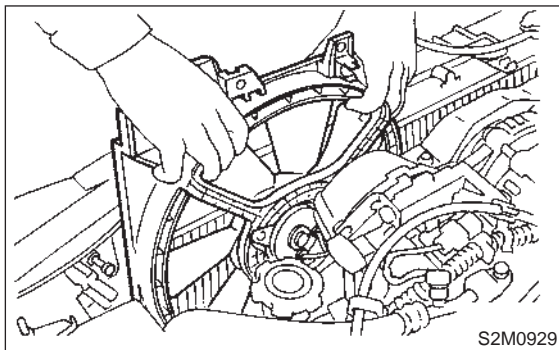
- 8) Disconnect over flow hose.



- 9) Remove reservoir tank.



10) Remove radiator main fan motor assembly.



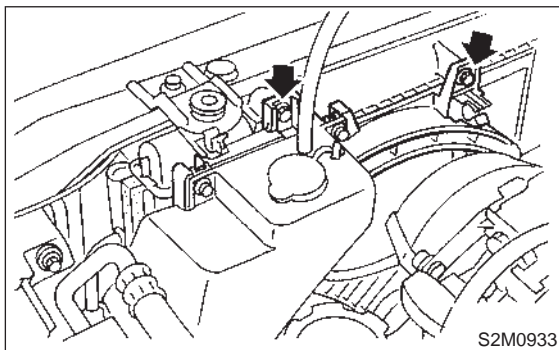
11) Installation is in the reverse order of removal.

NOTE:

When the main fan motor assembly cannot be installed as is, loosen the sub fan motor assembly securing bolts to install it. <Ref. to 2-5 [W7A0].>

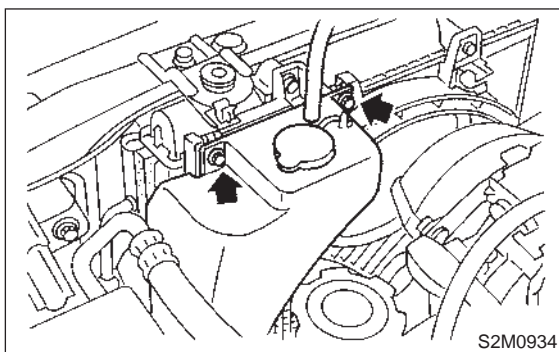
Tightening torque:

$4.9 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.50 \pm 0.15 \text{ kg}\cdot\text{m}$, $3.6 \pm 1.1 \text{ ft}\cdot\text{lb}$)



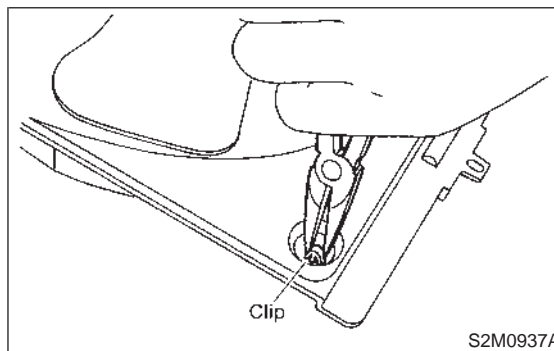
Tightening torque:

$4.9 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.50 \pm 0.15 \text{ kg}\cdot\text{m}$, $3.6 \pm 1.1 \text{ ft}\cdot\text{lb}$)

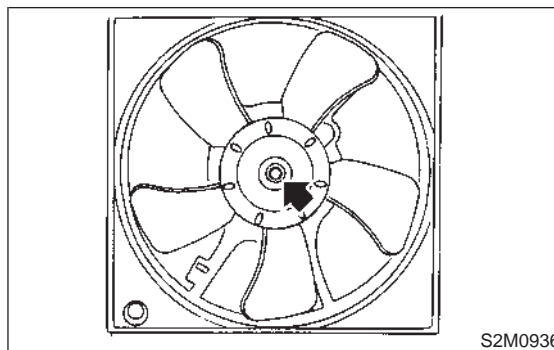


B: DISASSEMBLY AND ASSEMBLY

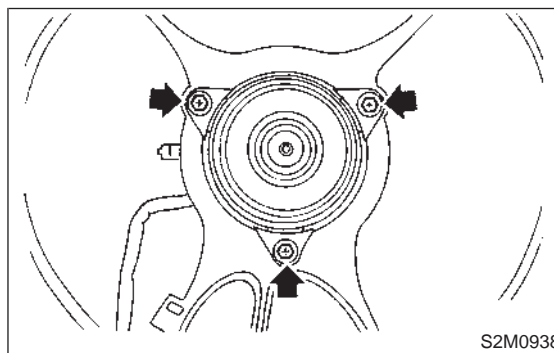
1) Remove clip which holds motor connector onto shroud.



2) Remove bolt which install fan itself onto fan motor and shroud assembly.



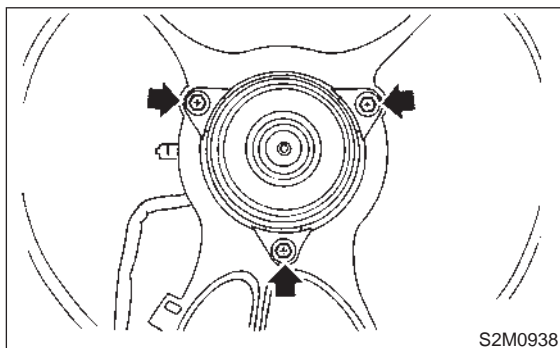
3) Remove bolts which install fan motor onto shroud.



4) Installation is in the reverse order of removal.

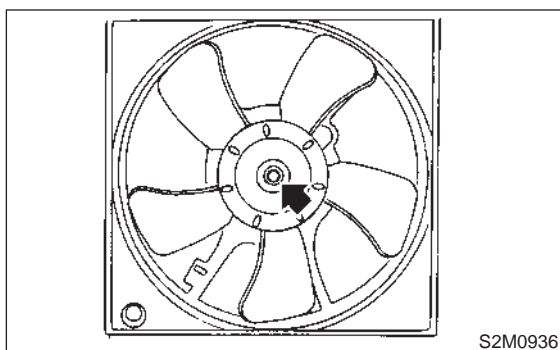
Tightening torque:

$4.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.45 \pm 0.05 \text{ kg}\cdot\text{m}$, $3.3 \pm 0.4 \text{ ft}\cdot\text{lb}$)



Tightening torque:

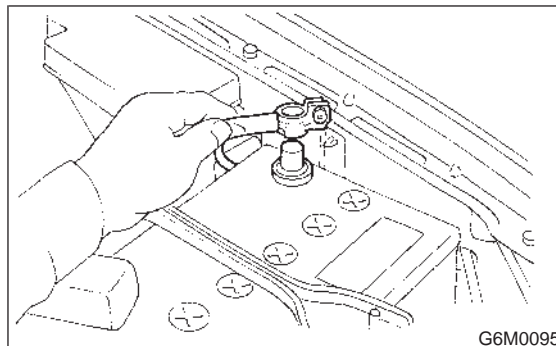
$3.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.35 \pm 0.05 \text{ kg}\cdot\text{m}$, $2.5 \pm 0.4 \text{ ft}\cdot\text{lb}$)



7. Radiator Sub Fan and Fan Motor

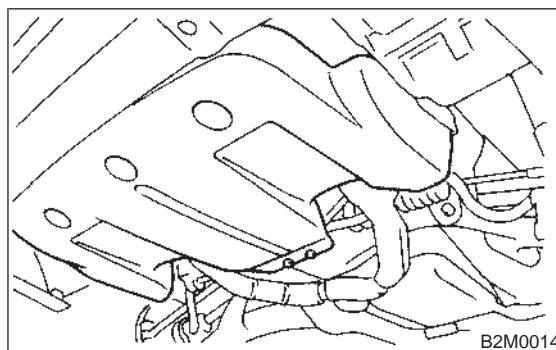
A: REMOVAL AND INSTALLATION

1) Disconnect battery ground cable.

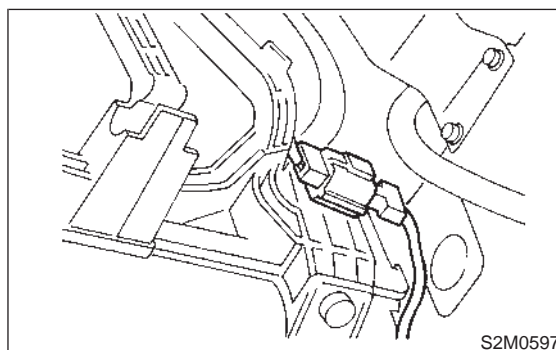


2) Lift-up the vehicle.

3) Remove under cover.

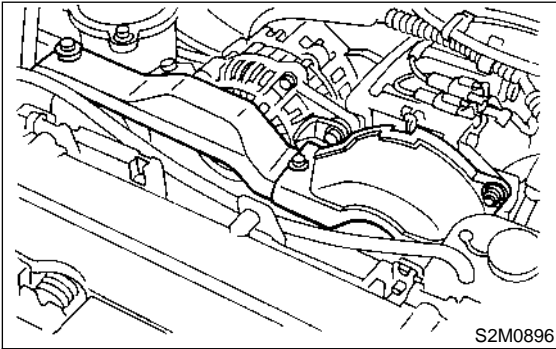


4) Disconnect connector of sub fan motor.

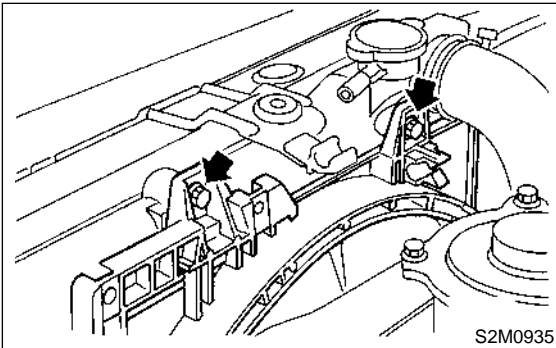


7. Radiator Sub Fan and Fan Motor

- 5) Lower the vehicle.
- 6) Remove V-belt covers.



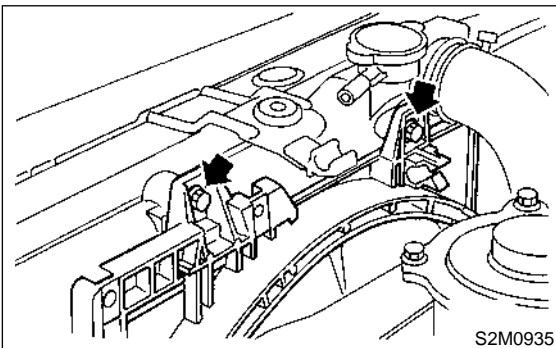
- 7) Remove bolts which hold sub fan shroud to radiator.
- 8) Remove radiator sub fan motor assembly.



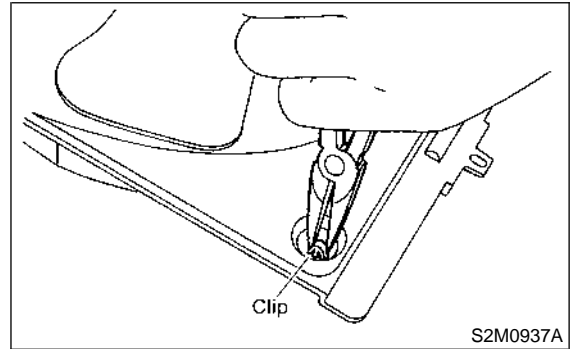
- 9) Installation is in the reverse order of removal.

Tightening torque:

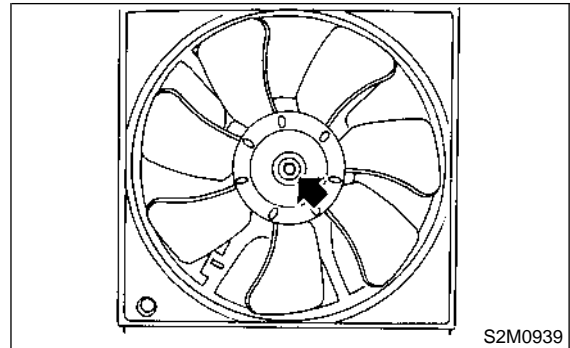
$4.9 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.50 \pm 0.15 \text{ kg}\cdot\text{m}$, $3.6 \pm 1.1 \text{ ft}\cdot\text{lb}$)

**B: DISASSEMBLY AND ASSEMBLY**

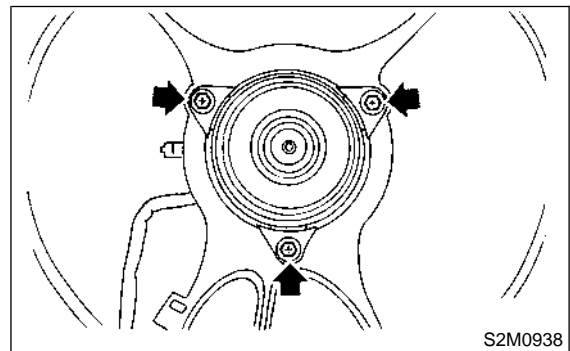
- 1) Remove clip which holds motor harness onto shroud.



- 2) Remove nut which install fan itself onto fan motor and shroud assembly.



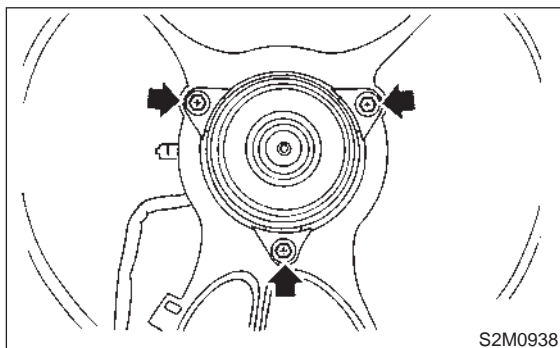
- 3) Remove bolts which install fan motor onto shroud.



4) Installation is in the reverse order of removal.

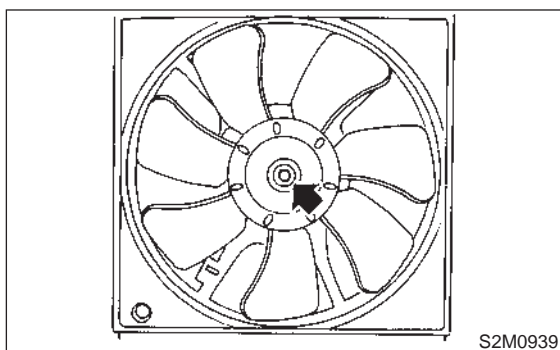
Tightening torque:

$4.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.45 \pm 0.05 \text{ kg}\cdot\text{m}$, $3.3 \pm 0.4 \text{ ft}\cdot\text{lb}$)



Tightening torque:

$3.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.35 \pm 0.05 \text{ kg}\cdot\text{m}$, $2.5 \pm 0.4 \text{ ft}\cdot\text{lb}$)



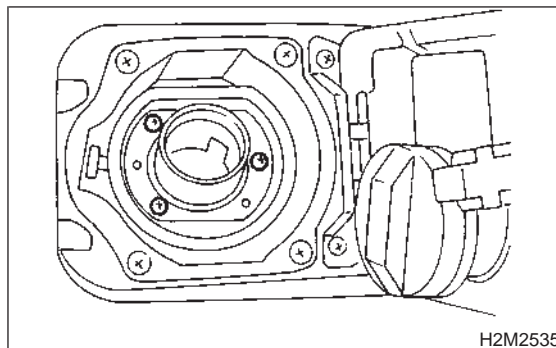
8. Water Pipe

A: REMOVAL

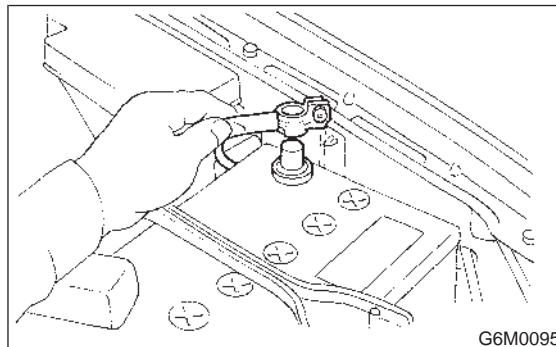
1) Release fuel pressure.

<Ref. to 2-8 [W1B0].>

2) Open fuel flap lid, and remove fuel filler cap.

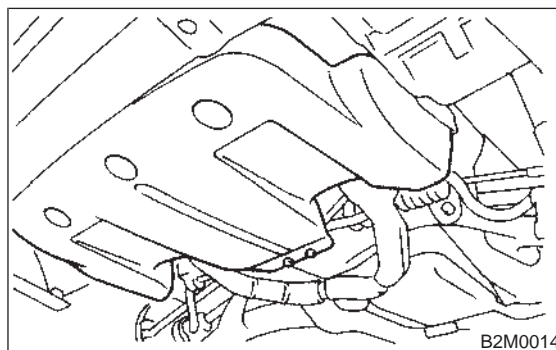


3) Disconnect ground cable from battery.

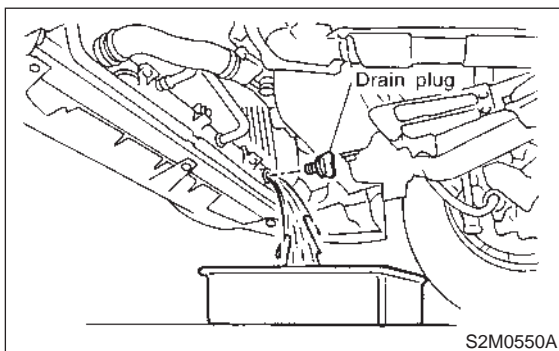


4) Lift-up the vehicle.

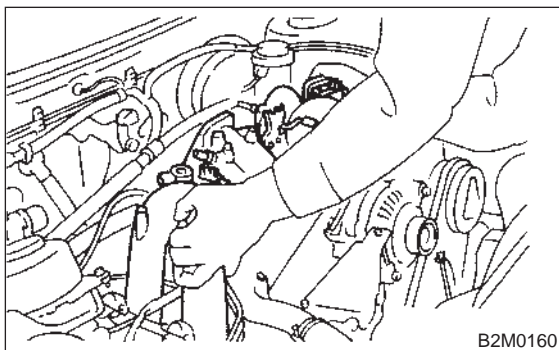
5) Remove under cover.



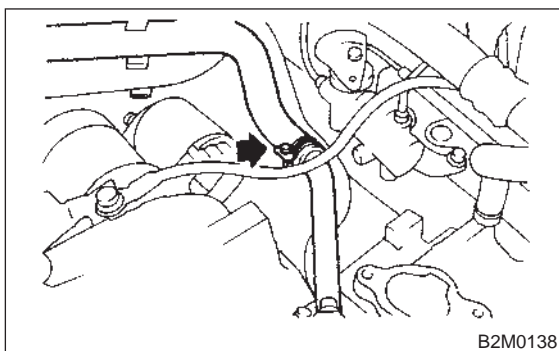
- 6) Drain engine coolant completely.
<Ref. to 2-5 [W1A0].>



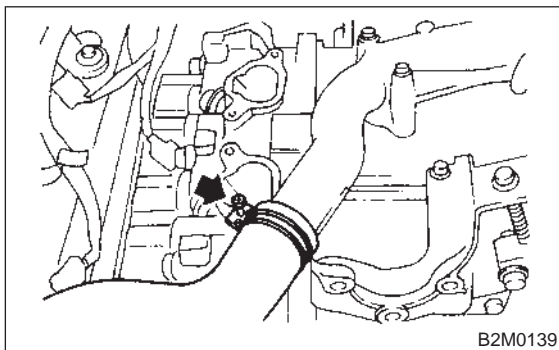
- 7) Lower the vehicle.
8) Remove intake manifold.
<Ref. to 2-7 [W4A0].>



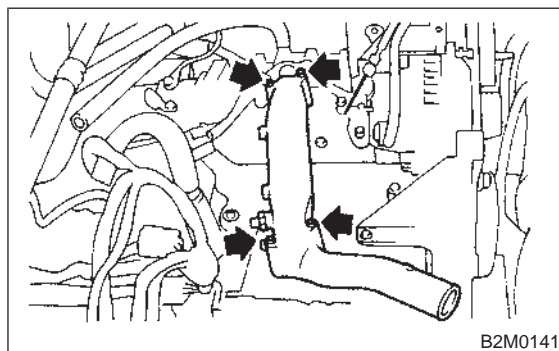
- 9) Disconnect heater inlet hose.



- 10) Disconnect radiator inlet hose from water pipe.



- 11) Remove bolts which install water pipe on cylinder block.



B: INSTALLATION

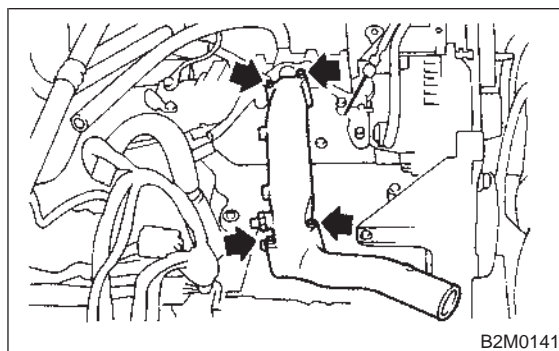
- 1) Install water pipe on cylinder block.

Tightening torque:

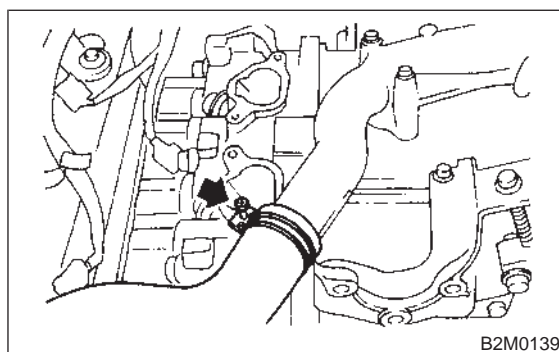
6.4 ± 0.5 N·m (0.65 ± 0.05 kg·m, 4.7 ± 0.4 ft·lb)

CAUTION:

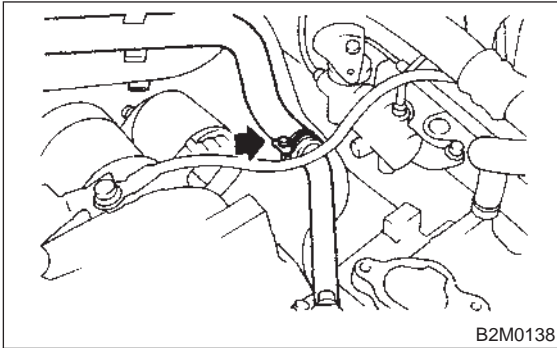
Use a new O-ring.



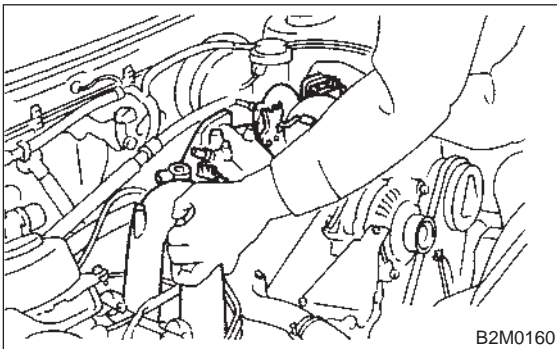
- 2) Connect radiator inlet hose.



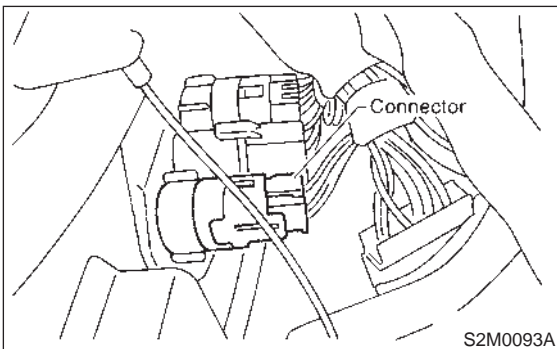
- 3) Connect heater inlet hose.



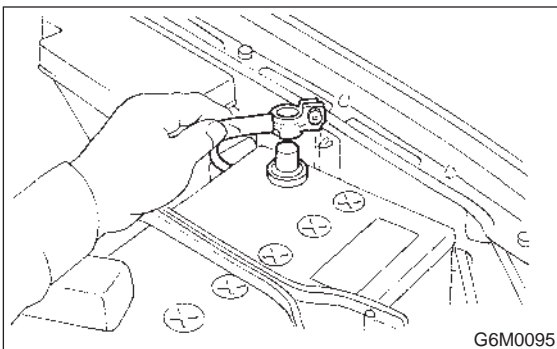
- 4) Install intake manifold.
<Ref. to 2-7 [W4D0].>



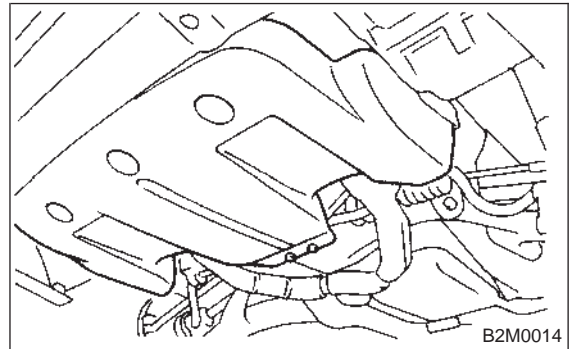
- 5) Connect connector to fuel pump relay.



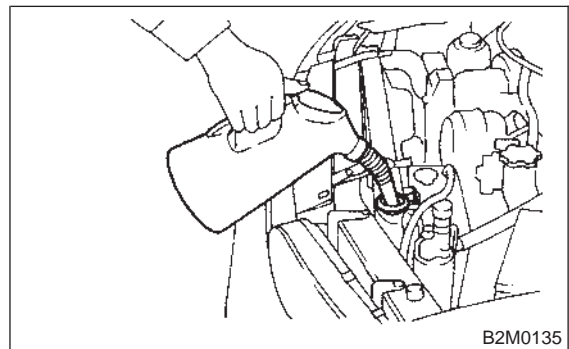
- 6) Connect ground cable to battery.



- 7) Lift-up the vehicle.
8) Install under cover.



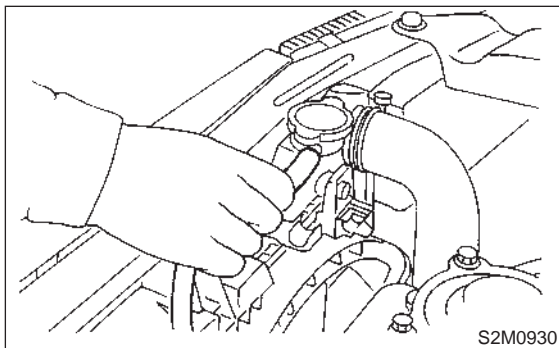
- 9) Lower the vehicle.
10) Fill coolant.
<Ref. to 2-5 [W1B0].>



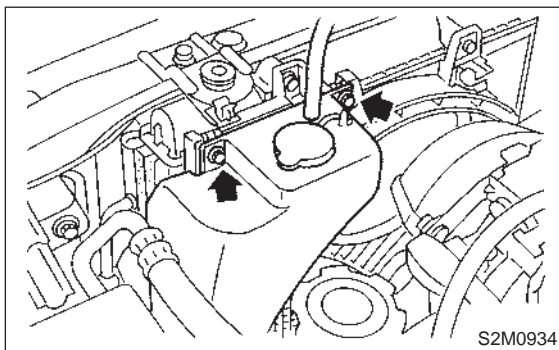
9. Reservoir Tank

A: REMOVAL AND INSTALLATION

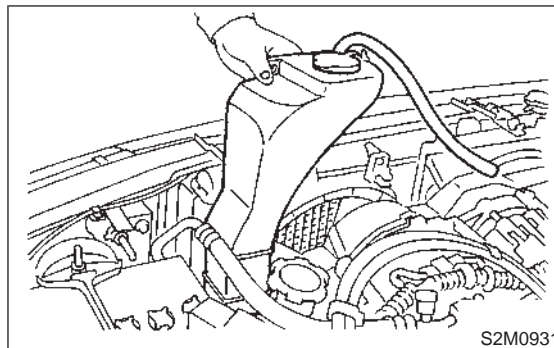
1) Disconnect over flow hose from radiator filler neck position.



2) Remove bolts which install reservoir tank onto radiator main fan shroud.



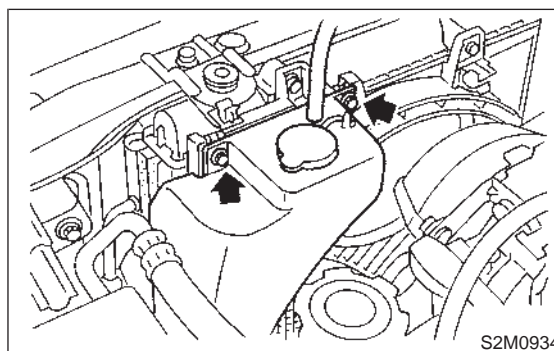
3) Remove reservoir tank.



4) Installation is in the reverse order of removal.

Tightening torque:

$4.9 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.50 \pm 0.15 \text{ kg}\cdot\text{m}$, $3.6 \pm 1.1 \text{ ft}\cdot\text{lb}$)

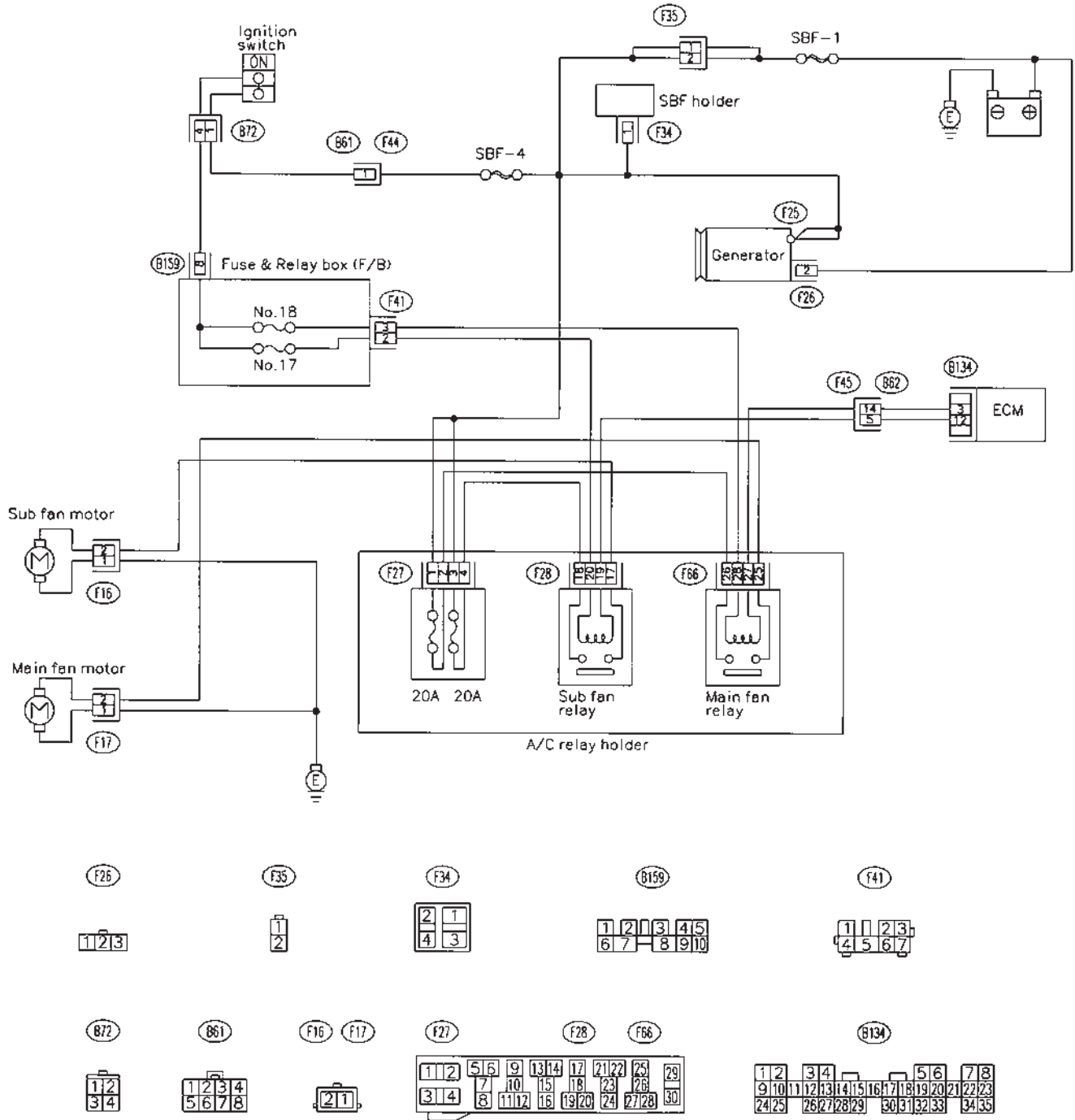


ENGINE COOLING SYSTEM

2-5

	Page
T DIAGNOSTICS	2
1. Wiring Diagram.....	2
2. Radiator Main Fan.....	3
3. Radiator Sub Fan (With A/C model only)	7

1. Wiring Diagram



2. Radiator Main Fan

A: OPERATION

DETECTING CONDITION:

Condition:

- Engine coolant temperature is above 95°C (203°F).
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOM:

- Radiator main fan does not rotate under the above conditions.

2A1 : CHECK POWER SUPPLY TO MAIN FAN MOTOR.

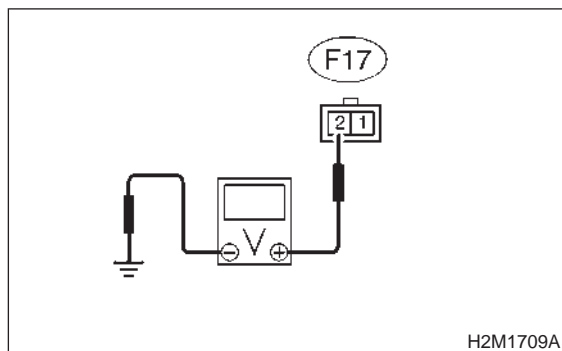
CAUTION:

Be careful not to overheat engine during repair.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from main fan motor.
- 3) Start the engine, and warm it up until engine coolant temperature increases over 95°C (203°F).
- 4) Stop the engine and turn ignition switch to ON.
- 5) Measure voltage between main fan motor connector and chassis ground.

Connector & terminal

(F17) No. 2 (+) — Chassis ground (-):



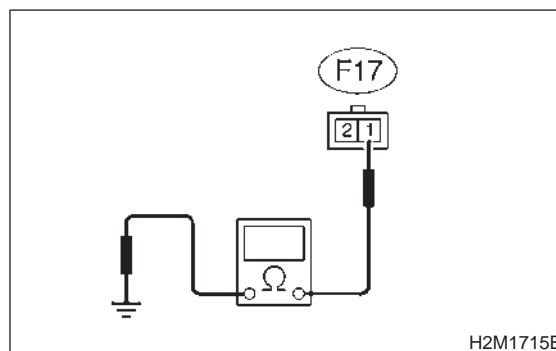
- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 2A2.
- NO** : Go to step 2A5.

2A2 : CHECK GROUND CIRCUIT OF MAIN FAN MOTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between main fan motor connector and chassis ground.

Connector & terminal

(F17) No. 1 — Chassis ground:



- CHECK** : Is the resistance less than 5 Ω?
- YES** : Go to step 2A3.
- NO** : Repair open circuit in harness between main fan motor connector and chassis ground.

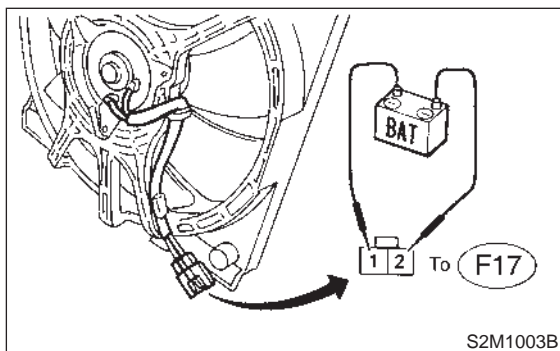
2A3 : CHECK POOR CONTACT.

Check poor contact in main fan motor connector.
<Ref. to FOREWORD [T3C1].>

- CHECK** : Is there poor contact in main fan motor connector?
- YES** : Repair poor contact in main fan motor connector.
- NO** : Go to step 2A4.

2A4 : CHECK MAIN FAN MOTOR.

Connect battery positive (+) terminal to terminal No. 2, and negative (-) terminal to terminal No. 1 of main fan motor connector.



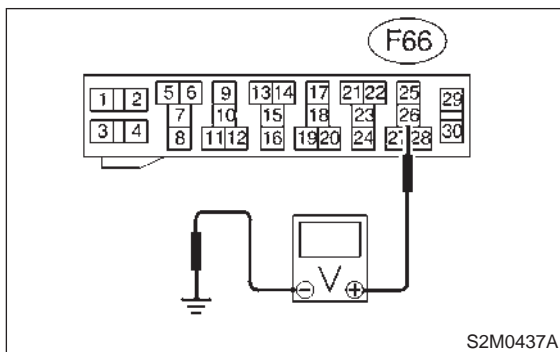
- CHECK** : *Does the main fan rotate?*
- YES** : Repair poor contact in main fan motor connector.
- NO** : Replace main fan motor with a new one.

2A5 : CHECK POWER SUPPLY TO MAIN FAN RELAY.

- 1) Turn ignition switch to OFF.
- 2) Remove main fan relay from A/C relay holder.
- 3) Measure voltage between main fan relay terminal and chassis ground.

Connector & terminal

(F66) No. 26 (+) — Chassis ground (-):



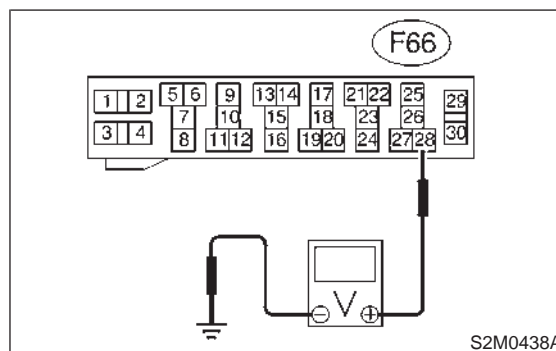
- CHECK** : *Is the voltage more than 10 V?*
- YES** : Go to step **2A6**.
- NO** : Go to step **2A7**.

2A6 : CHECK POWER SUPPLY TO MAIN FAN RELAY.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between main fan relay terminal and chassis ground.

Connector & terminal

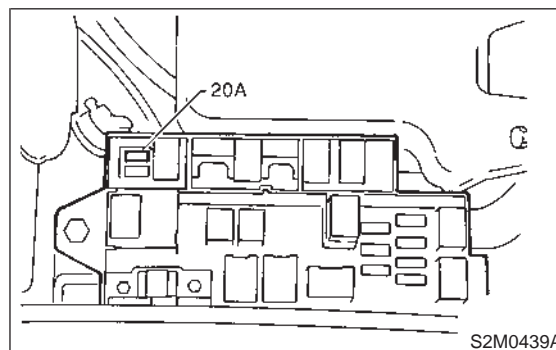
(F66) No. 28 (+) — Chassis ground (-):



- CHECK** : *Is the voltage more than 10 V?*
- YES** : Go to step **2A16**.
- NO** : Go to step **2A12**.

2A7 : CHECK 20 A FUSE.

- 1) Remove 20 A fuse from A/C relay holder.
- 2) Check condition of fuse.



- CHECK** : *Is the fuse blown-out?*
- YES** : Replace fuse.
- NO** : Go to step **2A8**.

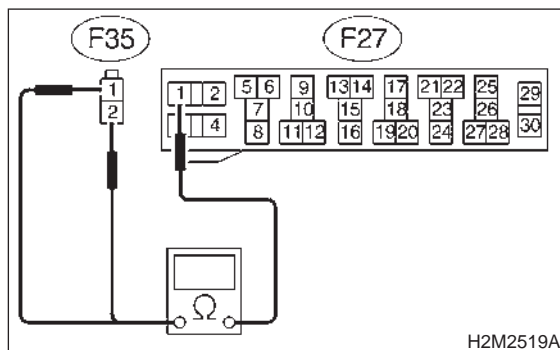
2A8 : CHECK HARNESS CONNECTOR BETWEEN MAIN FUSE BOX AND A/C RELAY HOLDER 20 A FUSE.

- 1) Disconnect connector from main fuse box.
- 2) Disconnect connectors (F25) and (F26) from generator, and (F34) from SBF holder.
- 3) Measure resistance of harness connector between main fuse box connector and A/C relay holder 20 A fuse terminals.

Connector & terminal

(F35) No. 1 — (F27) No. 1:

(F35) No. 2 — (F27) No. 1:



CHECK : *Is the resistance less than 1 Ω?*

YES : Go to step **2A9**.

NO : Repair open circuit in harness between main fuse box connector and 20 A fuse terminal.

2A9 : CHECK POOR CONTACT.

Check poor contact in main fuse box connector.
<Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in main fuse box connector?*

YES : Repair poor contact in main fuse box connector.

NO : Go to step **2A10**.

2A10 : CHECK POOR CONTACT.

Check poor contact in A/C relay holder 20 A fuse connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in A/C relay holder 20 A fuse connector?*

YES : Repair poor contact in 20 A fuse

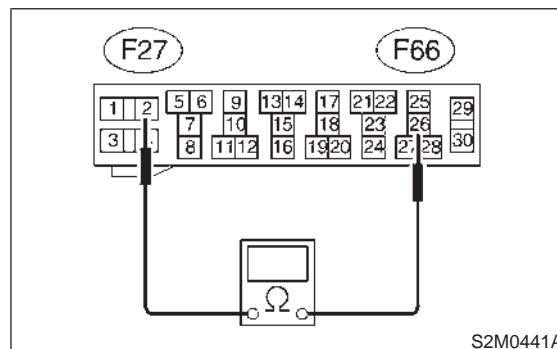
NO : Go to step **2A11**.

2A11 : CHECK HARNESS CONNECTOR BETWEEN 20 A FUSE AND MAIN FAN RELAY IN A/C RELAY HOLDER.

Measure resistance of harness between 20 A fuse and main fan relay terminal.

Connector & terminal

(F27) No. 2 — (F66) No. 26:



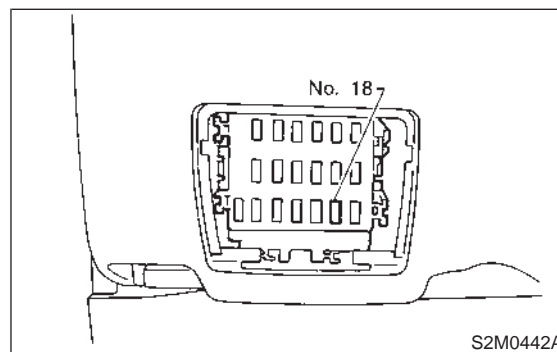
CHECK : *Is the resistance less than 1 Ω?*

YES : Repair poor contact in main fan relay connector.

NO : Repair open circuit in harness between 20 A fuse and main fan relay connector.

2A12 : CHECK FUSE.

- 1) Turn ignition switch to OFF.
- 2) Remove fuse No. 18 from joint box.
- 3) Check condition of fuse.



CHECK : *Is the fuse blown-out?*

YES : Replace fuse.

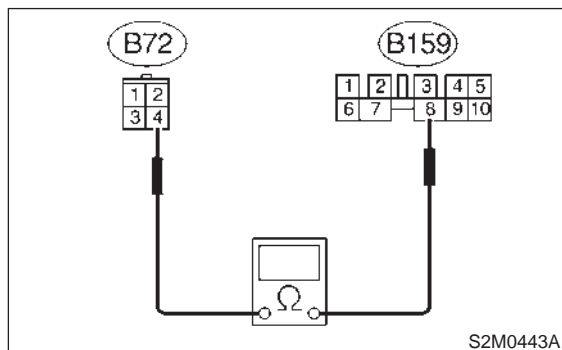
NO : Go to step **2A13**.

2A13 : CHECK HARNESS CONNECTOR BETWEEN IGNITION SWITCH AND JOINT BOX.

- 1) Disconnect connector from ignition switch.
- 2) Separate connectors (F44) and (B61).
- 3) Disconnect connector (B159) from joint box.
- 4) Measure resistance of harness between ignition switch connector and joint box.

Connector & terminal

(B72) No. 4 — (B159) No. 8:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 2A14.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ignition switch connector and joint box.
- Poor contact in coupling connector (B61).

2A14 : CHECK POOR CONTACT.

Check poor contact in ignition switch connector.
<Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in ignition switch connector?

YES : Repair poor contact in ignition switch connector.

NO : Go to step 2A15.

2A15 : CHECK POOR CONTACT.

Check poor contact in joint box 10 A fuse connector.
<Ref. to FOREWORD [T3C1].>

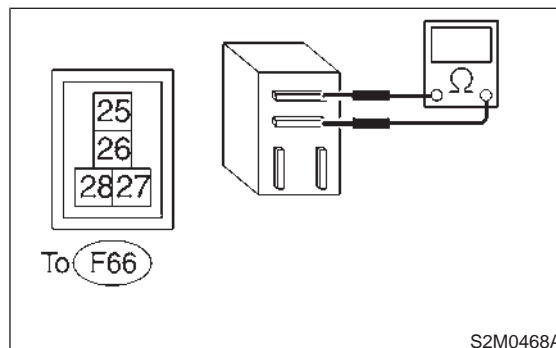
CHECK : Is there poor contact in joint box 10 A fuse connector?

YES : Repair poor contact in joint box connector.

NO : Go to step 2A16.

2A16 : CHECK MAIN FAN RELAY.

- 1) Turn ignition switch to OFF.
- 2) Check continuity between main fan relay terminals.



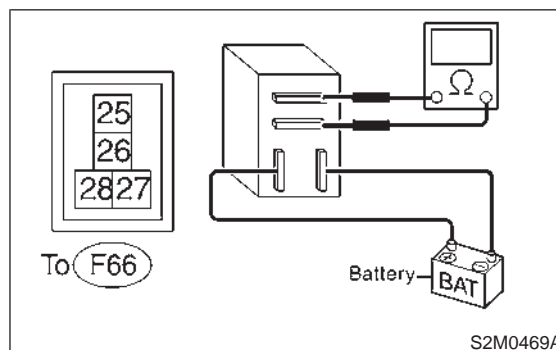
CHECK : Does no continuity exist between terminals No. 25 and No. 26?

YES : Go to step 2A17.

NO : Replace main fan relay.

2A17 : CHECK MAIN FAN RELAY.

- 1) Connect battery to terminals No. 27 and No. 28 of main fan relay.
- 2) Check continuity between main fan relay terminals.



CHECK : Does continuity exist between terminals No. 25 and No. 26?

YES : Go to step 2A18.

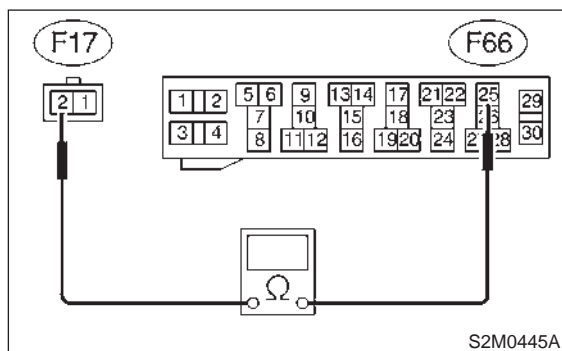
NO : Replace main fan relay.

2A18 : CHECK HARNESS CONNECTOR BETWEEN MAIN FAN RELAY AND MAIN FAN MOTOR.

Measure resistance of harness between main fan motor connector and main fan relay terminal.

Connector & terminal

(F17) No. 2 — (F66) No. 25:



- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 2A19.
- NO** : Repair open circuit in harness between main fan motor and main fan relay connector.

2A19 : CHECK POOR CONTACT.

Check poor contact in main fan relay connector.
<Ref. to FOREWORD [T3C1].>

- CHECK** : Is there poor contact in main fan relay connector?
- YES** : Repair poor contact in main fan relay connector.
- NO** : Go to step 2A20.

2A20 : CHECK POOR CONTACT.

Check poor contact in main fan relay connector.
<Ref. to FOREWORD [T3C1].>

- CHECK** : Is there poor contact in main fan motor connector?
- YES** : Repair poor contact in main fan motor connector.
- NO** : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

3. Radiator Sub Fan (With A/C model only)

A: OPERATION

DETECTING CONDITION:

Condition (1):

- Engine coolant temperature is below 95°C (203°F).
- A/C switch is turned ON.
- Vehicle speed is below 19 km/h (12 MPH).

Condition (2):

- Engine coolant temperature is above 100°C (212°F).
- A/C switch is turned OFF.
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOM:

- Radiator sub fan does not rotate under conditions (1) and (2) above.

3A1 : CHECK POWER SUPPLY TO SUB FAN MOTOR.

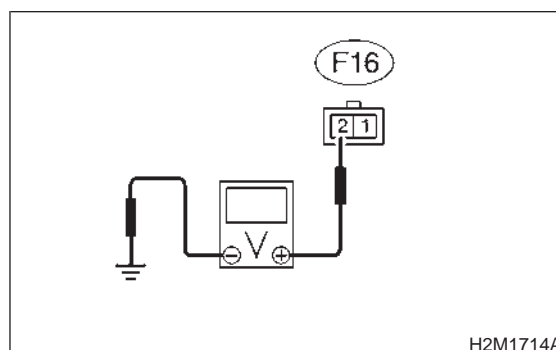
CAUTION:

Be careful not to overheat engine during repair.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from sub fan motor.
- 3) Start the engine, and warm it up until engine coolant temperature increases over 100°C (212°F).
- 4) Stop the engine and turn ignition switch to ON.
- 5) Measure voltage between sub fan motor connector and chassis ground.

Connector & terminal

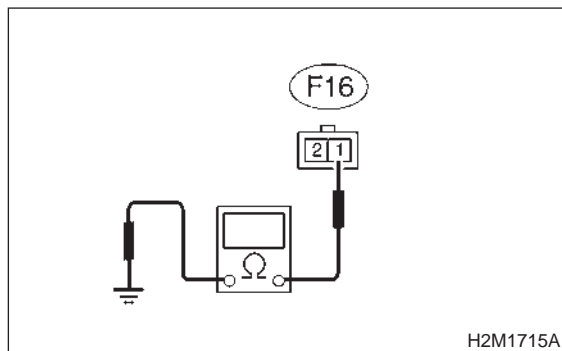
(F16) No. 2 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 3A2.
- NO** : Go to step 3A5.

3A2 : CHECK GROUND CIRCUIT OF SUB FAN MOTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between sub fan motor connector and chassis ground.

Connector & terminal**(F16) No. 1 — Chassis ground:**

- CHECK** : **Is the resistance less than 5 Ω?**
- YES** : Go to step **3A3**.
- NO** : Repair open circuit in harness between sub fan motor connector and chassis ground.

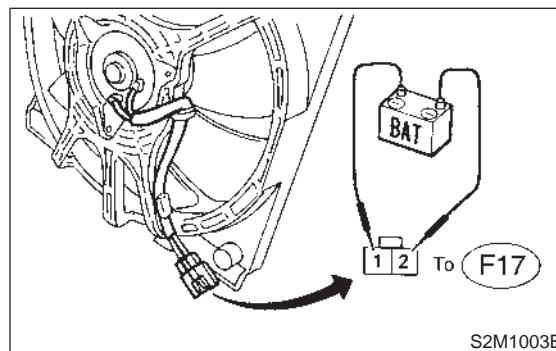
3A3 : CHECK POOR CONTACT.

Check poor contact in sub fan motor connector.
 <Ref. to FOREWORD [T3C1].>

- CHECK** : **Is there poor contact in sub fan motor connector?**
- YES** : Repair poor contact in sub fan motor connector.
- NO** : Go to step **3A4**.

3A4 : CHECK SUB FAN MOTOR.

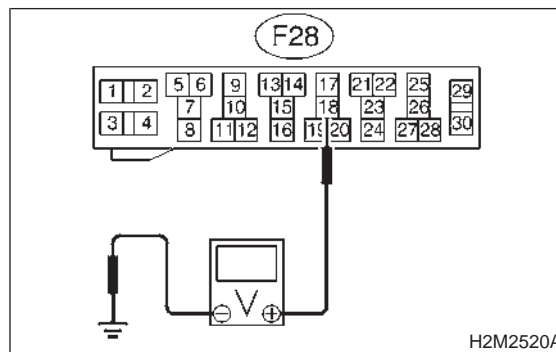
Connect battery positive (+) terminal to terminal No. 2, and negative (–) terminal to terminal No. 1 of sub fan motor connector.



- CHECK** : **Does the sub fan rotate?**
- YES** : Repair poor contact in sub fan motor connector.
- NO** : Replace sub fan motor with a new one.

3A5 : CHECK POWER SUPPLY TO SUB FAN RELAY.

- 1) Turn ignition switch to OFF.
- 2) Remove sub fan relay from A/C relay holder.
- 3) Measure voltage between sub fan relay terminal and chassis ground.

Connector & terminal**(F28) No. 18 (+) — Chassis ground (–):**

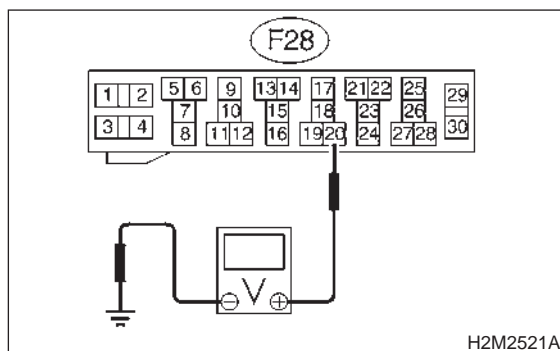
- CHECK** : **Is the voltage more than 10 V?**
- YES** : Go to step **3A6**.
- NO** : Go to step **3A7**.

3A6 : CHECK POWER SUPPLY TO SUB FAN RELAY.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between sub fan relay terminal and chassis ground.

Connector & terminal

(F28) No. 20 (+) — Chassis ground (-):



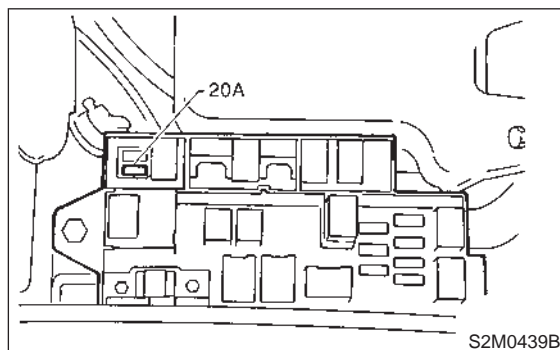
CHECK : Is the voltage more than 10 V?

YES : Go to step 3A16.

NO : Go to step 3A12.

3A7 : CHECK 20 A FUSE.

- 1) Remove 20 A fuse from A/C relay holder.
- 2) Check condition of fuse.



CHECK : Is the fuse blown-out?

YES : Replace fuse.

NO : Go to step 3A8.

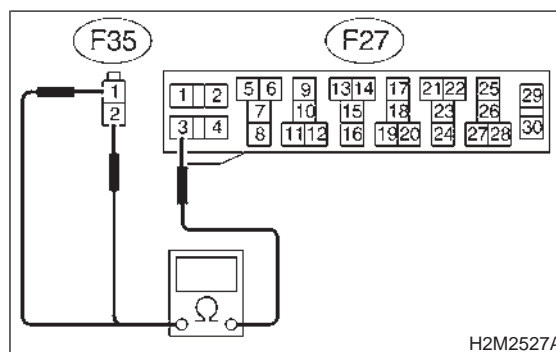
3A8 : CHECK HARNESS CONNECTOR BETWEEN MAIN FUSE BOX AND A/C RELAY HOLDER 20 A FUSE.

- 1) Disconnect connector from main fuse box.
- 2) Disconnect connectors (F25) and (F26) from generator, and (F34) from SBF holder.
- 3) Measure resistance of harness connector between main fuse box connector and A/C relay holder 20 A fuse terminals.

Connector & terminal

(F35) No. 1 — (F27) No. 3:

(F35) No. 2 — (F27) No. 3:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 3A9.

NO : Repair open circuit in harness between main fuse box connector and 20 A fuse terminal.

3A9 : CHECK POOR CONTACT.

Check poor contact in main fuse box connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in main fuse box connector?

YES : Repair poor contact in main fuse box connector.

NO : Go to step 3A10.

3A10 : CHECK POOR CONTACT.

Check poor contact in A/C relay holder 20 A fuse connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in A/C relay holder 20 A fuse connector?

YES : Repair poor contact in 20 A fuse

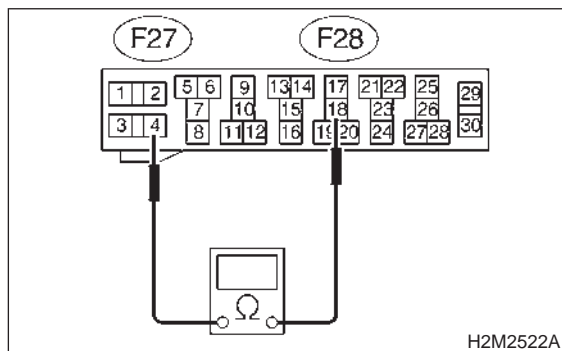
NO : Go to step 3A11.

3A11 : CHECK HARNESS CONNECTOR BETWEEN 20 A FUSE AND SUB FAN RELAY IN A/C RELAY HOLDER.

Measure resistance of harness between 20 A fuse and sub fan relay terminal.

Connector & terminal

(F27) No. 4 — (F28) No. 18:



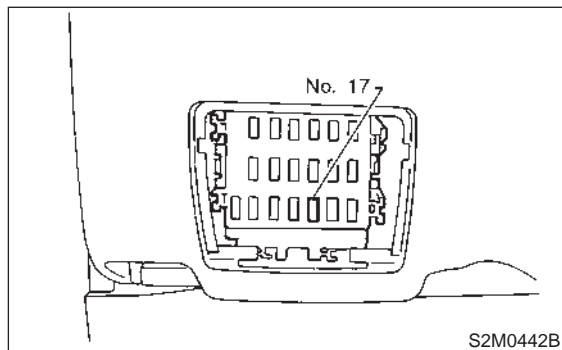
CHECK : **Is the resistance less than 1 Ω?**

YES : Repair poor contact in sub fan relay connector.

NO : Repair open circuit in harness between 20 A fuse and sub fan relay connector.

3A12 : CHECK FUSE.

- 1) Turn ignition switch to OFF.
- 2) Remove fuse No. 17 from joint box.
- 3) Check condition of fuse.



CHECK : **Is the fuse blown-out?**

YES : Replace fuse.

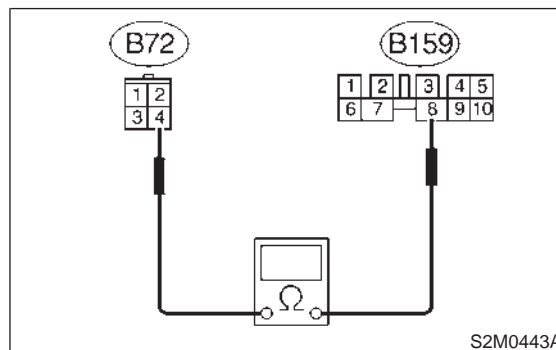
NO : Go to step 3A13.

3A13 : CHECK HARNESS CONNECTOR BETWEEN IGNITION SWITCH AND JOINT BOX.

- 1) Disconnect connector from ignition switch.
- 2) Separate connectors (F44) and (B61).
- 3) Disconnect connector (B159) from joint box.
- 4) Measure resistance of harness between ignition switch connector and joint box.

Connector & terminal

(B72) No. 4 — (B159) No. 8:



CHECK : **Is the resistance less than 1 Ω?**

YES : Go to step 3A14.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ignition switch connector and joint box.
- Poor contact in coupling connector (B61).

3A14 : CHECK POOR CONTACT.

Check poor contact in ignition switch connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in ignition switch connector?**

YES : Repair poor contact in ignition switch connector.

NO : Go to step 3A15.

3A15 : CHECK POOR CONTACT.

Check poor contact in joint box 10 A fuse connector. <Ref. to FOREWORD [T3C1].>

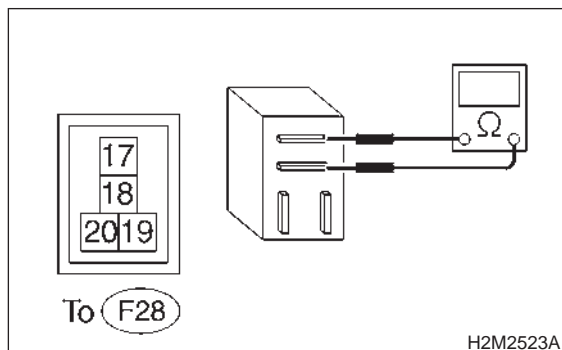
CHECK : **Is there poor contact in joint box 10 A fuse connector?**

YES : Repair poor contact in joint box connector.

NO : Go to step 3A16.

3A16 : CHECK SUB FAN RELAY.

- 1) Turn ignition switch to OFF.
- 2) Check continuity between sub fan relay terminals.



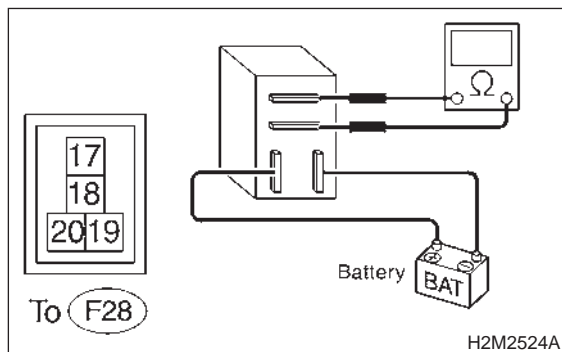
CHECK : *Does no continuity exist between terminals No. 17 and No. 18?*

YES : Go to step 3A17.

NO : Replace sub fan relay.

3A17 : CHECK SUB FAN RELAY.

- 1) Connect battery to terminals No. 19 and No. 20 of sub fan relay.
- 2) Check continuity between sub fan relay terminals.



CHECK : *Does continuity exist between terminals No. 17 and No. 18?*

YES : Go to step 3A18.

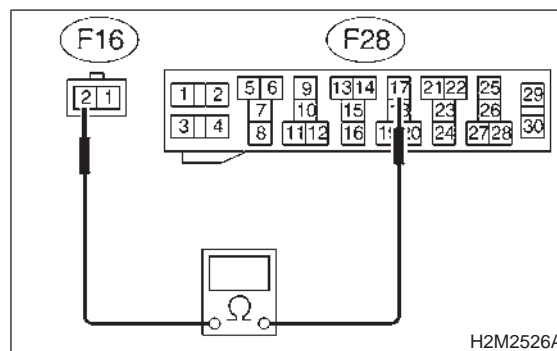
NO : Replace sub fan relay.

3A18 : CHECK HARNESS CONNECTOR BETWEEN SUB FAN RELAY AND SUB FAN MOTOR.

Measure resistance of harness between sub fan motor connector and sub fan relay terminal.

Connector & terminal

(F16) No. 2 — (F28) No. 17:



CHECK : *Is the resistance less than 1 Ω?*

YES : Go to step 3A19.

NO : Repair open circuit in harness between sub fan motor and sub fan relay connector.

3A19 : CHECK POOR CONTACT.

Check poor contact in sub fan relay connector.
<Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in sub fan relay connector?*

YES : Repair poor contact in sub fan relay connector.

NO : Go to step 3A20.

3A20 : CHECK POOR CONTACT.

Check poor contact in sub fan relay connector.
<Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in sub fan motor connector?*

YES : Repair poor contact in sub fan motor connector.

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

MEMO:

1. Engine Cooling System Trouble in General

Trouble	Possible cause	Corrective action
Over-heating	a. Insufficient engine coolant	Replenish engine coolant, inspect for leakage, and repair.
	b. Loose timing belt	Repair or replace timing belt tensioner.
	c. Oil on drive belt	Replace.
	d. Malfunction of thermostat	Replace.
	e. Malfunction of water pump	Replace.
	f. Clogged engine coolant passage	Clean.
	g. Improper ignition timing	Inspect and repair ignition control system. Refer to "2-7 On-Board Diagnostics II System".
	h. Clogged or leaking radiator	Clean or repair, or replace.
	i. Improper engine oil in engine coolant	Replace engine coolant.
	j. Air/fuel mixture ratio too lean	Inspect and repair fuel injection system. Refer to "2-7 On-Board Diagnostics II System".
	k. Excessive back pressure in exhaust system	Clean or replace.
	l. Insufficient clearance between piston and cylinder	Adjust or replace.
	m. Slipping clutch	Repair or replace.
	n. Dragging brake	Adjust.
	o. Improper transmission oil	Replace.
	p. Defective thermostat	Replace.
Over-cooling	q. Malfunction of electric fan	Inspect radiator fan relay, engine coolant temperature sensor or radiator motor and replace there.
	a. Atmospheric temperature extremely low	Partly cover radiator front area.
Engine coolant leaks.	b. Defective thermostat	Replace.
	a. Loosened or damaged connecting units on hoses	Repair or replace.
	b. Leakage from water pump	Replace.
	c. Leakage from water pipe	Repair or replace.
	d. Leakage around cylinder head gasket	Retighten cylinder head bolts or replace gasket.
	e. Damaged or cracked cylinder head and crankcase	Repair or replace.
	f. Damaged or cracked thermostat case	Repair or replace.
Noise	g. Leakage from radiator	Repair or replace.
	a. Defective drive belt	Replace.
	b. Defective radiator fan	Replace.
	c. Defective water pump bearing	Replace water pump.
	d. Defective water pump mechanical seal	Replace water pump.

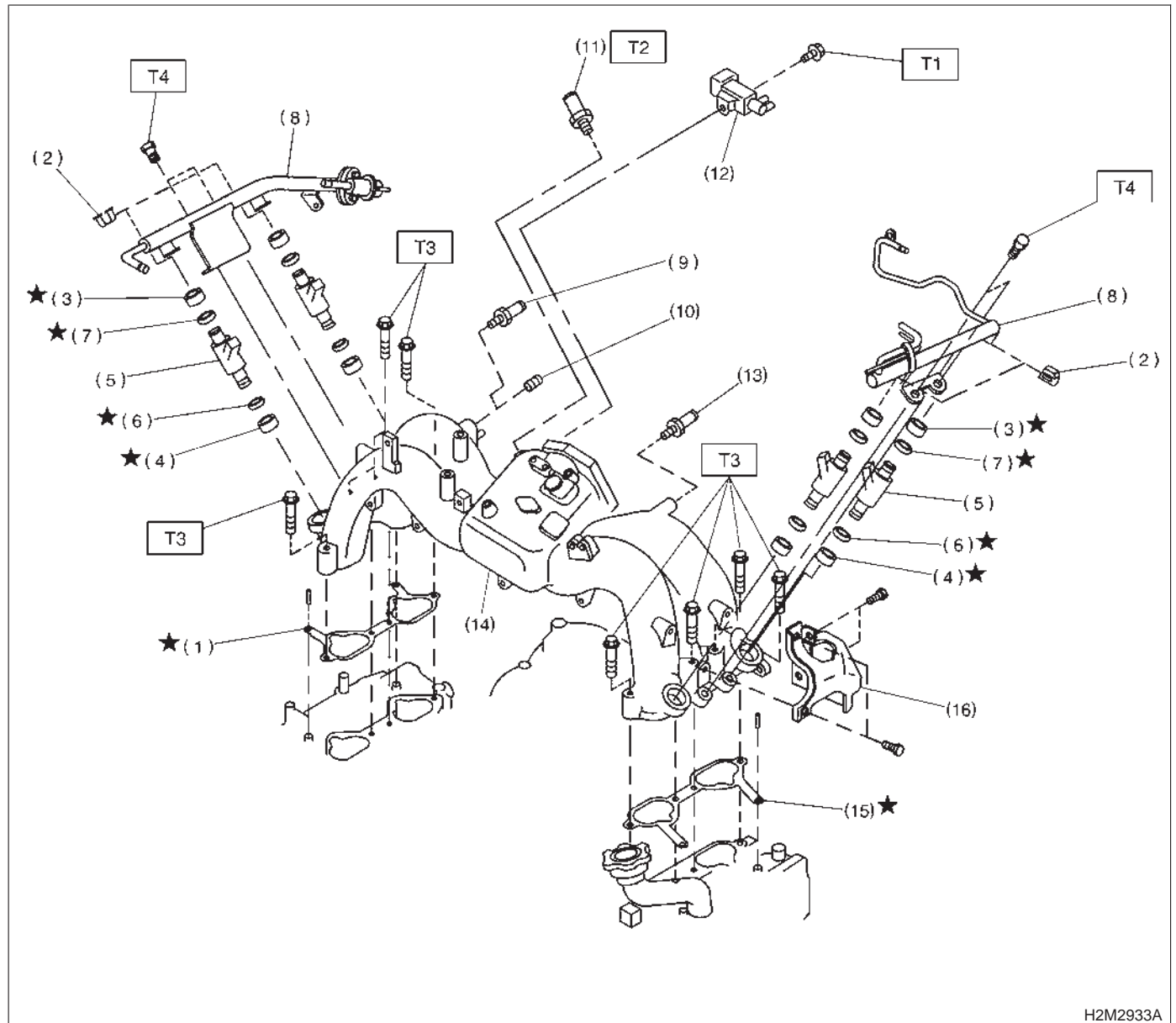
MEMO:

FUEL INJECTION SYSTEM **2-7**

	Page
C COMPONENT PARTS	2
1. Intake Manifold	2
2. Air Intake System	6
3. Air Cleaner	8
4. Crankshaft Position, Camshaft Position and Knock Sensors	10
W SERVICE PROCEDURE	11
1. Air Cleaner and Air Intake Duct	11
2. Mass Air Flow Sensor (Except 2200 cc California Spec. Vehicles)	13
3. Throttle Body	14
4. Intake Manifold	17
5. Engine Coolant Temperature Sensor	41
6. Crankshaft Position Sensor	42
7. Front Oxygen (A/F) Sensor	43
8. Rear Oxygen Sensor	44
9. Throttle Position Sensor	46
10. Camshaft Position Sensor	50
11. Pressure Sensor	51
12. Idle Air Control Solenoid Valve	51
13. Pressure Sources Switching Solenoid Valve	53
14. Fuel Injector	53
15. Engine Control Module (ECM)	58
16. Main Relay	59
17. Fuel Pump Relay	60
18. Air Intake Chamber (Except 2200 cc California Spec. Vehicles)	60
19. Knock Sensor	61
20. Intake Manifold Pressure Sensor (2200 cc California Spec. Vehicles only)	62
21. Intake Air Temperature Sensor (2200 cc California Spec. Vehicles only)	63

1. Intake Manifold

A: 2200 cc CALIFORNIA SPEC. VEHICLES



H2M2933A

- | | |
|-------------------------------|-----------------------------------|
| (1) Intake manifold gasket RH | (9) Nipple (AT vehicles) |
| (2) Fuel injector cap | (10) Plug |
| (3) Insulator A | (11) PCV valve |
| (4) Insulator B | (12) Purge control solenoid valve |
| (5) Fuel injector | (13) Nipple |
| (6) O-ring B | (14) Intake manifold |
| (7) O-ring A | (15) Intake manifold gasket LH |
| (8) Fuel pipe | (16) Fuel pipe protector |

Tightening torque: N-m (kg-m, ft-lb)

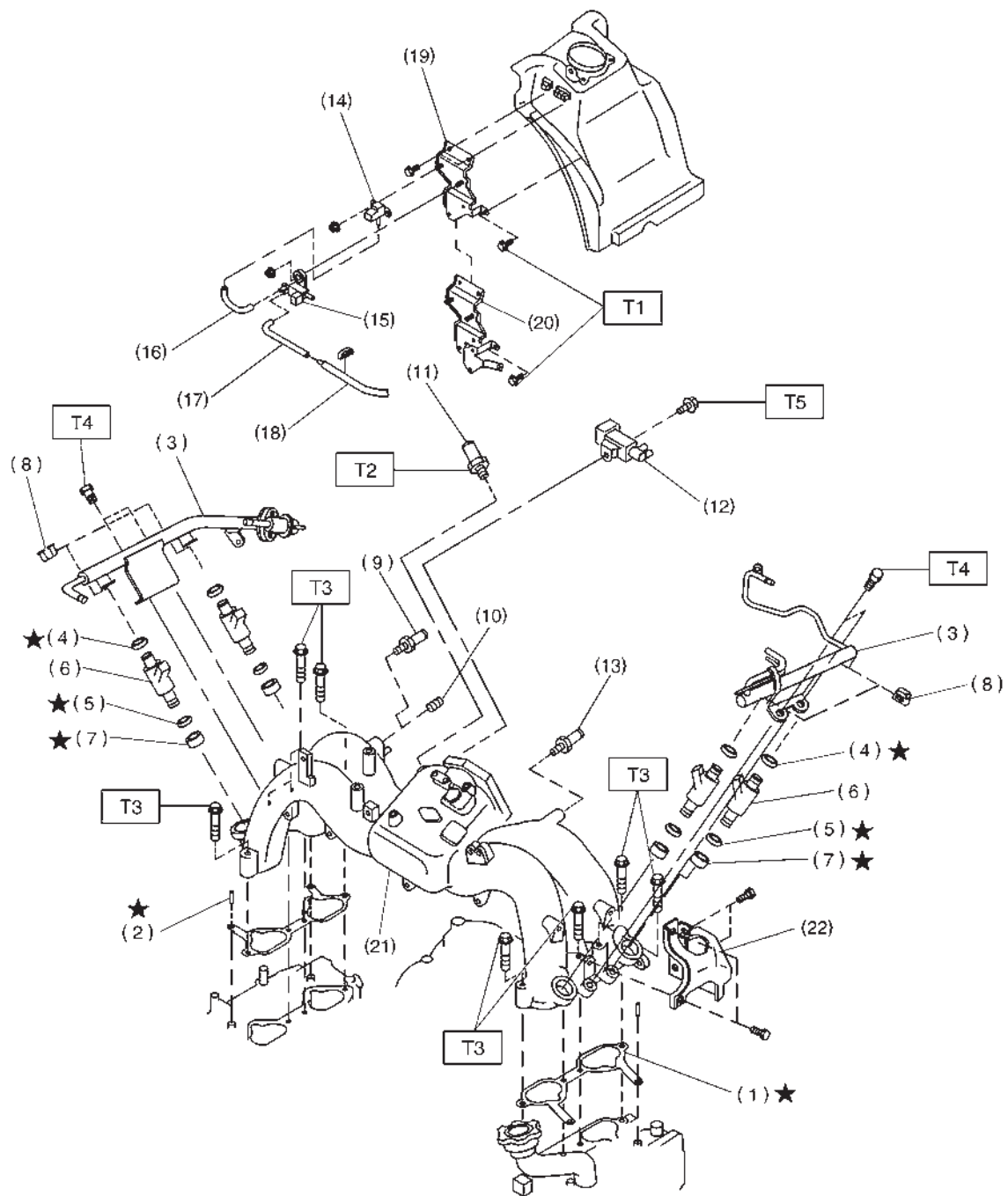
T1: 16 ± 1.5 (1.6 ± 0.15 , 11.6 ± 1.1)

T2: 23 ± 3 (2.3 ± 0.3 , 16.6 ± 2.2)

T3: 25 ± 2 (2.5 ± 0.2 , 18.1 ± 1.4)

T4: 3.4 ± 0.5 (0.35 ± 0.05 , 2.5 ± 0.4)

MEMO:



- (1) Intake manifold gasket LH
- (2) Intake manifold gasket RH
- (3) Fuel injector pipe
- (4) O-ring A
- (5) O-ring B
- (6) Fuel injector
- (7) Insulator
- (8) Fuel injector cap
- (9) Nipple (AT vehicles)
- (10) Plug
- (11) PCV valve

- (12) Purge control solenoid valve
- (13) Nipple
- (14) Pressure sensor
- (15) Pressure sources switching solenoid valve
- (16) Vacuum hose A
- (17) Vacuum hose B
- (18) Vacuum hose C
- (19) Bracket (Except Canada spec. vehicles)

- (20) Bracket (For Canada spec. vehicles)
- (21) Intake manifold
- (22) Fuel pipe protector LH

Tightening torque: N·m (kg-m, ft-lb)

T1: 4.9±0.5 (0.5±0.05, 3.6±0.4)

T2: 23±3 (2.3±0.3, 16.6±2.2)

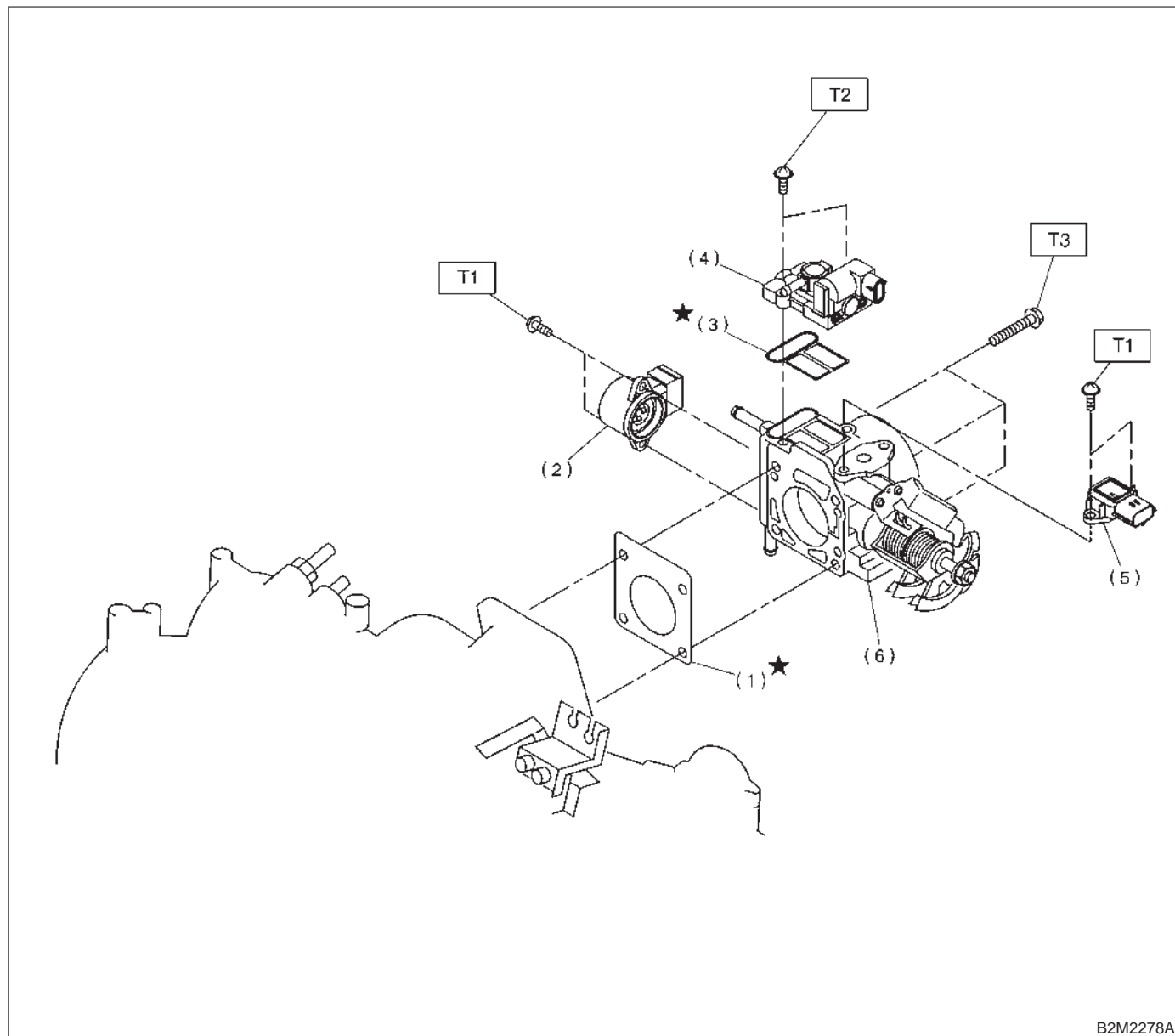
T3: 25±2 (2.5±0.2, 18.1±1.4)

T4: 3.4±0.5 (0.35±0.05, 2.5±0.4)

T5: 15.7±1.5 (1.6±0.15, 11.6±1.1)

2. Air Intake System

A: 2200 cc CALIFORNIA SPEC. VEHICLES



- (1) Gasket
- (2) Throttle position sensor
- (3) Gasket
- (4) Idle air control solenoid valve

- (5) Intake manifold pressure sensor
- (6) Throttle body

Tightening torque: N·m (kg-m, ft-lb)

T1: 2.0 ± 0.4 (0.20 ± 0.04 , 1.4 ± 0.3)

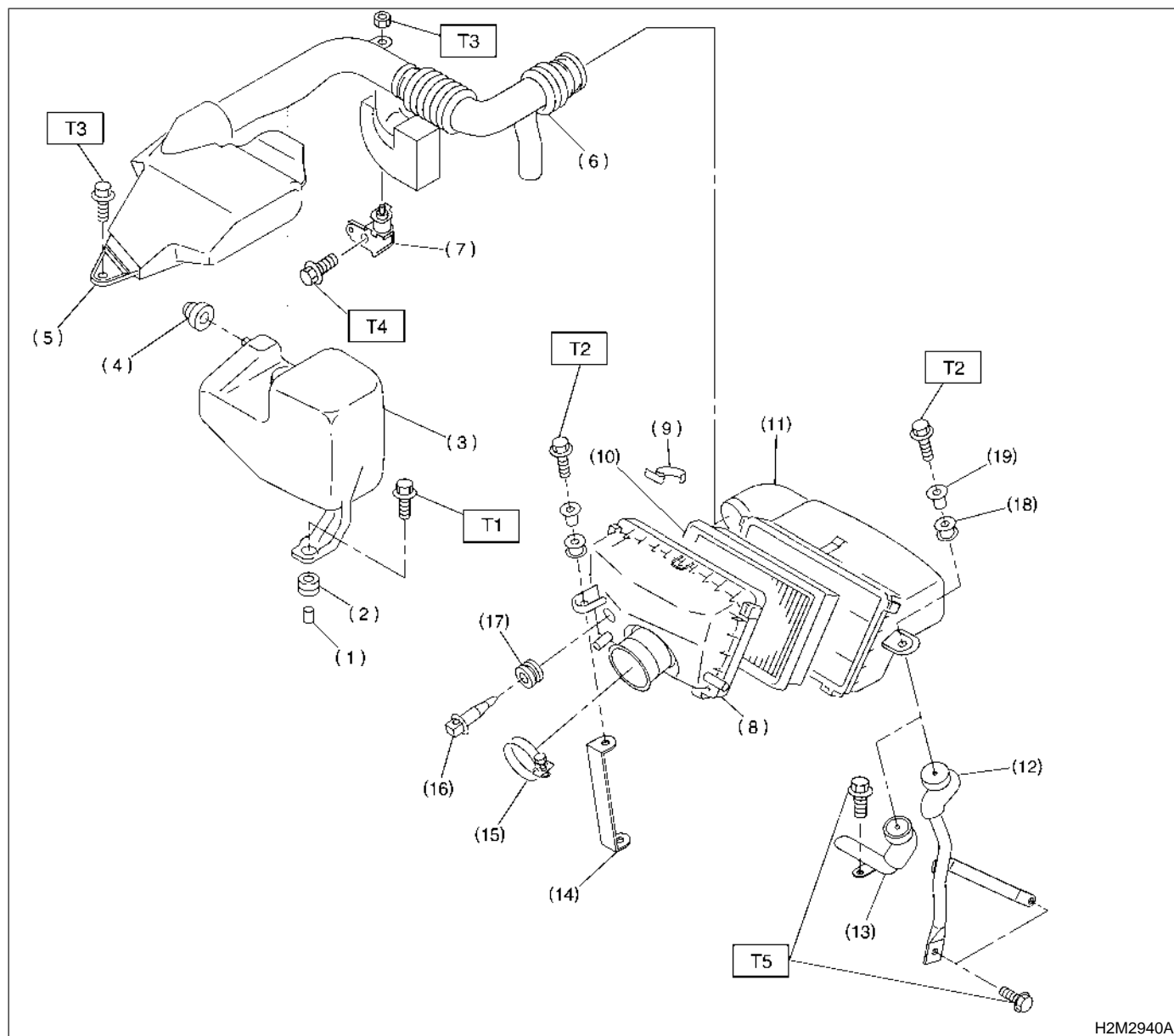
T2: 3.3 ± 0.4 (0.34 ± 0.045 , 2.5 ± 0.3)

T3: 22 ± 2 (2.2 ± 0.2 , 15.9 ± 1.4)

- Tightening torque: N-m (kg-m, ft-lb)**
- | | |
|------------|-------------------------------------|
| T1: | 2.0±0.4 (0.20±0.04, 1.4±0.3) |
| T2: | 6.4±0.5 (0.65±0.05, 4.7±0.4) |
| T3: | 22±2 (2.2±0.2, 15.9±1.4) |
| T4: | 6.0±0.8 (0.61±0.08, 4.4±0.6) |
| T5: | 16±5 (1.6±0.5, 11.6±3.6) |

3. Air Cleaner

A: 2200 cc CALIFORNIA SPEC. VEHICLES



- (1) Spacer
- (2) Bush
- (3) Air chamber
- (4) Cushion rubber
- (5) Air intake duct A
- (6) Air intake duct B
- (7) Holder
- (8) Air cleaner case A
- (9) Clip
- (10) Air cleaner element

- (11) Air cleaner case B
- (12) Air cleaner case stay LH (MT vehicles)
- (13) Air cleaner case stay LH (AT vehicles)
- (14) Air cleaner case stay RH
- (15) Clamp
- (16) Intake air temperature sensor
- (17) Rubber holder
- (18) Bush

- (19) Spacer

Tightening torque: N-m (kg-m, ft-lb)

T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)

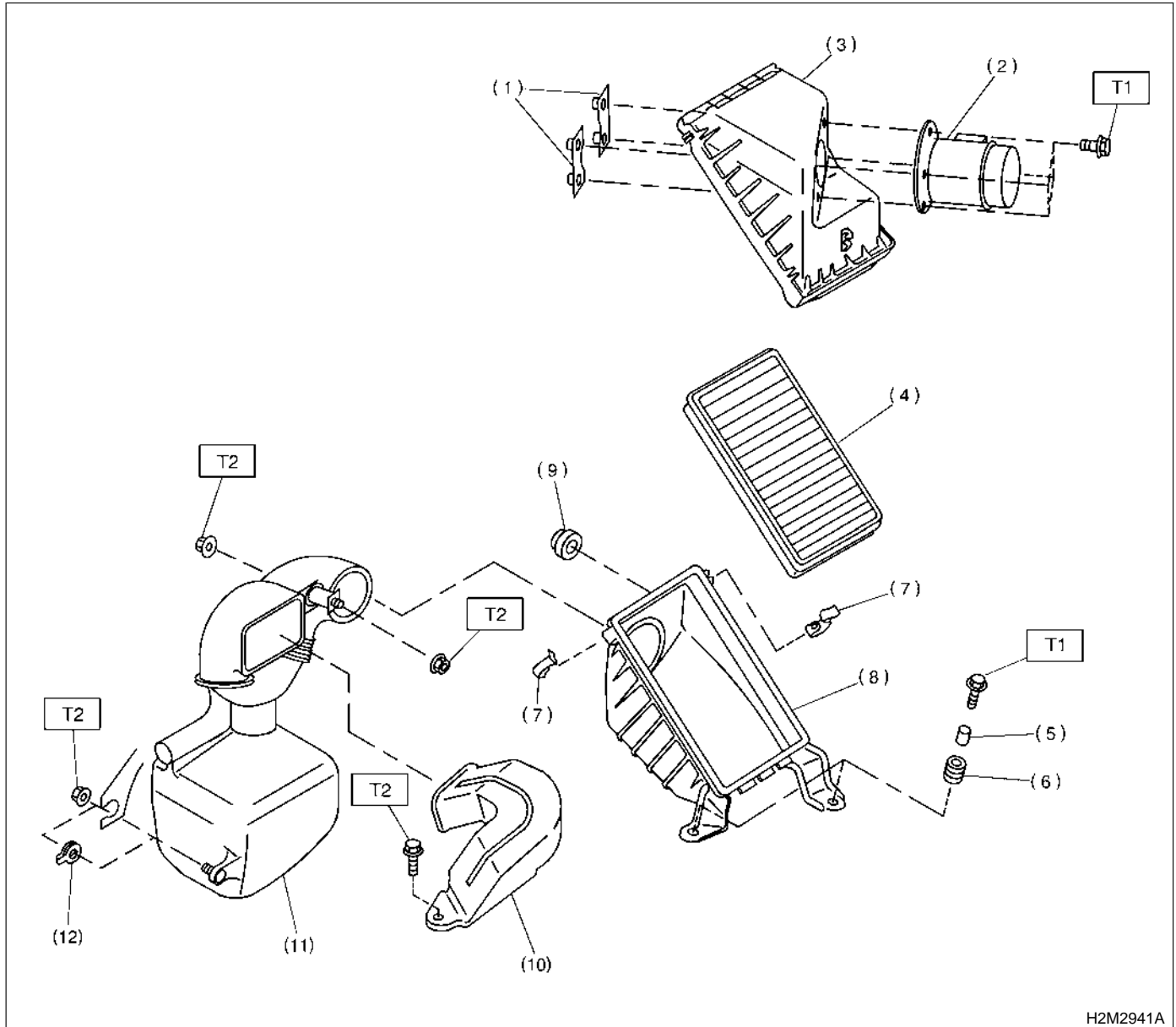
T2: 6.4±0.5 (0.65±0.05, 4.7±0.4)

T3: 7.4±2.0 (0.75±0.2, 5.4±1.4)

T4: 14±4 (1.4±0.4, 10.1±2.9)

T5: 16±5 (1.6±0.5, 11.6±3.6)

B: EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES



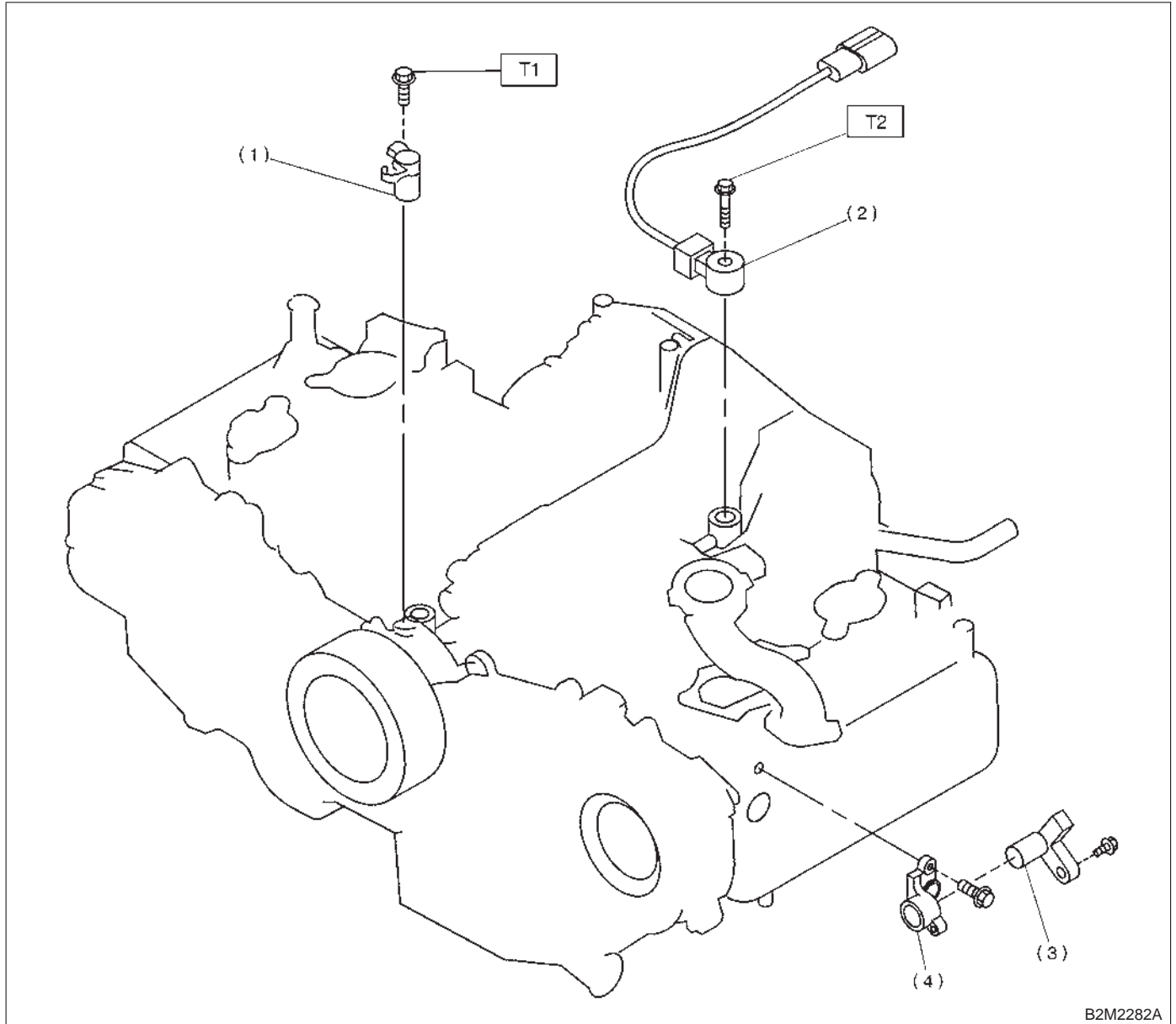
- | | |
|----------------------------------|-----------------------------|
| (1) Mass air flow sensor bracket | (7) Clip |
| (2) Mass air flow sensor ASSY | (8) Air cleaner case |
| (3) Air cleaner upper cover | (9) Cushion rubber |
| (4) Air cleaner element | (10) Air intake duct |
| (5) Spacer | (11) Resonator chamber ASSY |
| (6) Bush | (12) Clip |

Tightening torque: N·m (kg·m, ft·lb)

T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)

T2: 33±10 (3.4±1.0, 25±7)

4. Crankshaft Position, Camshaft Position and Knock Sensors



B2M2282A

- (1) Crankangle position sensor
- (2) Knock sensor
- (3) Camshaft position sensor
- (4) Camshaft position sensor support

Tightening torque: N·m (kg·m, ft·lb)

T1: 6.4 ± 0.5 (0.65 ± 0.05 , 4.7 ± 0.4)

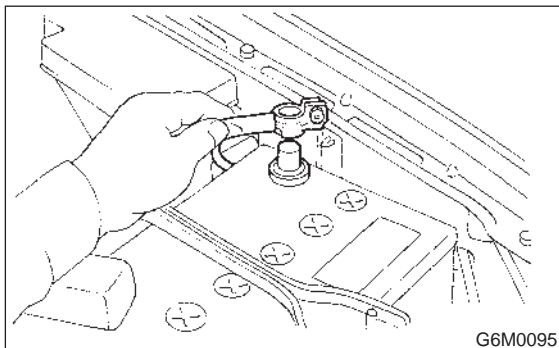
T2: 23.5 ± 2.9 (2.4 ± 0.3 , 17.4 ± 2.2)

1. Air Cleaner and Air Intake Duct

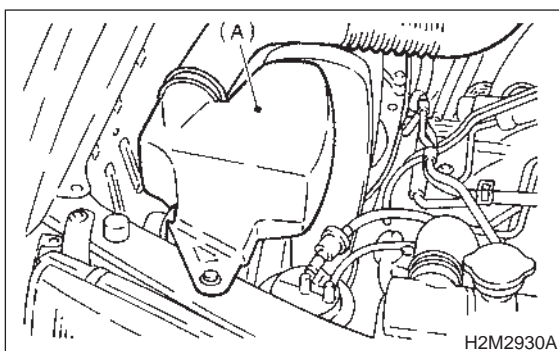
A: REMOVAL AND INSTALLATION

1. 2200 cc CALIFORNIA SPEC. VEHICLES

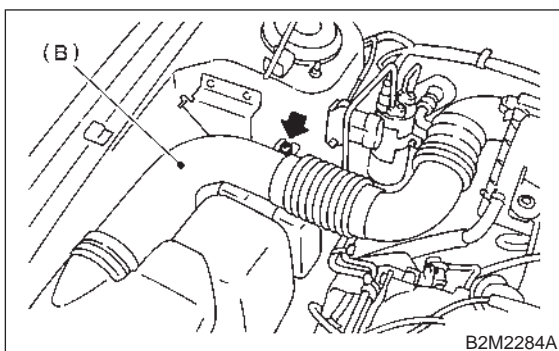
- 1) Disconnect battery ground cable.



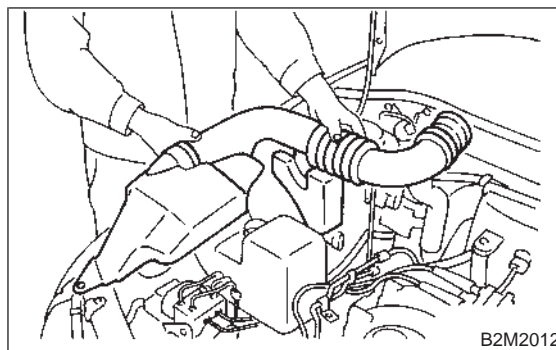
- 2) Remove bolt which installs air intake duct (A) on the front side of body.



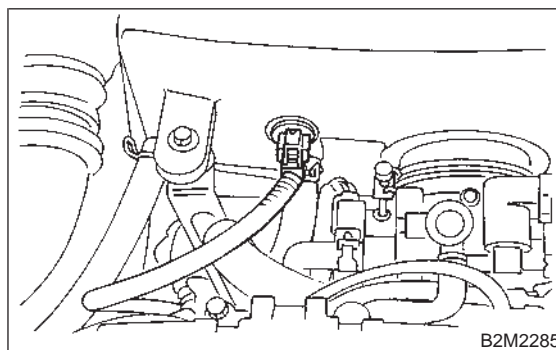
- 3) Remove bolt which installs air intake duct (B) on body.



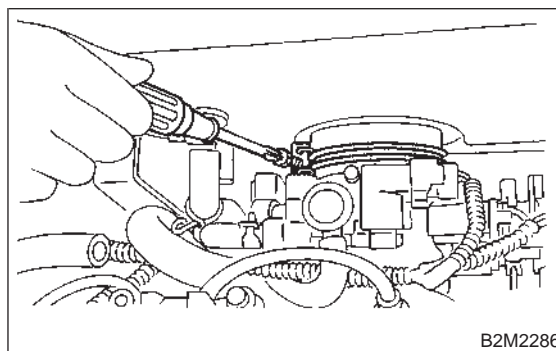
- 4) Remove air intake duct (A) and (B) as a unit.



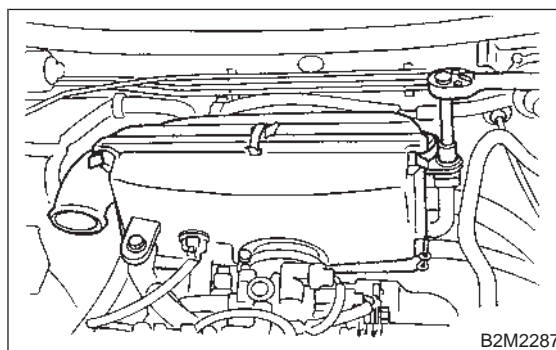
- 5) Disconnect connector from intake air temperature sensor.



- 6) Loosen clamp which connects air cleaner case to throttle body.



- 7) Disconnect hoses from air cleaner case.
8) Remove bolts which install air cleaner case to stays.
9) Remove air cleaner assembly.

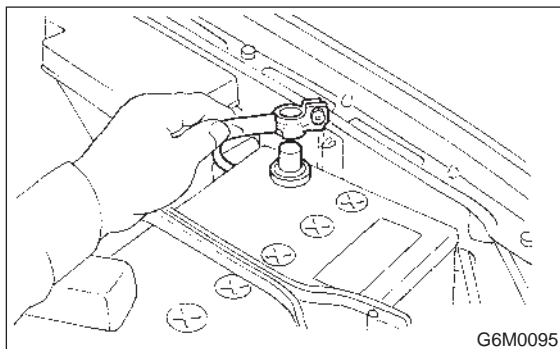


- 10) Installation is in the reverse order of removal.

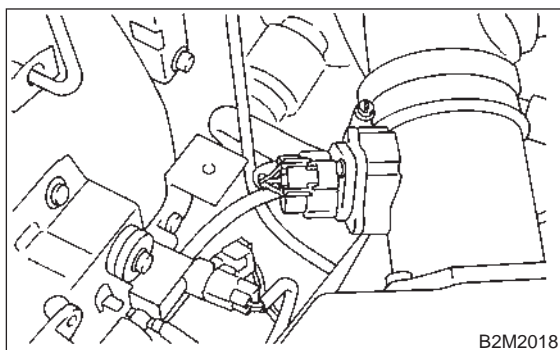
1. Air Cleaner and Air Intake Duct

2. EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES

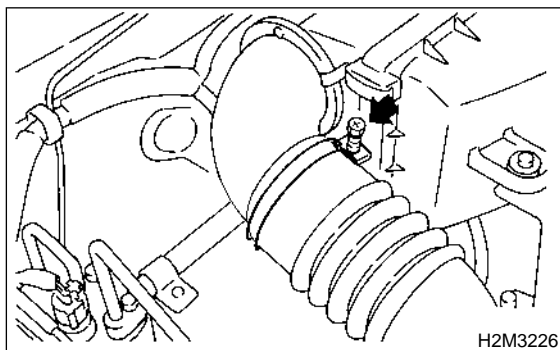
- 1) Disconnect battery ground cable.



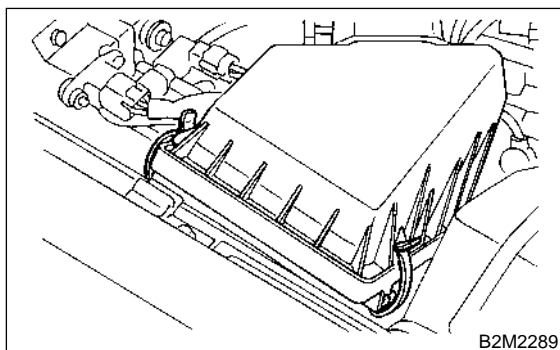
- 2) Disconnect connector from mass air flow sensor.



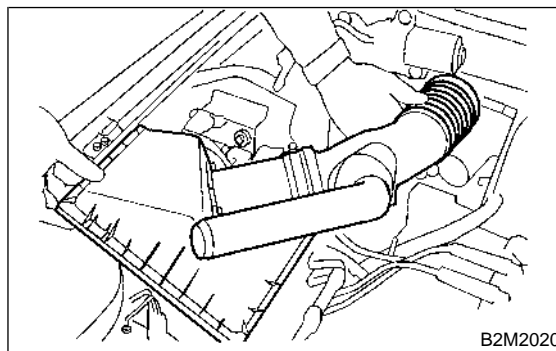
- 3) Loosen clamp which connects air intake duct to air intake chamber.



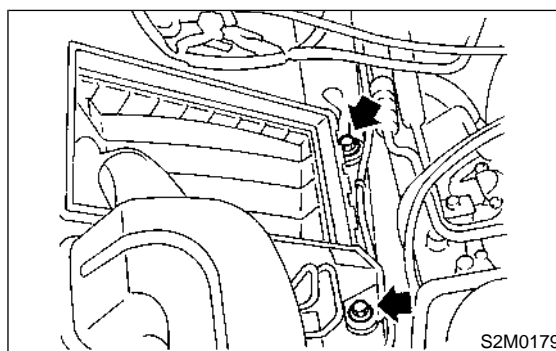
- 4) Remove two clips of air cleaner upper cover.



- 5) Remove air intake duct and air cleaner upper cover as a unit.



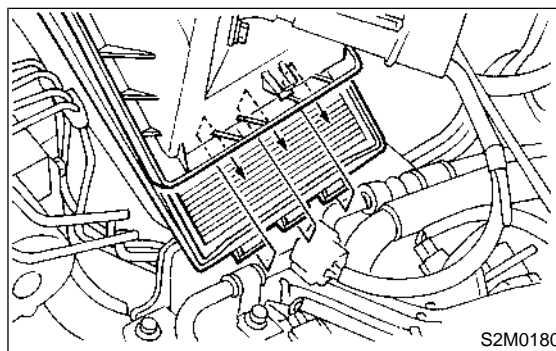
- 6) Remove air cleaner element.
-
- 7) Remove air cleaner lower case.



- 8) Installation is in the reverse order of removal.

CAUTION:

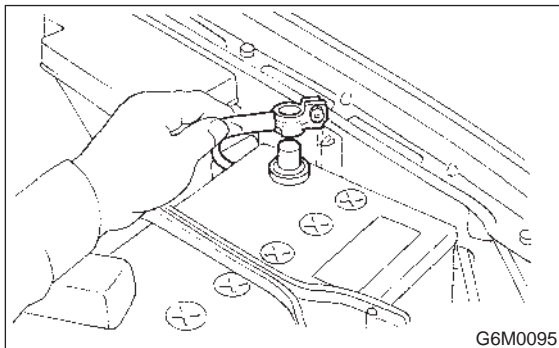
Before installing air cleaner upper cover, align holes with protruding portions of air cleaner lower case, then secure upper cover to lower case.



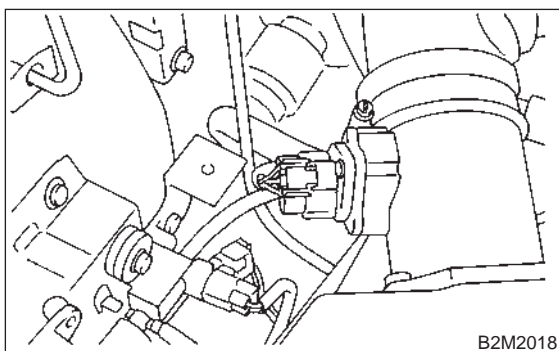
2. Mass Air Flow Sensor (Except 2200 cc California Spec. Vehicles)

A: REMOVAL AND INSTALLATION

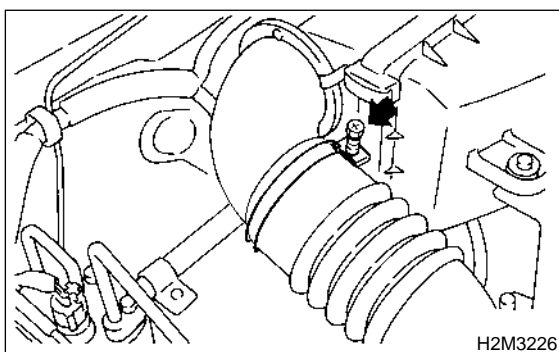
- 1) Disconnect battery ground cable.



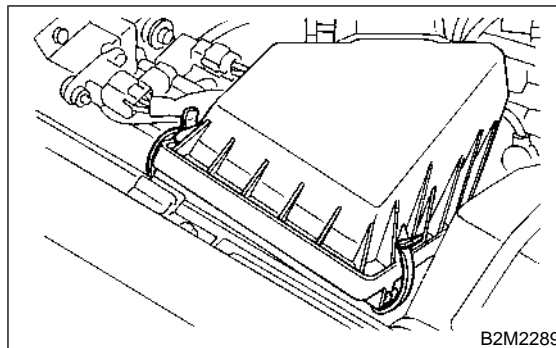
- 2) Disconnect connector from mass air flow sensor.



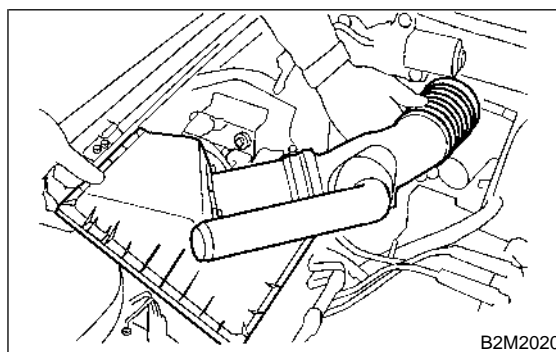
- 3) Loosen clamp which connects air intake duct to air intake chamber.



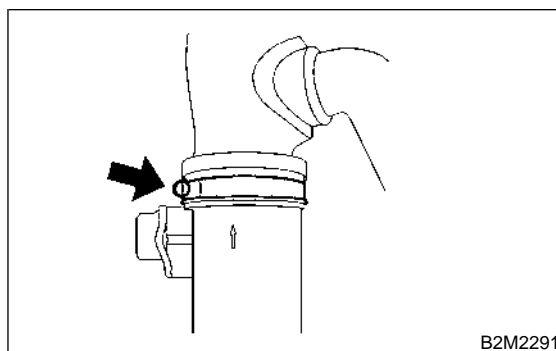
- 4) Remove two clips of air cleaner upper cover.



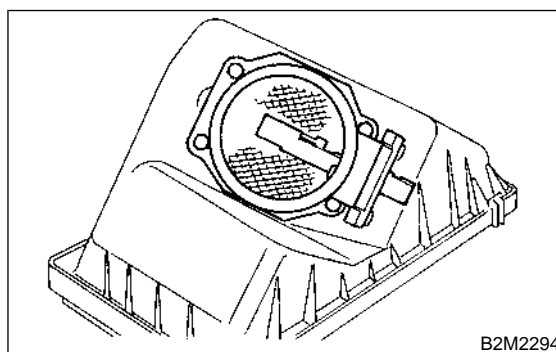
- 5) Remove air intake duct and air cleaner upper cover as a unit.



- 6) Loosen clamp which connects air intake duct to mass air flow sensor.



- 7) Remove mass air flow sensor from air cleaner upper cover.



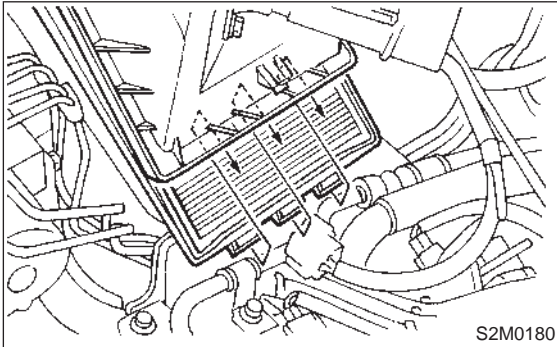
8) Installation is in the reverse order of removal.

Tightening torque:

7.4 ± 2.0 N·m (0.75 ± 0.2 kg-m, 5.4 ± 1.4 ft-lb)

CAUTION:

Before installing air cleaner upper cover, align holes with protruding portions of air cleaner lower case, then secure upper cover to lower case.

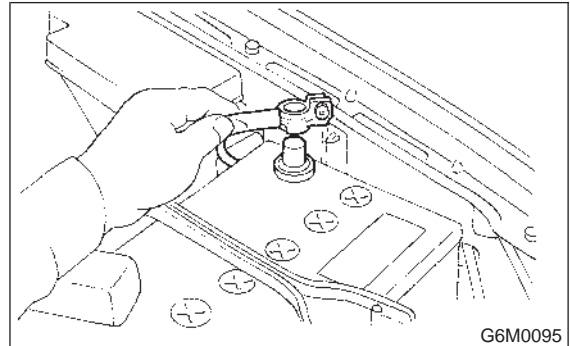


3. Throttle Body

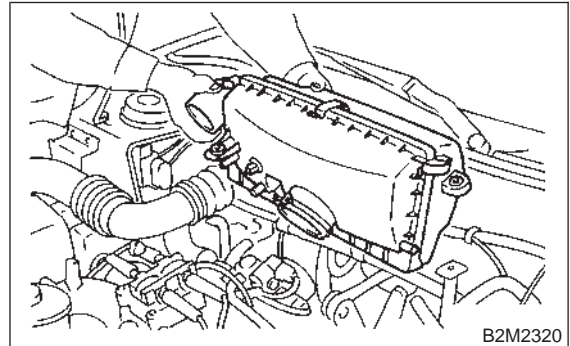
A: REMOVAL AND INSTALLATION

1. 2200 cc CALIFORNIA SPEC. VEHICLES

1) Disconnect battery ground cable.

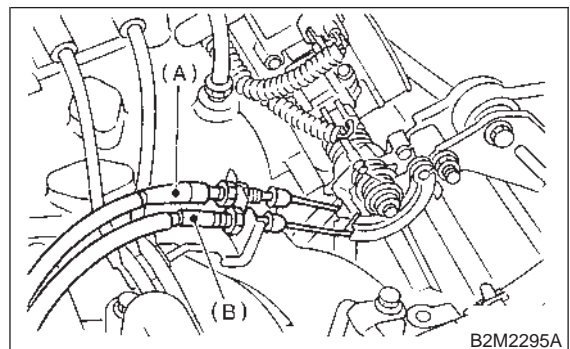


2) Remove air cleaner assembly. <Ref. to 2-7 [W1A0].>

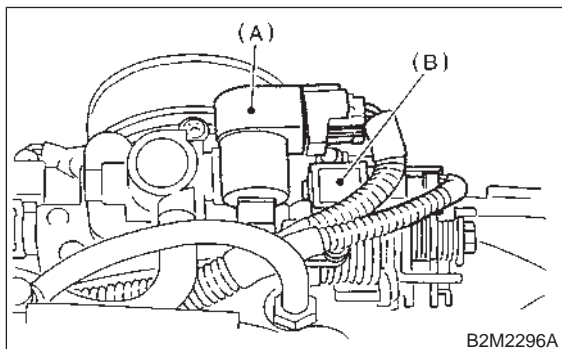


3) Disconnect accelerator cable (A).

4) Disconnect cruise control cable (B). (With cruise control model)

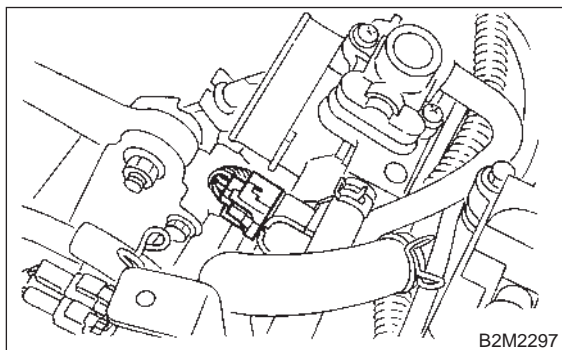


- 5) Disconnect connectors from idle air control solenoid valve (A) and intake manifold pressure sensor (B).

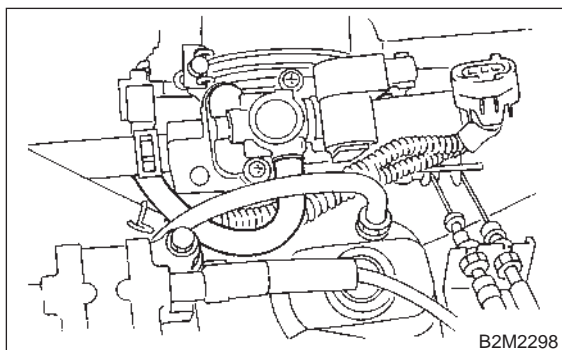


- (A) Idle air control solenoid valve
(B) Intake manifold pressure sensor

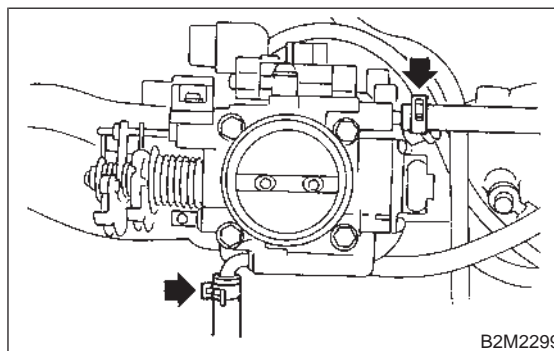
- 6) Disconnect connector from throttle position sensor.



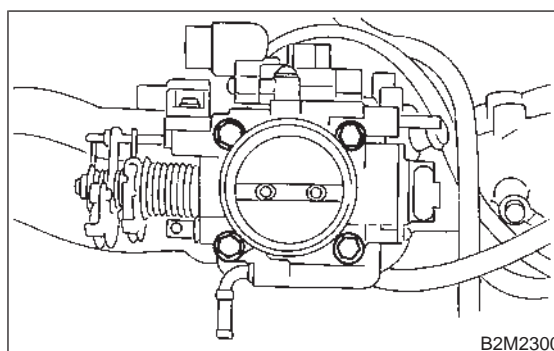
- 7) Disconnect air by-pass hose from idle air control solenoid valve.



- 8) Disconnect engine coolant hoses from throttle body.



- 9) Remove bolts which install throttle body to intake manifold.



- 10) Installation is in the reverse order of removal.

CAUTION:
Always use a new gasket.

Tightening torque:

Throttle body:

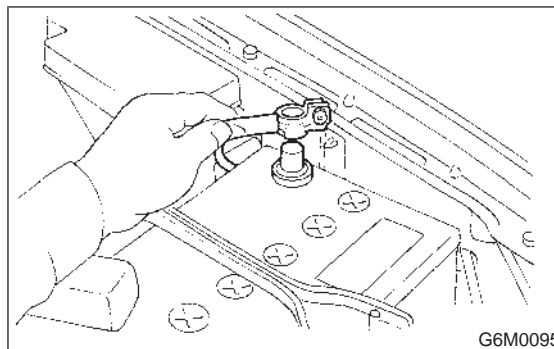
22 ± 2 N·m (2.2 ± 0.2 kg·m, 15.9 ± 1.4 ft·lb)

Air cleaner case:

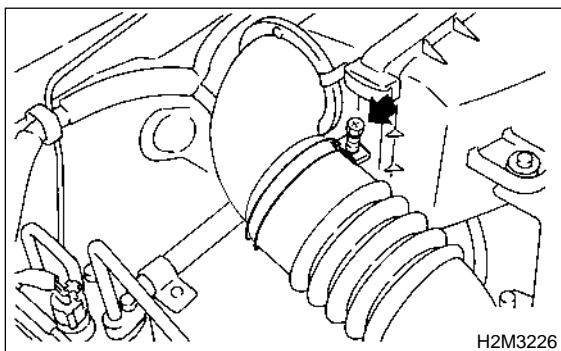
4.9 ± 0.5 N·m (0.5 ± 0.05 kg·m, 3.6 ± 0.4 ft·lb)

2. EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES

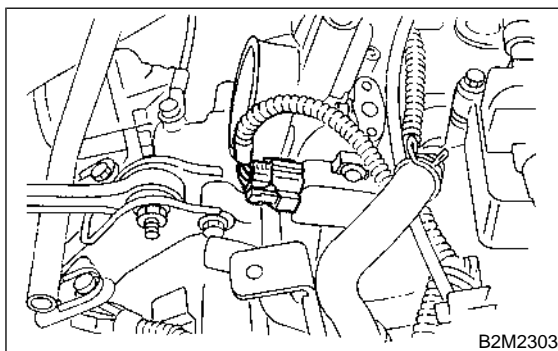
- 1) Disconnect battery ground cable.



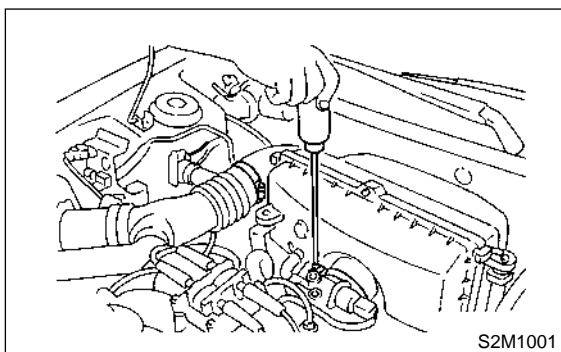
2) Loosen clamps which connect air intake duct to air intake chamber and mass air flow sensor.



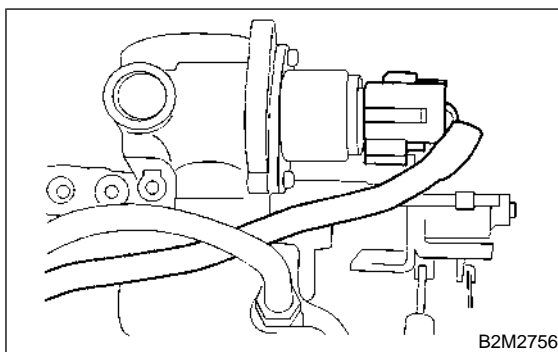
7) Disconnect connector from throttle position sensor.



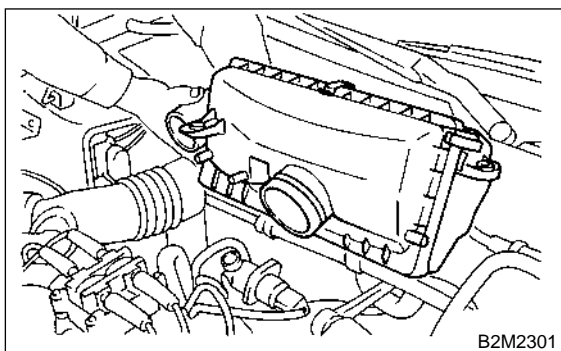
3) Loosen clamp which connects air intake chamber to throttle body.



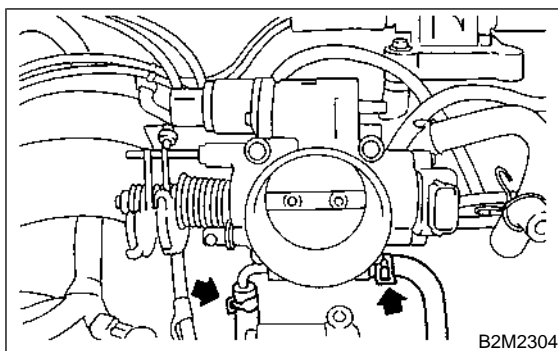
8) Disconnect connector from idle air control solenoid valve.



4) Disconnect blow-by hose and air hoses, and remove air intake chamber.

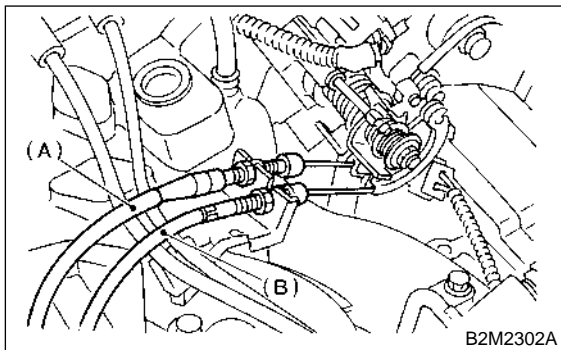


9) Disconnect engine coolant hoses from throttle body.

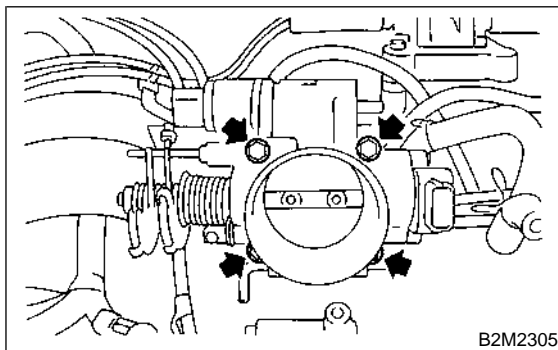


5) Disconnect accelerator cable (A).

6) Disconnect cruise control cable (B). (With cruise control model)



10) Remove bolts which install throttle body to intake manifold.



11) Installation is in the reverse order of removal.

CAUTION:

- Always use a new gasket.
- Before installing air cleaner upper cover, align holes with protruding portions of air cleaner lower case, then secure upper cover to lower case.

Tightening torque:**Throttle body:**

22 ± 2 N·m (2.2 ± 0.2 kg-m, 15.9 ± 1.4 ft-lb)

Air intake chamber:

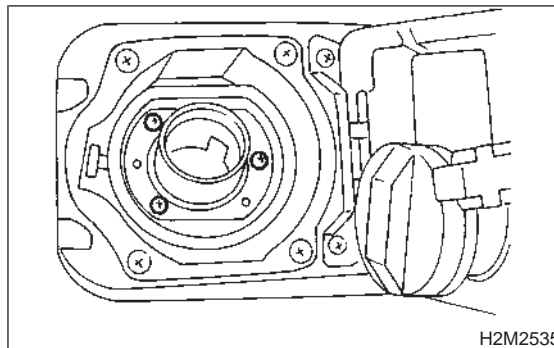
4.9 ± 0.5 N·m (0.5 ± 0.05 kg-m, 3.6 ± 0.4 ft-lb)

4. Intake Manifold

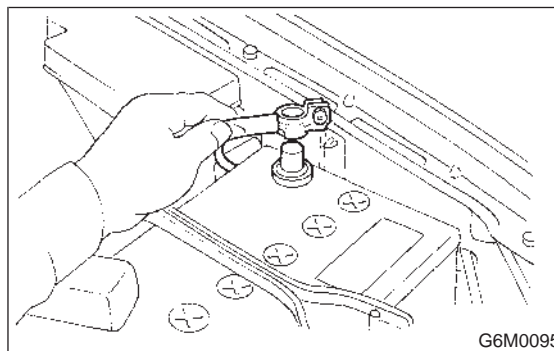
A: REMOVAL

1. 2200 cc CALIFORNIA SPEC. VEHICLES

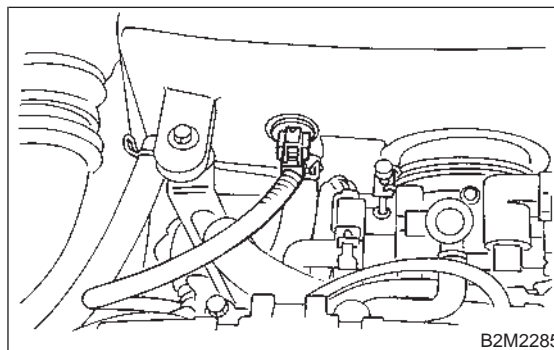
- 1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 2) Open fuel flap lid, and remove fuel filler cap.



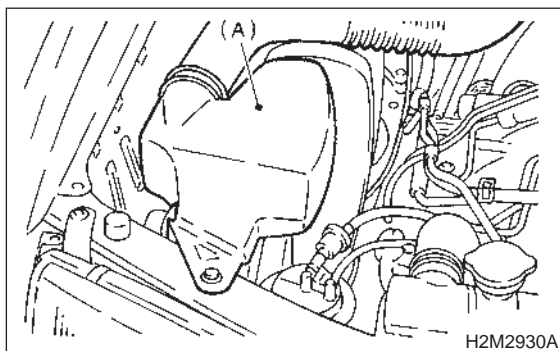
- 3) Disconnect battery ground cable.



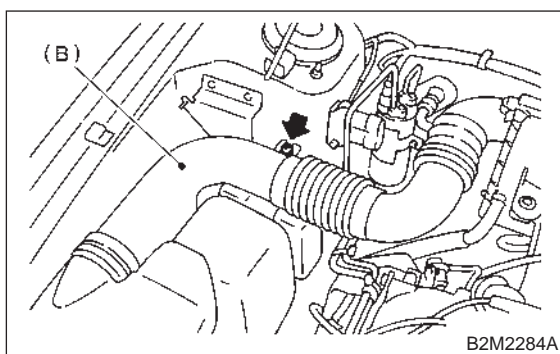
- 4) Disconnect connector from intake air temperature sensor.



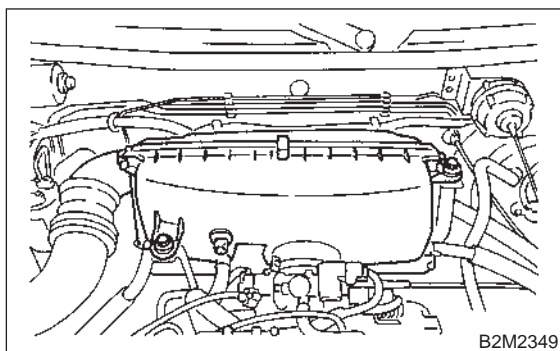
- 5) Remove bolt which installs air intake duct (A) on the front of body.



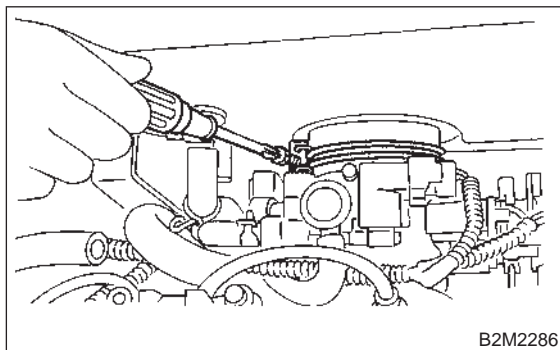
- 6) Remove bolt which installs air intake duct (B) on body.



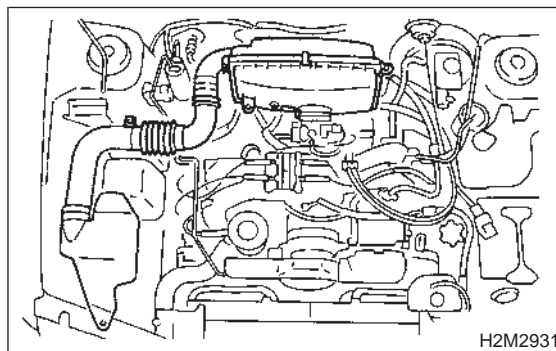
- 7) Remove bolts which install air cleaner case on stays.



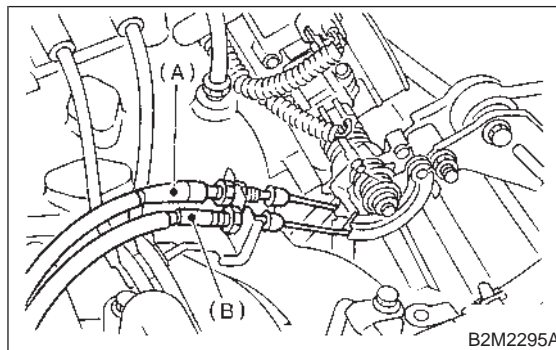
- 8) Loosen clamp which connects air intake chamber to throttle body.



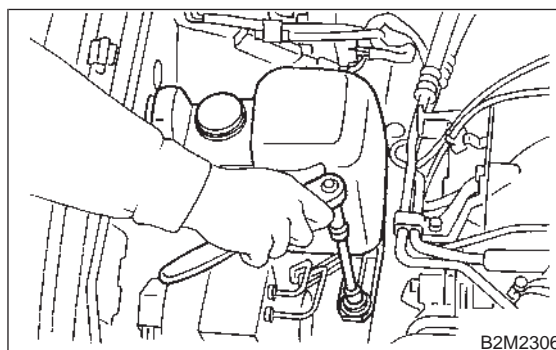
- 9) Disconnect blow-by hose from air cleaner case.
10) Remove air intake duct (A), (B) and air cleaner assembly as a unit.



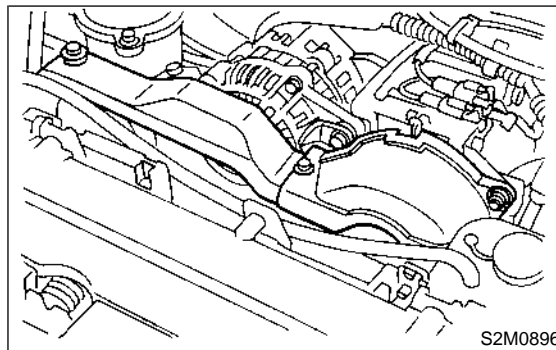
- 11) Disconnect accelerator cable (A).
12) Disconnect cruise control cable (B). (With cruise control model)



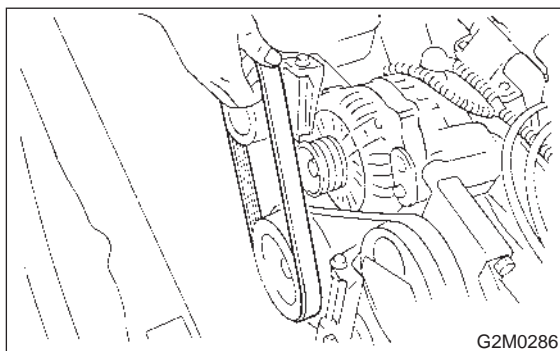
- 13) Remove power steering pump from bracket.
(1) Remove resonator chamber.



- (2) Remove V-belt covers.



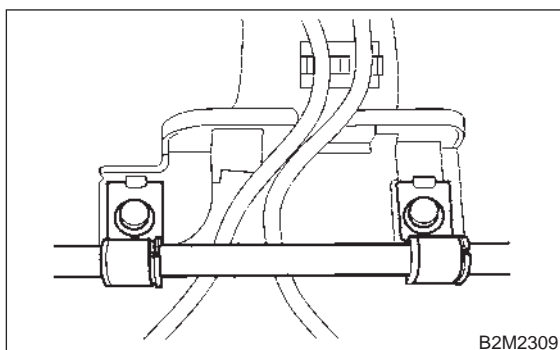
- (3) Loosen lock bolt and slider bolt, and remove power steering pump drive V-belt.



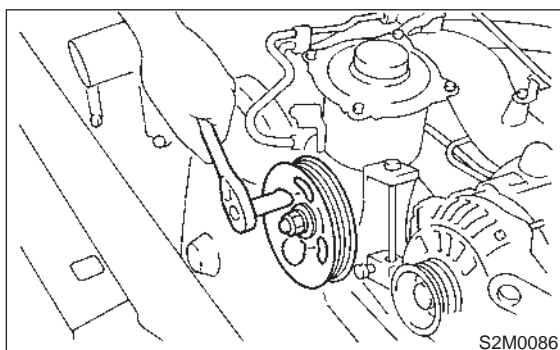
- (4) Remove bolts which secure power steering pipe brackets to intake manifold.

NOTE:

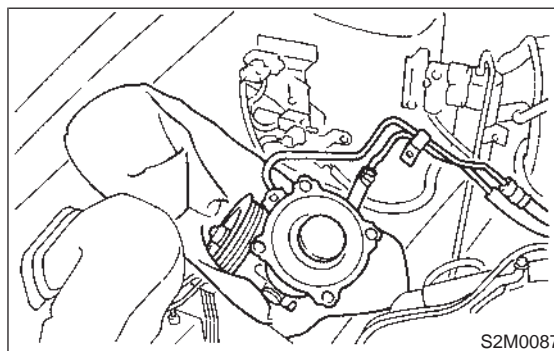
Do not disconnect power steering hose.



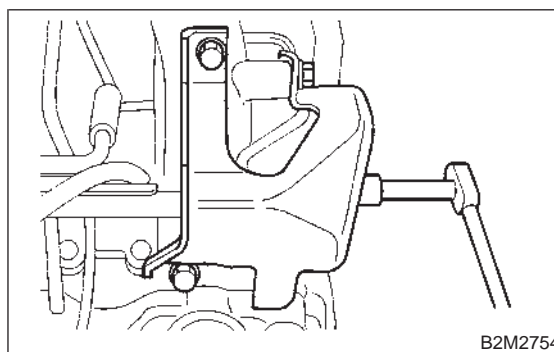
- (5) Remove bolts which install power steering pump to bracket.



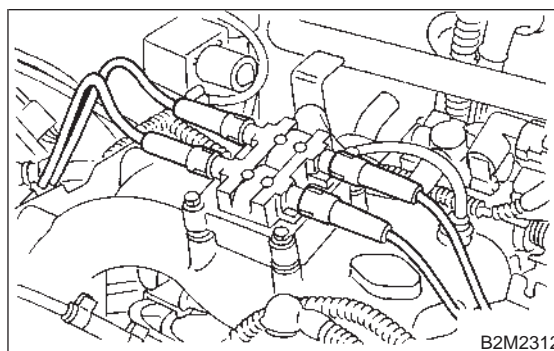
- (6) Place power steering pump on the right side wheel apron.



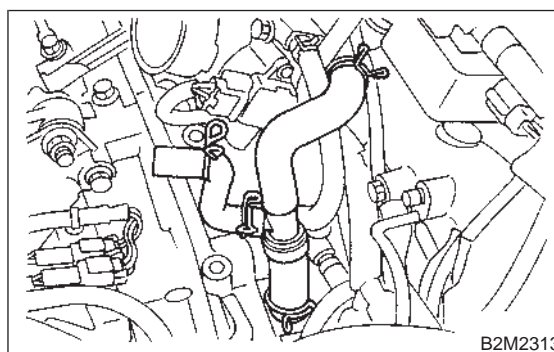
- 14) Remove fuel pipe protector.



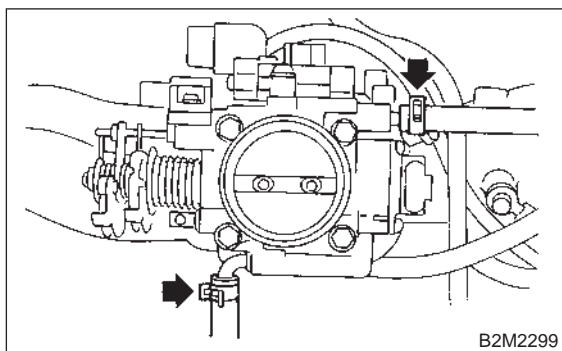
- 15) Disconnect spark plug cords from ignition coil and ignitor assembly.



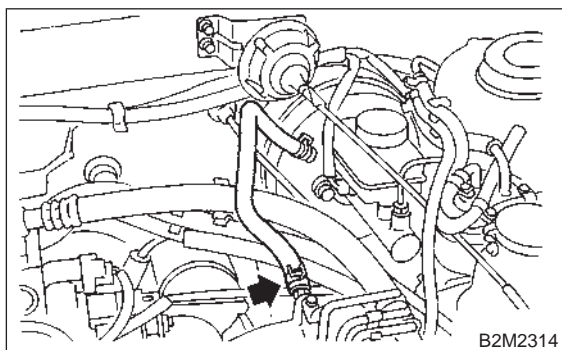
- 16) Disconnect PCV hose assembly from intake manifold.



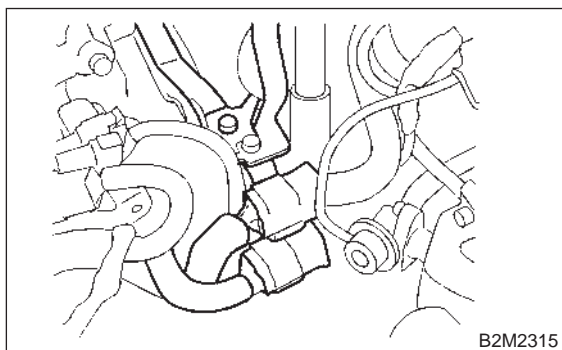
17) Disconnect engine coolant hoses from throttle body.



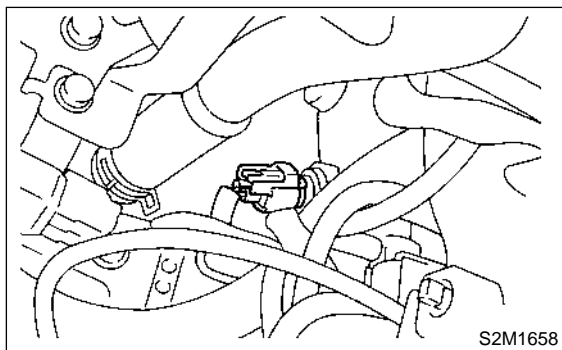
18) Disconnect brake booster hose.



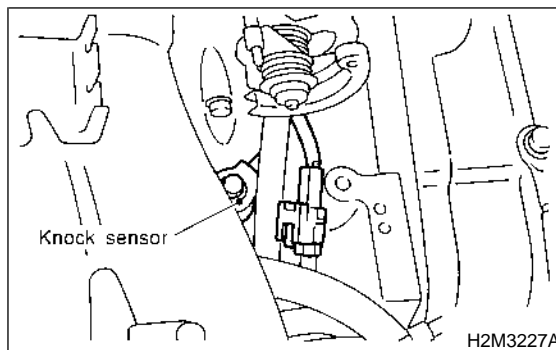
19) Remove air cleaner case stay RH and engine harness bracket, and disconnect engine harness connectors from bulkhead harness connectors.
20) Pull out engine harness connector from bracket.



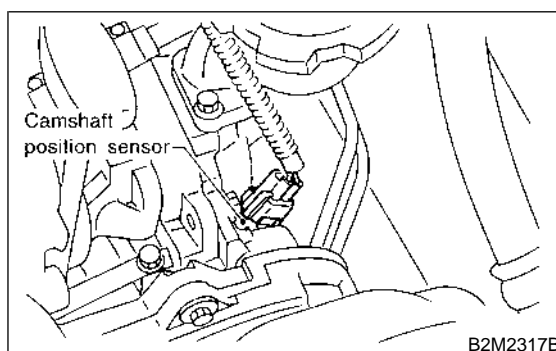
21) Disconnect connectors from engine coolant temperature sensor.



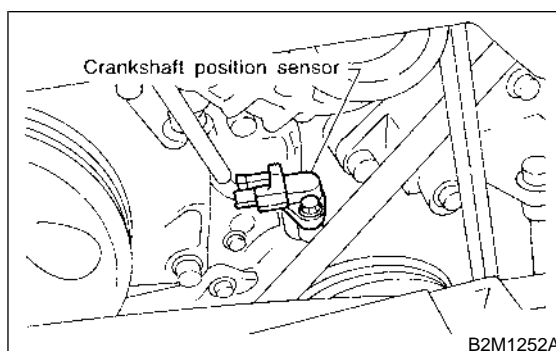
22) Disconnect knock sensor connector.



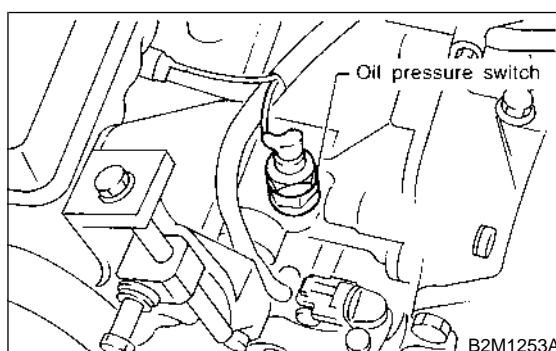
23) Disconnect connector from camshaft position sensor.



24) Disconnect connector from crankshaft position sensor.



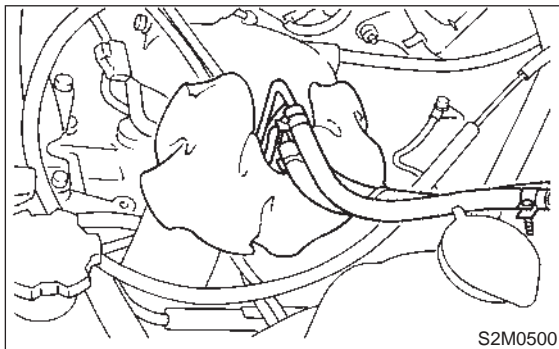
25) Disconnect connector from oil pressure switch.



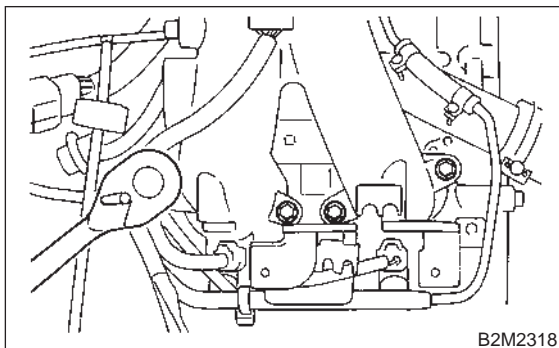
26) Disconnect fuel hoses from fuel pipes.

WARNING:

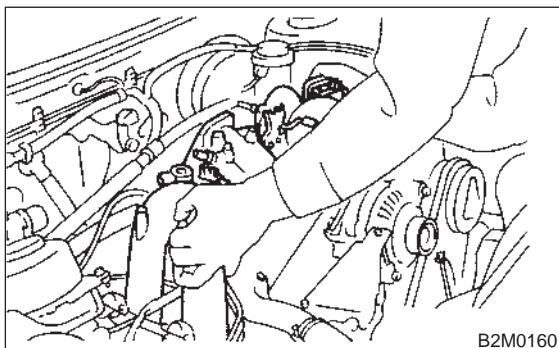
Catch fuel from hoses in a container.



27) Remove eight bolts which hold intake manifold onto cylinder heads.

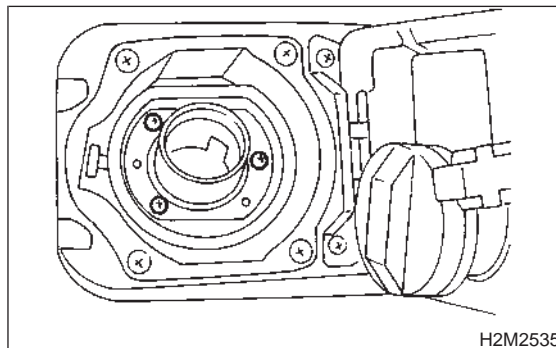


28) Remove intake manifold.

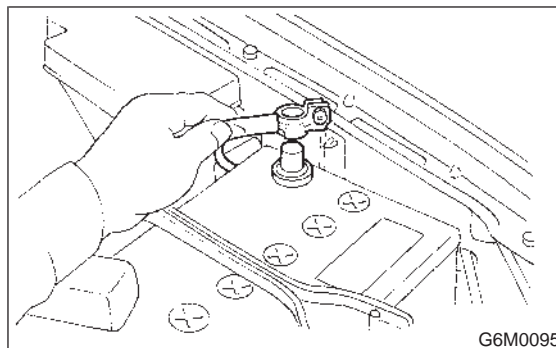


2. EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES

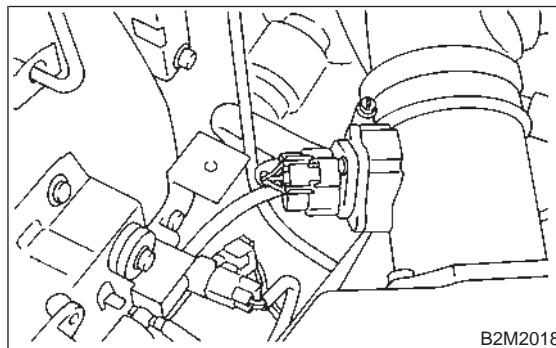
- 1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 2) Open fuel flap lid, and remove fuel filler cap.



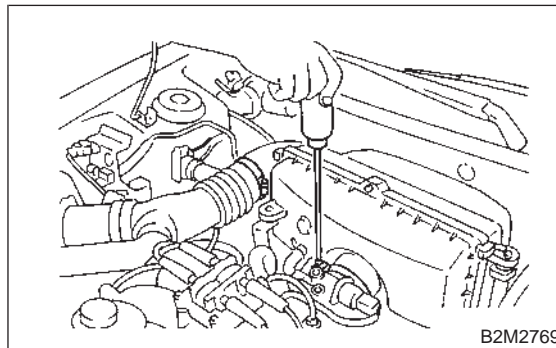
3) Disconnect battery ground cable.



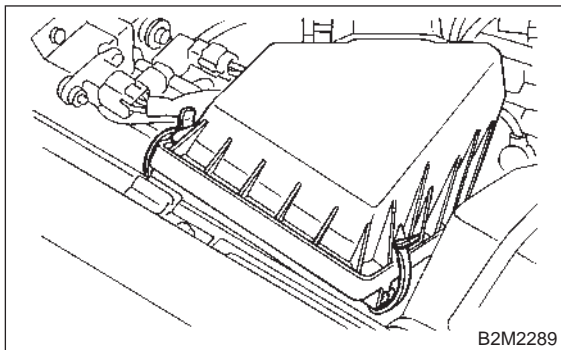
4) Disconnect connector from mass air flow sensor.



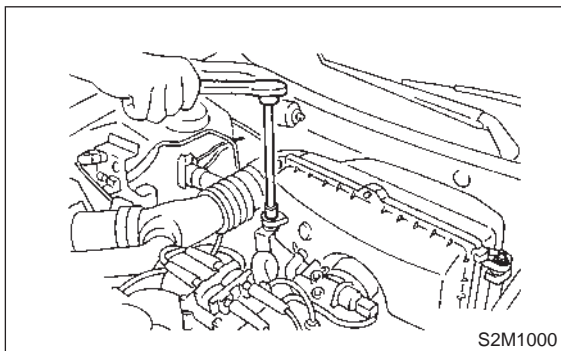
5) Loosen clamp which connects air intake chamber to throttle body.



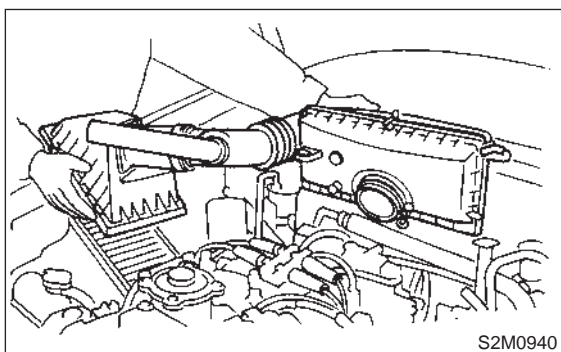
- 6) Remove two clips of air cleaner upper cover.



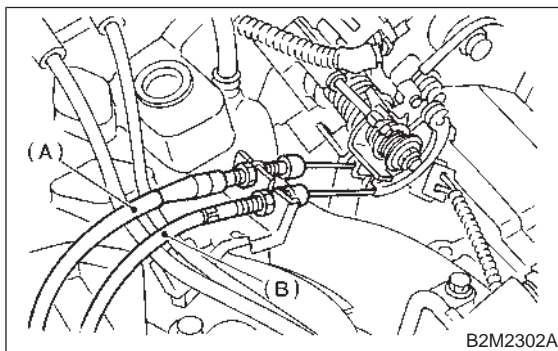
- 7) Remove bolts which install air intake chamber on stays.



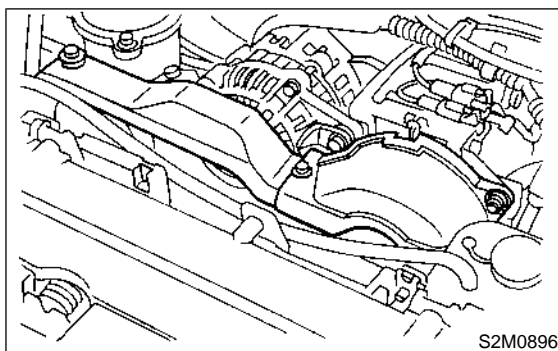
- 8) Disconnect blow-by hose from air intake chamber.
 9) Remove air intake duct, air cleaner upper cover and air intake chamber as a unit.
 10) Remove air cleaner element.



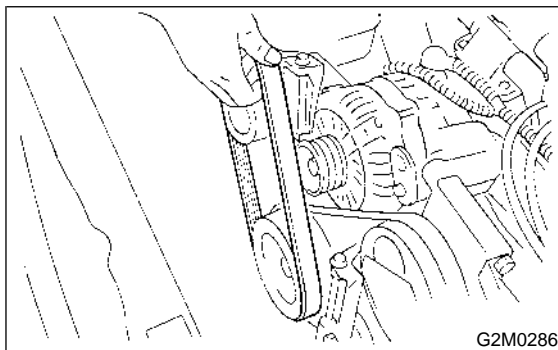
- 11) Disconnect accelerator cable (A).
 12) Disconnect cruise control cable (B). (With cruise control model)



- 13) Disconnect vacuum hoses from pressure sources switching solenoid valve.
 14) Remove power steering pump from bracket.
 (1) Remove V-belt cover.



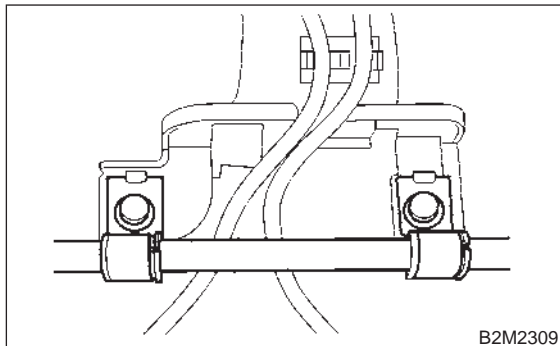
- (2) Loosen lock bolt and slider bolt, and remove power steering pump drive V-belt.



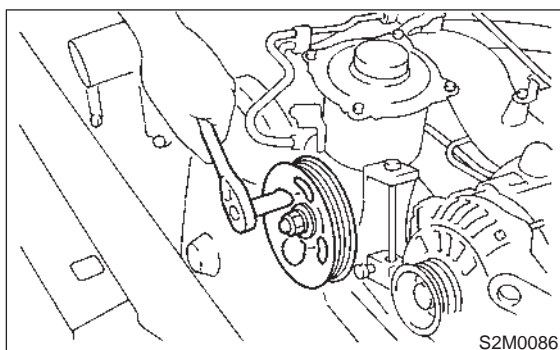
- (3) Remove bolts which secure power steering pipe brackets to intake manifold.

NOTE:

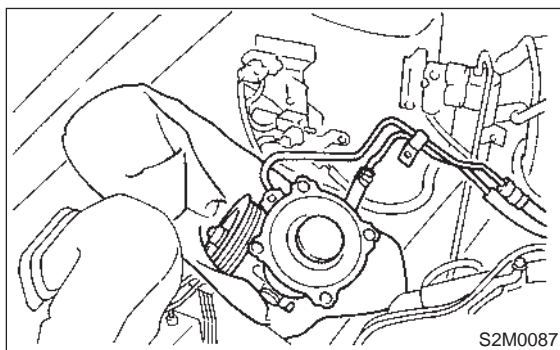
Do not disconnect power steering hose.



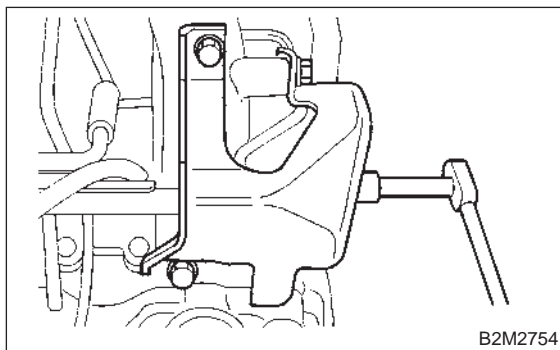
- (4) Remove bolts which install power steering pump to bracket.



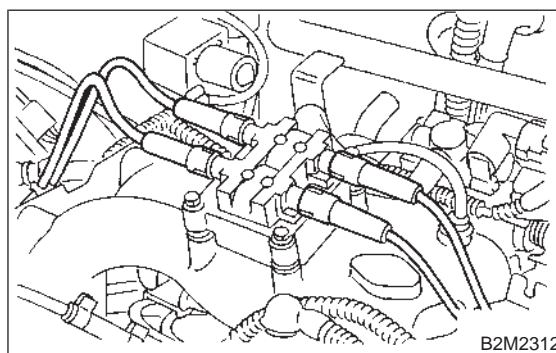
- (5) Place power steering pump on the right side wheel apron.



- 15) Remove fuel pipe protector.

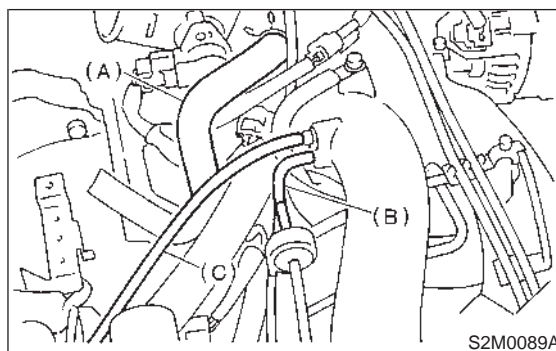


- 16) Disconnect spark plug cords from ignition coil and ignitor assembly.

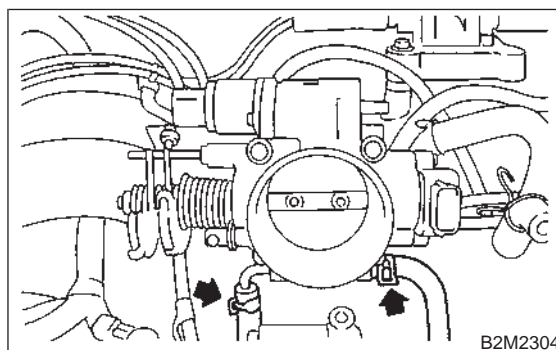


- 17) Disconnect PCV hose (A) and pressure regulator vacuum hose (B) from intake manifold.

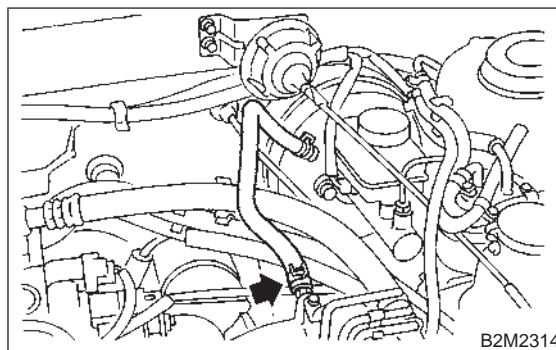
- 18) Disconnect vacuum hose (C) to cruise control diaphragm. (With cruise control models)



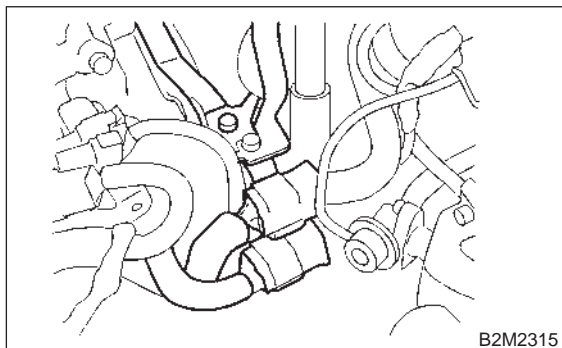
- 19) Disconnect engine coolant hose from throttle body.



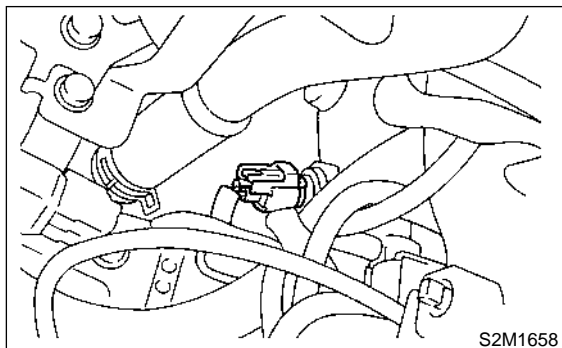
- 20) Disconnect brake booster hose.



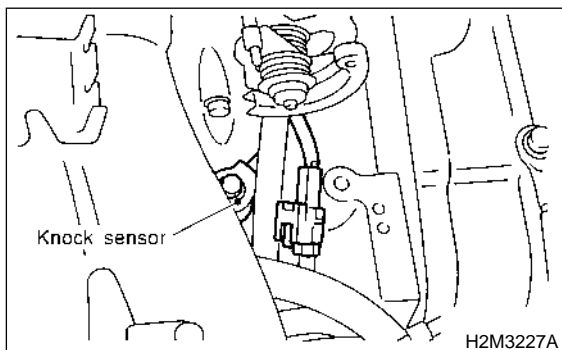
21) Remove air intake chamber stay RH, engine harness bracket from transmission housing, and disconnect engine harness connectors from bulk-head harness connectors.



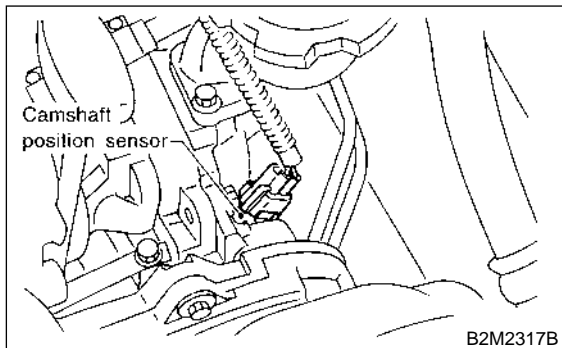
22) Disconnect connectors from engine coolant temperature sensor.



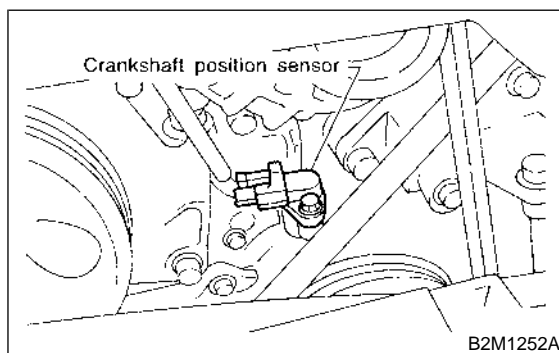
23) Disconnect knock sensor connector.



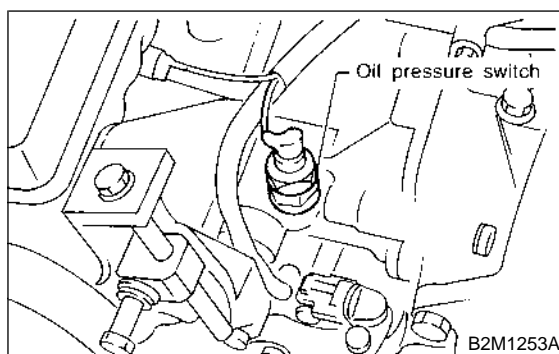
24) Disconnect connector from camshaft position sensor.



25) Disconnect connector from crankshaft position sensor.

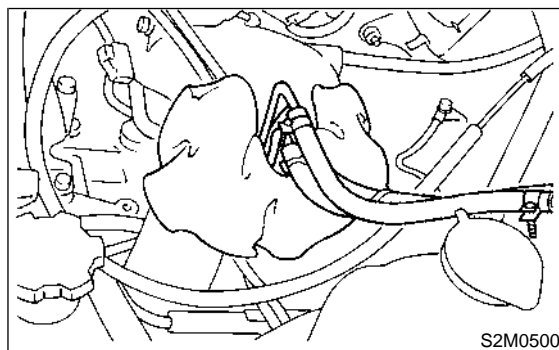


26) Disconnect connector from oil pressure switch.

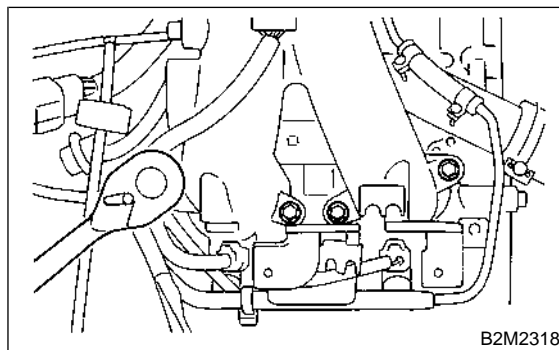


27) Disconnect fuel hoses from fuel pipes.

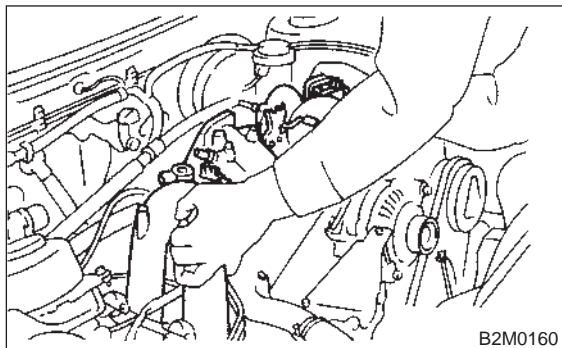
WARNING:
Catch fuel from hoses in a container.



28) Remove bolts which hold intake manifold onto cylinder heads.



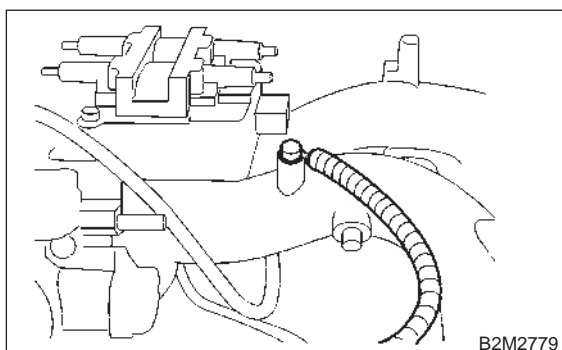
29) Remove intake manifold.



B: DISASSEMBLY

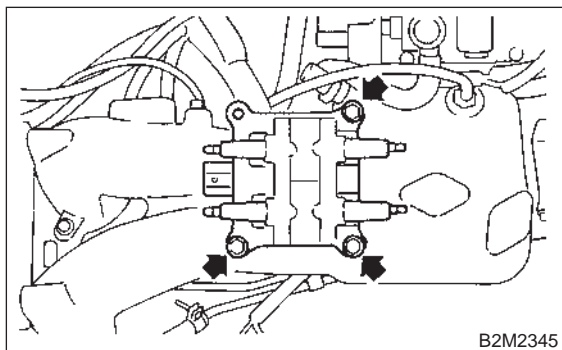
1. 2200 cc CALIFORNIA SPEC. VEHICLES

1) Disconnect engine ground terminal from intake manifold.



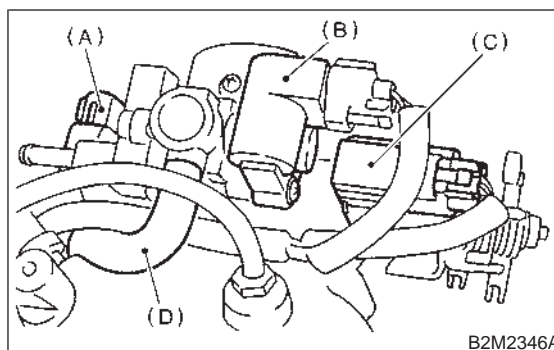
2) Disconnect connector from ignition coil and ignitor assembly.

3) Remove ignition coil and ignitor assembly.

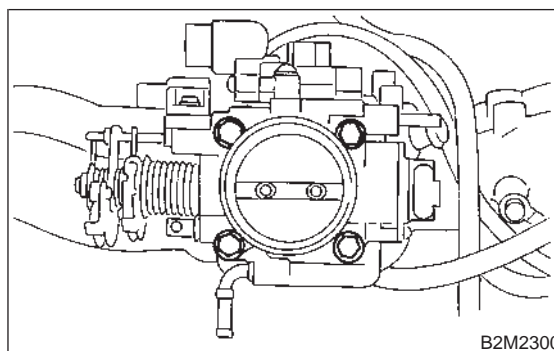


4) Disconnect connectors from throttle position sensor (A), idle air control solenoid valve (B) and intake manifold pressure sensor (C).

5) Disconnect air by-pass hose (D) from idle air control solenoid valve.



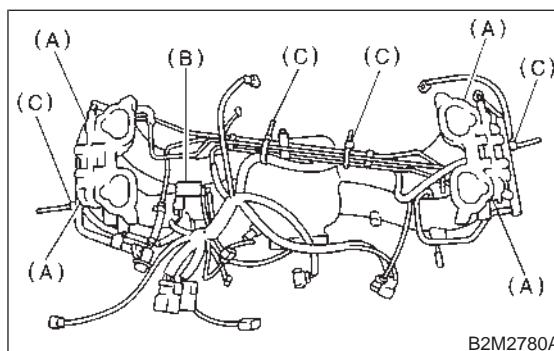
6) Remove throttle body.



7) Disconnect connectors from fuel injectors, and purge control solenoid valve.

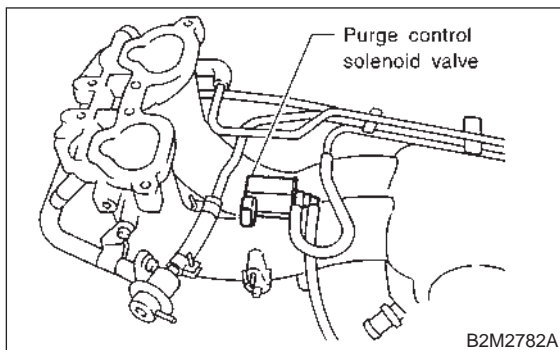
8) Remove harness bands which hold engine harness onto intake manifold.

9) Remove engine harness from intake manifold.

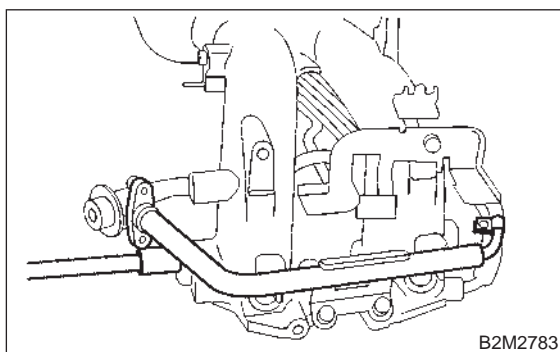


- (A) Fuel injector
- (B) Purge control solenoid valve
- (C) Harness band

- 10) Remove purge control solenoid valve.

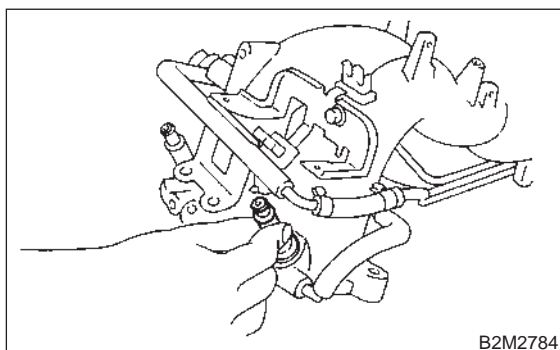


- 11) Remove bolts which install injector pipe on intake manifold.

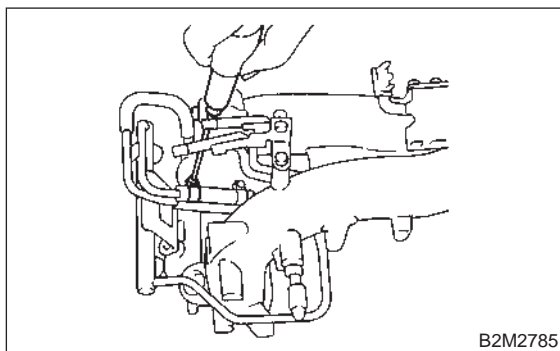


- 12) Remove fuel injectors.

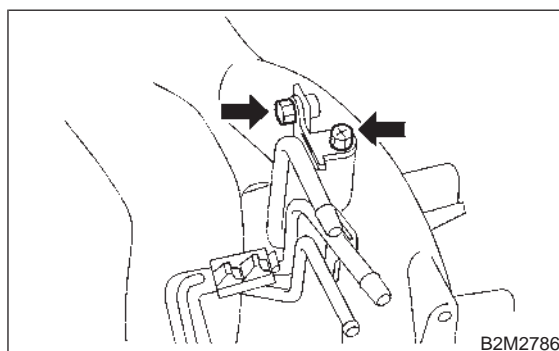
CAUTION:
Replace o-rings and insulators with new ones.



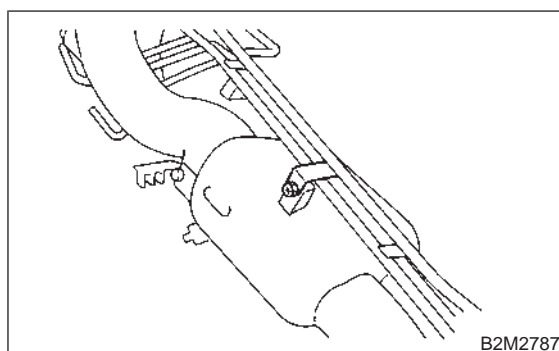
- 13) Loosen clamp which holds front left side fuel hose to injector pipe.



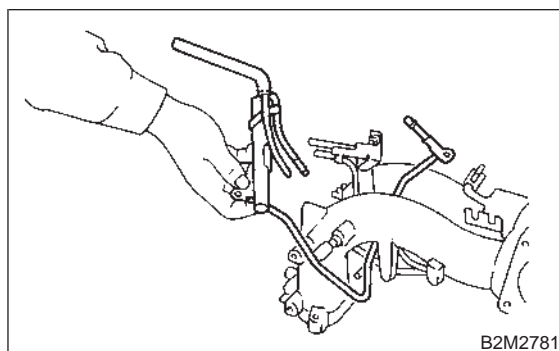
- 14) Remove bolts which hold fuel pipes on the left side of intake manifold.



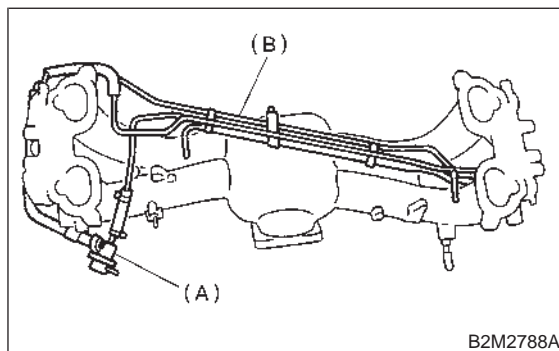
- 15) Remove two bolts which install fuel pipes on intake manifold.



- 16) Remove fuel injector pipe.



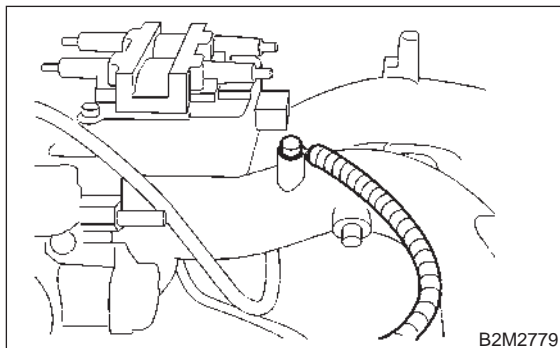
- 17) Remove fuel pipes, etc. from intake manifold.



- (A) Pressure regulator
(B) Fuel pipe ASSY

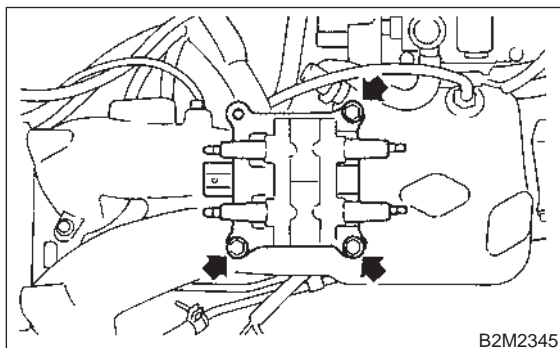
2. EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES

1) Remove engine ground terminal from intake manifold.

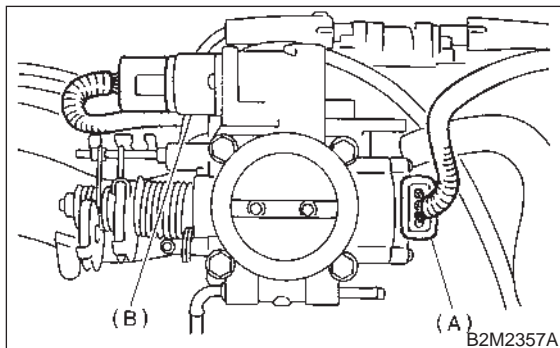


2) Disconnect connector from ignition coil and ignitor assembly.

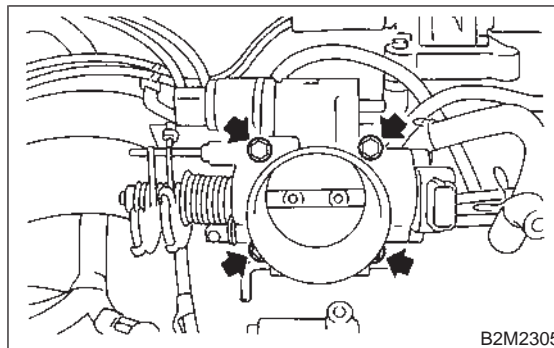
3) Remove ignition coil and ignitor assembly.



4) Disconnect connectors from throttle position sensor (A) and idle air control solenoid valve (B).



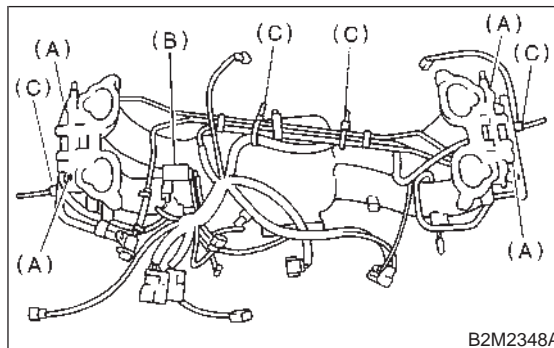
5) Remove throttle body.



6) Disconnect connectors from fuel injectors, and purge control solenoid valve.

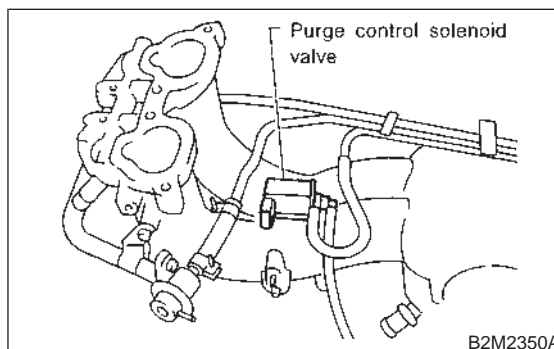
7) Remove harness bands which hold engine harness onto intake manifold.

8) Remove engine harness from intake manifold.

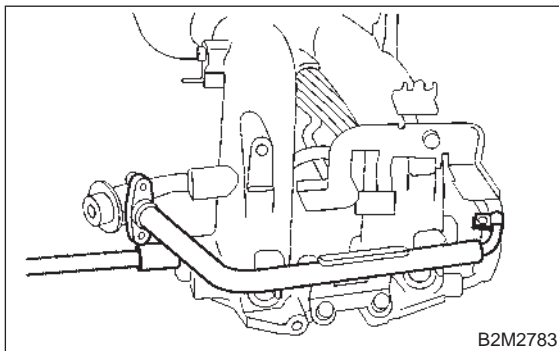


- (A) Fuel injector
- (B) Purge control solenoid valve
- (C) Harness band

9) Remove purge control solenoid valve.



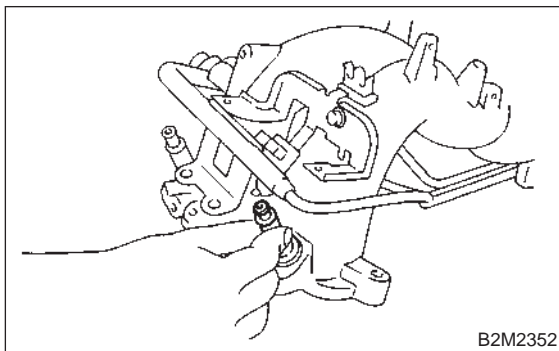
10) Remove bolts which install injector pipe on intake manifold.



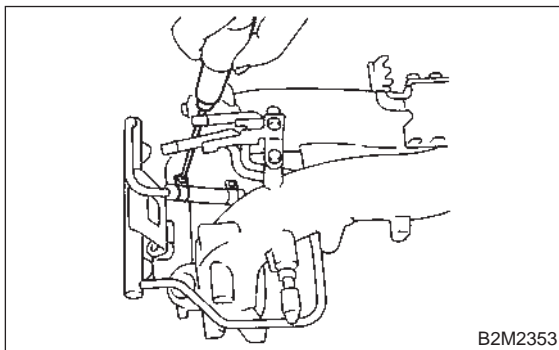
11) Remove fuel injectors.

CAUTION:

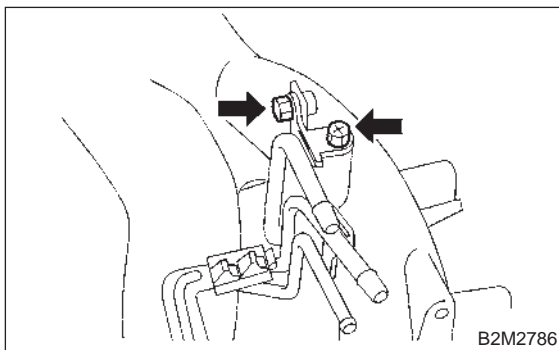
Replace o-rings and insulators with new ones.



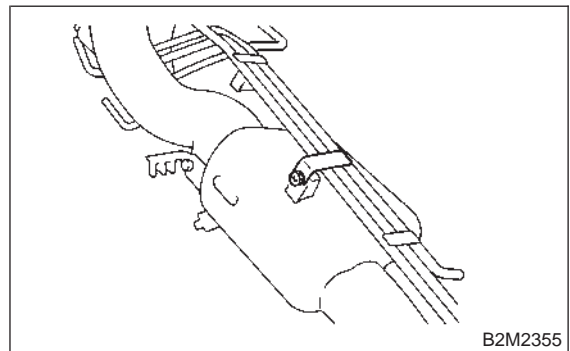
12) Loosen clamp which holds front left side fuel hose to injector pipe.



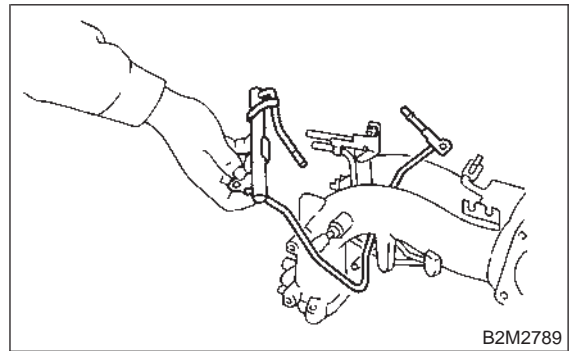
13) Remove bolts which hold fuel pipes on the left side of intake manifold.



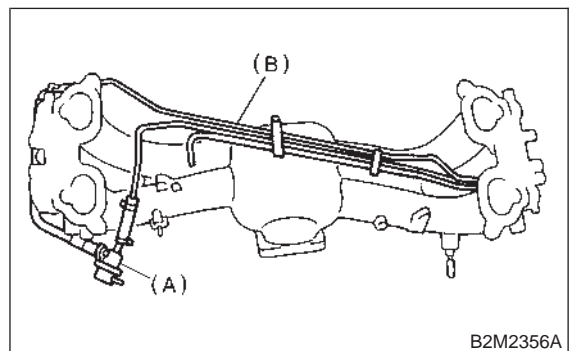
14) Remove two bolts which install fuel pipes on intake manifold.



15) Remove fuel injector pipe.



16) Remove fuel pipes, etc. from intake manifold.



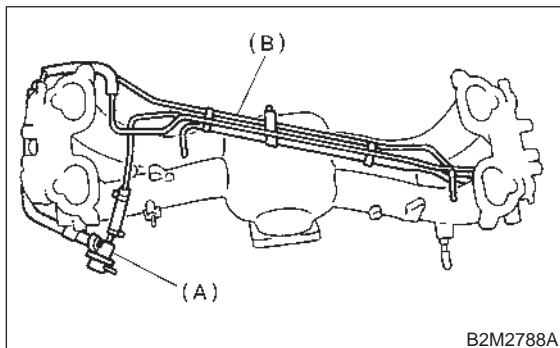
(A) Pressure regulator

(B) Fuel pipe ASSY

C: ASSEMBLY

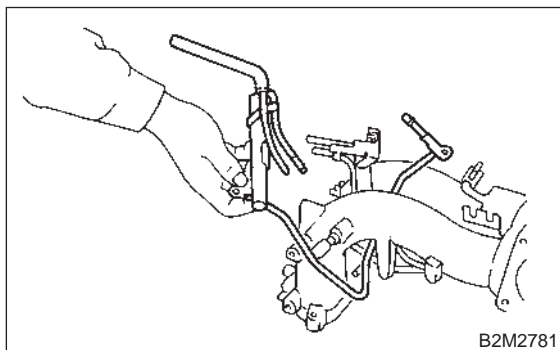
1. 2200 cc CALIFORNIA SPEC. VEHICLES

1) Assemble fuel pipes, etc. to intake manifold.

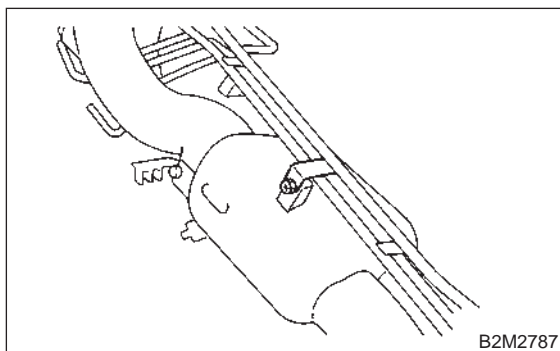


- (A) Pressure regulator
- (B) Fuel pipe ASSY

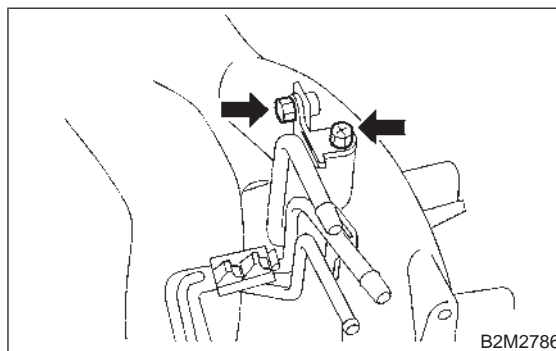
2) Install fuel injector pipe.



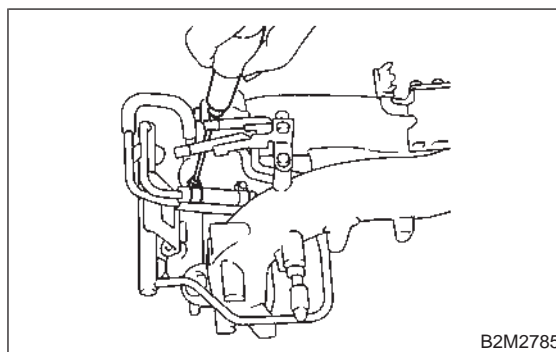
3) Tighten two bolts which install fuel pipes on intake manifold.



4) Tighten two bolts which install fuel pipes on the left side of intake manifold.

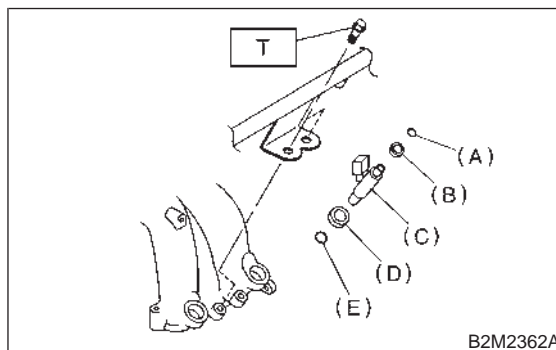


5) Connect left side fuel hose to injector pipe, and tighten clamp screw.



6) Install fuel injectors.

CAUTION:
Always use new o-rings and insulators.

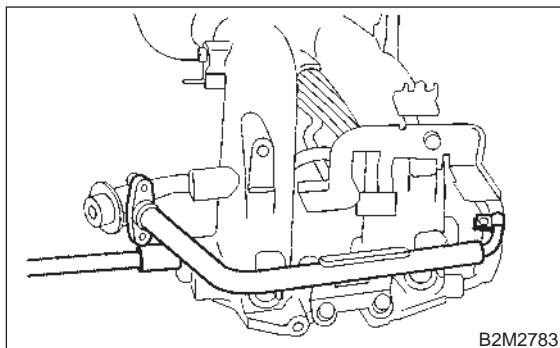


- (A) O-ring A
- (B) Insulator A
- (C) Fuel injector
- (D) Insulator B
- (E) O-ring B

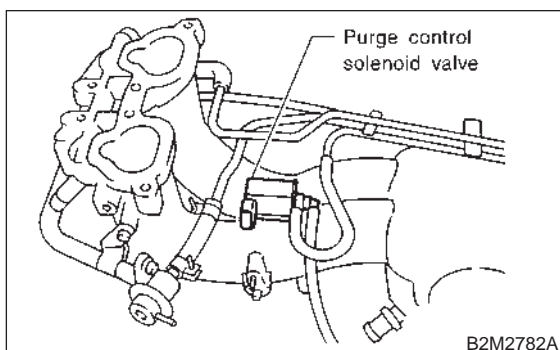
7) Tighten bolts which install injector pipe on intake manifold.

Tightening torque:

$3.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.35 \pm 0.05 \text{ kg}\cdot\text{m}$, $2.5 \pm 0.4 \text{ ft}\cdot\text{lb}$)



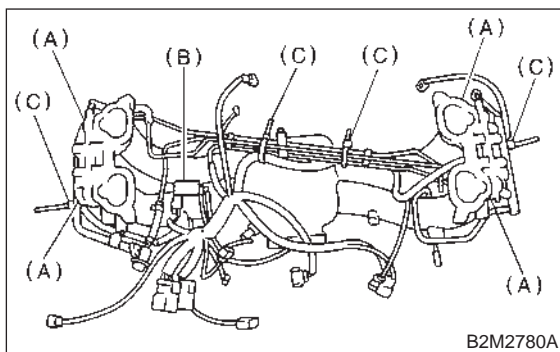
8) Install purge control solenoid valve.



9) Install engine harness onto intake manifold.

10) Connect connectors to fuel injectors and purge control solenoid valve.

11) Hold engine harness by harness bands.



- (A) Fuel injector
- (B) Purge control solenoid valve
- (C) Harness band

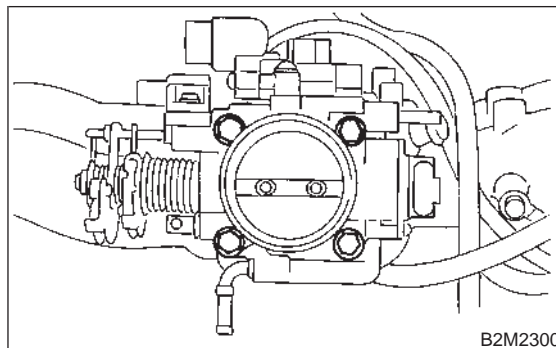
12) Assemble throttle body to intake manifold.

CAUTION:

Replace gasket with a new one.

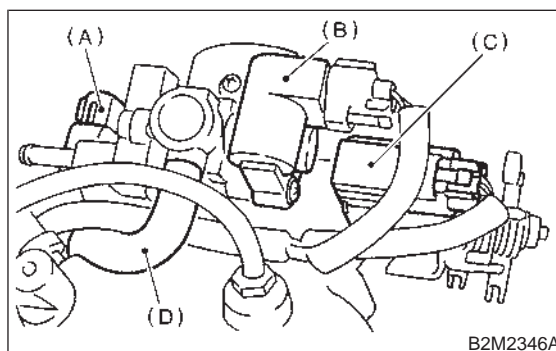
Tightening torque:

$22 \pm 2 \text{ N}\cdot\text{m}$ ($2.2 \pm 0.2 \text{ kg}\cdot\text{m}$, $15.9 \pm 1.4 \text{ ft}\cdot\text{lb}$)



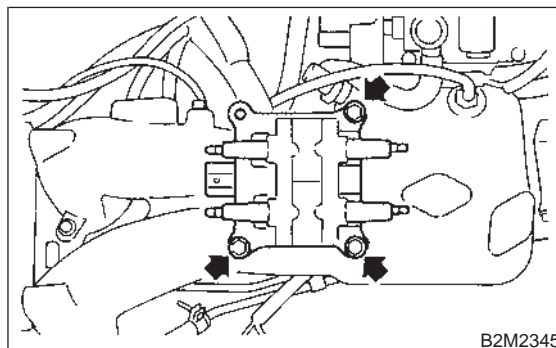
13) Connect connectors to throttle position sensor (A), idle air control solenoid valve (B) and intake manifold pressure sensor (C).

14) Connect air by-pass hose (D) to idle air control solenoid valve.



15) Install ignition coil and ignitor assembly.

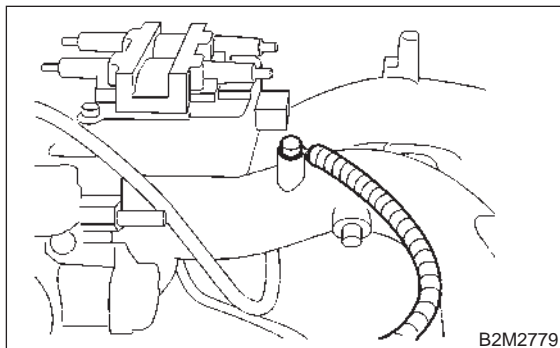
16) Connect connector to ignition coil and ignitor assembly.



17) Install engine ground terminal to intake manifold.

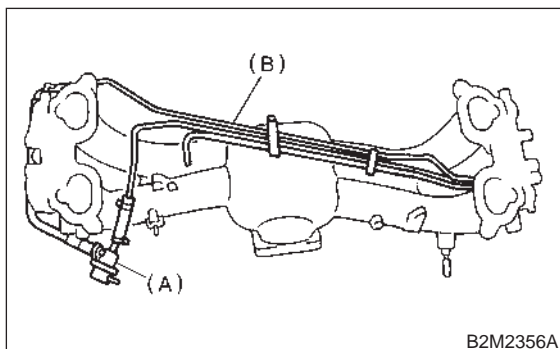
Tightening torque:

$18.6 \pm 1.5 \text{ N}\cdot\text{m}$ ($1.9 \pm 0.15 \text{ kg}\cdot\text{m}$, $13.7 \pm 1.1 \text{ ft}\cdot\text{lb}$)



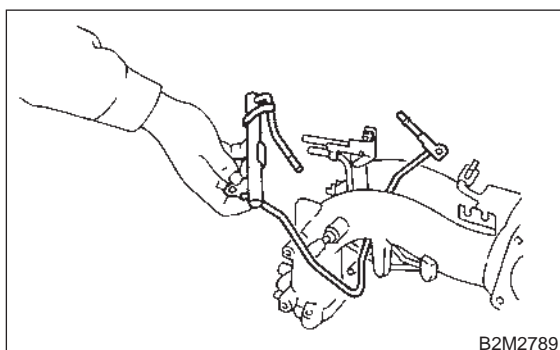
2. EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES

1) Assemble fuel pipes, etc. to intake manifold.

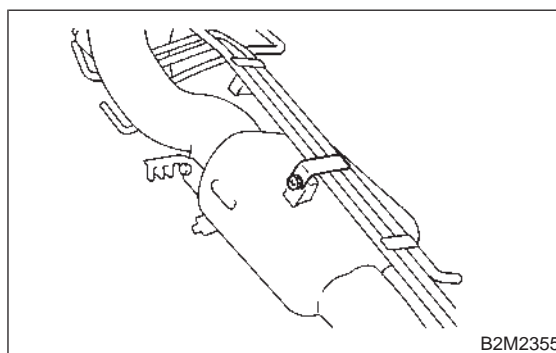


- (A) Pressure regulator
- (B) Fuel pipe ASSY

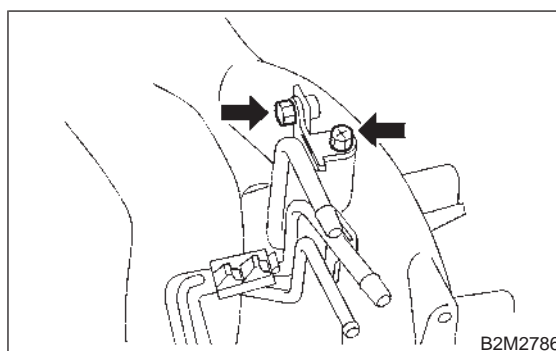
2) Install fuel injector pipe.



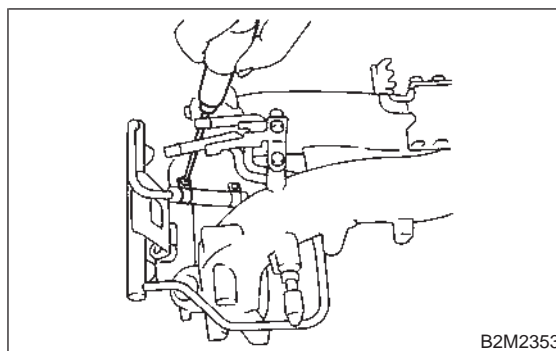
3) Tighten two bolts which install fuel pipes on intake manifold.



4) Tighten two bolts which install fuel pipes on the left side of intake manifold.



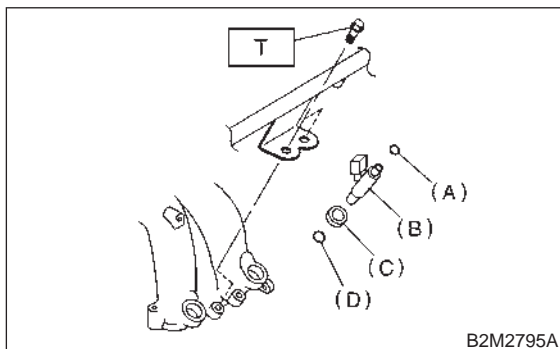
5) Connect left side fuel hose to injector pipe, and tighten clamp screw.



6) Install fuel injectors.

CAUTION:

Always use new o-rings and insulators.



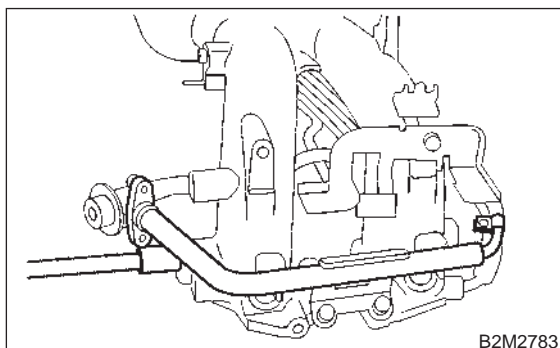
B2M2795A

- (A) O-ring A
- (B) Fuel injector
- (C) Insulator
- (D) O-ring B

7) Tighten bolts which install injector pipe on intake manifold.

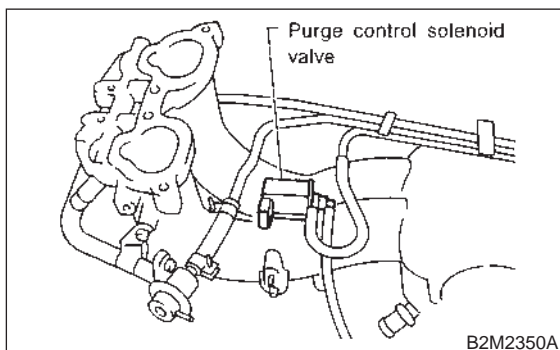
Tightening torque:

$3.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.35 \pm 0.05 \text{ kg}\cdot\text{m}$, $2.5 \pm 0.4 \text{ ft}\cdot\text{lb}$)



B2M2783

8) Install purge control solenoid valve.

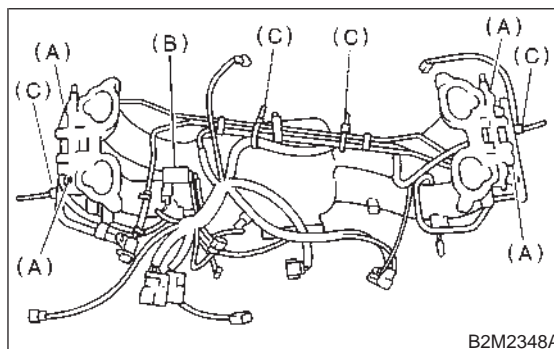


B2M2350A

9) Install engine harness onto intake manifold.

10) Connect connectors to fuel injectors and purge control solenoid valve.

11) Hold engine harness by harness bands.



B2M2348A

- (A) Fuel injector
- (B) Purge control solenoid valve
- (C) Harness band

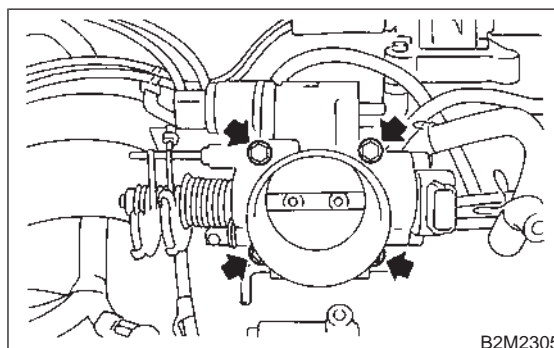
12) Assemble throttle body to intake manifold.

CAUTION:

Replace gasket with a new one.

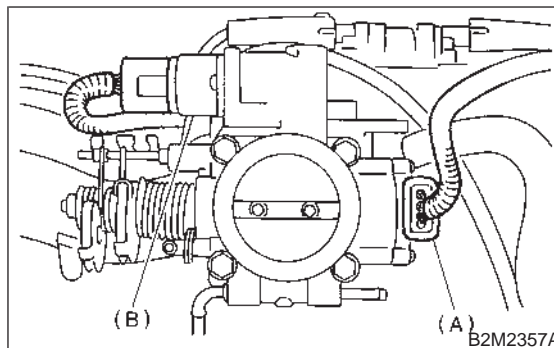
Tightening torque:

$22 \pm 2 \text{ N}\cdot\text{m}$ ($2.2 \pm 0.2 \text{ kg}\cdot\text{m}$, $15.9 \pm 1.4 \text{ ft}\cdot\text{lb}$)



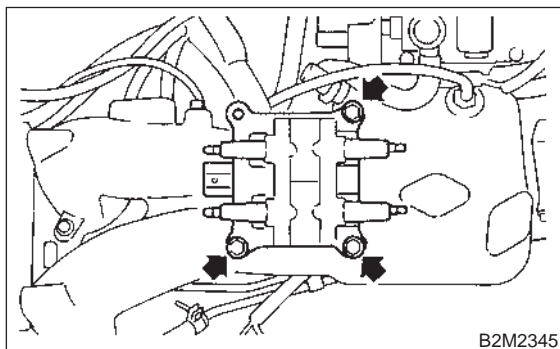
B2M2305

13) Connect connectors to throttle position sensor (A) and idle air control solenoid valve (B).



B2M2357A

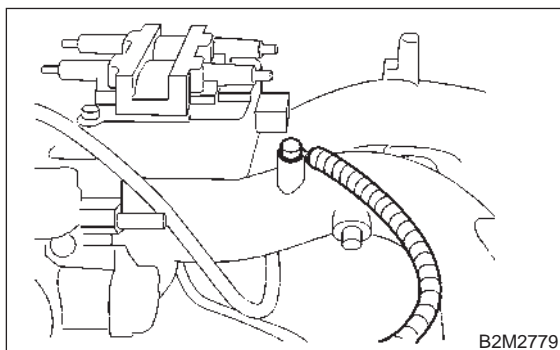
- 14) Install ignition coil and ignitor assembly.
- 15) Connect connector to ignition coil and ignitor assembly.



- 16) Install engine ground terminal to intake manifold.

Tightening torque:

$18.6 \pm 1.5 \text{ N}\cdot\text{m}$ ($1.9 \pm 0.15 \text{ kg}\cdot\text{m}$, $13.7 \pm 1.1 \text{ ft}\cdot\text{lb}$)



D: INSTALLATION

1. 2200 cc CALIFORNIA SPEC. VEHICLES

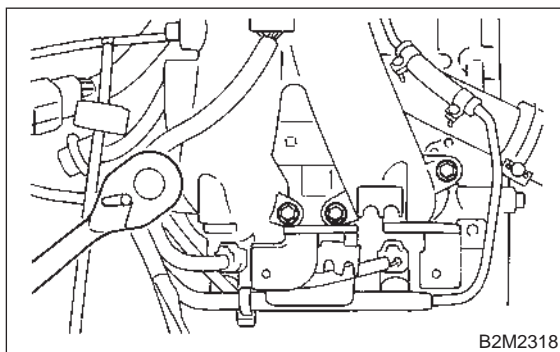
- 1) Install intake manifold onto cylinder heads.

CAUTION:

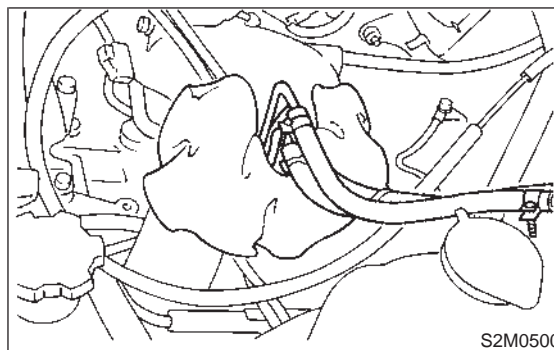
Always use new gaskets.

Tightening torque:

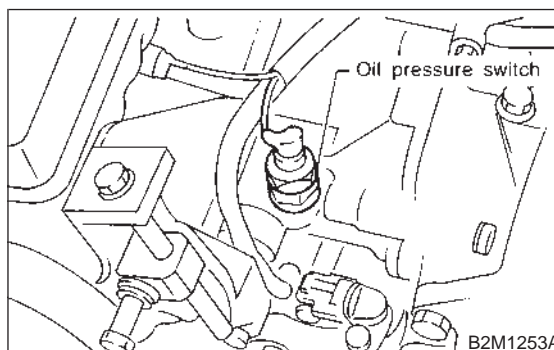
$25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)



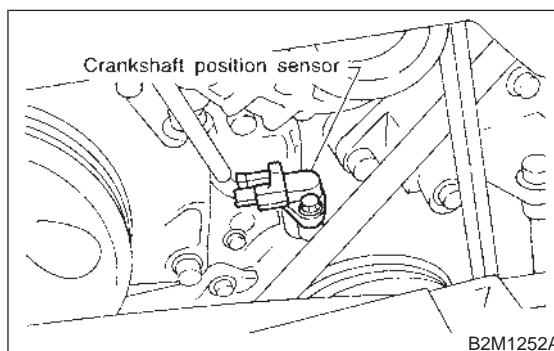
- 2) Connect fuel hoses.



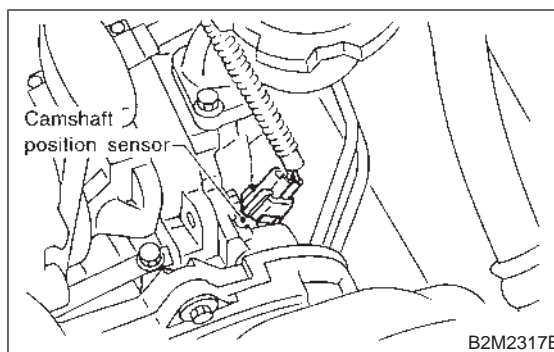
- 3) Connect connector to oil pressure switch.



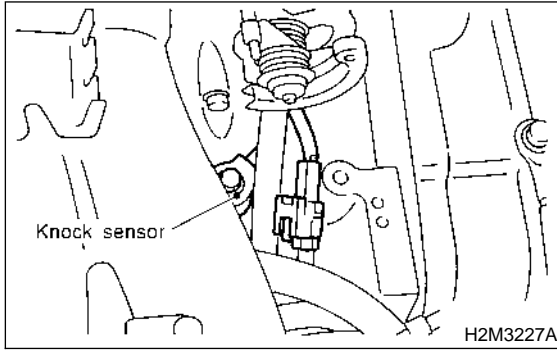
- 4) Connect connector to crankshaft position sensor.



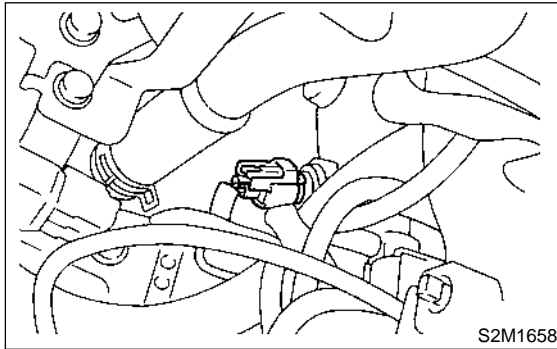
- 5) Connect connector to camshaft position sensor.



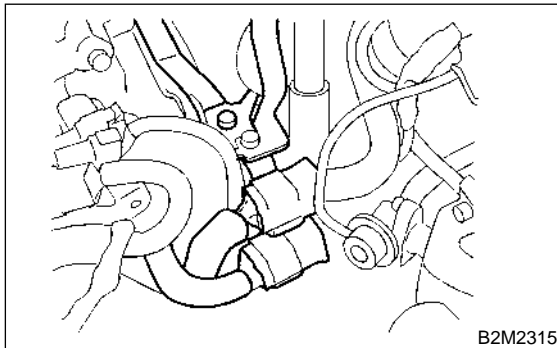
- 6) Connect knock sensor connector.



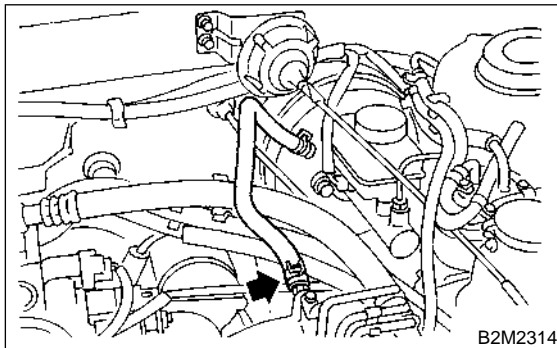
- 7) Connect connectors to engine coolant temperature sensor.



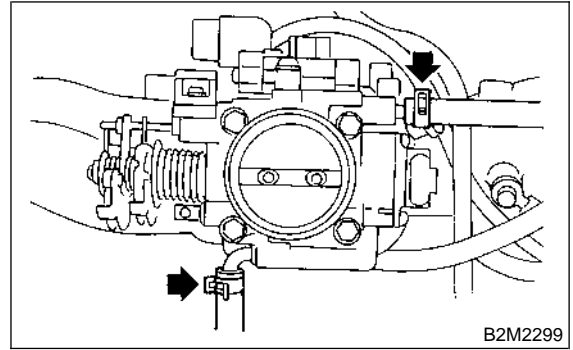
- 8) Hold engine harness connector onto bracket.
9) Install air cleaner case stay RH and engine harness bracket, and connect engine harness connectors to bulkhead connectors.



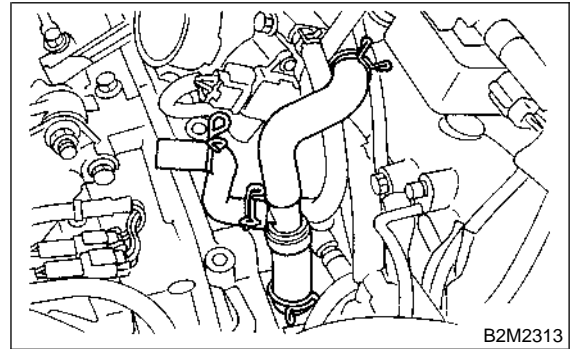
- 10) Connect brake booster hose.



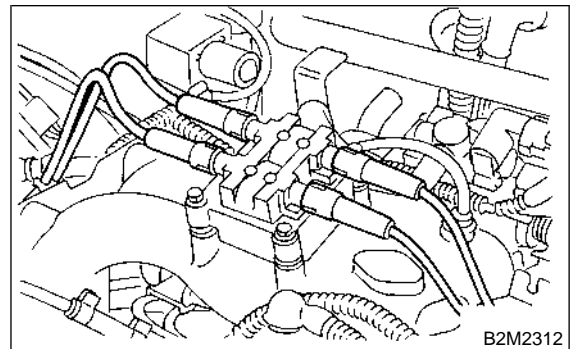
- 11) Connect engine coolant hose to throttle body.



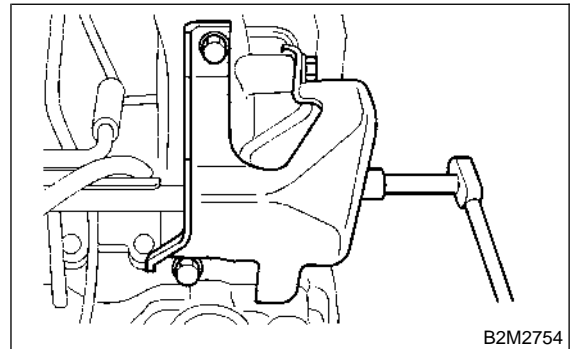
- 12) Connect PCV hose and pressure regulator vacuum hose to intake manifold.



- 13) Connect spark plug cords to ignition coil and ignitor assembly.



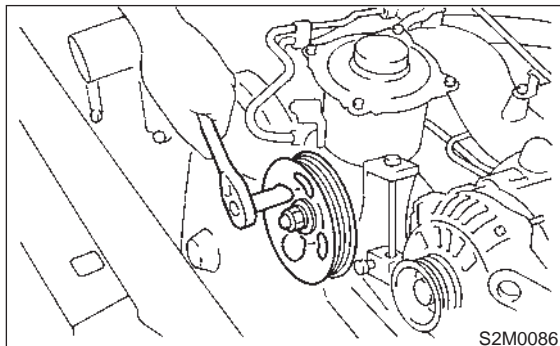
- 14) Install fuel protector.



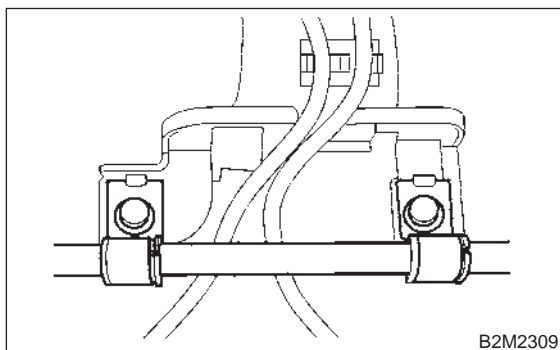
- 15) Install power steering pump on bracket.
(1) Tighten bolts which install power steering pump on bracket.

Tightening torque:

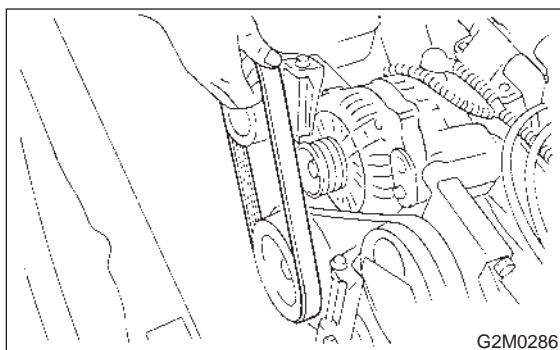
20.1 ± 2.5 N·m (2.05 ± 0.25 kg-m, 14.8 ± 1.8 ft-lb)



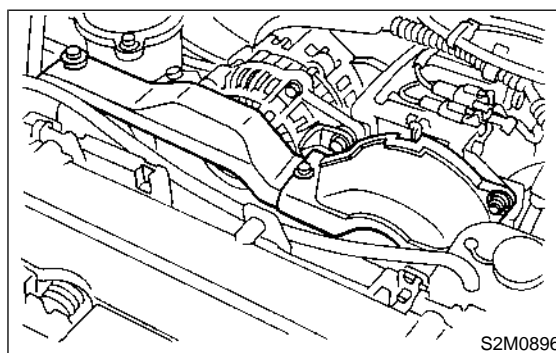
- (2) Install power steering pipe brackets on the right side of intake manifold.



- (3) Install power steering pump drive V-belt.



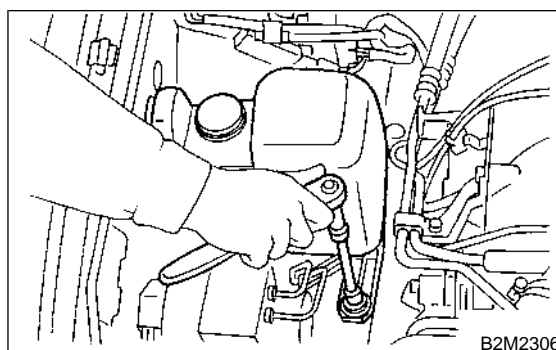
- (4) Adjust V-belt. <Ref. to 1-5 [G200].>
(5) Install V-belt covers.



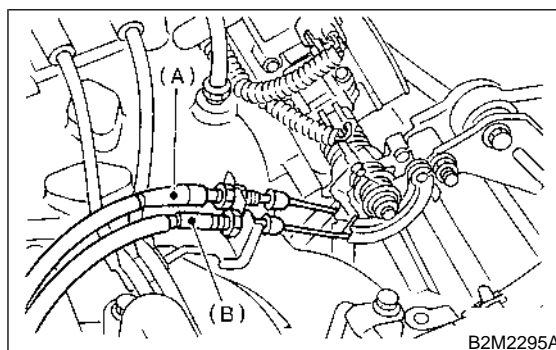
- (6) Install resonator chamber.

Tightening torque:

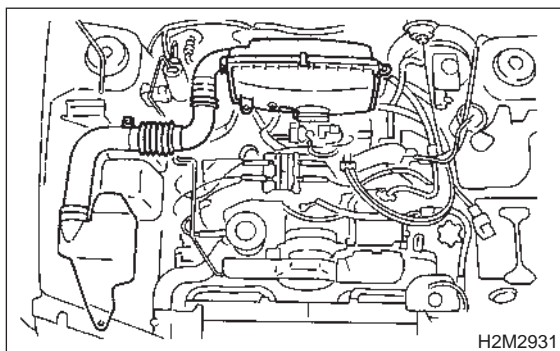
7.4 ± 2.0 N·m (0.75 ± 0.2 kg-m, 5.4 ± 1.4 ft-lb)



- 16) Connect accelerator cable (A).
17) Connect cruise control cable (B). (With cruise control models)



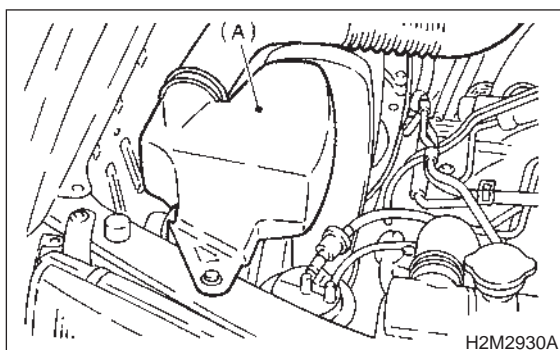
18) Install air cleaner case and air intake duct as a unit.



19) Tighten bolt which installs air intake duct (A) on the front side of body.

Tightening torque:

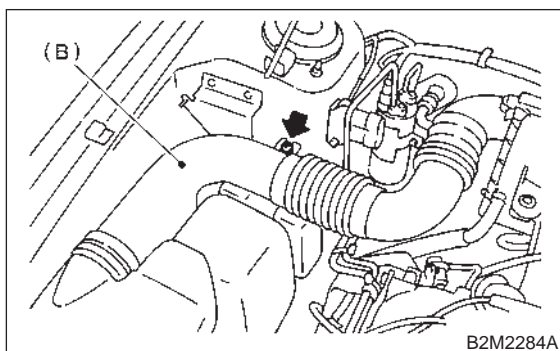
$7.4 \pm 2.0 \text{ N}\cdot\text{m}$ ($0.75 \pm 0.2 \text{ kg}\cdot\text{m}$, $5.4 \pm 1.4 \text{ ft}\cdot\text{lb}$)



20) Tighten bolt which installs air intake duct (B) on body.

Tightening torque:

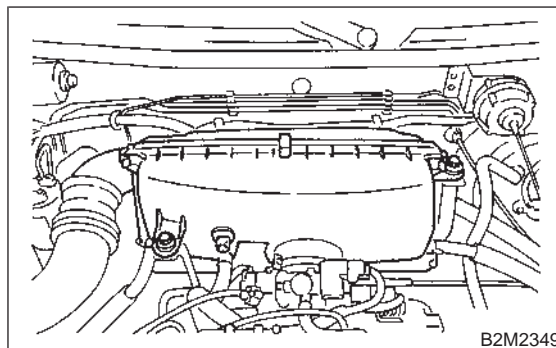
$7.4 \pm 2.0 \text{ N}\cdot\text{m}$ ($0.75 \pm 0.2 \text{ kg}\cdot\text{m}$, $5.4 \pm 1.4 \text{ ft}\cdot\text{lb}$)



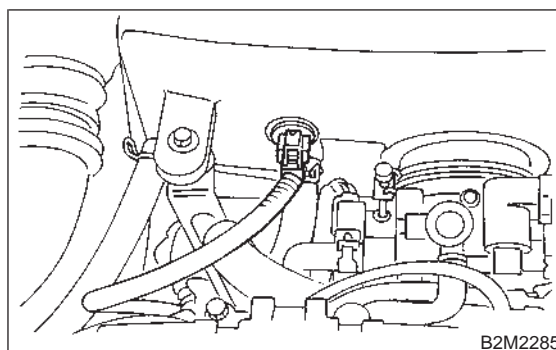
21) Tighten bolts which install air cleaner case to stays.

Tightening torque:

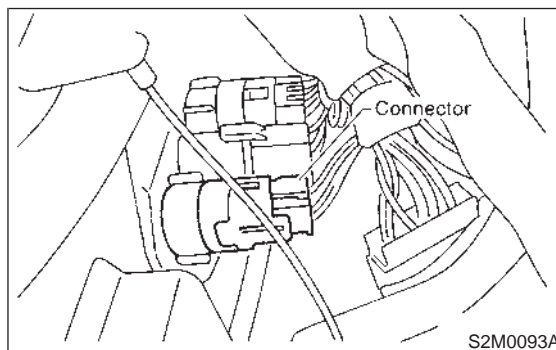
$4.9 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.5 \pm 0.05 \text{ kg}\cdot\text{m}$, $3.6 \pm 0.4 \text{ ft}\cdot\text{lb}$)



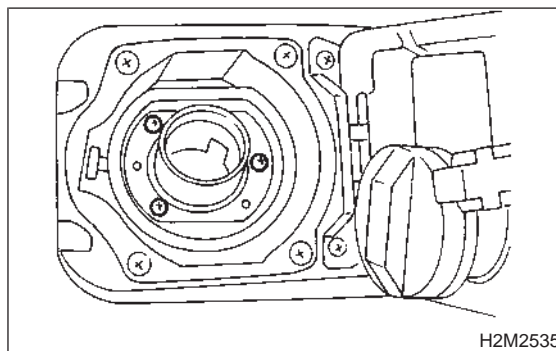
22) Connect connector to intake air temperature sensor.



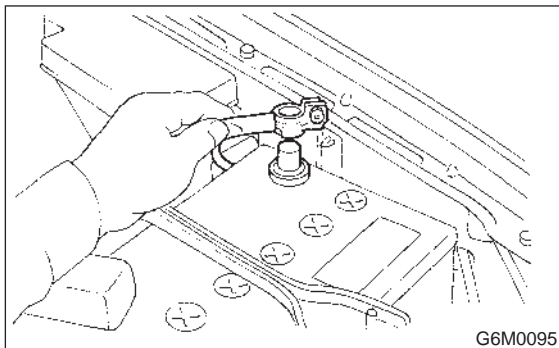
23) Connect connector to fuel pump relay.



24) Install fuel filler cap.



25) Connect battery ground cable.

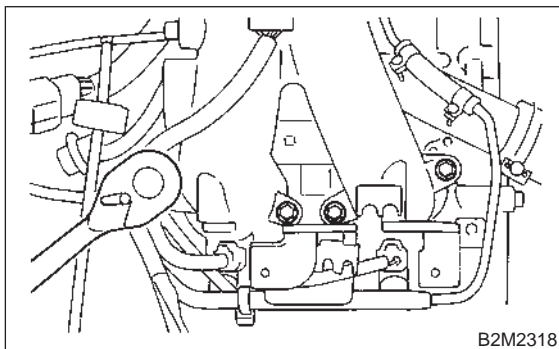


2. EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES

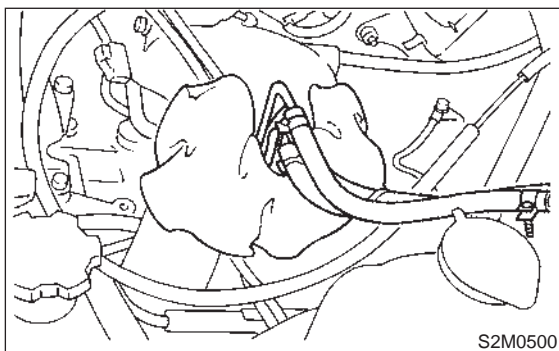
1) Install intake manifold onto cylinder heads.

CAUTION:
Always use new gaskets.

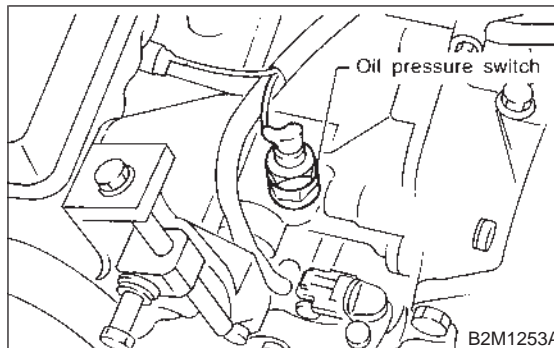
Tightening torque:
 $25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)



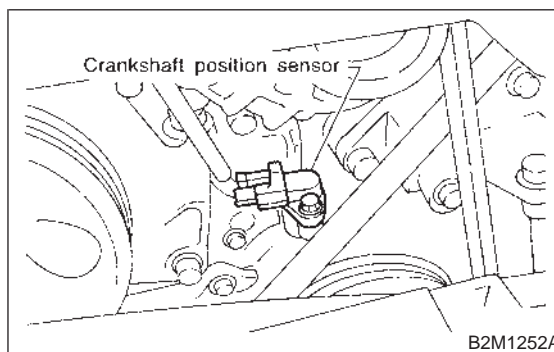
2) Connect fuel hoses.



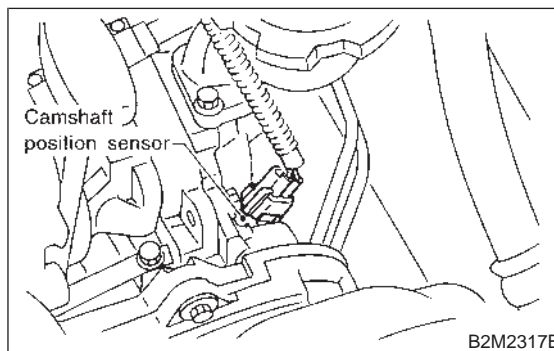
3) Connect connector to oil pressure switch.



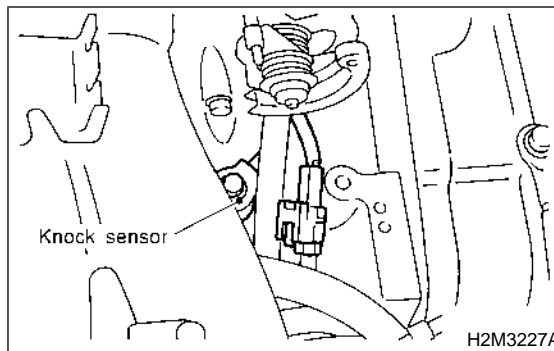
4) Connect connector to crankshaft position sensor.



5) Connect connector to camshaft position sensor.

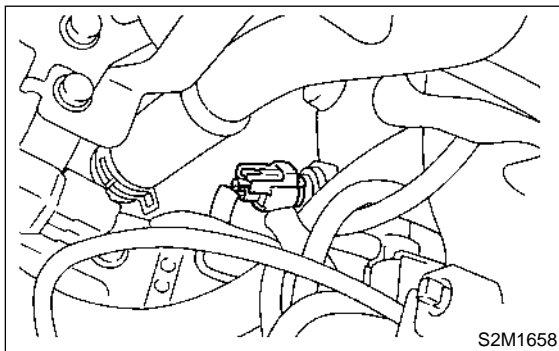


6) Connect knock sensor connector.

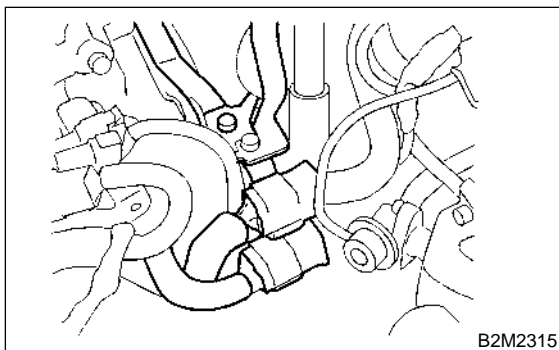


4. Intake Manifold

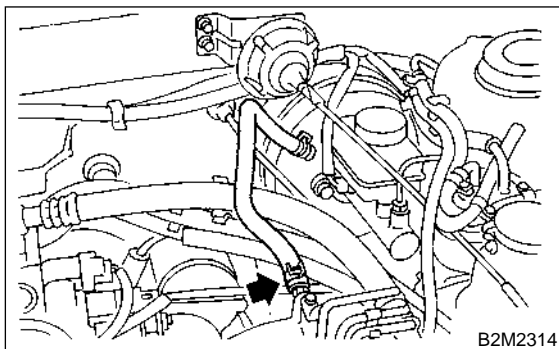
7) Connect connectors to engine coolant temperature sensor.



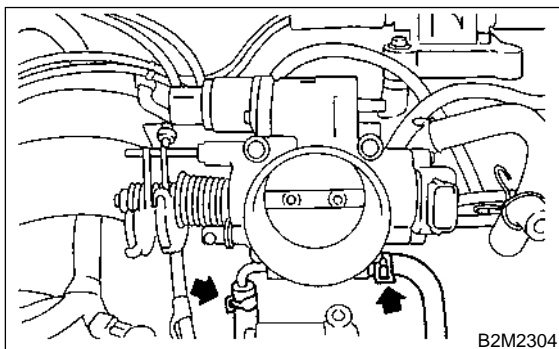
8) Install air intake chamber stay RH and engine harness bracket, and connect engine harness connectors to bulkhead connectors.



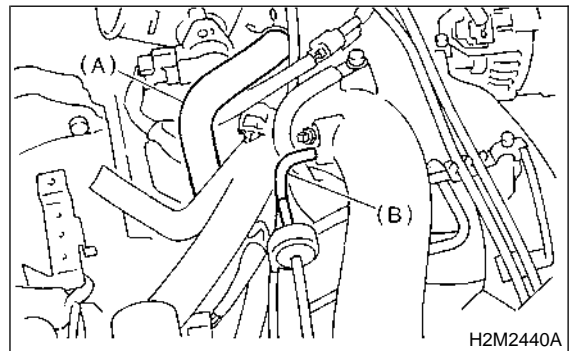
9) Connect brake booster hose.



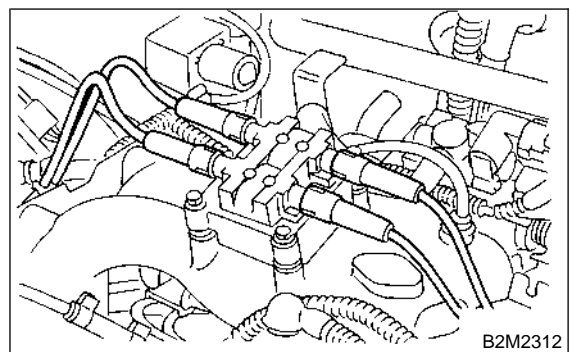
10) Connect engine coolant hose to throttle body.



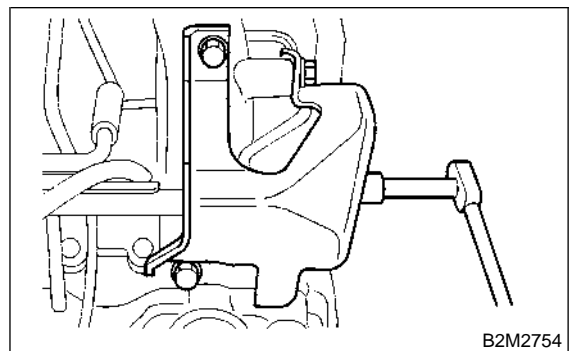
11) Connect PCV hose (A) and vacuum hose (B) to intake manifold.



12) Connect spark plug cords to ignition coil and ignitor assembly.



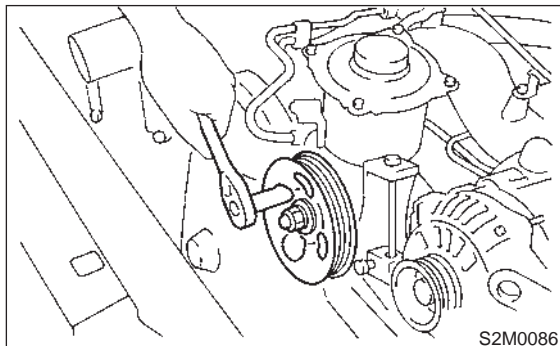
13) Install fuel pipe protector.



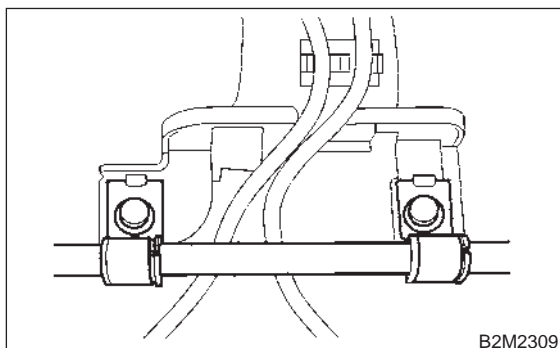
- 14) Install power steering pump on bracket.
(1) Install power steering pump on bracket, and tighten bolts.

Tightening torque:

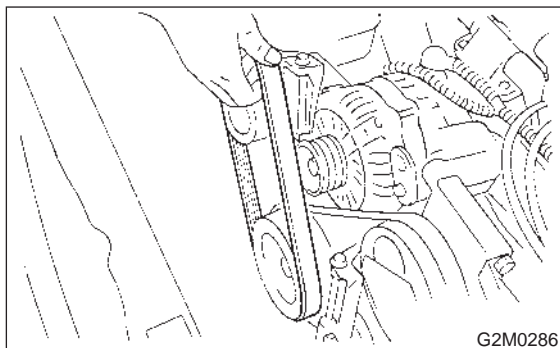
20.1 ± 2.5 N·m (2.05 ± 0.25 kg-m, 14.8 ± 1.8 ft-lb)



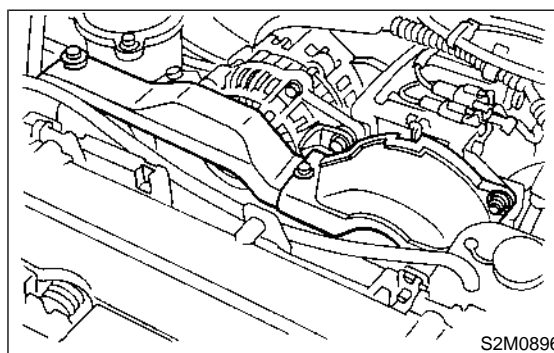
- (2) Install power steering pipe brackets on the right side of intake manifold.



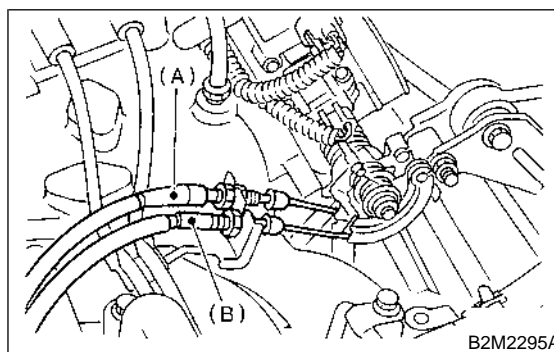
- (3) Install power steering pump drive V-belt.



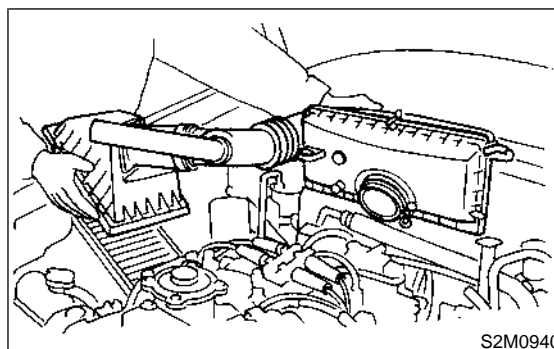
- (4) Adjust V-belt. <Ref. to 1-5 [G200].>
(5) Install V-belt covers.



- 15) Connect accelerator cable.

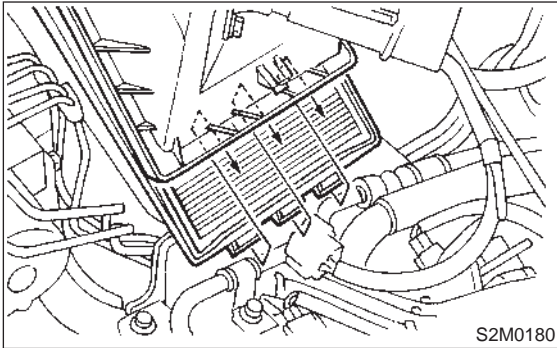


- 16) Install air cleaner element.
17) Install air cleaner upper cover, air intake duct and air intake chamber as a unit.



CAUTION:

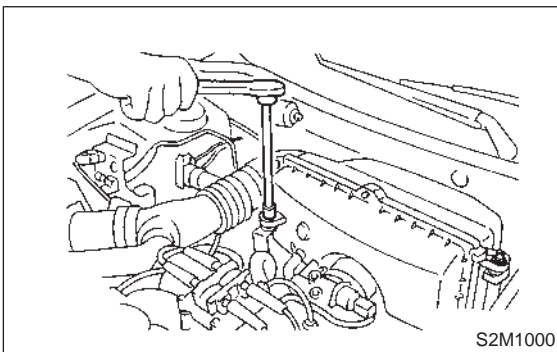
Before installing air cleaner upper cover, align holes with protruding portions of air cleaner lower case, then secure upper cover to lower case.



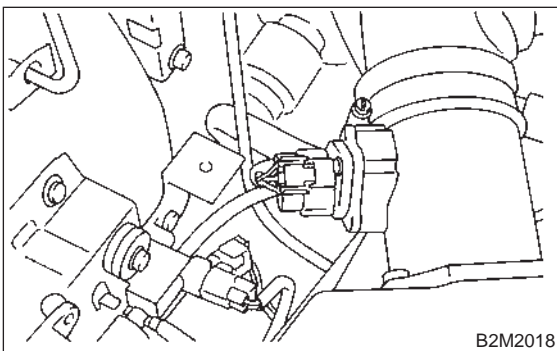
18) Tighten bolts which install air intake chamber to stays.

Tightening torque:

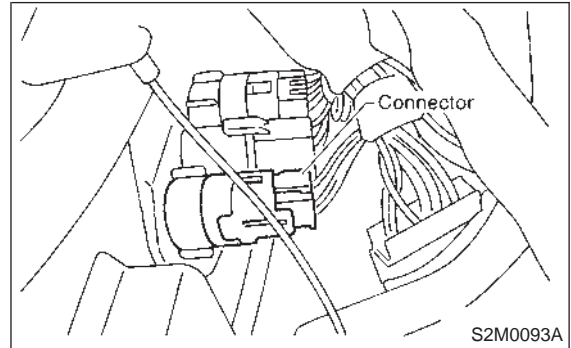
$4.9 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.5 \pm 0.05 \text{ kg}\cdot\text{m}$, $3.6 \pm 0.4 \text{ ft}\cdot\text{lb}$)



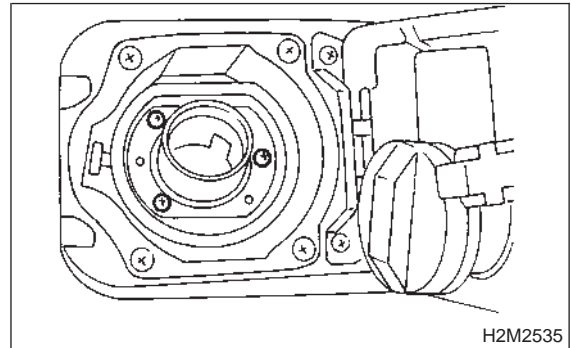
19) Connect connector to mass air flow sensor.



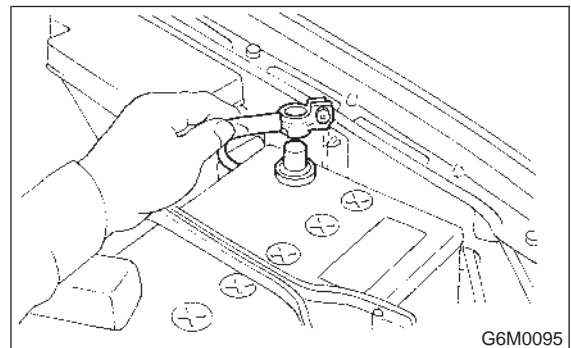
20) Connect connector to fuel pump relay.



21) Install fuel filler cap.



22) Connect battery ground cable.

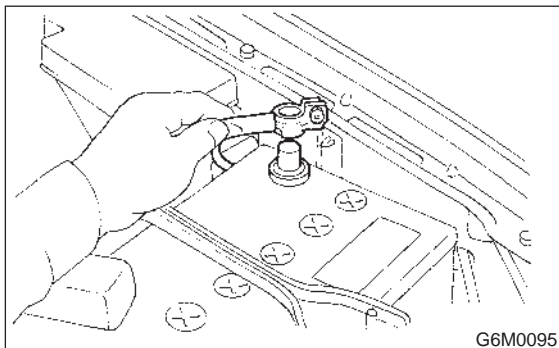


5. Engine Coolant Temperature Sensor

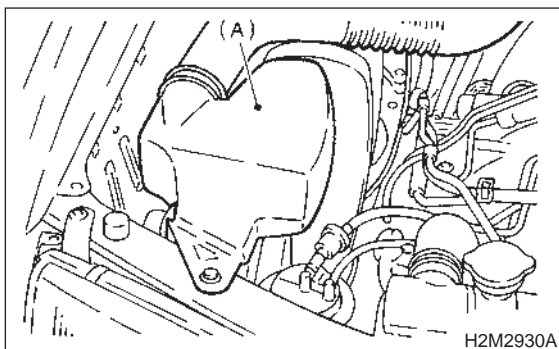
A: REMOVAL AND INSTALLATION

1. 2200 cc CALIFORNIA SPEC. VEHICLES

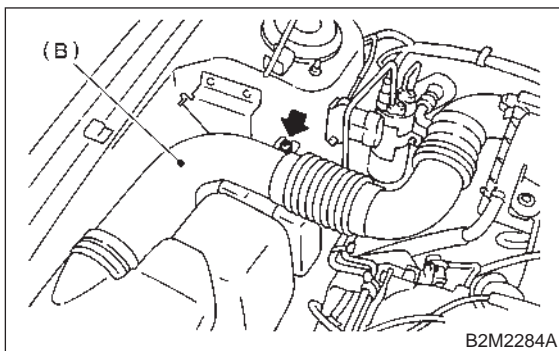
- 1) Disconnect battery ground cable.



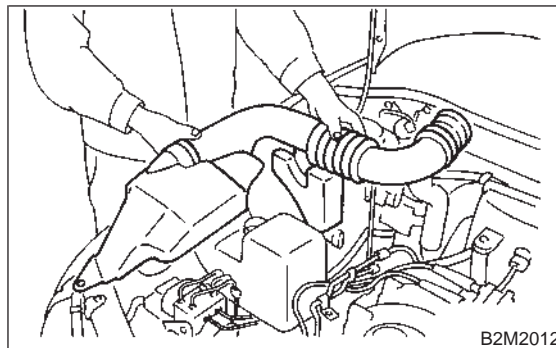
- 2) Remove bolt which installs air intake duct (A) on the front side of body.



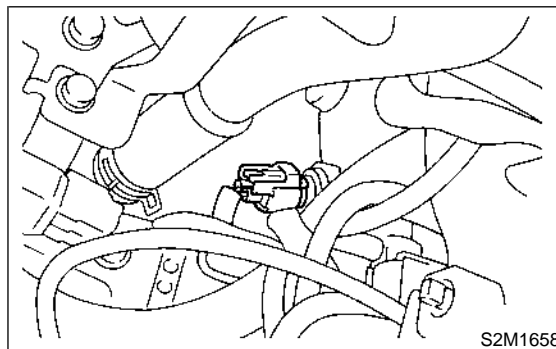
- 3) Remove bolt which installs air intake duct (B) on body.



- 4) Remove air intake duct (A) and (B) as a unit.



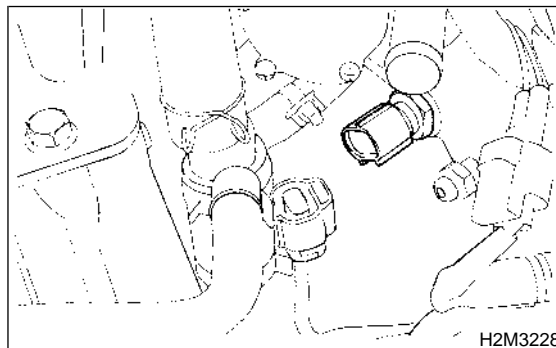
- 5) Disconnect connector from engine coolant temperature sensor.



- 6) Remove engine coolant temperature sensor.
7) Installation is in the reverse order of removal.

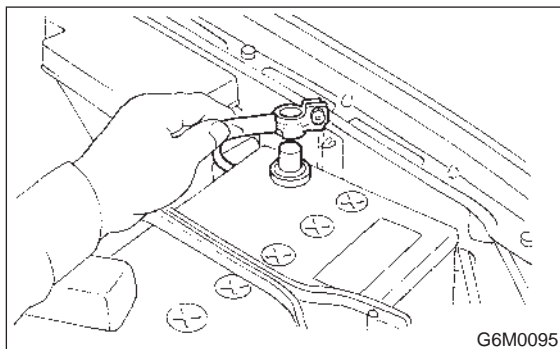
Tightening torque:

25 ± 3 N·m (2.5 ± 0.3 kg-m, 18.1 ± 2.2 ft-lb)

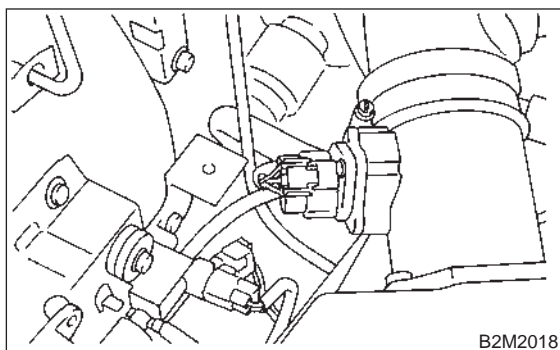


2. EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES

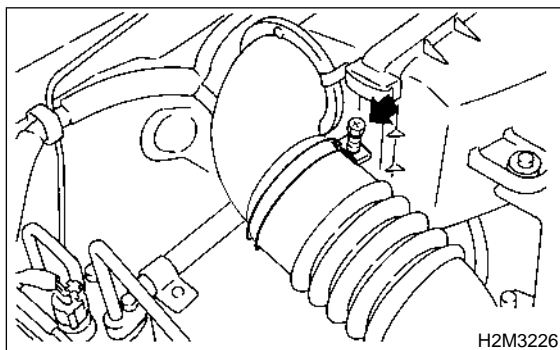
- 1) Disconnect battery ground cable.



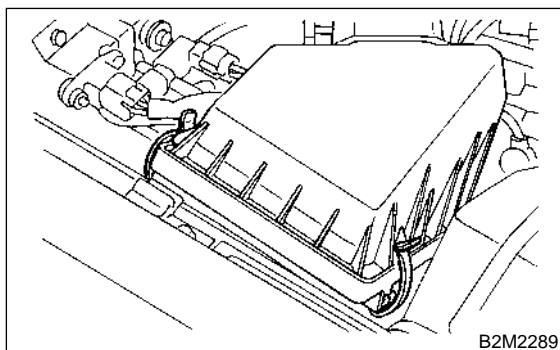
- 2) Disconnect connector from mass air flow sensor.



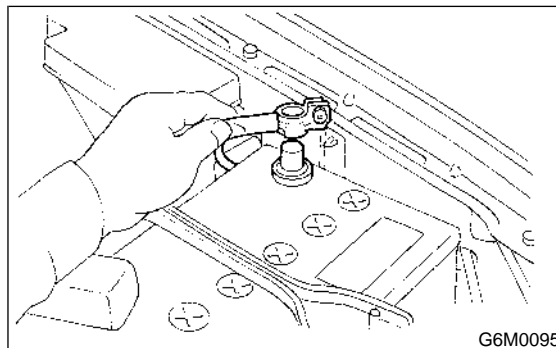
- 3) Loosen clamp which connects air intake duct to air intake chamber.



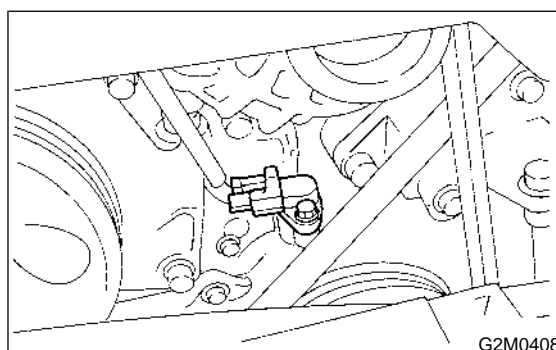
- 4) Remove two clips of air cleaner upper cover.

**6. Crankshaft Position Sensor
A: REMOVAL AND INSTALLATION**

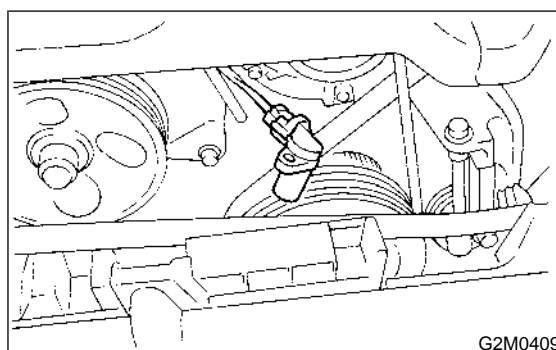
- 1) Disconnect battery ground cable.



- 2) Remove bolt which install crankshaft position sensor to cylinder block.



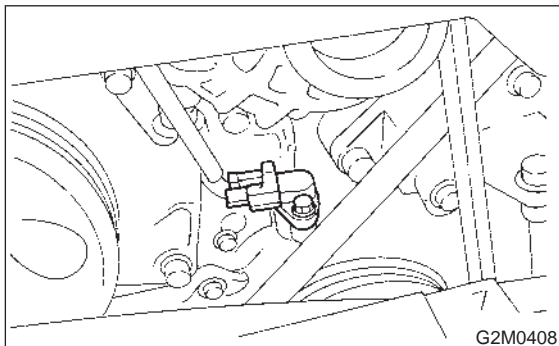
- 3) Remove crankshaft position sensor, and disconnect connector from it.



4) Installation is in the reverse order of removal.

Tightening torque:

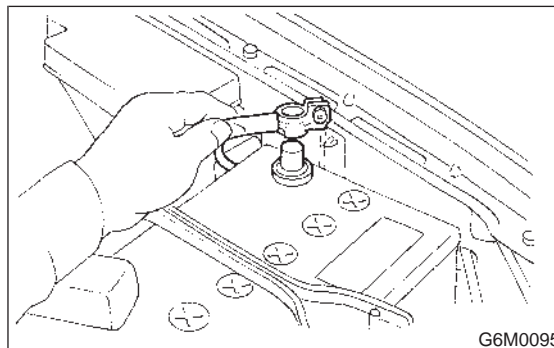
$6.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.65 \pm 0.05 \text{ kg}\cdot\text{m}$, $4.7 \pm 0.4 \text{ ft}\cdot\text{lb}$)



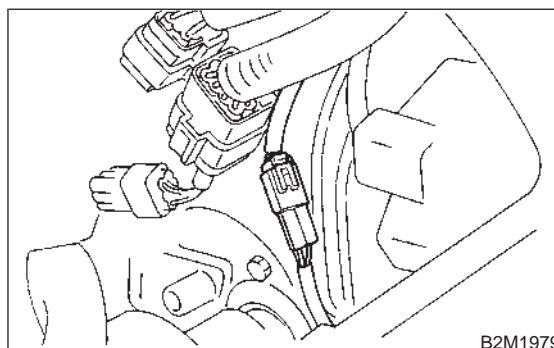
7. Front Oxygen (A/F) Sensor

A: REMOVAL

1) Disconnect battery ground cable.



2) Disconnect connector from front oxygen sensor.



3) Lift-up the vehicle.

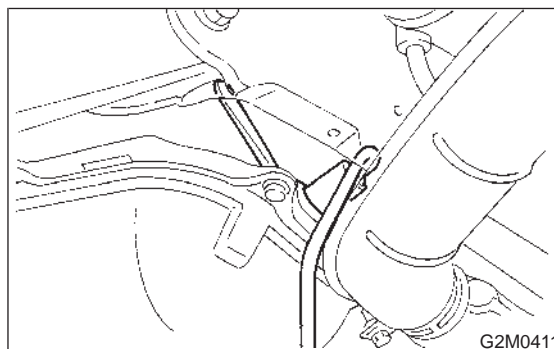
4) Apply SUBARU CRC or its equivalent to threaded portion of front oxygen (A/F) sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

5) Remove front oxygen (A/F) sensor.

CAUTION:

When removing, do not force front oxygen (A/F) sensor in an unnatural way especially when exhaust pipe is cold, otherwise it will damage exhaust pipe.



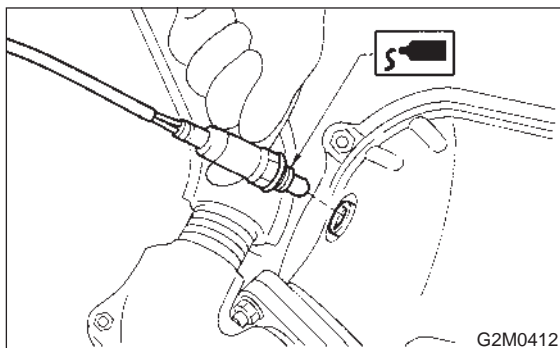
B: INSTALLATION

1) Before installing front oxygen (A/F) sensor, apply anti-seize compound only to threaded portion of front oxygen (A/F) sensor to make the next removal easier.

Anti-seize compound:
SS-30 by JET LUBE

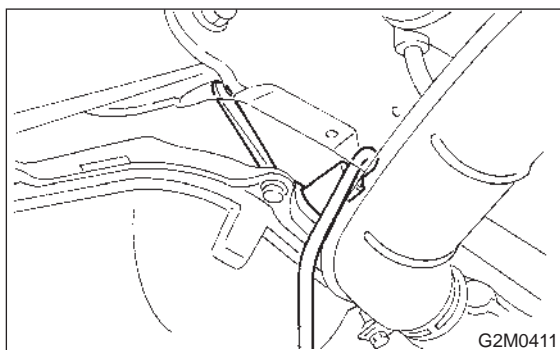
CAUTION:

Never apply anti-seize compound to protector of front oxygen (A/F) sensor.



2) Install front oxygen (A/F) sensor.

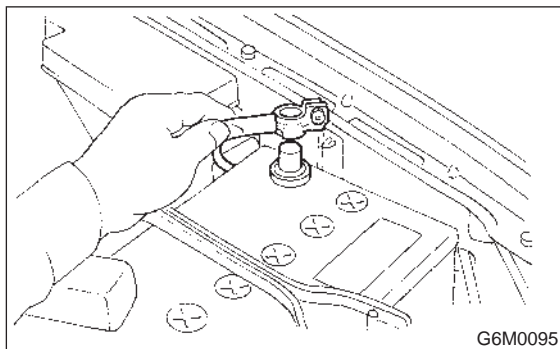
Tightening torque:
21±3 N·m (2.1±0.3 kg-m, 15.2±2.2 ft-lb)



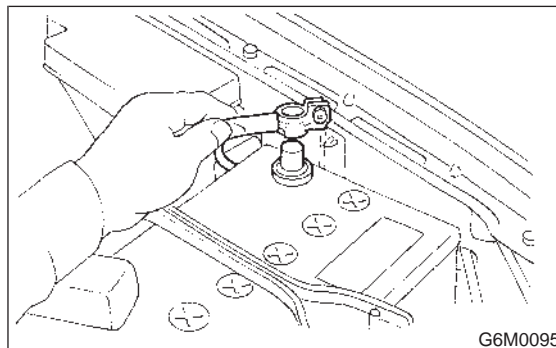
3) Lower the vehicle.

4) Connect connector to front oxygen (A/F) sensor.

5) Connect battery ground cable.

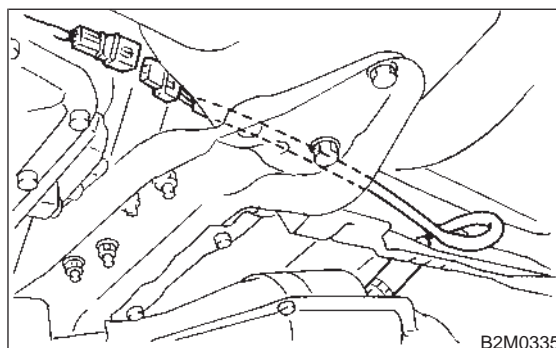
**8. Rear Oxygen Sensor****A: REMOVAL**

1) Disconnect battery ground cable.



2) Lift-up the vehicle.

3) Disconnect connector from rear oxygen sensor.



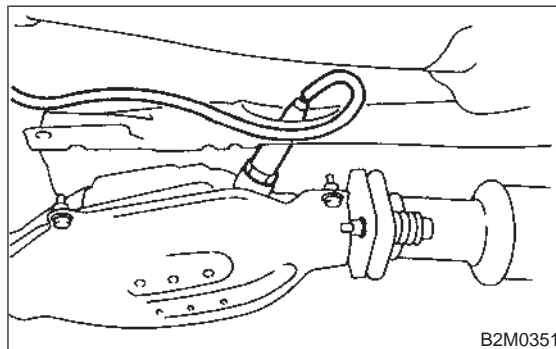
4) Apply SUBARU CRC or its equivalent to threaded portion of rear oxygen sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

5) Remove rear oxygen sensor.

CAUTION:

When removing, do not force rear oxygen sensor in an unnatural way especially when exhaust pipe is cold, otherwise it will damage exhaust pipe.



B: INSTALLATION

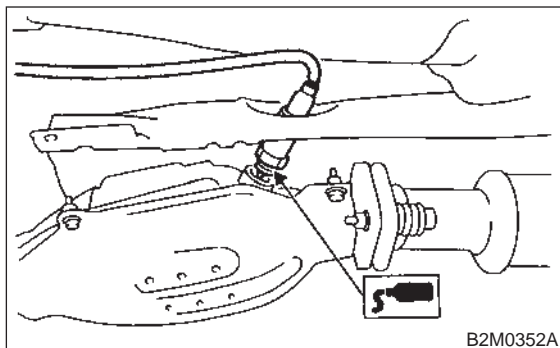
1) Before installing rear oxygen sensor, apply anti-seize compound only to threaded portion of rear oxygen sensor to make the next removal easier.

Anti-seize compound:

SS-30 by JET LUBE

CAUTION:

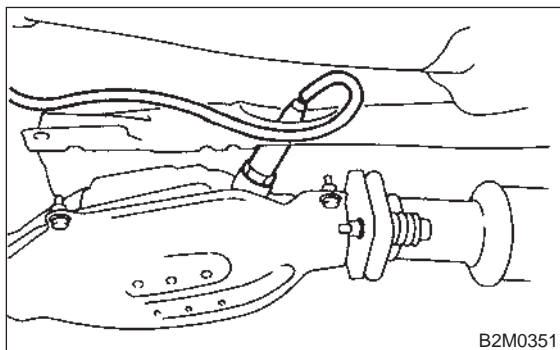
Never apply anti-seize compound to protector of rear oxygen sensor.



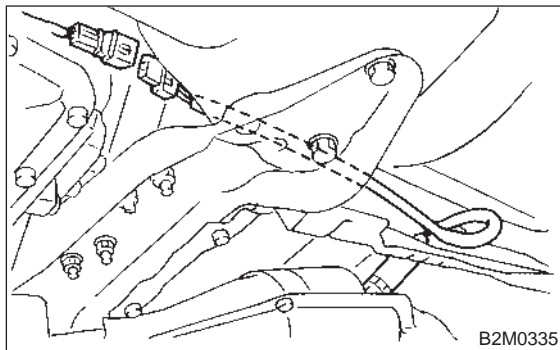
2) Install rear oxygen sensor.

Tightening torque:

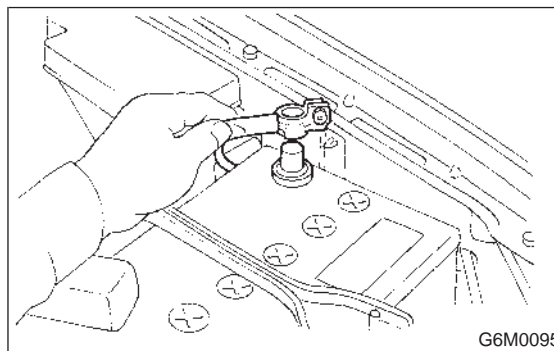
$21 \pm 3 \text{ N}\cdot\text{m}$ ($2.1 \pm 0.3 \text{ kg}\cdot\text{m}$, $15.2 \pm 2.2 \text{ ft}\cdot\text{lb}$)



3) Connect connector to rear oxygen sensor.



- 4) Lower the vehicle.
- 5) Connect battery ground cable.

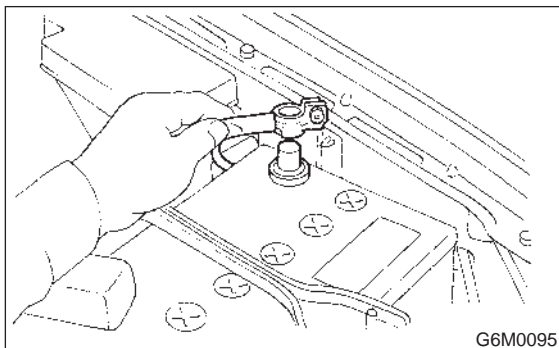


9. Throttle Position Sensor

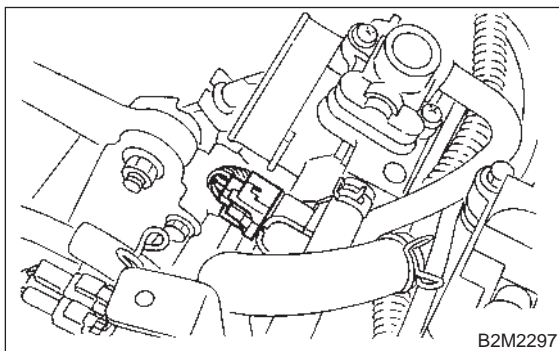
A: REMOVAL AND INSTALLATION

1. 2200 cc CALIFORNIA SPEC. VEHICLES

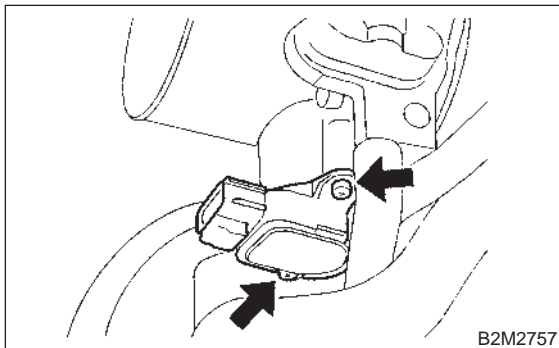
- 1) Disconnect battery ground cable.



- 2) Disconnect connector from throttle position sensor.



- 3) Remove throttle position sensor holding screws, and remove throttle position sensor itself.



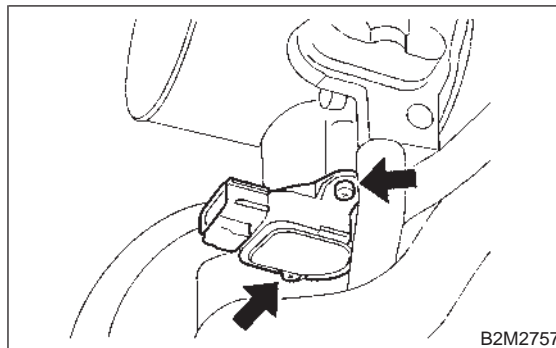
- 4) Installation is in the reverse order of removal.

Tightening torque:

$2.2 \pm 0.2 \text{ N}\cdot\text{m}$ ($0.22 \pm 0.02 \text{ kg}\cdot\text{m}$, $1.6 \pm 0.1 \text{ ft}\cdot\text{lb}$)

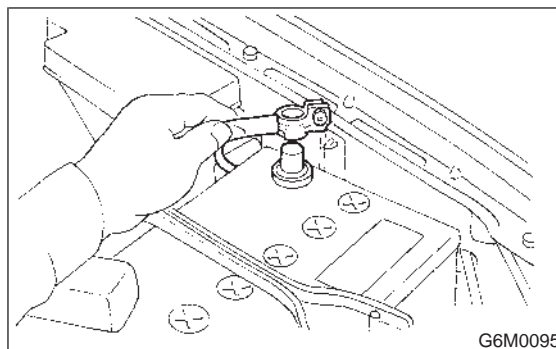
CAUTION:

When installing throttle position sensor, adjust the position to match with the specified data.

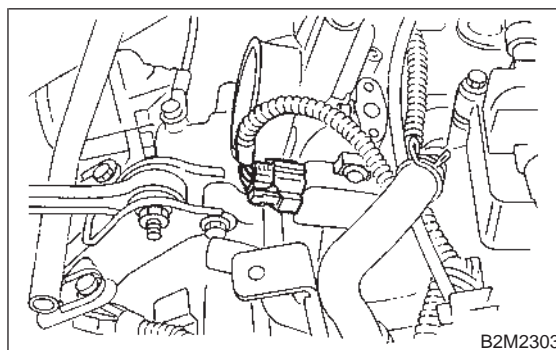


2. EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES

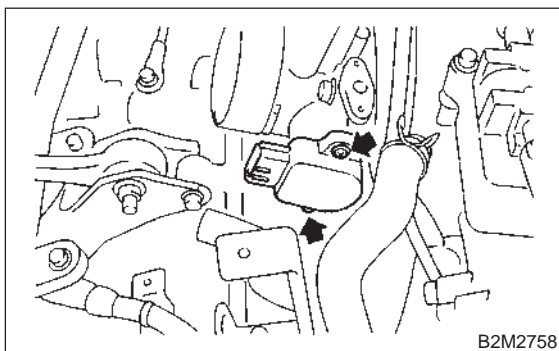
- 1) Disconnect battery ground cable.



- 2) Disconnect connector from throttle position sensor.



- 3) Remove throttle position sensor holding screws, and remove throttle position sensor itself.



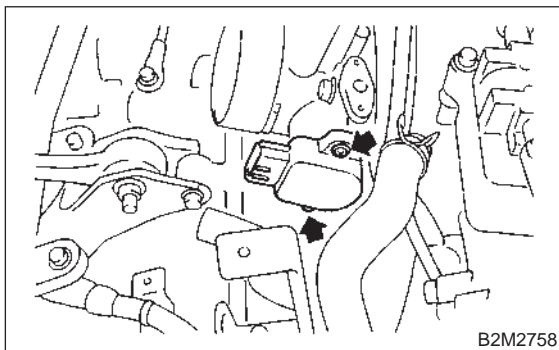
- 4) Installation is in the reverse order of removal.

Tightening torque:

$2.0 \pm 0.4 \text{ N-m}$ ($0.20 \pm 0.04 \text{ kg-m}$, $1.4 \pm 0.3 \text{ ft-lb}$)

CAUTION:

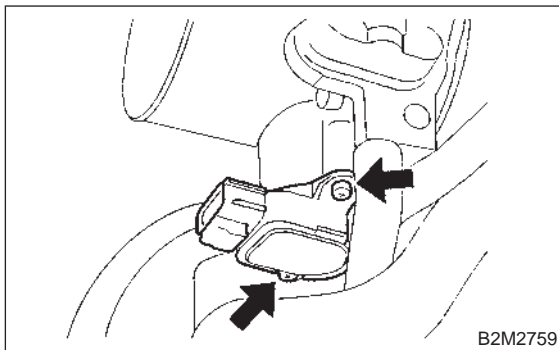
When installing throttle position sensor, adjust the position to match with the specified data.



B: ADJUSTMENT

1. 2200 cc CALIFORNIA SPEC. VEHICLES

- 1) Turn ignition switch to OFF.
- 2) Loosen throttle position sensor holding screws.

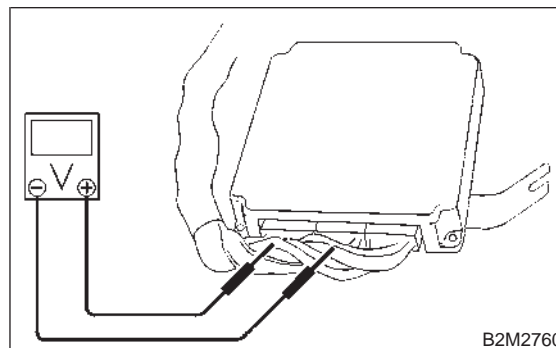


- 3) When using voltage meter;
 - (1) Take out ECM.
 - (2) Turn ignition switch to ON.
 - (3) Adjust throttle position sensor to the proper position to allow the voltage signal to ECM to be in specification.

Connector & terminal / Specified voltage

(B136) No. 15 — (B136) No. 17 / $0.45 \pm 0.55 \text{ V}$

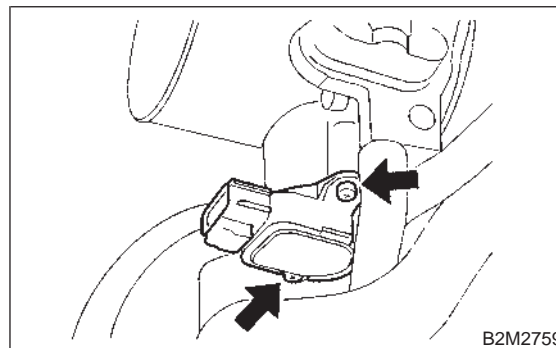
[Fully closed.]



- (4) Tighten throttle position sensor holding screws.

Tightening torque:

$2.0 \pm 0.4 \text{ N-m}$ ($0.20 \pm 0.04 \text{ kg-m}$, $1.4 \pm 0.3 \text{ ft-lb}$)

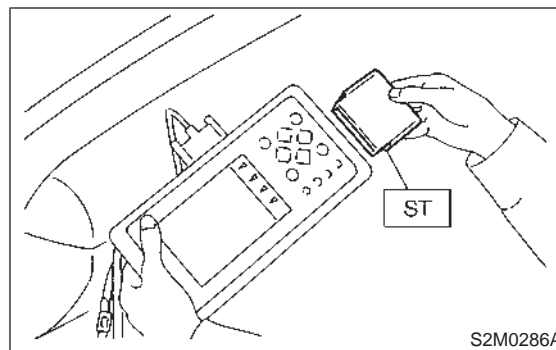


- 4) When using Subaru Select Monitor;

NOTE:

For detailed operation procedures, refer to the Subaru Select Monitor Operation Manual.

- (1) Insert the cartridge to Subaru Select Monitor. <Ref. to 1-6 [G1100].>



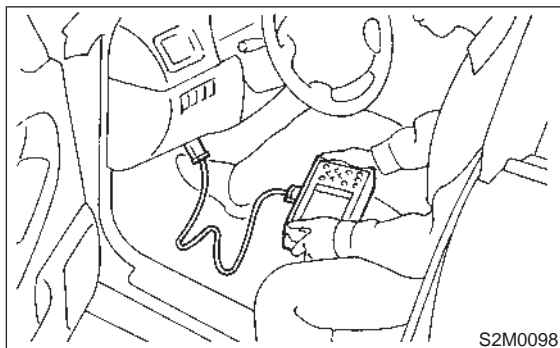
9. Throttle Position Sensor

- (2) Connect Subaru Select Monitor to the data link connector.
- (3) Turn ignition switch to ON, and Subaru Select Monitor switch to ON.
- (4) Select {2. Each System Check} in Main Menu.
- (5) Select {Engine Control System} in Selection Menu.
- (6) Select {1. Current Data Display & Save} in Engine Control System Diagnosis.
- (7) Select {1.12 Data Display} in Data Display Menu.
- (8) Adjust throttle position sensor to the proper position to match with the following specifications.

Condition: Throttle fully closed

Throttle opening angle 0.00%

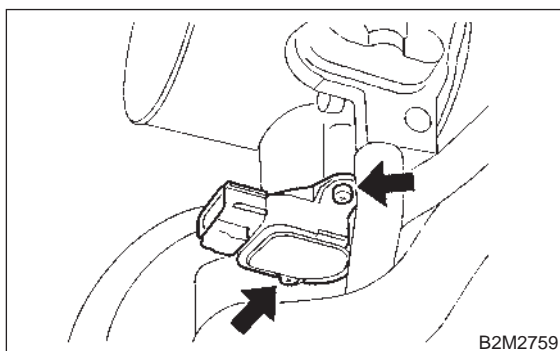
Throttle sensor voltage 0.50 V



- (9) Tighten throttle position sensor holding screws.

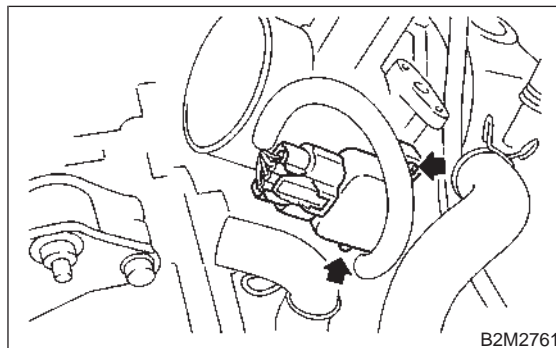
Tightening torque:

$2.0 \pm 0.4 \text{ N}\cdot\text{m}$ ($0.20 \pm 0.04 \text{ kg}\cdot\text{m}$, $1.4 \pm 0.3 \text{ ft}\cdot\text{lb}$)



2. EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES

- 1) Turn ignition switch to OFF.
- 2) Loosen throttle position sensor holding screws.

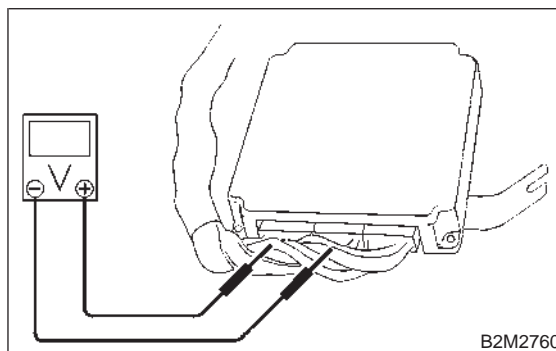


- 3) When using voltage meter;
 - (1) Take out ECM.
 - (2) Turn ignition switch to ON.
 - (3) Adjust throttle position sensor to the proper position to allow the voltage signal to ECM to be in specification.

Connector & terminal / Specified voltage

(B136) No. 15 — (B136) No. 17 / 0.45 — 0.55 V

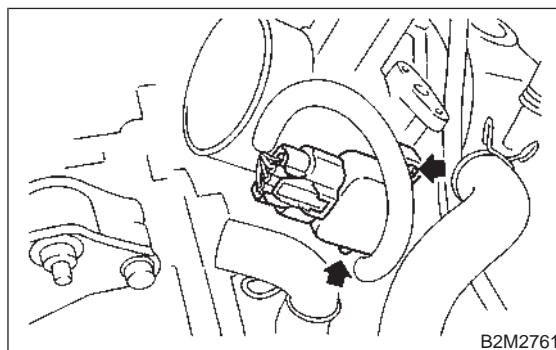
[Fully closed.]



- (4) Tighten throttle position sensor holding screws.

Tightening torque:

$2.0 \pm 0.4 \text{ N}\cdot\text{m}$ ($0.20 \pm 0.04 \text{ kg}\cdot\text{m}$, $1.4 \pm 0.3 \text{ ft}\cdot\text{lb}$)

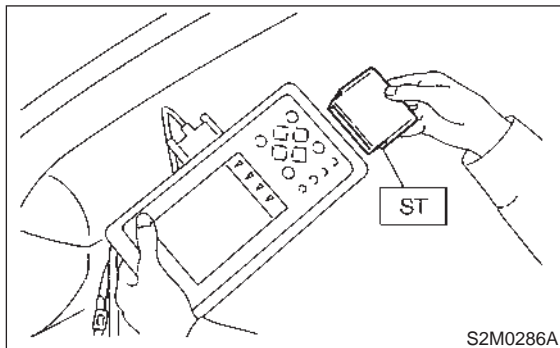


4) When using Subaru Select Monitor;

NOTE:

For detailed operation procedures, refer to the Subaru Select Monitor Operation Manual.

(1) Insert the cartridge to Subaru Select Monitor. <Ref. to 1-6 [G1100].>



(2) Connect Subaru Select Monitor to the data link connector.

(3) Turn ignition switch to ON, and Subaru Select Monitor switch to ON.

(4) Select {2. Each System Check} in Main Menu.

(5) Select {Engine Control System} in Selection Menu.

(6) Select {1. Current Data Display & Save} in Engine Control System Diagnosis.

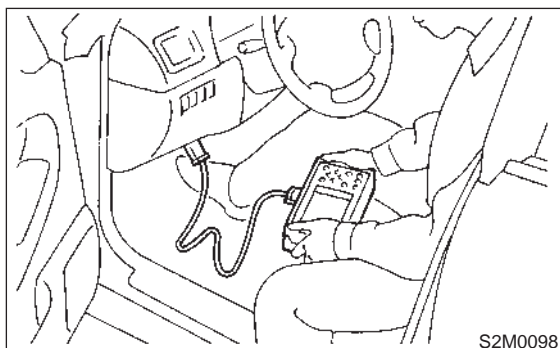
(7) Select {1.12 Data Display} in Data Display Menu.

(8) Adjust throttle position sensor to the proper position to match with the following specifications.

Condition: Throttle fully closed

Throttle opening angle 0.00%

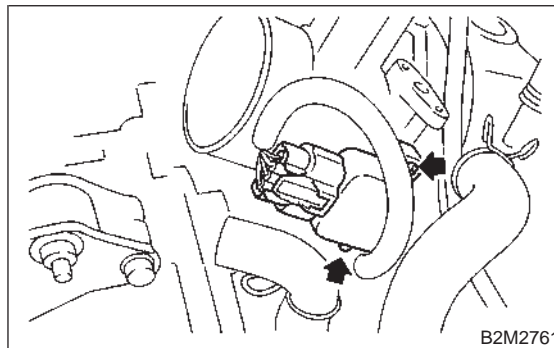
Throttle sensor voltage 0.50 V



(9) Tighten throttle position sensor holding screws.

Tightening torque:

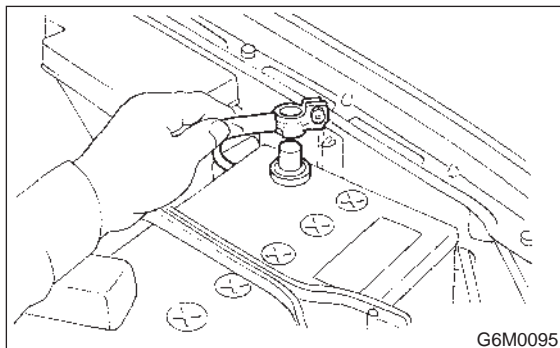
$2.0 \pm 0.4 \text{ N}\cdot\text{m}$ ($0.20 \pm 0.04 \text{ kg}\cdot\text{m}$, $1.4 \pm 0.3 \text{ ft}\cdot\text{lb}$)



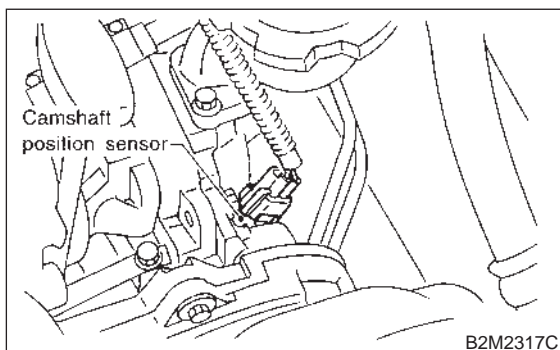
10. Camshaft Position Sensor

A: REMOVAL AND INSTALLATION

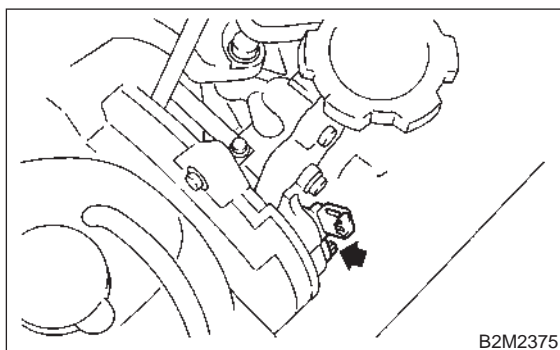
- 1) Disconnect battery ground cable.



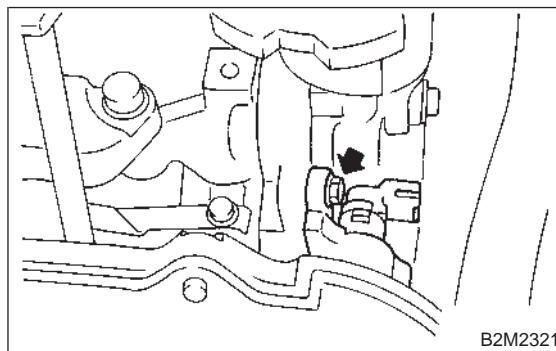
- 2) Disconnect connector from camshaft position sensor.



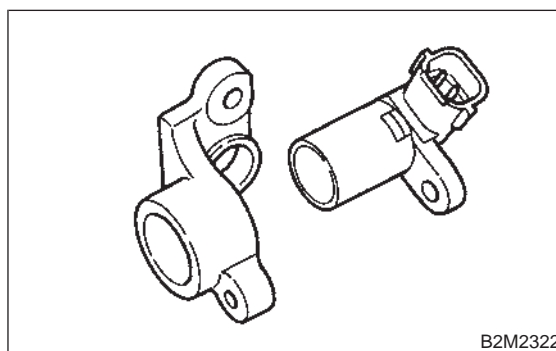
- 3) Remove bolt which installs camshaft position sensor to camshaft position sensor support.



- 4) Remove bolt which installs camshaft position sensor support to camshaft cap LH.



- 5) Remove camshaft position sensor and camshaft position sensor support as a unit.
6) Remove camshaft position sensor itself.



- 7) Installation is in the reverse order of removal.

Tightening torque:

Camshaft position sensor support;

6.4 ± 0.5 N·m (0.65 ± 0.05 kg-m, 4.7 ± 0.4 ft-lb)

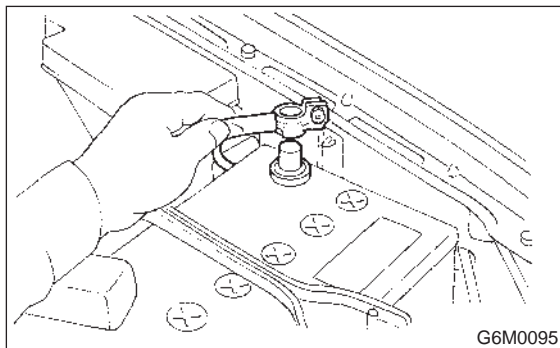
Camshaft position sensor;

6.4 ± 0.5 N·m (0.65 ± 0.05 kg-m, 4.7 ± 0.4 ft-lb)

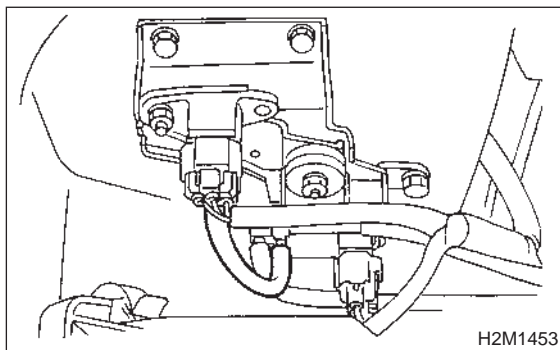
11. Pressure Sensor

A: REMOVAL AND INSTALLATION

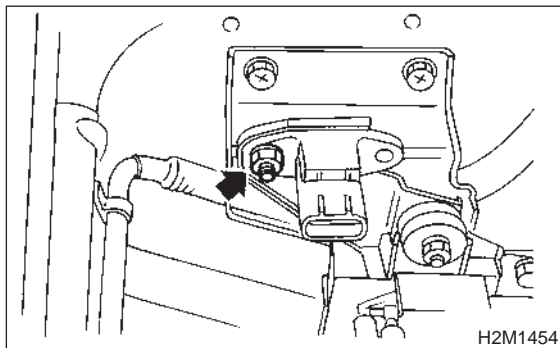
- 1) Disconnect battery ground cable.



- 2) Disconnect connector from pressure sensor.
- 3) Disconnect hose from pressure sensor.



- 4) Remove pressure sensor from bracket.



- 5) Installation is in the reverse order of removal.

Tightening torque:

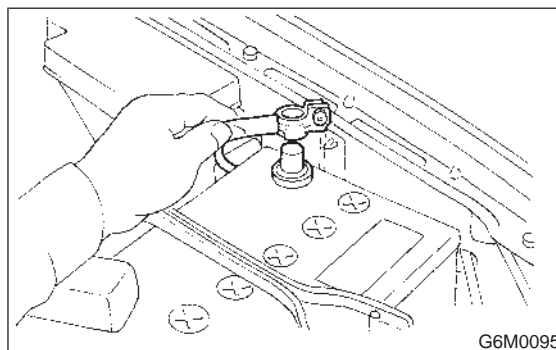
$6.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.65 \pm 0.05 \text{ kg}\cdot\text{m}$, $4.7 \pm 0.4 \text{ ft}\cdot\text{lb}$)

12. Idle Air Control Solenoid Valve

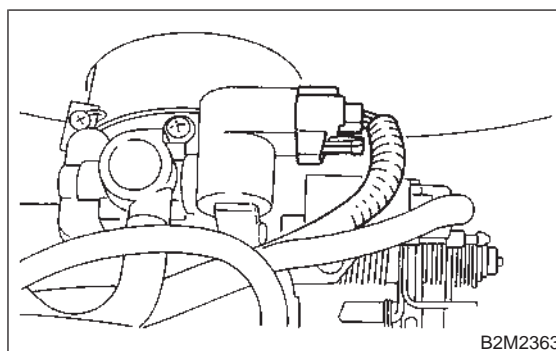
A: REMOVAL AND INSTALLATION

1. 2200 cc CALIFORNIA SPEC. VEHICLES

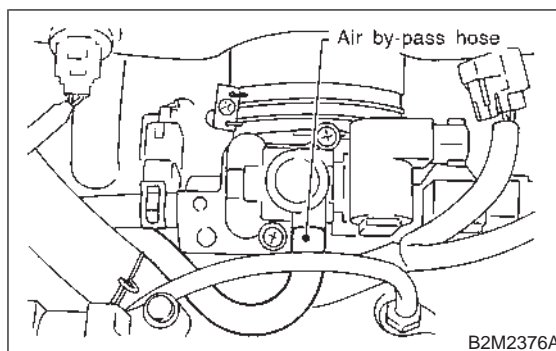
- 1) Disconnect battery ground cable.



- 2) Disconnect connector from idle air control solenoid valve.

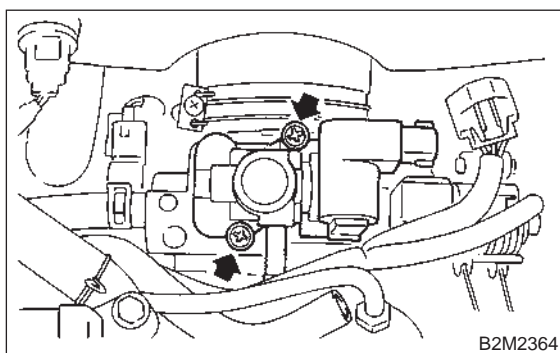


- 3) Disconnect air by-pass hose from idle air control solenoid valve.

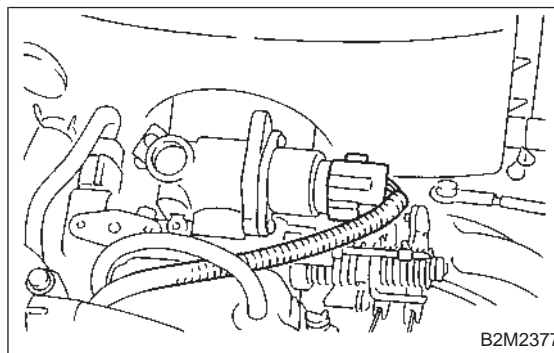


12. Idle Air Control Solenoid Valve

4) Remove idle air control solenoid valve from throttle body.



2) Disconnect connector from idle air control solenoid valve.



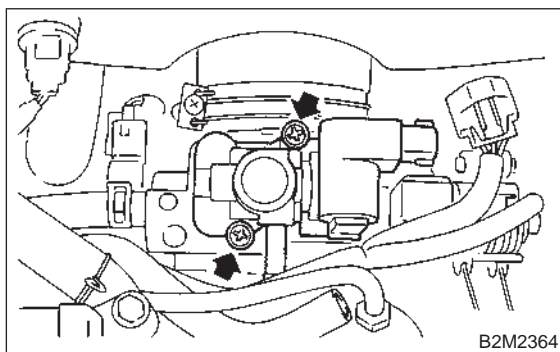
5) Installation is in the reverse order of removal.

CAUTION:

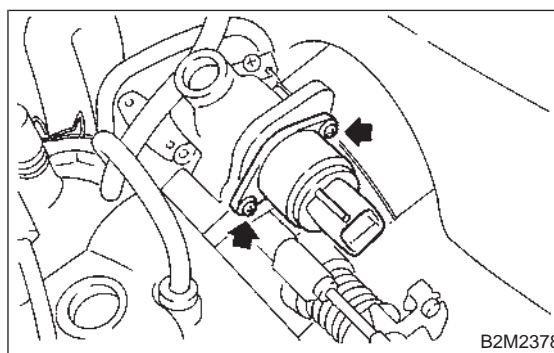
Replace gasket with a new one.

Tightening torque:

3.3 ± 0.4 N·m (0.34 ± 0.045 kg-m, 2.5 ± 0.3 ft-lb)



3) Remove idle air control solenoid valve from throttle body.



4) Installation is in the reverse order of removal.

CAUTION:

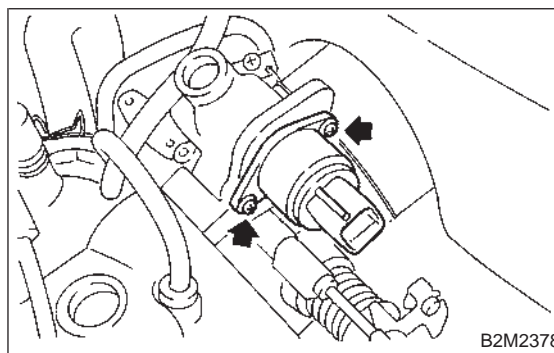
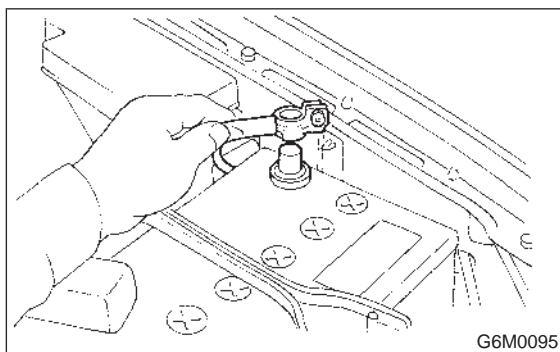
Replace gasket with a new one.

Tightening torque:

6.0 ± 0.8 N·m (0.61 ± 0.08 kg-m, 4.4 ± 0.6 ft-lb)

2. EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES

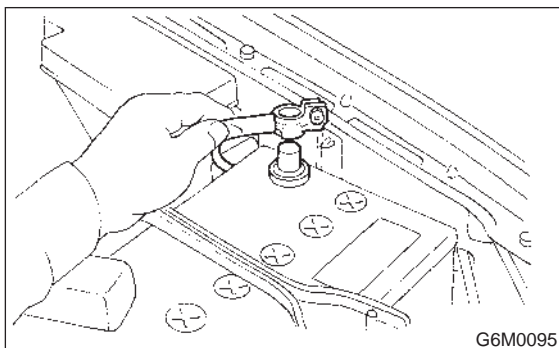
1) Disconnect battery ground cable.



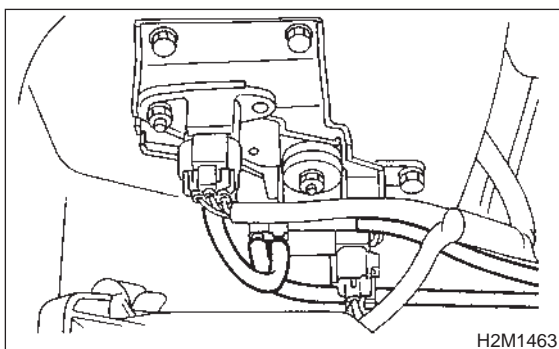
13. Pressure Sources Switching Solenoid Valve

A: REMOVAL AND INSTALLATION

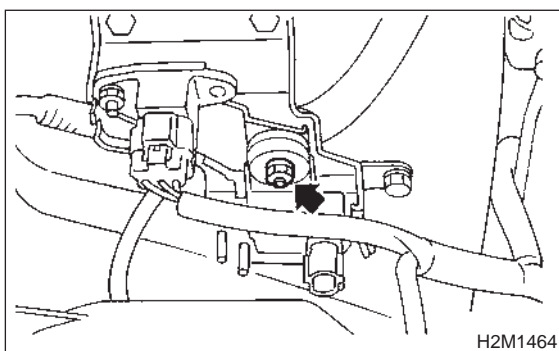
- 1) Disconnect battery ground cable.



- 2) Disconnect connector from pressure sources switching solenoid valve.
- 3) Disconnect hoses from pressure sources switching solenoid valve.



- 4) Remove pressure sources switching solenoid valve from bracket.



- 5) Installation is in the reverse order of removal.

Tightening torque:

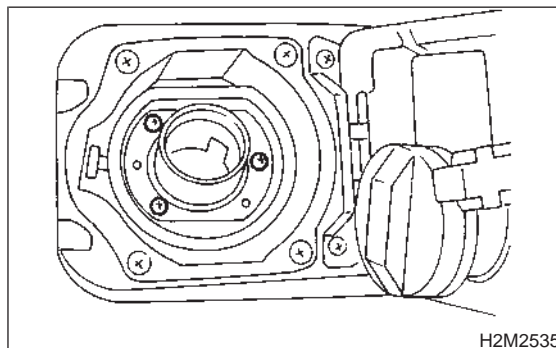
6.4 ± 0.5 N·m (0.65 ± 0.05 kg·m, 4.7 ± 0.4 ft·lb)

14. Fuel Injector

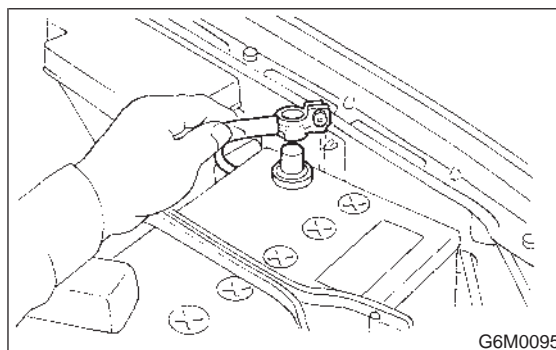
A: REMOVAL AND INSTALLATION

1. RH SIDE

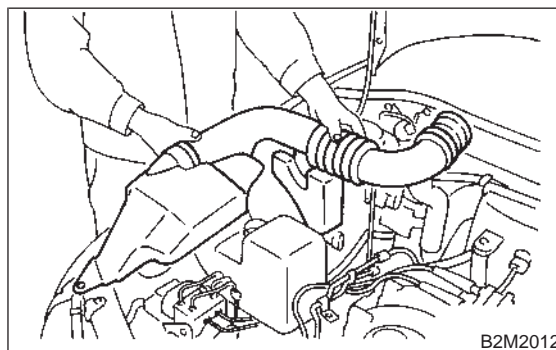
- 1) Release fuel pressure.
<Ref. to 2-8 [W1B0].>
- 2) Open fuel flap lid, and remove fuel filler cap.



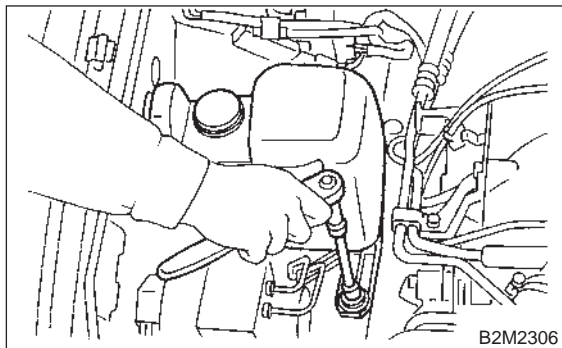
- 3) Disconnect battery ground cable.



- 4) Remove component parts of air intake system on California spec. vehicles.
(1) Remove air intake duct (A) and (B) as a unit.

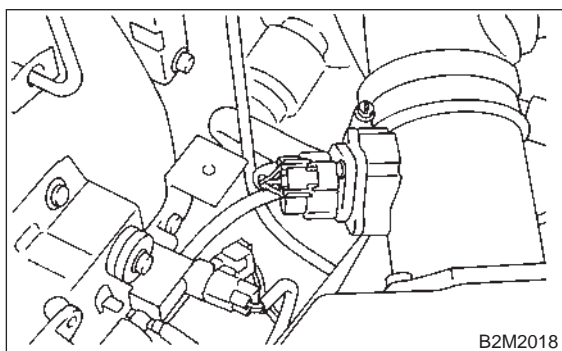


- (2) Remove resonator chamber.

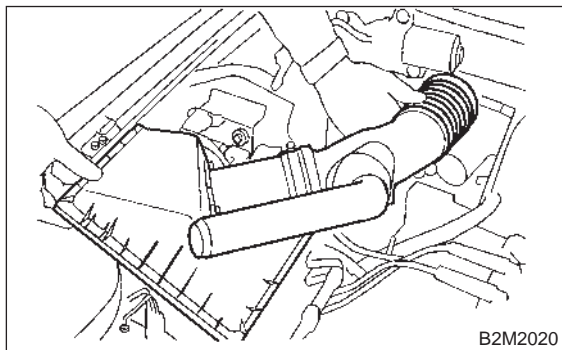


- 5) Remove component parts of air intake system.
(Except California spec. vehicles)

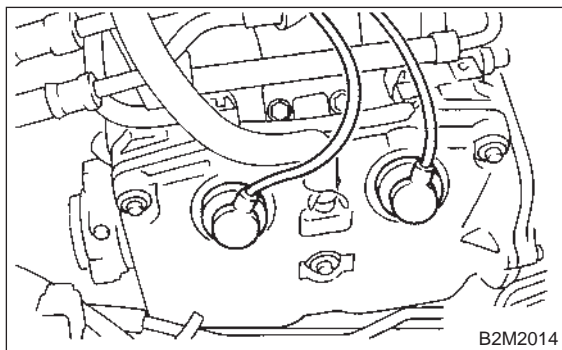
- (1) Disconnect connector from mass air flow sensor.



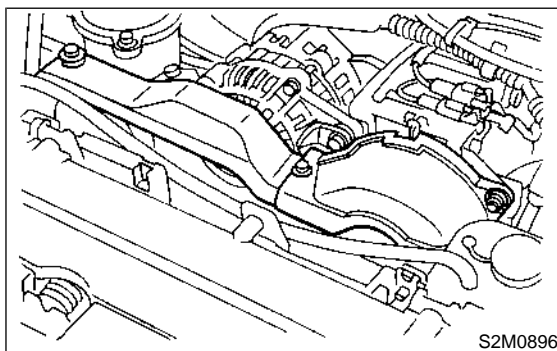
- (2) Remove air intake duct and air cleaner upper cover as a unit, and remove air cleaner element. <Ref. to 2-7 [W1A0].>



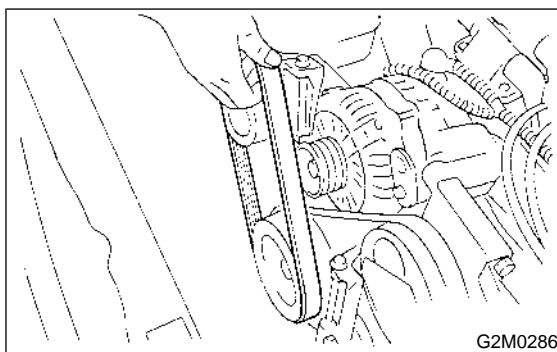
- 6) Remove spark plug cords from spark plugs (#1 and #3 cylinders).



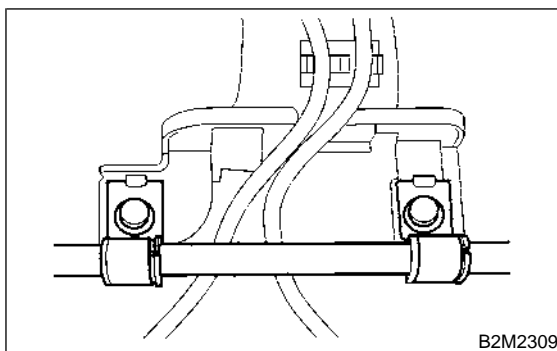
- 7) Remove power steering pump from bracket.
(1) Remove V-belt covers.



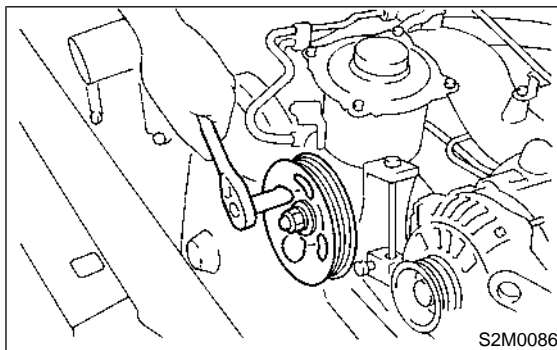
- (2) Loosen lock bolt and slider bolt, and remove power steering pump drive V-belt.



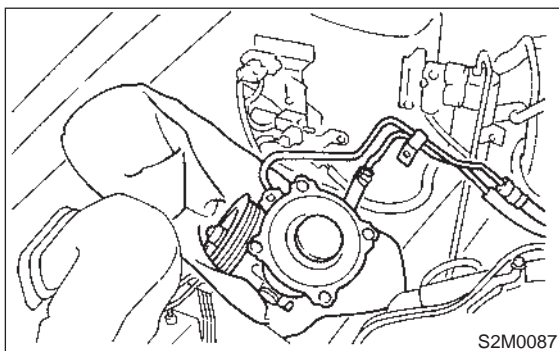
- (3) Remove bolts which secure power steering pipe brackets to intake manifold.



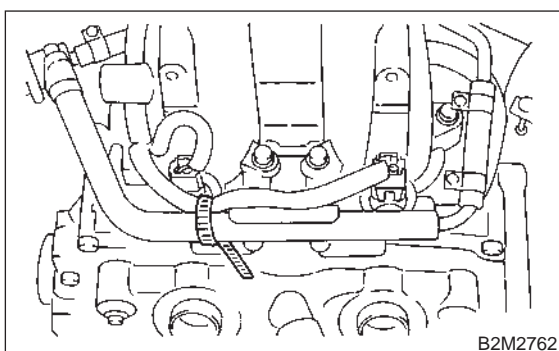
- (4) Remove bolts which install power steering pump to bracket.



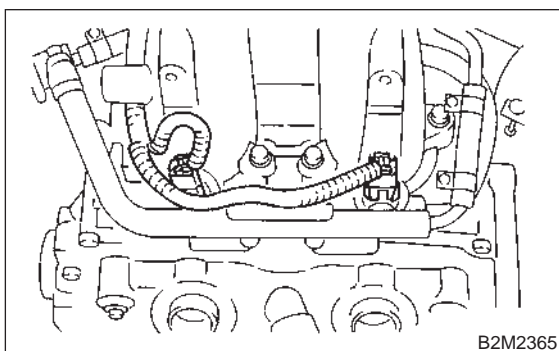
- (5) Place power steering pump on the right side wheel apron.



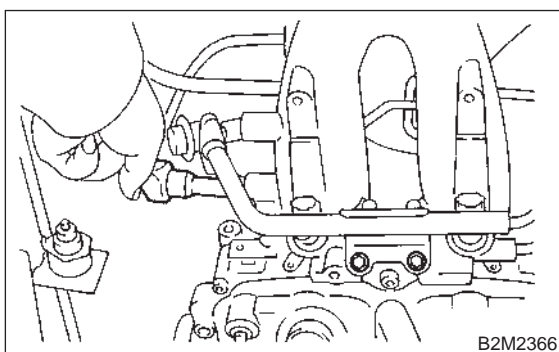
- 8) Remove band which holds engine harness to fuel injector pipe.



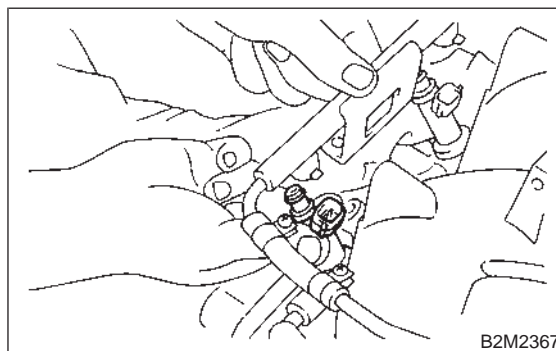
- 9) Disconnect connector from fuel injector.



- 10) Remove bolts which install injector pipe to intake manifold.



- 11) Pull up injector pipe, and remove fuel injector from intake manifold.



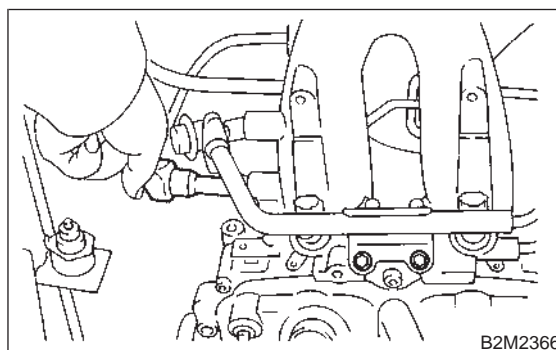
- 12) Installation is in the reverse order of removal.

CAUTION:

Replace O-rings with new ones.

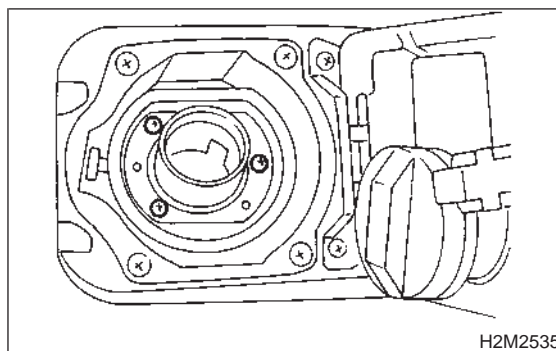
Tightening torque:

$3.4 \pm 0.5 \text{ N-m}$ ($0.35 \pm 0.05 \text{ kg-m}$, $2.5 \pm 0.4 \text{ ft-lb}$)

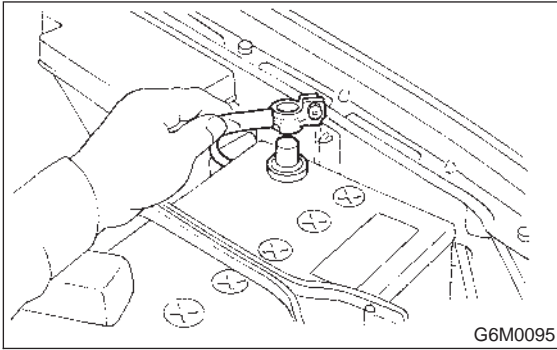


2. LH SIDE

- 1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 2) Open fuel flap lid, and remove fuel filler cap.

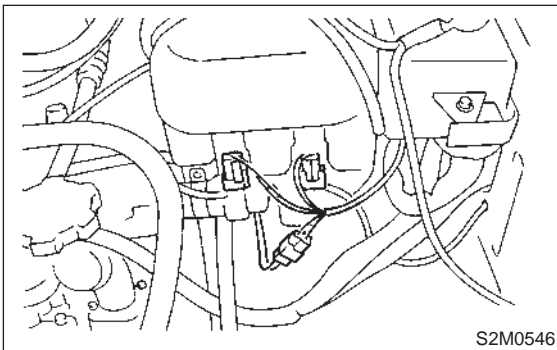


- 3) Disconnect battery ground cable.



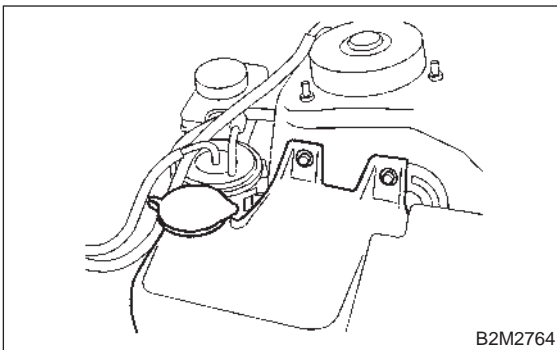
- 4) Disconnect connector from front window washer motor.

- 5) Disconnect connector from rear gate glass washer motor. (Wagon only)

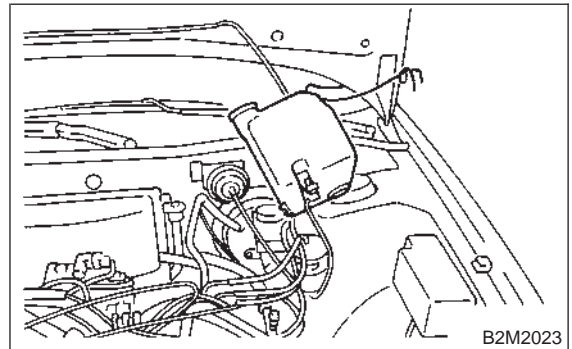


- 6) Disconnect rear window glass washer hose from washer motor, then plug connection with a suitable cap.

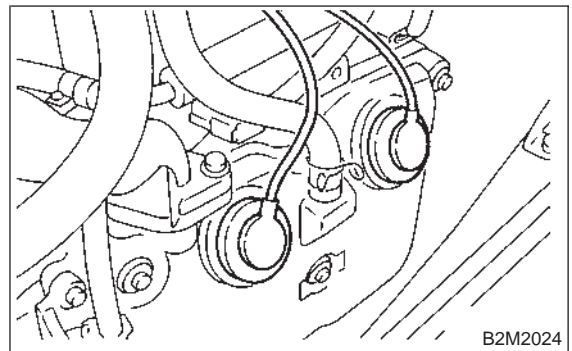
- 7) Remove two bolts which install washer tank on body.



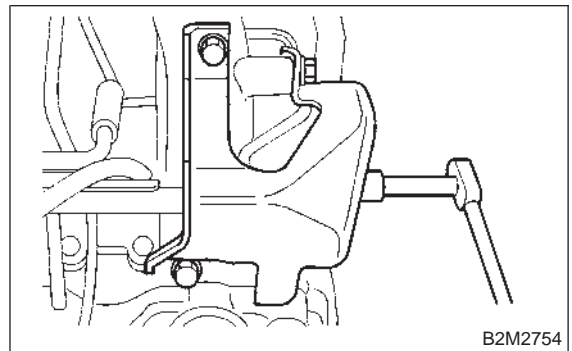
- 8) Move washer tank, and secure it away from working area.



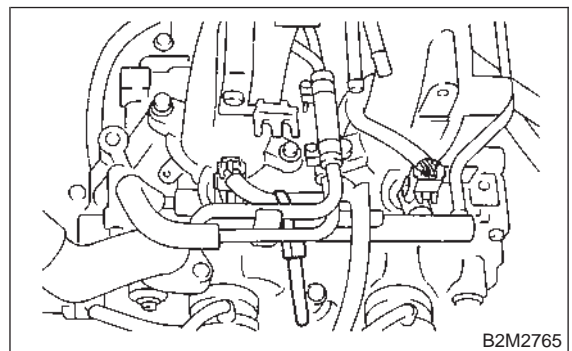
- 9) Remove spark plug cords from spark plugs (#1 and #3 cylinders).



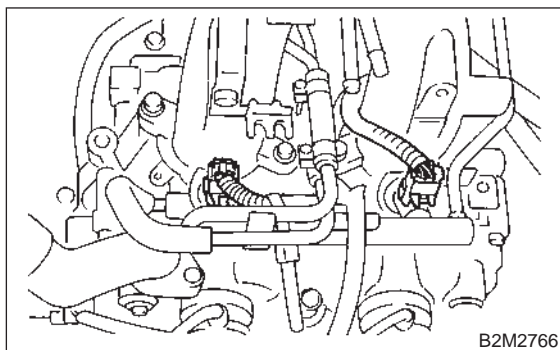
- 10) Remove fuel pipe protector.



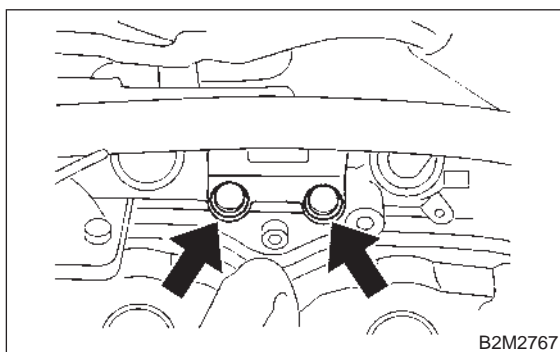
- 11) Remove band which holds engine harness to fuel injector pipe.



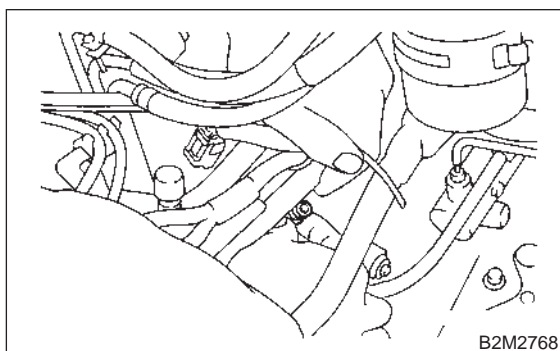
12) Disconnect connector from fuel injector.



13) Remove bolts which install injector pipe to intake manifold.



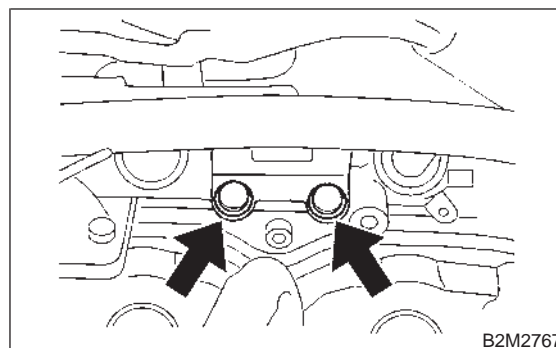
14) Pull up injector pipe, and remove fuel injector from intake manifold.



15) Installation is in the reverse order of removal.

CAUTION:
Replace O-rings with new ones.

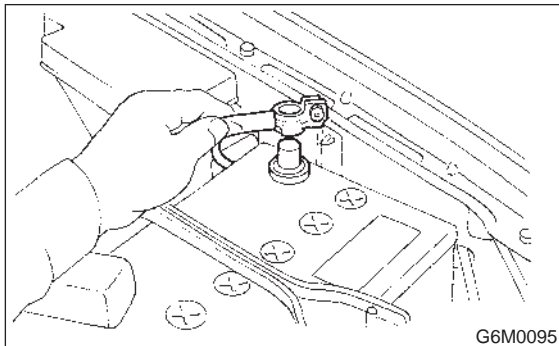
Tightening torque:
 $3.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.35 \pm 0.05 \text{ kg}\cdot\text{m}$, $2.5 \pm 0.4 \text{ ft}\cdot\text{lb}$)



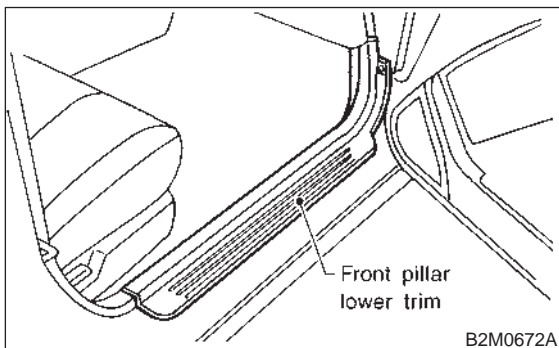
15. Engine Control Module (ECM)

A: REMOVAL AND INSTALLATION

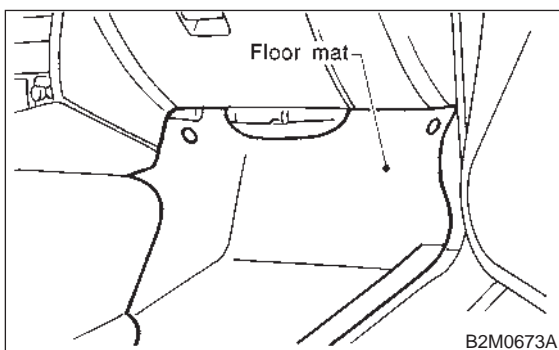
- 1) Disconnect battery ground cable.



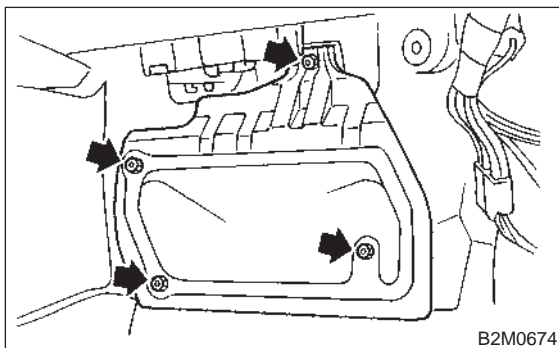
- 2) Remove side sill front cover.
<Ref. to 5-3 [W5A0].>



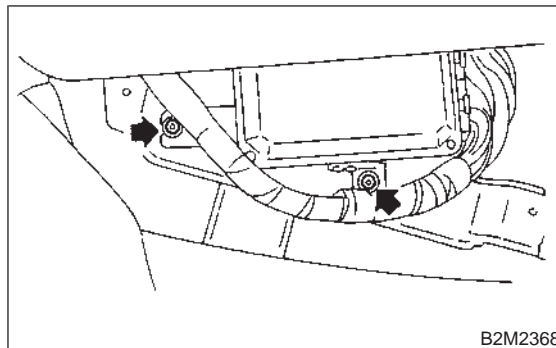
- 3) Detach floor mat of front passenger seat.



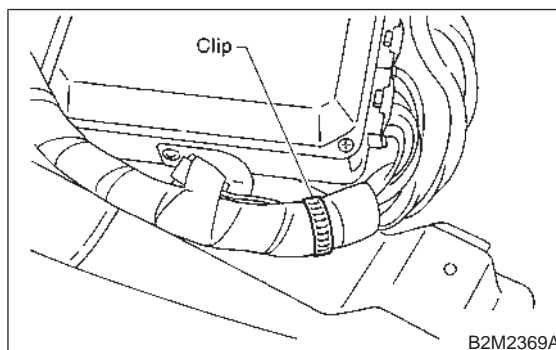
- 4) Remove protect cover.



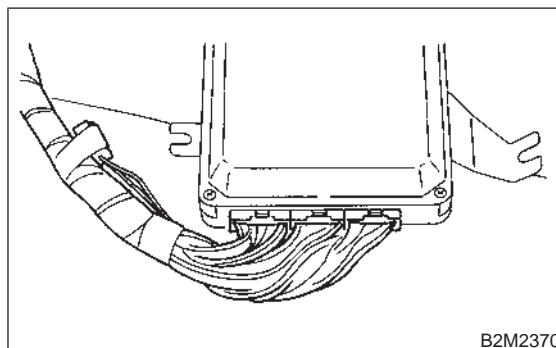
- 5) Remove nuts which hold ECM to bracket.



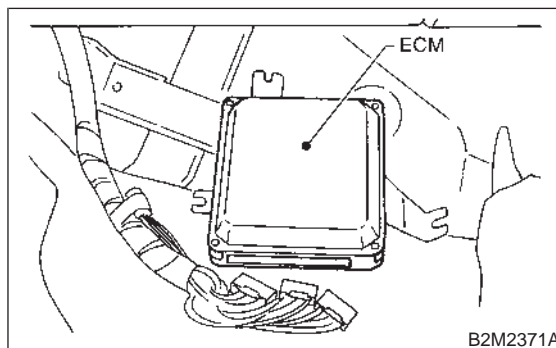
- 6) Remove clip from bracket.



- 7) Disconnect ECM connectors.



- 8) Take out ECM.



- 9) Installation is in the reverse order of removal.

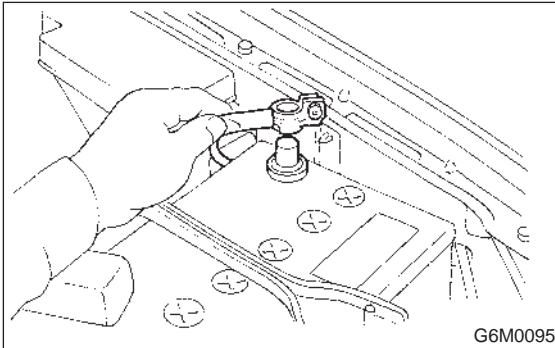
CAUTION:

When replacing ECM, be careful not to use the wrong spec. ECM to avoid any damage to the fuel injection system.

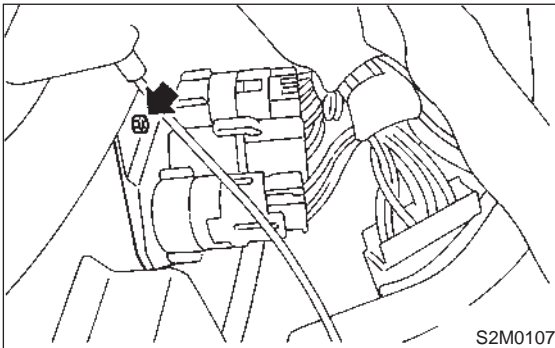
16. Main Relay

A: REMOVAL AND INSTALLATION

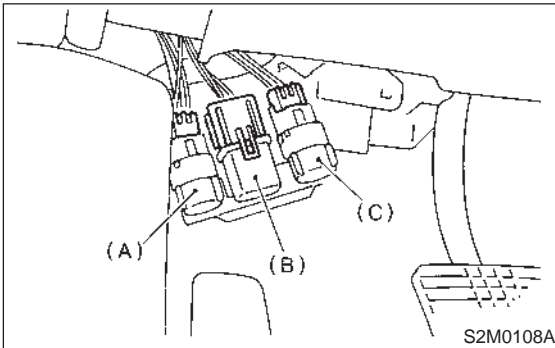
- 1) Disconnect battery ground cable.



- 2) Remove bolt which holds bracket of main relay and fuel pump relay.

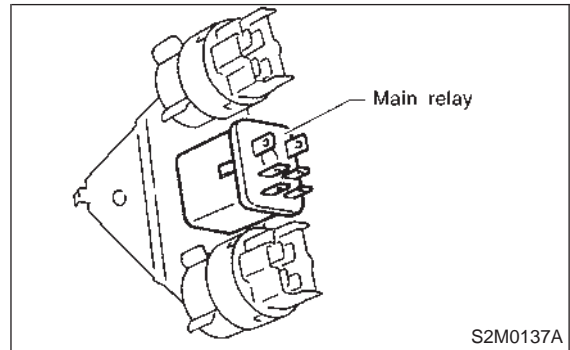


- 3) Disconnect connectors from relays.



- (A) Rear accessory power supply relay
(B) Main relay
(C) Fuel pump relay

- 4) Remove main relay from mounting bracket.

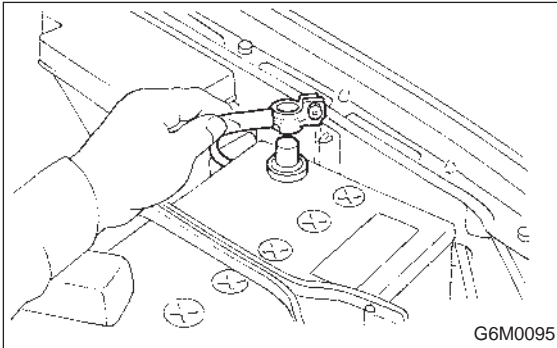


- 5) Installation is in the reverse order of removal.

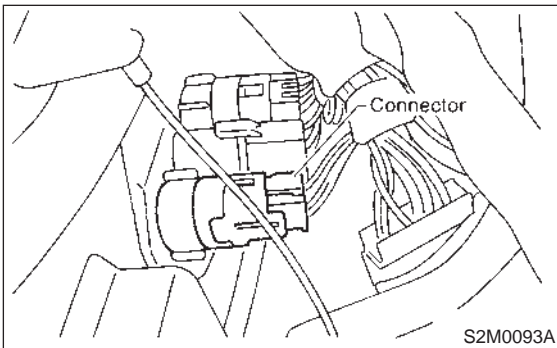
17. Fuel Pump Relay

A: REMOVAL AND INSTALLATION

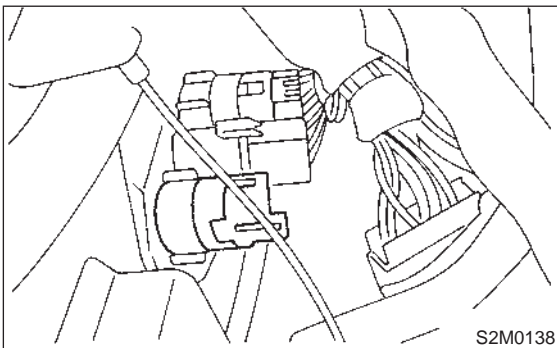
- 1) Disconnect battery ground cable.



- 2) Disconnect connector from fuel pump relay.



- 3) Remove fuel pump relay from mounting bracket.

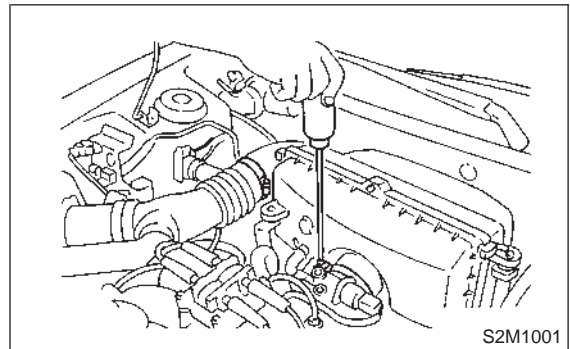


- 4) Installation is in the reverse order of removal.

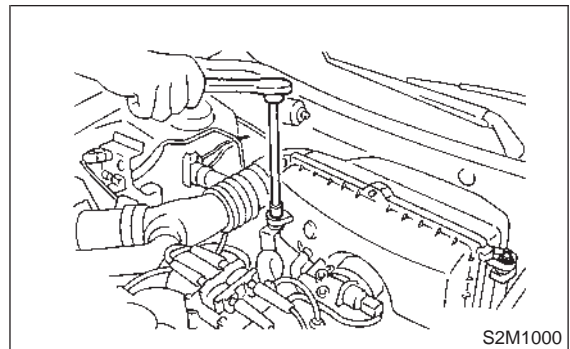
18. Air Intake Chamber (Except 2200 cc California Spec. Vehicles)

A: REMOVAL AND INSTALLATION

- 1) Loosen clamps which connect air intake chamber to throttle body and air intake duct.



- 2) Disconnect air hoses from air intake chamber.
- 3) Remove bolts which secure air intake chamber to stays.



- 4) Remove air intake chamber.
- 5) Installation is in the reverse order of removal.

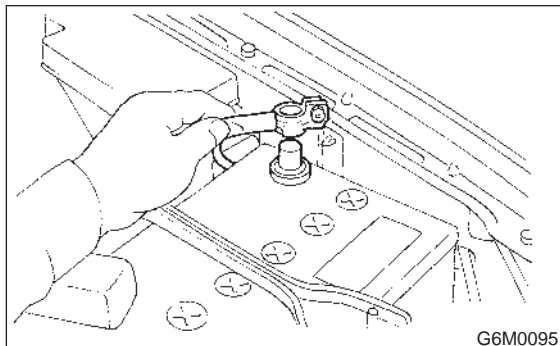
Tightening torque:

4.9 ± 0.5 N-m (0.5 ± 0.05 kg-m, 3.6 ± 0.4 ft-lb)

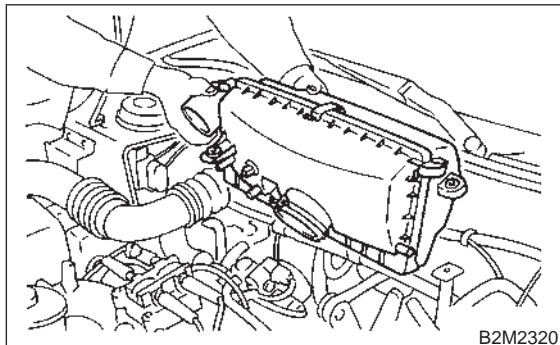
19. Knock Sensor

A: REMOVAL

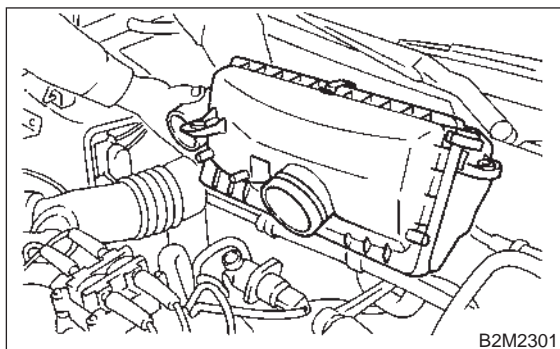
- 1) Disconnect battery ground cable from battery ground terminal.



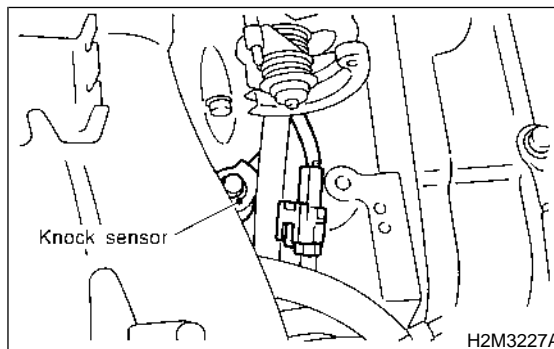
- 2) Remove air cleaner assembly.
(2200 cc California spec. vehicles only)
<Ref. to 2-7 [W1A0].>



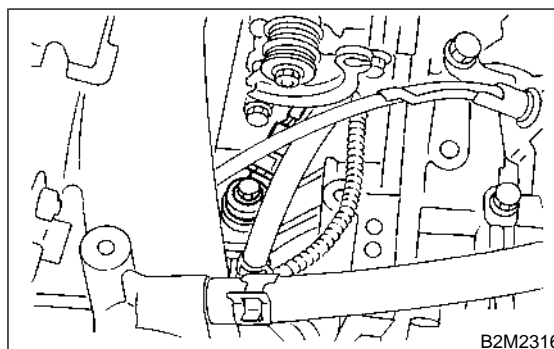
- 3) Remove air intake chamber.
(Except 2200 cc California spec. vehicles)
<Ref. to 2-7 [W18A0].>



- 4) Remove band which holds knock sensor harness, and disconnect connector from knock sensor.



- 5) Remove knock sensor from cylinder block.



B: INSTALLATION

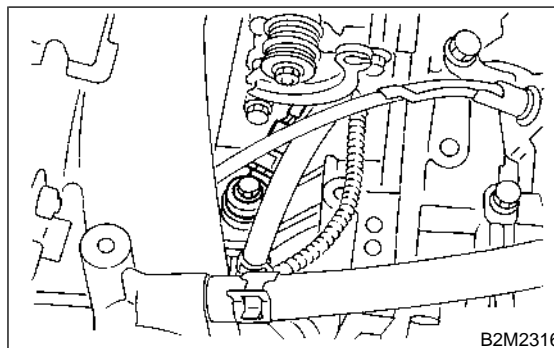
- 1) Install knock sensor to cylinder block.

Tightening torque:

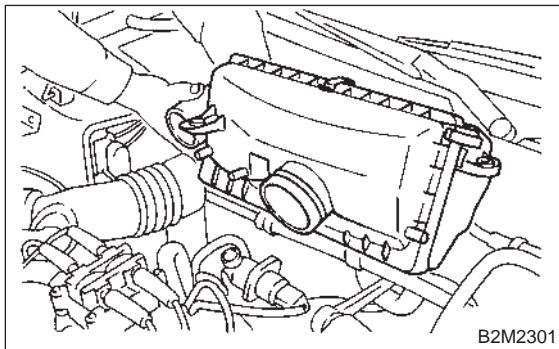
23.5 ± 2.9 N·m (2.4 ± 0.3 kg·m, 17.4 ± 2.2 ft·lb)

NOTE:

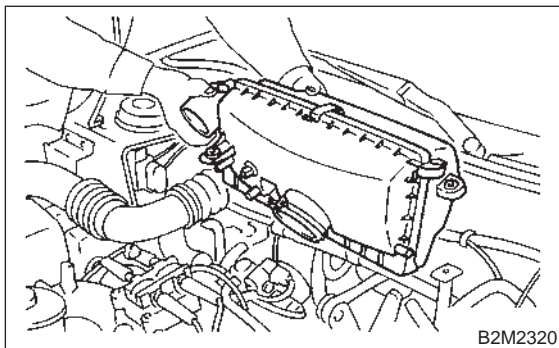
The knock sensor cord which is extracted from the sensor must be positioned at a 45° angle against the rear side of the engine.



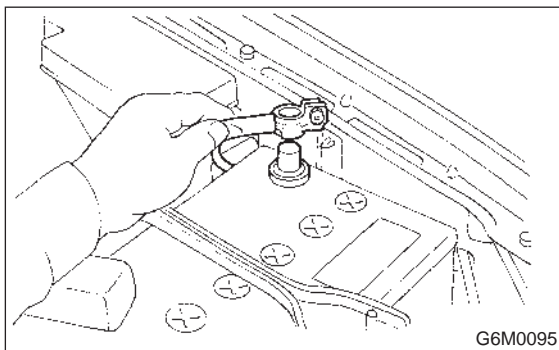
- 2) Connect knock sensor connector and hold knock sensor harness with band.
- 3) Install air intake chamber. (Except California spec. vehicles) <Ref. to 2-7 [W18A0].>



- 4) Install air cleaner assembly. (California spec. vehicles only) <Ref. to 2-7 [W1A0].>



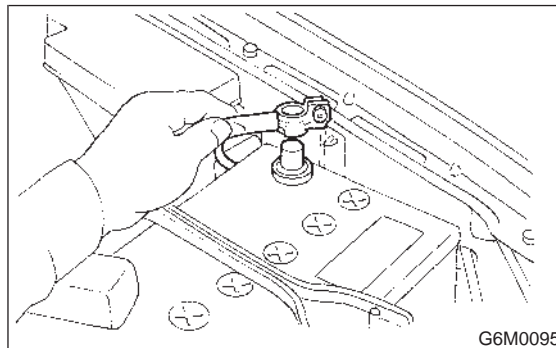
- 5) Connect battery ground cable to battery ground terminal.



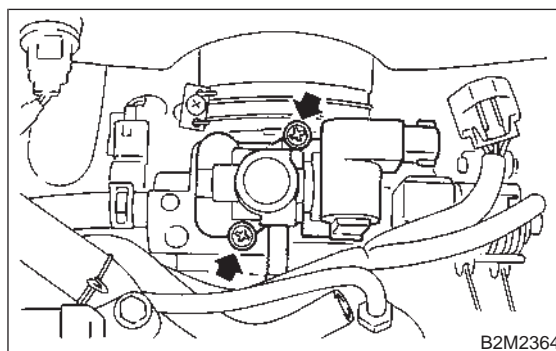
20. Intake Manifold Pressure Sensor (2200 cc California Spec. Vehicles only)

A: REMOVAL AND INSTALLATION

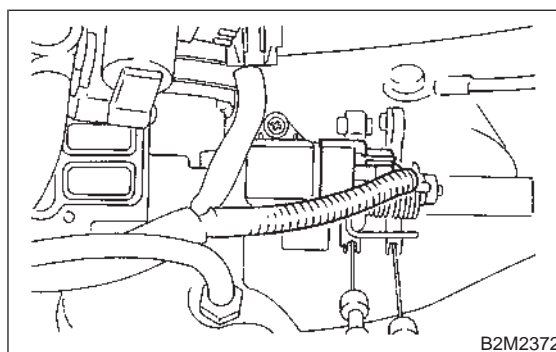
- 1) Disconnect battery ground cable.



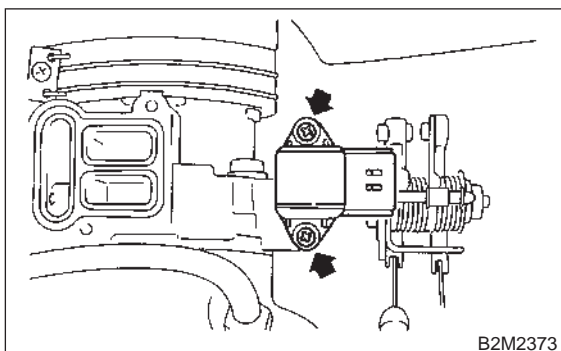
- 2) Remove idle air control solenoid valve. <Ref. to 2-7 [W12A1].>



- 3) Disconnect connector from intake manifold pressure sensor.



- 4) Remove intake manifold pressure sensor from throttle body.



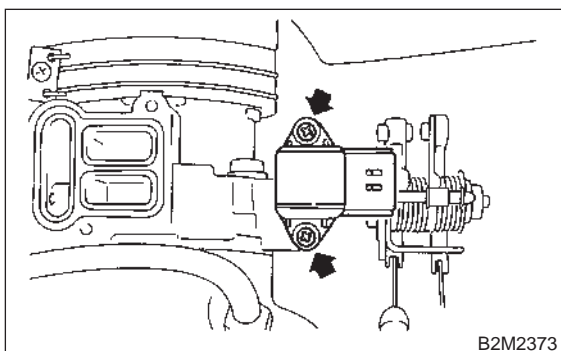
- 5) Installation is in the reverse order of removal.

CAUTION:

Replace gaskets for intake air pressure sensor and idle air control solenoid valve with new ones.

Tightening torque:

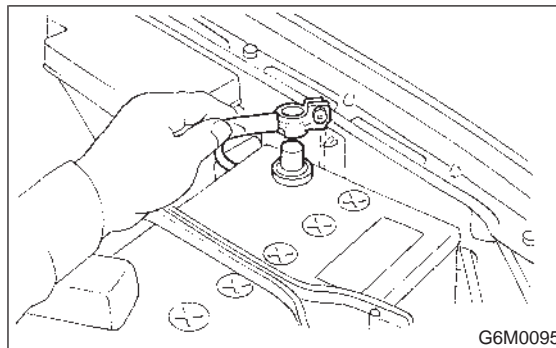
$2.0 \pm 0.4 \text{ N}\cdot\text{m}$ ($0.20 \pm 0.04 \text{ kg}\cdot\text{m}$, $1.4 \pm 0.3 \text{ ft}\cdot\text{lb}$)



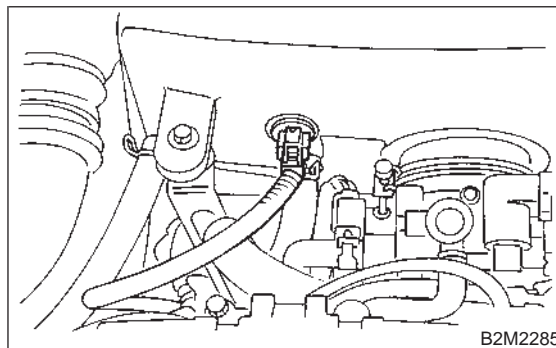
21. Intake Air Temperature Sensor (2200 cc California Spec. Vehicles only)

A: REMOVAL AND INSTALLATION

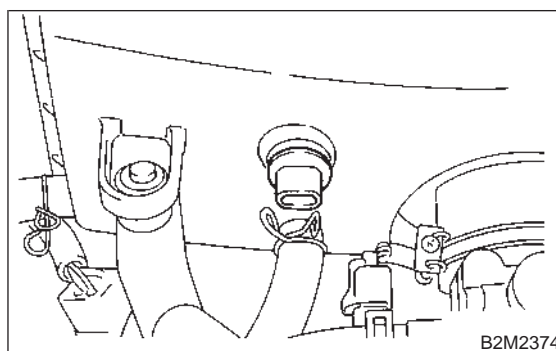
- 1) Disconnect battery ground cable.



- 2) Disconnect connector from intake air temperature sensor.



- 3) Remove intake air temperature sensor from air cleaner case.



- 4) Installation is in the reverse order of removal.

MEMO:

ON-BOARD DIAGNOSTICS II SYSTEM

2-7

	Page
T DIAGNOSTICS AIRBAG	2
1. General.....	2
2. Electrical Components Location.....	3
3. Diagnosis System.....	31
4. Cautions	47
5. Specified Data	50
6. Basic Diagnostic Procedure	60
7. Diagnostics for CHECK ENGINE Malfunction Indicator Lamp (MIL)	64
8. Diagnostics for Engine Starting Failure	77
9. General Diagnostic Table	108
10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles	110
11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles	390

1. General

A: GENERAL DESCRIPTION

- The on-board diagnostics (OBD) system detects and indicates a fault in various inputs and outputs of the complex electronic control. CHECK ENGINE malfunction indicator lamp (MIL) in the combination meter indicates occurrence of a fault or trouble.
- Further, against such a failure or sensors as may disable the drive, the fail-safe function is provided to ensure the minimal driveability.
- The OBD system incorporated with the vehicles within this engine family complies with Section 1968.1, California Code of Regulations (OBD-II regulation). The OBD system monitors the components and the system malfunction listed in Engine Section which affects on emissions.
- When the system decides that a malfunction occurs, MIL illuminates. At the same time of the MIL illumination or blinking, a diagnostic trouble code (DTC) and a freeze frame engine conditions are stored into on-board computer.
- The OBD system stores freeze frame engine condition data (engine load, engine coolant temperature, fuel trim, engine speed and vehicle speed, etc.) into on-board computer when it detects a malfunction first.
- If the OBD system detects the various malfunctions including the fault of fuel trim or misfire, the OBD system first stores freeze frame engine conditions about the fuel trim or misfire.
- When the malfunction does not occur again for three consecutive driving cycles, MIL is turned off, but DTC remains at on-board computer.
- The OBD-II system is capable of communication with a general scan tool (OBD-II general scan tool) formed by ISO 9141 CARB.
- The OBD-II diagnostics procedure is different from the usual diagnostics procedure. When troubleshooting OBD-II vehicles, connect Subaru Select Monitor or the OBD-II general scan tool to the vehicle.

B: ENGINE

1. ENGINE AND EMISSION CONTROL SYSTEM

- The Multipoint Fuel Injection (MFI) system is a system that supplies the optimum air-fuel mixture

to the engine for all the various operating conditions through the use of the latest electronic technology.

With this system fuel, which is pressurized at a constant pressure, is injected into the intake air passage of the cylinder head. The injection quantity of fuel is controlled by an intermittent injection system where the electro-magnetic injection valve (fuel injector) opens only for a short period of time, depending on the quantity of air required for one cycle of operation. In actual operation, the injection quantity is determined by the duration of an electric pulse applied to the fuel injector and this permits simple, yet highly precise metering of the fuel.

- Further, all the operating conditions of the engine are converted into electric signals, and this results in additional features of the system, such as large improved adaptability, easier addition of compensating element, etc.

The MFI system also has the following features:

- Reduced emission of harmful exhaust gases.
- Reduced in fuel consumption.
- Increased engine output.
- Superior acceleration and deceleration.
- Superior startability and warm-up performance in cold weather since compensation is made for coolant and intake air temperature.

C: AUTOMATIC TRANSMISSION

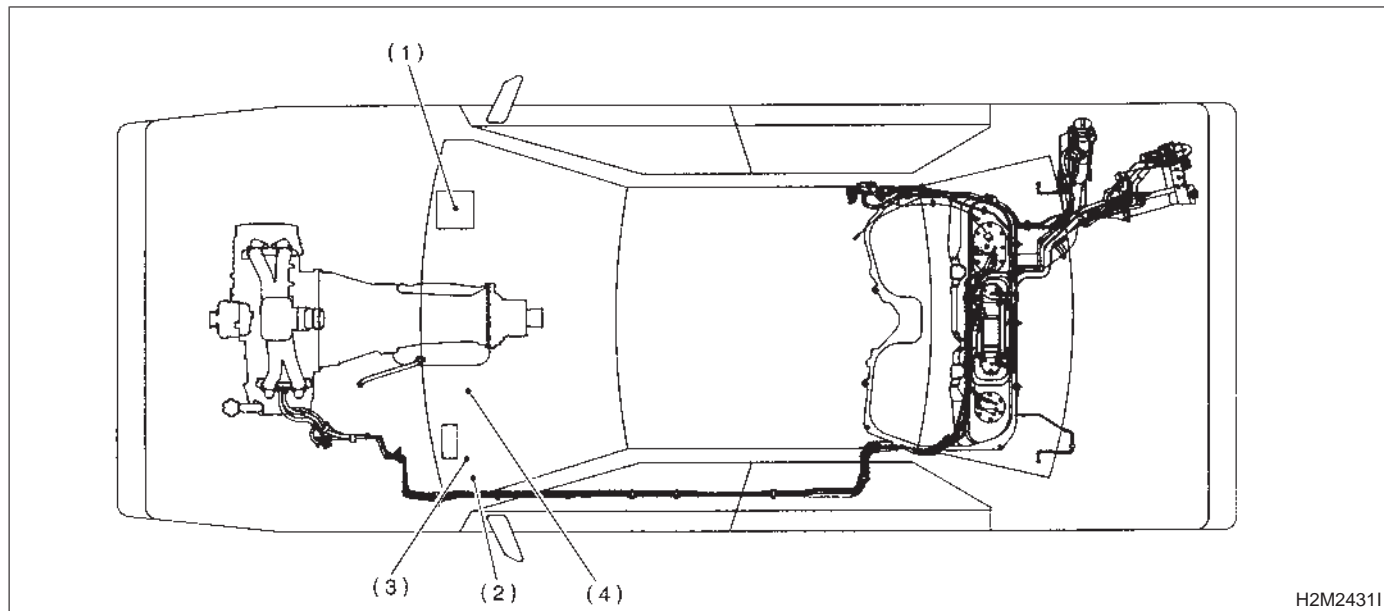
1. ELECTRONIC-HYDRAULIC CONTROL SYSTEM

The electronic-hydraulic control system consists of various sensors and switches, a transmission control module (TCM) and the hydraulic controller including solenoid valves. The system controls the transmission proper including shift control, lock-up control, overrunning clutch control, line pressure control and shift timing control. It also controls the AWD transfer clutch. In other words, the system detects various operating conditions from various input signals and sends output signals to shift solenoids 1, 2 and low clutch timing solenoid and 2-4 brake timing solenoid and duty solenoids A, B, C, D (a total of eight solenoids).

2. Electrical Components Location

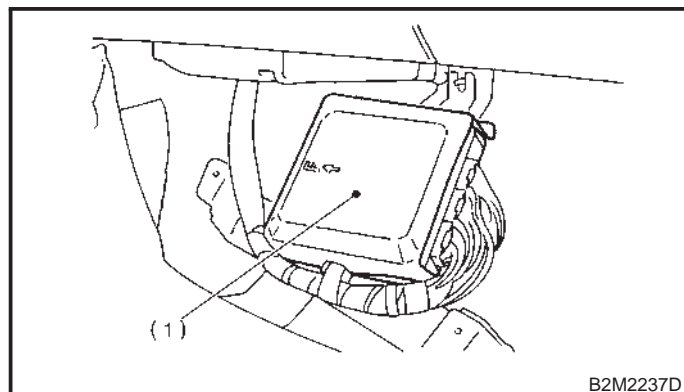
A: ENGINE (2200 cc CALIFORNIA SPEC. VEHICLES)

1. MODULE

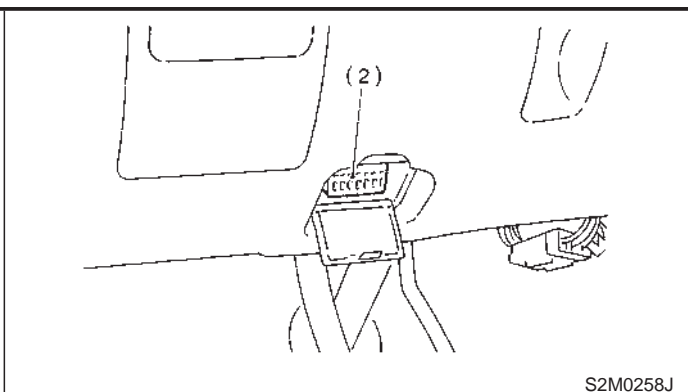


H2M24311

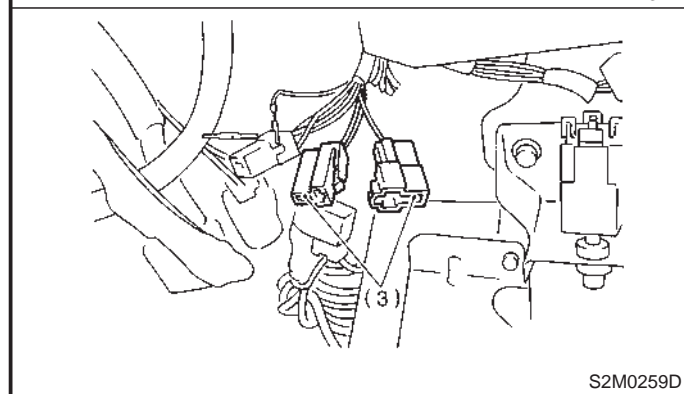
- | | |
|--|---|
| (1) Engine control module (ECM) | (3) Test mode connector |
| (2) Data link connector (for Subaru Select Monitor and OBD-II general scan tool) | (4) CHECK ENGINE malfunction indicator lamp (MIL) |



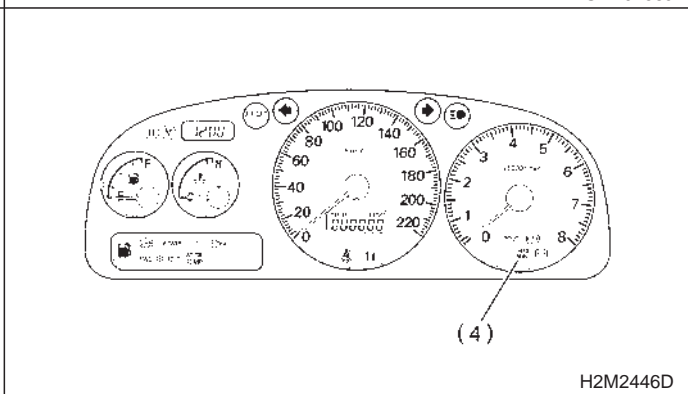
B2M2237D



S2M0258J

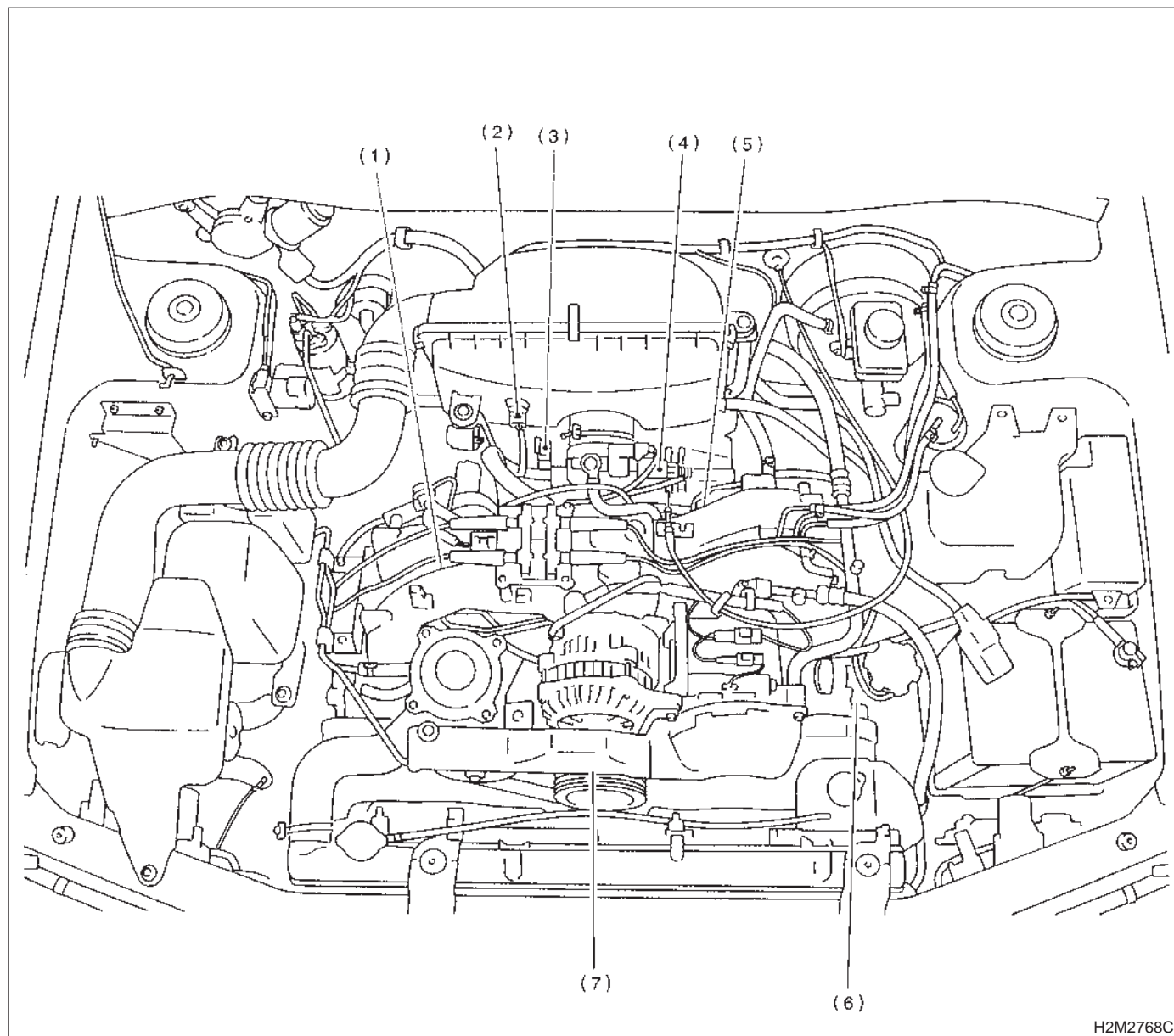


S2M0259D



H2M2446D

2. SENSOR



H2M2768C

(1) Engine coolant temperature sensor

(2) Intake air temperature sensor

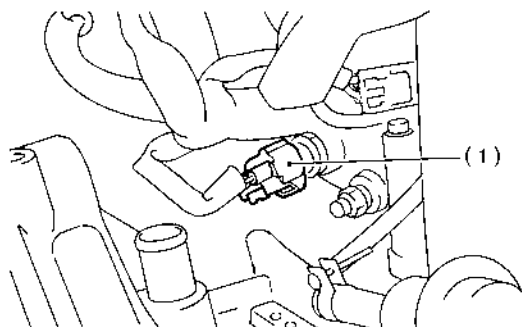
(3) Throttle position sensor

(4) Intake manifold pressure sensor

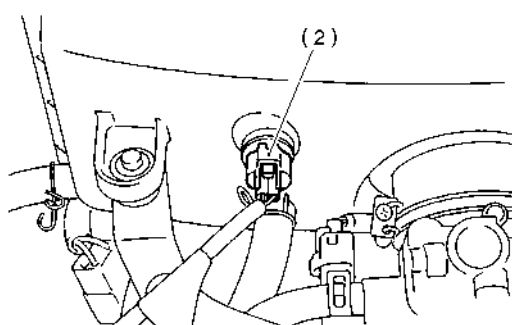
(5) Knock sensor

(6) Camshaft position sensor

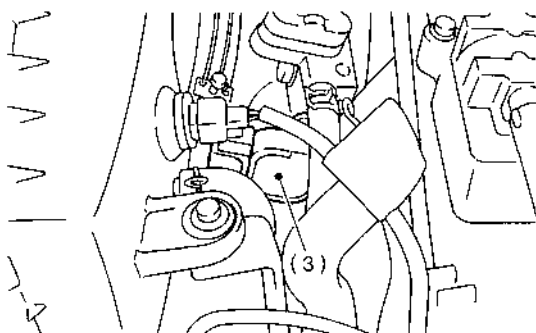
(7) Crankshaft position sensor



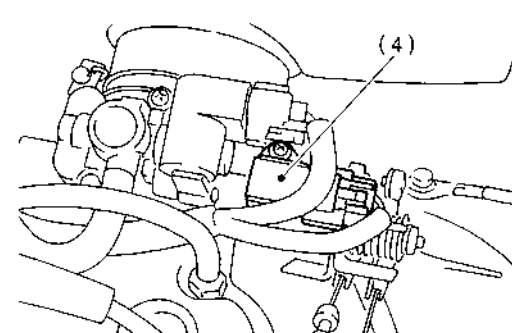
H2M3229A



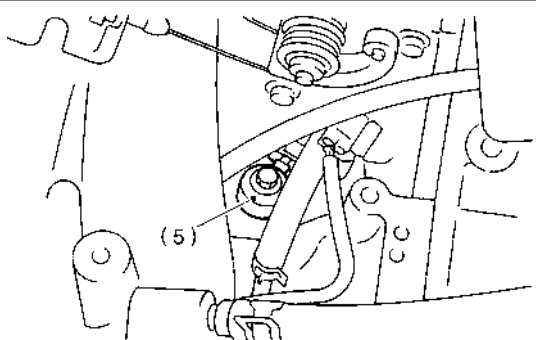
B2M2250A



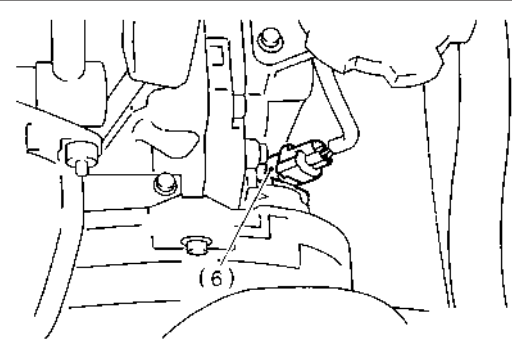
B2M2251A



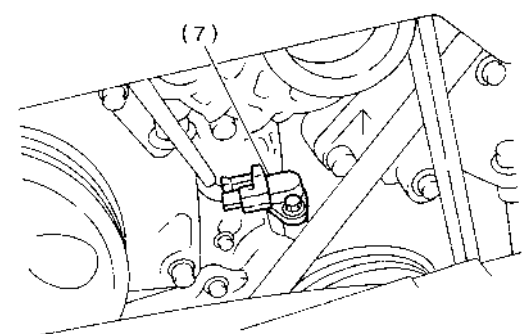
B2M2252A



B2M2241A

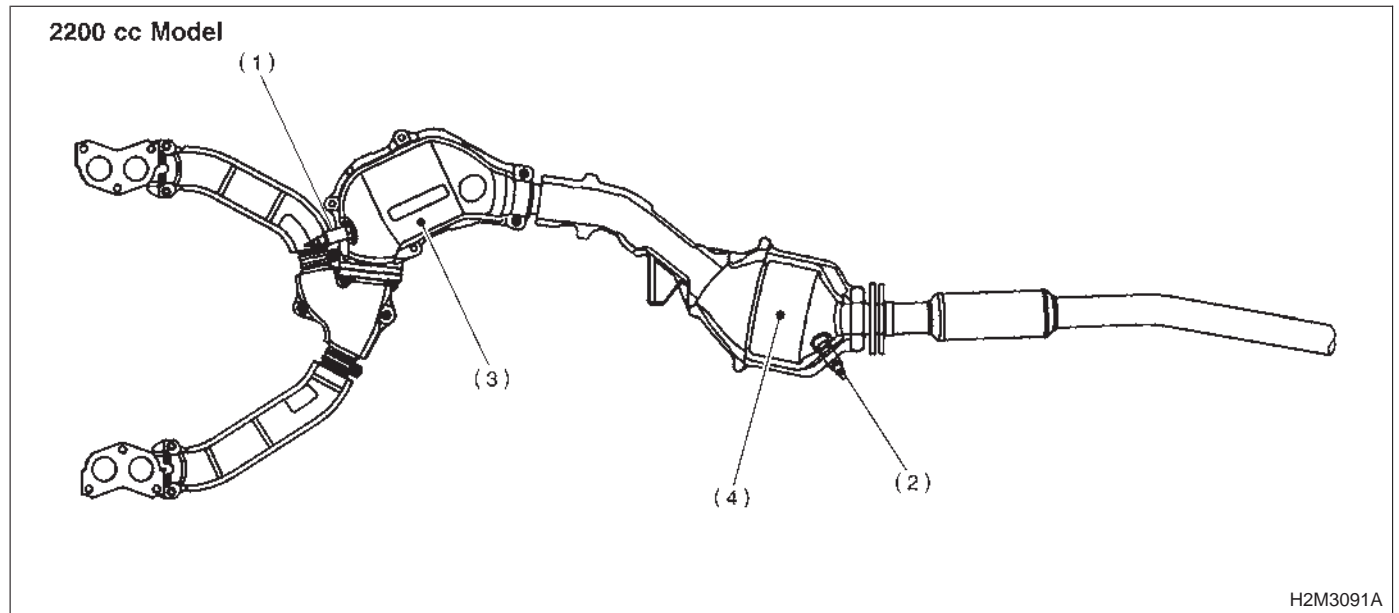


B2M2242A



B2M0213J

SUBARU.

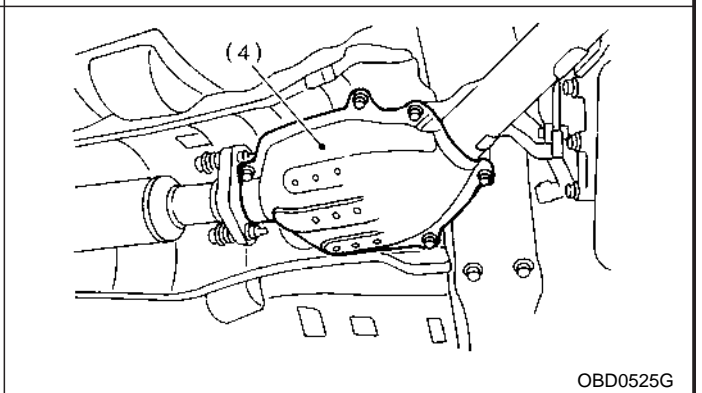
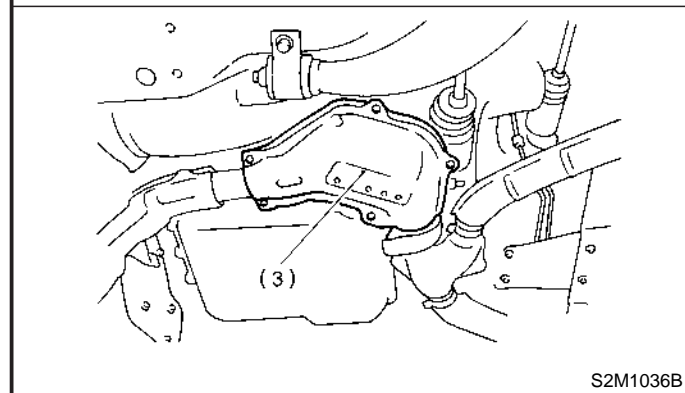
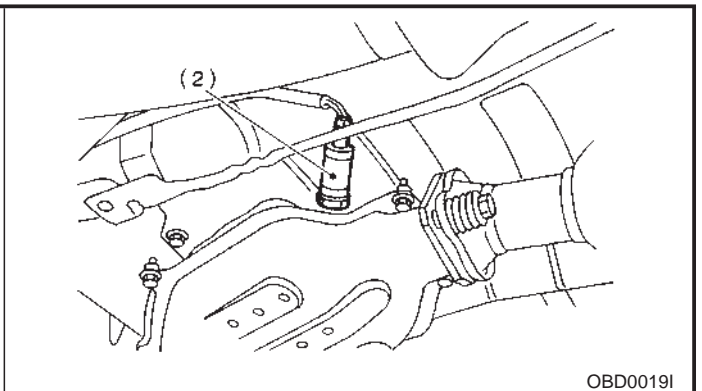
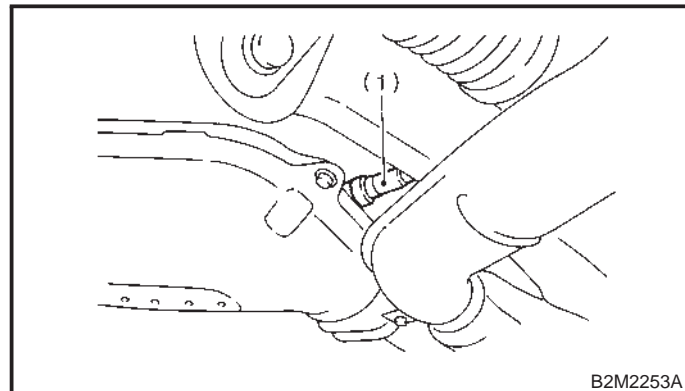


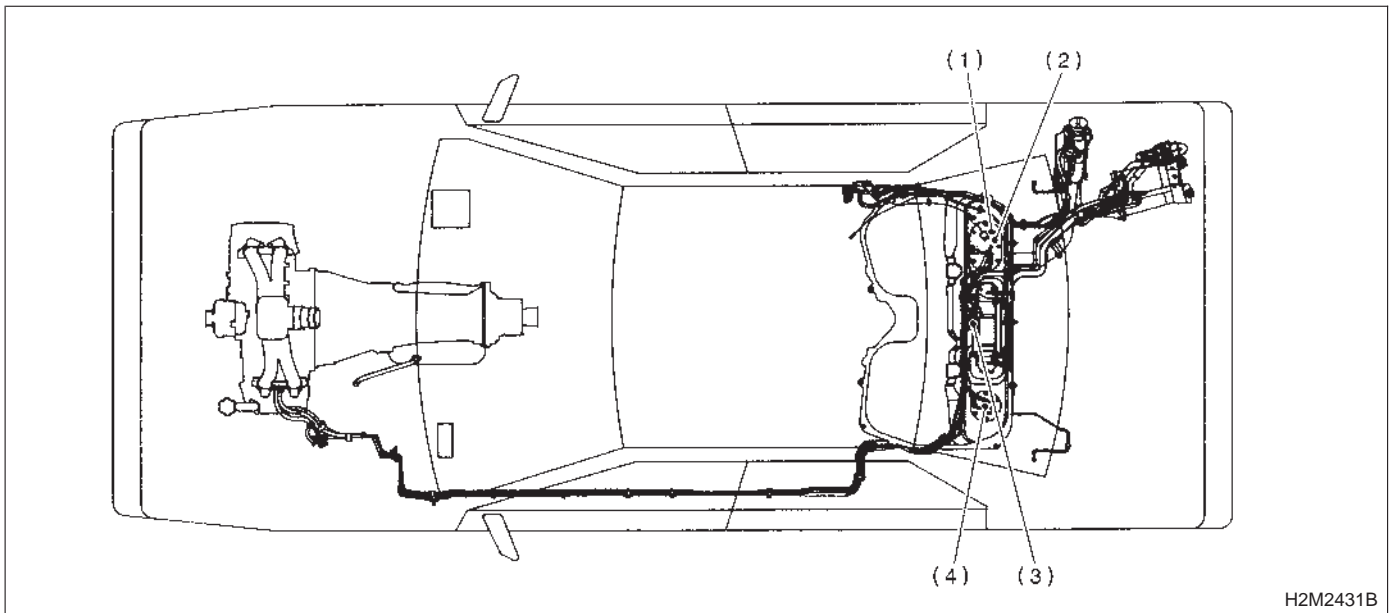
(1) Front oxygen (A/F) sensor

(2) Rear oxygen sensor

(3) Front catalytic converter

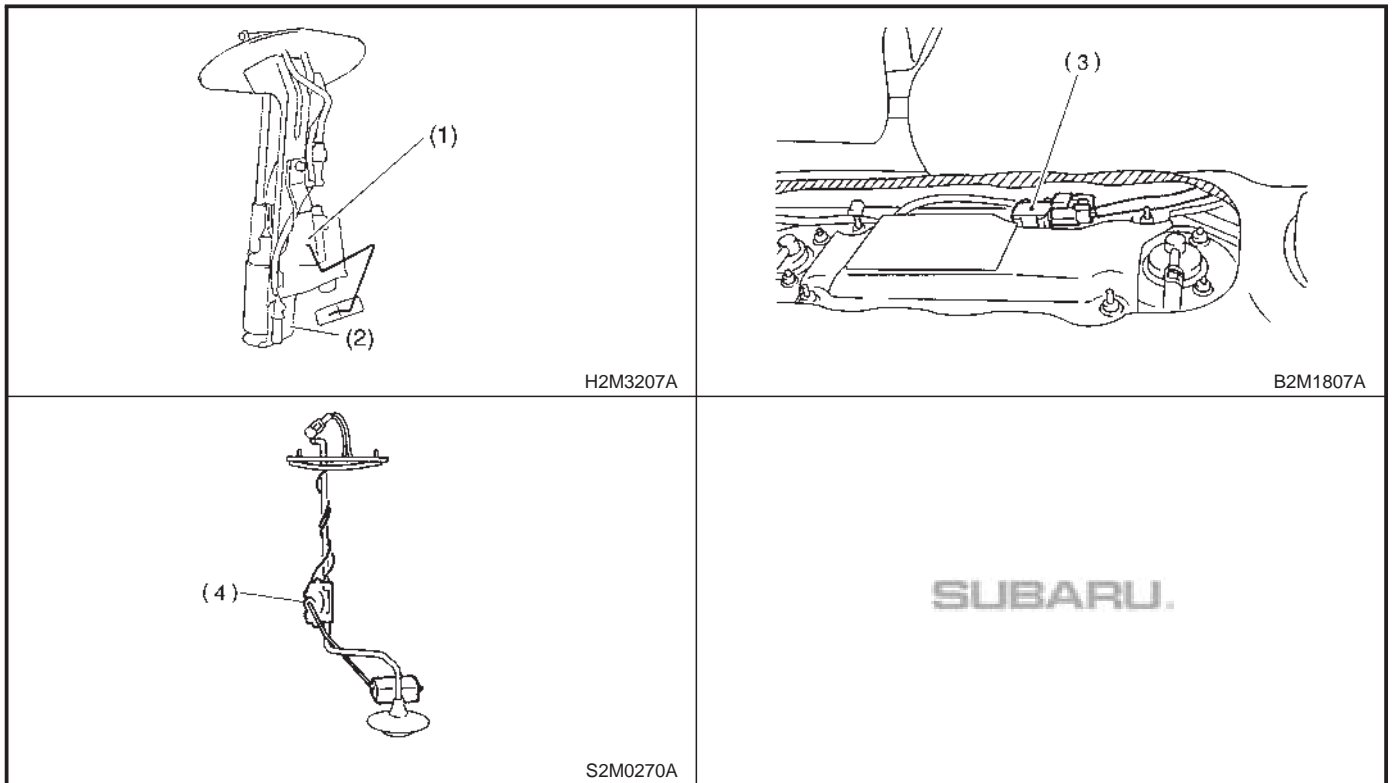
(4) Rear catalytic converter

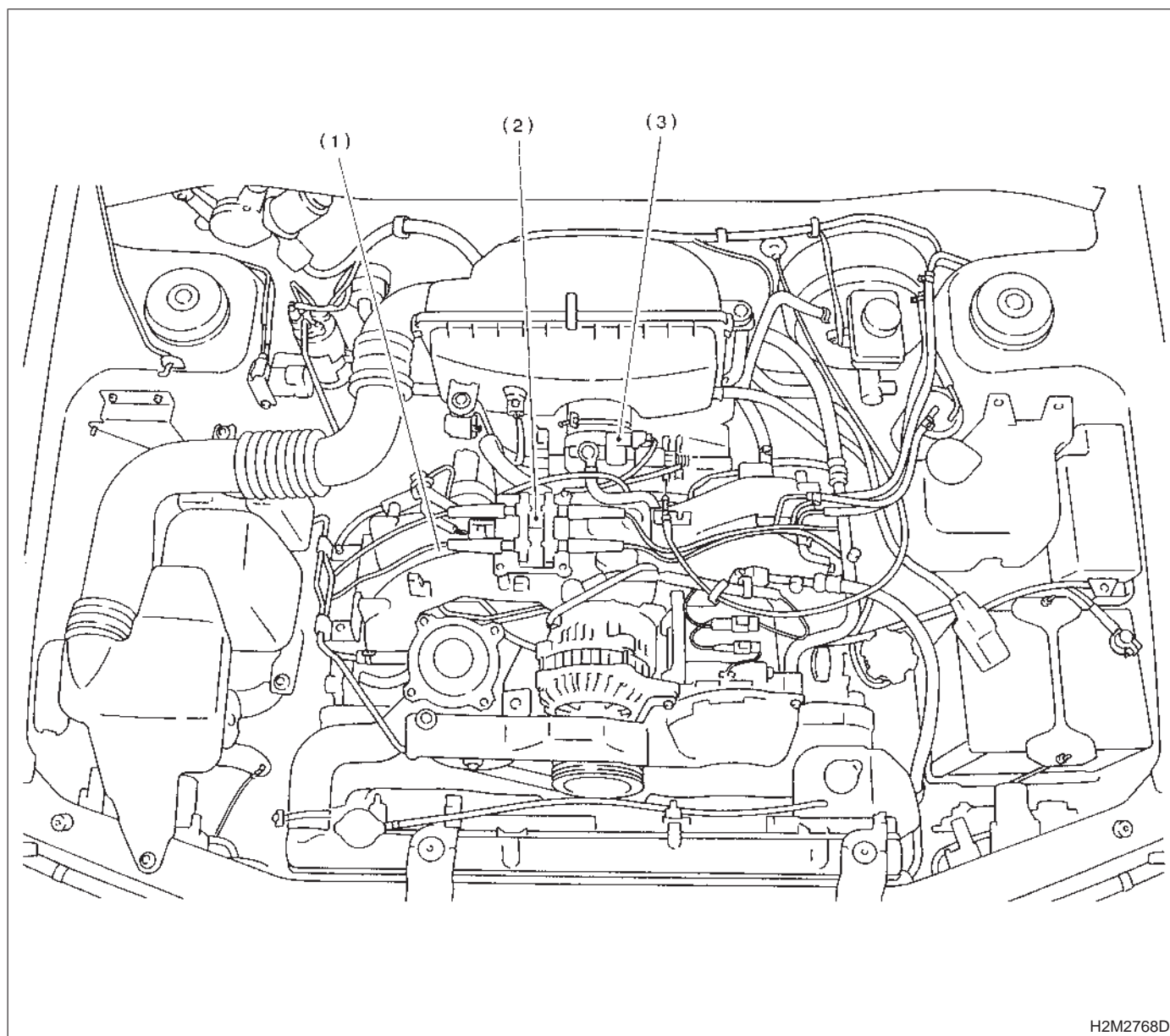




- (1) Fuel level sensor
- (2) Fuel temperature sensor

- (3) Fuel tank pressure sensor
- (4) Fuel sub level sensor



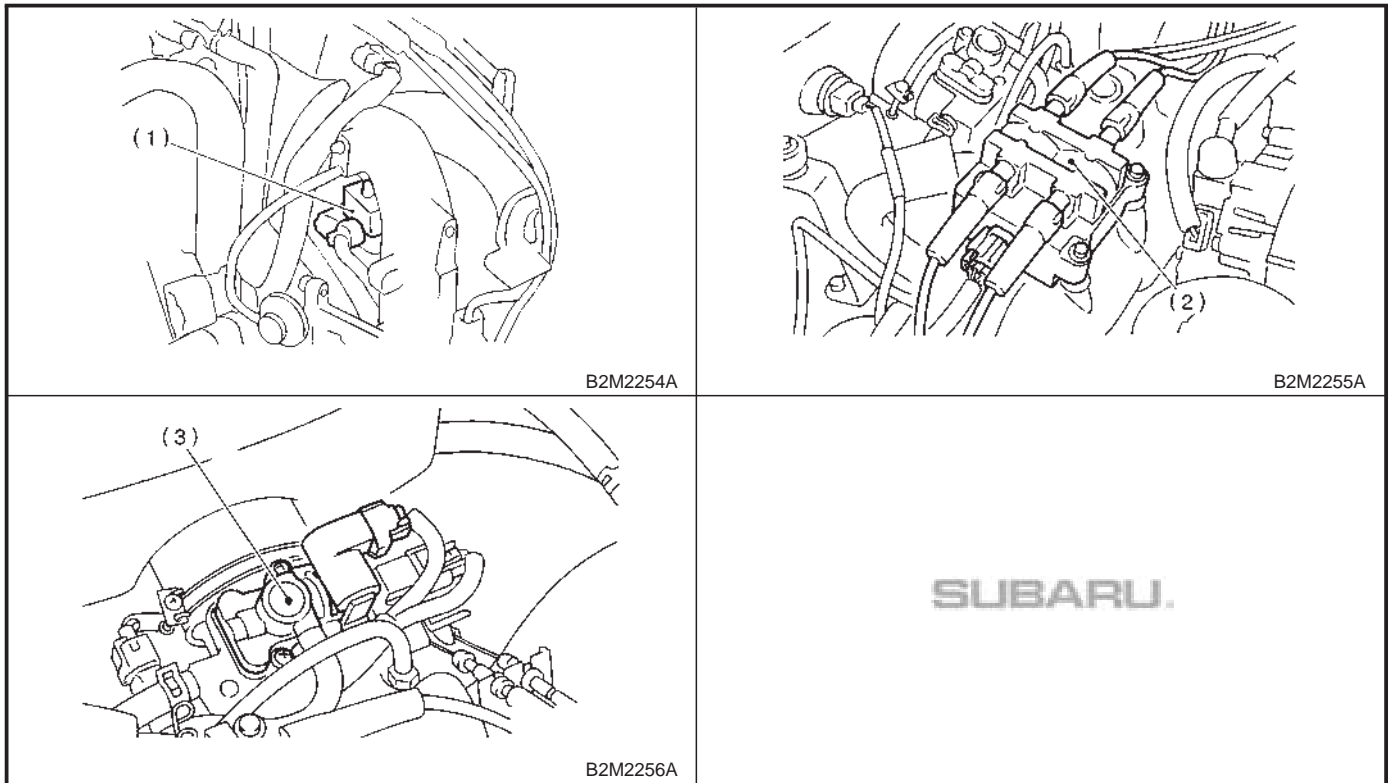
3. SOLENOID VALVE, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS

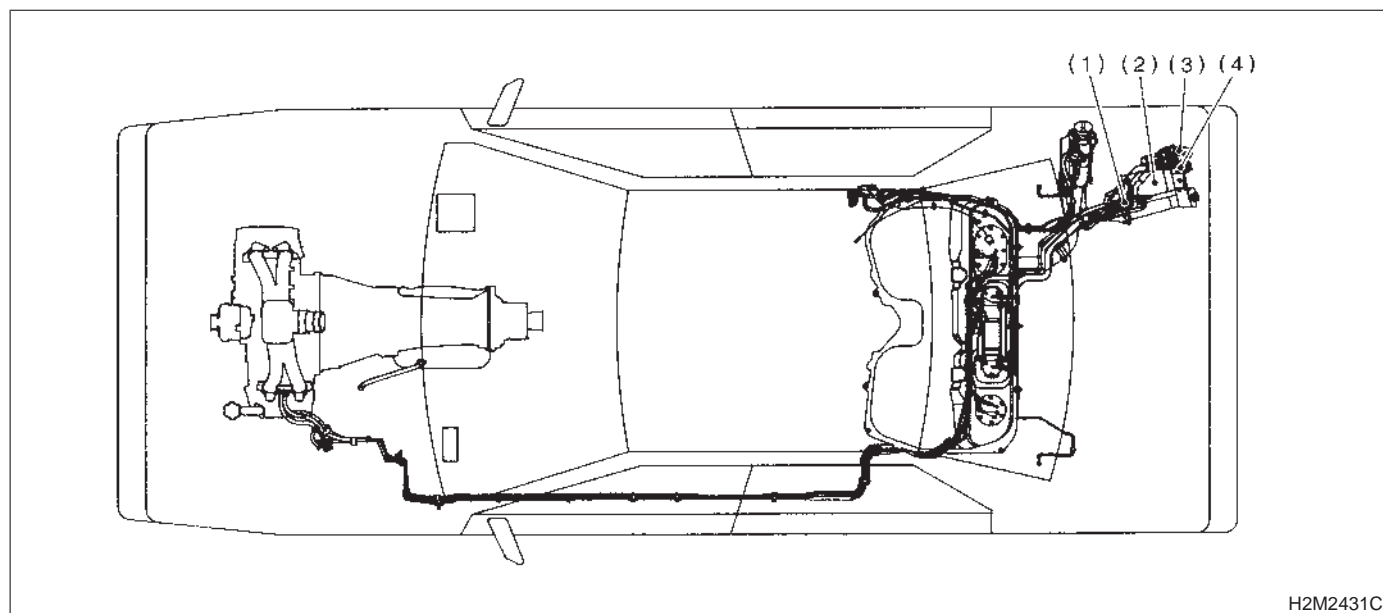
H2M2768D

(1) Purge control solenoid valve

(2) Ignition coil & ignitor ASSY

(3) Idle air control solenoid valve



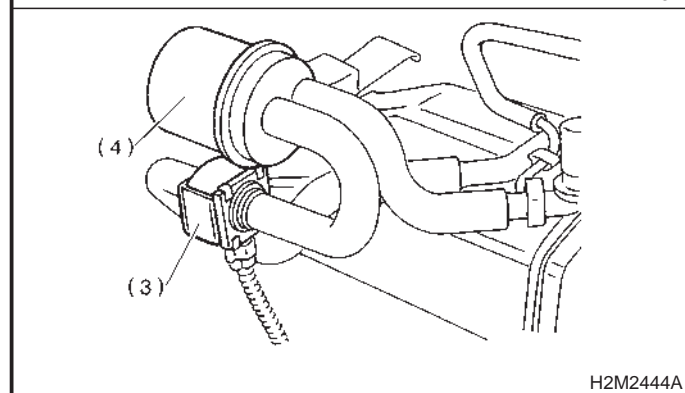
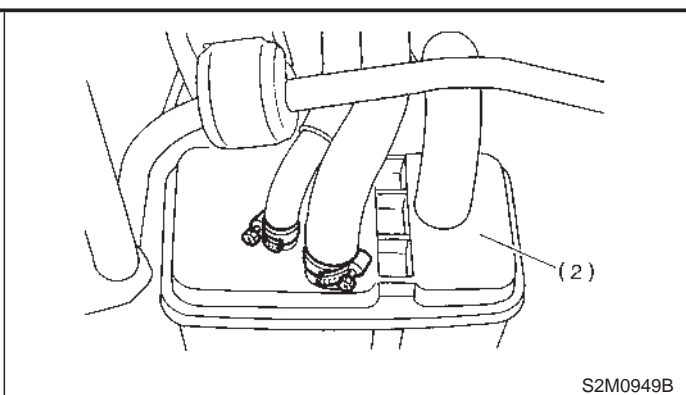
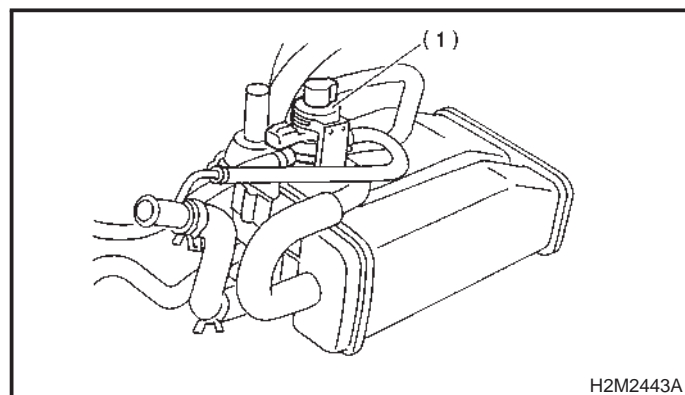


(1) Pressure control solenoid valve

(3) Drain valve

(2) Canister

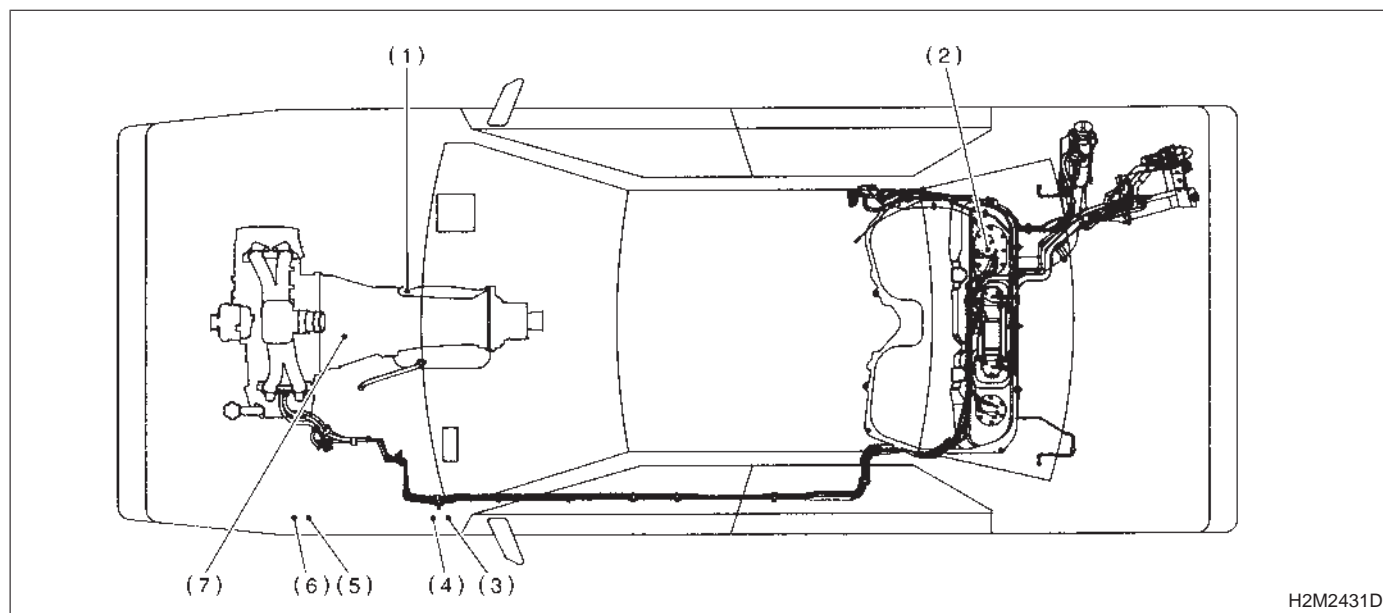
(4) Air filter



SUBARU.

MEMO:

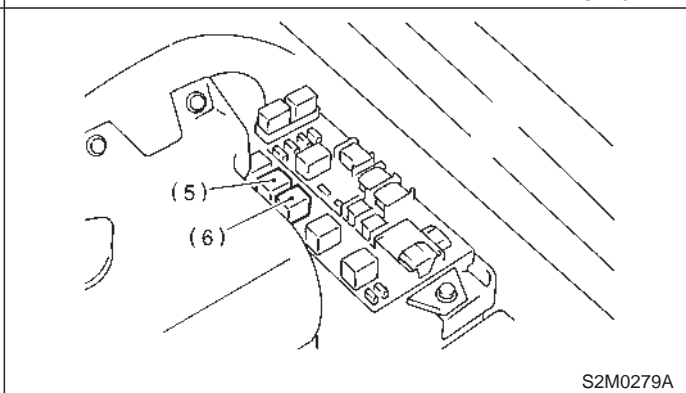
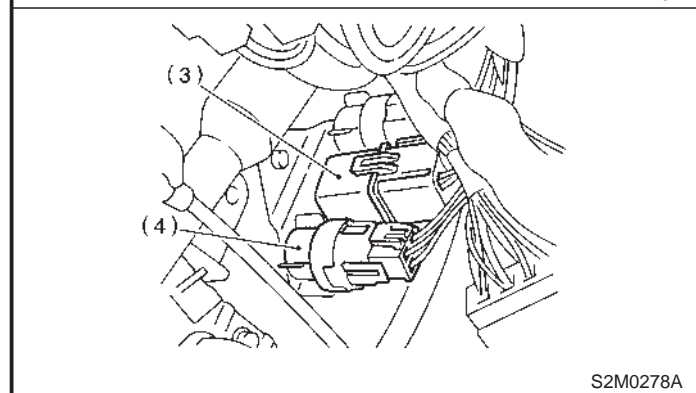
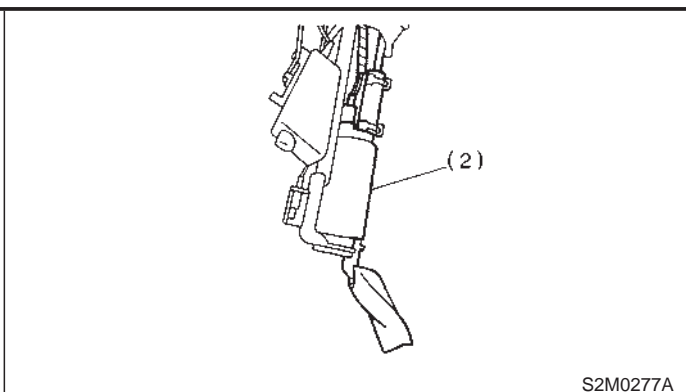
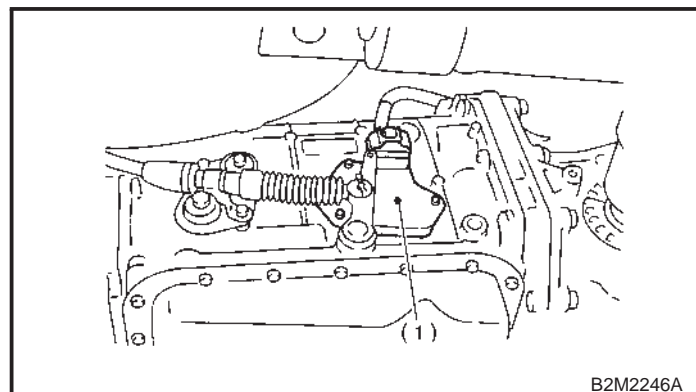
2. Electrical Components Location

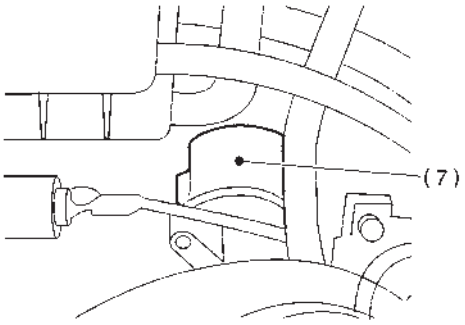


- (1) Inhibitor switch (AT vehicles only)
(2) Fuel pump

- (3) Main relay
(4) Fuel pump relay
(5) Radiator main fan relay

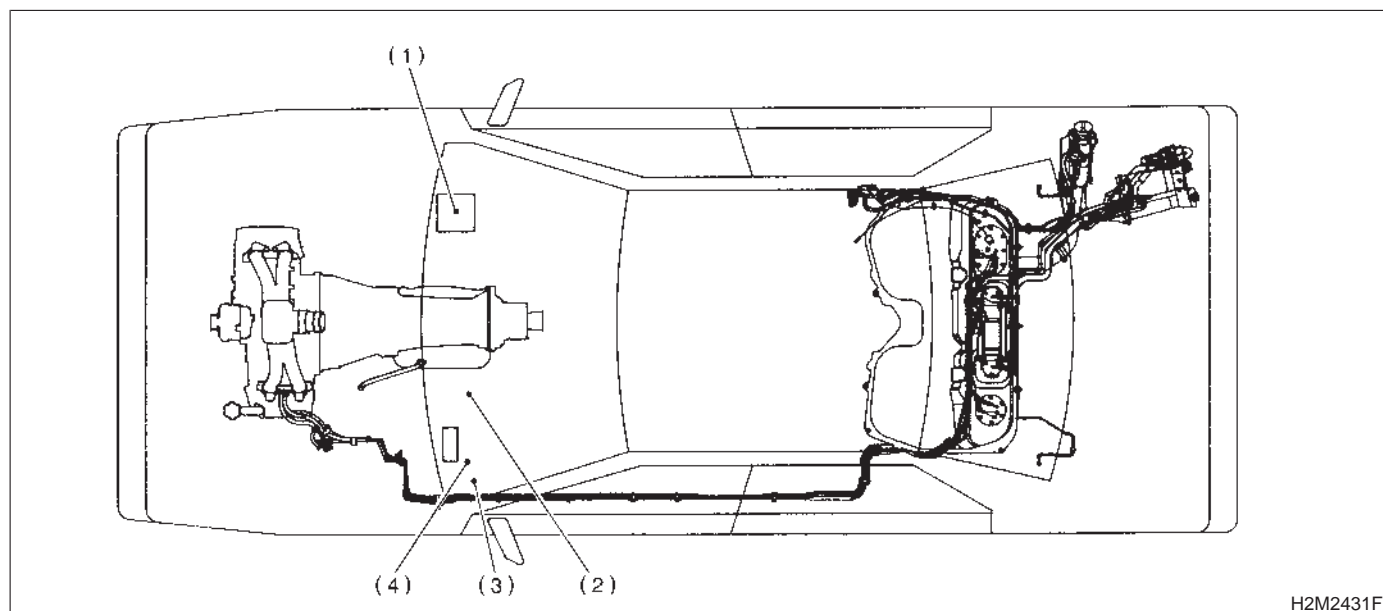
- (6) Radiator sub fan relay
(7) Starter





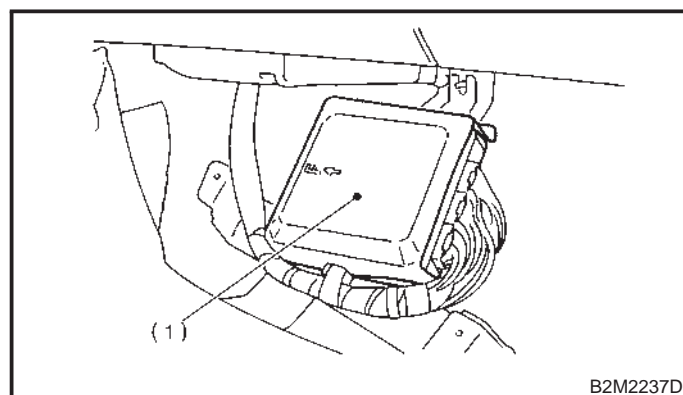
B2M2247B

SUBARU.

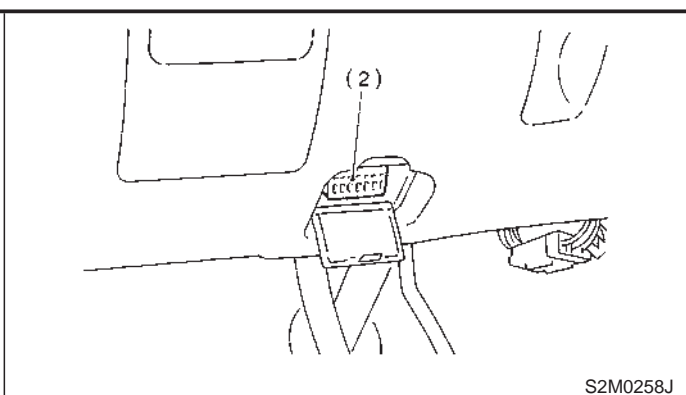
B: ENGINE (EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES)**1. MODULE**

H2M2431F

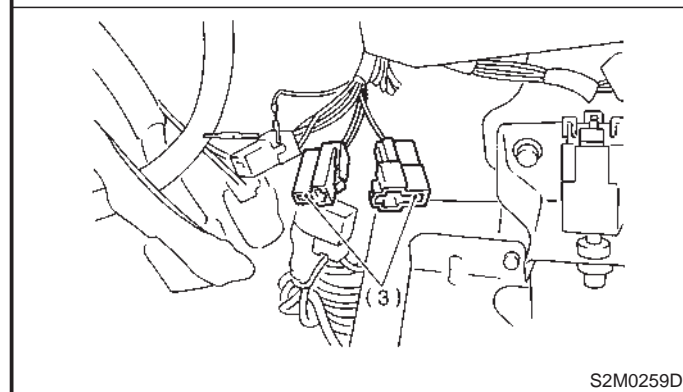
- | | |
|--|---|
| (1) Engine control module (ECM) | (3) Test mode connector |
| (2) Data link connector (for Subaru Select Monitor and OBD-II general scan tool) | (4) CHECK ENGINE malfunction indicator lamp (MIL) |



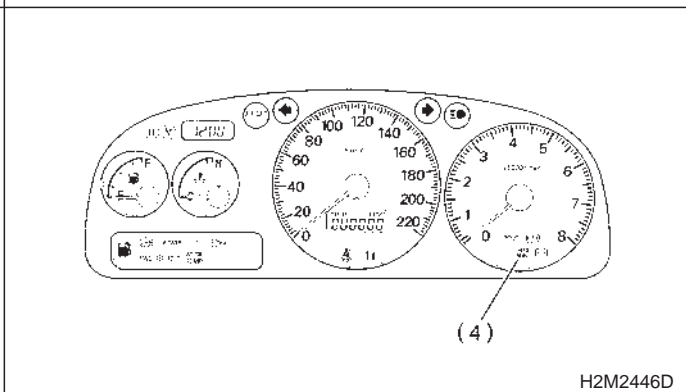
B2M2237D



S2M0258J



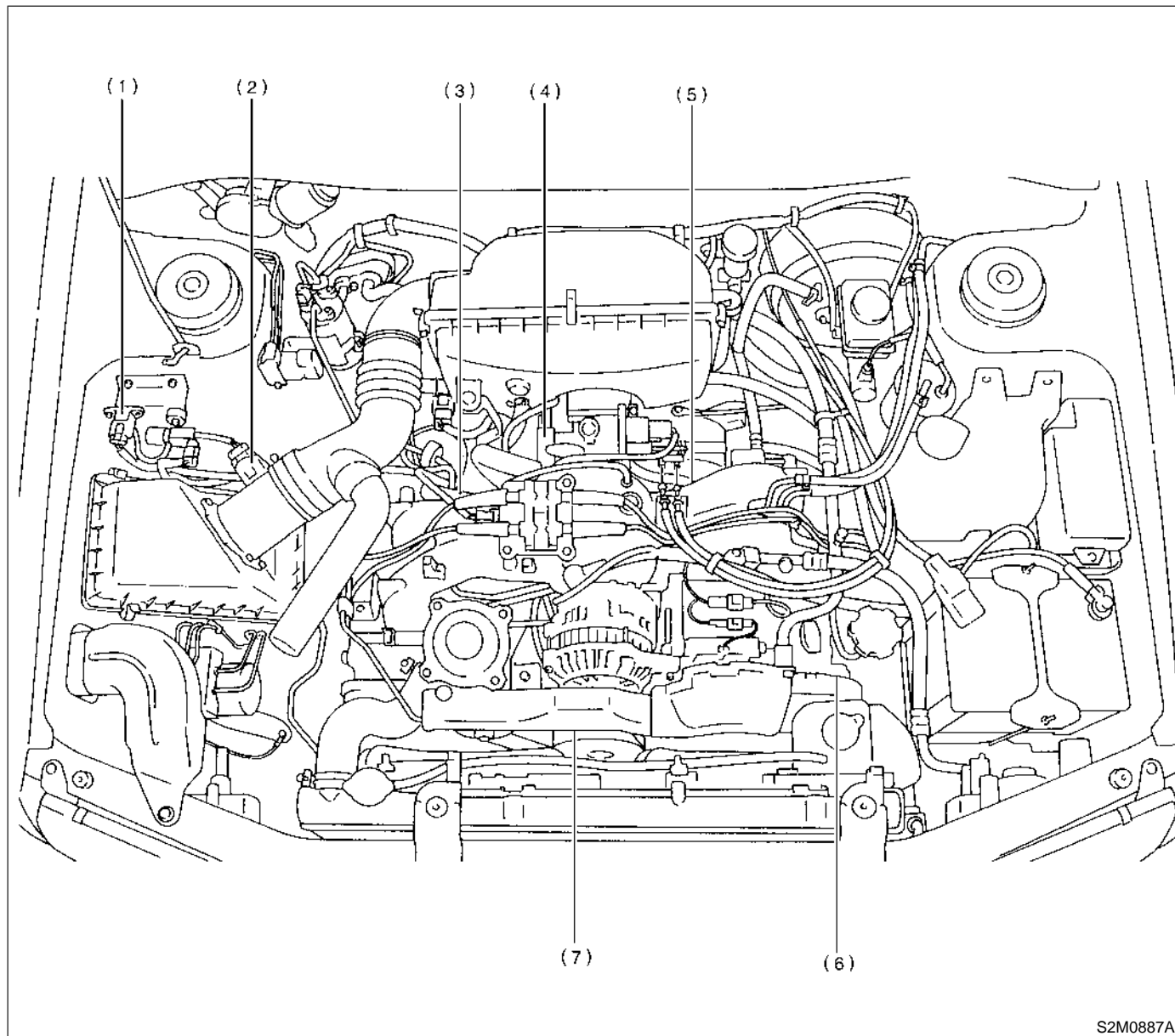
S2M0259D



H2M2446D

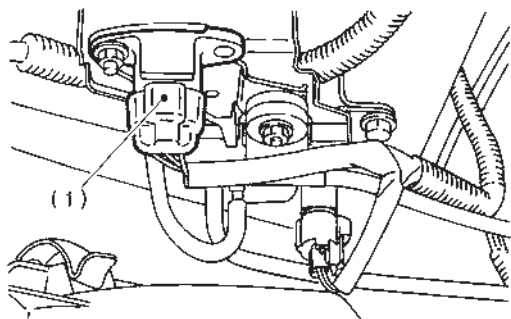
MEMO:

2. SENSOR

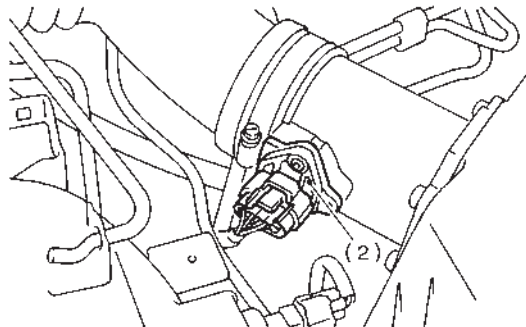


S2M0887A

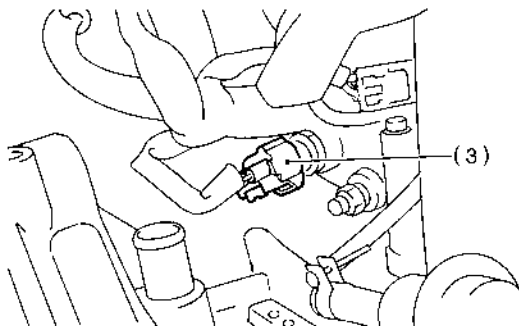
- | | |
|---------------------------------------|--------------------------------|
| (1) Pressure sensor | (4) Throttle position sensor |
| (2) Mass air flow sensor | (5) Knock sensor |
| (3) Engine coolant temperature sensor | (6) Camshaft position sensor |
| | (7) Crankshaft position sensor |



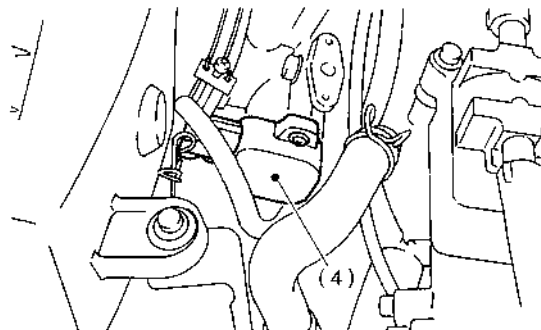
B2M0776B



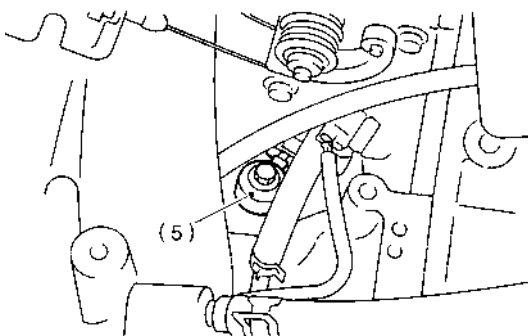
B2M2239A



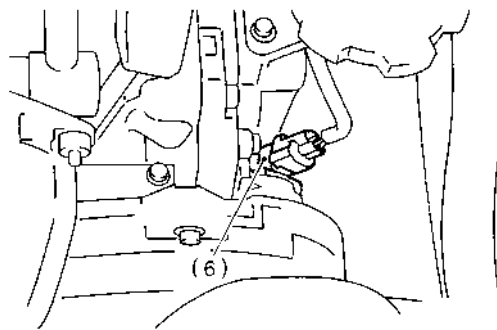
H2M3229B



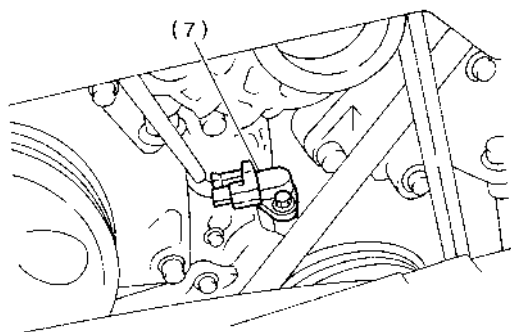
B2M2240A



B2M2241A

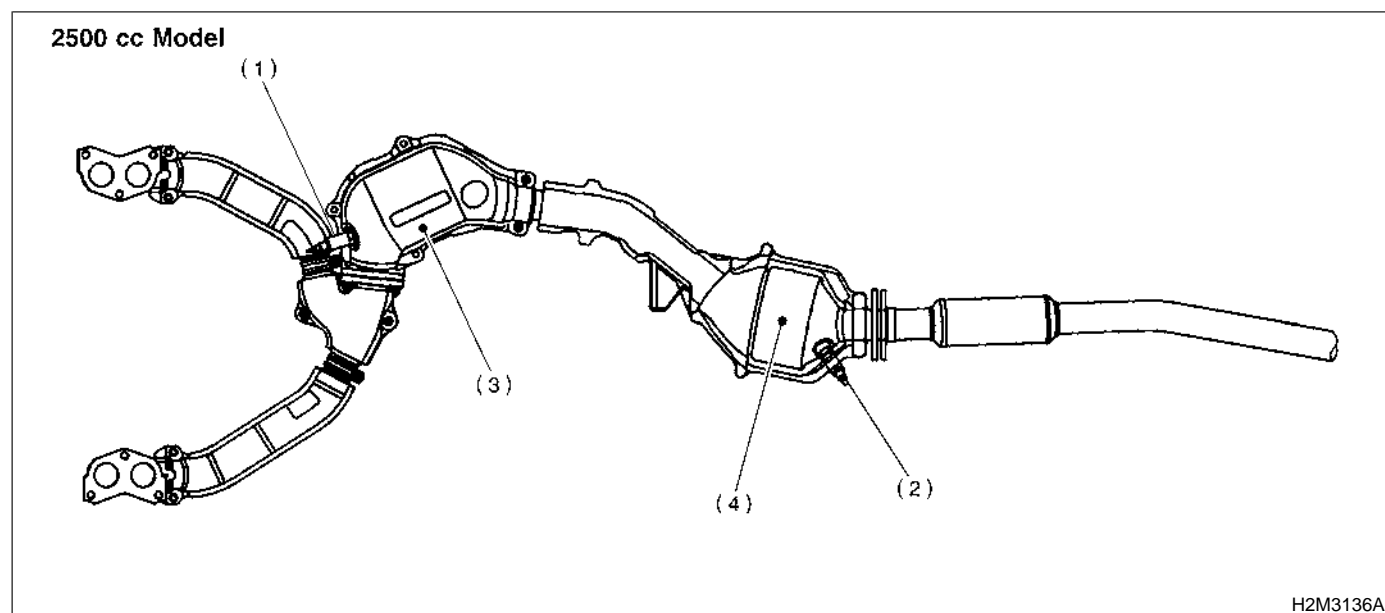
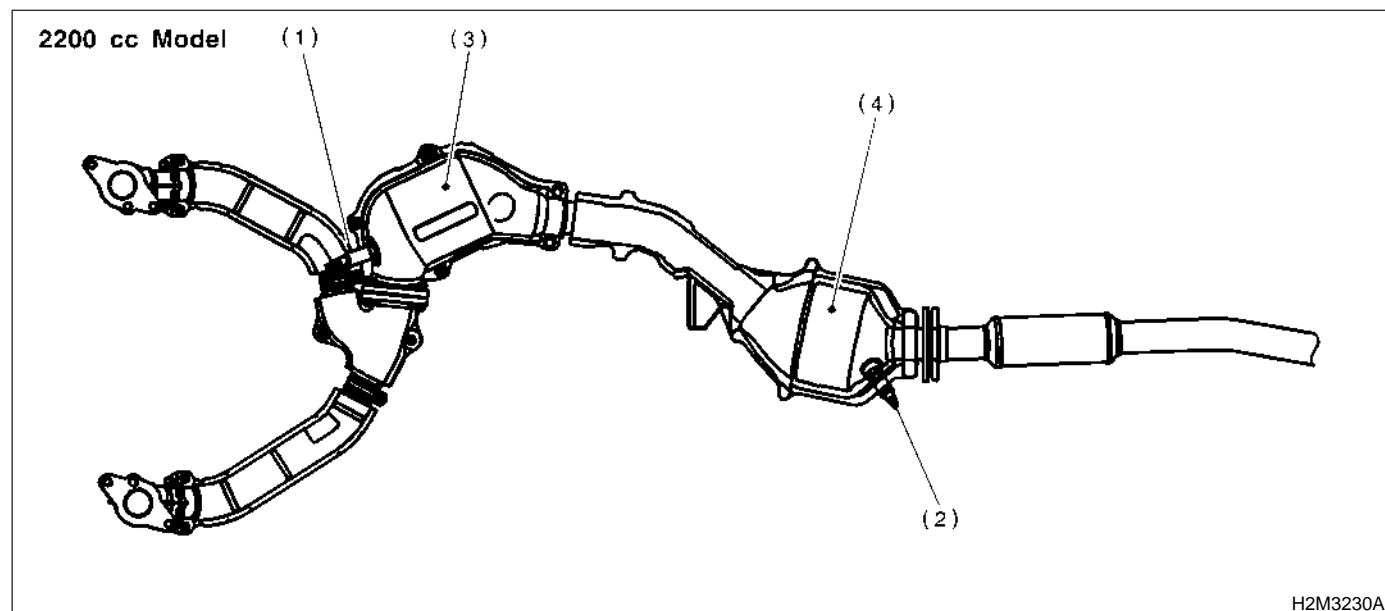


B2M2242A



B2M0213J

SUBARU

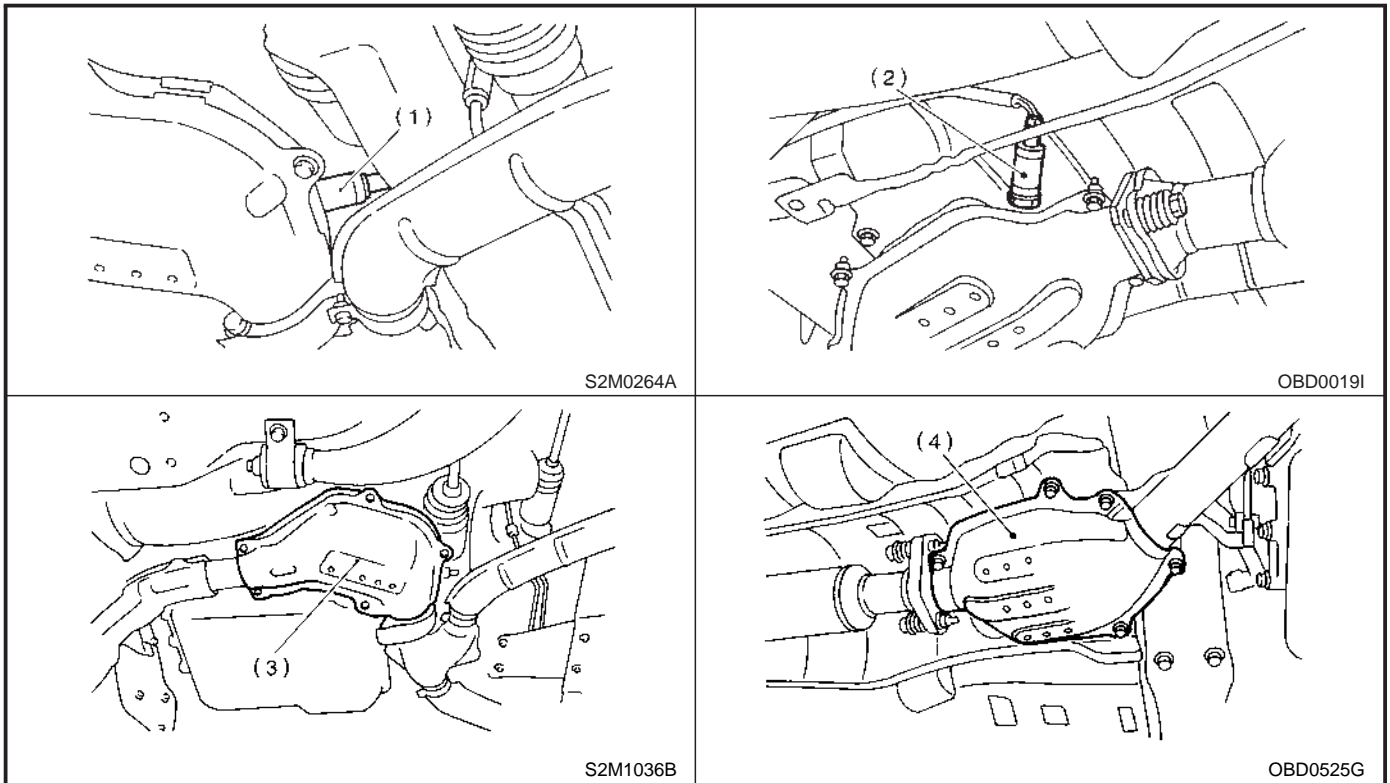


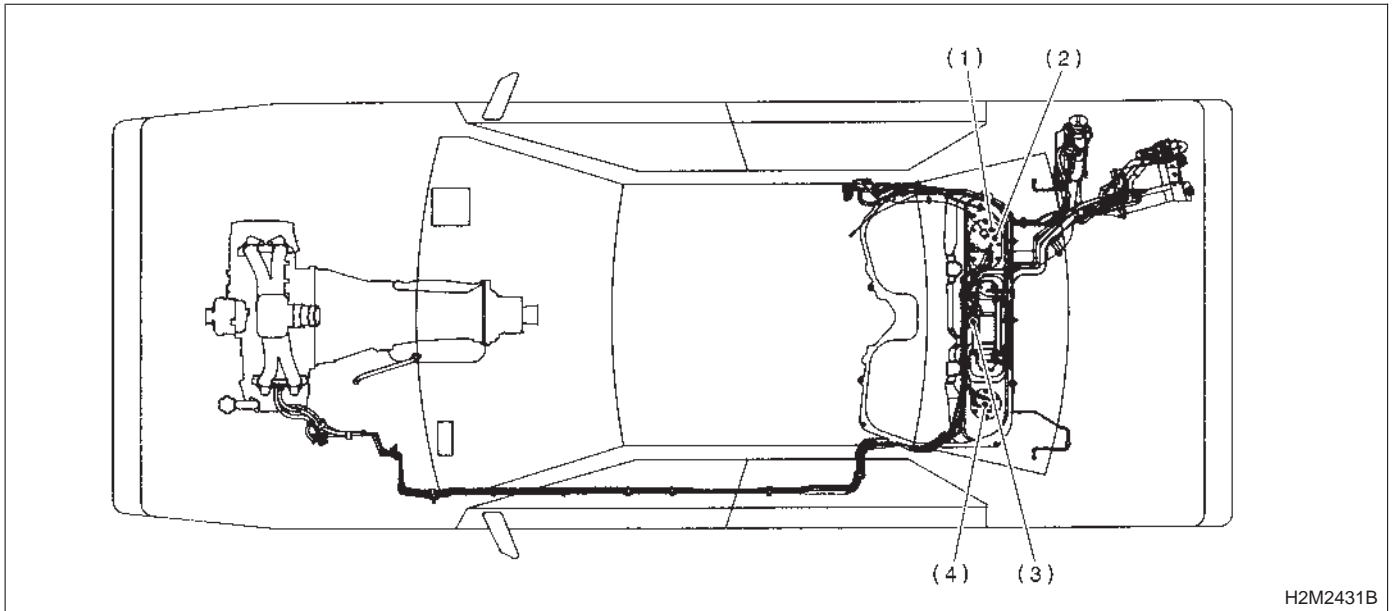
(1) Front oxygen sensor

(2) Rear oxygen sensor

(3) Front catalytic converter

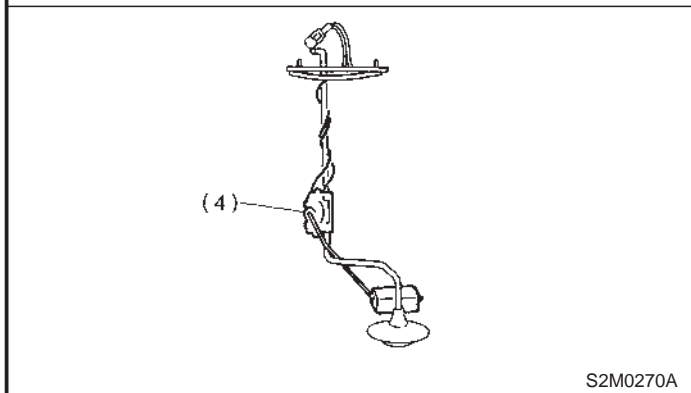
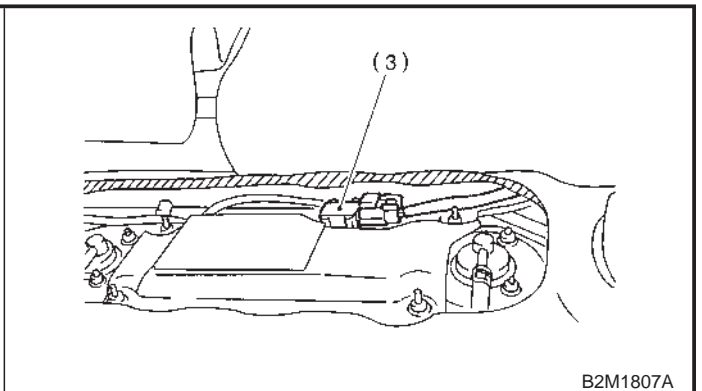
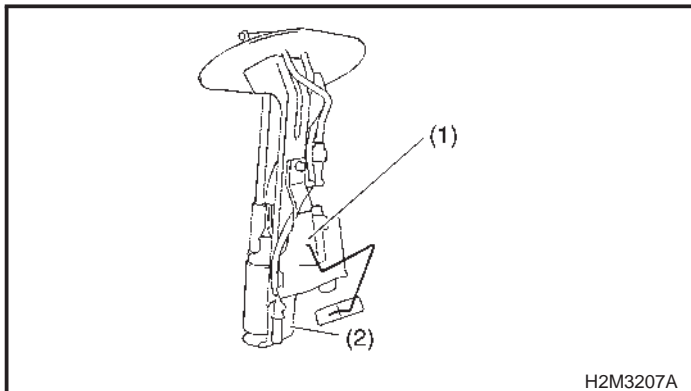
(4) Rear catalytic converter



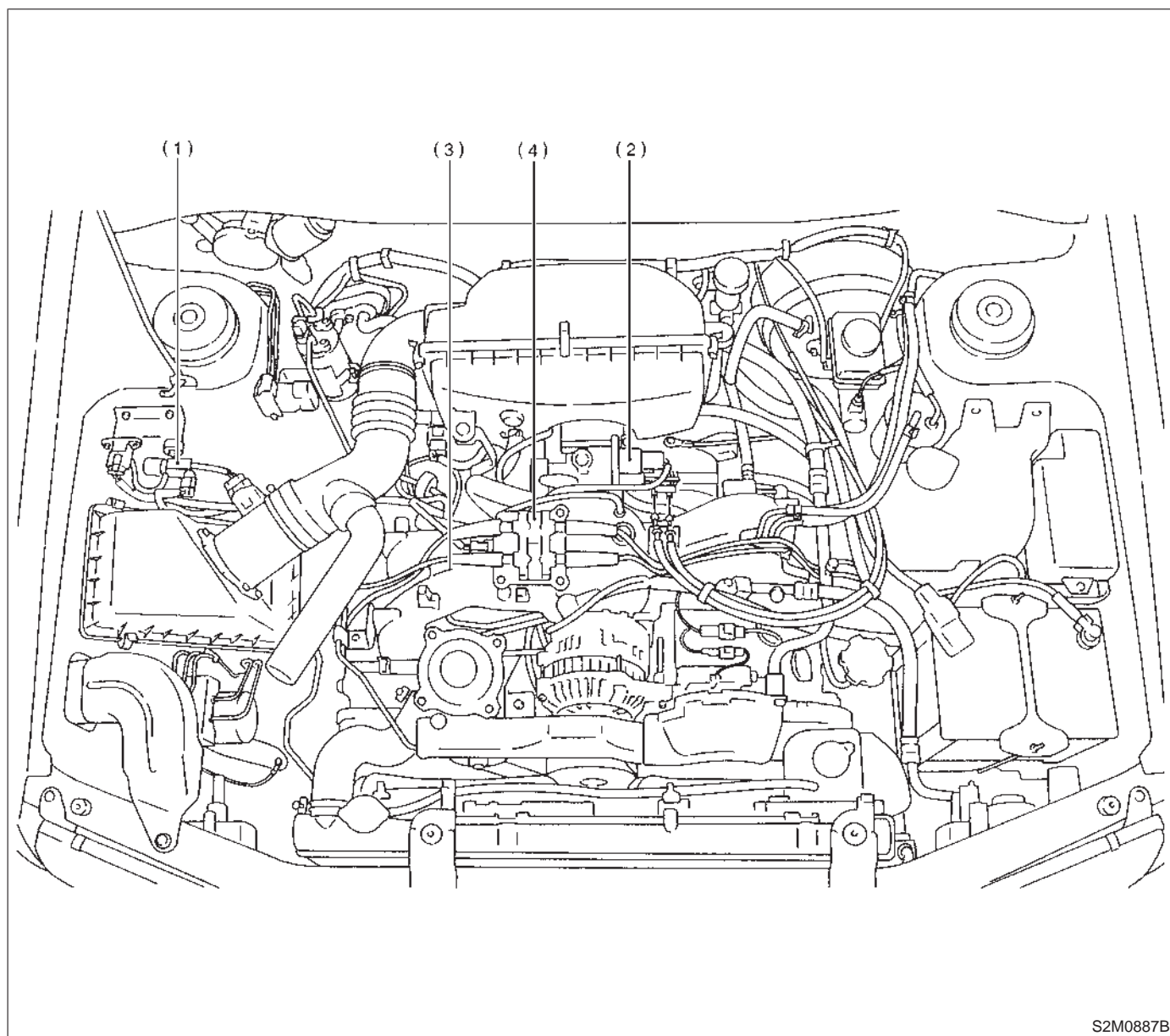


- (1) Fuel level sensor
(2) Fuel temperature sensor

- (3) Fuel tank pressure sensor
(4) Fuel sub level sensor



MEMO:

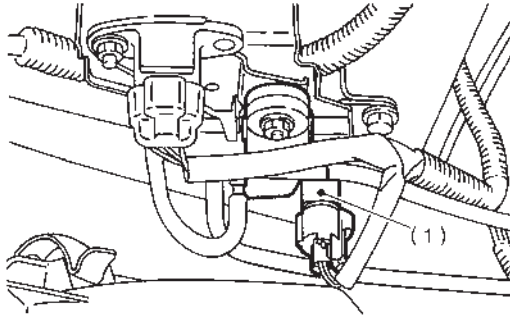
3. SOLENOID VALVE, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS

S2M0887B

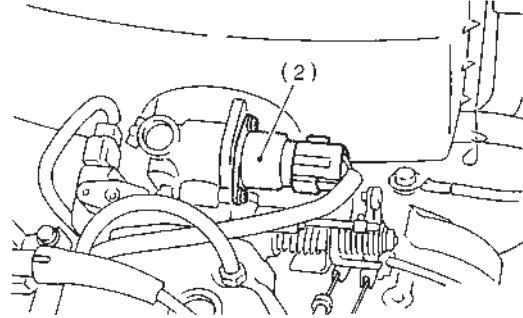
(1) Pressure sources switching solenoid valve

(2) Idle air control solenoid valve
(3) Purge control solenoid valve

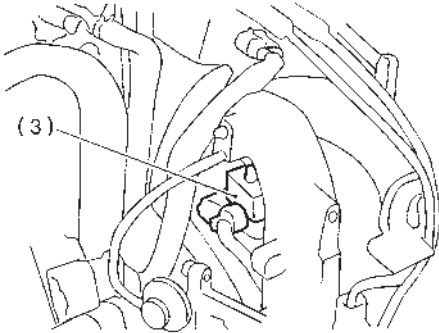
(4) Ignition coil & ignitor ASSY



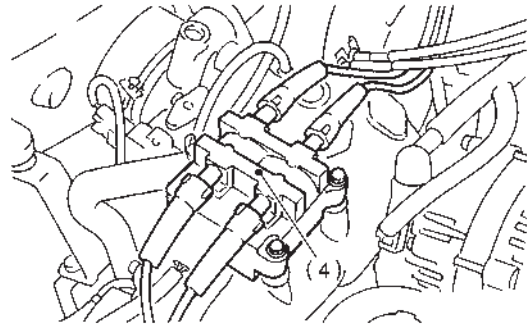
B2M0777B



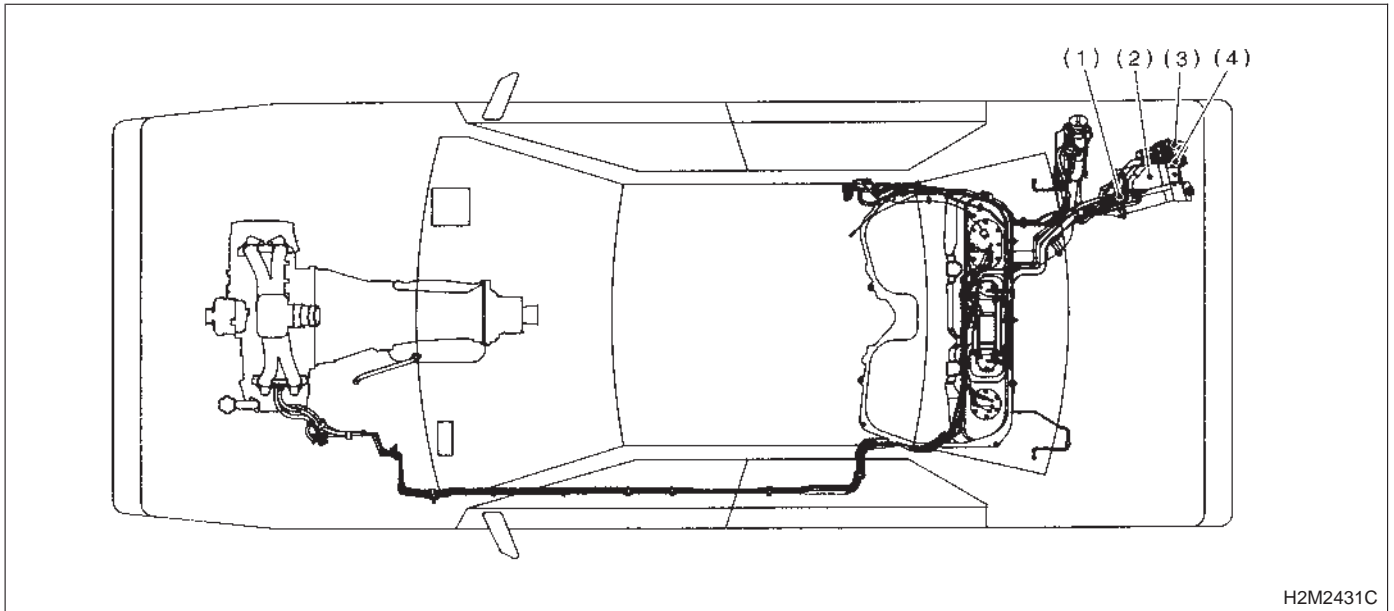
B2M2243A



B2M2254B

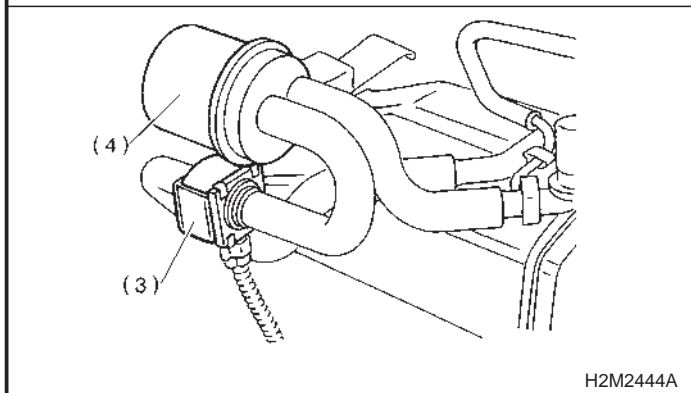
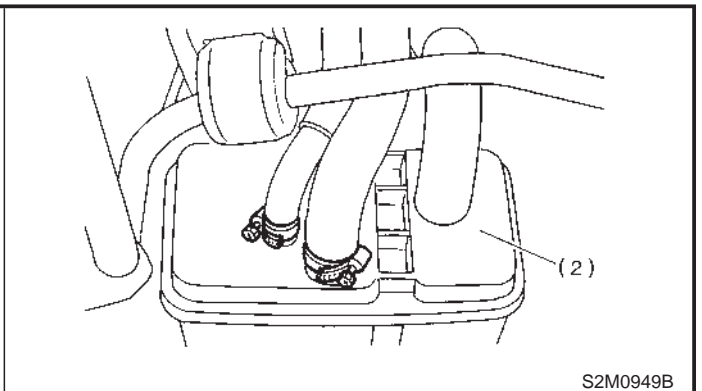
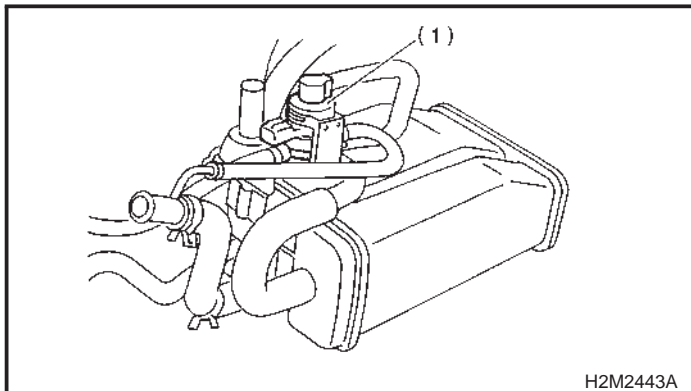


B2M2245A



- (1) Pressure control solenoid valve
(2) Canister

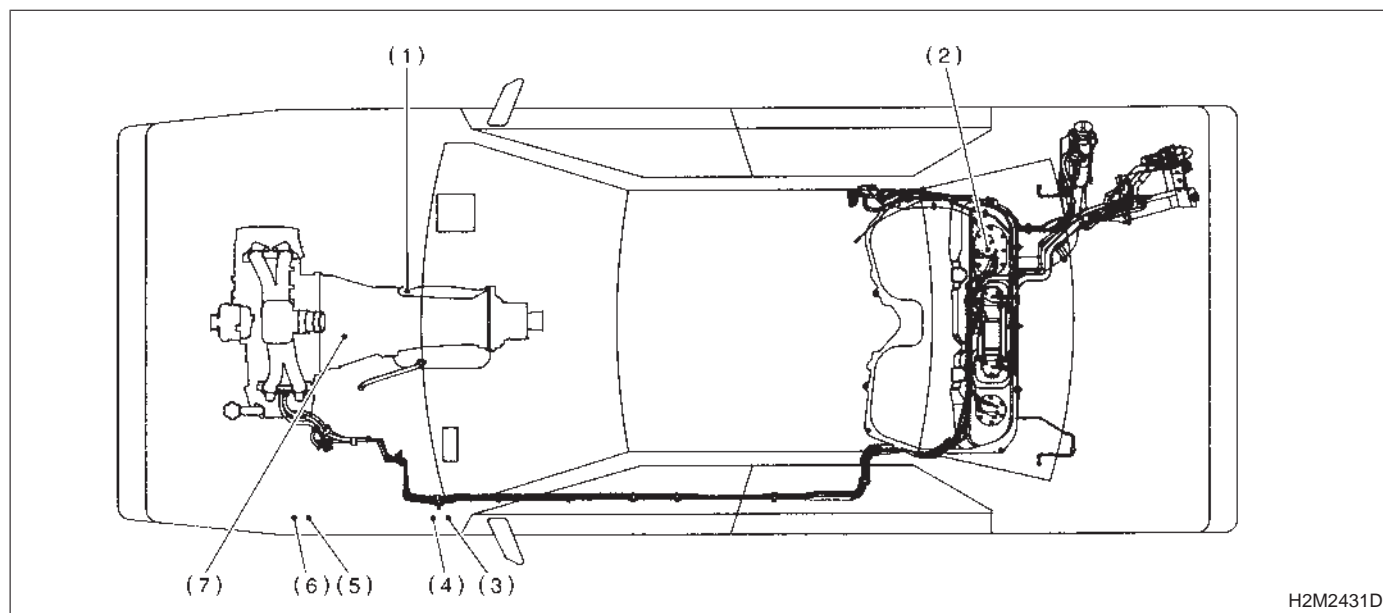
- (3) Drain valve
(4) Air filter



SUBARU

MEMO:

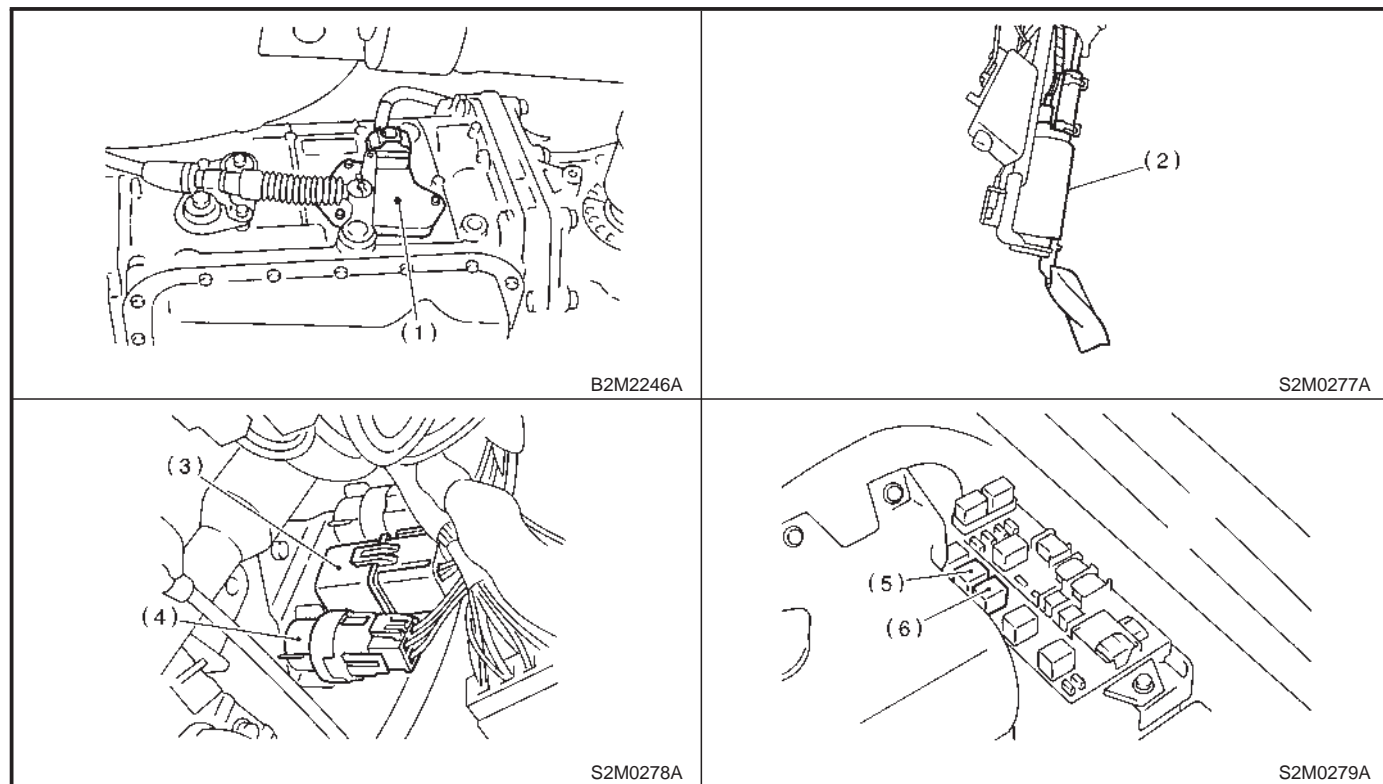
2. Electrical Components Location

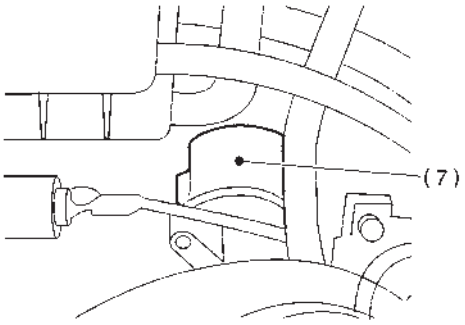


- (1) Inhibitor switch (AT vehicles only)
(2) Fuel pump

- (3) Main relay
(4) Fuel pump relay
(5) Radiator main fan relay

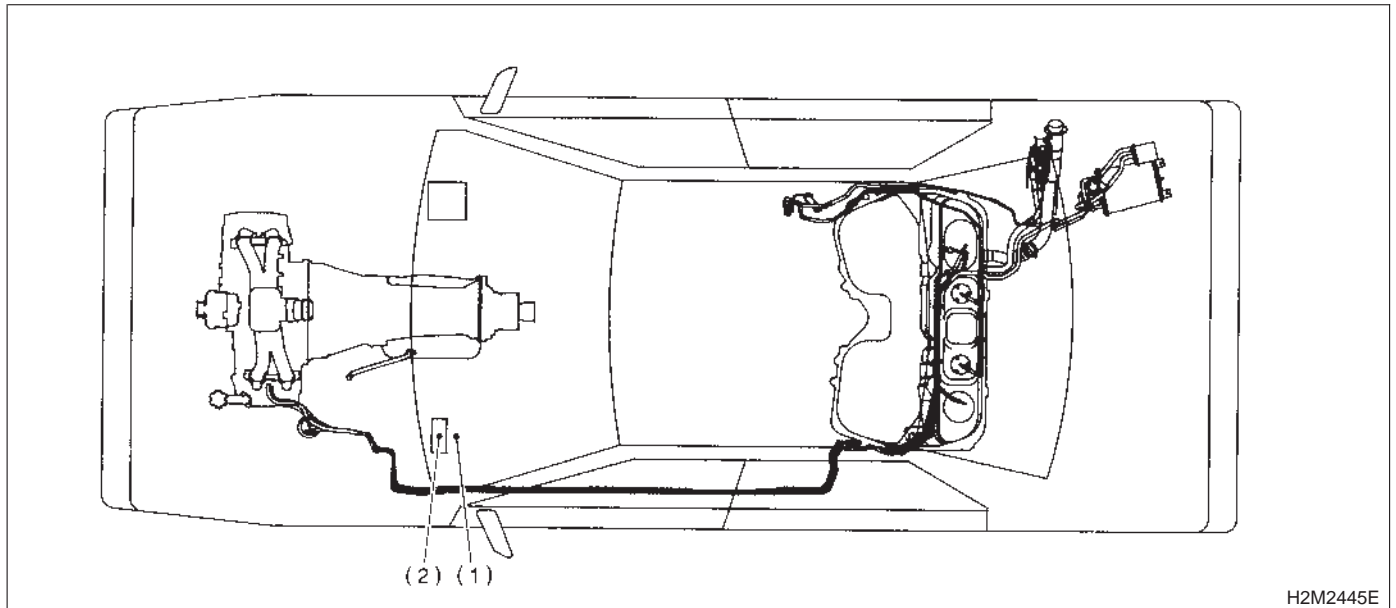
- (6) Radiator sub fan relay
(7) Starter





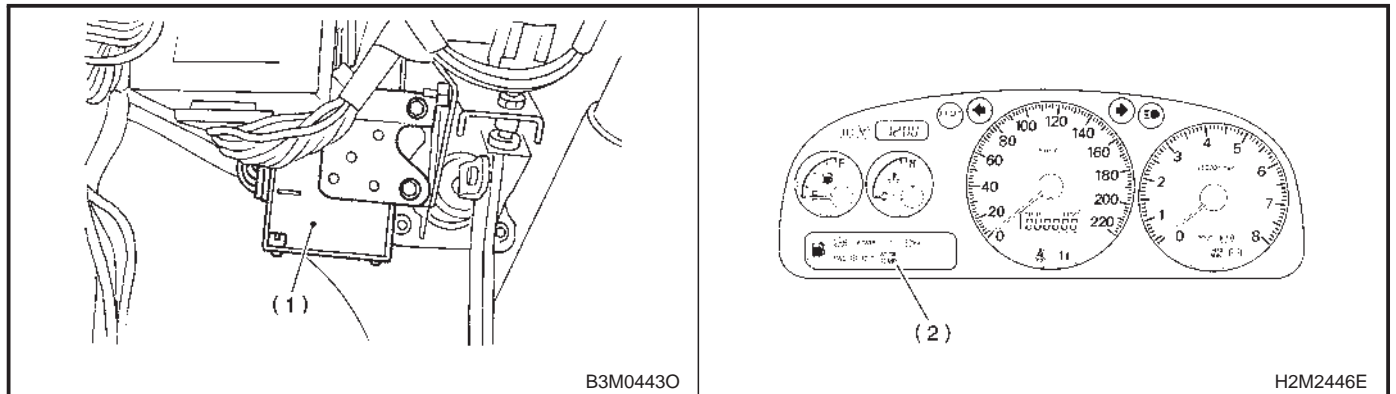
B2M2247B

SUBARU.

C: TRANSMISSION**1. MODULE**

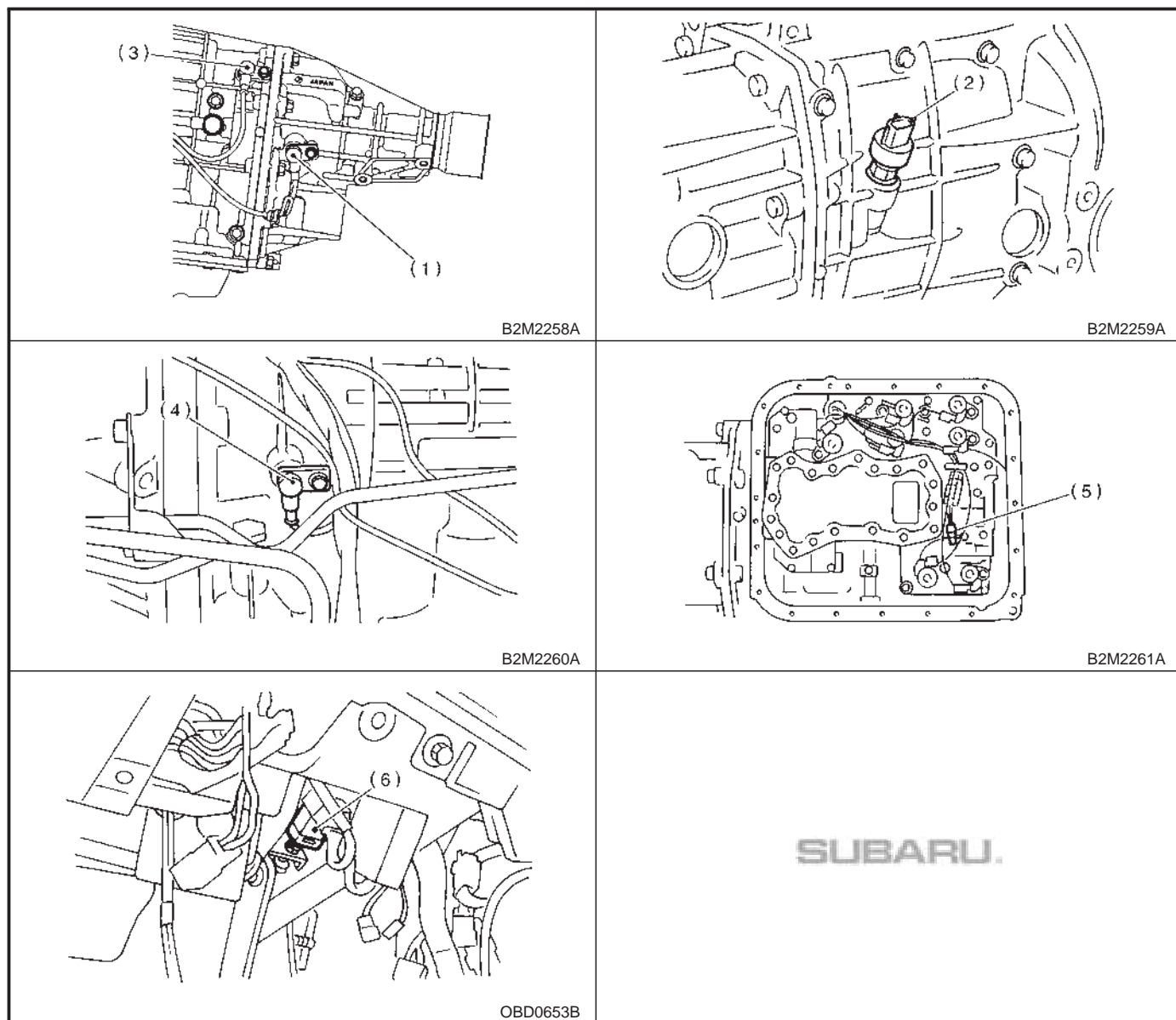
(1) Transmission Control Module (TCM) (for AT vehicles)

(2) AT diagnostic indicator light (for AT vehicles)



B3M0443O

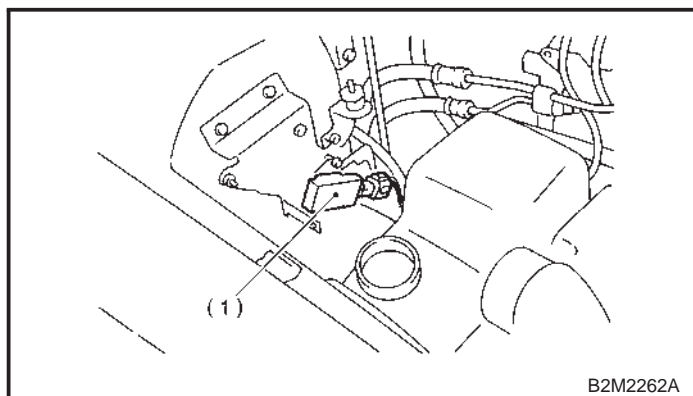
2. SENSOR



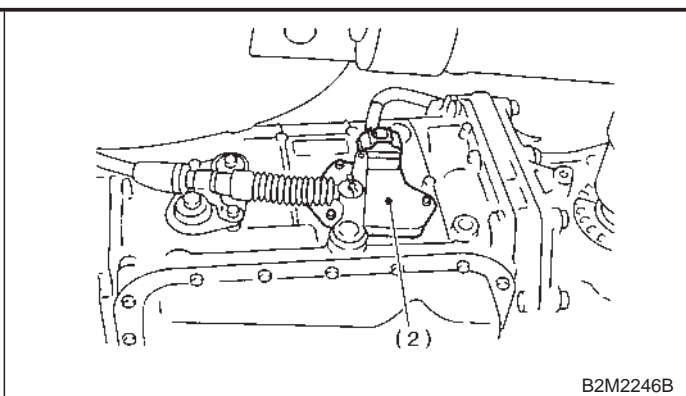
- (1) Vehicle speed sensor 1 (for AT AWD vehicles)
- (2) Vehicle speed sensor 2 (for MT vehicles)
- (3) Vehicle speed sensor 2 (for AT AWD vehicles)
- (4) Torque converter turbine speed sensor
- (5) ATF temperature sensor (for AT vehicles)
- (6) Brake light switch

3. SOLENOID VALVE AND RELAY

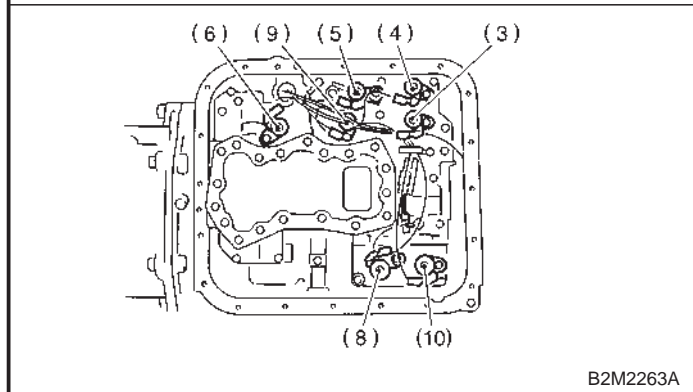
● For AT vehicles



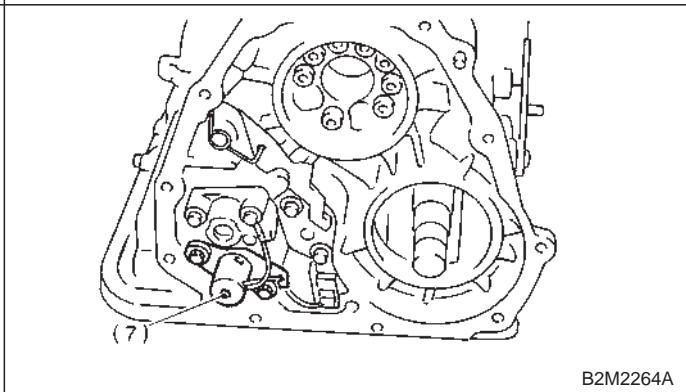
B2M2262A



B2M2246B



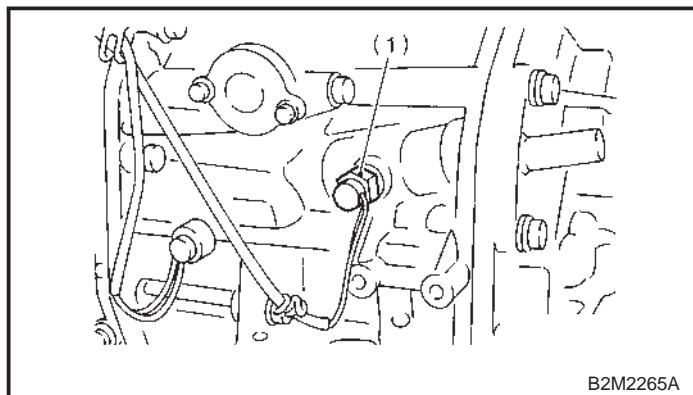
B2M2263A



B2M2264A

- (1) Dropping resistor
- (2) Inhibitor switch
- (3) Shift solenoid valve 1
- (4) Shift solenoid valve 2
- (5) Duty solenoid valve A
- (6) Duty solenoid valve B
- (7) Duty solenoid valve C
- (8) Duty solenoid valve D
- (9) Low clutch timing solenoid valve
- (10) 2-4 brake timing solenoid valve

● For MT vehicles



B2M2265A



- (1) Neutral position switch

3. Diagnosis System

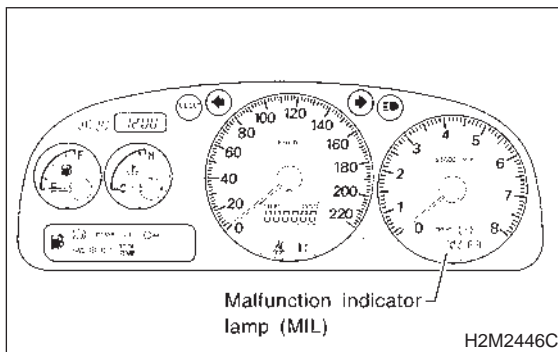
A: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL)

1. ACTIVATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL)

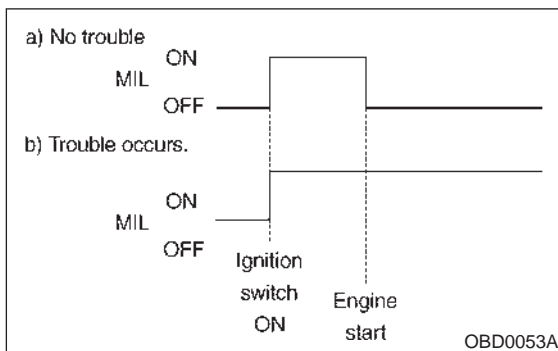
1) When ignition switch is turned to ON (engine off), the CHECK ENGINE malfunction indicator lamp (MIL) in the combination meter illuminates.

NOTE:

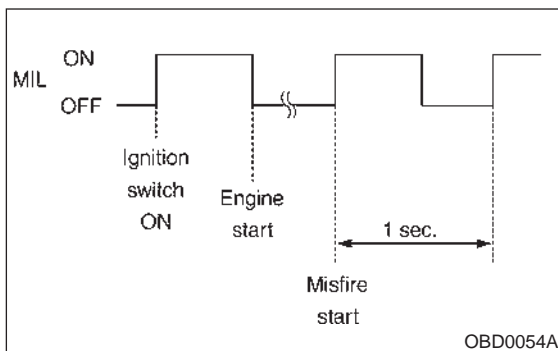
If the MIL does not illuminate, perform diagnostics of the CHECK ENGINE light circuit or the combination meter circuit. <Ref. to 2-7 [T700].>



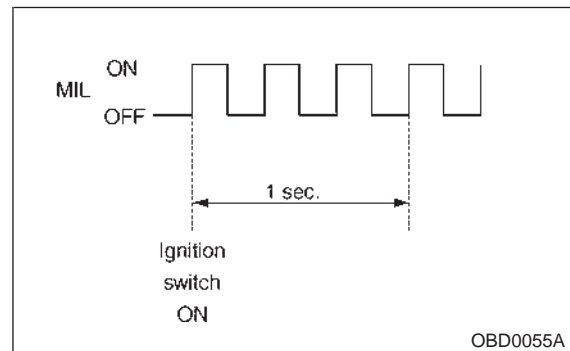
2) After starting the engine, the MIL goes out. If it does not, either the engine or the emission control system is malfunctioning.



3) If the diagnosis system senses a misfire which could damage the catalyzer, the MIL will blink at a cycle of 1 Hz.



4) When ignition switch is turned to ON (engine off) or to "START" with the test mode connector connected, the MIL blinks at a cycle of 3 Hz.

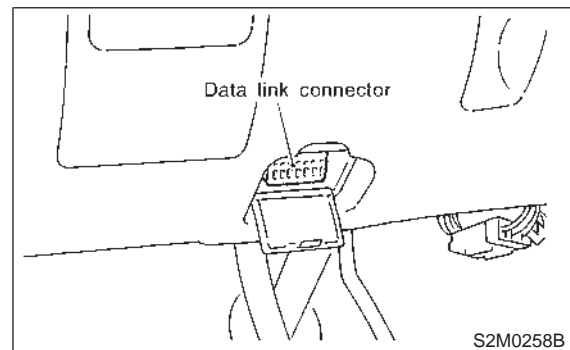


B: OBD-II GENERAL SCAN TOOL

1. HOW TO USE OBD-II GENERAL SCAN TOOL

1) Prepare a general scan tool (OBD-II general scan tool) required by SAE J1978.

2) Open the cover and connect the OBD-II general scan tool to the data link connector located in the lower portion of the instrument panel (on the driver's side), to the lower cover.



3) Using the OBD-II general scan tool, call up diagnostic trouble code(s) and freeze frame data.

OBD-II general scan tool functions consist of:

- (1) MODE \$01: Current powertrain diagnostic data
- (2) MODE \$02: Powertrain freeze frame data
- (3) MODE \$03: Emission-related powertrain diagnostic trouble codes
- (4) MODE \$04: Clear/Reset emission-related diagnostic information
- (5) MODE \$05: Oxygen sensor monitoring test results

Read out data according to repair procedures. (For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.)

NOTE:

For details concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST.

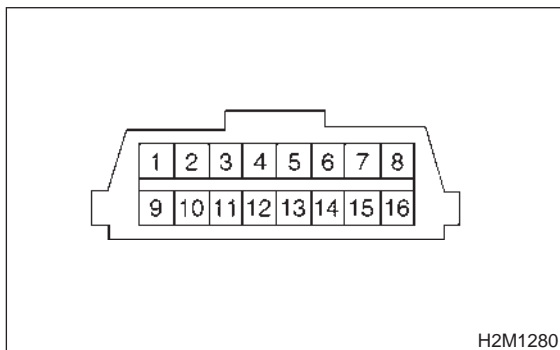
- 2200 cc California spec. vehicles: <Ref. to 2-7 [T10A0].>
- Except 2200 cc California spec. vehicles: <Ref. to 2-7 [T11A0].>

2. DATA LINK CONNECTOR (FOR OBD-II GENERAL SCAN TOOL AND SUBARU SELECT MONITOR)

- 1) This connector is used both for OBD-II general scan tools and the Subaru Select Monitor.
- 2) Terminal No. 4 to No. 6 of the data link connector is used for the Subaru Select Monitor signal.

CAUTION:

Do not connect any scan tools other than the OBD-II general scan tools and the Subaru Select Monitor, because the circuit for the Subaru Select Monitor may be damaged.



Terminal No.	Contents	Terminal No.	Contents
1	Power supply	9	Blank
2	Blank	10	K line of ISO 9141 CARB
3	Blank	11	Blank
4	Subaru Select Monitor signal (ECM to Subaru Select Monitor)*	12	Ground
5	Subaru Select Monitor signal (Subaru Select Monitor to ECM)*	13	Ground
6	Line end check signal 1	14	Blank
7	Blank	15	Blank
8	Line end check signal 2	16	Blank

*: Circuit only for Subaru Select Monitor

3. CURRENT POWERTRAIN DIAGNOSTIC DATA (MODE \$01)

Refers to data denoting the current operating condition of analog input/output, digital input/output and/or the powertrain system.

A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
01	Number of emission-related powertrain trouble codes and MIL status	ON/OFF
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h
0E	Ignition timing advance	°
10	Air flow rate from mass air flow sensor*1	g/sec
10	Air flow rate from pressure sensor*2	g/sec
11	Throttle valve opening angle	%
13	Check whether oxygen sensor is installed.	—
14	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor—bank 1	V and %
15	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor—bank 2	V and %
1C	On-board diagnosis system	—

*1: Except 2200 cc California spec. vehicles

*2: 2200 cc California spec. vehicles

NOTE:

Refer to OBD-II general scan tool manufacturer's instruction manual to access generic OBD-II PIDs (MODE \$01).

4. POWERTRAIN FREEZE FRAME DATA (MODE \$02)

Refers to data denoting the operating condition when trouble is sensed by the on-board diagnosis system.

A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
02	Trouble code that caused CARB required freeze frame data storage	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h

NOTE:

Refer to OBD-II general scan tool manufacturer's instruction manual to access freeze frame data (MODE \$02).

5. EMISSION-RELATED POWERTRAIN DIAGNOSTIC TROUBLE CODE (MODE \$03)

Refers to data denoting emission-related powertrain diagnostic trouble codes.

For details concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST.

- 2200 cc California spec. vehicles: <Ref. to 2-7 [T10A0].>
- Except 2200 cc California spec. vehicles: <Ref. to 2-7 [T11A0].>

NOTE:

Refer to OBD-II general scan tool manufacturer's instruction manual to access emission-related powertrain diagnostic trouble codes (MODE \$03).

6. CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION (MODE \$04)

Refers to the mode used to clear or reset emission-related diagnostic information (OBD-II trouble diagnostic information).

NOTE:

Refer to OBD-II general scan tool manufacturer's instruction manual to clear or reset emission-related diagnostic information (MODE \$04).

7. OXYGEN SENSOR MONITORING TEST RESULTS (MODE \$05)

Refers to the mode using oxygen sensor output data while the on-board diagnosis system is performing diagnosis on the oxygen sensor.

A list of the support data of oxygen sensor output and test ID (identification) are shown in the following table.

NOTE:

This system is not applicable to the front oxygen (A/F) sensor of the 2200 cc California spec. vehicles.

Test ID	Data	Unit of measure
01	Rich to lean sensor threshold voltage (constant)	V
02	Lean to rich sensor threshold voltage (constant)	V
03	Low sensor voltage for switch time calculation (constant)	V
04	High sensor voltage for switch time calculation (constant)	V
05	Rich to lean sensor switch time (calculated)	sec.
06	Lean to rich sensor switch time (calculated)	sec.
07	Minimum sensor voltage for test cycle (calculated)	V
08	Maximum sensor voltage for test cycle (calculated)	V

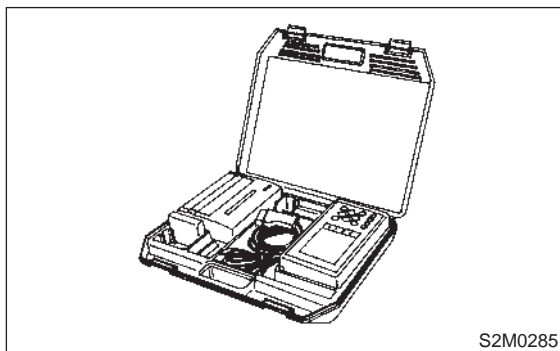
NOTE:

Refer to OBD-II general scan tool manufacturer's instruction manual to access oxygen sensor monitoring test results (MODE \$05).

C: SUBARU SELECT MONITOR

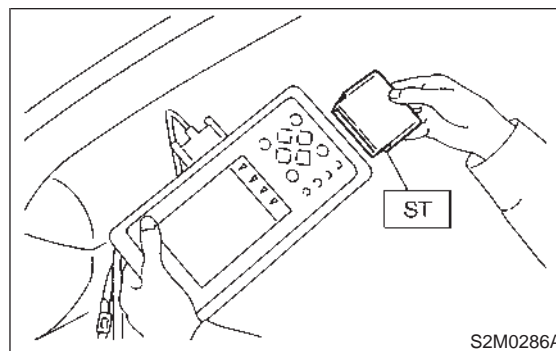
1. HOW TO USE SUBARU SELECT MONITOR

- 1) Prepare Subaru Select Monitor kit.



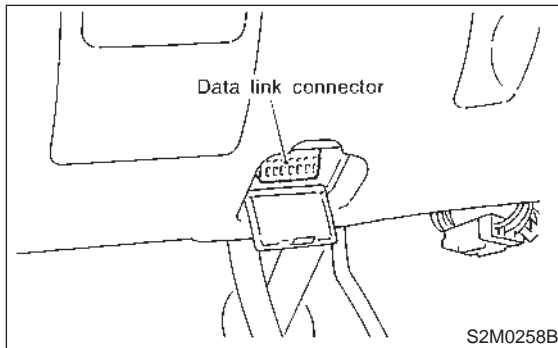
- 2) Connect diagnosis cable to Subaru Select Monitor.

- 3) Insert cartridge into Subaru Select Monitor.
<Ref. to 1-6 [G1100].>



4) Connect Subaru Select Monitor to data link connector.

- (1) Open the cover data link connector located in the lower portion of the instrument panel (on the driver's side), to the lower cover.

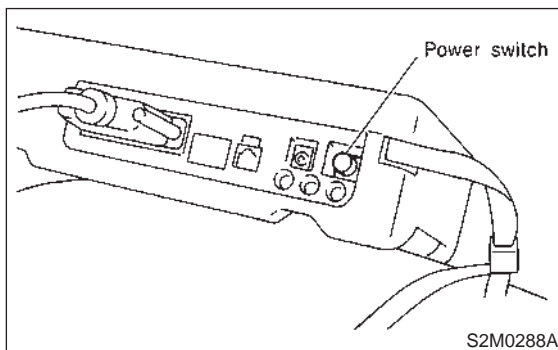


- (2) Connect diagnosis cable to data link connector.

CAUTION:

Do not connect scan tools except for Subaru Select Monitor and OBD-II general scan tool.

- 5) Turn ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



- 6) Using Subaru Select Monitor, call up diagnostic trouble code(s) and various data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) SHOWN ON DISPLAY FOR ENGINE. (NORMAL MODE)

- 1) On the 「Main Menu」 display screen, select the {1. All System Diagnosis} and press the [YES] key.
- 2) Make sure that a diagnostic trouble code (DTC) is shown on the {Engine Control System} display screen.

NOTE:

- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
- For detailed concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST.
 - 2200 cc California spec. vehicles: <Ref. to 2-7 [T10A0].>
 - Except 2200 cc California spec. vehicles: <Ref. to 2-7 [T11A0].>

3. READ DIAGNOSTIC TROUBLE CODE (DTC) SHOWN ON DISPLAY FOR ENGINE. (OBD MODE)

- 1) On the 「Main Menu」 display screen, select the {2. Each System Check} and press the [YES] key.
- 2) On the 「System Selection Menu」 display screen, select the {Engine Control System} and press the [YES] key.
- 3) Press the [YES] key after displayed the information of engine type.
- 4) On the 「Engine Control System Diagnosis」 display screen, select the {7. OBD System} and press the [YES] key.
- 5) On the 「OBD Menu」 display screen, select the {3. Diagnosis Code(s) Display} and press the [YES] key.
- 6) Make sure that a diagnostic trouble code (DTC) is shown on the display screen.

NOTE:

- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
- For detailed concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST.
 - 2200 cc California spec. vehicles: <Ref. to 2-7 [T10A0].>
 - Except 2200 cc California spec. vehicles: <Ref. to 2-7 [T11A0].>

4. READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE. (NORMAL MODE)

- 1) On the 「Main Menu」 display screen, select the {2. Each System Check} and press the [YES] key.
 - 2) On the 「System Selection Menu」 display screen, select the {Engine Control System} and press the [YES] key.
 - 3) Press the [YES] key after displayed the information of engine type.
 - 4) On the 「Engine Control System Diagnosis」 display screen, select the {1. Current Data Display & Save} and press the [YES] key.
 - 5) On the 「Data Display Menu」 display screen, select the {1. 12 Data Display} and press the [YES] key.
 - 6) Using the scroll key, move the display screen up or down until the desired data is shown.
- A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Vehicle speed signal	Vehicle Speed	km/h or MPH
Engine speed signal	Engine Speed	rpm
Engine coolant temperature signal	Coolant Temp.	°C or °F
Ignition timing signal	Ignition Timing	deg
Mass air flow signal*1	Mass Air Flow	g/s or lb/m
Mass air flow signal*1	Air Flow Sensor Voltage	V
Throttle position signal	Throttle Opening Angle	%
Throttle position signal	Throttle Sensor Voltage	V
Injection pulse width	Fuel Injection #1 Pulse	ms
Idle air control signal*2	ISC Valve Duty Ratio	%
Idle air control signal*1	ISC Valve Step	STEP
Engine load data	Engine Load	%
Front oxygen sensor output signal*1	Front O2 Sensor #1	V
Front oxygen (A/F) sensor output signal*2	A/F Sensor #1	—
Front oxygen (A/F) sensor resistance*2	A/F Sensor #1 Resistance	Ω
Rear oxygen sensor output signal	Rear O2 Sensor	V
Short term fuel trim	A/F Correction #1	%
Knock sensor signal	Knocking Correction	deg
Atmospheric absolute pressure signal	Atmosphere Pressure	mmHg or kPa or inHg or psi
Intake manifold relative pressure signal	Mani. Relative Pressure	mmHg or kPa or inHg or psi
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg or kPa or inHg or psi
A/F correction (short term fuel trim) by rear oxygen sensor	A/F Correction #3	%
Long term whole fuel trim	A/F Learning #1	%
Front oxygen sensor heater current*1	Front O2 Heater #1	A
Front oxygen (A/F) sensor heater current*2	A/F Heater #1	A
Rear oxygen sensor heater current*1	Rear O2 Heater Current	A
Rear oxygen sensor heater voltage*2	Rear O2 Heater Voltage	V
Canister purge control solenoid valve duty ratio	CPC Valve Duty Ratio	%
Fuel tank pressure signal	Fuel Tank Pressure	mmHg or kPa or inHg or psi
Fuel temperature signal	Fuel Temp.	°C or °F
Fuel level signal	Fuel Level	V
Intake air temperature signal*2	Intake Air Temp.	°C or °F
Ignition switch signal	Ignition Switch	ON or OFF
Automatic transmission vehicle identification signal*1	AT Vehicle ID Signal	ON or OFF
Test mode connector signal	Test Mode Signal	ON or OFF
Neutral position switch signal	Neutral Position Switch	ON or OFF
Air conditioning switch signal	A/C Switch	ON or OFF

Contents	Display	Unit of measure
Air conditioning relay signal	A/C Relay	ON or OFF
Radiator main fan relay signal	Radiator Fan Relay #1	ON or OFF
Fuel pump relay signal	Fuel Pump Relay	ON or OFF
Knocking signal	Knocking Signal	ON or OFF
Radiator sub fan relay signal	Radiator Fan Relay #2	ON or OFF
Engine torque control signal #1	Torque Control Signal #1	ON or OFF
Engine torque control signal #2	Torque Control Signal #2	ON or OFF
Engine torque control permission signal	Torque Control Permit	ON or OFF
Pressure sources switching solenoid valve*1	Pressure Sources Change	ON or OFF
Front oxygen sensor rich signal*1	Front O2 Rich Signal #1	ON or OFF
Rear oxygen sensor rich signal	Rear O2 Rich Signal	ON or OFF
Pressure control solenoid valve	PCV Solenoid Valve	ON or OFF
Drain valve	Vent. Solenoid Valve	ON or OFF
Starter switch signal	Starter Switch Signal	ON or OFF
Idle switch signal	Idle Switch Signal	ON or OFF
Crankshaft position sensor signal	Crankshaft Position Sig.	ON or OFF
Camshaft position sensor signal	Camshaft Position Sig.	ON or OFF

*1: Except 2200 cc California spec. vehicles

*2: 2200 cc California spec. vehicles

NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

5. READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE. (OBD MODE)

- 1) On the 「Main Menu」 display screen, select the {2. Each System Check} and press the [YES] key.
 - 2) On the 「System Selection Menu」 display screen, select the {Engine Control System} and press the [YES] key.
 - 3) Press the [YES] key after displayed the information of engine type.
 - 4) On the 「Engine Control System Diagnosis」 display screen, select the {7. OBD System} and press the [YES] key.
 - 5) On the 「OBD Menu」 display screen, select the {1. Current Data Display & Save} and press the [YES] key.
 - 6) On the 「Data Display Menu」 display screen, select the {1. 12 Data Display} and press the [YES] key.
 - 7) Using the scroll key, move the display screen up or down until the desired data is shown.
- A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Number of diagnosis code	Number of Diagnosis Code	—
Malfunction indicator lamp status	MIL Status	ON or OFF
Monitoring test of misfire	Misfire monitoring	ON or OFF
Monitoring test of fuel system	Fuel system monitoring	ON or OFF
Monitoring test of comprehensive component	Component monitoring	ON or OFF
Test of catalyst	Catalyst Diagnosis	ON or OFF
Test of heated catalyst	Heated catalyst	ON or OFF
Test of evaporative emission purge control system	Evaporative purge system	ON or OFF
Test of secondary air system	Secondary air system	ON or OFF
Test of air conditioning system refrigerant	A/C system refrigerant	ON or OFF
Test of oxygen sensor	Oxygen sensor	ON or OFF
Test of oxygen sensor heater	Oxygen sensor heater	ON or OFF
Test of exhaust gas recirculation system	EGR System Diagnosis	ON or OFF
Air fuel ratio control system for bank 1	Fuel System for Bank 1	ON or OFF
Engine load data	Engine Load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor	Long term fuel trim B1	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg or kPa or inHg or psi
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH
Ignition timing advance for #1 cylinder	Ignition timing adv. #1	°
Intake air temperature signal*1	Intake Air Temp.	°C or °F
Mass air flow signal	Mass Air Flow	g/s or lb/m
Throttle position signal	Throttle Opening Angle	%
A/F sensor equipment*1	A/F sensor	ON or OFF
Front oxygen sensor output signal*2	Oxygen Sensor #11	V
Air fuel ratio correction by front oxygen sensor*2	Short term fuel trim #11	%
Rear oxygen sensor output signal	Oxygen Sensor #12	V
Air fuel ratio correction by rear oxygen sensor	Short term fuel trim #12	%
On-board diagnostic system	OBD System	—

*1: 2200 cc California spec. vehicles

*2: Except 2200 cc California spec. vehicles

NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

6. READ FREEZE FRAME DATA SHOWN ON DISPLAY FOR ENGINE. (OBD MODE)

- 1) On the 「Main Menu」 display screen, select the {2. Each System Check} and press the [YES] key.
 - 2) On the 「System Selection Menu」 display screen, select the {Engine Control System} and press the [YES] key.
 - 3) Press the [YES] key after displayed the information of engine type.
 - 4) On the 「Engine Control System Diagnosis」 display screen, select the {7. OBD System} and press the [YES] key.
 - 5) On the 「OBD Menu」 display screen, select the {2. Freeze Frame Data} and press the [YES] key.
- A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Diagnostic trouble code (DTC) for freeze frame data	Freeze frame data	DTC
Air fuel ratio control system for bank 1	Fuel system for Bank1	ON or OFF
Engine load data	Engine Load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor	Long term fuel trim B1	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg or kPa or inHg or psi
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH

NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

7. READ OXYGEN SENSOR MONITORING TEST RESULTS DATA SHOWN ON DISPLAY FOR ENGINE. (OBD MODE)

- 1) On the 「Main Menu」 display screen, select the {2. Each System Check} and press the [YES] key.
 - 2) On the 「System Selection Menu」 display screen, select the {Engine Control System} and press the [YES] key.
 - 3) Press the [YES] key after displayed the information of engine type.
 - 4) On the 「Engine Control System Diagnosis」 display screen, select the {7. OBD System} and press the [YES] key.
 - 5) On the 「OBD Menu」 display screen, select the {5. O2 Sensor Monitor} and press the [YES] key.
 - 6) On the 「O2 Sensor Select」 display screen, select the {Bank 1-Sensor1} or {Bank 1-Sensor2} and press the [YES] key.
- Bank 1-Sensor1 indicates the front oxygen or A/F sensor, and Bank 1-Sensor2 indicates the rear oxygen sensor.
 - A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Oxygen sensor for monitoring test	<O2 Sensor Monitor (-----)>	—
Rich to lean oxygen sensor threshold voltage	Rich to lean sensor volt	V
Lean to rich oxygen sensor threshold voltage	Lean to rich sensor volt	V
Low oxygen sensor voltage for switch time calculation	Low sensor voltage	V
High oxygen sensor voltage for switch time calculation	High sensor voltage	V
Rich to lean oxygen sensor switch time	Rich to lean switch time	sec
Lean to rich oxygen sensor switch time	Lean to rich switch time	sec
Maximum oxygen sensor voltage for test cycle	Maximum sensor Voltage	V
Minimum oxygen sensor voltage for test cycle	Minimum sensor Voltage	V

NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

8. LED OPERATION MODE FOR ENGINE

- 1) On the 「Main Menu」 display screen, select the {2. Each System Check} and press the [YES] key.
- 2) On the 「System Selection Menu」 display screen, select the {Engine Control System} and press the [YES] key.
- 3) Press the [YES] key after displayed the information of engine type.
- 4) On the 「Engine Control System Diagnosis」 display screen, select the {1. Current Data Display & Save} and press the [YES] key.
- 5) On the 「Data Display Menu」 display screen, select the {2. 6 Data & LED Display} and press the [YES] key.
- 6) Using the scroll key, move the display screen up or down until the desired data is shown.

- A list of the support data is shown in the following table.

Contents	Display	Message	LED "ON" requirements
Ignition switch signal	Ignition Switch	ON or OFF	When ignition switch is turned ON.
Automatic transmission vehicle identification signal*	AT Vehicle ID Signal	ON or OFF	When AT identification signal is entered.
Test mode connector signal	Test Mode Signal	ON or OFF	When test mode connector is connected.
Neutral position switch signal	Neutral Position Switch	ON or OFF	When neutral position signal is entered.
Air conditioning switch signal	A/C Switch	ON or OFF	When air conditioning switch is turned ON.
Air conditioning relay signal	A/C Relay	ON or OFF	When air conditioning relay is in function.
Radiator main fan relay signal	Radiator Fan Relay #1	ON or OFF	When radiator main fan relay is in function.
Fuel pump relay signal	Fuel Pump Relay	ON or OFF	When fuel pump relay is in function.
Knocking signal	Knocking Signal	ON or OFF	When knocking signal is entered.
Radiator sub fan relay signal	Radiator Fan Relay #2	ON or OFF	When radiator sub fan relay is in function.
Engine torque control signal #1	Torque Control Signal #1	ON or OFF	When engine torque control signal 1 is entered.
Engine torque control signal #2	Torque Control Signal #2	ON or OFF	When engine torque control signal 2 is entered.
Engine torque control permission signal	Torque Control Permit	ON or OFF	When engine torque control permission signal is entered.
Pressure sources switching solenoid valve*	Pressure Sources Change	ON or OFF	When pressure sources switching solenoid valve is in function.
Front oxygen sensor rich signal*	Front O2 Rich Signal #1	ON or OFF	When front oxygen sensor mixture ratio is rich.
Rear oxygen sensor rich signal	Rear O2 Rich Signal	ON or OFF	When rear oxygen sensor mixture ratio is rich.
Pressure control solenoid valve	PCV Solenoid Valve	ON or OFF	When pressure control solenoid valve is in function.
Drain valve	Vent. Solenoid Valve	ON or OFF	When drain valve is in function.
Starter switch signal	Starter Switch Signal	ON or OFF	When starter switch signal is entered.
Idle switch signal	Idle Switch Signal	ON or OFF	When idle switch signal is entered.
Crankshaft position sensor signal	Crankshaft Position Sig.	ON or OFF	When crankshaft position sensor signal is entered.
Camshaft position sensor signal	Camshaft Position Sig.	ON or OFF	When camshaft position sensor signal is entered.

*: Except 2200 cc California spec. vehicles

NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

9. READ CURRENT DATA SHOWN ON DISPLAY FOR AT.

- 1) On the 「Main Menu」 display screen, select the {2. Each System Check} and press the [YES] key.
 - 2) On the 「System Selection Menu」 display screen, select the {AT/ECVT} and press the [YES] key.
 - 3) Press the [YES] key after displayed the information of transmission type.
 - 4) On the 「E-4AT/ECVT Diagnosis」 display screen, select the {1. Current Data Display & Save} and press the [YES] key.
 - 5) On the 「Data Display Menu」 display screen, select the {1. 12 Data Display} and press the [YES] key.
 - 6) Using the scroll key, move the display screen up or down until the desired data is shown.
- A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Vehicle speed sensor 1 signal	Vehicle Speed #1	km/h or MPH
Vehicle speed sensor 2 signal	Vehicle Speed #2	km/h or MPH
Engine speed signal	Engine Speed	rpm
Automatic transmission fluid temperature signal	ATF Temp.	°C or °F
Throttle position signal	Throttle Sensor Voltage	V
Gear position	Gear Position	—
Line pressure control duty ratio	Line Pressure Duty Ratio	%
Lock up clutch control duty ratio	Lock Up Duty Ratio	%
Transfer clutch control duty ratio	Transfer Duty Ratio	%
Power supply for throttle position sensor	Throttle Sensor Power	V
Mass air flow signal*	Air Flow Sensor Voltage	V
Torque converter turbine speed signal	AT Turbine Speed	rpm
2-4 brake timing pressure control duty ratio	2-4B Duty Ratio	%
Intake manifold pressure sensor voltage	Mani. Pressure Voltage	V
2 wheel drive switch signal	2WD Switch	ON or OFF
Kick down switch signal	Kick Down Switch	ON or OFF
Stop lamp switch signal	Stop Lamp Switch	ON or OFF
Anti lock brake system signal	ABS Signal	ON or OFF
Cruise control system signal	Cruise Control Signal	ON or OFF
Neutral/Parking range signal	N/P Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
Drive range signal	D Range Signal	ON or OFF
3rd range signal	3rd Range Signal	ON or OFF
2nd range signal	2nd Range Signal	ON or OFF
1st range signal	1st Range Signal	ON or OFF
Shift control solenoid A	Shift Solenoid #1	ON or OFF
Shift control solenoid B	Shift Solenoid #2	ON or OFF
Torque control output signal #1	Torque Control Signal #1	ON or OFF
Torque control output signal #2	Torque Control Signal #2	ON or OFF
Torque control cut signal	Torque Control Cut Sig.	ON or OFF
2-4 brake timing control solenoid valve	2-4 Brake Timing Sol.	ON or OFF
Low clutch timing control solenoid valve	Low Clutch Timing Sol.	ON or OFF
Automatic transmission diagnosis indicator lamp	AT Diagnosis Lamp	ON or OFF

*: Except 2200 cc California spec. vehicles

NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

D: CLEAR MEMORY MODE

1. SUBARU SELECT MONITOR (NORMAL MODE)

- 1) On the 「Main Menu」 display screen, select the {2. Each System Check} and press the [YES] key.
- 2) On the 「System Selection Menu」 display screen, select the {Engine Control System} and press the [YES] key.
- 3) Press the [YES] key after displayed the information of engine type.
- 4) On the 「Engine Control System Diagnosis」 display screen, select the {3. Clear Memory} and press the [YES] key.
- 5) When the 'Done' and 'Turn Ignition Switch OFF' are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:

- After the memory has been cleared, the ISC must be initialized. To do this, turn the ignition switch to the ON position. Wait 3 seconds before starting the engine. (Except 2200 cc California spec. vehicles only)
- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

2. SUBARU SELECT MONITOR (OBD MODE)

- 1) On the 「Main Menu」 display screen, select the {2. Each System Check} and press the [YES] key.
- 2) On the 「System Selection Menu」 display screen, select the {Engine Control System} and press the [YES] key.
- 3) Press the [YES] key after displayed the information of engine type.
- 4) On the 「Engine Control System Diagnosis」 display screen, select the {7. OBD System} and press the [YES] key.
- 5) On the 「OBD Menu」 display screen, select the {4. Diagnosis Code(s) Cleared} and press the [YES] key.
- 6) When the 'Clear Diagnostic Code?' is shown on the display screen, press the [YES] key.
- 7) Turn Subaru Select Monitor and ignition switch to OFF.

NOTE:

- After the memory has been cleared, the ISC must be initialized. To do this, turn the ignition switch to the ON position. Wait 3 seconds before starting the engine. (Except 2200 cc California spec. vehicles only)
- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

3. OBD-II GENERAL SCAN TOOL

For clear memory procedures using the OBD-II general scan tool, refer to the OBD-II General Scan Tool Instruction Manual.

After the memory has been cleared, the ISC must be initialized. To do this, turn the ignition switch to the ON position. Wait 3 seconds before starting the engine. (Except 2200 cc California spec. vehicles only)

E: INSPECTION MODE

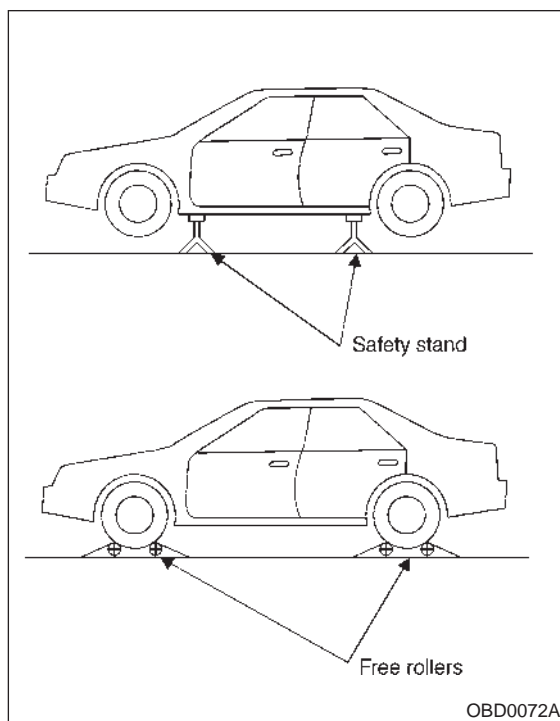
1. PREPARATIONS FOR THE INSPECTION MODE

Raise the vehicle using a garage jack and place on safety stands or drive the vehicle onto free rollers.

● FULL-TIME AWD MODELS

WARNING:

- Before raising the vehicle, ensure parking brakes are applied.
- Do not use a pantograph jack in place of a safety stand.
- Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.
- Do not abruptly depress/release clutch pedal or accelerator pedal during works even when engine is operating at low speeds since this may cause vehicle to jump off free rollers.
- In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the safety stands and the vehicle.
- Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



2. SUBARU SELECT MONITOR

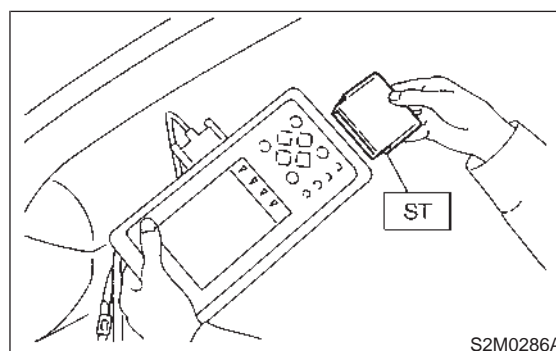
After performing diagnostics and clearing the memory, check for any remaining unresolved trouble data.

- 1) Prepare Subaru Select Monitor kit.

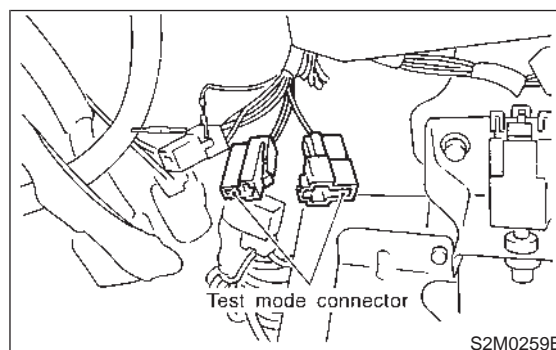


- 2) Connect diagnosis cable to Subaru Select Monitor.

- 3) Insert cartridge into Subaru Select Monitor.
<Ref. to 1-6 [G1100].>

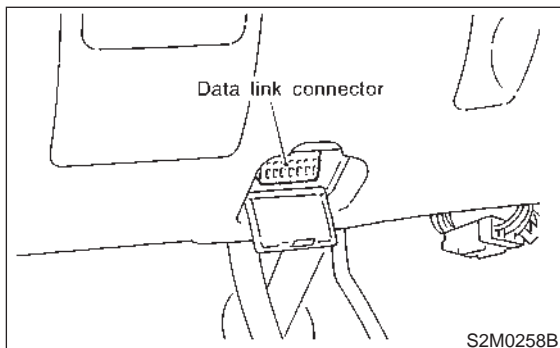


- 4) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



5) Connect Subaru Select Monitor to data link connector.

(1) Open the cover and connect Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side), to the lower cover.

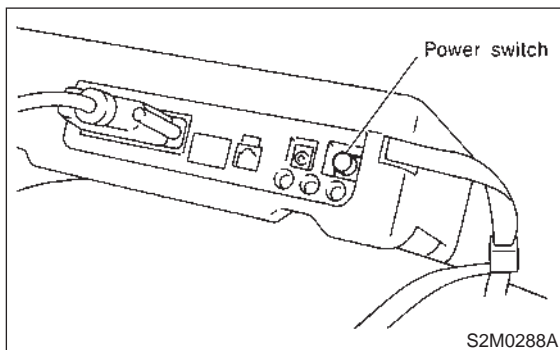


(2) Connect diagnosis cable to data link connector.

CAUTION:

Do not connect scan tools except for Subaru Select Monitor and OBD-II general scan tool.

6) Turn ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



7) On the 「Main Menu」 display screen, select the {2. Each System Check} and press the [YES] key.

8) On the 「System Selection Menu」 display screen, select the {Engine Control System} and press the [YES] key.

9) Press the [YES] key after displayed the information of engine type.

10) On the 「Engine Control System Diagnosis」 display screen, select the {6. Dealer Check Mode Procedure} and press the [YES] key.

11) When the "Perform Inspection (Dealer Check) Mode?" is shown on the display screen, press the [YES] key.

12) Perform subsequent procedures as instructed on the display screen.

- If trouble still remains in the memory, the corresponding diagnostic trouble code (DTC) appears on the display screen.

NOTE:

- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

- For detailed concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST.

- 2200 cc California spec. vehicles: <Ref. to 2-7 [T10A0].>

- Except 2200 cc California spec. vehicles: <Ref. to 2-7 [T11A0].>

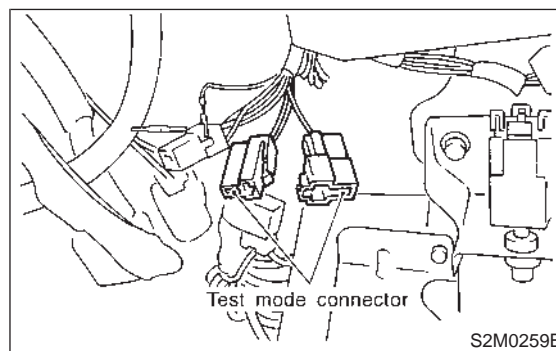
- On AWD vehicles, release the parking brake.

- The speed difference between front and rear wheels may light either the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

3. OBD-II GENERAL SCAN TOOL

After performing diagnostics and clearing the memory, check for any remaining unresolved trouble data:

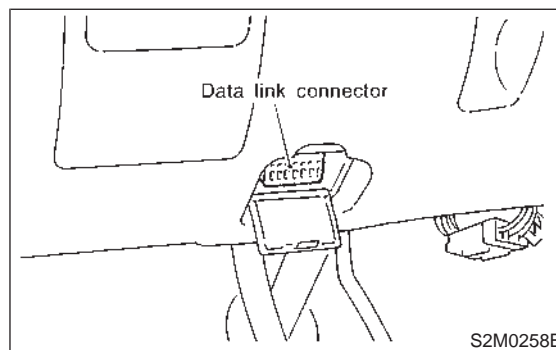
1) Connect test mode connector at the lower side of the instrument panel (on the driver's side), to the side of the center console box.



2) Open the cover and connect the OBD-II general scan tool to its data link connector in the lower portion of the instrument panel (on the driver's side), to the lower cover.

CAUTION:

Do not connect the scan tools except for Subaru Select Monitor and OBD-II general scan tool.



3) Start the engine.

NOTE:

- Ensure the selector lever is placed in the "P" position before starting. (AT vehicles)
- Depress clutch pedal when starting the engine. (MT vehicles)

4) Using the selector lever or shift lever, turn the "P" position switch and the "N" position switch to ON.

5) Depress the brake pedal to turn the brake switch ON. (AT vehicles)

6) Keep engine speed in the 2,500 — 3,000 rpm range for 40 seconds.

NOTE:

On models without tachometer, use the tachometer (Secondary pickup type).

7) Place the selector lever or shift lever in the "D" position (AT vehicles) or "1st" gear (MT vehicles) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:

- On AWD vehicles, release the parking brake.
- The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

8) Using the OBD-II general scan tool, check for diagnostic trouble code(s) and record the result(s).

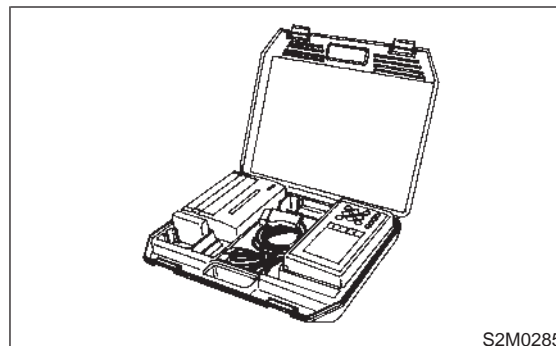
NOTE:

- For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.
- For detailed concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST.
 - 2200 cc California spec. vehicles: <Ref. to 2-7 [T10A0].>
 - Except 2200 cc California spec. vehicles: <Ref. to 2-7 [T11A0].>

F: COMPULSORY VALVE OPERATION CHECK MODE

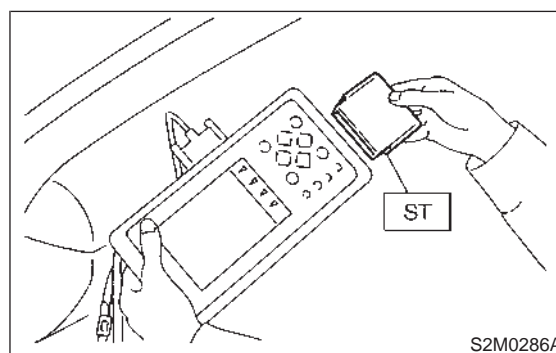
1. SUBARU SELECT MONITOR

1) Prepare Subaru Select Monitor kit.

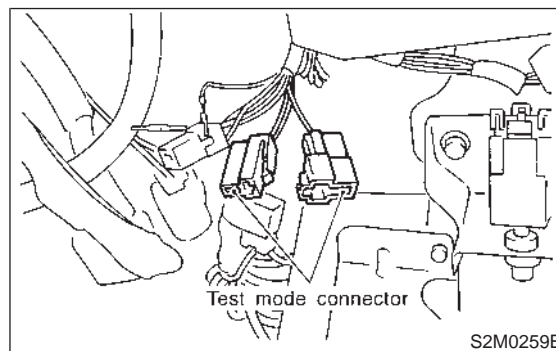


2) Connect diagnosis cable to Subaru Select Monitor.

3) Insert cartridge into Subaru Select Monitor. <Ref. to 1-6 [G1100].>

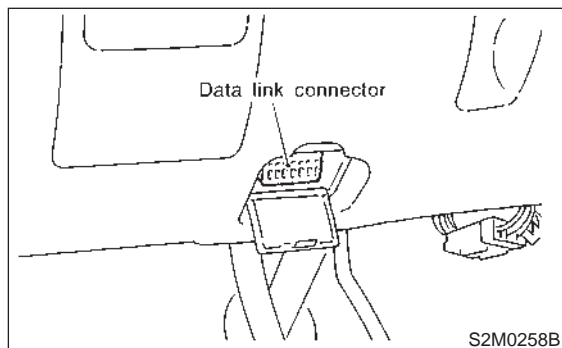


4) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



5) Connect Subaru Select Monitor to data link connector.

(1) Open the cover and connect Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side), to the lower cover.

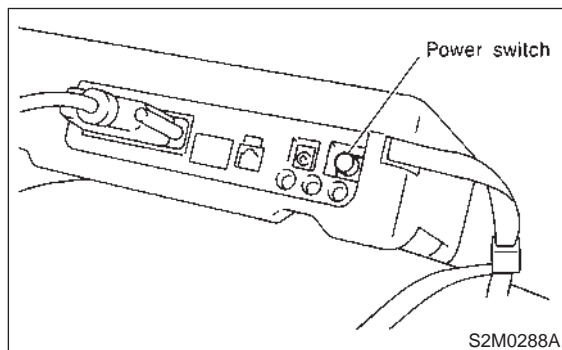


(2) Connect diagnosis cable to data link connector.

CAUTION:

Do not connect scan tools except for Subaru Select Monitor and OBD-II general scan tool.

6) Turn ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



7) On the 「Main Menu」 display screen, select the {2. Each System Check} and press the [YES] key.
 8) On the 「System Selection Menu」 display screen, select the {Engine Control System} and press the [YES] key.
 9) Press the [YES] key after displayed the information of engine type.
 10) On the 「Engine Control System Diagnosis」 display screen, select the {4. System Operation Check Mode} and press the [YES] key.
 11) On the 「System Operation Check Mode」 display screen, select the {Actuator ON/OFF Operation} and press the [YES] key.
 12) Select the desired compulsory actuator on the 「Actuator ON/OFF Operation」 display screen and press the [YES] key.
 13) Pressing the [NO] key completes the compulsory operation check mode. The display will then return to the 「Actuator ON/OFF Operation」 screen.

● A list of the support data is shown in the following table.

Contents	Display
Compulsory fuel pump relay operation check	Fuel Pump Relay
Compulsory radiator fan relay operation check	Radiator Fan Relay
Compulsory air conditioning relay operation check	A/C Relay
Compulsory pressure control solenoid valve operation check	PCV Solenoid Valve
Compulsory drain valve operation check	Vent Control Solenoid Valve
Compulsory pressure sources switching solenoid valve operation check*	Pressure Switching Sol.1

*: Except 2200 cc California spec. vehicles

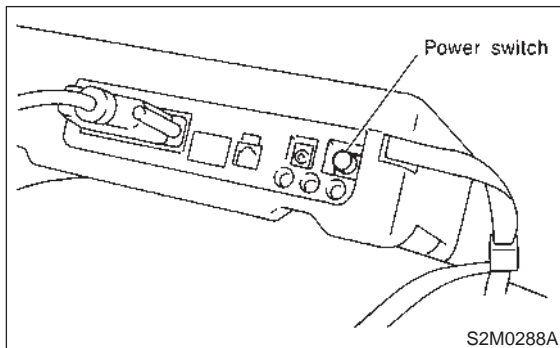
NOTE:

- Because ASV solenoid valve, FICD solenoid valve and air injection system diagnosis solenoid valve are not installed, ASV Solenoid Valve, FICD Solenoid Valve and Pressure Switching Sol.2 will be displayed but non-functional.
- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

G: FINISHING DIAGNOSIS OPERATION

1. SUBARU SELECT MONITOR

- 1) Turn ignition switch to OFF.
- 2) Turn Subaru Select Monitor switch to OFF.



- 3) Disconnect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.
- 4) Disconnect Subaru Select Monitor from its data link connector.

4. Cautions

A: SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the engine control module (ECM), main relay and fuel pump relay.

CAUTION:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage Airbag system wiring harness when servicing the engine control module (ECM), transmission control module (TCM), main relay and fuel pump relay.

B: PRECAUTIONS

- 1) Never connect the battery in reverse polarity.
 - The ECM will be destroyed instantly.
 - The fuel injector and other part will be damaged in just a few minutes more.
- 2) Do not disconnect the battery terminals while the engine is running.
 - A large counter electromotive force will be generated in the alternator, and this voltage may damage electronic parts such as ECM, etc.
- 3) Before disconnecting the connectors of each sensor and the ECM, be sure to turn OFF the ignition switch.
- 4) Poor contact has been identified as a primary cause of this problem. To measure the voltage and/or resistance of individual sensors or all electrical control modules at the harness side connector, use a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in) into the part.
- 5) Before removing ECM from the located position, disconnect two cables on battery.
 - Otherwise, the ECM may be damaged.

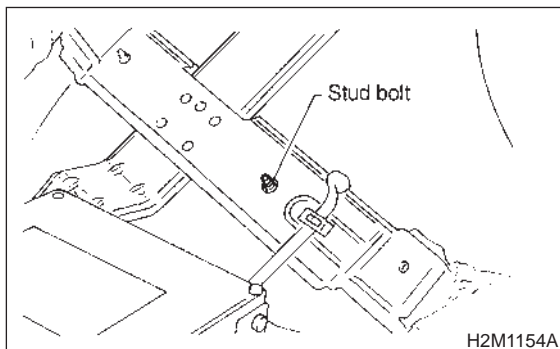
CAUTION:

When replacing ECM, be careful not to use the wrong spec. ECM to avoid any damage on fuel injection system.

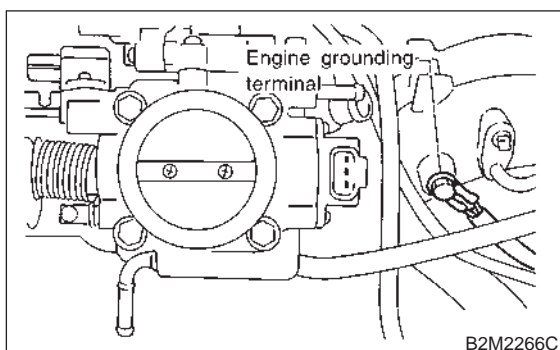
- 6) The connectors to each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.

4. Cautions

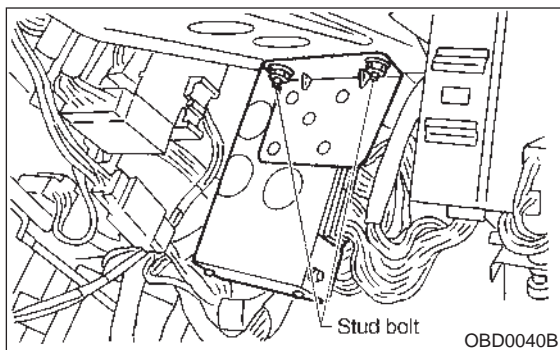
7) Use ECM mounting stud bolts at the body head grounding point when measuring voltage and resistance inside the passenger compartment.



8) Use engine grounding terminal or engine proper as the grounding point to the body when measuring voltage and resistance in the engine compartment.



9) Use TCM mounting stud bolts at the body head grounding point when measuring voltage and resistance inside the passenger compartment.



10) Every MFI-related part is a precision part. Do not drop them.

11) Observe the following cautions when installing a radio in MFI equipped models.

CAUTION:

- The antenna must be kept as far apart as possible from the control unit.
(The ECM is located under the steering column, inside of the instrument panel lower trim panel.)

- The antenna feeder must be placed as far apart as possible from the ECM and MFI harness.

- Carefully adjust the antenna for correct matching.

- When mounting a large power type radio, pay special attention to the three items above mentioned.

- Incorrect installation of the radio may affect the operation of the ECM.

12) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for more than five seconds to release pressure in the fuel system. If engine starts during this operation, run it until it stops.

13) Problems in the electronic-controlled automatic transmission may be caused by failure of the engine, the electronic control system, the transmission proper, or by a combination of these. These three causes must be distinguished clearly when performing diagnostics.

14) Diagnostics should be conducted by rotating with simple, easy operations and proceeding to complicated, difficult operations. The most important thing in diagnostics is to understand the customer's complaint, and distinguish between the three causes.

15) In AT vehicles, do not continue the stall for more than five seconds at a time (from closed throttle, fully open throttle to stall engine speed).

16) On ABS vehicle, when performing driving test in jacked-up or lifted-up position, sometimes the warning light may be lit, but this is not a malfunction of the system. The reason for this is the speed difference between the front and rear wheels. After diagnosis of engine control system, perform the ABS memory clearance procedure of self-diagnosis system.

C: PRE-INSPECTION

Before performing diagnostics, check the following items which might affect engine problems:

1. POWER SUPPLY

1) Measure battery voltage and specific gravity of electrolyte.

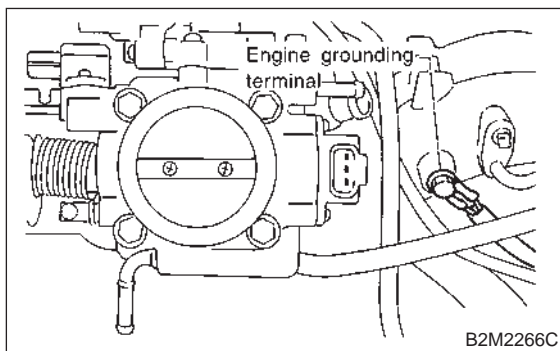
Standard voltage: 12 V

Specific gravity: Above 1.260

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

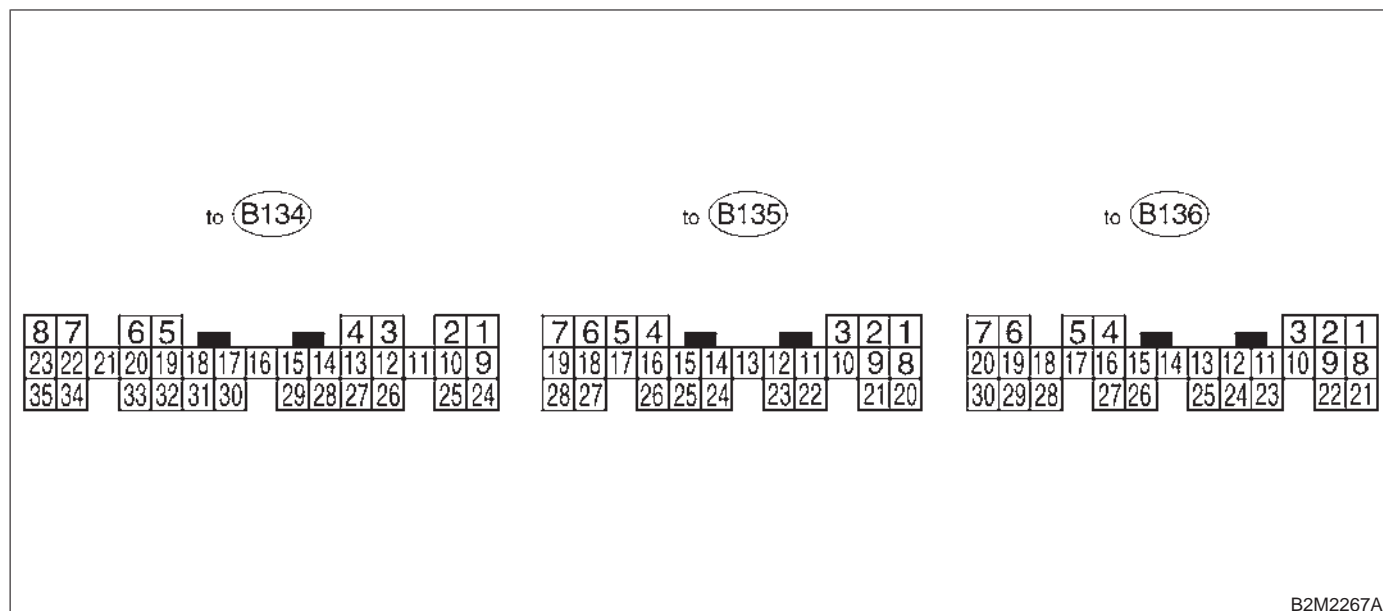
2. ENGINE GROUNDING

Make sure the engine grounding terminal is properly connected to the engine.



5. Specified Data

A: ENGINE CONTROL MODULE (ECM) I/O SIGNAL FOR 2200 cc CALIFORNIA SPEC. VEHICLES

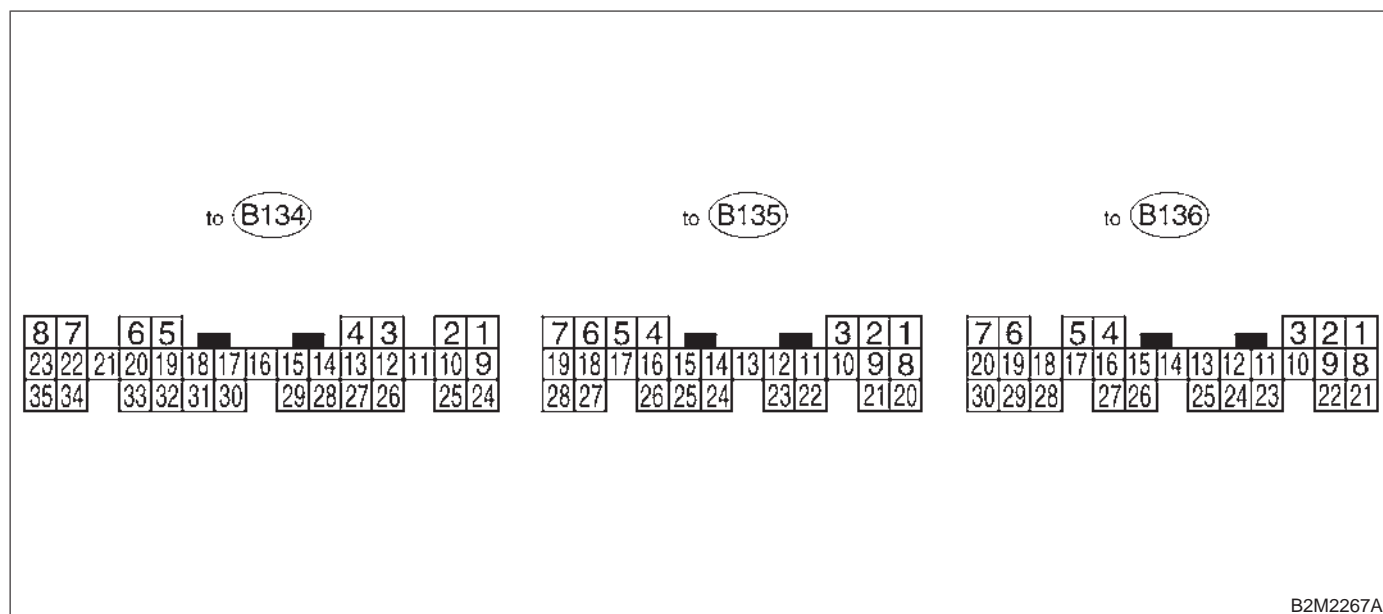


Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Crankshaft position sensor	Signal (+)	B135	1	0	-7 — +7	Sensor output waveform
	Signal (-)	B135	8	0	0	—
	Shield	B135	10	0	0	—
Camshaft position sensor	Signal (+)	B135	2	0	-7 — +7	Sensor output waveform
	Signal (-)	B135	9	0	0	—
	Shield	B135	10	0	0	—
Throttle position sensor	Signal	B136	17	Fully closed: 0.2 — 1.0 Fully opened: 4.2 — 4.7		—
	Power supply	B136	15	5	5	—
	GND (sensor)	B136	16	0	0	—
Rear oxygen sensor	Signal	B136	18	0	0 — 0.9	—
	Shield	B136	24	0	0	—
	GND sensor	B136	16	0	0	—
Front oxygen sensor heater	Signal 1	B134	22	0.5 — 13	0.5 — 14	Waveform
	Signal 2	B134	23	0.5 — 13	0.5 — 14	Waveform
	Power supply monitor	B136	3	10 — 13	13 — 14	—
Rear oxygen sensor heater	Signal	B134	21	0.5 — 13	0.5 — 14	Waveform
	Power supply monitor	B136	3	10 — 13	13 — 14	—

Content		Con- ector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Engine coolant tempera- ture sen- sor	Signal	B136	14	1.0 — 1.4	1.0 — 1.4	After warm-up the engine.
	GND (sen- sor)	B136	16	0	0	After warm-up the engine.
Vehicle speed signal		B135	24	0 or 5	0 or 5	“5” and “0” are repeatedly dis- played when vehicle is driven
Starter switch		B135	28	0	0	Cranking: 8 — 14
A/C switch		B135	27	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch		B135	7	10 — 13	13 — 14	—
Neutral position switch (MT)		B135	26	ON: 5.0±0.5 OFF: 0		On MT vehicle; switch is ON when gear is in neutral posi- tion.
Neutral position switch (AT)		B135	26	ON: 0 OFF: 5.0±0.5		On AT vehicle; switch is ON when shift is in “N” or “P” position.
Test mode connector		B135	14	5	5	When connected: 0
Knock sensor	Signal	B136	4	2.5	2.5	—
	Shield	B136	25	0	0	—
Back-up power supply		B136	9	10 — 13	13 — 14	Ignition switch “OFF”: 10 — 13
Control unit power supply		B136	1	10 — 13	13 — 14	—
		B136	2	10 — 13	13 — 14	—
Sensor power supply		B136	15	5	5	—
Line end check 1		B135	20	0	0	—
Ignition control	#1, #2	B134	25	0	1 — 3.4	Waveform
	#3, #4	B134	26	0	1 — 3.4	Waveform
Fuel injec- tor	#1	B134	4	10 — 13	1 — 14	Waveform
	#2	B134	13	10 — 13	1 — 14	Waveform
	#3	B134	14	10 — 13	1 — 14	Waveform
	#4	B134	15	10 — 13	1 — 14	Waveform
Idle air control solenoid valve	Signal	B134	5	—	1 — 13	Waveform
	Power supply	B136	2	10 — 13	13 — 14	—
	GND (power)	B134	8	0	0	—
Fuel pump relay con- trol		B134	16	ON: 0.5, or less OFF: 10 — 13	0.5, or less	—
A/C relay control		B134	17	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 1 control		B134	3	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 2 control		B134	2	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	With A/C vehicles only
Self-shutoff control		B135	19	10 — 13	13 — 14	—
Malfunction indicator lamp		B134	11	—	—	Light “ON”: 1, or less Light “OFF”: 10 — 14
Engine speed output		B134	30	—	0 — 13, or more	Waveform
Torque control 1 signal		B135	16	5	5	—
Torque control 2 signal		B135	17	5	5	—
Torque control cut sig- nal		B134	31	8	8	—

Content		Con- nec- tor No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Intake manifold pres- sure signal for AT		B136	11	3.5 — 3.8	1.2 — 1.8	—
Purge control solenoid valve		B134	2	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
Power steering switch		B135	13	10 — 13	ON: 0 OFF: 13 — 14	Switch is ON when turning steering wheel.
Intake manifold pressure sensor	Signal	B136	5	3.5 — 3.8	1.2 — 1.8	—
	Power supply	B136	15	5	5	—
	GND (sen- sor)	B136	16	0	0	—
Fuel temperature sen- sor		B136	26	2.5 — 3.8	2.5 — 3.8	Ambient temperature: 25°C (75°F)
Fuel level sensor		B136	27	0.12 — 4.75	0.12 — 4.75	—
Fuel tank pressure sensor	Signal	B136	12	2.3 — 2.7	2.3 — 2.7	The value obtained after the fuel filler cap was removed once and recapped.
	Power supply	B136	15	5	5	—
	GND (sen- sor)	B136	16	0	0	—
Fuel tank pressure control solenoid valve		B134	1	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
Drain valve		B134	10	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
AT diagnosis input sig- nal		B135	4	Less than 1 ↔ More than 4	Less than 1 ↔ More than 4	Waveform
Intake air temperature sensor		B136	13	3.0 — 3.4	3.0 — 3.4	Intake air temperature: 25°C (75°F)
Line end check 2		B135	21	5	5	—
GND (sensors)		B136	16	0	0	—
GND (injectors)		B134	7	0	0	—
GND (ignition system)		B134	27	0	0	—
GND (power supply)		B134	8	0	0	—
GND (control systems)		B136	21	0	0	—
		B136	22	0	0	—
GND (oxygen sensor heater 1)		B134	35	0	0	—
GND (oxygen sensor heater 2)		B134	34	0	0	—

B: ENGINE CONTROL MODULE (ECM) I/O SIGNAL FOR EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES



Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Crankshaft position sensor	Signal (+)	B135	1	0	-7 — +7	Sensor output waveform
	Signal (-)	B135	8	0	0	—
	Shield	B135	10	0	0	—
Camshaft position sensor	Signal (+)	B135	2	0	-7 — +7	Sensor output waveform
	Signal (-)	B135	9	0	0	—
	Shield	B135	10	0	0	—
Mass air flow sensor	Signal	B136	5	0 — 0.3	0.8 — 1.2	—
	Power supply	B136	15	5	5	—
	Shield	B136	25	0	0	—
	GND	B136	8	0	0	—
Throttle position sensor	Signal	B136	17	Fully closed: 0.2 — 1.0 Fully opened: 4.2 — 4.7		—
	Power supply	B136	15	5	5	—
	GND (sensor)	B136	16	0	0	—
Front oxygen sensor	Signal (+)	B136	7	0	0 — 0.9	—
	Signal (-)	B136	20	0	—	—
	Shield	B136	23	0	0	—
Rear oxygen sensor	Signal	B136	18	0	0 — 0.9	—
	Shield	B136	24	0	0	—
	GND (sensor)	B136	16	0	0	—
Front oxygen sensor heater	Signal 1	B134	22	0 — 1.0	0 — 1.0	—
	Signal 2	B134	23	0 — 1.0	0 — 1.0	—
Rear oxygen sensor heater signal		B134	21	0 — 1.0	0 — 1.0	—

Content		Conne- ctor No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Engine coolant tempera- ture sen- sor	Signal	B136	14	1.0 — 1.4	1.0 — 1.4	After warm-up the engine.
	GND (sen- sor)	B136	16	0	0	After warm-up the engine.
Vehicle speed signal		B135	24	0 or 5	0 or 5	“5” and “0” are repeatedly dis- played when vehicle is driven
Starter switch		B135	28	0	0	Cranking: 8 — 14
A/C switch		B135	27	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch		B135	7	10 — 13	13 — 14	—
Neutral position switch (MT)		B135	26	ON: 5.0±0.5 OFF: 0		On MT vehicle; switch is ON when gear is in neutral posi- tion.
Neutral position switch (AT)		B135	26	ON: 0 OFF: 5.0±0.5		On AT vehicle; switch is ON when shift is in “N” or “P” position.
Test mode connector		B135	14	5	5	When connected: 0
Knock sensor	Signal	B136	4	2.8	2.8	—
	Shield	B136	25	0	0	—
AT/MT identification		B135	25	AT: 5 MT: 0	AT: 5 MT: 0	When measuring voltage between ECM and chassis ground.
Back-up power supply		B136	9	10 — 13	13 — 14	Ignition switch “OFF”: 10 — 13
Control unit power supply		B136	1	10 — 13	13 — 14	—
		B136	2	10 — 13	13 — 14	—
Sensor power supply		B136	15	5	5	—
Line end check 1		B135	20	0	0	—
Ignition control	#1, #2	B134	25	0	1 — 3.4	Waveform
	#3, #4	B134	26	0	1 — 3.4	Waveform
Fuel injec- tor	#1	B134	4	10 — 13	1 — 14	Waveform
	#2	B134	13	10 — 13	1 — 14	Waveform
	#3	B134	14	10 — 13	1 — 14	Waveform
	#4	B134	15	10 — 13	1 — 14	Waveform
Idle air control solenoid valve	Signal 1	B134	5	—	1 — 13	Waveform
	Signal 2	B134	6	—	1 — 13	Waveform
	Signal 3	B134	19	—	1 — 13	Waveform
	Signal 4	B134	20	—	1 — 13	Waveform
	Power supply	B136	2	10 — 13	13 — 14	—
Fuel pump relay con- trol		B134	16	ON: 0.5, or less OFF: 10 — 13	0.5, or less	—
A/C relay control		B134	17	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 1 control		B134	3	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 2 control		B134	2	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	With A/C vehicles only
Self-shutoff control		B135	19	10 — 13	13 — 14	—
Malfunction indicator lamp		B134	11	—	—	Light “ON”: 1, or less Light “OFF”: 10 — 14
Engine speed output		B134	30	—	0 — 13, or more	Waveform

Content		Con- nec- tor No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Torque control 1 signal		B135	16	5	5	—
Torque control 2 signal		B135	17	5	5	—
Torque control cut sig- nal		B134	31	8	8	—
Mass air flow signal for AT		B136	11	0 — 0.3	0.8 — 1.2	—
Purge control solenoid valve		B134	2	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
Power steering switch		B135	13	10 — 13	ON: 0 OFF: 13 — 14	Switch is ON when turning steering wheel.
Atmo- spheric pressure sensor	Signal	B136	29	3.5 — 3.8	1.2 — 1.8	—
	Power supply	B136	15	5	5	
	GND (sen- sor)	B136	16	0	0	
Pressure sources switching solenoid valve		B134	9	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
Fuel temperature sen- sor		B136	26	2.5 — 3.8	2.5 — 3.8	Ambient temperature: 25°C (75°F)
Fuel level sensor		B136	27	0.12 — 4.75	0.12 — 4.75	—
Fuel tank pressure sensor	Signal	B136	12	2.3 — 2.7	2.3 — 2.7	The value obtained after the fuel filler cap was removed once and recapped.
	Power supply	B136	15	5	5	—
	GND (sen- sor)	B136	16	0	0	—
Fuel tank pressure control solenoid valve		B134	1	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
Drain valve		B134	10	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
AT diagnosis input sig- nal		B135	4	Less than 1 ↔ More than 4	Less than 1 ↔ More than 4	Waveform
Line end check 2		B135	21	5	5	—
GND (sensors)		B136	16	0	0	—
GND (injectors)		B134	7	0	0	—
GND (ignition system)		B134	27	0	0	—
GND (power supply)		B134	8	0	0	—
GND (control systems)		B136	21	0	0	—
		B136	22	0	0	—
GND (oxygen sensor heater 1)		B134	35	0	0	—
GND (oxygen sensor heater 2)		B134	34	0	0	—

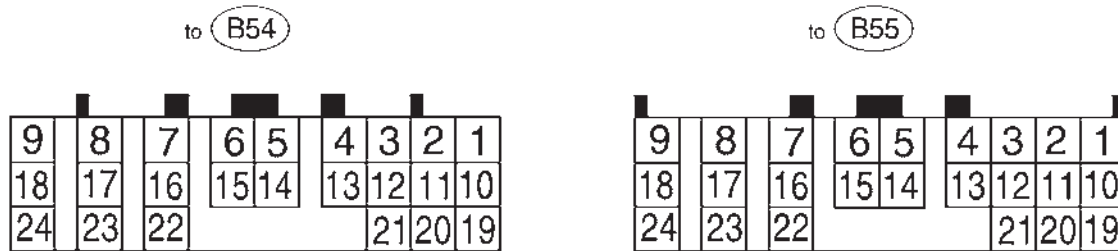
C: ENGINE CONDITION DATA

Content	Model	Specified data
Mass air flow	2200 cc except California spec. vehicles	1.7 — 3.3 (g/sec): Idling
		7.1 — 14.2 (g/sec): 2,500 rpm racing
	2500 cc	2.2 — 4.2 (g/sec): Idling
		8.6 — 14.2 (g/sec): 2,500 rpm racing
Engine load	2200 cc California spec. vehicles	1.6 — 2.9 (%): Idling
		6.4 — 12.8 (%): 2,500 rpm racing
	2200 cc except California spec. vehicles	1.6 — 2.9 (%): Idling
		6.4 — 12.8 (%): 2,500 rpm racing
	2500 cc	1.9 — 3.5 (%): Idling
		7.2 — 12.1 (%): 2,500 rpm racing

Measuring condition:

- After warm-up the engine.
- Gear position is in “N” or “P” position.
- A/C is turned OFF.
- All accessory switches are turned OFF.

D: TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL



B2M2269A

NOTE:
Check with ignition switch ON.

Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)
Back-up power supply		B55	6	Ignition switch OFF	10 — 16
Ignition power supply		B54	23	Ignition switch ON (with engine OFF)	10 — 16
		B54	24		
Inhibitor switch	“P” range switch	B55	23	Selector lever in “P” range	Less than 1
				Selector lever in any other than “P” range	More than 8
	“N” range switch	B55	22	Selector lever in “N” range	Less than 1
				Selector lever in any other than “N” range	More than 8
	“R” range switch	B55	17	Selector lever in “R” range	Less than 1
				Selector lever in any other than “R” range	More than 9.5
	“D” range switch	B55	8	Selector lever in “D” range	Less than 1
				Selector lever in any other than “D” range	More than 9.5
	“3” range switch	B55	18	Selector lever in “3” range	Less than 1
				Selector lever in any other than “3” range	More than 9.5
	“2” range switch	B54	10	Selector lever in “2” range	Less than 1
				Selector lever in any other than “2” range	More than 9.5
“1” range switch	B54	1	Selector lever in “1” range	Less than 1	
			Selector lever in any other than “1” range	More than 9.5	
Brake switch		B55	24	Brake pedal depressed	More than 10.5
				Brake pedal released	Less than 1
ABS signal		B54	19	ABS switch ON	Less than 1
				ABS switch OFF	More than 6.5

Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Throttle position sensor	B55	1	Throttle fully closed.	0.3 — 0.7	—
			Throttle fully open.	4.3 — 4.9	
Throttle position sensor power supply	B55	2	Ignition switch ON (with engine OFF)	4.8 — 5.3	—
ATF temperature sensor	B55	11	ATF temperature 20°C (68°F)	2.9 — 4.0	2.1 k — 2.9 k
			ATF temperature 80°C (176°F)	1.0 — 1.4	275 — 375
Vehicle speed sensor 1	B55	3	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Vehicle speed sensor 2	B55	5	Vehicle speed at most 10 km/h (6 MPH)	Less than 1 ← → More than 4	—
Torque converter turbine speed sensor	B55	12	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Vehicle speed output signal	B55	13	Vehicle speed at most 10 km/h (6 MPH)	Less than 1 ← → More than 4	—
Engine speed signal	B55	4	Ignition switch ON (with engine OFF).	More than 10.5	—
			Ignition switch ON (with engine ON).	8 — 11	
Cruise set signal	B54	11	When cruise control is set (SET lamp ON).	Less than 1	—
			When cruise control is not set (SET lamp OFF).	More than 6.5	
Torque control 1 signal	B54	13	Ignition switch ON (with engine ON)	More than 9	—
Torque control 2 signal	B54	21	Ignition switch ON (with engine ON)	More than 9	—
Torque control cut signal	B54	2	Ignition switch ON	8	—
AT load signal	B55	20	Engine idling after warm-up	1.2 — 1.8*1	—
				0.5 — 1.2*2	
Shift solenoid 1	B54	7	1st or 4th gear	More than 9	10 — 16
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B54	6	1st or 2nd gear	More than 9	10 — 16
			3rd or 4th gear	Less than 1	
Duty solenoid A	B54	9	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
Dropping resistor	B54	18	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	9 — 15
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
Duty solenoid B	B54	16	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	
Duty solenoid C (AWD models only)	B54	15	Fuse on FWD switch	More than 8.5	10 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	

Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Duty solenoid D	B54	8	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake duty solenoid resistor	B54	17	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	9 — 15
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake timing solenoid	B54	5	3rd gear	More than 9	10 — 16
			1st gear	Less than 1	
Low clutch timing solenoid	B54	14	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
Sensor ground line 1	B55	10	—	0	Less than 1
Sensor ground line 2	B55	21	—	0	Less than 1
System ground line	B55	9	—	0	Less than 1
		19			
FWD switch	B55	14	Fuse removed.	6 — 9.1	—
			Fuse installed.	Less than 1	
FWD indicator lamp	B54	12	Fuse on FWD switch	Less than 1	—
			Fuse removed from FWD switch.	More than 9	
Data link signal (Subaru Select Monitor)	B55	7	—	—	—
		16	—	—	
AT diagnosis signal	B54	4	Ignition switch ON	Less than 1 \longleftrightarrow More than 4	—

6. Basic Diagnostic Procedure

A: BASIC DIAGNOSTIC PROCEDURE FOR ENGINE

6A1 : CHECK ENGINE START FAILURE.

- 1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to 2-7 [T6C0].>
- 2) Start the engine.

CHECK : **Does the engine start?**

YES : Go to step **6A2**.

NO : Inspection using "Diagnostics for Engine Start Failure". <Ref. to 2-7 [T800].>

6A2 : CHECK ILLUMINATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).

CHECK : **Does CHECK ENGINE malfunction indicator lamp illuminate?**

YES : Go to step **6A3**.

NO : Inspection using "9. General Diagnostics Table". <Ref. to 2-7 [T900].>

6A3 : CHECK INDICATION OF DTC ON DISPLAY.

- 1) Turn ignition switch to OFF.
- 2) Connect the Subaru Select Monitor or the OBD-II general scan tool to data link connector.
- 3) Turn ignition switch to ON and the Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Read DTC on the Subaru Select Monitor or OBD-II general scan tool.

CHECK : **Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC?**

YES : Go to step **6A4**.

NO : Repair the related parts.

NOTE:

If DTC is not shown on display although the MIL illuminates, perform diagnostics of MIL (CHECK ENGINE malfunction indicator lamp) circuit or combination meter. <Ref. to 2-7 [T800].>

6A4 : PERFORM THE DIAGNOSIS.

- 1) Inspect using "Diagnostics Chart with Trouble Code (DTC)".

NOTE:

● 2200 cc California spec. vehicles: <Ref. to 2-7 [T10A0].>

● Except 2200 cc California spec. vehicles: <Ref. to 2-7 [T11A0].>

NOTE:

Carry out the basic check, only when DTC about automatic transmission is shown on display. <Ref. to 2-7 [T6B0].>

- 2) Repair the trouble cause.

- 3) Perform the clear memory mode. <Ref. to 2-7 [T3D0].>

- 4) Perform the inspection mode. <Ref. to 2-7 [T3E0].>

CHECK : **Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC?**

YES : Inspect using "Diagnostics Chart with Trouble Code (DTC)".

NOTE:

● 2200 cc California spec. vehicles: <Ref. to 2-7 [T10A0].>

● Except 2200 cc California spec. vehicles: <Ref. to 2-7 [T11A0].>

NO : Complete the diagnosis.

B: BASIC CHECK ITEMS FOR AT

When trouble code about automatic transmission is shown on display, carry out the following basic check. After that, carry out the replacement or repair work.

- 1) ATF level check <Ref. to 3-2 [W1B1].>

- 2) Differential gear oil level check <Ref. to 3-2 [W1B2].>

- 3) ATF leak check <Ref. to 3-2 [W1B3].>

- 4) Differential gear oil leak check <Ref. to 3-2 [W1B3].>

- 5) Stall test <Ref. to 3-2 [W7A0].>

- 6) Line pressure test <Ref. to 3-2 [W9A0].>

- 7) Transfer clutch pressure test <Ref. to 3-2 [W10A0].>

- 8) Time lag test <Ref. to 3-2 [W8A0].>

- 9) Road test <Ref. to 3-2 [W6A0].>

- 10) Shift characteristics <Ref. to 3-2 [W6A0].>

C: CHECK LIST FOR INTERVIEW**1. CHECK LIST NO. 1**

Check the following items when problem has occurred.

NOTE:

Use copies of this page for interviewing customers.

Customer's name		Engine no.	
Date of sale		Fuel brand	
Date of repair		Odometer reading	km
Vin no.			miles
Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Various/Others:		
Outdoor temperature	°F (°C) <input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold		
Place	<input type="checkbox"/> Highway <input type="checkbox"/> Suburbs <input type="checkbox"/> Inner city <input type="checkbox"/> Uphill <input type="checkbox"/> Downhill <input type="checkbox"/> Rough road <input type="checkbox"/> Others:		
Engine temperature	<input type="checkbox"/> Cold <input type="checkbox"/> Warming-up <input type="checkbox"/> After warming-up <input type="checkbox"/> Any temperature <input type="checkbox"/> Others:		
Engine speed	rpm		
Vehicle speed	MPH		
Driving conditions	<input type="checkbox"/> Not affected <input type="checkbox"/> At starting <input type="checkbox"/> While idling <input type="checkbox"/> At racing <input type="checkbox"/> While accelerating <input type="checkbox"/> While cruising <input type="checkbox"/> While decelerating <input type="checkbox"/> While turning (RH/LH)		
Headlight	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF	Rear defogger	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF
Blower	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF	Radio	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF
A/C compressor	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF	CD/Cassette	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF
Cooling fan	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF	Car phone	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF
Front wiper	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF	CB	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF
Rear wiper	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF		

2. CHECK LIST NO. 2

Check the following items about the vehicle's state when MIL turns on.

NOTE:

Use copies of this page for interviewing customers.

a) Other warning lights or indicators turn on. <input type="checkbox"/> Yes/ <input type="checkbox"/> No
<input type="checkbox"/> Low fuel warning light <input type="checkbox"/> Charge indicator light <input type="checkbox"/> AT diagnostics indicator light <input type="checkbox"/> ABS warning light <input type="checkbox"/> TCS warning light <input type="checkbox"/> Engine oil pressure warning light
b) Fuel level
<ul style="list-style-type: none"> ● Lack of gasoline: <input type="checkbox"/> Yes/<input type="checkbox"/> No ● Indicator position of fuel gauge:
c) Intentional connecting or disconnecting of harness connectors or spark plug cords: <input type="checkbox"/> Yes/ <input type="checkbox"/> No
<ul style="list-style-type: none"> ● What:
d) Intentional connecting or disconnecting of hoses: <input type="checkbox"/> Yes/ <input type="checkbox"/> No
<ul style="list-style-type: none"> ● What:
e) Installing of parts other than genuine parts: <input type="checkbox"/> Yes/ <input type="checkbox"/> No
<ul style="list-style-type: none"> ● What: ● Where:
f) Occurrence of noise: <input type="checkbox"/> Yes/ <input type="checkbox"/> No
<ul style="list-style-type: none"> ● From where: ● What kind:
g) Occurrence of smell: <input type="checkbox"/> Yes/ <input type="checkbox"/> No
<ul style="list-style-type: none"> ● From where: ● What kind:
h) Intrusion of water into engine compartment or passenger compartment: <input type="checkbox"/> Yes/ <input type="checkbox"/> No
i) Troubles occurred
<input type="checkbox"/> Engine does not start. <input type="checkbox"/> Engine stalls during idling. <input type="checkbox"/> Engine stalls while driving. <input type="checkbox"/> Engine speed decreases. <input type="checkbox"/> Engine speed does not decrease. <input type="checkbox"/> Rough idling <input type="checkbox"/> Poor acceleration <input type="checkbox"/> Back fire <input type="checkbox"/> After fire <input type="checkbox"/> No shift <input type="checkbox"/> Excessive shift shock

MEMO:

7. Diagnostics for CHECK ENGINE Malfunction Indicator Lamp (MIL)

A: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON.

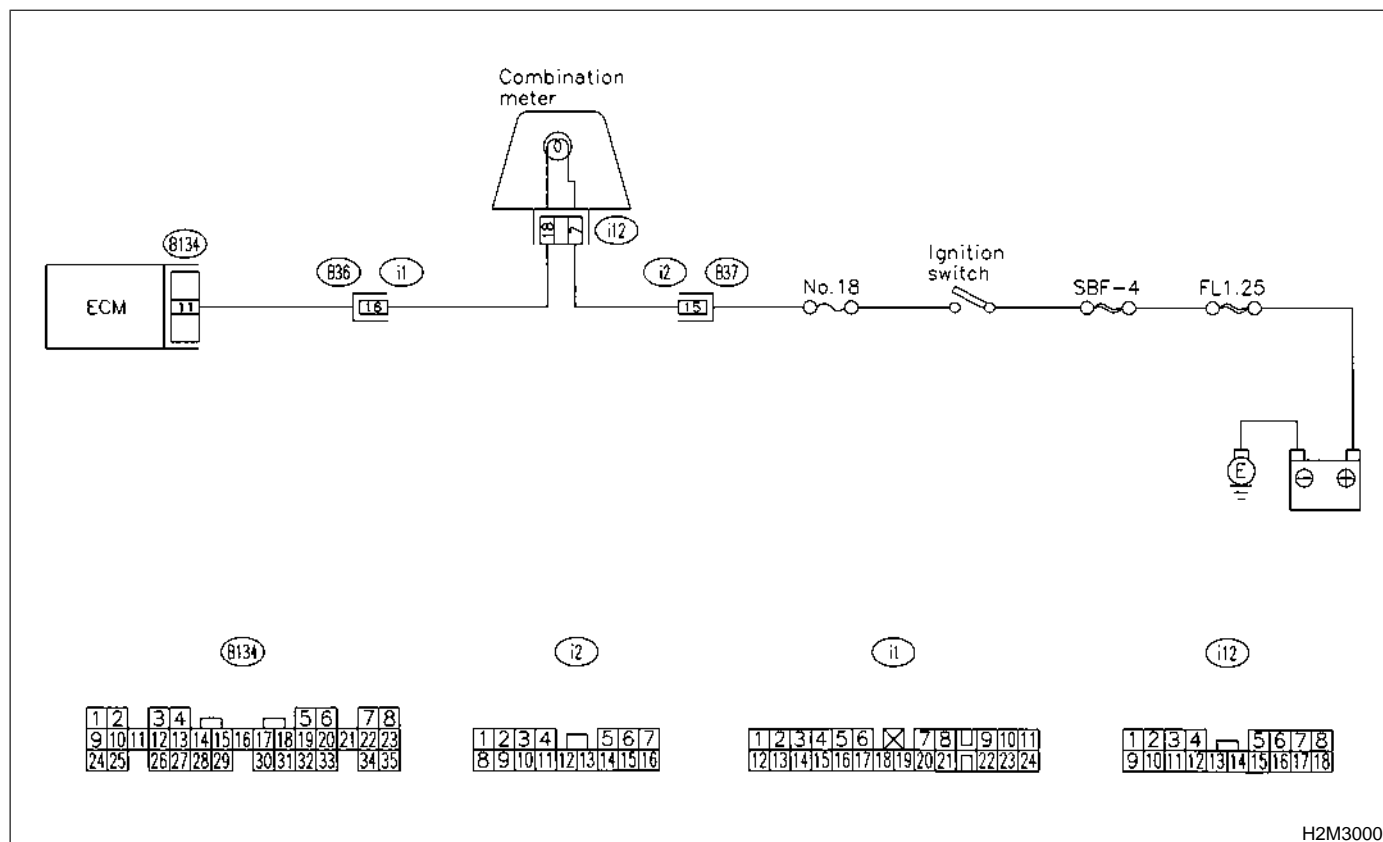
- **DIAGNOSIS:**

- The CHECK ENGINE malfunction indicator lamp (MIL) circuit is open or shorted.

- **TROUBLE SYMPTOM:**

- When ignition switch is turned ON (engine OFF), MIL does not come on.

- **WIRING DIAGRAM:**

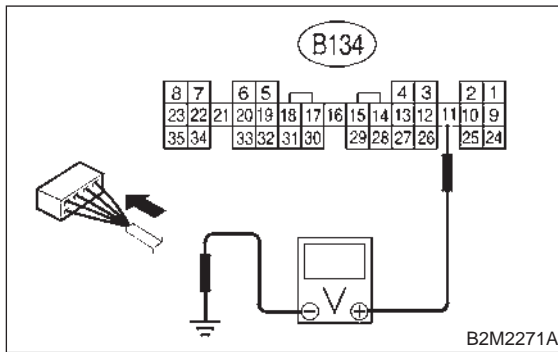


7A1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 11 (+) — Chassis ground (-):



- CHECK** : Is the voltage less than 1 V?
- YES** : Go to step 7A2.
- NO** : Go to step 7A4.

7A2 : CHECK POOR CONTACT.

- CHECK** : Does the MIL come on when shaking or pulling ECM connector and harness?
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 7A3.

7A3 : CHECK ECM CONNECTOR.

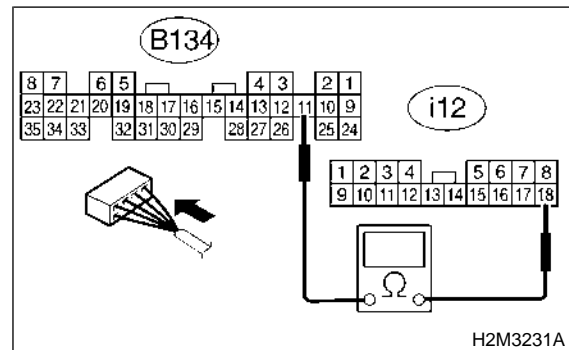
- CHECK** : Is ECM connector correctly connected?
- YES** : Replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Repair connection of ECM connector.

7A4 : CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Remove combination meter. <Ref. to 6-2 [W8A0].>
- 3) Disconnect connector from ECM and combination meter.
- 4) Measure resistance of harness between ECM and combination meter connector.

Connector & terminal

(B134) No. 11 — (i12) No. 18:



- CHECK** : Is resistance less than 1 Ω?
- YES** : Go to step 7A5.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and combination meter connector
- Poor contact in coupling connector (i1)

7A5 : CHECK POOR CONTACT.

Check poor contact in combination meter connector.
<Ref. to FOREWORD [T3C1].>

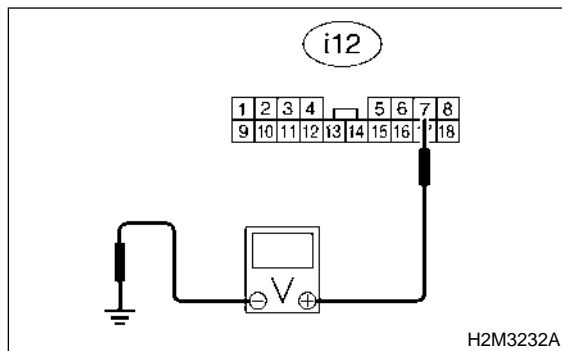
- CHECK** : Is there poor contact in combination meter connector?
- YES** : Repair poor contact in combination meter connector.
- NO** : Go to step 7A6.

7A6 : CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between combination meter connector and chassis ground.

Connector & terminal

(i12) No. 7 (+) — Chassis ground (-):



- CHECK** : **Is voltage more than 10 V?**
- YES** : Go to step **7A7**.
- NO** : Check the following and repair if necessary.

NOTE:

- Blown out fuse (No. 18).
- If replaced fuse (No. 18) is blown easily, check the harness for short circuit of harness between fuse (No. 18) and combination meter connector.
 - Open or short circuit in harness between fuse (No. 18) and combination meter connector
 - Open or short circuit in harness between fuse (No. 18) and ignition switch connector
 - Poor contact in ignition switch connector

7A7 : CHECK POOR CONTACT.

Check poor contact in combination meter connector.

<Ref. to FOREWORD [T3C1].>

- CHECK** : **Is there poor contact in combination meter connector?**
- YES** : Repair poor contact in combination meter connector.
- NO** : Replace bulb or combination meter.
<Ref. to 6-2 [W800].>

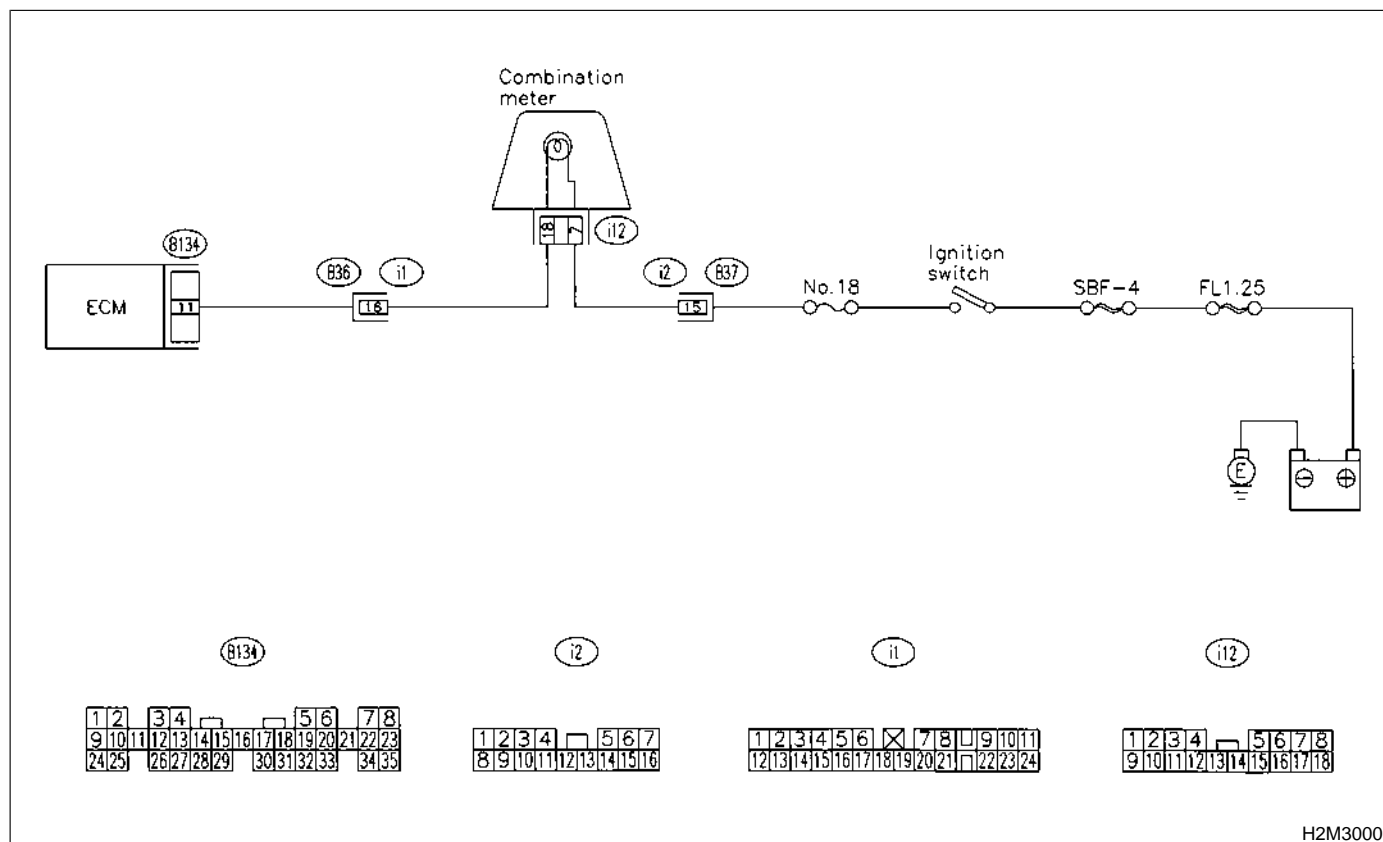
MEMO:

B: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT GO OFF.● **DIAGNOSIS:**

- The CHECK ENGINE malfunction indicator lamp (MIL) circuit is shorted.

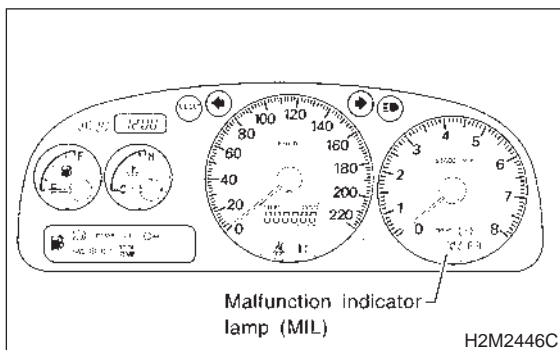
● **TROUBLE SYMPTOM:**

- Although MIL comes on when engine runs, trouble code is not shown on Subaru Select Monitor or OBD-II general scan tool display.

● **WIRING DIAGRAM:**

7B1 : CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Turn ignition switch to ON.



- CHECK** : ***Does the MIL come on?***
- YES** : Repair ground short circuit in harness between combination meter and ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

C: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT BLINK AT A CYCLE OF 3 Hz.

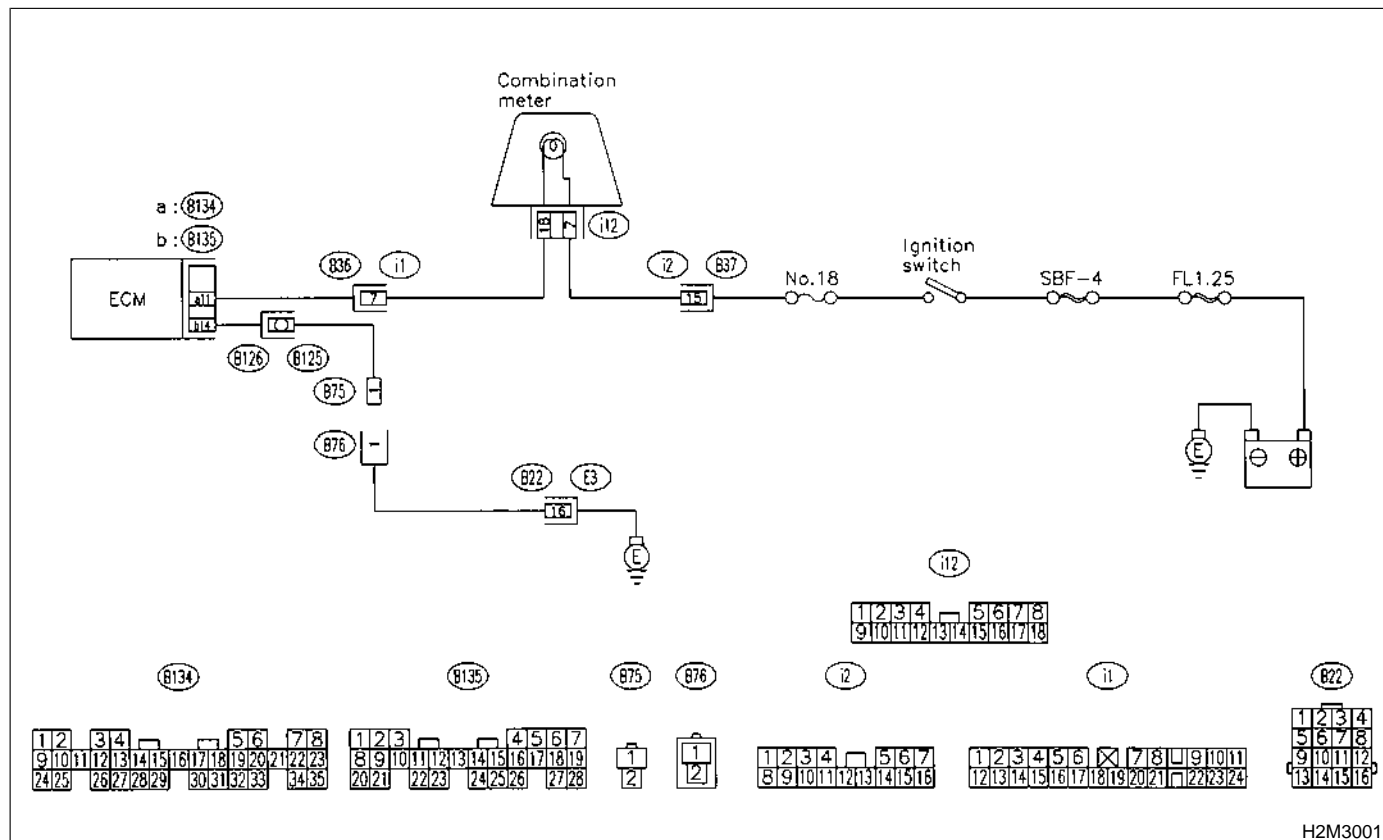
• DIAGNOSIS:

- The CHECK ENGINE malfunction indicator lamp (MIL) circuit is open or shorted.
- Test mode connector circuit is in open.

• TROUBLE SYMPTOM:

- When inspection mode, MIL does not blink at a cycle of 3 Hz.

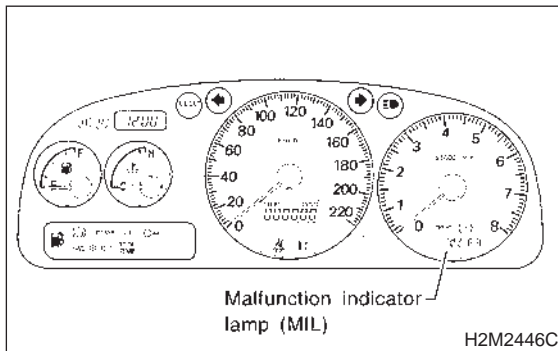
• WIRING DIAGRAM:



H2M3001

7C1 : CHECK OPERATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).

- 1) Turn ignition switch to OFF.
- 2) Disconnect test mode connector.
- 3) Turn ignition switch to ON.

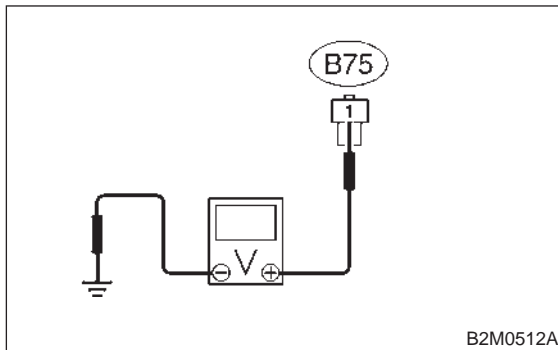


- CHECK** : Does the MIL come on?
- YES** : Go to step 7C2.
- NO** : Repair the MIL circuit. <Ref. to 2-7 [T7A0].>

7C2 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between test mode connector and chassis ground.

Connector & terminal
(B75) No. 1 (+) — Chassis ground (-):

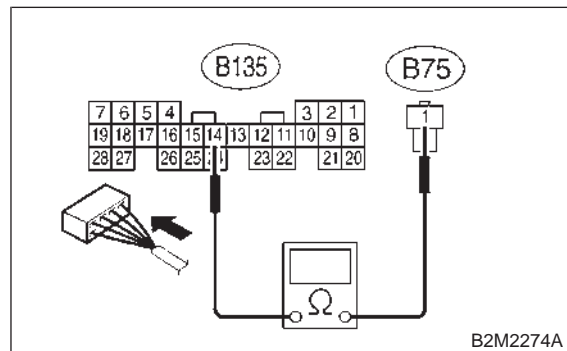


- CHECK** : Is voltage less than 1 V?
- YES** : Go to step 7C3.
- NO** : Go to step 7C5.

7C3 : CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM and test mode connector.

Connector & terminal
(B135) No. 14 — (B75) No. 1:



- CHECK** : Is resistance less than 1 Ω?
- YES** : Go to step 7C4.
- NO** : Repair open circuit in harness between ECM and test mode connector.

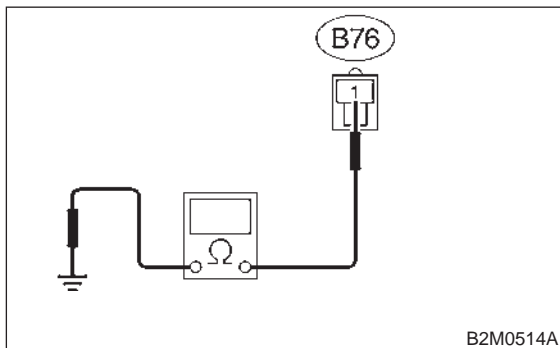
7C4 : CHECK POOR CONTACT.

Check poor contact in ECM connector.
<Ref. to FOREWORD [T3C1].>

- CHECK** : Is there poor contact in ECM connector?
- YES** : Repair poor contact in ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

7C5 : CHECK GROUND CIRCUIT.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between test mode connector and chassis ground.

Connector & terminal**(B76) No. 1 — Chassis ground:****CHECK** : **Is resistance less than 5 Ω ?****YES** : Repair poor contact in test mode connector.**NO** : Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open circuit in harness between test mode and coupling connector (B22)
- Open circuit in harness between coupling connector (B22) and engine grounding terminal
- Poor contact in coupling connector (B22)

MEMO:

D: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 Hz.

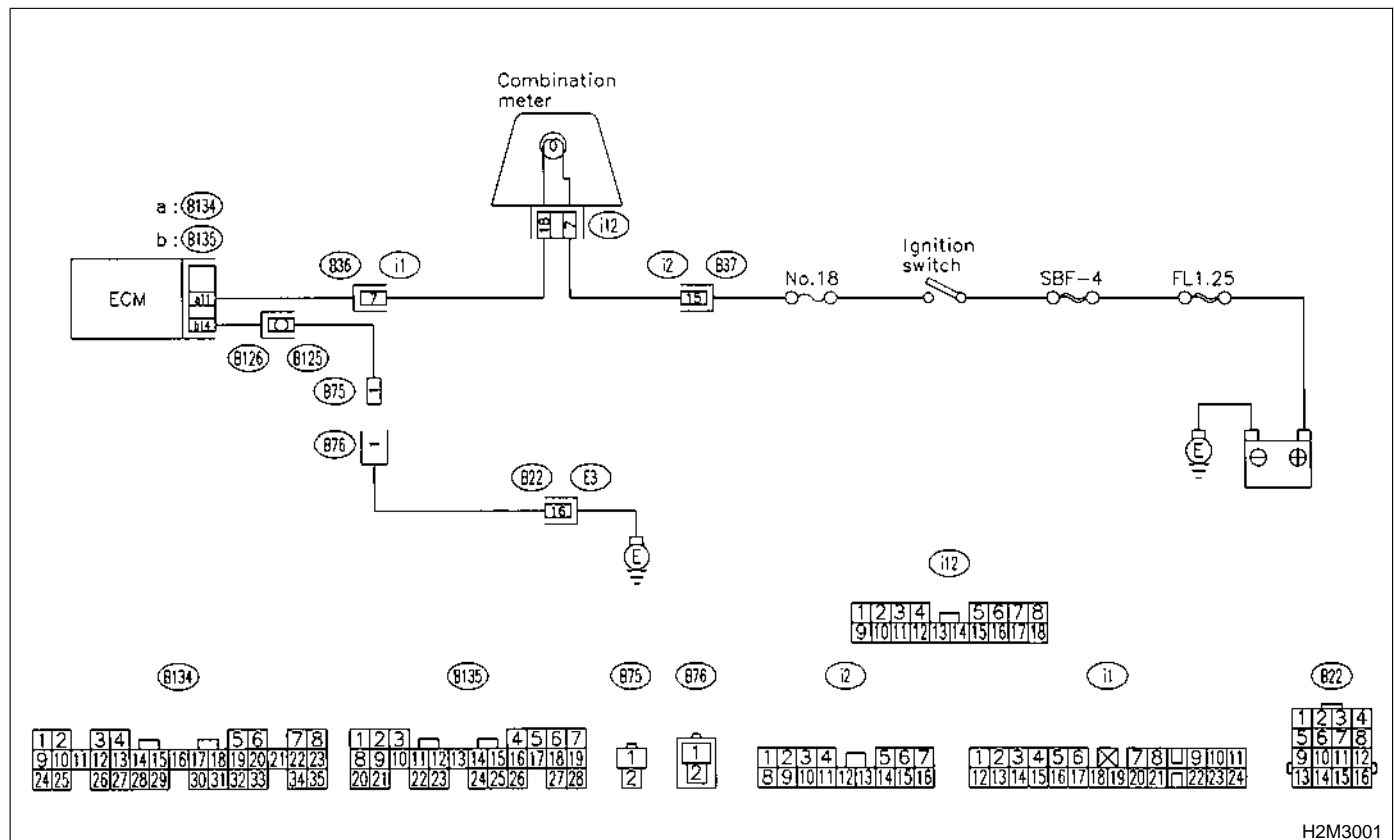
• DIAGNOSIS:

- Test mode connector circuit is shorted.

• TROUBLE SYMPTOM:

- Even though test mode connector is disconnected, MIL blinks at a cycle of 3 Hz when ignition switch is turned ON.

• WIRING DIAGRAM:



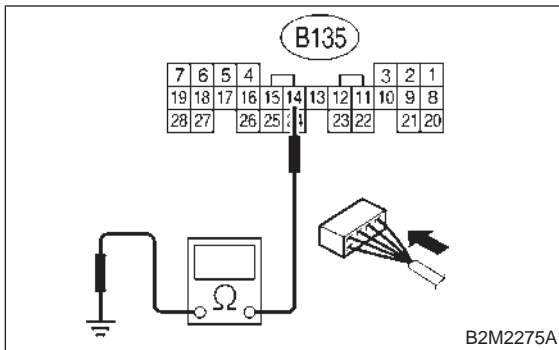
H2M3001

7D1 : CHECK HARNESS BETWEEN ECM CONNECTOR AND ENGINE GROUNDING TERMINAL.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B135) No. 14 — Chassis ground:



- CHECK** : **Is resistance less than 5 Ω ?**
- YES** : Repair short circuit in harness between ECM and test mode connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

MEMO:

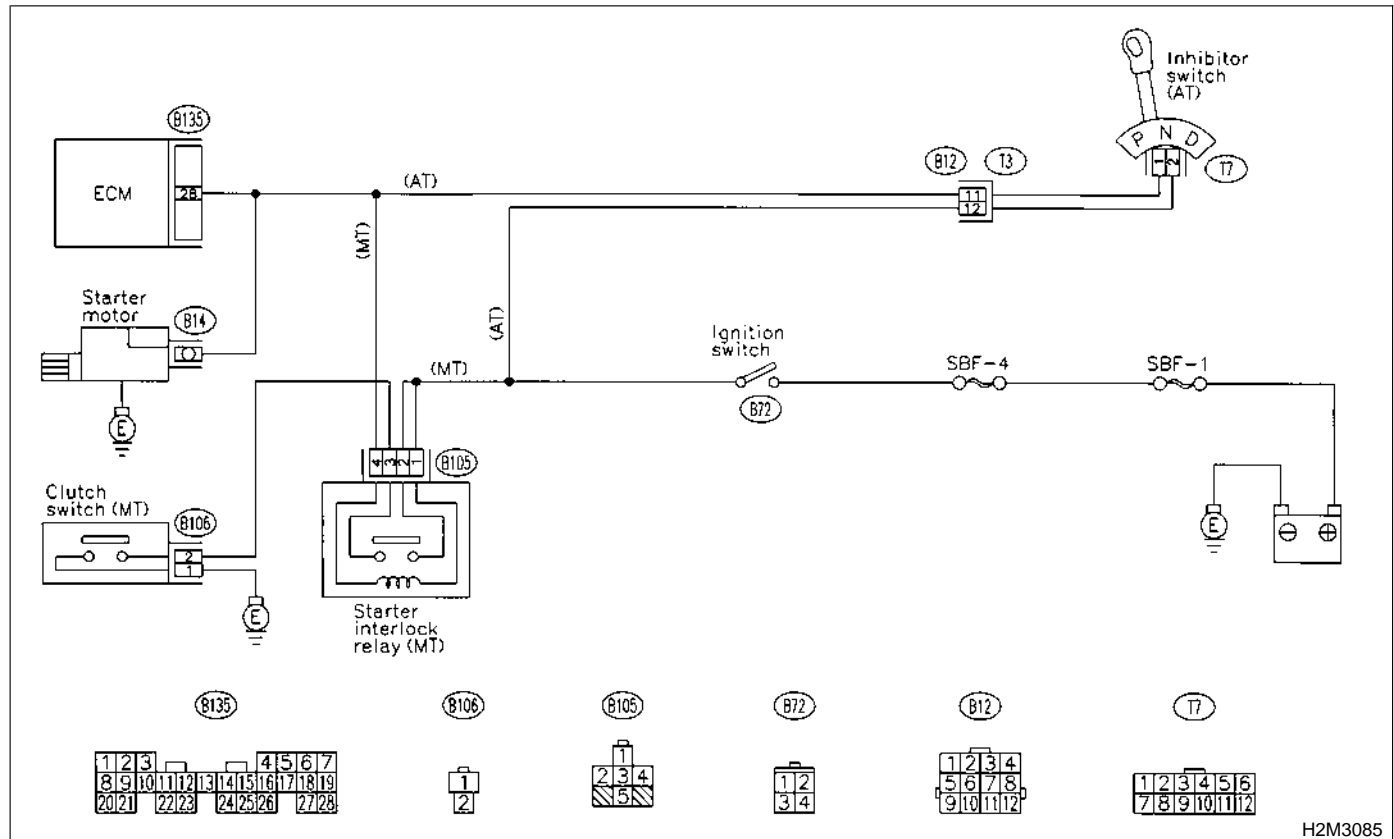
8. Diagnostics for Engine Starting Failure

A: BASIC DIAGNOSTICS CHART

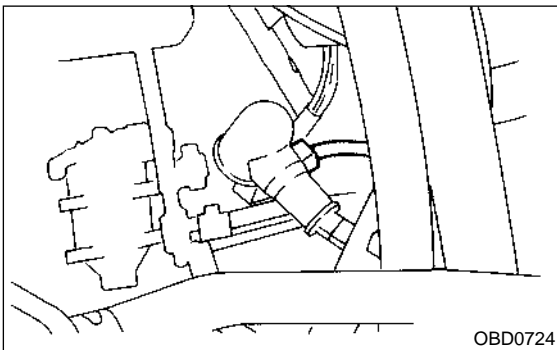
1. Inspection of starter motor circuit. <Ref. to 2-7 [T8B0].>	↓
2. Inspection of ECM power supply and ground line. <Ref. to 2-7 [T8C0].>	↓
3. Inspection of ignition control system. <Ref. to 2-7 [T8D0].>	↓
4. Inspection of fuel pump circuit. <Ref. to 2-7 [T8E0].>	↓
5. Inspection of fuel injector circuit. <Ref. to 2-7 [T8F0].>	↓
6. Inspection of crankshaft position sensor circuit. <Ref. to 2-7 [T8G0].> or <Ref. to 2-7 [T8H0].>	↓
7. Inspection of camshaft position sensor circuit. <Ref. to 2-7 [T8I0].>	↓
8. Inspection using Subaru Select Monitor or OBD-II general scan tool (California spec. vehicles: <Ref. to 2-7 [T10A0].>, and except 2200 cc California spec. vehicles: <Ref. to 2-7 [T11A0].> or inspection using "9. General Diagnostics Table". <Ref. to 2-7 [T900].>	

B: STARTER MOTOR CIRCUIT**CAUTION:**

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● **WIRING DIAGRAM:****8B1 : CHECK INPUT SIGNAL FOR STARTER MOTOR.**

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from starter motor.

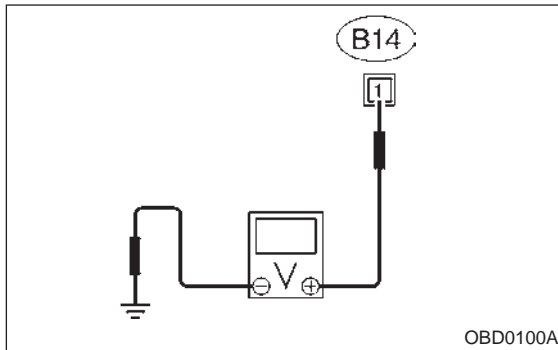


- 3) Turn ignition switch to ST.

4) Measure power supply voltage between starter motor connector terminal and engine ground.

Connector & terminal

(B14) No. 1 (+) — Engine ground (-):



NOTE:

- On AT vehicles, place the selector lever in the "P" or "N" position.
- On MT vehicles, depress the clutch pedal.

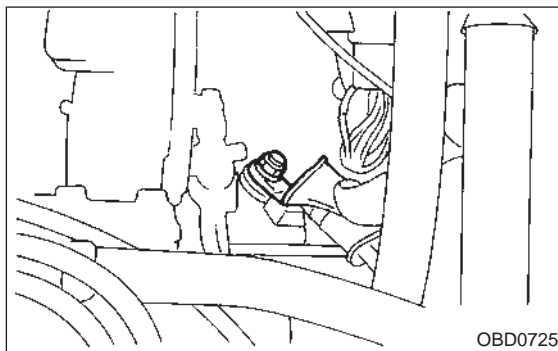
CHECK : Is the voltage more than 10 V?

YES : Go to step 8B2.

NO : Go to step 8B3.

8B2 : CHECK GROUND CIRCUIT OF STARTER MOTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect terminal from starter motor.



3) Measure resistance of ground cable between ground cable terminal and engine ground.

CHECK : Is resistance less than 5 Ω?

YES : Check starter motor. <Ref. to 6-1 [K100].>

NO : Repair open circuit of ground cable.

8B3 : CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Remove SBF No. 4 from main fuse box.
- 3) Measure resistance of fuse.

CHECK : Is resistance less than 1 Ω?

YES : Replace SBF No. 4. <Ref. to 6-3 [D5A0].>

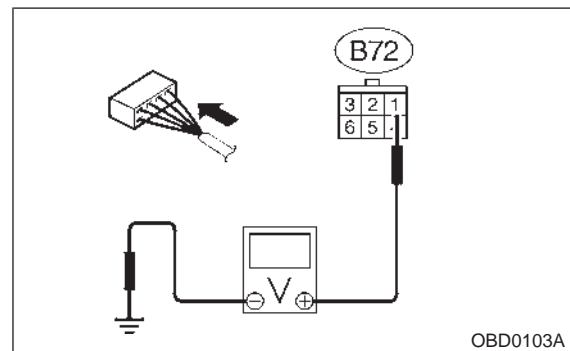
NO : Go to step 8B4.

8B4 : CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.

- 1) Install SBF No. 4 to main fuse box.
- 2) Turn ignition switch to ON.
- 3) Measure power supply voltage between ignition switch connector and chassis ground.

Connector & terminal

(B72) No. 1 (+) — Chassis ground (-):



CHECK : Is the voltage more than 10 V?

YES : Go to step 8B5.

NO : Repair open circuit in harness between ignition switch and SBF No. 4 connector.

8B5 : CHECK TRANSMISSION TYPE.

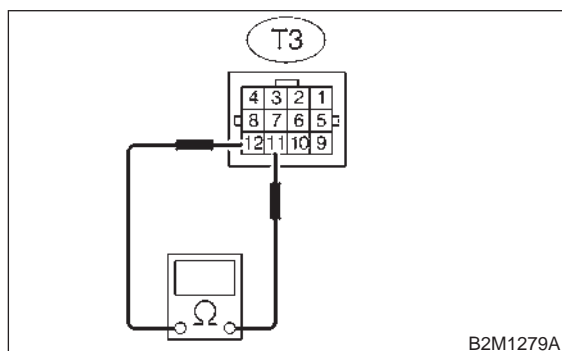
CHECK : Is transmission type AT?

YES : Go to step 8B6.

NO : Go to step 8B10.

8B6 : CHECK INHIBITOR SWITCH CIRCUIT.

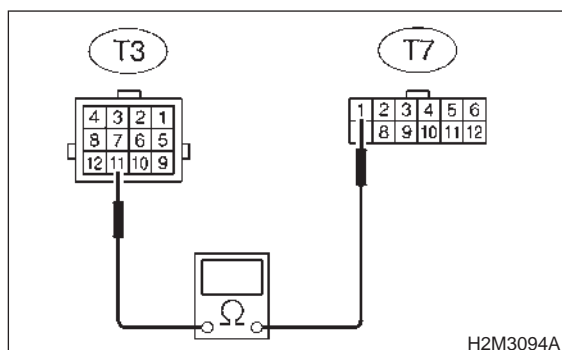
- 1) Turn ignition switch to OFF.
- 2) Place the selector lever in the "P" or "N" position.
- 3) Measure resistance between transmission harness connector receptacle's terminals.

Connector & terminal**(T3) No. 11 — No. 12:**

- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Repair open circuit in harness between starter motor and ignition switch connector.
- NO** : Go to step **8B7**.

8B7 : CHECK TRANSMISSION HARNESS.

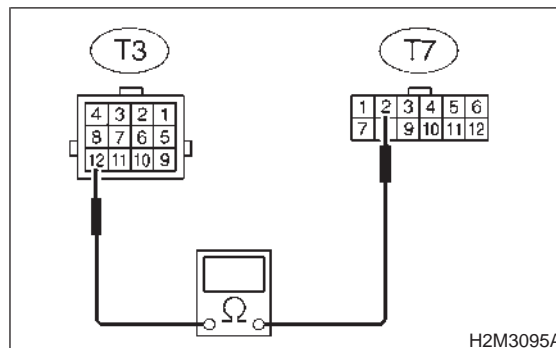
- 1) Disconnect connector from inhibitor switch.
- 2) Measure resistance of harness between transmission harness and inhibitor switch connector.

Connector & terminal**(T3) No. 11 — (T7) No. 1:**

- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Go to step **8B8**.
- NO** : Repair open circuit in harness between transmission harness and inhibitor switch connector.

8B8 : CHECK TRANSMISSION HARNESS.

Measure resistance of harness between transmission harness and inhibitor switch connector.

Connector & terminal**(T3) No. 12 — (T7) No. 2:**

- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Go to step **8B9**.
- NO** : Repair open circuit in harness between transmission harness and inhibitor switch connector.

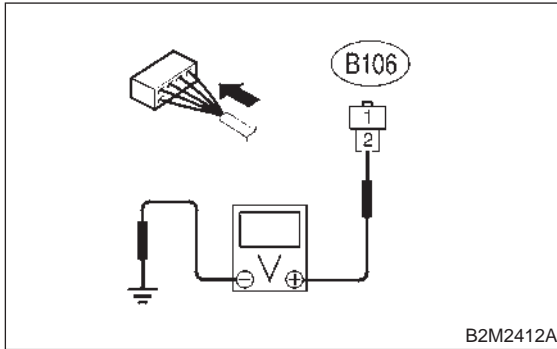
8B9 : CHECK POOR CONTACT.

Check poor contact in inhibitor switch connector.
 <Ref. to FOREWORD [T3C1].>

- CHECK** : **Is there poor contact in inhibitor switch connector?**
- YES** : Repair poor contact in inhibitor switch connector.
- NO** : Replace inhibitor switch. <Ref. to 3-2 [W2C0].>

8B10 : CHECK STARTER INTERLOCK CIRCUIT.

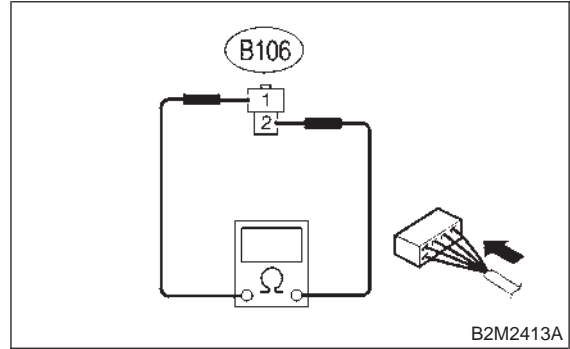
- 1) Turn ignition switch to "ST".
- 2) Measure voltage between clutch switch connector and chassis ground.

Connector & terminal**(B106) No. 2 (+) — Chassis ground (-):**

- CHECK** : **Is the voltage more than 10 V?**
- YES** : Replace starter interlock relay. <Ref. to 6-3 [D6D0].>
- NO** : Go to step **8B11**.

8B11 : CHECK STARTER INTERLOCK CIRCUIT.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between clutch switch connector terminals while depressing the clutch pedal.

Connector & terminal**(B106) No. 1 — No. 2:**

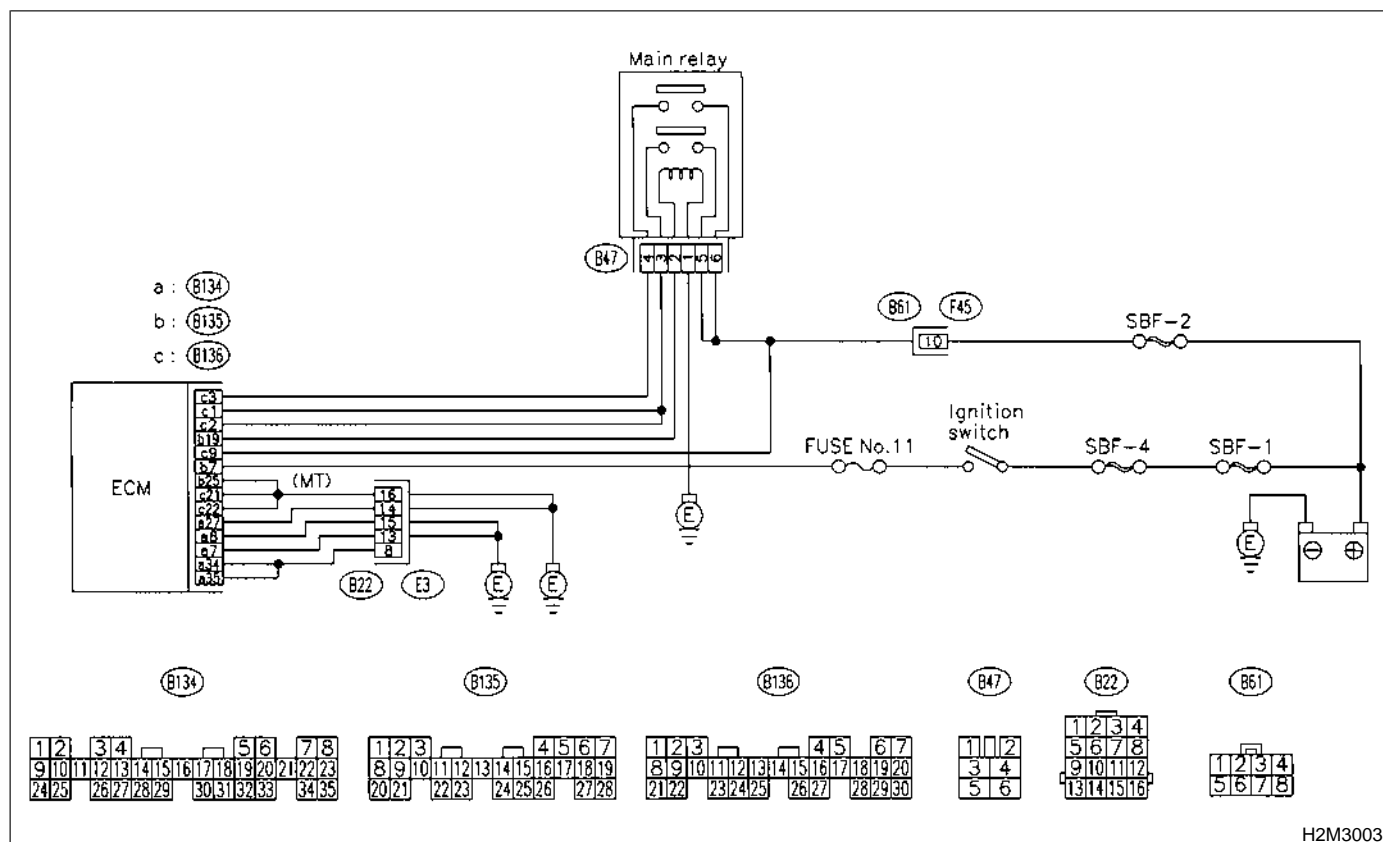
- CHECK** : **Is the resistance less than 10 Ω?**
- YES** : Repair open circuit in harness between starter motor and ignition switch connector.
- NO** : Replace clutch switch. <Ref. to 4-5 [C1A0].>

C: CONTROL MODULE POWER SUPPLY AND GROUND LINE

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:

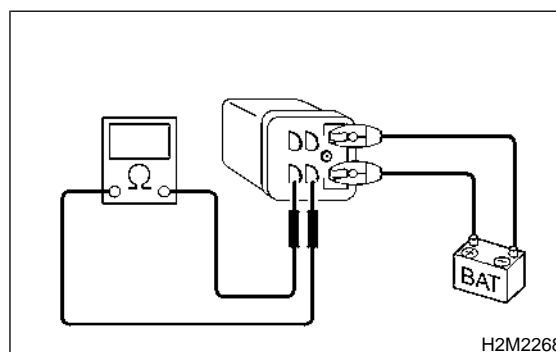


H2M3003

8C1 : CHECK MAIN RELAY.

- 1) Turn the ignition switch to OFF.
- 2) Remove main relay.
- 3) Connect battery to main relay terminals No. 1 and No. 2.

- 4) Measure resistance between main relay terminals.

Terminals**No. 3 — No. 5:**

CHECK : Is the resistance less than 10 Ω?

YES : Go to step 8C2.

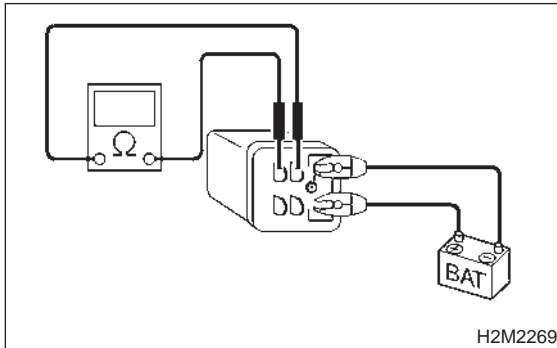
NO : Replace main relay. <Ref. to 2-7 [W16A0].>

8C2 : CHECK MAIN RELAY.

Measure resistance between main relay terminals.

Terminals

No. 4 — No. 6:



CHECK : Is the resistance less than 10 Ω?

YES : Go to step 8C3.

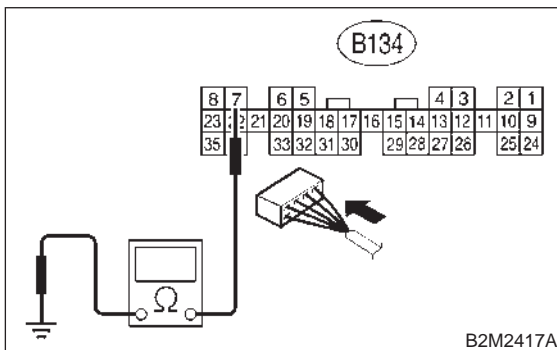
NO : Replace main relay. <Ref. to 2-7 [W16A0].>

8C3 : CHECK GROUND CIRCUIT OF ECM.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness connector between ECM and chassis ground.

Connector & terminal

(B134) No. 7 — Chassis ground:



CHECK : Is the resistance less than 5 Ω?

YES : Go to step 8C4.

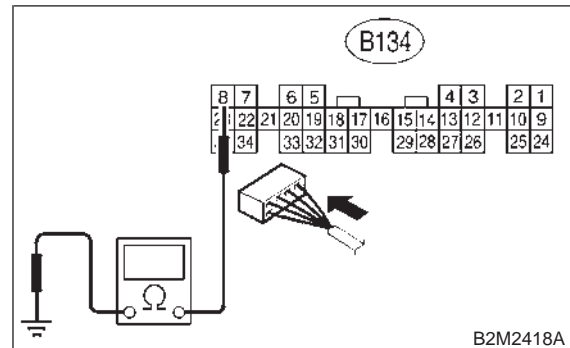
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8C4 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B134) No. 8 — Chassis ground:



CHECK : Is the resistance less than 5 Ω?

YES : Go to step 8C5.

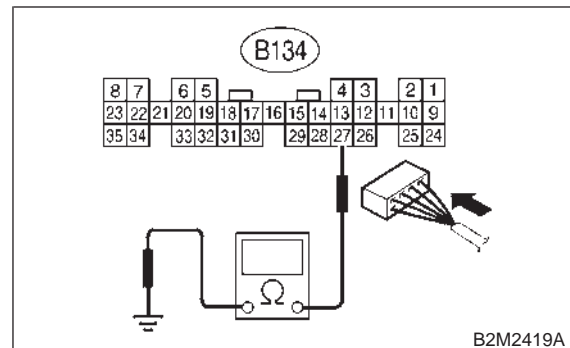
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8C5 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B134) No. 27 — Chassis ground:



CHECK : Is the resistance less than 5 Ω?

YES : Go to step 8C6.

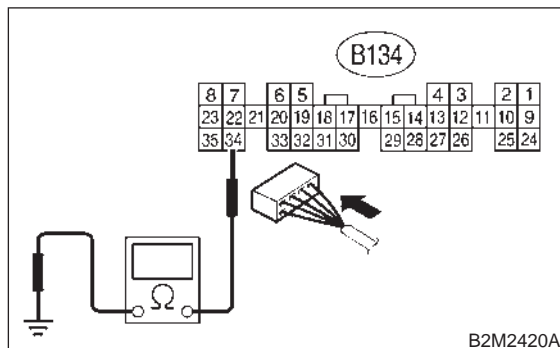
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8C6 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B134) No. 34 — Chassis ground:



CHECK : Is the resistance less than 5 Ω?

YES : Go to step 8C7.

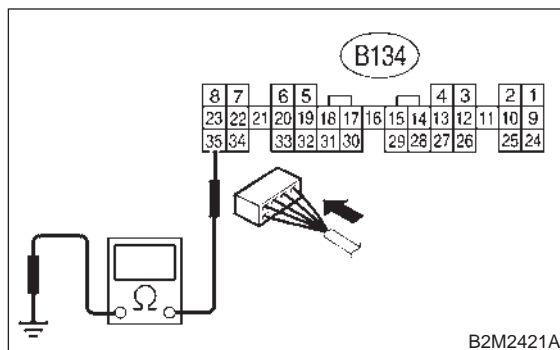
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8C7 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B134) No. 35 — Chassis ground:



CHECK : Is the resistance less than 5 Ω?

YES : Go to step 8C8.

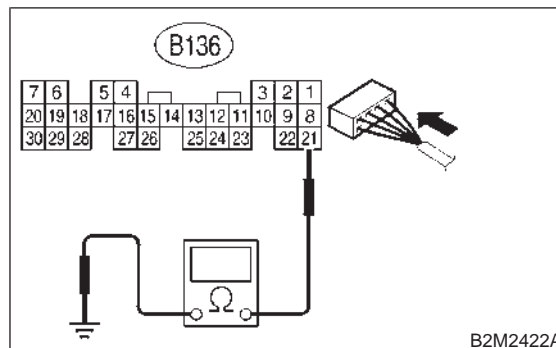
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8C8 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B136) No. 21 — Chassis ground:



CHECK : Is the resistance less than 5 Ω?

YES : Go to step 8C9.

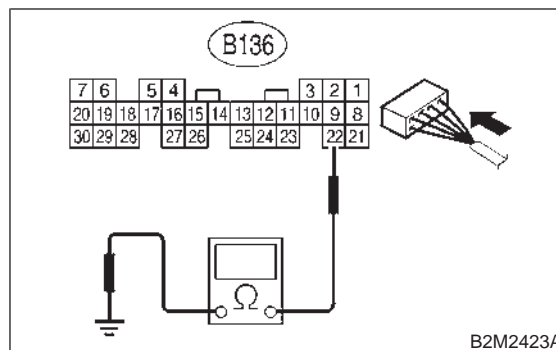
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8C9 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B136) No. 22 — Chassis ground:



CHECK : Is the resistance less than 5 Ω?

YES : Go to step 8C10.

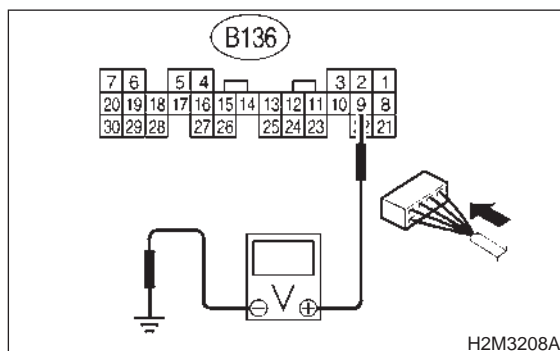
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8C10 : CHECK INPUT VOLTAGE OF ECM.

- 1) Disconnect connector from ECM.
- 2) Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 9 (+) — Chassis ground (-):



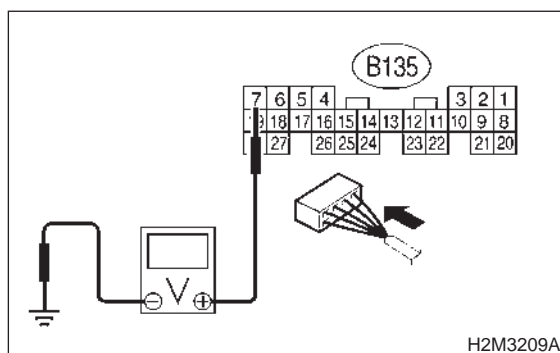
- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 8C11.
- NO** : Repair open or ground short circuit of power supply circuit.

8C11 : CHECK INPUT VOLTAGE OF ECM.

- 1) Ignition switch to ON.
- 2) Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B135) No. 7 (+) — Chassis ground (-):



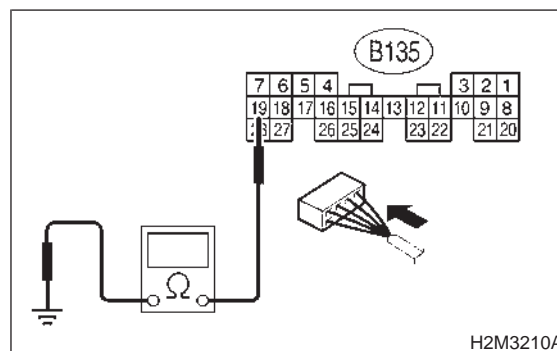
- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 8C12.
- NO** : Repair open or ground short circuit of power supply circuit.

8C12 : CHECK HARNESS BETWEEN ECM AND MAIN RELAY CONNECTOR.

- 1) Ignition switch to OFF.
- 2) Measure resistance between ECM and chassis ground.

Connector & terminal

(B135) No. 19 — Chassis ground:



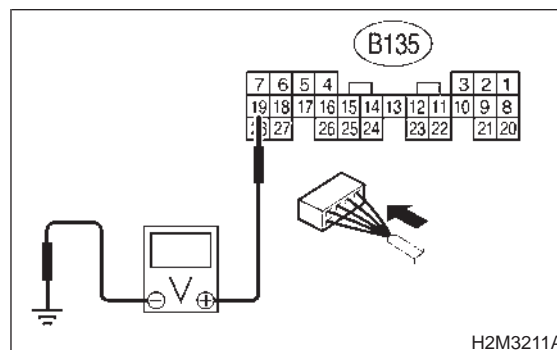
- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 8C13.
- NO** : Repair ground short circuit in harness between ECM connector and main relay connector, then replace ECM.

8C13 : CHECK OUTPUT VOLTAGE FROM ECM.

- 1) Connect connector to ECM.
- 2) Ignition switch to ON.
- 3) Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B135) No. 19 (+) — Chassis ground (-):



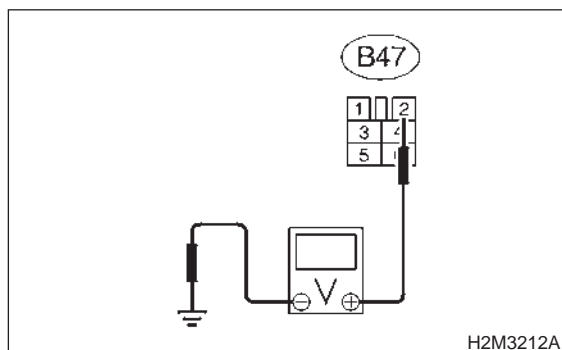
- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 8C14.
- NO** : Replace ECM.

8C14 : CHECK INPUT VOLTAGE OF MAIN RELAY.

Check voltage between main relay connector and chassis ground.

Connector & terminal

(B47) No. 2 (+) — Chassis ground (-):



CHECK : Is the voltage more than 10 V?

YES : Go to step 8C15.

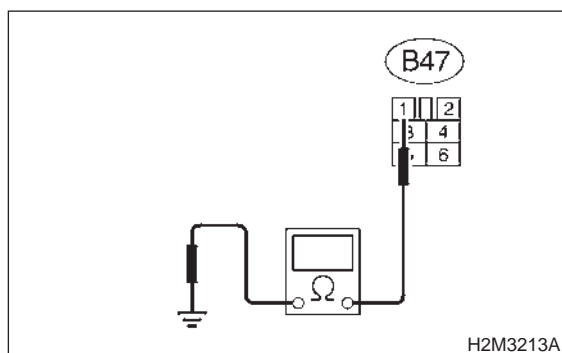
NO : Repair open circuit in harness between ECM connector and main relay connector.

8C15 : CHECK GROUND CIRCUIT OF MAIN RELAY.

- 1) Ignition switch to OFF.
- 2) Measure resistance between main relay connector and chassis ground.

Connector & terminal

(B47) No. 1 — Chassis ground:



CHECK : Is the resistance less than 5 Ω?

YES : Go to step 8C16.

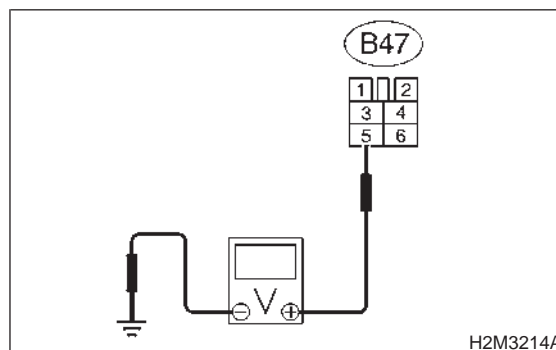
NO : Repair open circuit between main relay and chassis ground.

8C16 : CHECK INPUT VOLTAGE OF MAIN RELAY.

Measure voltage between main relay connector and chassis ground.

Connector & terminal

(B47) No. 5 (+) — Chassis ground (-):



CHECK : Is the voltage more than 10 V?

YES : Go to step 8C17.

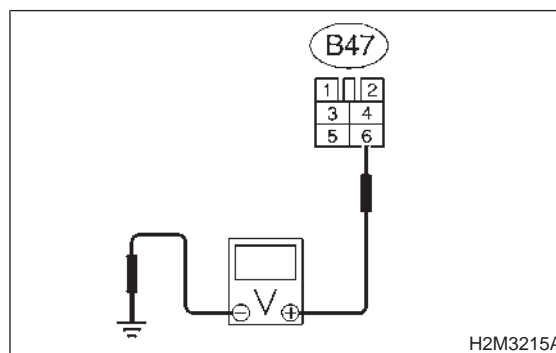
NO : Repair open or ground short circuit in harness of power supply circuit.

8C17 : CHECK INPUT VOLTAGE OF MAIN RELAY.

Measure voltage between main relay connector and chassis ground.

Connector & terminal

(B47) No. 6 (+) — Chassis ground (-):



CHECK : Is the voltage more than 10 V?

YES : Go to step 8C18.

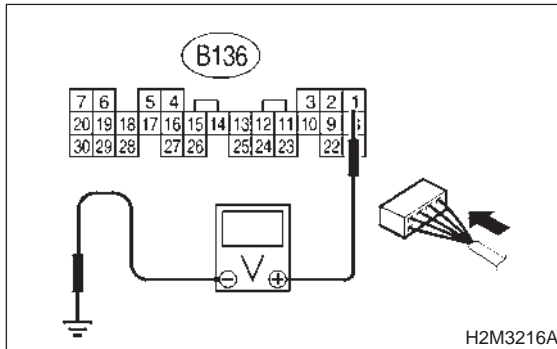
NO : Repair open or ground short circuit in harness of power supply circuit.

8C18 : CHECK INPUT VOLTAGE OF ECM.

- 1) Connect main relay connector.
- 2) Ignition switch to ON.
- 3) Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 1 (+) — Chassis ground (-):



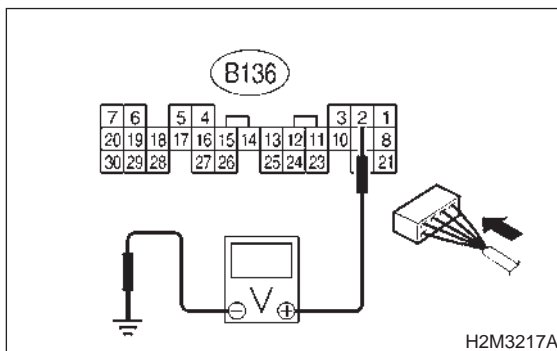
- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 8C19.
- NO** : Repair open or ground short circuit in harness between ECM connector and main relay connector.

8C19 : CHECK INPUT VOLTAGE OF ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 2 (+) — Chassis ground (-):



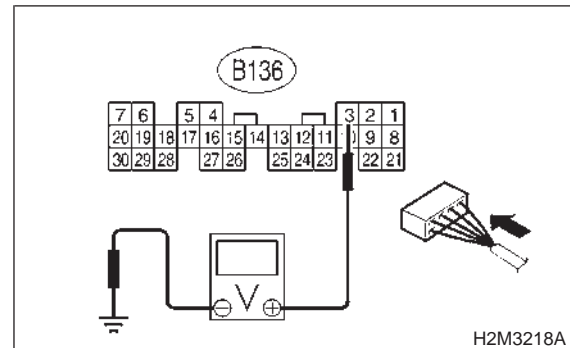
- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 8C20.
- NO** : Repair open or ground short circuit in harness between ECM connector and main relay connector.

8C20 : CHECK INPUT VOLTAGE OF ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 3 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 8C21.
- NO** : Repair open or ground short circuit in harness between ECM connector and main relay connector.

8C21 : CHECK TRANSMISSION TYPE.

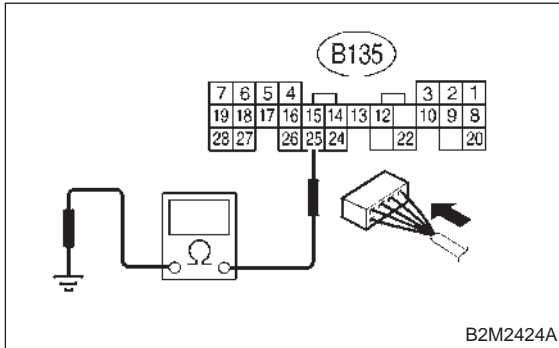
- CHECK** : Is transmission type AT?
- YES** : Check ignition control system. <Ref. to 2-7 [T8D0].>
- NO** : Go to step 8C22.

8C22 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B135) No. 25 — Chassis ground:



- CHECK** : **Is the resistance less than 5 Ω ?**
- YES** : Check ignition control system. <Ref. to 2-7 [T8D0].>
- NO** : Repair open circuit in harness between ECM connector and engine grounding terminal.

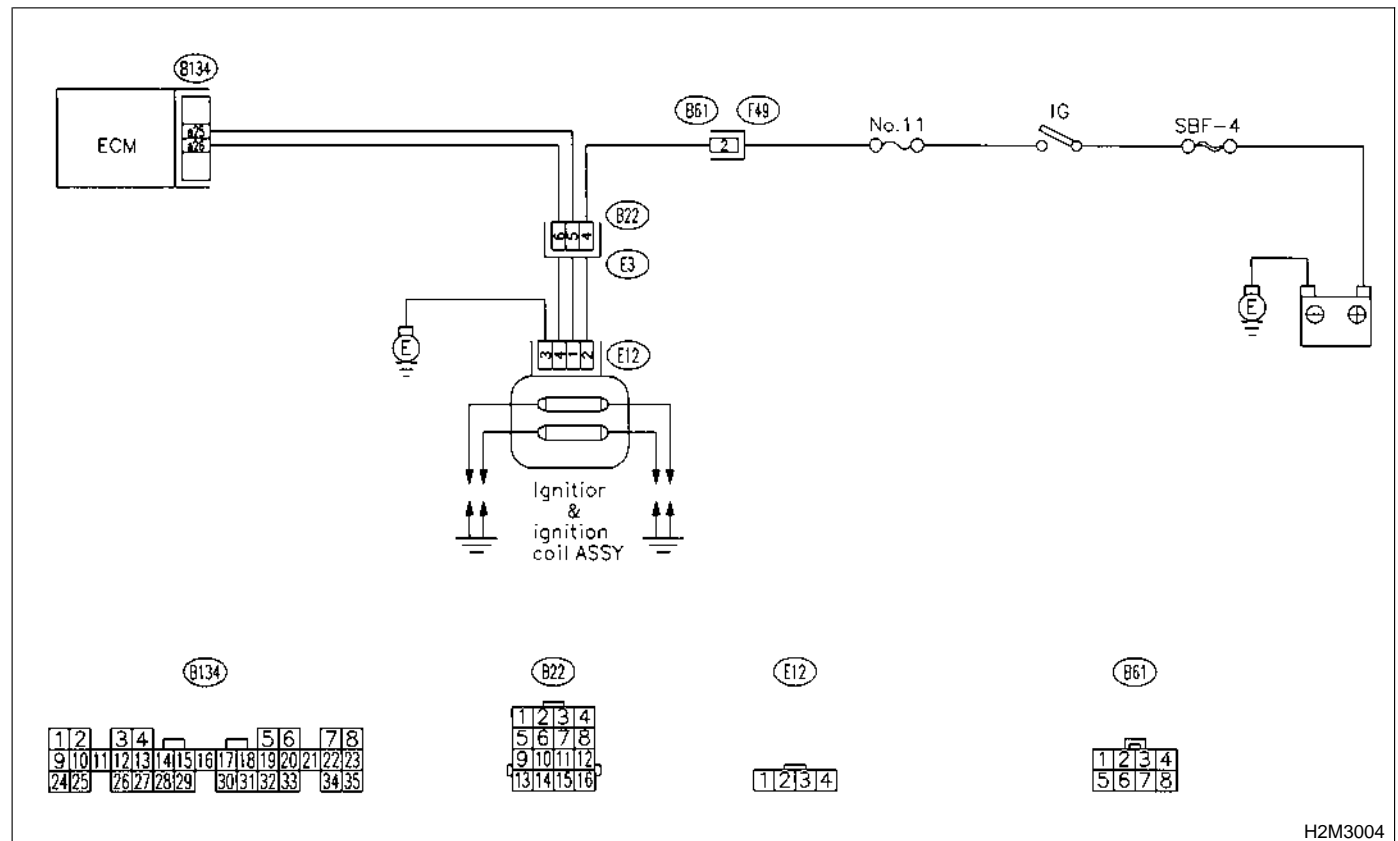
MEMO:

D: IGNITION CONTROL SYSTEM

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

- **WIRING DIAGRAM:**



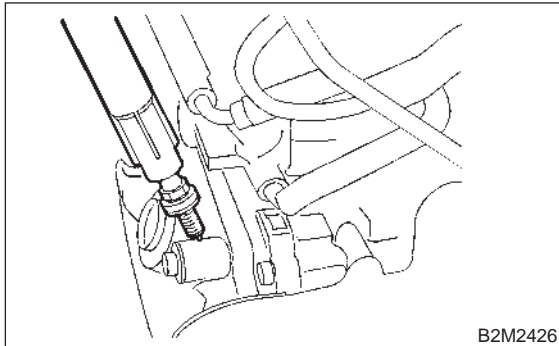
8D1 : CHECK IGNITION SYSTEM FOR SPARKS.

- 1) Remove plug cord cap from each spark plug.
- 2) Install new spark plug on plug cord cap.

CAUTION:

Do not remove spark plug from engine.

- 3) Contact spark plug's thread portion on engine.
- 4) While opening throttle valve fully, crank engine to check that spark occurs at each cylinder.



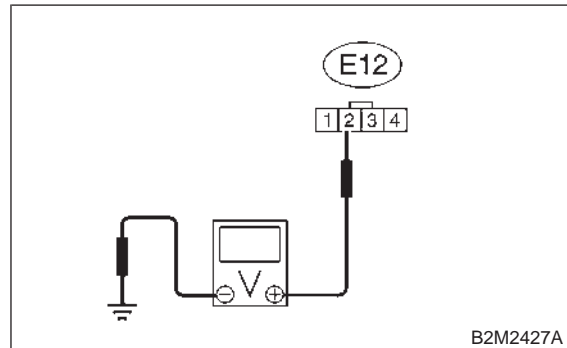
- CHECK** : **Does spark occur at each cylinder?**
- YES** : Check fuel pump system. <Ref. to 2-7 [T8E0].>
- NO** : Go to step **8D2**.

8D2 : CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL & IGNITOR ASSEMBLY.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ignition coil & ignitor assembly.
- 3) Turn ignition switch to ON.
- 4) Measure power supply voltage between ignition coil & ignitor assembly connector and engine ground.

Connector & terminal

(E12) No. 2 (+) — Engine ground (-):



- CHECK** : **Is the voltage more than 10 V?**
- YES** : Go to step **8D3**.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

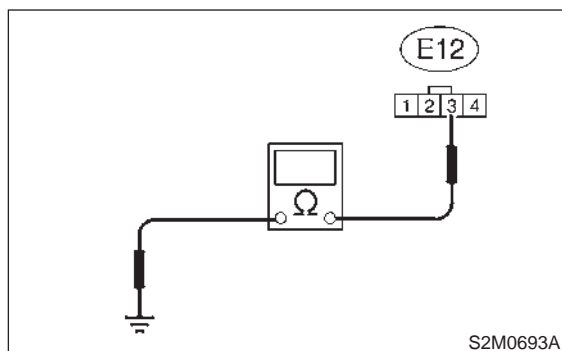
- Open circuit in harness between ignition coil & ignitor assembly, and ignition switch connector
- Poor contact in coupling connectors (B22) and (F44)

8D3 : CHECK HARNESS OF IGNITION COIL & IGNITOR ASSEMBLY GROUND CIRCUIT.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ignition coil & ignitor assembly connector and engine ground.

Connector & terminal

(E12) No. 3 — Engine ground:



CHECK : Is the resistance between less than 5 Ω ?

YES : Go to step 8D4.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

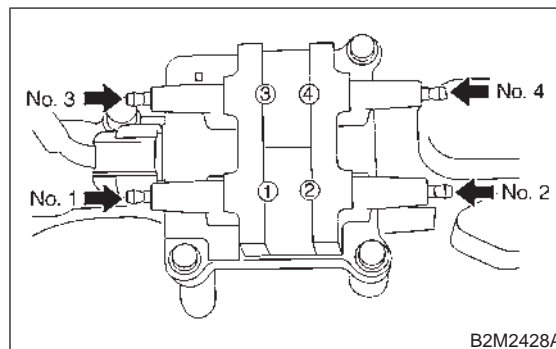
- Open circuit in harness between ignition coil & ignitor assembly connector and engine grounding terminal

8D4 : CHECK IGNITION COIL & IGNITOR ASSEMBLY.

- 1) Remove spark plug cords.
- 2) Measure resistance between spark plug cord contact portions to check secondary coil.

Terminals

No. 1 — No. 2:



CHECK : Is the resistance between 10 and 15 $k\Omega$?

YES : Go to step 8D5.

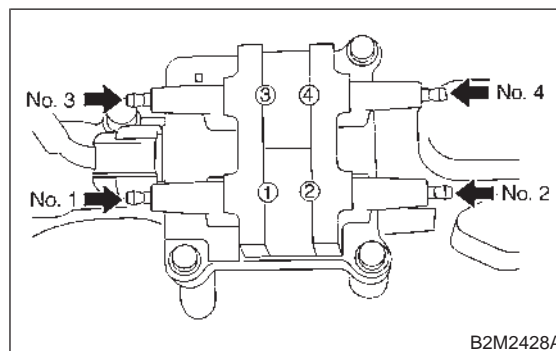
NO : Replace ignition coil & ignitor assembly.
<Ref. to 6-1 [W4A0].>

8D5 : CHECK IGNITION COIL & IGNITOR ASSEMBLY.

Measure resistance between spark plug cord contact portions to check secondary coil.

Terminals

No. 3 — No. 4:



CHECK : Is the resistance between 10 and 15 $k\Omega$?

YES : Go to step 8D6.

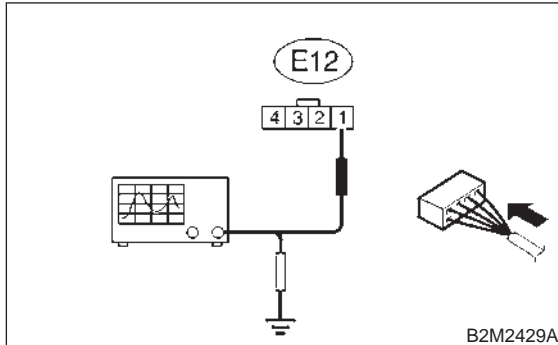
NO : Replace ignition coil & ignitor assembly.
<Ref. to 6-1 [W4A0].>

8D6 : CHECK INPUT SIGNAL FOR IGNITION COIL & IGNITOR ASSEMBLY.

- 1) Connect connector to ignition coil & ignitor assembly.
- 2) Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil & ignitor assembly connector and engine ground.

Connector & terminal

(E12) No. 1 (+) — Engine ground (-):



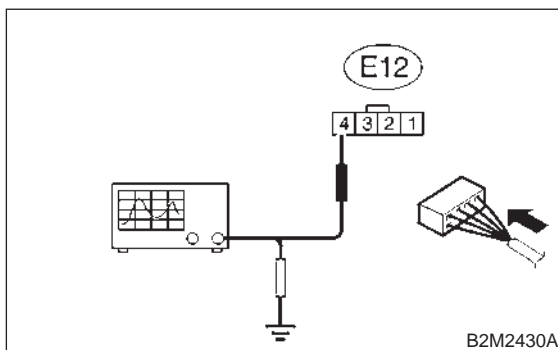
- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 8D7.
- NO** : Replace ignition coil & ignitor assembly.
<Ref. to 6-1 [W4A0].>

8D7 : CHECK INPUT SIGNAL FOR IGNITION COIL & IGNITOR ASSEMBLY.

Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil & ignitor assembly connector and engine ground.

Connector & terminal

(E12) No. 4 (+) — Engine ground (-):



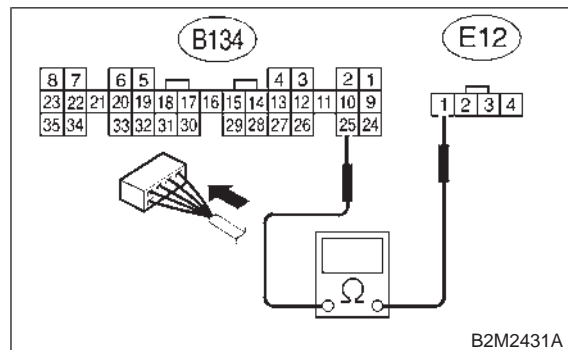
- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 8D8.
- NO** : Replace ignition coil & ignitor assembly.
<Ref. to 6-1 [W4A0].>

8D8 : CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Disconnect connector from ignition coil & ignitor assembly.
- 4) Measure resistance of harness between ECM and ignition coil & ignitor assembly connector.

Connector & terminal

(B134) No. 25 — (E12) No. 1:



- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8D9.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

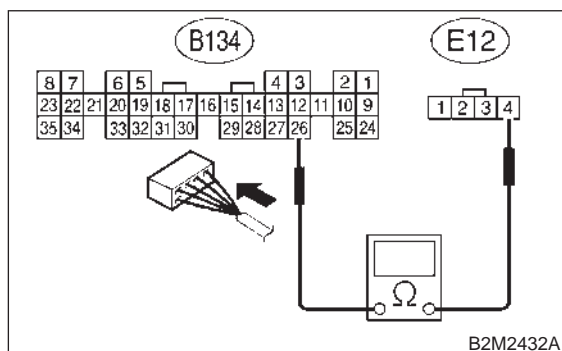
- Open circuit in harness between ECM and ignition coil & ignitor assembly connector
- Poor contact in coupling connector (B22)

8D9 : CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.

Measure resistance of harness between ECM and ignition coil & ignitor assembly connector.

Connector & terminal

(B134) No. 26 — (E12) No. 4:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 8D10.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

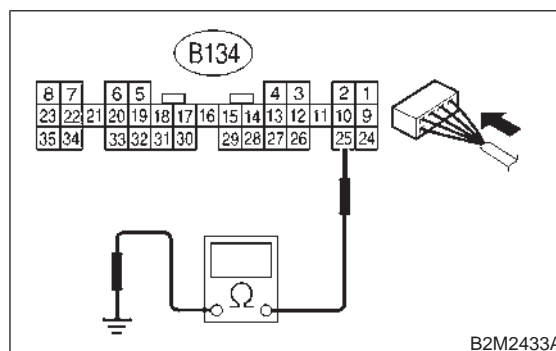
- Open circuit in harness between ECM and ignition coil & ignitor assembly connector
- Poor contact in coupling connector (B22)

8D10 : CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.

Measure resistance of harness between ECM and engine ground.

Connector & terminal:

(B134) No. 25 — Engine ground:



CHECK : Is the resistance more than 1 $M\Omega$?

YES : Go to step 8D11.

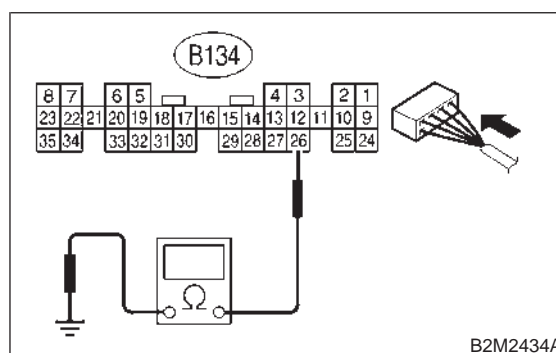
NO : Repair ground short circuit in harness between ECM and ignition coil & ignitor assembly connector.

8D11 : CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.

Measure resistance of harness between ECM and engine ground.

Connector & terminal

(B134) No. 26 — Engine ground:



CHECK : Is the resistance more than 1 $M\Omega$?

YES : Go to step 8D12.

NO : Repair ground short circuit in harness between ECM and ignition coil & ignitor assembly connector.

8D12 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

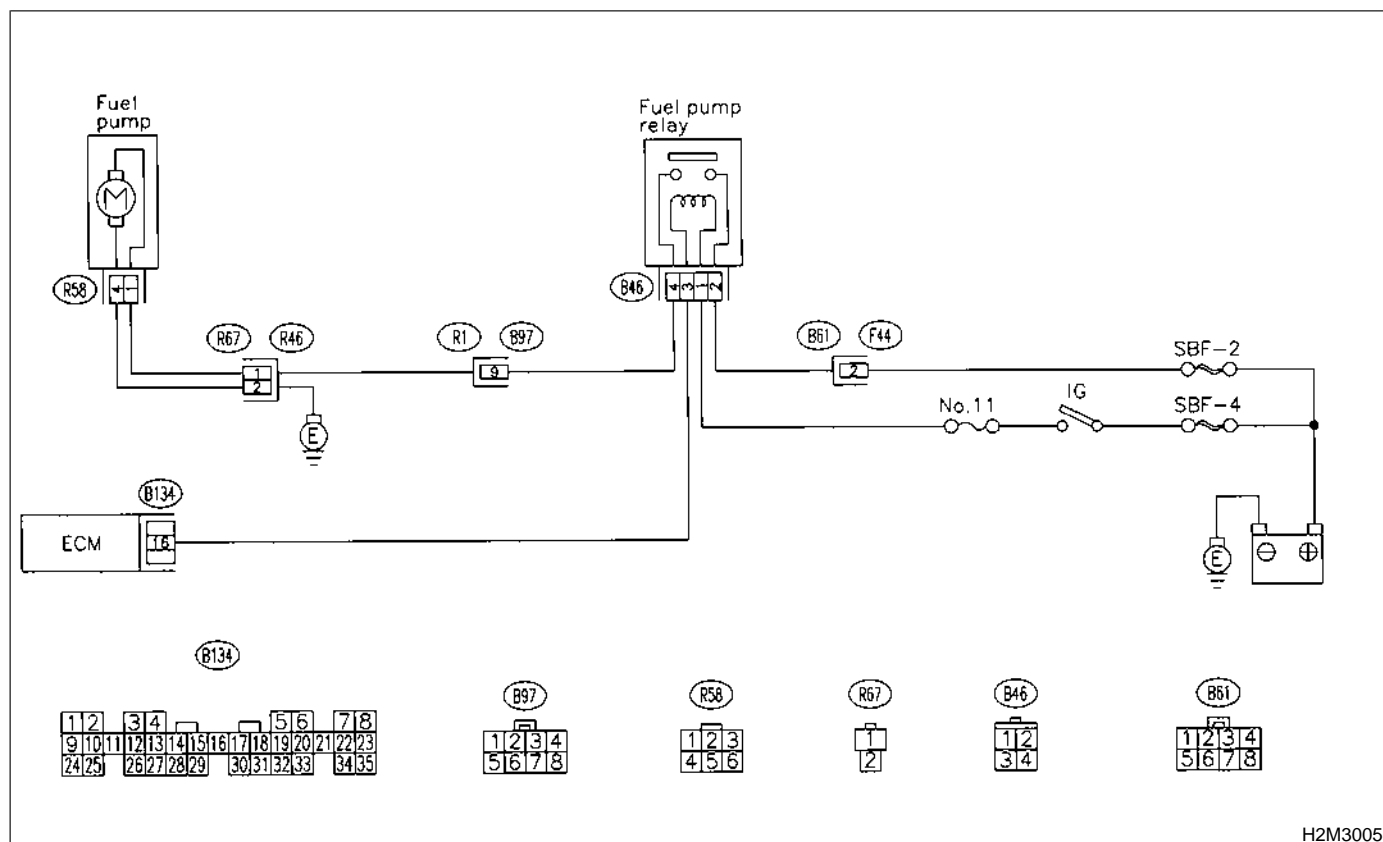
CHECK : *Is there poor contact in ECM connector?*

YES : Repair poor contact in ECM connector.

NO : Check fuel pump circuit. <Ref. to 2-7 [T8E0].>

E: FUEL PUMP CIRCUIT**CAUTION:**

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>

● **WIRING DIAGRAM:**

H2M3005

8E1 : CHECK OPERATING SOUND OF FUEL PUMP.

Make sure that fuel pump is in operation for two seconds when turning ignition switch to ON.

NOTE:

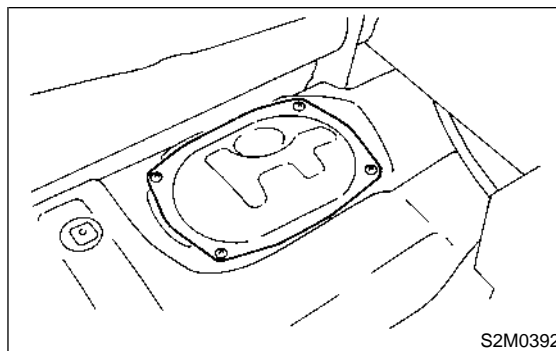
Fuel pump operation check can also be executed using Subaru Select Monitor (Function mode: FD01).

For the procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

- CHECK** : Does fuel pump produce operating sound?
- YES** : Check fuel injector circuit. <Ref. to 2-7 [T8F0].>
- NO** : Go to step **8E2**.

8E2 : CHECK GROUND CIRCUIT OF FUEL PUMP.

- 1) Turn ignition switch to OFF.
- 2) Remove fuel pump access hole lid located on the right rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).

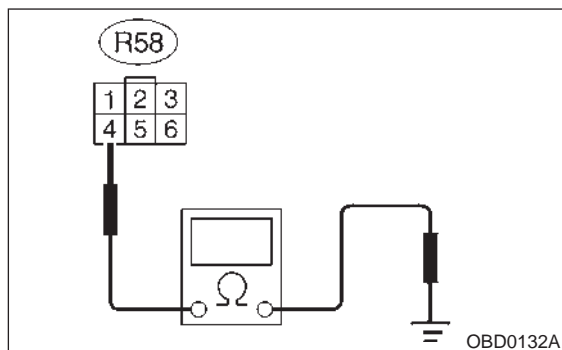


- 3) Disconnect connector from fuel pump.

4) Measure resistance of harness connector between fuel pump and chassis ground.

Connector & terminal

(R58) No. 4 — Chassis ground:



CHECK : Is the resistance less than 5 Ω?

YES : Go to step 8E3.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

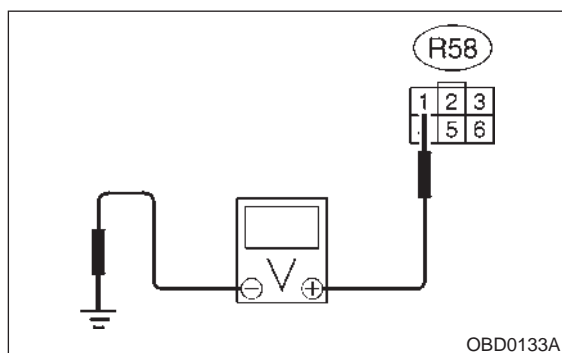
- Open circuit in harness between fuel pump connector and chassis grounding terminal
- Poor contact in coupling connector (R67)

8E3 : CHECK POWER SUPPLY TO FUEL PUMP.

1) Turn ignition switch to ON.
2) Measure voltage of power supply circuit between fuel pump connector and chassis ground.

Connector & terminal

(R58) No. 1 (+) — Chassis ground (-):



CHECK : Is the voltage more than 10 V?

YES : Replace fuel pump. <Ref. to 2-8 [W5A0].>

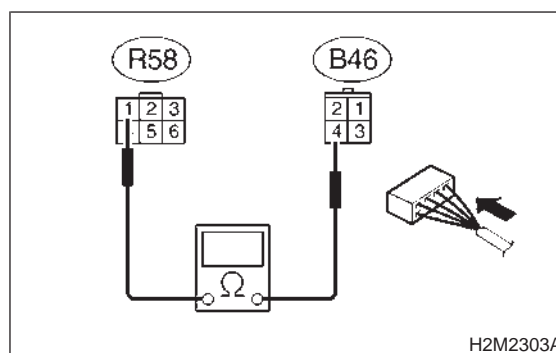
NO : Go to step 8E4.

8E4 : CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.

1) Turn ignition switch to OFF.
2) Measure resistance of harness connector between fuel pump and fuel pump relay.

Connector & terminal

(R58) No. 1 — (B46) No. 4:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 8E5.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

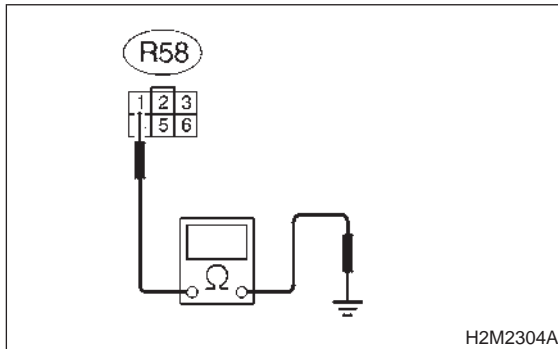
- Open circuit in harness between fuel pump connector and chassis grounding terminal
- Poor contact in coupling connectors (R67) and (B97)

8E5 : CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.

Measure resistance of harness between fuel pump and fuel pump relay connector.

Connector & terminal

(R58) No. 1 — Chassis ground:



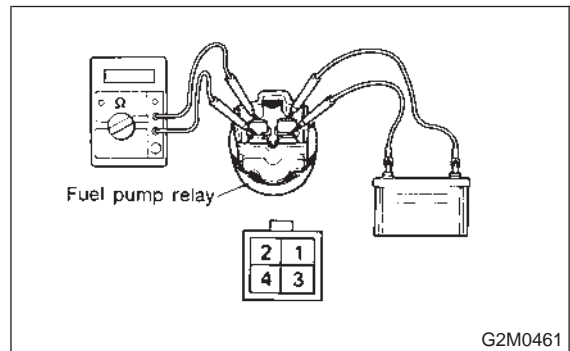
- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 8E6.
- NO** : Repair short circuit in harness between fuel pump and fuel pump relay connector.

8E6 : CHECK FUEL PUMP RELAY.

- 1) Disconnect connectors from fuel pump relay and main relay.
- 2) Remove fuel pump relay and main relay with bracket.
- 3) Connect battery to fuel pump relay connector terminals No. 1 and No. 3.
- 4) Measure resistance between connector terminals of fuel pump relay.

Terminals

No. 2 — No. 4:



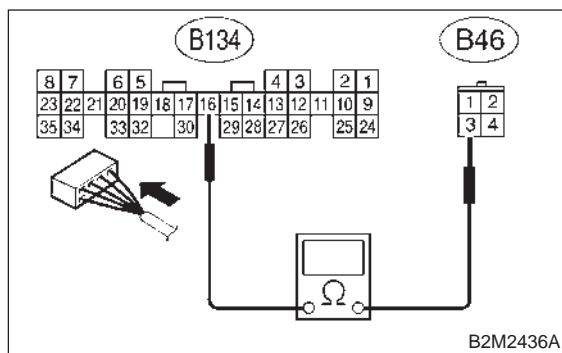
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Go to step 8E7.
- NO** : Replace fuel pump relay. <Ref. to 2-7 [W17A0].>

8E7 : CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR.

- 1) Disconnect connectors from ECM.
- 2) Measure resistance of harness between ECM and fuel pump relay connector.

Connector & terminal

(B134) No. 16 — (B46) No. 3:



- CHECK** : *Is the resistance less than 1 Ω ?*
- YES** : Go to step **8E8**.
- NO** : Repair open circuit in harness between ECM and fuel pump relay connector.

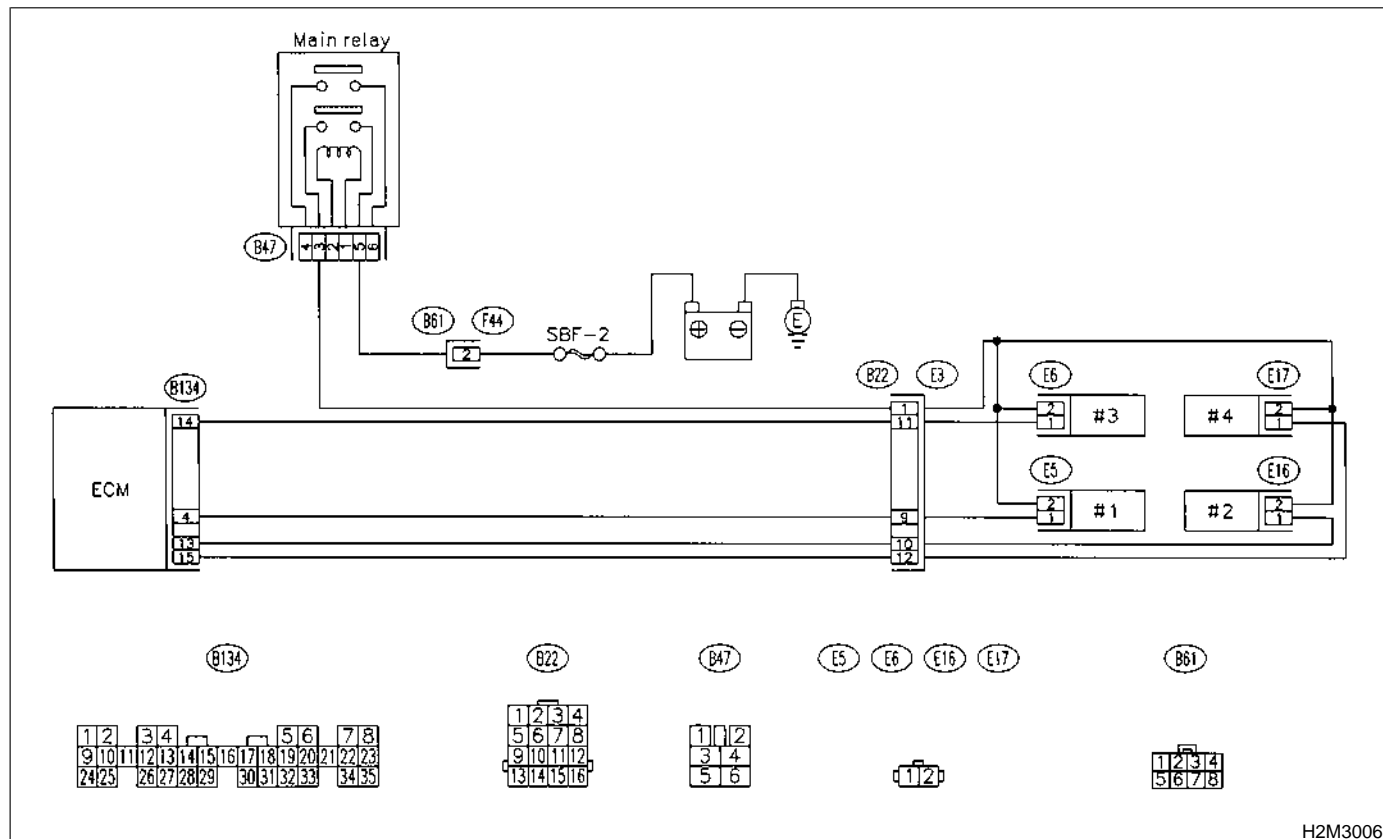
8E8 : CHECK POOR CONTACT.

Check poor contact in ECM connector.
<Ref. to FOREWORD [T3C1].>

- CHECK** : *Is there poor contact in ECM connector?*
- YES** : Repair poor contact in ECM connector.
- NO** : Check fuel injector circuit. <Ref. to 2-7 [T8F0].>

F: FUEL INJECTOR CIRCUIT**CAUTION:**

- Check or repair only faulty parts.
- After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

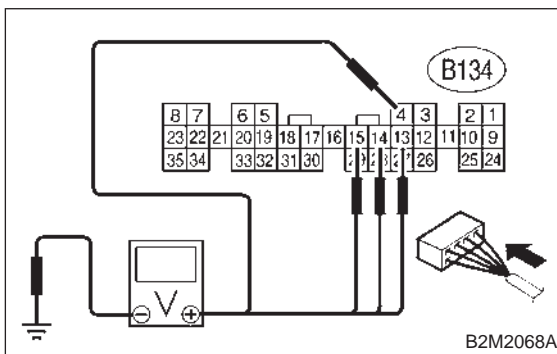
H2M3006

8F1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM connector and chassis ground on faulty cylinders.

Connector & terminal

- #1 (B134) No. 4 (+) — Chassis ground (-):
- #2 (B134) No. 13 (+) — Chassis ground (-):
- #3 (B134) No. 14 (+) — Chassis ground (-):
- #4 (B134) No. 15 (+) — Chassis ground (-):



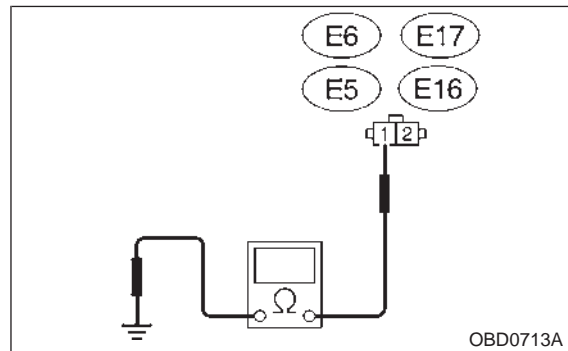
- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 8F6.
- NO** : Go to step 8F2.

8F2 : CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from fuel injector on faulty cylinders.
- 3) Measure voltage between ECM connector and engine ground on faulty cylinders.

Connector & terminal

- #1 (E5) No. 1 — Engine ground:
- #2 (E16) No. 1 — Engine ground:
- #3 (E6) No. 1 — Engine ground:
- #4 (E17) No. 1 — Engine ground:



- CHECK** : Is the resistance less than 10 Ω ?
- YES** : Repair ground short circuit in harness between fuel injector and ECM connector.
- NO** : Go to step 8F3.

8F3 : CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.

Measure resistance of harness connector between ECM connector and fuel injector on faulty cylinders.

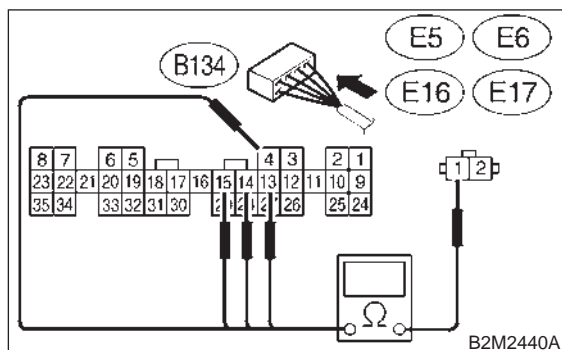
Connector & terminal

#1 (B134) No. 4 — (E5) No. 1:

#2 (B134) No. 13 — (E16) No. 1:

#3 (B134) No. 14 — (E6) No. 1:

#4 (B134) No. 15 — (E17) No. 1:



CHECK : *Is the resistance less than 1 Ω ?*

YES : Go to step **8F4**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

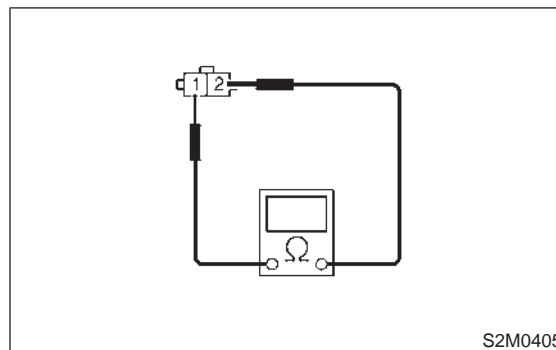
- Open circuit in harness between ECM and fuel injector connector
- Poor contact in coupling connector (B22)

8F4 : CHECK FUEL INJECTOR.

Measure resistance between fuel injector terminals on faulty cylinder.

Terminals

No. 1 — No. 2:



CHECK : *Is the resistance between 5 and 20 Ω ?*

YES : Go to step **8F5**.

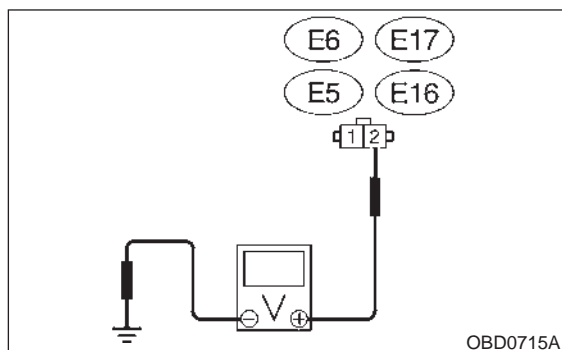
NO : Replace faulty fuel injector. <Ref. to 2-7 [W14A0].>

8F5 : CHECK POWER SUPPLY LINE.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between fuel injector and engine ground on faulty cylinders.

Connector & terminal

- #1 (E5) No. 2 (+) — Engine ground (-):
- #2 (E16) No. 2 (+) — Engine ground (-):
- #3 (E6) No. 2 (+) — Engine ground (-):
- #4 (E17) No. 2 (+) — Engine ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Repair poor contact in all connectors in fuel injector circuit.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

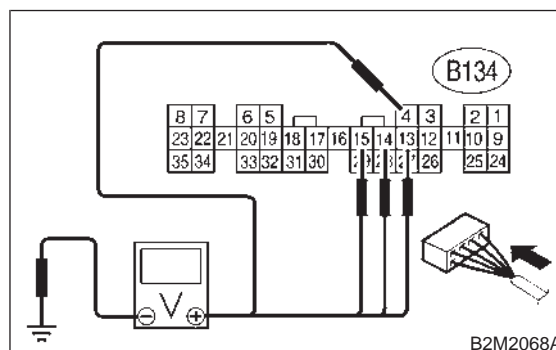
- Open circuit in harness between main relay and fuel injector connector on faulty cylinders
- Poor contact in coupling connector (B22)
- Poor contact in main relay connector
- Poor contact in fuel injector connector on faulty cylinders

8F6 : CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from fuel injector on faulty cylinder.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM connector and chassis ground on faulty cylinders.

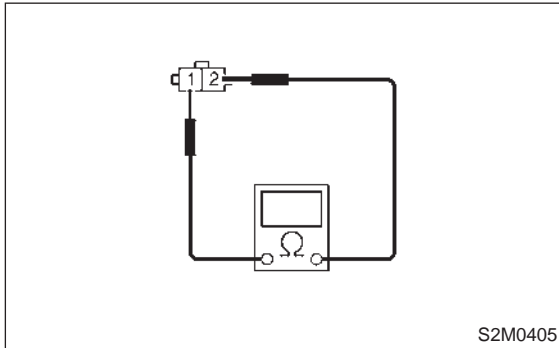
Connector & terminal

- #1 (B134) No. 4 (+) — Chassis ground (-):
- #2 (B134) No. 13 (+) — Chassis ground (-):
- #3 (B134) No. 14 (+) — Chassis ground (-):
- #4 (B134) No. 15 (+) — Chassis ground (-):



8F7 : CHECK FUEL INJECTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between fuel injector terminals on faulty cylinder.

Terminals**No. 1 — No. 2:**

CHECK : **Is the resistance less than 1 Ω ?**

YES : Replace faulty fuel injector <Ref. to 2-7 [W14A0].> and ECM <Ref. to 2-7 [W15A0].>.

NO : Go to step **8F8**.

8F8 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in ECM connector?**

YES : Repair poor contact in ECM connector.

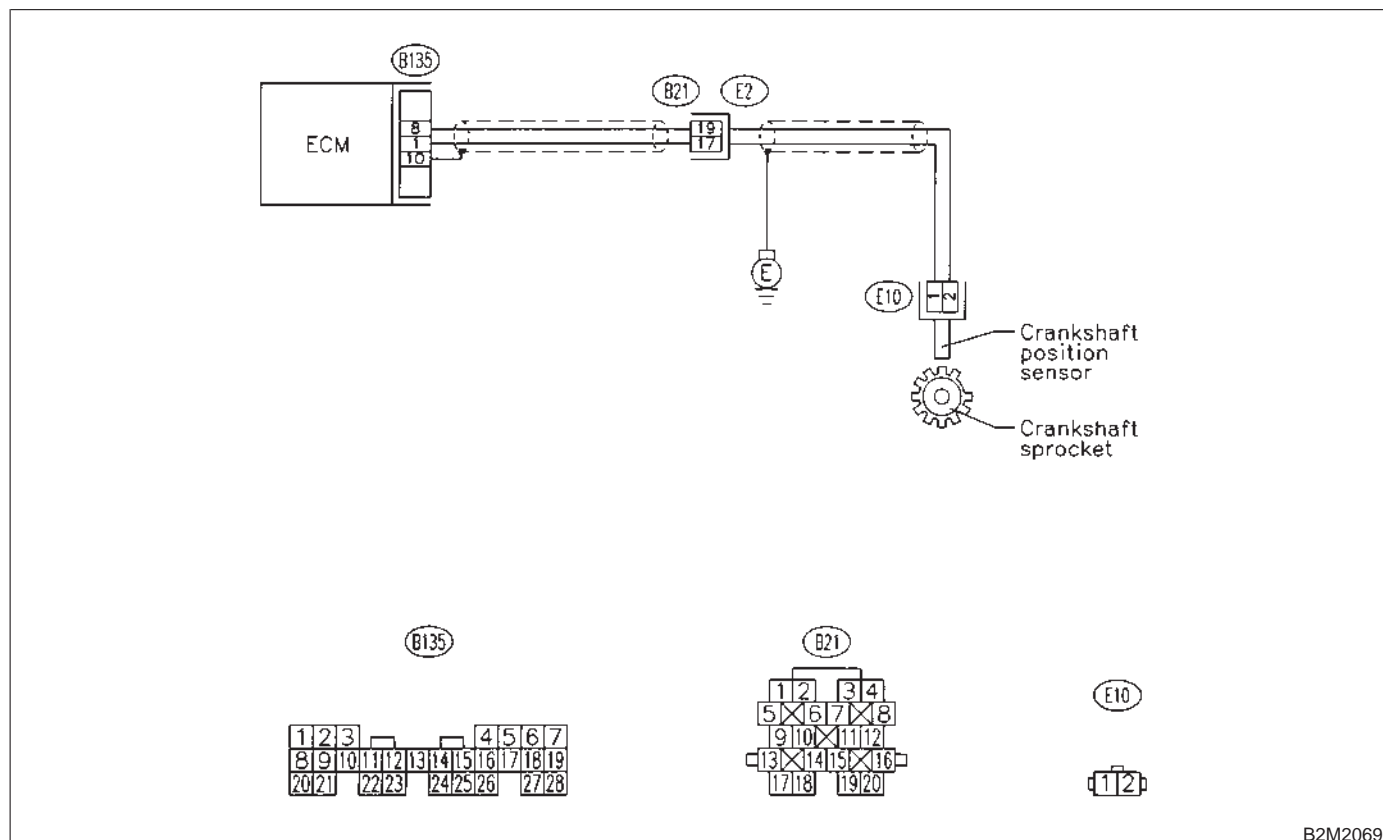
NO : Check crankshaft position sensor circuit. <Ref. to 2-7 [T8G0].>

G: CRANKSHAFT POSITION SENSOR CIRCUIT (2200 cc CALIFORNIA SPEC. VEHICLES)**CAUTION:**

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

NOTE:

Check crankshaft position sensor circuit. <Ref. to 2-7 [T10AD0].>

● WIRING DIAGRAM:

B2M2069

H: CRANKSHAFT POSITION SENSOR CIRCUIT (EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES)

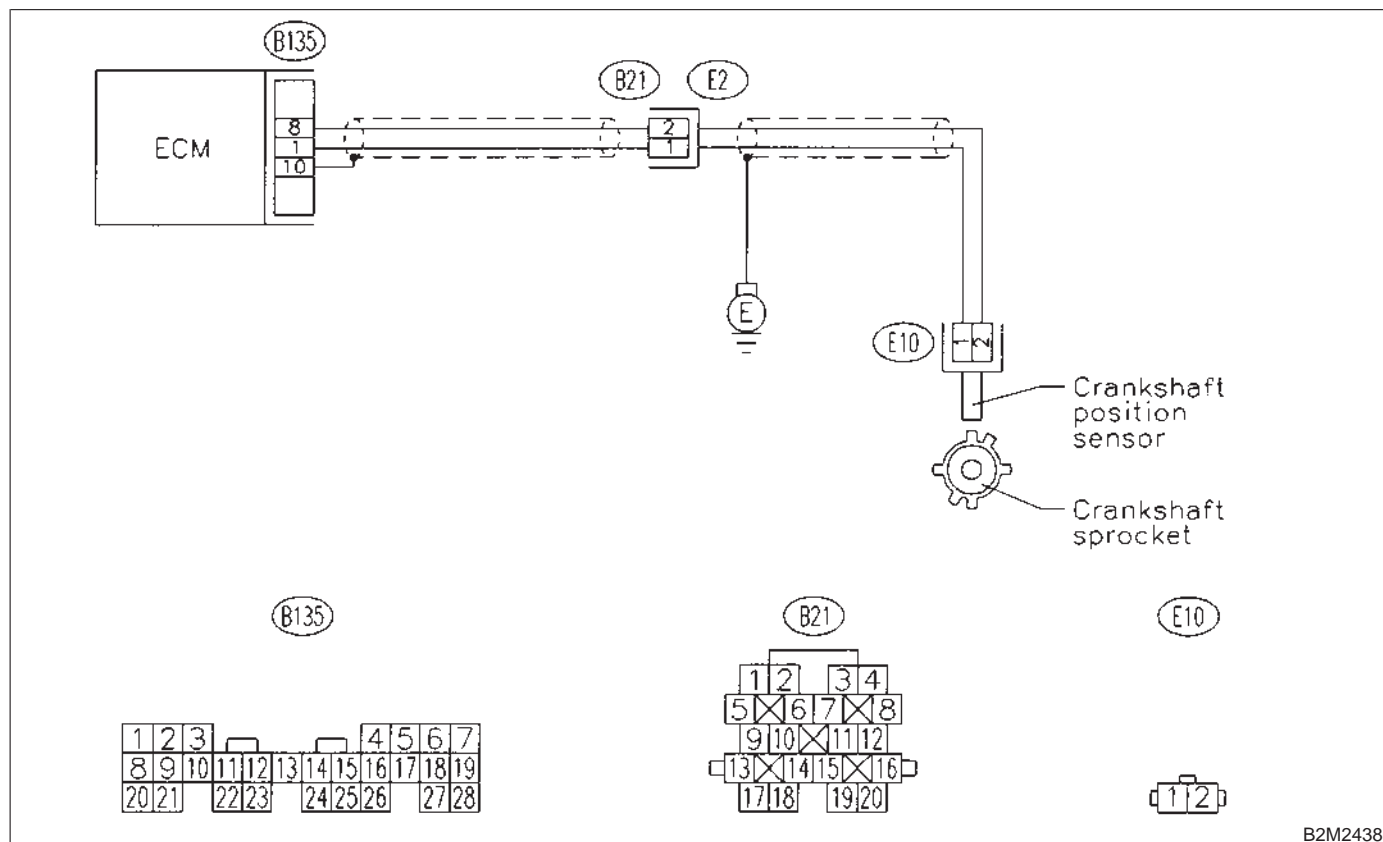
CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

NOTE:

Check crankshaft position sensor circuit. <Ref. to 2-7 [T11AC0].>

● WIRING DIAGRAM:



I: CAMSHAFT POSITION SENSOR CIRCUIT

CAUTION:

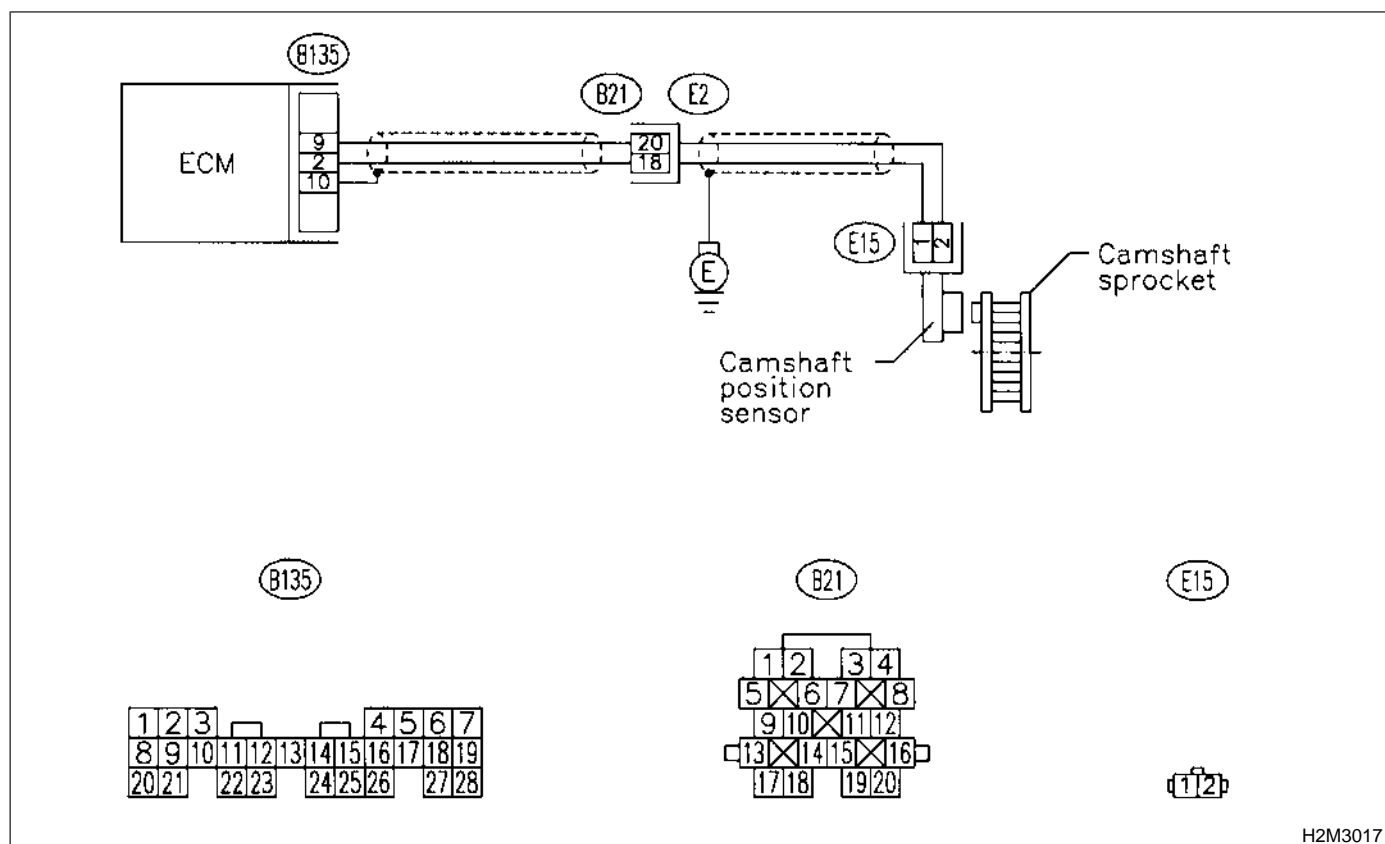
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

NOTE:

Check camshaft position sensor circuit.

- 2200 cc California spec. vehicles: <Ref. to 2-7 [T10AF0].>
- Except 2200 cc California spec. vehicles: <Ref. to 2-7 [T11AE0].>

• WIRING DIAGRAM:



H2M3017

9. General Diagnostic Table

A: GENERAL DIAGNOSTICS TABLE WITH NON-CONFORMITY SYMPTOM FOR ENGINE

NOTE:

Malfunction of parts other than those listed is also possible. <Ref. to 2-3 [K100].>

Symptom	Problem parts
1. Engine stalls during idling.	1) Idle air control solenoid valve 2) Mass air flow sensor 3) Intake manifold pressure sensor 4) Intake air temperature sensor 5) Ignition parts (*1) 6) Engine coolant temperature sensor (*2) 7) Crankshaft position sensor (*3) 8) Camshaft position sensor (*3) 9) Fuel injection parts (*4)
2. Rough idling	1) Idle air control solenoid valve 2) Mass air flow sensor 3) Intake manifold pressure sensor 4) Intake air temperature sensor 5) Engine coolant temperature sensor (*2) 6) Ignition parts (*1) 7) Air intake system (*5) 8) Fuel injection parts (*4) 9) Throttle position sensor 10) Crankshaft position sensor (*3) 11) Camshaft position sensor (*3) 12) Oxygen sensor 13) Fuel pump and fuel pump relay
3. Engine does not return to idle.	1) Idle air control solenoid valve 2) Engine coolant temperature sensor 3) Accelerator cable (*6) 4) Throttle position sensor 5) Mass air flow sensor 6) Intake manifold pressure sensor 7) Intake air temperature sensor
4. Poor acceleration	1) Mass air flow sensor 2) Intake manifold pressure sensor 3) Intake air temperature sensor 4) Throttle position sensor 5) Fuel injection parts (*4) 6) Fuel pump and fuel pump relay 7) Engine coolant temperature sensor (*2) 8) Crankshaft position sensor (*3) 9) Camshaft position sensor (*3) 10) A/C switch and A/C cut relay 11) Engine torque control signal circuit 12) Ignition parts (*1)
5. Engine stalls or engine sags or hesitates at acceleration.	1) Mass air flow sensor 2) Intake manifold pressure sensor 3) Intake air temperature sensor 4) Engine coolant temperature sensor (*2) 5) Crankshaft position sensor (*3) 6) Camshaft position sensor (*3) 7) Purge control solenoid valve 8) Fuel injection parts (*4) 9) Throttle position sensor 10) Fuel pump and fuel pump relay

Symptom	Problem parts
6. Surge	1) Mass air flow sensor 2) Intake manifold pressure sensor 3) Intake air temperature sensor 4) Engine coolant temperature sensor (*2) 5) Crankshaft position sensor (*3) 6) Camshaft position sensor (*3) 7) Fuel injection parts (*4) 8) Throttle position sensor 9) Fuel pump and fuel pump relay
7. Spark knock	1) Mass air flow sensor 2) Intake manifold pressure sensor 3) Intake air temperature sensor 4) Engine coolant temperature sensor 5) Knock sensor 6) Fuel injection parts (*4) 7) Fuel pump and fuel pump relay
8. After burning in exhaust system	1) Mass air flow sensor 2) Intake manifold pressure sensor 3) Intake air temperature sensor 4) Engine coolant temperature sensor (*2) 5) Fuel injection parts (*4) 6) Fuel pump and fuel pump relay

*1: Check ignition coil & ignitor assembly and spark plug.

*2: Indicate the symptom occurring only in cold temperatures.

*3: Ensure the secure installation.

*4: Check fuel injector, fuel pressure regulator and fuel filter.

*5: Inspect air leak in air intake system.

*6: Adjust accelerator cable.

B: GENERAL DIAGNOSTICS TABLE WITH NON-CONFORMITY SYMPTOM FOR AUTOMATIC TRANSMISSION

NOTE:

Check general diagnostics table with non-conformity symptom for automatic transmission. <Ref. to 3-2 [T1000].>

10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles

A: DIAGNOSTIC TROUBLE CODE (DTC) LIST

DTC No.	Item	Index
P0106	Intake manifold pressure sensor circuit range/performance problem	<Ref. to 2-7 [T10B0].>
P0107	Intake manifold pressure sensor circuit low input	<Ref. to 2-7 [T10C0].>
P0108	Intake manifold pressure sensor circuit high input	<Ref. to 2-7 [T10D0].>
P0111	Intake air temperature sensor circuit range/performance problem	<Ref. to 2-7 [T10E0].>
P0112	Intake air temperature sensor circuit low input	<Ref. to 2-7 [T10F0].>
P0113	Intake air temperature sensor circuit high input	<Ref. to 2-7 [T10G0].>
P0116	Engine coolant temperature sensor circuit low input	<Ref. to 2-7 [T10H0].>
P0117	Engine coolant temperature sensor circuit high input	<Ref. to 2-7 [T10I0].>
P0121	Throttle position sensor circuit range/performance problem (high input)	<Ref. to 2-7 [T10J0].>
P0122	Throttle position sensor circuit low input	<Ref. to 2-7 [T10K0].>
P0123	Throttle position sensor circuit high input	<Ref. to 2-7 [T10L0].>
P0125	Insufficient coolant temperature for closed loop fuel control	<Ref. to 2-7 [T10M0].>
P0131	Front oxygen (A/F) sensor circuit range/performance problem (low input)	<Ref. to 2-7 [T10N0].>
P0132	Front oxygen (A/F) sensor circuit range/performance problem (high input)	<Ref. to 2-7 [T10O0].>
P0133	Front oxygen (A/F) sensor circuit slow response	<Ref. to 2-7 [T10P0].>
P0136	Rear oxygen sensor circuit malfunction	<Ref. to 2-7 [T10Q0].>
P0139	Rear oxygen sensor circuit slow response	<Ref. to 2-7 [T10R0].>
P0141	Rear oxygen sensor heater circuit low input	<Ref. to 2-7 [T10S0].>
P0171	Fuel trim malfunction (A/F too lean)	<Ref. to 2-7 [T10T0].>
P0172	Fuel trim malfunction (A/F too rich)	<Ref. to 2-7 [T10U0].>
P0181	Fuel temperature sensor A circuit range/performance problem	<Ref. to 2-7 [T10V0].>
P0182	Fuel temperature sensor A circuit low input	<Ref. to 2-7 [T10W0].>
P0183	Fuel temperature sensor A circuit high input	<Ref. to 2-7 [T10X0].>
P0301	Cylinder 1 misfire detected	<Ref. to 2-7 [T10Y0].>
P0302	Cylinder 2 misfire detected	<Ref. to 2-7 [T10Z0].>

DTC No.	Item	Index
P0303	Cylinder 3 misfire detected	<Ref. to 2-7 [T10AA0].>
P0304	Cylinder 4 misfire detected	<Ref. to 2-7 [T10AB0].>
P0325	Knock sensor circuit malfunction	<Ref. to 2-7 [T10AC0].>
P0335	Crankshaft position sensor circuit malfunction	<Ref. to 2-7 [T10AD0].>
P0336	Crankshaft position sensor circuit range/performance problem	<Ref. to 2-7 [T10AE0].>
P0340	Camshaft position sensor circuit malfunction	<Ref. to 2-7 [T10AF0].>
P0341	Camshaft position sensor circuit range/performance problem	<Ref. to 2-7 [T10AG0].>
P0420	Catalyst system efficiency below threshold	<Ref. to 2-7 [T10AH0].>
P0440	Evaporative emission control system malfunction	<Ref. to 2-7 [T10AI0].>
P0443	Evaporative emission control system purge control valve circuit low input	<Ref. to 2-7 [T10AJ0].>
P0446	Evaporative emission control system vent control low input	<Ref. to 2-7 [T10AK0].>
P0451	Evaporative emission control system pressure sensor range/performance problem	<Ref. to 2-7 [T10AL0].>
P0452	Evaporative emission control system pressure sensor low input	<Ref. to 2-7 [T10AM0].>
P0453	Evaporative emission control system pressure sensor high input	<Ref. to 2-7 [T10AN0].>
P0461	Fuel level sensor circuit range/performance problem	<Ref. to 2-7 [T10AO0].>
P0462	Fuel level sensor circuit low input	<Ref. to 2-7 [T10AP0].>
P0463	Fuel level sensor circuit high input	<Ref. to 2-7 [T10AQ0].>
P0480	Cooling fan relay 1 circuit low input	<Ref. to 2-7 [T10AR0].>
P0483	Cooling fan function problem	<Ref. to 2-7 [T10AS0].>
P0500	Vehicle speed sensor malfunction	<Ref. to 2-7 [T10AT0].>
P0505	Idle control system circuit low input	<Ref. to 2-7 [T10AU0].>
P0506	Idle control system RPM lower than expected	<Ref. to 2-7 [T10AV0].>
P0507	Idle control system RPM higher than expected	<Ref. to 2-7 [T10AW0].>
P0601	Internal control module memory check sum error	<Ref. to 2-7 [T10AX0].>
P0703	Brake switch input malfunction	<Ref. to 2-7 [T10AY0].>
P0705	Transmission range sensor circuit malfunction	<Ref. to 2-7 [T10AZ0].>
P0710	Transmission fluid temperature sensor circuit malfunction	<Ref. to 2-7 [T10BA0].>

DTC No.	Item	Index
P0715	Torque converter turbine speed sensor circuit malfunction	<Ref. to 2-7 [T10BB0].>
P0720	Output speed sensor (vehicle speed sensor 2) circuit malfunction	<Ref. to 2-7 [T10BC0].>
P0725	Engine speed input circuit malfunction	<Ref. to 2-7 [T10BD0].>
P0731	Gear 1 incorrect ratio	<Ref. to 2-7 [T10BE0].>
P0732	Gear 2 incorrect ratio	<Ref. to 2-7 [T10BF0].>
P0733	Gear 3 incorrect ratio	<Ref. to 2-7 [T10BG0].>
P0734	Gear 4 incorrect ratio	<Ref. to 2-7 [T10BH0].>
P0740	Torque converter clutch system malfunction	<Ref. to 2-7 [T10BI0].>
P0743	Torque converter clutch system (Duty solenoid B) electrical	<Ref. to 2-7 [T10BJ0].>
P0748	Pressure control solenoid (Duty solenoid A) electrical	<Ref. to 2-7 [T10BK0].>
P0753	Shift solenoid A (shift solenoid 1) electrical	<Ref. to 2-7 [T10BL0].>
P0758	Shift solenoid B (shift solenoid 2) electrical	<Ref. to 2-7 [T10BM0].>
P1100	Starter switch circuit low input	<Ref. to 2-7 [T10BN0].>
P1101	Neutral position switch circuit low input [MT vehicles]	<Ref. to 2-7 [T10BO0].>
P1101	Neutral position switch circuit high input [AT vehicles]	<Ref. to 2-7 [T10BP0].>
P1103	Engine torque control signal 1 circuit malfunction	<Ref. to 2-7 [T10BQ0].>
P1106	Engine torque control signal 2 circuit malfunction	<Ref. to 2-7 [T10BR0].>
P1110	Atmospheric pressure sensor circuit low input	<Ref. to 2-7 [T10BS0].>
P1111	Atmospheric pressure sensor circuit high input	<Ref. to 2-7 [T10BT0].>
P1112	Atmospheric pressure sensor circuit range/performance problem	<Ref. to 2-7 [T10BU0].>
P1115	Engine torque control cut signal circuit high input	<Ref. to 2-7 [T10BV0].>
P1116	Engine torque control cut signal circuit low input	<Ref. to 2-7 [T10BW0].>
P1120	Starter switch circuit high input	<Ref. to 2-7 [T10BX0].>
P1121	Neutral position switch circuit high input [MT vehicles]	<Ref. to 2-7 [T10BY0].>
P1121	Neutral position switch circuit low input [AT vehicles]	<Ref. to 2-7 [T10BZ0].>
P1130	Front oxygen (A/F) sensor circuit malfunction (open circuit)	<Ref. to 2-7 [T10CA0].>
P1131	Front oxygen (A/F) sensor circuit malfunction (short circuit)	<Ref. to 2-7 [T10CB0].>

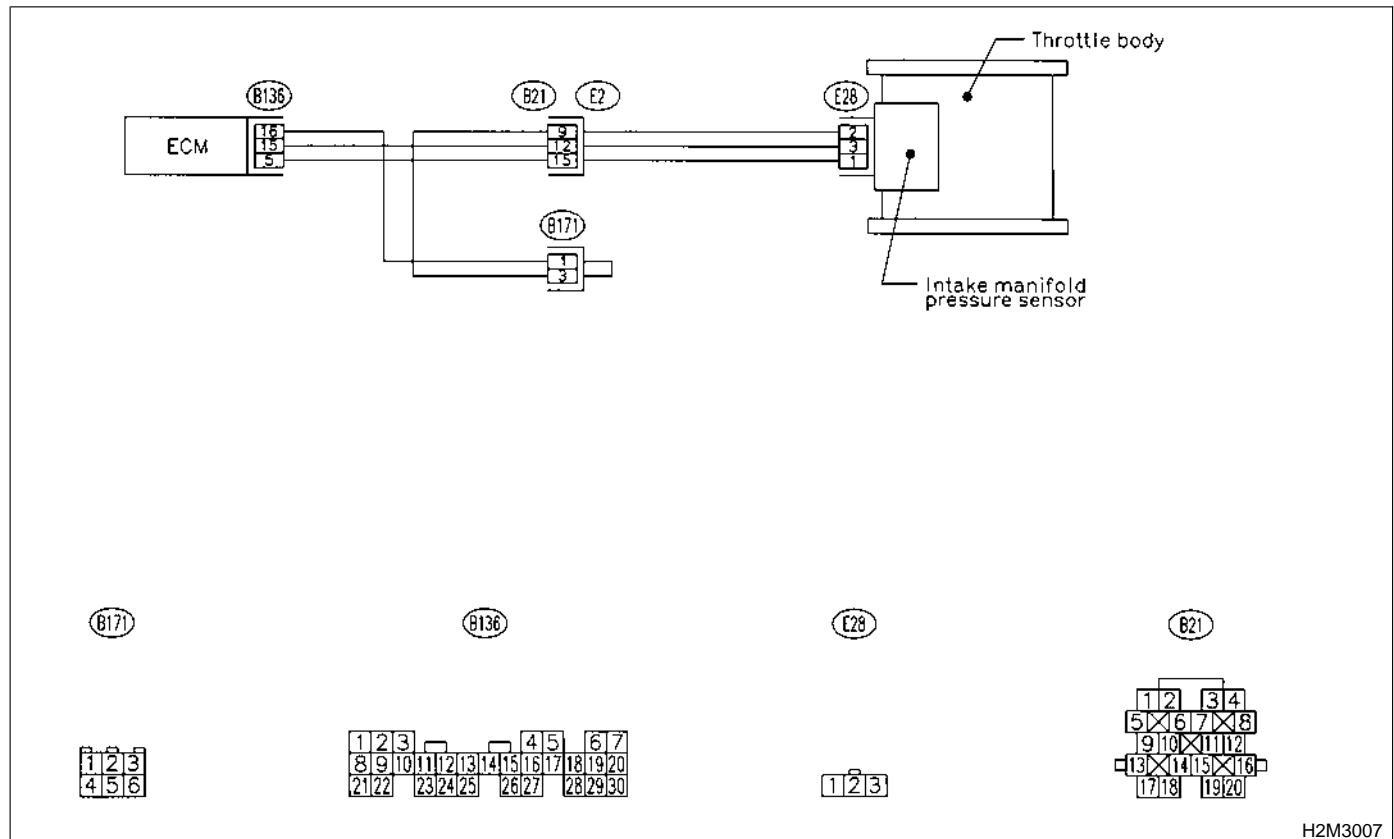
DTC No.	Item	Index
P1132	Front oxygen (A/F) sensor heater circuit low input	<Ref. to 2-7 [T10CC0].>
P1133	Front oxygen (A/F) sensor heater circuit high input	<Ref. to 2-7 [T10CD0].>
P1134	Front oxygen (A/F) sensor micro-computer problem	<Ref. to 2-7 [T10CE0].>
P1139	Front oxygen (A/F) sensor #1 heater circuit range/performance problem	<Ref. to 2-7 [T10CF0].>
P1142	Throttle position sensor circuit range/performance problem (low input)	<Ref. to 2-7 [T10CG0].>
P1151	Rear oxygen sensor heater circuit high input	<Ref. to 2-7 [T10CH0].>
P1400	Fuel tank pressure control solenoid valve circuit low input	<Ref. to 2-7 [T10CI0].>
P1420	Fuel tank pressure control solenoid valve circuit high input	<Ref. to 2-7 [T10CJ0].>
P1422	Evaporative emission control system purge control valve circuit high input	<Ref. to 2-7 [T10CK0].>
P1423	Evaporative emission control system vent control high input	<Ref. to 2-7 [T10CL0].>
P1443	Evaporative emission control system vent control function problem	<Ref. to 2-7 [T10CM0].>
P1505	Idle control system circuit high input	<Ref. to 2-7 [T10CN0].>
P1507	Idle control system malfunction (fail-safe)	<Ref. to 2-7 [T10CO0].>
P1520	Cooling fan relay 1 circuit high input	<Ref. to 2-7 [T10CP0].>
P1560	Back-up voltage circuit malfunction	<Ref. to 2-7 [T10CQ0].>
P1700	Throttle position sensor circuit malfunction for automatic transmission	<Ref. to 2-7 [T10CR0].>
P1701	Cruise control set signal circuit malfunction for automatic transmission	<Ref. to 2-7 [T10CS0].>
P1702	Automatic transmission diagnosis input signal circuit low input	<Ref. to 2-7 [T10CT0].>
P1703	Low clutch timing control solenoid valve circuit malfunction	<Ref. to 2-7 [T10CU0].>
P1704	2-4 brake timing control solenoid valve circuit malfunction	<Ref. to 2-7 [T10CV0].>
P1705	2-4 brake pressure control solenoid valve (Duty solenoid D) circuit malfunction	<Ref. to 2-7 [T10CW0].>
P1722	Automatic transmission diagnosis input signal circuit high input	<Ref. to 2-7 [T10CX0].>
P1742	Automatic transmission diagnosis input signal circuit malfunction	<Ref. to 2-7 [T10CY0].>

B: DTC P0106 — INTAKE MANIFOLD PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

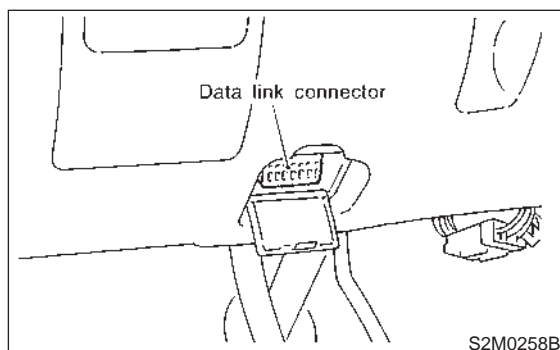
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

H2M3007

10B1 : CHECK IDLE SWITCH SIGNAL.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor switch to ON.
- 4) Operate the LED operation mode for engine using Subaru Select Monitor.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to 2-7 [T3C8].>

CHECK : *Does the LED of {Idle Switch Signal} come on?*

YES : Go to step **10B2**.

NO : Check throttle position sensor circuit.
<Ref. to 2-7 [T10K0].>

NOTE:

In this case, it is not necessary to inspect DTC P0106.

10B2 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0107 or P0108?*

YES : Inspect DTC P0107 or P0108 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles".
<Ref. to 2-7 [T10A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0106.

NO : Go to step **10B3**.

10B3 : CHECK CONDITION OF INTAKE MANIFOLD PRESSURE SENSOR.

CHECK : *Is the intake manifold pressure sensor installation bolt tightened securely?*

YES : Go to step **10B4**.

NO : Tighten intake manifold pressure sensor installation bolt securely.

10B4 : CHECK CONDITION OF THROTTLE BODY.

CHECK : *Is the throttle body installation bolt tightened securely?*

YES : Replace intake manifold pressure sensor. <Ref. to 2-7 [W20A0].>

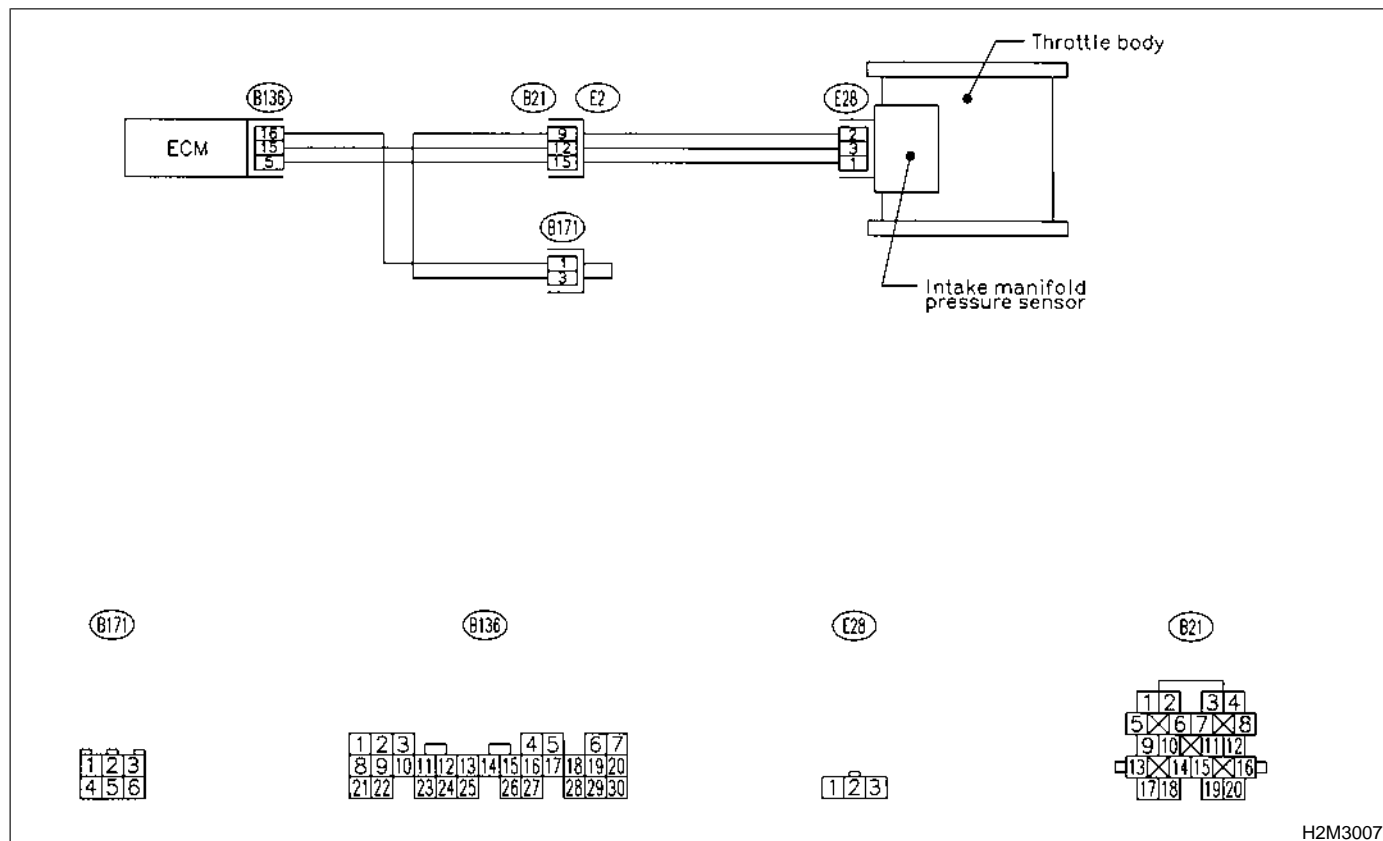
NO : Tighten throttle body installation bolt securely.

C: DTC P0107 — INTAKE MANIFOLD PRESSURE SENSOR CIRCUIT LOW INPUT —**• DTC DETECTING CONDITION:**

- Immediately at fault recognition

CAUTION:

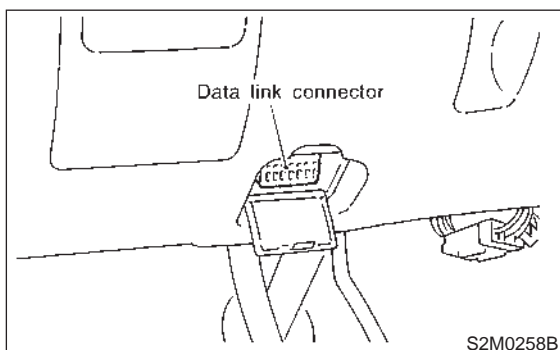
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

H2M3007

10C1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the value less than 3.3 kPa (25 mmHg, 0.98 inHg)?*

YES : Go to step 10C3.

NO : Go to step 10C2.

10C2 : CHECK POOR CONTACT.

Check poor contact in ECM and pressure sensor connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in ECM or pressure sensor connector?*

YES : Repair poor contact in ECM or pressure sensor connector.

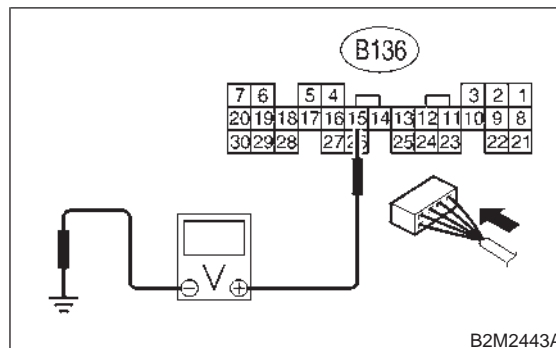
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time.

10C3 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : *Is the voltage more than 4.5 V?*

YES : Go to step 10C5.

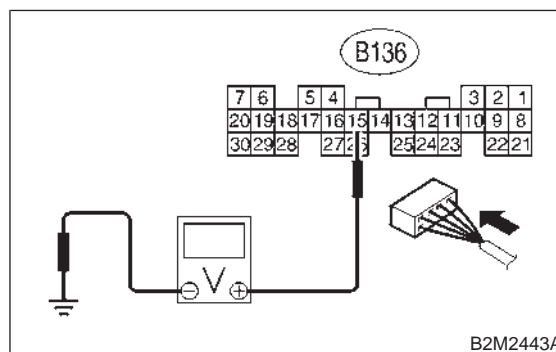
NO : Go to step 10C4.

10C4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : *Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?*

YES : Repair poor contact in ECM connector.

NO : Contact with SOA service.

NOTE:

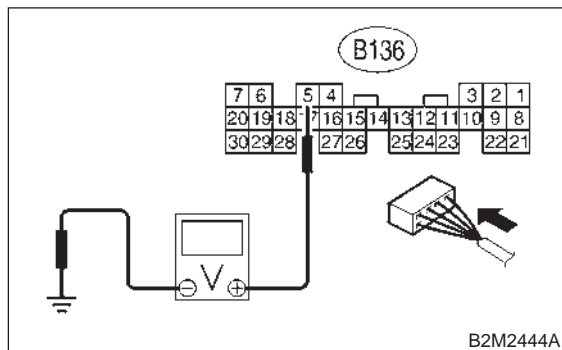
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10C5 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

(B136) No. 5 (+) — Chassis ground (-):



- CHECK** : *Is the voltage less than 0.7 V?*
- YES** : Go to step **10C7**.
- NO** : Go to step **10C6**.

10C6 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of atmospheric absolute pressure signal using Subaru Select Monitor.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

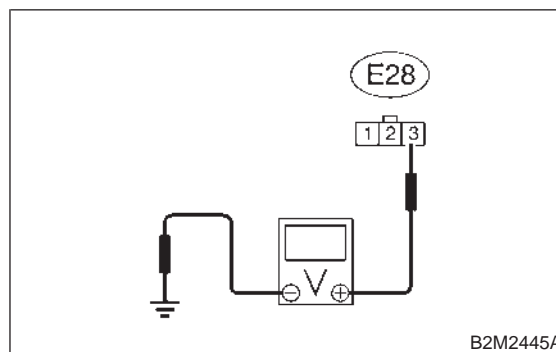
- CHECK** : *Does the value change more than 3.3 kPa (25 mmHg, 0.98 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?*
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step **10C7**.

10C7 : CHECK HARNESS BETWEEN ECM AND INTAKE MANIFOLD PRESSURE SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from intake manifold pressure sensor.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between intake manifold pressure sensor connector and engine ground.

Connector & terminal

(E28) No. 3 (+) — Engine ground (-):



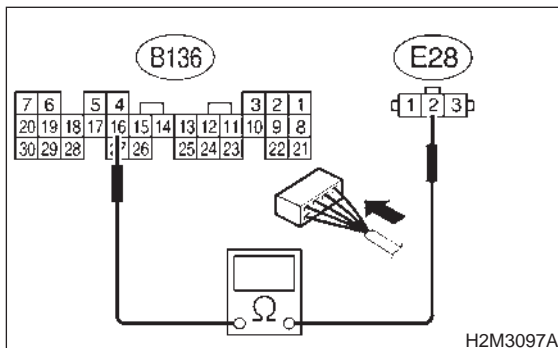
- CHECK** : *Is the voltage more than 4.5 V?*
- YES** : Go to step **10C8**.
- NO** : Repair open circuit in harness between ECM and intake manifold pressure sensor connector.

10C8 : CHECK HARNESS BETWEEN ECM AND INTAKE MANIFOLD PRESSURE SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM and intake manifold pressure sensor connector.

Connector & terminal

(B136) No. 16 — (E28) No. 2:



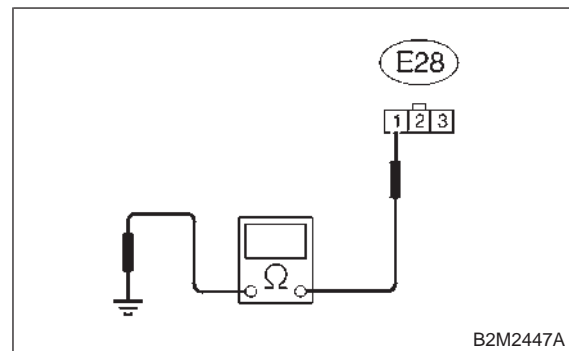
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 10C9.
- NO** : Repair open circuit in harness between ECM and intake manifold pressure sensor connector.

10C9 : CHECK HARNESS BETWEEN ECM AND INTAKE MANIFOLD PRESSURE SENSOR CONNECTOR.

Measure resistance of harness between intake manifold pressure sensor connector and engine ground.

Connector & terminal

(E28) No. 1 — Engine ground:



- CHECK** : Is the resistance more than 500 $k\Omega$?
- YES** : Go to step 10C10.
- NO** : Repair ground short circuit in harness between ECM and intake manifold pressure sensor connector.

10C10 : CHECK POOR CONTACT.

Check poor contact in intake manifold pressure sensor connector. <Ref. to FOREWORD [T3C1].>

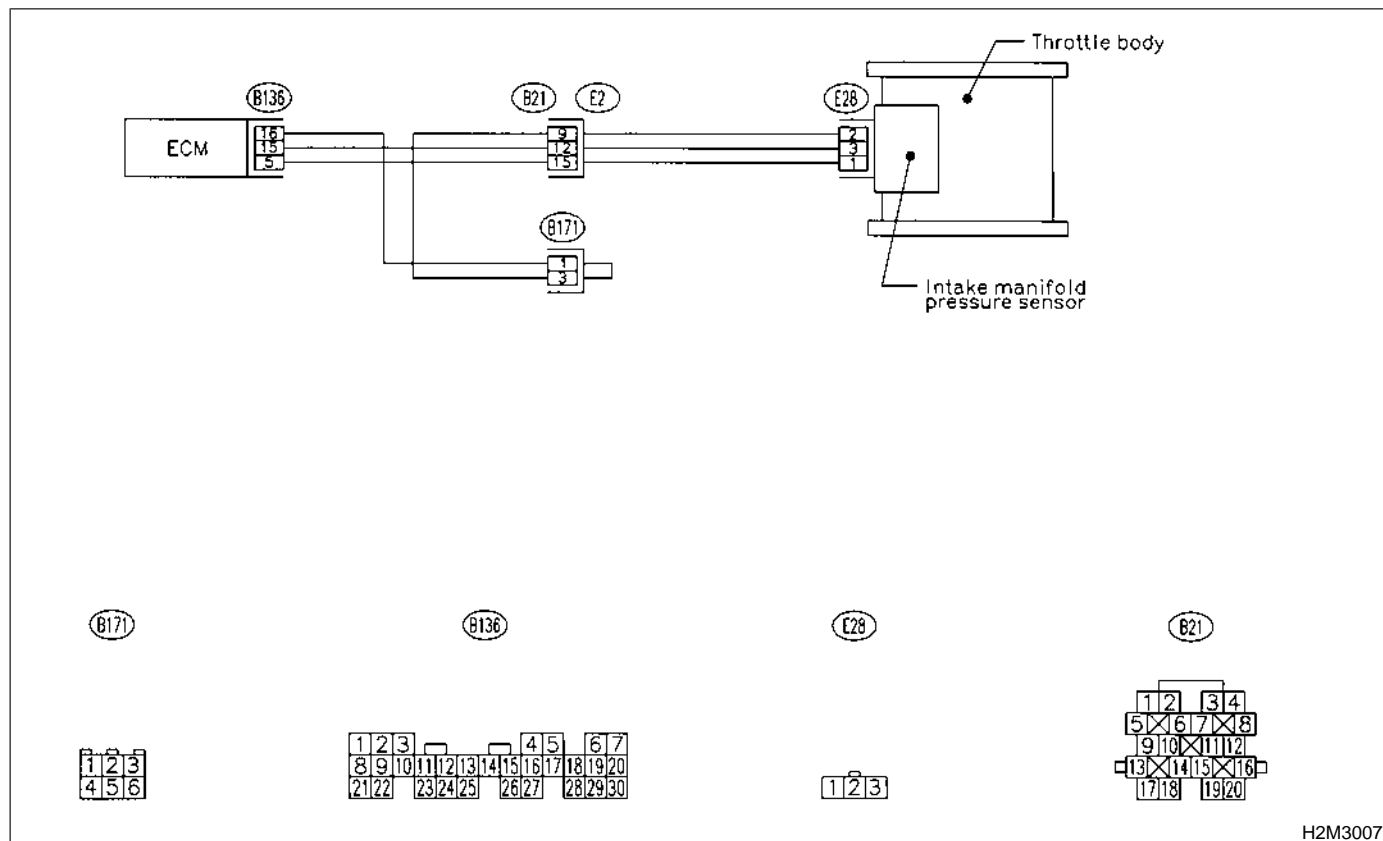
- CHECK** : Is there poor contact in intake manifold pressure sensor connector?
- YES** : Repair poor contact in intake manifold pressure sensor connector.
- NO** : Replace intake manifold pressure sensor. <Ref. to 2-7 [W20A0].>

D: DTC P0108 — INTAKE MANIFOLD PRESSURE SENSOR CIRCUIT HIGH INPUT —**• DTC DETECTING CONDITION:**

- Immediately at fault recognition

CAUTION:

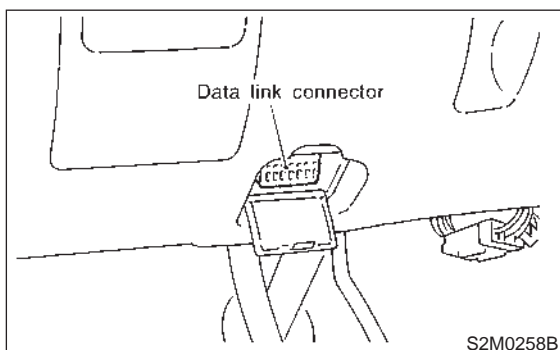
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3007

10D1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : Is the value more than 130 kPa (975 mmHg, 38.39 inHg)?

YES : Go to step 10D10.

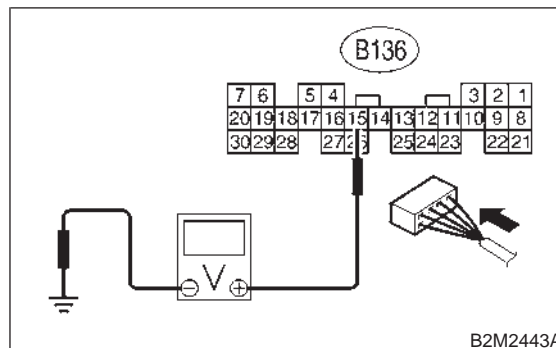
NO : Go to step 10D2.

10D2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : Is the voltage more than 4.5 V?

YES : Go to step 10D4.

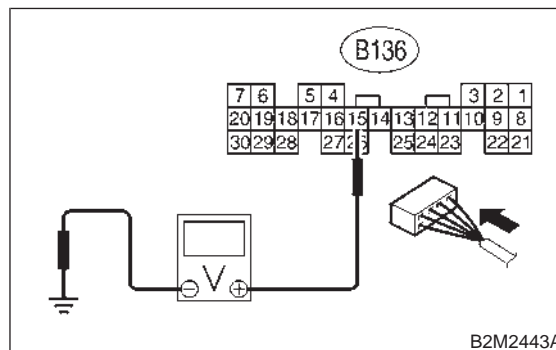
NO : Go to step 10D3.

10D3 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?

YES : Repair poor contact in ECM connector.

NO : Contact with SOA service.

NOTE:

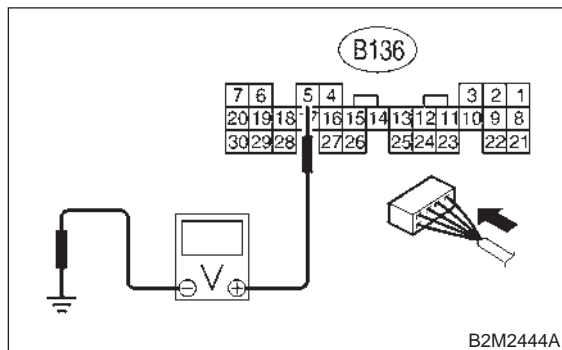
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10D4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 5 (+) — Chassis ground (-):



- CHECK** : **Is the voltage less than 0.7 V?**
- YES** : Go to step **10D6**.
- NO** : Go to step **10D5**.

10D5 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of atmospheric absolute pressure signal using Subaru Select Monitor.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

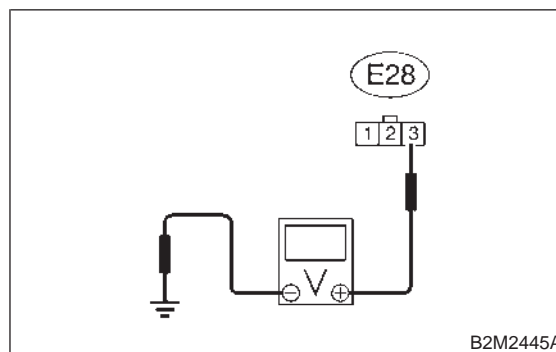
- CHECK** : **Does the value change more than 3.3 kPa (25 mmHg, 0.98 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?**
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step **10D6**.

10D6 : CHECK HARNESS BETWEEN ECM AND INTAKE MANIFOLD PRESSURE SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from intake manifold pressure sensor.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between intake manifold pressure sensor connector and engine ground.

Connector & terminal

(E28) No. 3 (+) — Engine ground (-):



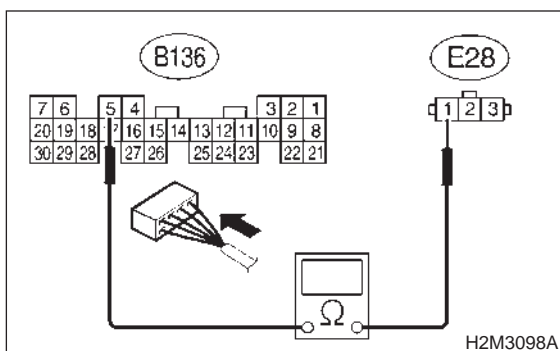
- CHECK** : **Is the voltage more than 4.5 V?**
- YES** : Go to step **10D7**.
- NO** : Repair open circuit in harness between ECM and intake manifold pressure sensor connector.

10D7 : CHECK HARNESS BETWEEN ECM AND INTAKE MANIFOLD PRESSURE SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM and intake manifold pressure sensor connector.

Connector & terminal

(B136) No. 5 — (E28) No. 1:



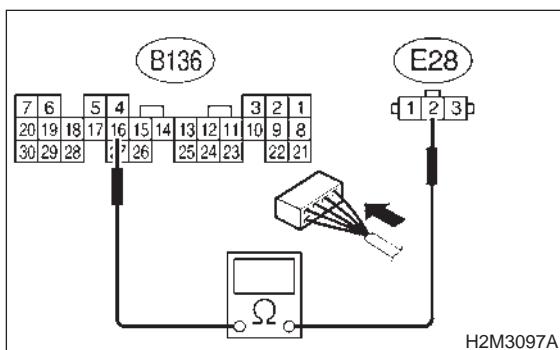
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10D8.
- NO** : Repair open circuit in harness between ECM and intake manifold pressure sensor connector.

10D8 : CHECK HARNESS BETWEEN ECM AND INTAKE MANIFOLD PRESSURE SENSOR CONNECTOR.

Measure resistance of harness between ECM and intake manifold pressure sensor connector.

Connector & terminal

(B136) No. 16 — (E28) No. 2:



- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10D9.
- NO** : Repair open circuit in harness between ECM and intake manifold pressure sensor connector.

10D9 : CHECK POOR CONTACT.

Check poor contact in intake manifold pressure sensor connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : Is there poor contact in intake manifold pressure sensor connector?
- YES** : Repair poor contact in intake manifold pressure sensor connector.
- NO** : Replace intake manifold pressure sensor. <Ref. to 2-7 [W20A0].>

10D10 : CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF and Subaru Select Monitor or the OBD-II general scan tool switch to OFF.
- 2) Disconnect connector from pressure sensor.
- 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 4) Read data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

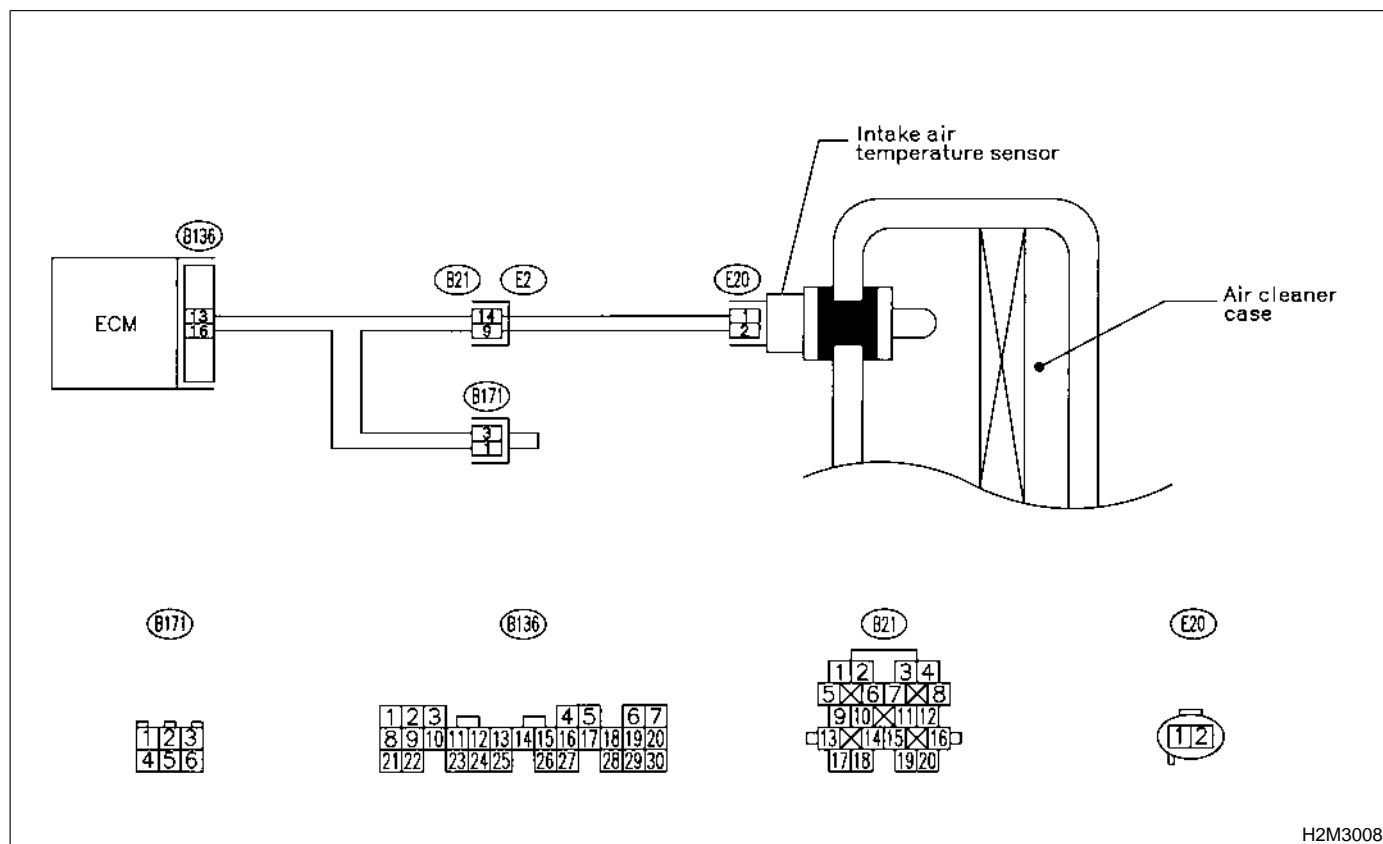
- CHECK** : Is the value more than 130 kPa (975 mmHg, 38.39 inHg)?
- YES** : Repair battery short circuit in harness between ECM and intake manifold pressure sensor connector.
- NO** : Replace intake manifold pressure sensor. <Ref. to 2-7 [W20A0].>

E: DTC P0111 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Erroneous idling
 - Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

● **WIRING DIAGRAM:**

H2M3008

10E1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0112 or P0113?*

YES : Inspect DTC P0112 or P0113 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles".
<Ref. to 2-7 [T10A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0111.

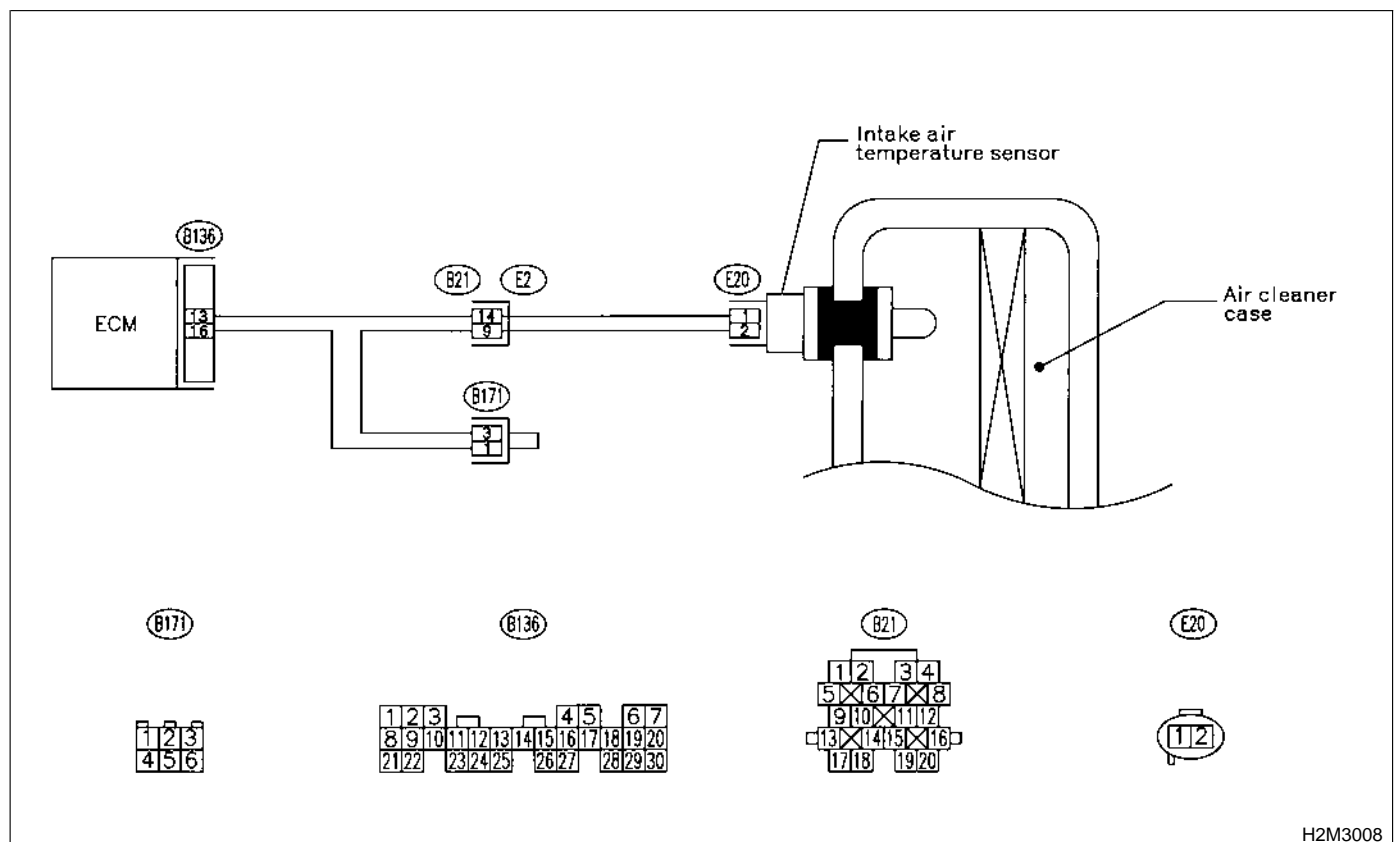
NO : Replace intake air temperature sensor.
<Ref. to 2-7 [W21A0].>

F: DTC P0112 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT LOW INPUT

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Erroneous idling
 - Poor driving performance

CAUTION:

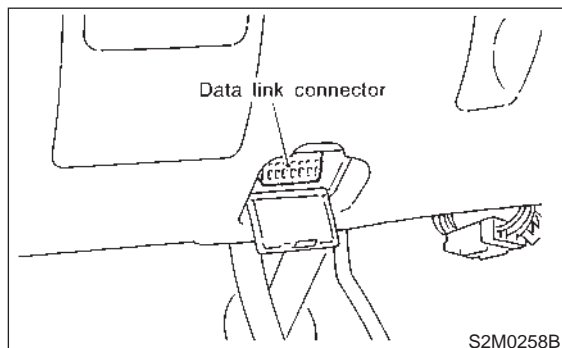
After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

● **WIRING DIAGRAM:**

H2M3008

10F1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON.
- 4) Start engine.
- 5) Read data of intake air temperature sensor signal using Subaru Select Monitor or the OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the value greater than 120°C (248°F)?*

YES : Go to step **10F2**.

NO : Repair poor contact.

NOTE:

In this case, repair the following:

- Poor contact in intake air temperature sensor
- Poor contact in ECM
- Poor contact in coupling connector (B21) and (B171)

10F2 : CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from intake air temperature sensor.
- 3) Turn ignition switch and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Read data of intake air temperature sensor signal using Subaru Select Monitor or the OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the value less than -40°C (-40°F)?*

YES : Replace intake air temperature sensor. <Ref. to 2-7 [W21A0].>

NO : Repair ground short circuit in harness between intake air temperature sensor and ECM connector.

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Erroneous idling
 - Poor driving performance

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

Wiring diagram for the intake air temperature sensor. The diagram shows the ECM connected to the sensor via a multi-pin connector. The sensor is located in the air cleaner case. The diagram includes labels for the ECM, Intake air temperature sensor, and Air cleaner case. Below the main diagram, there are four connector pinout diagrams: B171 (3 pins), B136 (30 pins), B21 (16 pins), and E20 (2 pins).

ECM

Intake air temperature sensor

Air cleaner case

B171

B136

B21

E20

ECM Pinout:

1	2	3
4	5	6

B136 Pinout:

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

B21 Pinout:

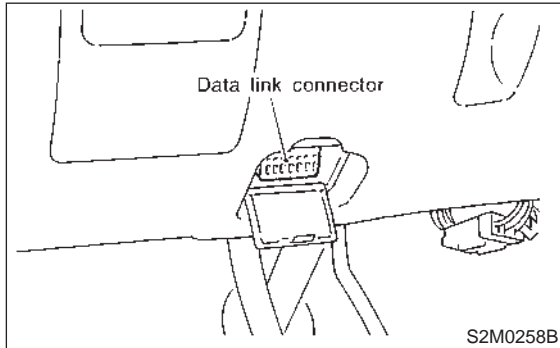
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20

E20 Pinout:

1	2
---	---

10G1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON.
- 4) Start engine.
- 5) Read data of intake air temperature sensor signal using Subaru Select Monitor or the OBD-II general scan tool.

NOTE:

- Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
- OBD-II general scan tool
For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.

- CHECK** : **Is the value less than -40°C (-40°F)?**
- YES** : Go to step **10G2**.
- NO** : Repair poor contact.

NOTE:

In this case, repair the following:

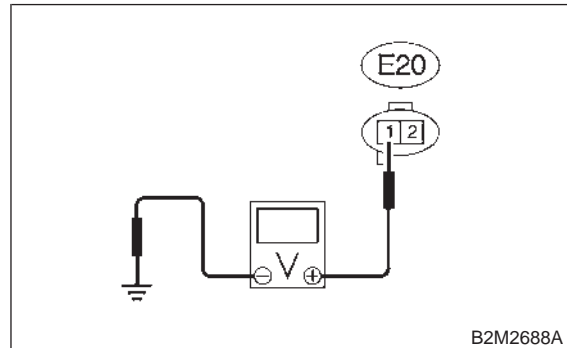
- Poor contact in intake air temperature sensor
- Poor contact in ECM
- Poor contact in coupling connector (B21) and (B171)

10G2 : CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from intake air temperature sensor.
- 3) Measure voltage between intake air temperature sensor connector and engine ground.

Connector & terminal

(E20) No. 1 (+) — Engine ground (-):



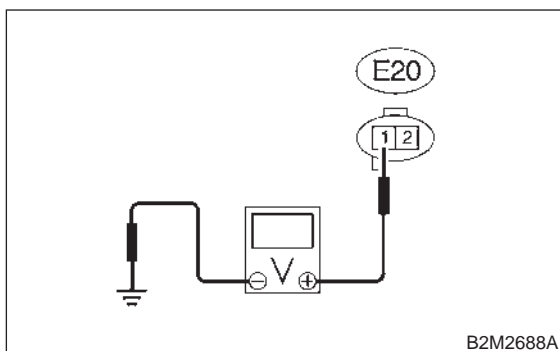
- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair battery short circuit in harness between intake air temperature sensor and ECM connector.
- NO** : Go to step **10G3**.

10G3 : CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between intake air temperature sensor connector and engine ground.

Connector & terminal

(E20) No. 1 (+) — Engine ground (-):



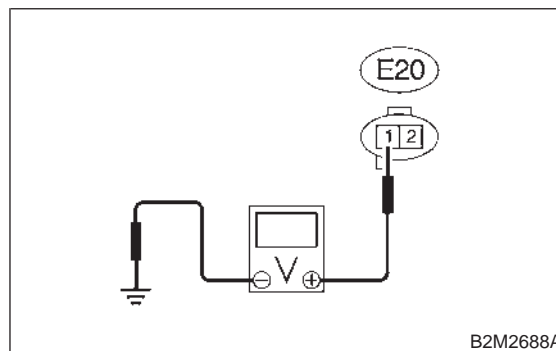
- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair battery short circuit in harness between intake air temperature sensor and ECM connector.
- NO** : Go to step **10G4**.

10G4 : CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.

Measure voltage between intake air temperature sensor connector and engine ground.

Connector & terminal

(E20) No. 1 (+) — Engine ground (-):



- CHECK** : **Is the voltage more than 3 V?**
- YES** : Go to step **10G5**.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

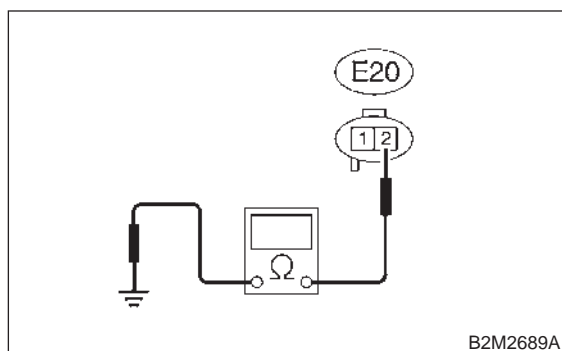
- Open circuit in harness between intake air temperature sensor and ECM connector
- Poor contact in intake air temperature sensor
- Poor contact in ECM
- Poor contact in coupling connector (B21)

**10G5 : CHECK HARNESS BETWEEN
INTAKE AIR TEMPERATURE SEN-
SOR AND ECM CONNECTOR.**

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between intake air temperature sensor connector and engine ground.

Connector & terminal

(E20) No. 2 — Engine ground:



CHECK : **Is the resistance less than 5 Ω?**

YES : Replace intake air temperature sensor.
<Ref. to 2-7 [W21A0].>

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

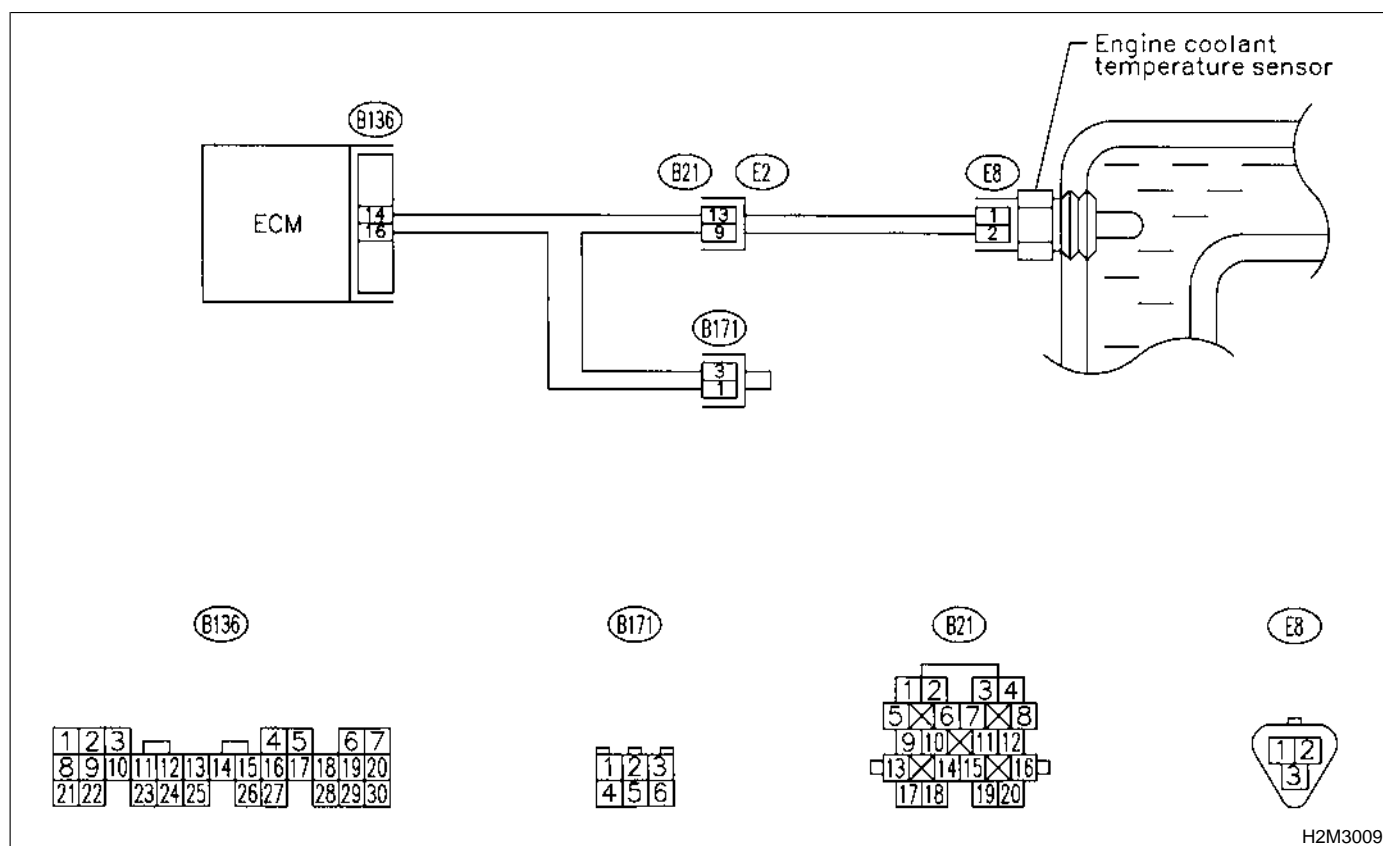
- Open circuit in harness between intake air temperature sensor and ECM connector
- Poor contact in intake air temperature sensor
- Poor contact in ECM
- Poor contact in coupling connector (B21) and (B171)

H: DTC P0116 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Hard to start
 - Erroneous idling
 - Poor driving performance

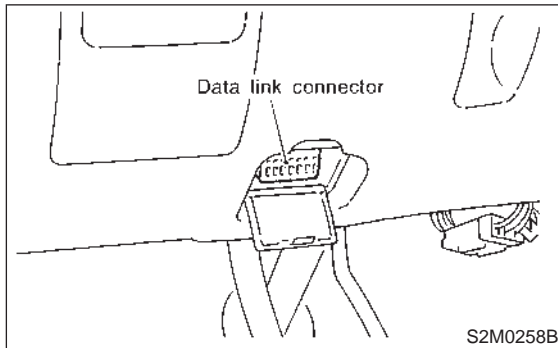
CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

● **WIRING DIAGRAM:**

10H1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
- OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the value greater than 120°C (248°F)?*

YES : Go to step 10H2.

NO : Repair poor contact.

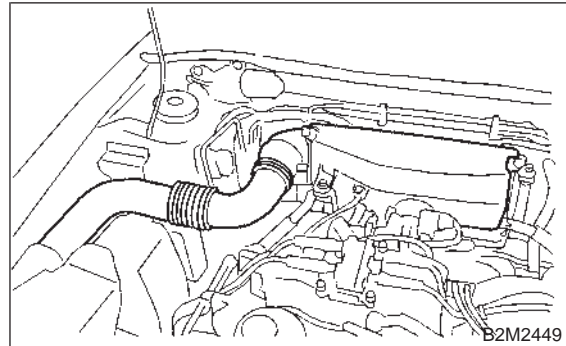
NOTE:

In this case, repair the following:

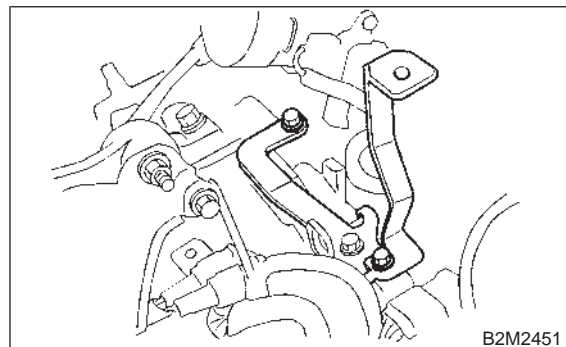
- Poor contact in engine coolant temperature sensor
- Poor contact in ECM
- Poor contact in coupling connector (B21) and (B171)

10H2 : CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.

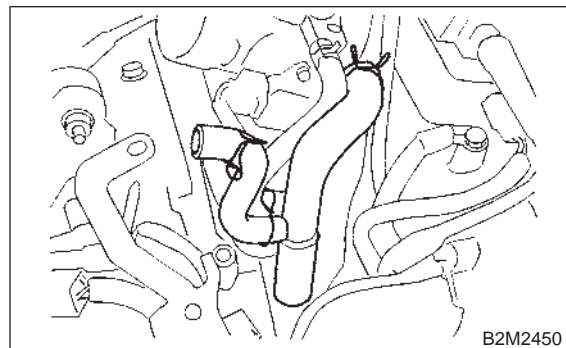
- 1) Turn ignition switch to OFF.
- 2) Remove air intake duct and air cleaner case assembly as a unit.



- 3) Remove engine harness connector bracket from cylinder block.



- 4) Remove blow-by hoses.



- 5) Disconnect connector from engine coolant temperature sensor.
- 6) Turn ignition switch and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 7) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value less than -40°C (-40°F)?***

YES : Replace engine coolant temperature sensor. <Ref. to 2-7 [W5A1].>

NO : Repair ground short circuit in harness between engine coolant temperature sensor and ECM connector.

MEMO:

I: DTC P0117 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH INPUT —**• DTC DETECTING CONDITION:**

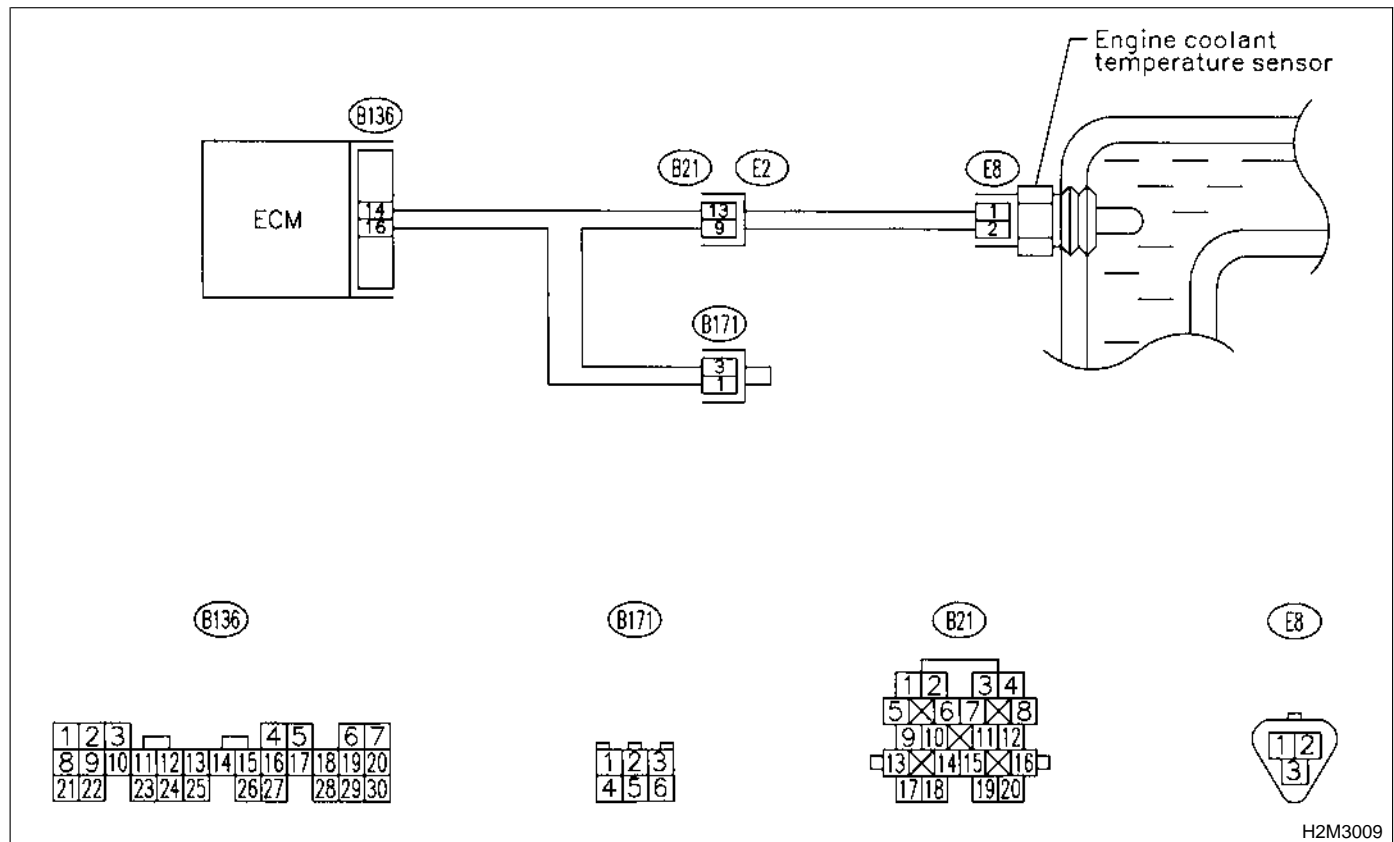
- Immediately at fault recognition

• TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

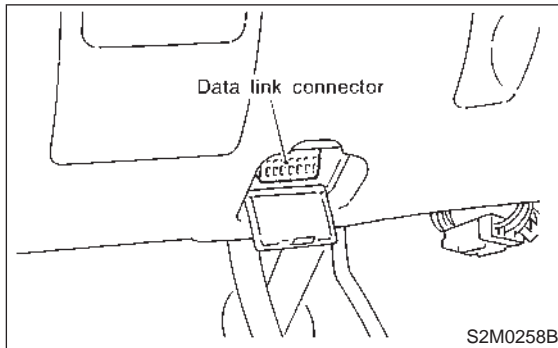
CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

1011 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the value less than -40°C (-40°F)?*

YES : Go to step 1012.

NO : Repair poor contact.

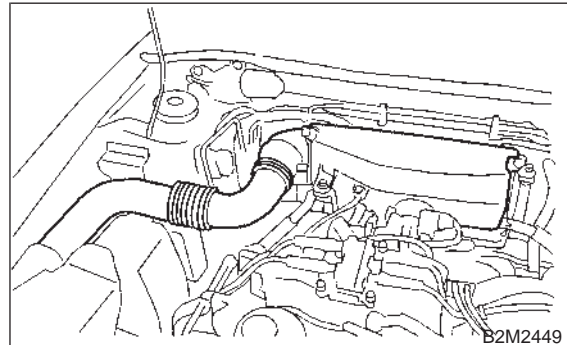
NOTE:

In this case, repair the following:

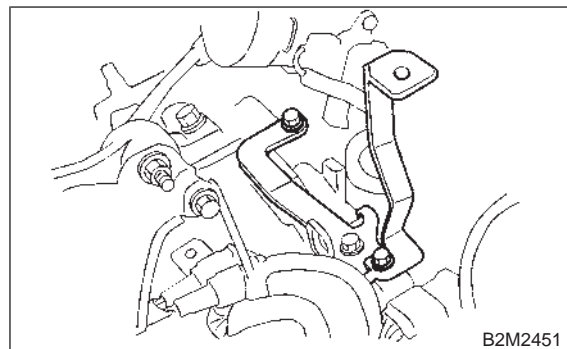
- Poor contact in engine coolant temperature sensor
- Poor contact in ECM
- Poor contact in coupling connector (B21) and (B171)

1012 : CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.

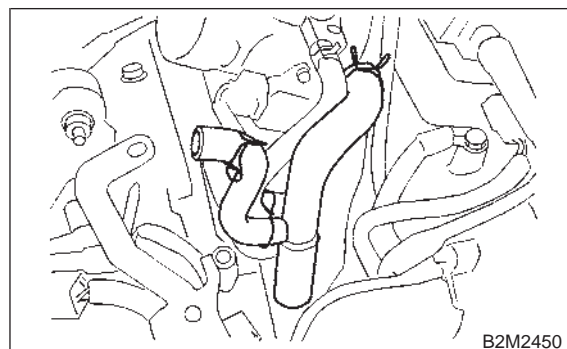
- 1) Turn ignition switch to OFF.
- 2) Remove air intake duct and air cleaner case assembly as a unit.



- 3) Remove engine harness connector bracket from cylinder block.



- 4) Remove blow-by hoses.

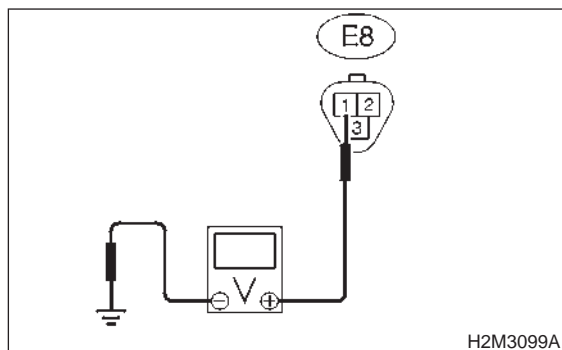


- 5) Disconnect connector from engine coolant temperature sensor.

6) Measure voltage between engine coolant temperature sensor connector and engine ground.

Connector & terminal

(E8) No. 1 (+) — Engine ground (-):



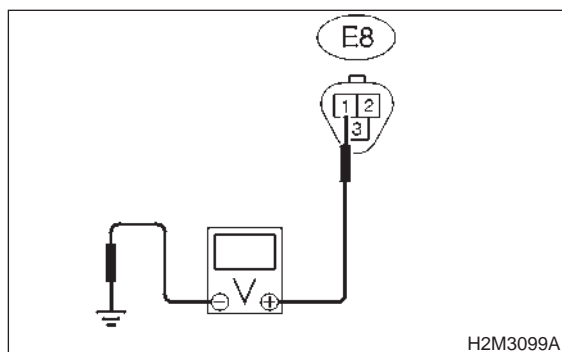
- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair battery short circuit in harness between ECM and engine coolant temperature sensor connector.
- NO** : Go to step 10I3.

10I3 : CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between engine coolant temperature sensor connector and engine ground.

Connector & terminal

(E8) No. 1 (+) — Engine ground (-):



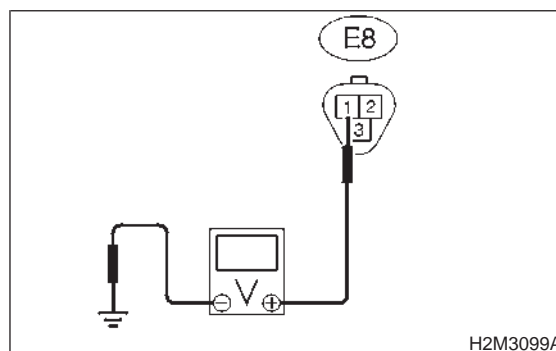
- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair battery short circuit in harness between ECM and engine coolant temperature sensor connector.
- NO** : Go to step 10I4.

10I4 : CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.

Measure voltage between engine coolant temperature sensor connector and engine ground.

Connector & terminal

(E8) No. 1 (+) — Engine ground (-):



- CHECK** : **Is the voltage more than 4 V?**
- YES** : Go to step 10I5.
- NO** : Repair harness and connector.

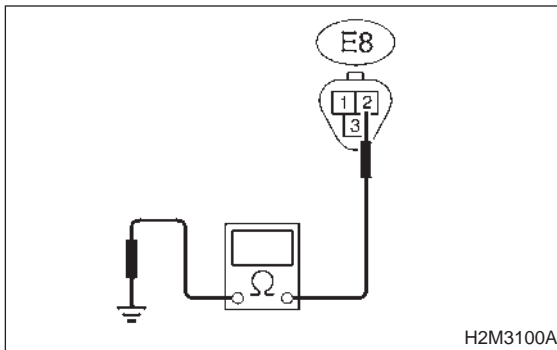
NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and engine coolant temperature sensor connector
- Poor contact in engine coolant temperature sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

**1015 : CHECK HARNESS BETWEEN
ENGINE COOLANT TEMPERATURE
SENSOR AND ECM CONNECTOR.**

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between engine coolant temperature sensor connector and engine ground.

Connector & terminal**(E8) No. 2 — Engine ground:****CHECK : Is the resistance less than 5 Ω ?****YES :** Replace engine coolant temperature sensor. <Ref. to 2-7 [W5A1].>**NO :** Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open circuit in harness between ECM and engine coolant temperature sensor connector
- Poor contact in engine coolant temperature sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21) and (B171)

J: DTC P0121 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

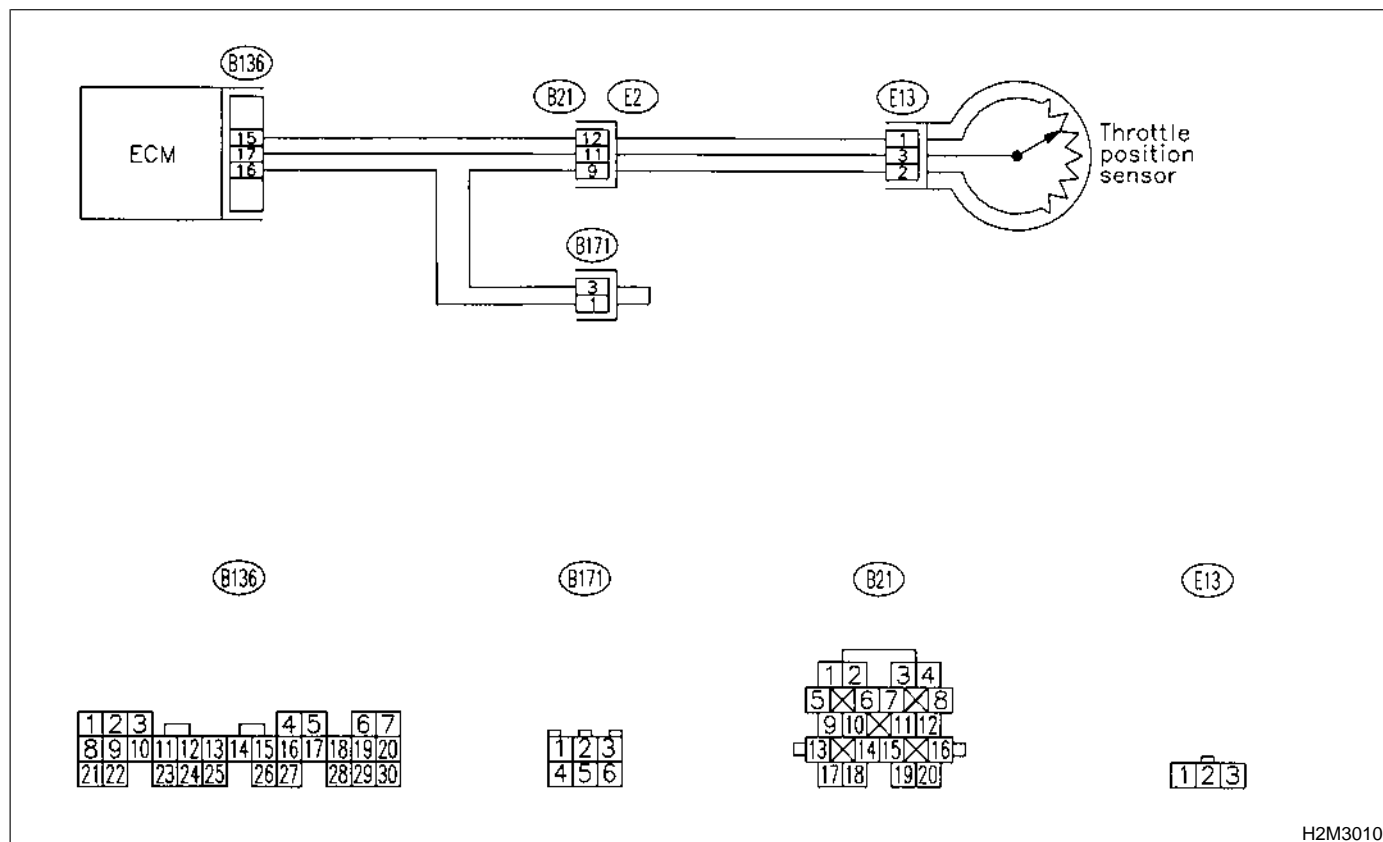
• TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3010

10J1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0107, P0108, P0122 or P0123?

YES : Inspect DTC P0107, P0108, P0122 or P0123 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

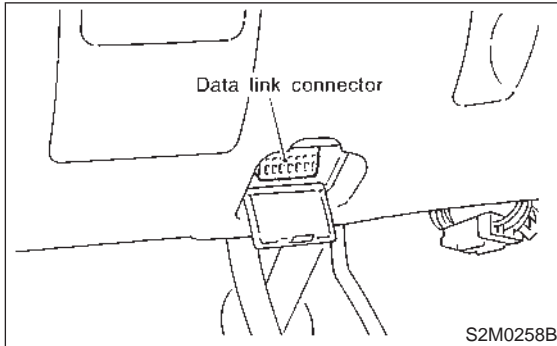
NOTE:

In this case, it is not necessary to inspect DTC P0121.

NO : Go to step 10J2.

10J2 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:**● Subaru Select Monitor**

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

● OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value more than 53.3 kPa (400 mmHg, 15.75 inHg)?***

YES : Replace intake manifold pressure sensor. <Ref. to 2-7 [W20A0].>

NO : Replace throttle position sensor. <Ref. to 2-7 [W9A1].>

K: DTC P0122 — THROTTLE POSITION SENSOR CIRCUIT LOW INPUT —● **DTC DETECTING CONDITION:**

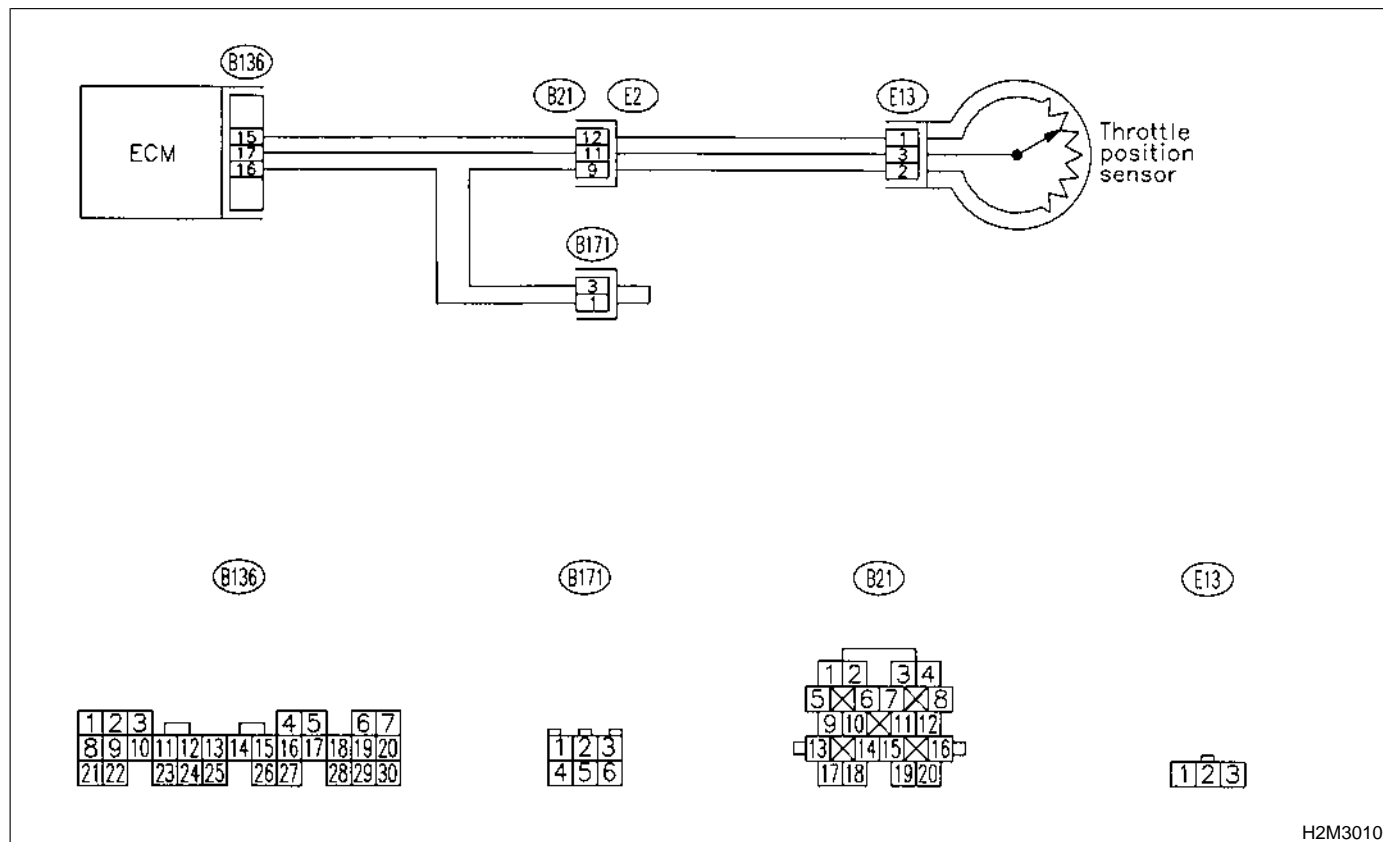
- Immediately at fault recognition

● **TROUBLE SYMPTOM:**

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

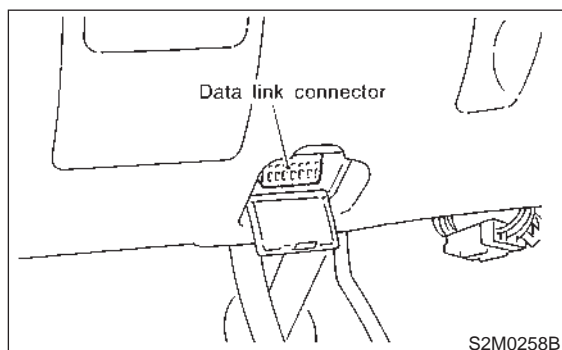
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

● **WIRING DIAGRAM:**

H2M3010

10K1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
- OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : Is the value less than 0.1 V?

YES : Go to step 10K2.

NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause.

NOTE:

In this case, repair the following:

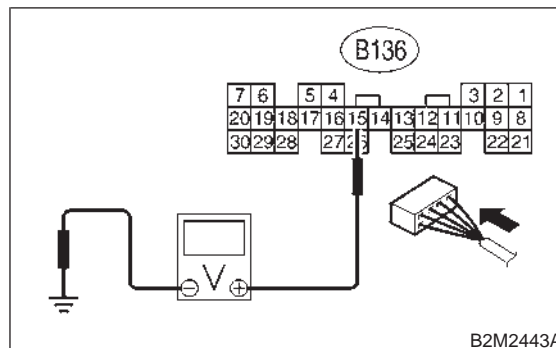
- Poor contact in throttle position sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21) and (B171)

10K2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground while throttle valve is fully closed.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : Is the voltage more than 4.5 V?

YES : Go to step 10K4.

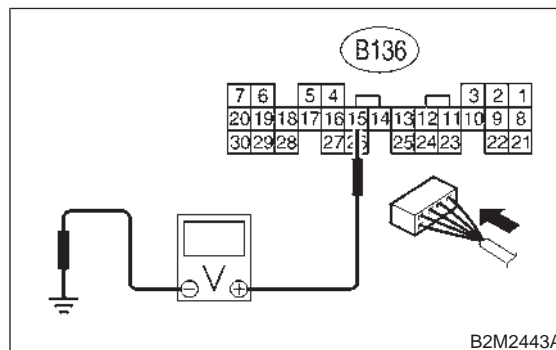
NO : Go to step 10K3.

10K3 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?

YES : Repair poor contact in ECM connector.

NO : Contact with SOA service.

NOTE:

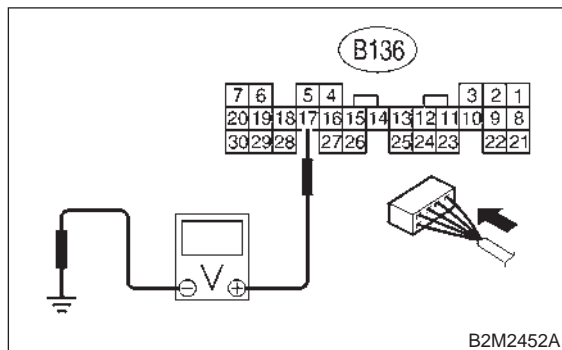
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10K4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 17 (+) — Chassis ground (-):



- CHECK** : *Is the voltage less than 0.1 V?*
- YES** : Go to step 10K6.
- NO** : Go to step 10K5.

10K5 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Measure voltage between ECM connector and chassis ground.

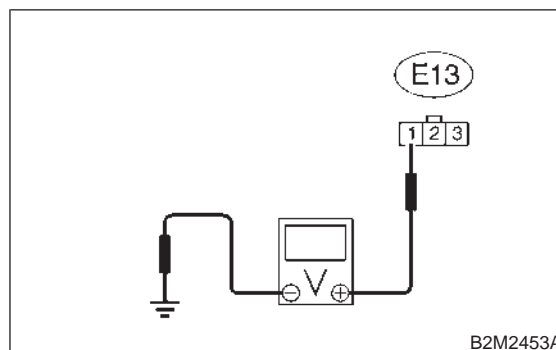
- CHECK** : *Does the voltage change more than 0.1 V by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?*
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 10K6.

10K6 : CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from throttle position sensor.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between throttle position sensor connector and engine ground.

Connector & terminal

(E13) No. 1 (+) — Engine ground (-):



- CHECK** : *Is the voltage more than 4.5 V?*
- YES** : Go to step 10K7.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

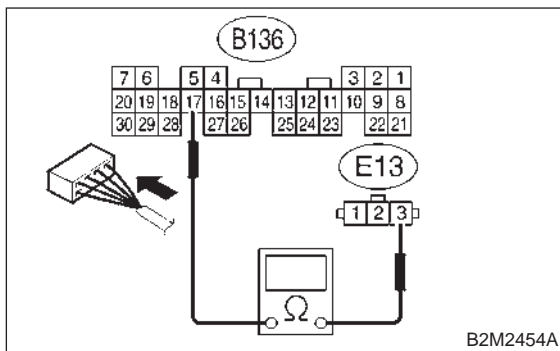
- Open circuit in harness between throttle position sensor and ECM connector
- Poor contact in throttle position sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

10K7 : CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between ECM connector and throttle position sensor connector.

Connector & terminal

(B136) No. 17 — (E13) No. 3:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 10K8.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

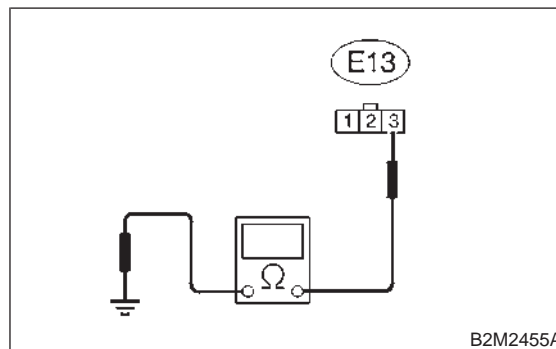
- Open circuit in harness between throttle position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in throttle position sensor connector
- Poor contact in coupling connector (B21) and (B171)

10K8 : CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.

Measure resistance of harness between throttle position sensor connector and engine ground.

Connector & terminal

(E13) No. 3 — Engine ground:



CHECK : Is the resistance less than 10 Ω ?

YES : Repair ground short circuit in harness between throttle position sensor and ECM connector.

NO : Go to step 10K9.

10K9 : CHECK POOR CONTACT.

Check poor contact in throttle position sensor connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in throttle position sensor connector?

YES : Repair poor contact in throttle position sensor connector.

NO : Replace throttle position sensor. <Ref. to 2-7 [W9A1].>

L: DTC P0123 — THROTTLE POSITION SENSOR CIRCUIT HIGH INPUT —**• DTC DETECTING CONDITION:**

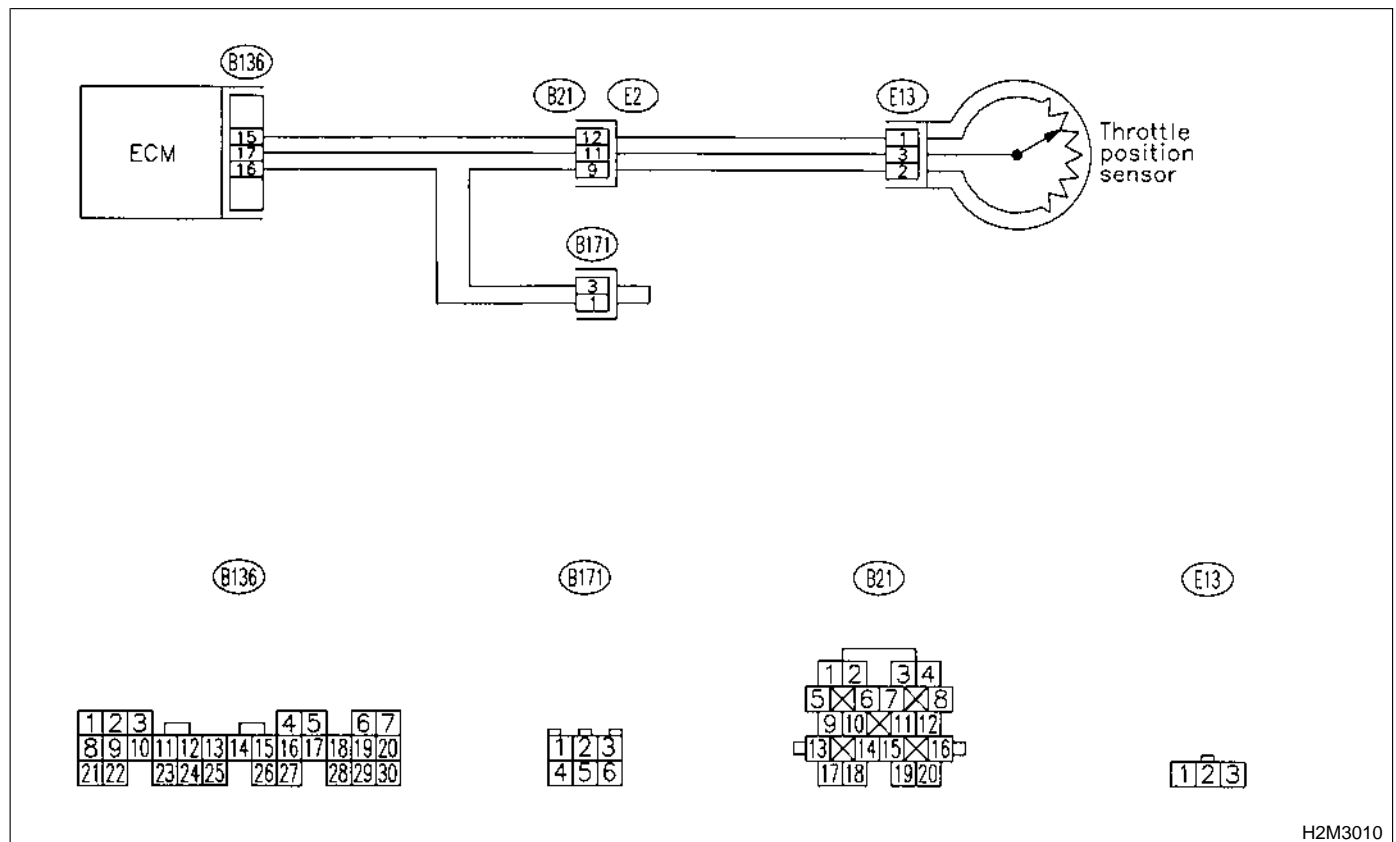
- Immediately at fault recognition

• TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

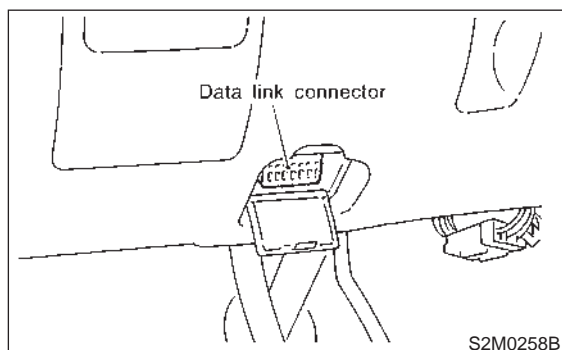
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

H2M3010

10L1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the value more than 4.9 V?*

YES : Go to step 10L2.

NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause.

NOTE:

In this case, repair the following:

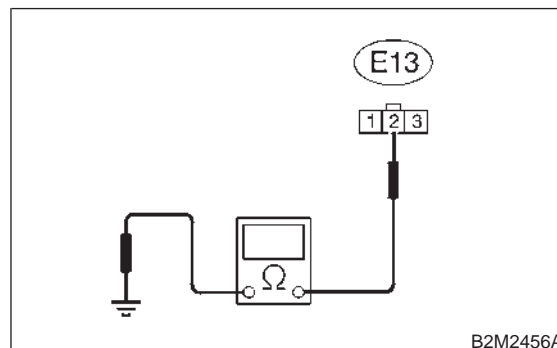
- Poor contact in throttle position sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21) and (B171)

10L2 : CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from throttle position sensor.
- 3) Measure resistance of harness between throttle position sensor connector and engine ground.

Connector & terminal

(E13) No. 2 — Engine ground:



CHECK : *Is the resistance less than 5 Ω?*

YES : Go to step 10L3.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

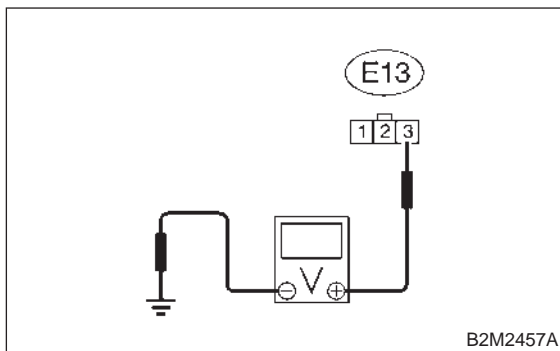
- Open circuit in harness between throttle position sensor and ECM connector
- Poor contact in coupling connector (B21) and (B171)

10L3 : CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between throttle position sensor connector and engine ground.

Connector & terminal

(E13) No. 3 (+) — Engine ground (-):



- CHECK** : **Is the voltage more than 4.9 V?**
- YES** : Repair battery short circuit in harness between throttle position sensor and ECM connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Replace throttle position sensor. <Ref. to 2-7 [W9A1].>

M: DTC P0125 — INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL —

● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

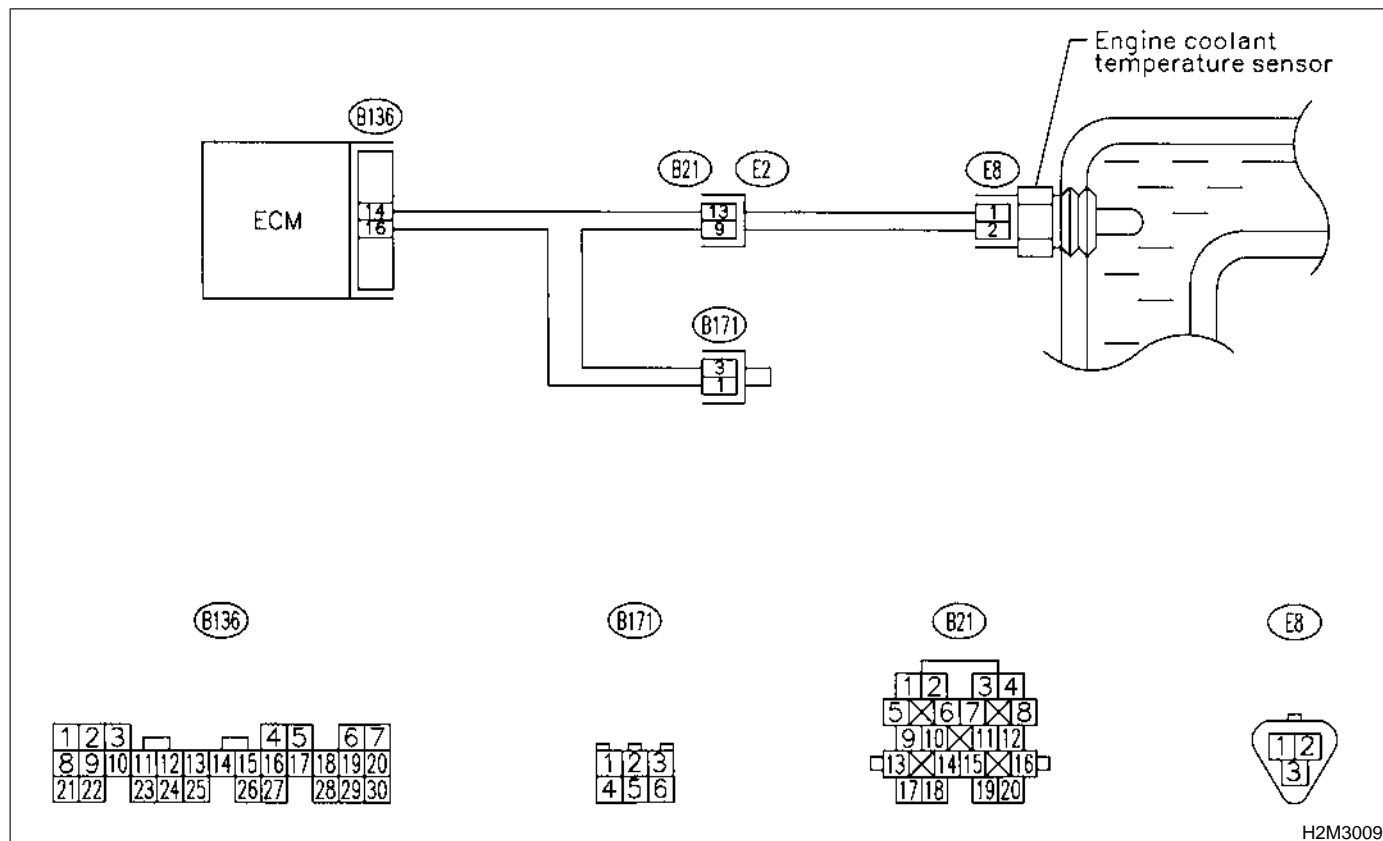
● TROUBLE SYMPTOM:

- Engine would not return to idling.

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:



H2M3009

10M1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0116 or P0117?

YES : Inspect DTC P0116 or P0117 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0125.

NO : Replace engine coolant temperature sensor. <Ref. to 2-7 [W5A1].>

N: DTC P0131 — FRONT OXYGEN (A/F) SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —

NOTE:

For the diagnostic procedure, refer to 2-7 [T10O0]. <Ref. to 2-7 [T10O0].>

O: DTC P0132 — FRONT OXYGEN (A/F) SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —

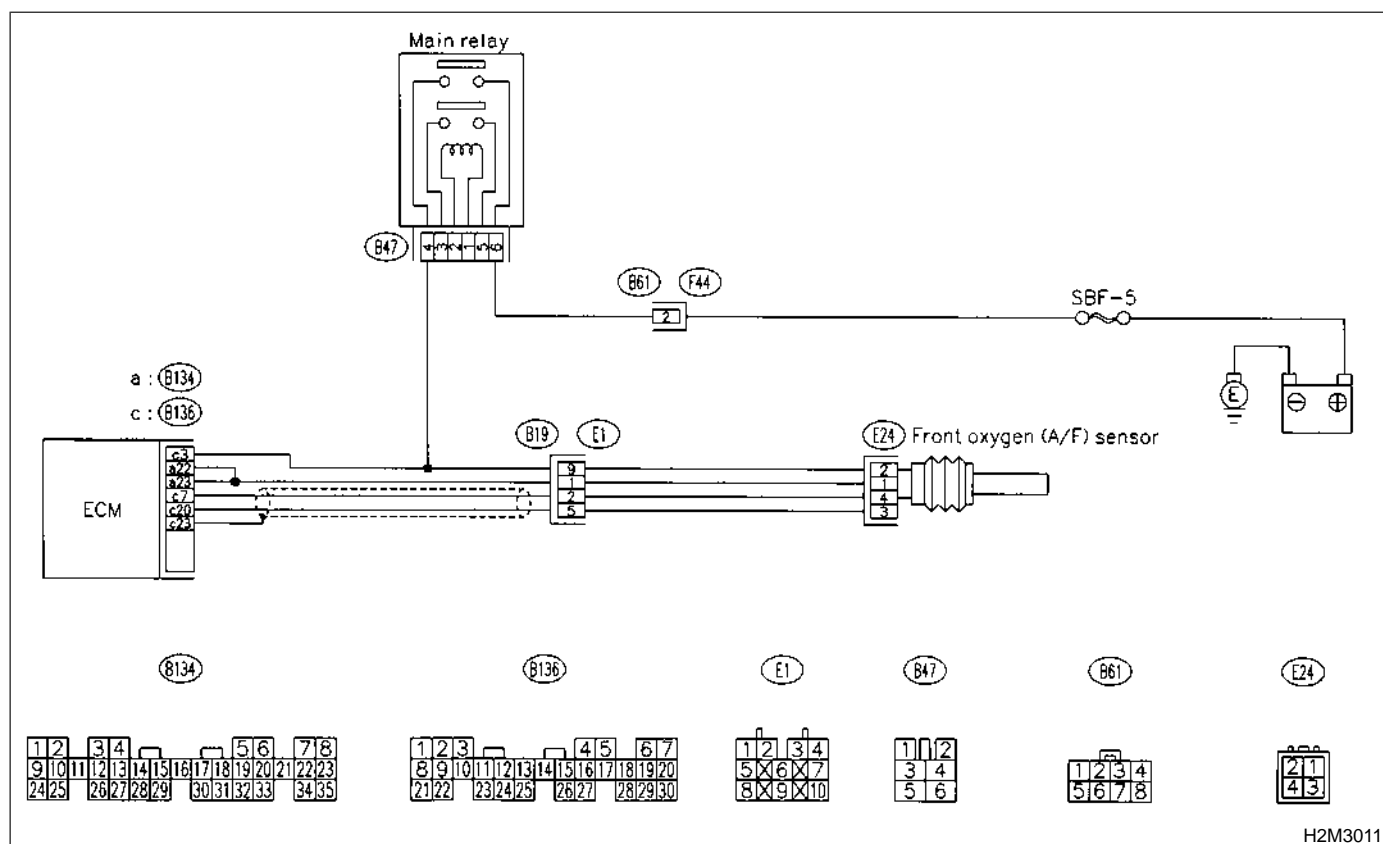
● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

● WIRING DIAGRAM:



H2M3011

1001 : CHECK ANY OTHER DTC ON DISPLAY.

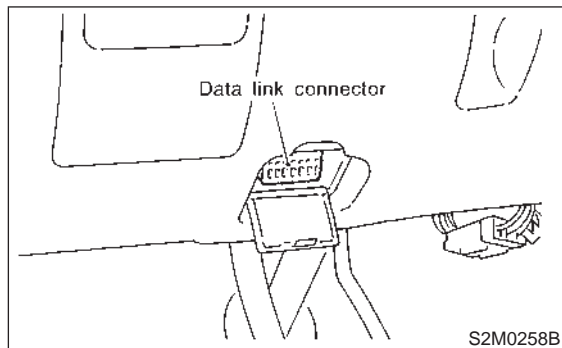
CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1130 or P1131?

YES : Inspect DTC P1130 or P1131 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

NO : Go to step 1002.

1002 : CHECK FRONT (A/F) OXYGEN SENSOR DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect the Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Start engine and Turn the Subaru Select Monitor and the OBD-II general scan tool switch to ON.
- 4) Warm-up the engine until coolant temperature is above 70°C (160°F).
- 5) Read data of front oxygen (A/F) sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Is the value equal to or more than 0.85 and equal to less than 1.15?**

YES : Go to step **1003**.

NO : Go to step **1004**.

1003 : CHECK REAR OXYGEN SENSOR SIGNAL.

- 1) Race engine at speeds from idling to 5,000 rpm for a total of 5 cycles.
- 2) Operate the LED operation mode for engine.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to 2-7 [T3C8].>

CHECK : **Does the LED of {Rear O2 Rich Signal} blink?**

YES : Repair poor contact in front oxygen (A/F) sensor and rear oxygen sensor connector.

NO : Check rear oxygen sensor circuit. <Ref. to 2-7 [T10Q0].>

1004 : CHECK EXHAUST SYSTEM.

Check exhaust system parts.

NOTE:

Check the following items.

- Loose installation of portions
- Damage (crack, hole etc.) of parts
- Looseness of front oxygen (A/F) sensor
- Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor

CHECK : **Is there a fault in exhaust system?**

YES : Repair or replace faulty parts.

NO : Replace front oxygen (A/F) sensor. <Ref. to 2-7 [W7A0].>

P: DTC P0133 — FRONT OXYGEN (A/F) SENSOR CIRCUIT SLOW RESPONSE —

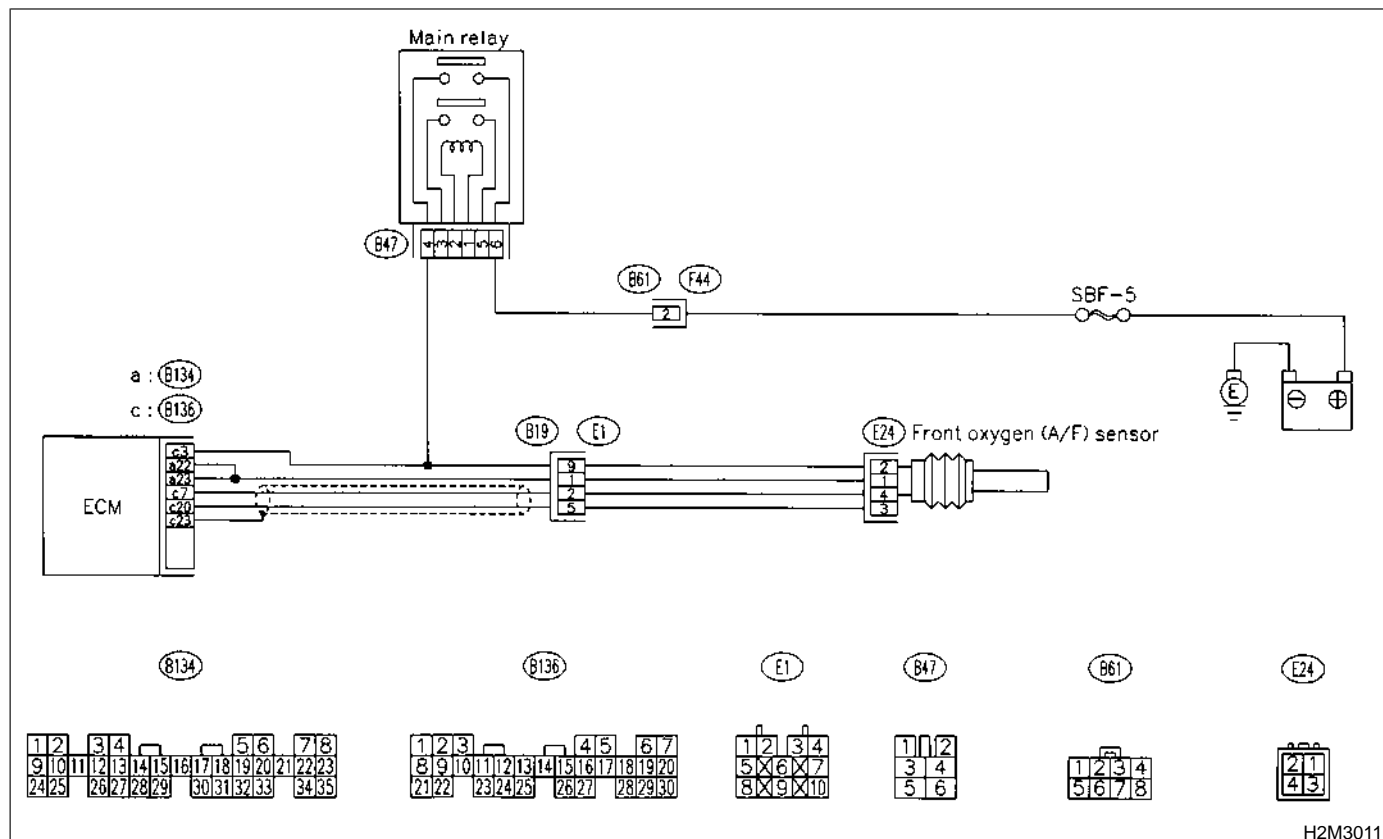
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3011

10P1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1130 or P1131?

YES : Inspect DTC P1130 or P1131 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0133.

NO : Go to step 10P2.

10P2 : CHECK EXHAUST SYSTEM.

NOTE:

Check the following items.

- Loose installation of front portion of exhaust pipe onto cylinder heads
- Loose connection between front exhaust pipe and front catalytic converter
- Damage of exhaust pipe resulting in a hole

CHECK : Is there a fault in exhaust system?

YES : Repair exhaust system.

NO : Replace front oxygen (A/F) sensor. <Ref. to 2-7 [W7A0].>

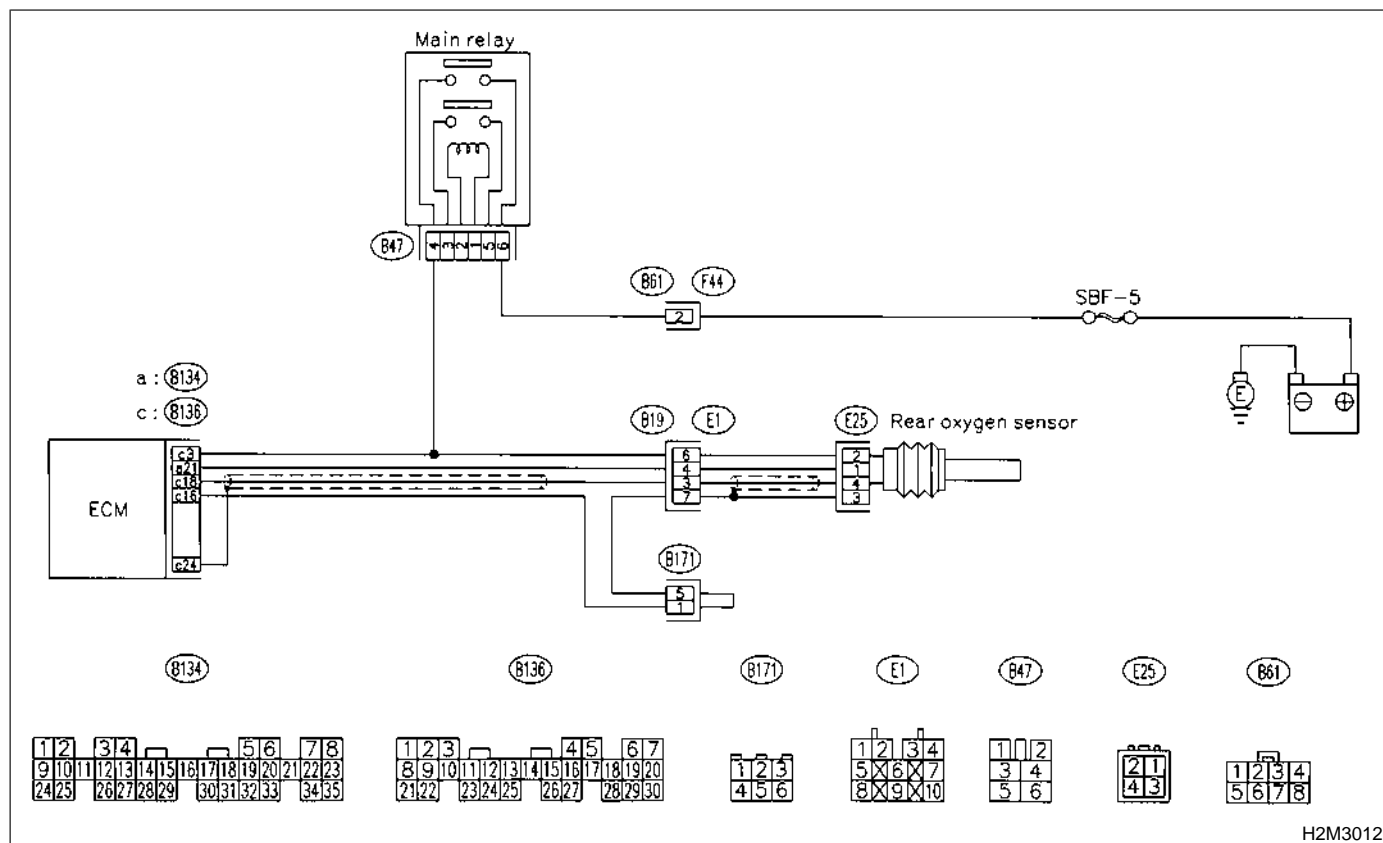
MEMO:

Q: DTC P0136 — REAR OXYGEN SENSOR CIRCUIT MALFUNCTION —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3012

10Q1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1130 or P1131?

YES : Go to step 10Q2.

NO : Go to step 10Q3.

10Q2 : CHECK FAILURE CAUSE OF P1130 OR P1131.

Inspect DTC P1130 or P1131 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

CHECK : Is the failure cause of P1130 or P1131 in the fuel system?

YES : Check fuel system.

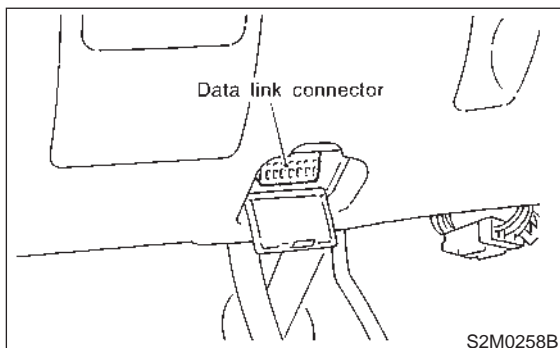
NOTE:

In this case, it is not necessary to inspect DTC P0136.

NO : Go to step 10Q3.

10Q3 : CHECK REAR OXYGEN SENSOR DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or OBD-II general scan tool to data link connector.



- 3) Start the engine, and turn Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Warm-up the engine until engine coolant temperature is above 70°C (160°F), and keep the engine speed at 2,000 rpm to 3,000 rpm for two minutes.
- 5) Read data of rear oxygen sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

● Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

● OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Does the value fluctuate?**

YES : Go to step **10Q7**.

NO : Go to step **10Q4**.

10Q4 : CHECK REAR OXYGEN SENSOR DATA.

Read data of rear oxygen sensor signal using Subaru Select Monitor or OBD-II General Scan Tool.

CHECK : **Is the value fixed between 0.2 and 0.4 V?**

YES : Go to step **10Q5**.

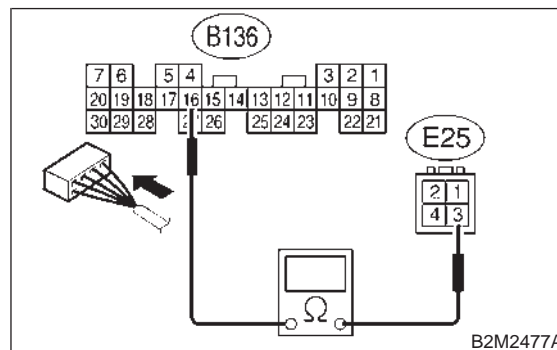
NO : Replace rear oxygen sensor. <Ref. to 2-7 [W8A0].>

10Q5 : CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from ECM and rear oxygen sensor.
- 3) Measure resistance of harness between ECM and rear oxygen sensor connector.

Connector & terminal

(B136) No. 16 — (E25) No. 3:



CHECK : **Is the resistance more than 3 Ω?**

YES : Repair open circuit in harness between ECM and rear oxygen sensor connector.

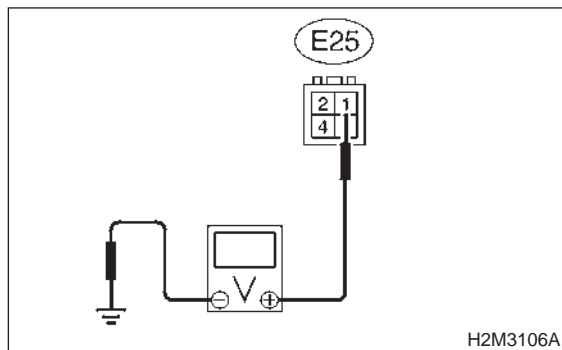
NO : Go to step **10Q6**.

10Q6 : CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.

- 1) Connect connector to ECM.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between rear oxygen sensor harness connector and engine ground or chassis ground.

Connector & terminal

(E25) No. 1 (+) — Engine ground (-):



CHECK : **Is the voltage more than 0.2 V?**

YES : Replace rear oxygen sensor. <Ref. to 2-7 [W8A0].>

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between rear oxygen sensor and ECM connector
- Poor contact in rear oxygen sensor connector
- Poor contact in ECM connector

10Q7 : CHECK EXHAUST SYSTEM.

Check exhaust system parts.

NOTE:

Check the following items.

- Loose installation of portions
- Damage (crack, hole etc.) of parts
- Looseness and ill fitting of parts between front oxygen sensor and rear oxygen sensor

CHECK : **Is there a fault in exhaust system?**

YES : Repair or replace faulty parts.

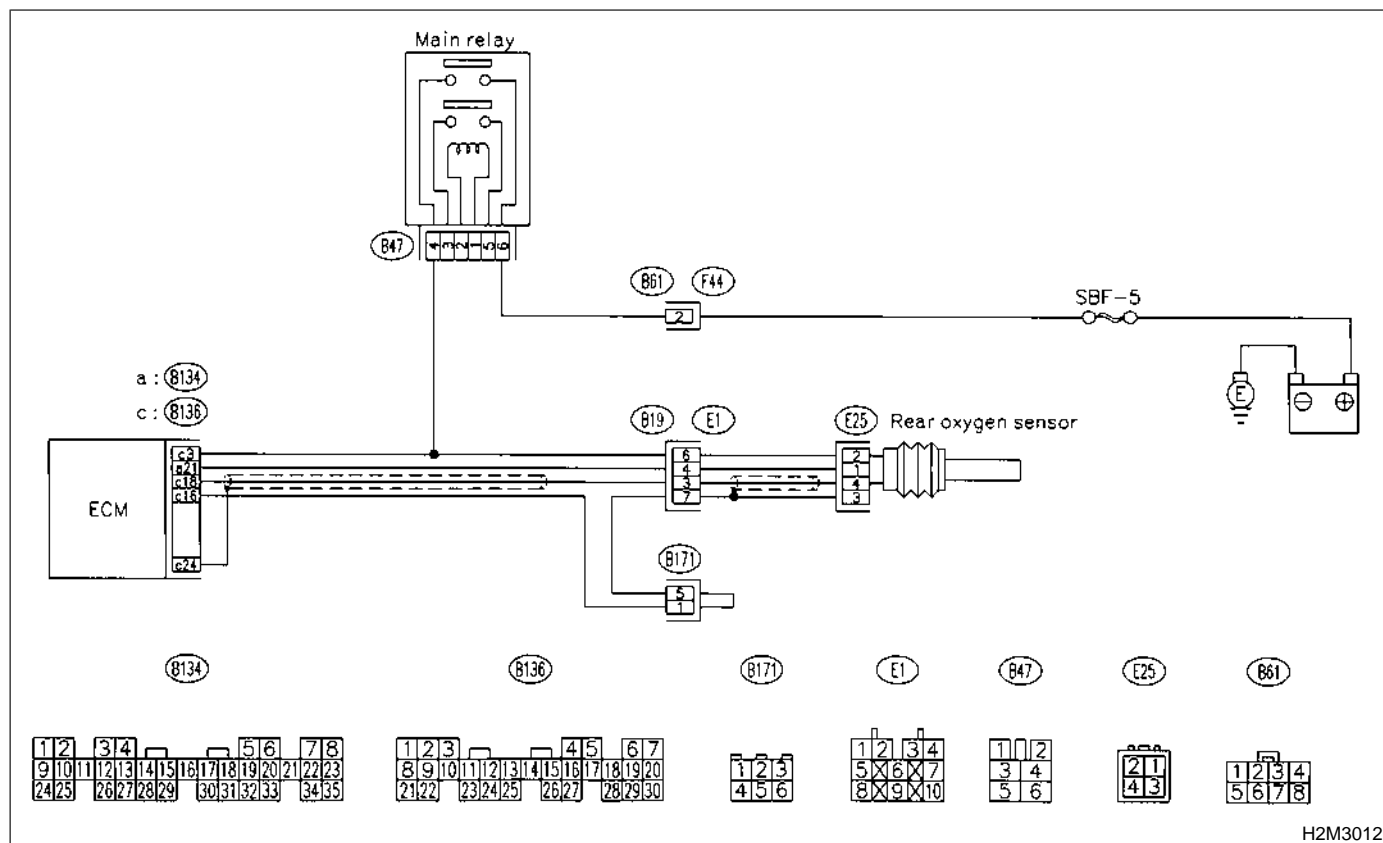
NO : Replace rear oxygen sensor. <Ref. to 2-7 [W8A0].>

R: DTC P0139 — REAR OXYGEN SENSOR CIRCUIT SLOW RESPONSE —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3012

10R1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0136?

YES : Inspect DTC P0136 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0139.

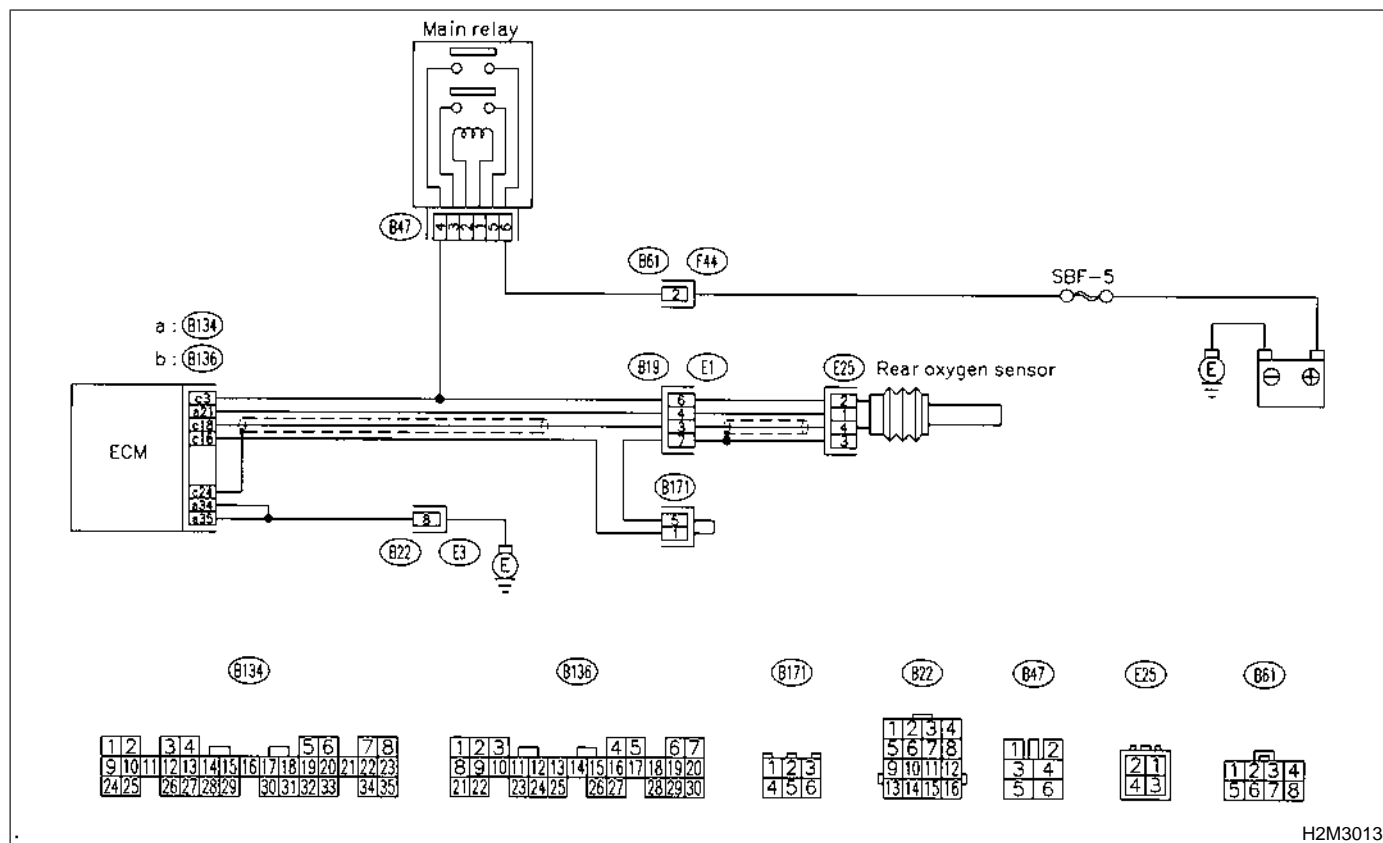
NO : Replace rear oxygen sensor. <Ref. to 2-7 [W8A0].>

S: DTC P0141 — REAR OXYGEN SENSOR HEATER CIRCUIT LOW INPUT —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3013

10S1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0141 and P0135 at the same time?

YES : Go to step 10S2.

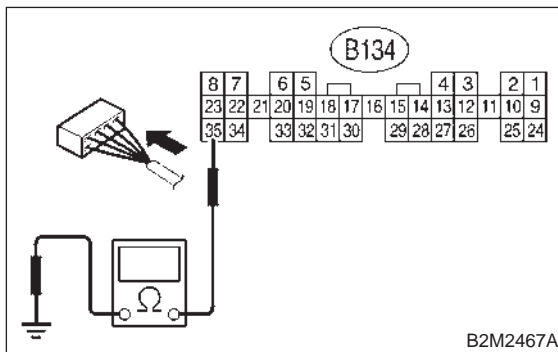
NO : Go to step 10S3.

10S2 : CHECK GROUND CIRCUIT OF ECM.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B134) No. 35 — Chassis ground:



- CHECK** : Is the resistance less than 10 Ω?
- YES** : Go to step 10S4.
- NO** : Go to step 10S3.

10S3 : CHECK GROUND CIRCUIT OF ECM.

- 1) Repair harness and connector.

NOTE:

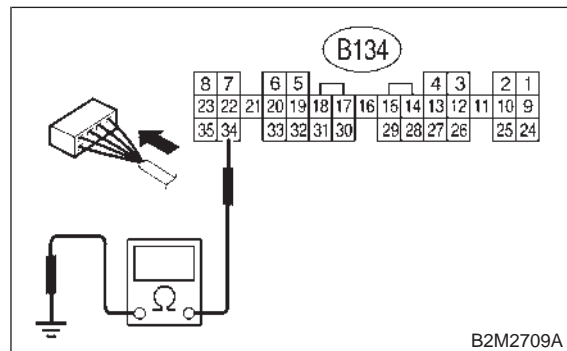
In this case, repair the following:

- Open circuit in harness between ECM and engine ground terminal
- Poor contact in ECM connector
- Poor contact in coupling connector (B22)

- 2) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B134) No. 34 — Chassis ground:



- CHECK** : Is the resistance less than 5 Ω?
- YES** : Go to step 10S4.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

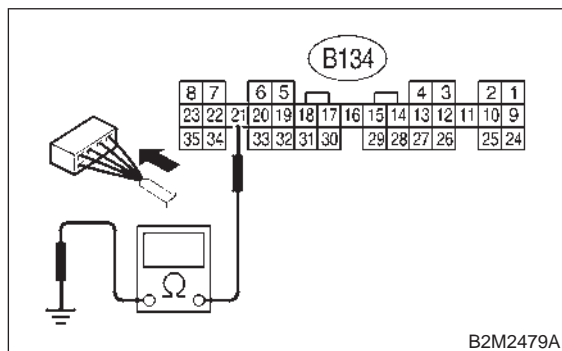
- Open circuit in harness between ECM and engine ground terminal
- Poor contact in ECM connector
- Poor contact in coupling connector (B22)

10S4 : CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B134) No. 21 — Chassis ground:



CHECK : **Is the resistance less than 10 Ω ?**

YES : Repair ground short circuit in harness between ECM and rear oxygen sensor connector.

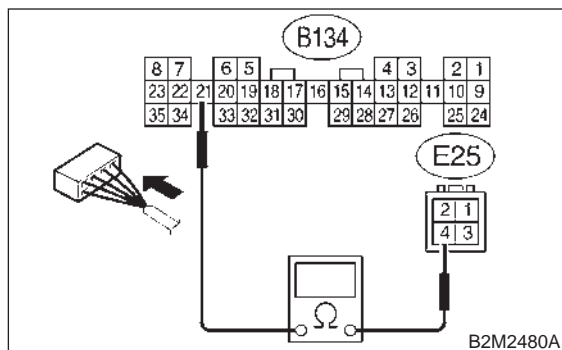
NO : Go to step 10S5.

10S5 : CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

- 1) Disconnect connector from rear oxygen sensor.
- 2) Measure resistance of harness between ECM and rear oxygen sensor connector.

Connector & terminal

(B134) No. 21 — (E25) No. 4:



CHECK : **Is the resistance less than 3 Ω ?**

YES : Go to step 10S6.

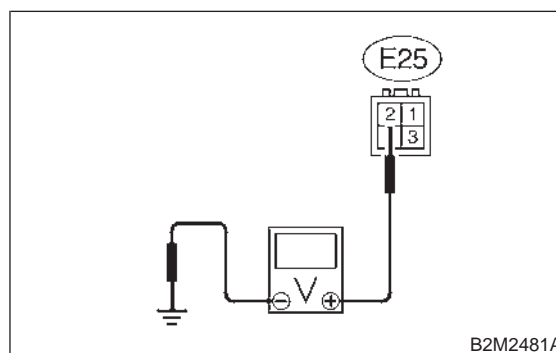
NO : Repair open circuit in harness between ECM and rear oxygen sensor connector.

10S6 : CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.

- 1) Connect connector to ECM.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between rear oxygen sensor connector and engine ground or chassis ground.

Connector & terminal

(E25) No. 2 (+) — Engine ground (-):



CHECK : **Is the voltage more than 10 V?**

YES : Go to step 10S7.

NO : Repair power supply line.

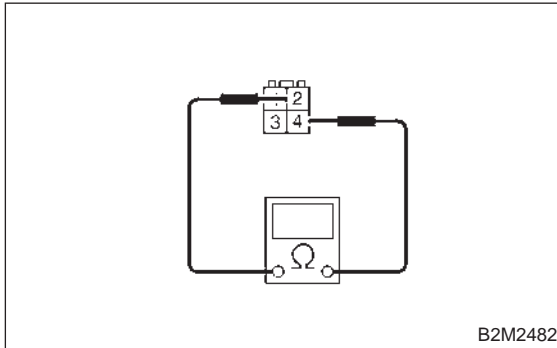
NOTE:

In this case, repair the following:

- Open circuit in harness between main relay and rear oxygen sensor connector
- Poor contact in rear oxygen sensor connector
- Poor contact in coupling connector (E1)

10S7 : CHECK REAR OXYGEN SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between rear oxygen sensor connector terminals.

Terminals**No. 2 — No. 4:****CHECK** : *Is the resistance less than 30 Ω ?***YES** : Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open circuit in harness between rear oxygen sensor and ECM connector
- Poor contact in rear oxygen sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (E1)

NO : Replace rear oxygen sensor. <Ref. to 2-7 [W8A0].>

T: DTC P0171 — FUEL TRIM MALFUNCTION (A/F TOO LEAN) —**NOTE:**

For the diagnostic procedure, refer to 2-7 [T10U0]. <Ref. to 2-7 [T10U0].>

U: DTC P0172 — FUEL TRIM MALFUNCTION (A/F TOO RICH) —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

10U1 : CHECK EXHAUST SYSTEM.

CHECK : *Are there holes or loose bolts on exhaust system?*

YES : Repair exhaust system.

NO : Go to step **10U2**.

10U2 : CHECK AIR INTAKE SYSTEM.

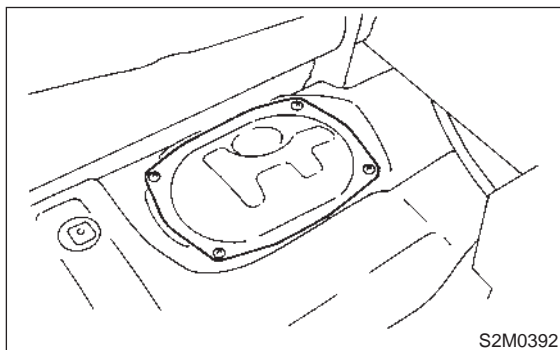
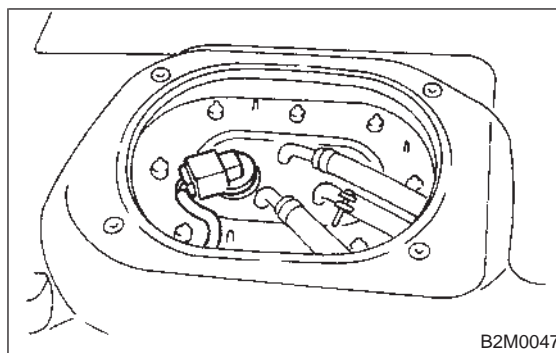
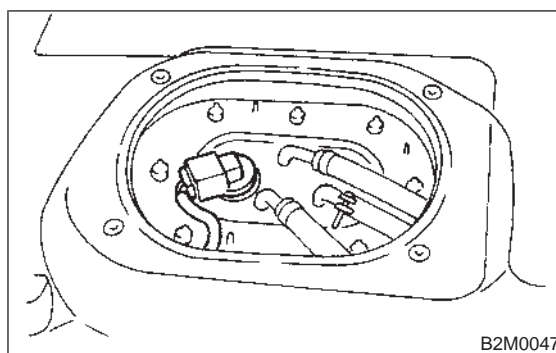
CHECK : *Are there holes, loose bolts or disconnection of hose on air intake system?*

YES : Repair air intake system.

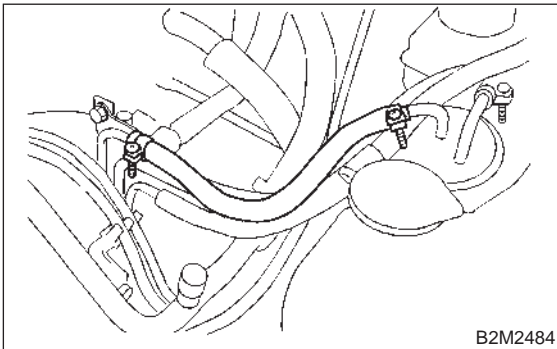
NO : Go to step **10U3**.

10U3 : CHECK FUEL PRESSURE.**1) Release fuel pressure.**

- (1) Remove fuel pump access hole lid located on the right rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).

**(2) Disconnect connector from fuel tank.****(3) Start the engine, and run it until it stalls.****(4) After stopping the engine, crank the engine for 5 to 7 seconds to reduce fuel pressure.****(5) Turn ignition switch to OFF.****(6) Remove fuel filler cap.****2) Connect connector to fuel tank.**

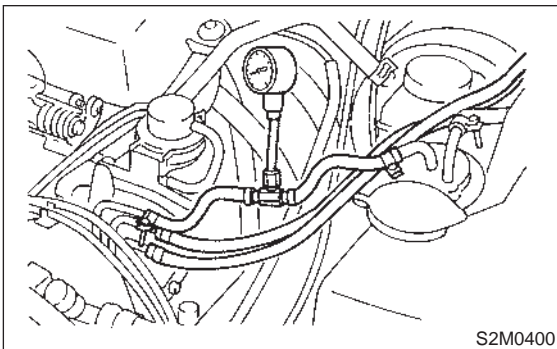
- 3) Disconnect fuel delivery hose from fuel filter, and connect fuel pressure gauge.



- 4) Install fuel filler cap.
5) Start the engine and idle while gear position is neutral.
6) Measure fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold.

WARNING:
Before removing fuel pressure gauge, release fuel pressure.

NOTE:
If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.



CHECK : Is fuel pressure between 284 and 314 kPa (2.9 — 3.2 kg/cm², 41 — 46 psi)?

YES : Go to step 10U4.

NO : Repair the following items.

Fuel pressure too high	<ul style="list-style-type: none"> ● Clogged fuel return line or bent hose
Fuel pressure too low	<ul style="list-style-type: none"> ● Improper fuel pump discharge ● Clogged fuel supply line

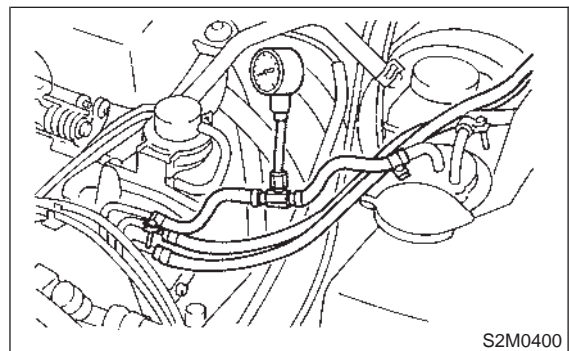
10U4 : CHECK FUEL PRESSURE.

After connecting pressure regulator vacuum hose, measure fuel pressure.

WARNING:
Before removing fuel pressure gauge, release fuel pressure.

NOTE:

- If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.
- If out of specification as measured at this step, check or replace pressure regulator and pressure regulator vacuum hose.



CHECK : Is fuel pressure between 206 and 235 kPa (2.1 — 2.4 kg/cm², 30 — 34 psi)?

YES : Go to step 10U5.

NO : Repair the following items.

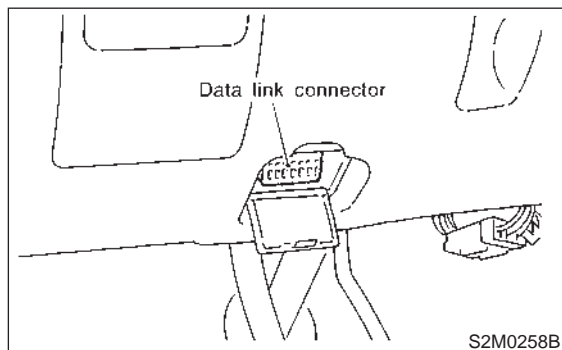
Fuel pressure too high	<ul style="list-style-type: none"> ● Faulty pressure regulator ● Clogged fuel return line or bent hose
Fuel pressure too low	<ul style="list-style-type: none"> ● Faulty pressure regulator ● Improper fuel pump discharge ● Clogged fuel supply line

NOTE:

The fuel pressure gauge resisters 10 to 20 kPa (0.1 to 0.2 kg/cm², 1.4 to 2.8 psi) higher than standard values during high-altitude operations.

10U5 : CHECK ENGINE COOLANT TEMPERATURE SENSOR. < REF. TO 2-7 [T10H0].> OR <REF. TO 2-7 [T10I0].>

- 1) Turn ignition switch to OFF.
- 2) Connect the Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Start the engine and warm-up completely.
- 4) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Is temperature greater than 60°C (140°F)?**

YES : Go to step **10U6**.

NO : Replace engine coolant temperature sensor. <Ref. to 2-7 [W5A1].>

10U6 : CHECK INTAKE MANIFOLD PRESSURE SENSOR.

- 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F).
- 2) Place the shift lever in neutral position (MT vehicles) or the selector lever in "N" or "P" position (AT vehicles).
- 3) Turn A/C switch to OFF.
- 4) Turn all accessory switches to OFF.
- 5) Read data of intake manifold pressure sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.

Specification:

- Intake manifold absolute pressure

Engine speed	Specified value
Idling	20.0 — 46.7 kPa (150 — 350 mmHg, 5.91 — 13.78 inHg)
2,500 rpm	20.0 — 46.7 kPa (150 — 350 mmHg, 5.91 — 13.78 inHg)

CHECK : **Is the value within the specifications?**

YES : Go to step **10U7**.

NO : Replace intake manifold pressure sensor. <Ref. to 2-7 [W20A0].>

10U7 : CHECK INTAKE AIR TEMPERATURE SENSOR.

- 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F).
- 2) Place the shift lever in neutral position (MT vehicles) or the selector lever in "N" or "P" position (AT vehicles).
- 3) Turn A/C switch to OFF.
- 4) Turn all accessory switches to OFF.
- 5) Open front hood.
- 6) Measure ambient temperature.
- 7) Read data of intake manifold pressure sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is value obtained when ambient temperature is subtracted from intake air temperature greater than -10°C (14°F) and less than 50°C (122°F)?*

YES : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

NO : Check intake air temperature sensor.
<Ref. to 2-7 [T10E0].>

V: DTC P0181 — FUEL TEMPERATURE SENSOR A CIRCUIT RANGE/PERFORMANCE PROBLEM —

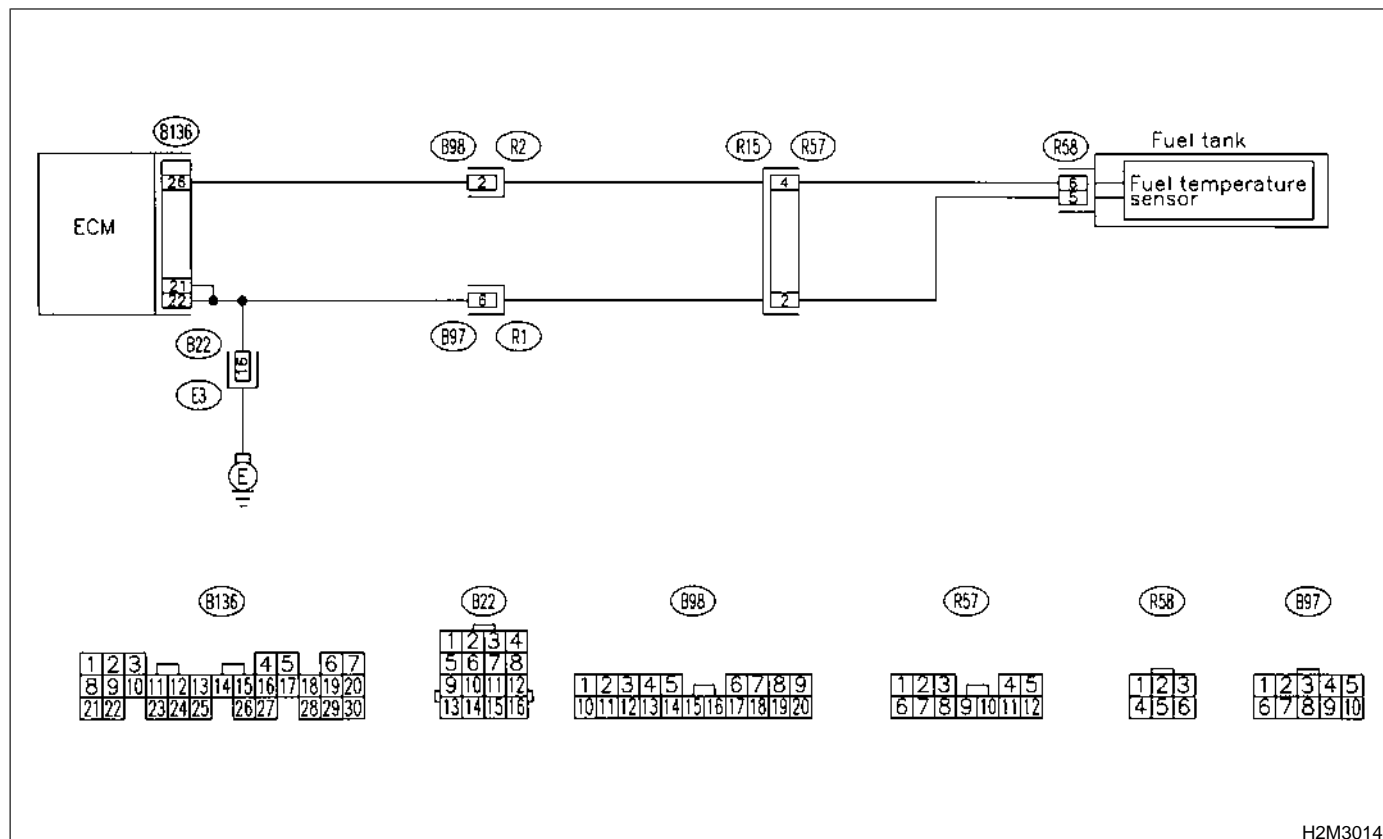
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3014

10V1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0182 or P0183?

YES : Inspect DTC P0182 or P0183 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0181.

NO : Replace fuel temperature sensor. <Ref. to 2-1 [W5A0].>

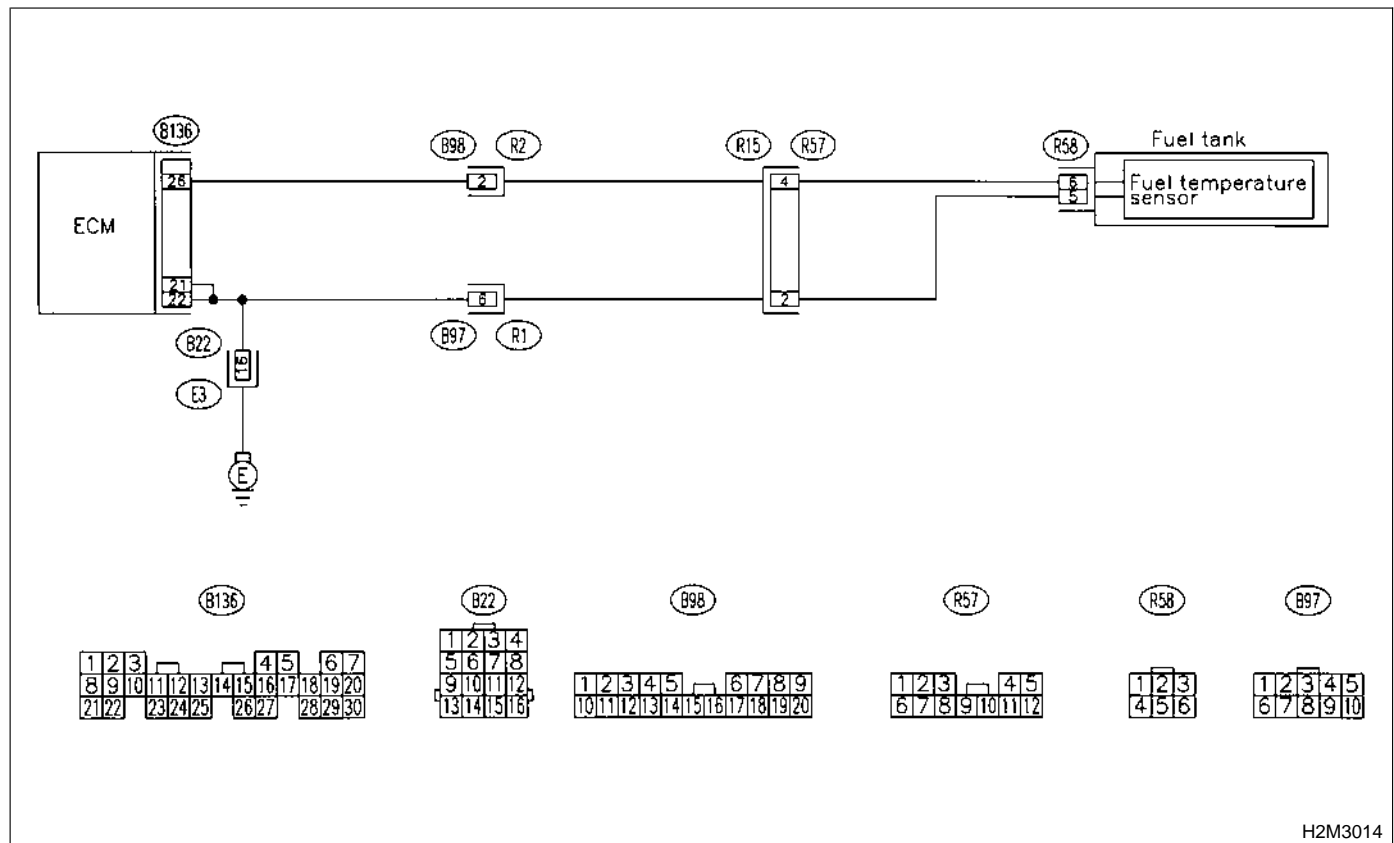
MEMO:

W: DTC P0182 — FUEL TEMPERATURE SENSOR A CIRCUIT LOW INPUT —**• DTC DETECTING CONDITION:**

- Immediately at fault recognition

CAUTION:

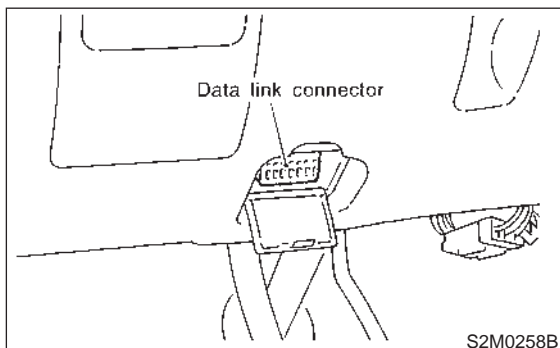
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3014

10W1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read data of fuel temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

● Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

● OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

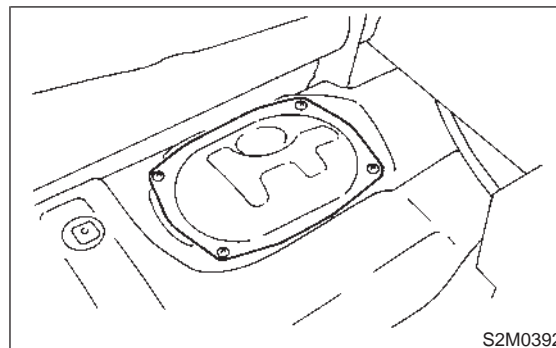
CHECK : **Is the value greater than 150°C (300°F)?**

YES : Go to step 10W2.

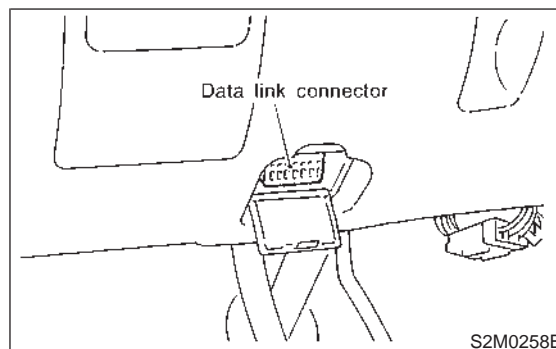
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time.

10W2 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Remove access hole lid.



- 3) Disconnect connector from fuel pump.
- 4) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 5) Turn ignition switch and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 6) Read data of fuel temperature sensor signal using Subaru Select Monitor or the OBD-II general scan tool.

NOTE:

● Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

● OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Is the value less than -40°C (-40°F)?**

YES : Replace fuel temperature sensor. <Ref. to 2-1 [W5A0].>

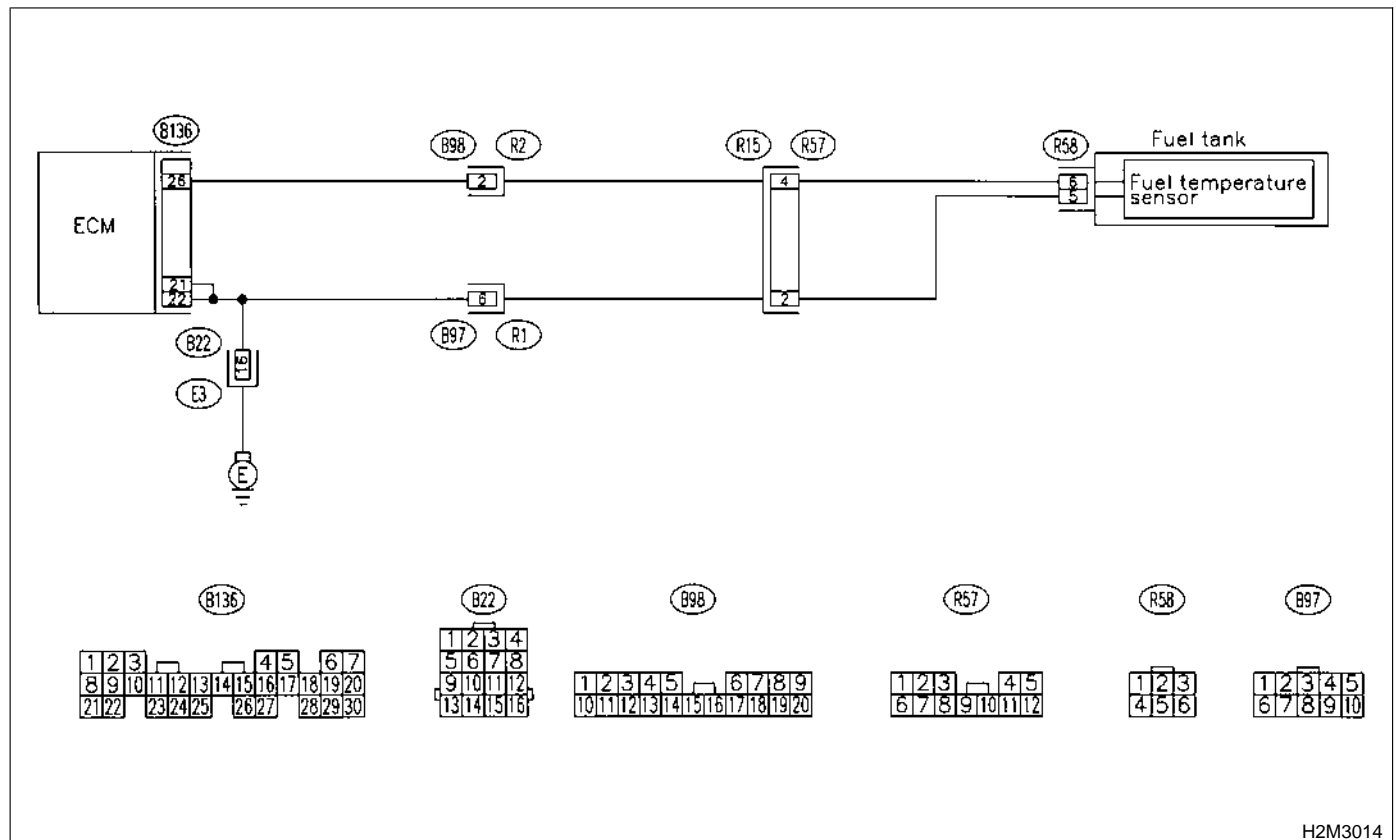
NO : Repair ground short circuit in harness between fuel pump and ECM connector.

X: DTC P0183 — FUEL TEMPERATURE SENSOR A CIRCUIT HIGH INPUT —● **DTC DETECTING CONDITION:**

- Immediately at fault recognition

CAUTION:

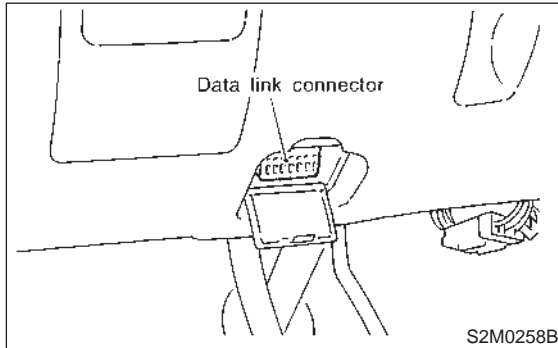
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● **WIRING DIAGRAM:**

H2M3014

10X1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read data of fuel temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
- OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

- CHECK** : Is the value less than -40°C (-40°F)?
- YES** : Go to step 10X2.
- NO** : Repair poor contact.

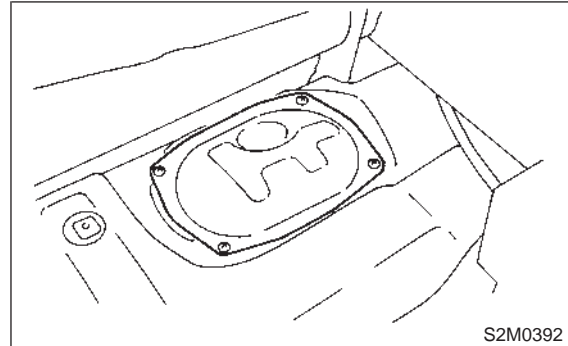
NOTE:

In this case, repair the following:

- Poor contact in fuel pump connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (B22), (B98), (B97) and (R57)

10X2 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

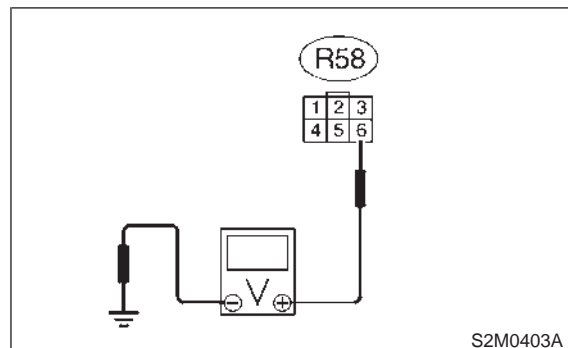
- 1) Turn ignition switch to OFF.
- 2) Remove access hole lid.



- 3) Disconnect connector from fuel pump.
- 4) Measure voltage between fuel pump connector and chassis ground.

Connector & terminal

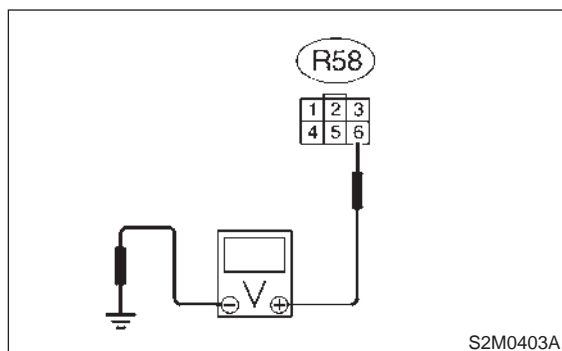
(R58) No. 6 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in harness between ECM and fuel pump connector.
- NO** : Go to step 10X3.

10X3 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

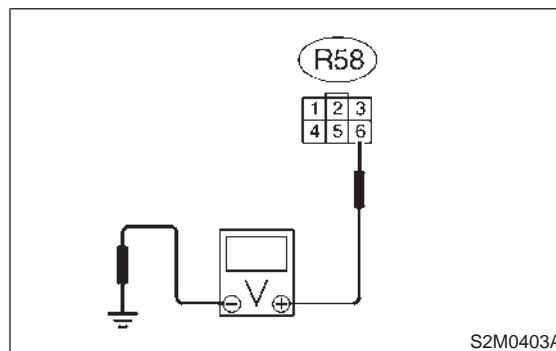
- 1) Turn ignition switch to ON.
- 2) Measure voltage between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 6 (+) — Chassis ground (-):


- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair battery short circuit in harness between ECM and fuel pump connector.
- NO** : Go to step **10X4**.

10X4 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

Measure voltage between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 6 (+) — Chassis ground (-):


- CHECK** : **Is the voltage more than 4 V?**
- YES** : Go to step **10X5**.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

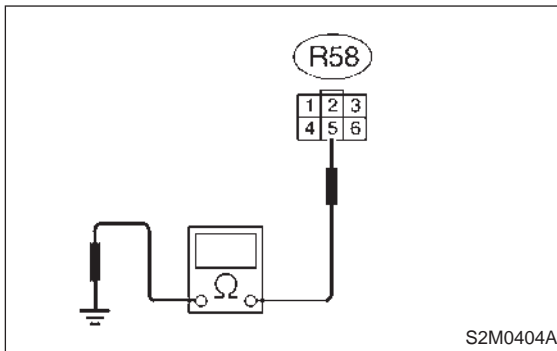
- Open circuit in harness between ECM and fuel pump connector
- Poor contact in fuel pump connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (B98) and (R57)

10X5 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between fuel pump connector and chassis ground.

Connector & terminal

(R58) No. 5 — Chassis ground:



CHECK : **Is the resistance less than 5 Ω?**

YES : Replace fuel temperature sensor. <Ref. to 2-1 [W5A0].>

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and fuel pump connector
- Poor contact in fuel pump connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (B22), (B98), (B97) and (R57)

For the diagnostic procedure, refer to 2-7 [T10AB1]. <Ref. to 2-7 [T10AB1].>

For the diagnostic procedure, refer to 2-7 [T10AB1]. <Ref. to 2-7 [T10AB1].>

For the diagnostic procedure, refer to 2-7 [T10AB1]. <Ref. to 2-7 [T10AB1].>

- **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault
- Immediately at fault recognition (A misfire which could damage catalyst occurs.)

- Engine stalls.
- Erroneous idling
- Rough driving

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

H2M3015

10AB1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0106, P0107, P0108, P0116, P0117 or P0125?

YES : Inspect DTC P0106, P0107, P0108, P0116, P0117 or P0125 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles".
<Ref. to 2-7 [T10A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0301, P0302, P0303 and P0304.

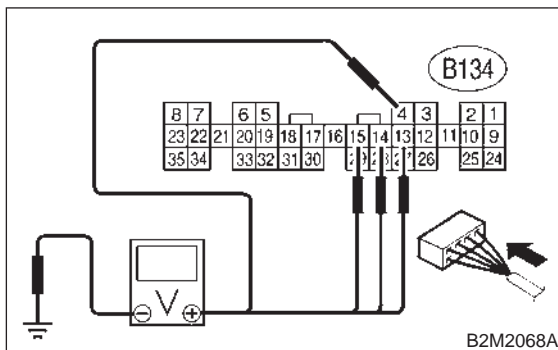
NO : Go to step 10AB2.

10AB2 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM connector and chassis ground on faulty cylinders.

Connector & terminal

- #1 (B134) No. 4 (+) — Chassis ground (-):
- #2 (B134) No. 13 (+) — Chassis ground (-):
- #3 (B134) No. 14 (+) — Chassis ground (-):
- #4 (B134) No. 15 (+) — Chassis ground (-):



CHECK : Is the voltage more than 10 V?

YES : Go to step 10AB7.

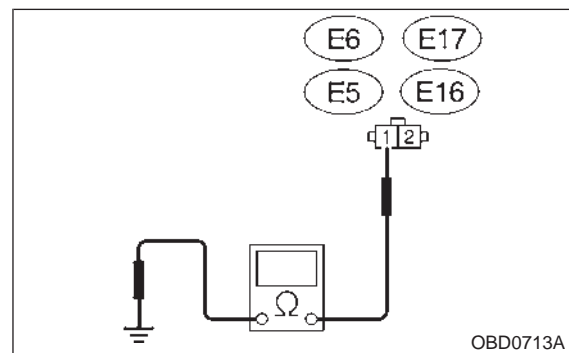
NO : Go to step 10AB3.

10AB3 : CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from fuel injector on faulty cylinders.
- 3) Measure voltage between ECM connector and engine ground on faulty cylinders.

Connector & terminal

- #1 (E5) No. 1 — Engine ground:
- #2 (E16) No. 1 — Engine ground:
- #3 (E6) No. 1 — Engine ground:
- #4 (E17) No. 1 — Engine ground:



CHECK : Is the resistance less than 10 Ω?

YES : Repair ground short circuit in harness between fuel injector and ECM connector.

NO : Go to step 10AB4.

10AB4 : CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.

Measure resistance of harness connector between ECM connector and fuel injector on faulty cylinders.

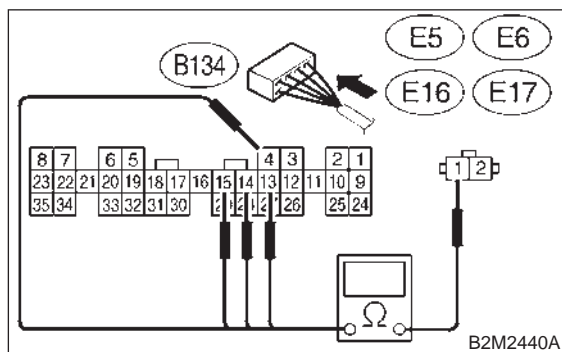
Connector & terminal

#1 (B134) No. 4 — (E5) No. 1:

#2 (B134) No. 13 — (E16) No. 1:

#3 (B134) No. 14 — (E6) No. 1:

#4 (B134) No. 15 — (E17) No. 1:



CHECK : **Is the resistance less than 1 Ω?**

YES : Go to step **10AB5**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

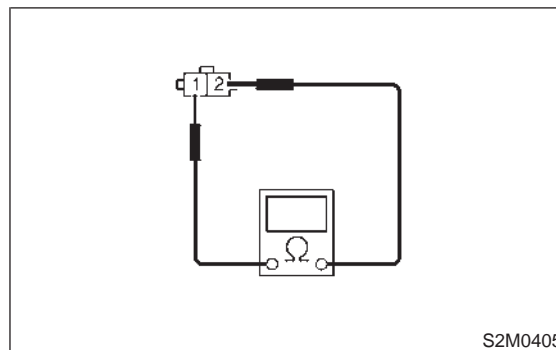
- Open circuit in harness between ECM and fuel injector connector
- Poor contact in coupling connector (B22)

10AB5 : CHECK FUEL INJECTOR.

Measure resistance between fuel injector terminals on faulty cylinder.

Terminals

No. 1 — No. 2:



CHECK : **Is the resistance between 5 and 20 Ω?**

YES : Go to step **10AB6**.

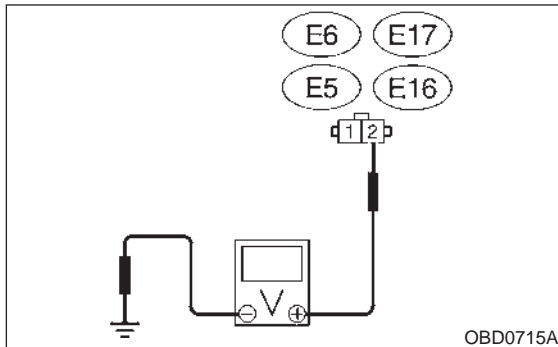
NO : Replace faulty fuel injector. <Ref. to 2-7 [W14A0].>

10AB6 : CHECK POWER SUPPLY LINE.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between fuel injector and engine ground on faulty cylinders.

Connector & terminal

- #1 (E5) No. 2 (+) — Engine ground (-):
- #2 (E16) No. 2 (+) — Engine ground (-):
- #3 (E6) No. 2 (+) — Engine ground (-):
- #4 (E17) No. 2 (+) — Engine ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Repair poor contact in all connectors in fuel injector circuit.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

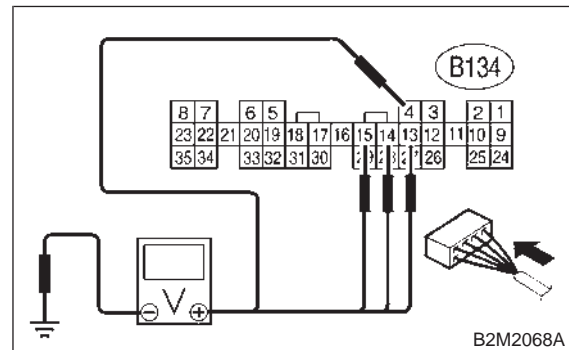
- Open circuit in harness between main relay and fuel injector connector on faulty cylinders
- Poor contact in coupling connector (B22)
- Poor contact in main relay connector
- Poor contact in fuel injector connector on faulty cylinders

10AB7 : CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from fuel injector on faulty cylinder.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM connector and chassis ground on faulty cylinders.

Connector & terminal

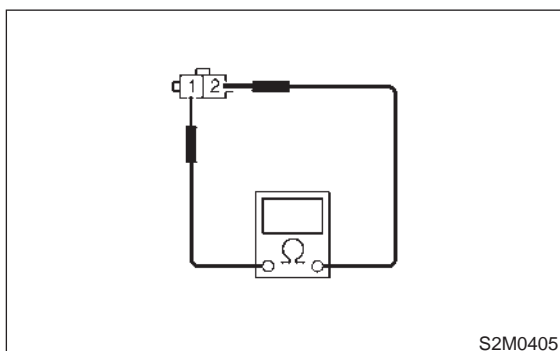
- #1 (B134) No. 4 (+) — Chassis ground (-):
- #2 (B134) No. 13 (+) — Chassis ground (-):
- #3 (B134) No. 14 (+) — Chassis ground (-):
- #4 (B134) No. 15 (+) — Chassis ground (-):



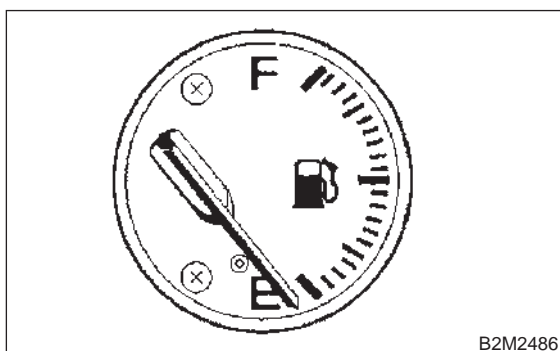
- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in harness between ECM and fuel injector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Go to step 10AB8.

10AB8 : CHECK FUEL INJECTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between fuel injector terminals on faulty cylinder.

Terminals**No. 1 — No. 2:**

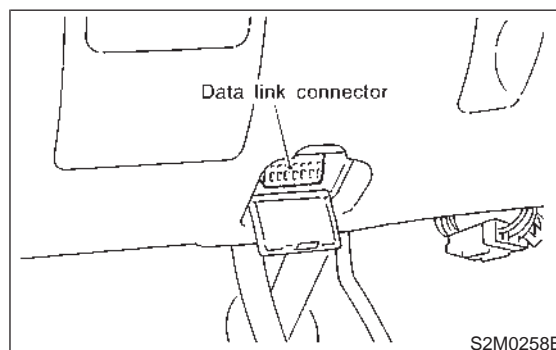
- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Replace faulty fuel injector <Ref. to 2-7 [W14A1].> and ECM <Ref. to 2-7 [W15A0].>.
- NO** : Go to step **10AB9**.

10AB9 : CHECK FUEL LEVEL.

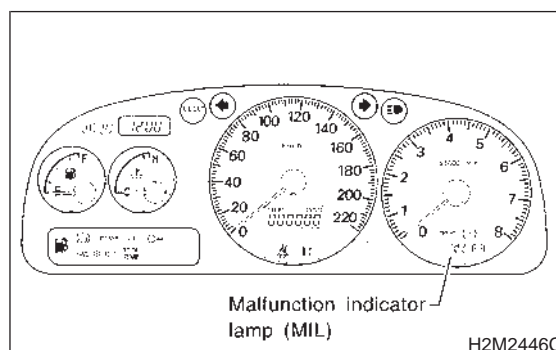
- CHECK** : **Is the fuel meter indication higher than the "Lower" level?**
- YES** : Go to step **10AB10**.
- NO** : Replenish fuel so fuel meter indication is higher than the "Lower" level. After replenishing fuel, Go to step **10AB10**. <Ref. to 2-7 [T10AB10].>

10AB10 : CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor to the data link connector.



- 3) Clear memory using Subaru Select Monitor. <Ref. to 2-7 [T3D0].>
- 4) Start engine, and drive the vehicle more than 10 minutes.



- CHECK** : **Is the MIL coming on or blinking?**
- YES** : Go to step **10AB12**.
- NO** : Go to step **10AB11**.

10AB11 : CHECK CAUSE OF MISFIRE DIAGNOSED.

CHECK : *Was the cause of misfire diagnosed when the engine is running?*

YES : Finish diagnostics operation, if the engine has no abnormality.

NOTE:

Ex. Remove spark plug cord, etc.

NO : Repair poor contact.

NOTE:

In this case, repair the following:

- Poor contact in ignitor connector
- Poor contact in ignition coil connector
- Poor contact in fuel injector connector on faulty cylinders
- Poor contact in ECM connector
- Poor contact in coupling connector (B22)

10AB12 : CHECK AIR INTAKE SYSTEM.

CHECK : *Is there a fault in air intake system?*

YES : Repair air intake system.

NOTE:

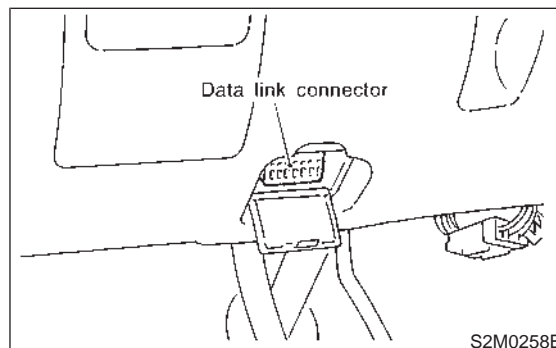
Check the following items:

- Are there air leaks or air suction caused by loose or dislocated nuts and bolts?
- Are there cracks or any disconnection of hoses?

NO : Go to step **10AB13**.

10AB13 : CHECK MISFIRE SYMPTOM.

- 1) Turn ignition switch to OFF.
- 2) Connect the Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON, and turn Subaru Select Monitor or OBD-II general scan tool switch to ON.

- 4) Read diagnostic trouble code (DTC).

● Subaru Select Monitor

<Ref. to 2-7 [T3C2].>

● OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.

NOTE:

Perform diagnosis according to the items listed below.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate only one DTC?*

YES : Go to step **10AB18**.

NO : Go to step **10AB14**.

10AB14 : CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0301 and P0302?*

YES : Go to step **10AB19**.

NO : Go to step **10AB15**.

10AB15 : CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0303 and P0304?*

YES : Go to step **10AB20**.

NO : Go to step **10AB16**.

10AB16 : CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0301 and P0303?*

YES : Go to step 10AB21.

NO : Go to step 10AB17.

10AB17 : CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0302 and P0304?*

YES : Go to step 10AB22.

NO : Go to step 10AB23.

10AB18 : ONLY ONE CYLINDER

CHECK : *Is there a fault in that cylinder?*

YES : Repair or replace faulty parts.

NOTE:

Check the following items.

- Spark plug
- Spark plug cord
- Fuel injector
- Compression ratio

NO : Go to DTC P0171 <Ref. to 2-7 [T10T0].> and P0172. <Ref. to 2-7 [T10U0].>

10AB19 : GROUP OF #1 AND #2 CYLINDERS

CHECK : *Are there faults in #1 and #2 cylinders?*

YES : Repair or replace faulty parts.

NOTE:

- Check the following items.

- Spark plugs
- Fuel injectors
- Ignition coil
- Compression ratio

● If no abnormal is discovered, check for "9. D: IGNITION CONTROL SYSTEM" of #1 and #2 cylinders side. <Ref. to 2-7 [T8D0].>

NO : Go to DTC P0171 <Ref. to 2-7 [T10T0].> and P0172. <Ref. to 2-7 [T10U0].>

10AB20 : GROUP OF #3 AND #4 CYLINDERS

CHECK : *Are there faults in #3 and #4 cylinders?*

YES : Repair or replace faulty parts.

NOTE:

- Check the following items.

- Spark plugs
- Fuel injectors
- Ignition coil

● If no abnormal is discovered, check for "9. D: IGNITION CONTROL SYSTEM" of #3 and #4 cylinders side. <Ref. to 2-7 [T8D0].>

NO : Go to DTC P0171 <Ref. to 2-7 [T10T0].> and P0172. <Ref. to 2-7 [T10U0].>

10AB21 : GROUP OF #1 AND #3 CYLINDERS

CHECK : *Are there faults in #1 and #3 cylinders?*

YES : Repair or replace faulty parts.

NOTE:

Check the following items.

- Spark plugs
- Fuel injectors
- Skipping timing belt teeth

NO : Go to DTC P0171 <Ref. to 2-7 [T10T0].> and P0172. <Ref. to 2-7 [T10U0].>

10AB22 : GROUP OF #2 AND #4 CYLINDERS

CHECK : *Are there faults in #2 and #4 cylinders?*

YES : Repair or replace faulty parts.

NOTE:

Check the following items.

- Spark plugs
- Fuel injectors
- Compression ratio
- Skipping timing belt teeth

NO : Go to DTC P0171 <Ref. to 2-7 [T10T0].> and P0172. <Ref. to 2-7 [T10U0].>

10AB23 : CYLINDER AT RANDOM

CHECK : *Is the engine idle rough?*

YES : Go to DTC P0171 <Ref. to 2-7 [T10T0].> and P0172. <Ref. to 2-7 [T10U0].>

NO : Repair or replace faulty parts.

NOTE:

Check the following items.

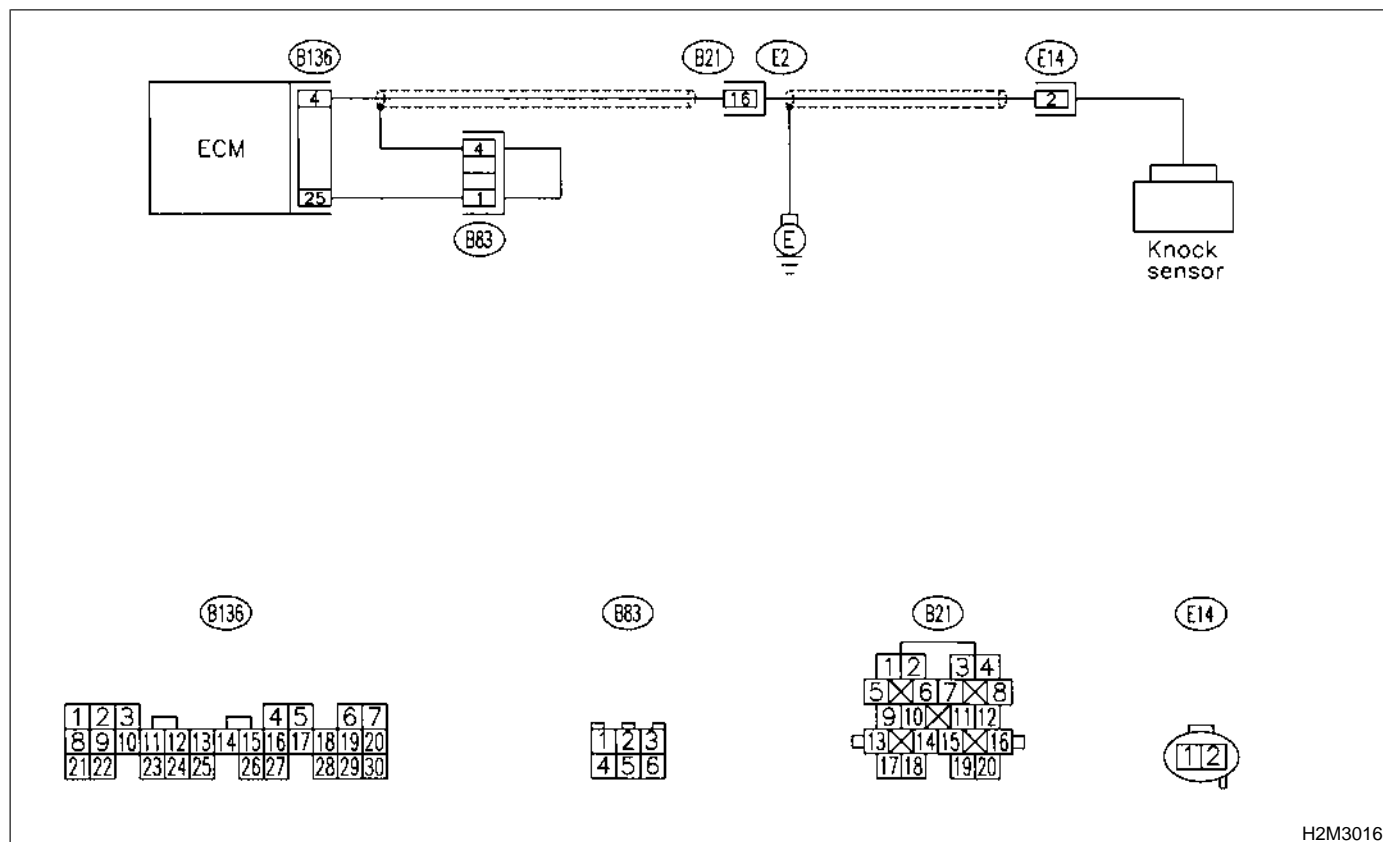
- Spark plugs
- Fuel injectors
- Compression ratio

AC: DTC P0325 — KNOCK SENSOR CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Poor driving performance
 - Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

● **WIRING DIAGRAM:**

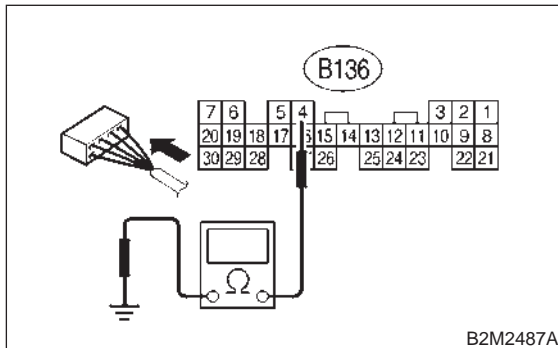
H2M3016

10AC1 : CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance between ECM harness connector and chassis ground.

Connector & terminal

(B136) No. 4 — Chassis ground:



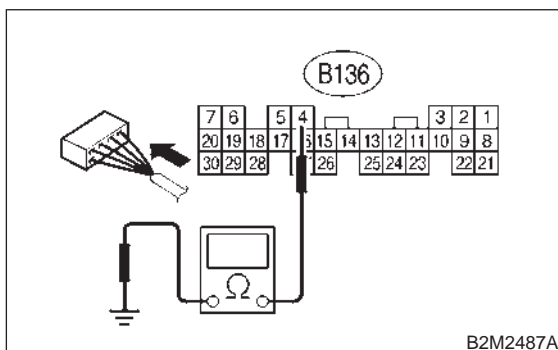
- CHECK** : Is the resistance more than 700 kΩ?
- YES** : Go to step 10AC3.
- NO** : Go to step 10AC2.

10AC2 : CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.

Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B136) No. 4 — Chassis ground:



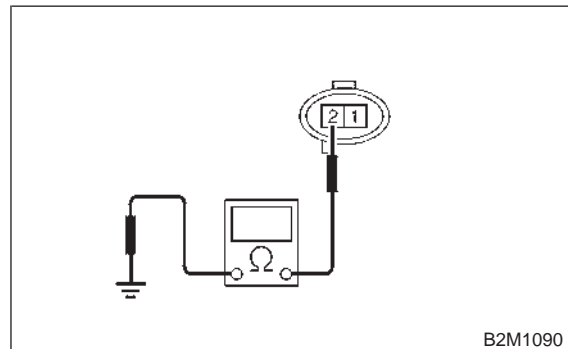
- CHECK** : Is the resistance less than 400 kΩ?
- YES** : Go to step 10AC5.
- NO** : Go to step 10AC6.

10AC3 : CHECK KNOCK SENSOR.

- 1) Disconnect connector from knock sensor.
- 2) Measure resistance between knock sensor connector terminal and engine ground.

Terminal

No. 2 — Engine ground:



- CHECK** : Is the resistance more than 700 kΩ?
- YES** : Go to step 10AC4.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

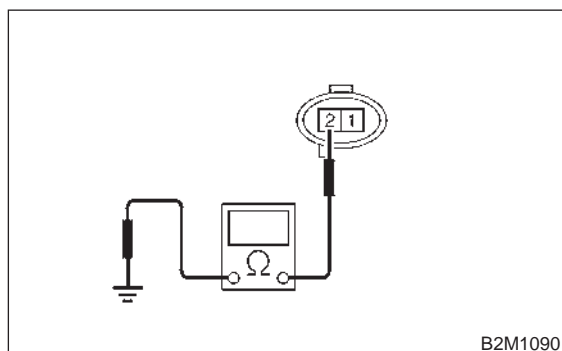
- Open circuit in harness between knock sensor and ECM connector
- Poor contact in knock sensor connector
- Poor contact in coupling connector (B21) and (B83)

10AC4 : CHECK CONDITION OF KNOCK SENSOR INSTALLATION.

- CHECK** : Is the knock sensor installation bolt tightened securely?
- YES** : Replace knock sensor. <Ref. to 2-7 [W19A0].>
- NO** : Tighten knock sensor installation bolt securely.

10AC5 : CHECK KNOCK SENSOR.

- 1) Disconnect connector from knock sensor.
- 2) Measure resistance between knock sensor connector terminal and engine ground.

Terminal**No. 2 — Engine ground:**

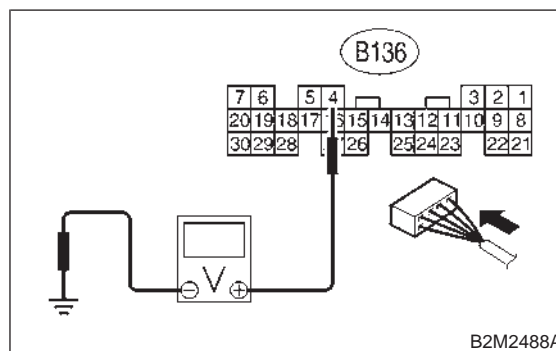
- CHECK** : **Is the resistance less than 400 kΩ?**
- YES** : Replace knock sensor. <Ref. to 2-7 [W19A0].>
- NO** : Repair ground short circuit in harness between knock sensor connector and ECM connector.

NOTE:

The harness between both connectors is shielded.
Repair short circuit of harness together with shield.

10AC6 : CHECK INPUT SIGNAL FOR ECM.

- 1) Connect connectors to ECM and knock sensor.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between ECM and chassis ground.

Connector & terminal**(B136) No. 4 (+) — Chassis ground (-):**

- CHECK** : **Is the voltage more than 2 V?**
- YES** : Even if MIL lights up, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.)

NOTE:

In this case, repair the following:

- Poor contact in knock sensor connector
 - Poor contact in ECM connector
 - Poor contact in coupling connector (B21) and (B83)
- NO** : Repair poor contact in ECM connector.

MEMO:

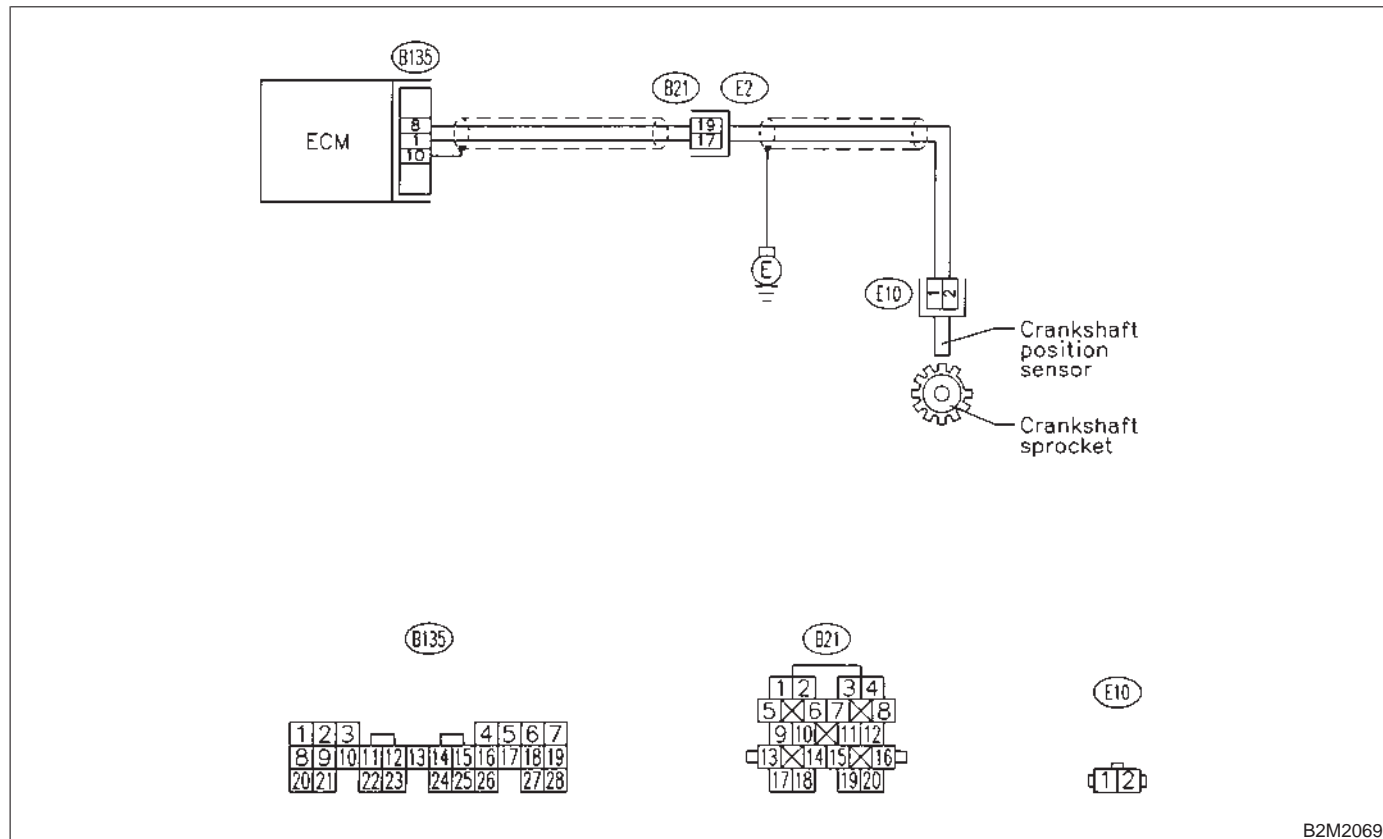
AD: DTC P0335 — CRANKSHAFT POSITION SENSOR CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Engine stalls.
 - Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

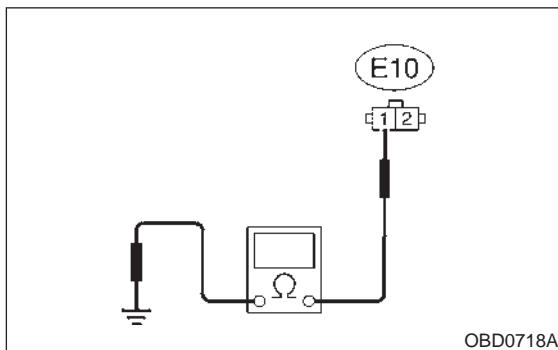
● WIRING DIAGRAM:



B2M2069

10AD1 : CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from crankshaft position sensor.
- 3) Measure resistance of harness between crankshaft position sensor connector and engine ground.

Connector & terminal
(E10) No. 1 — Engine ground:


- CHECK** : **Is the resistance more than 100 k Ω ?**
YES : Repair harness and connector.

NOTE:

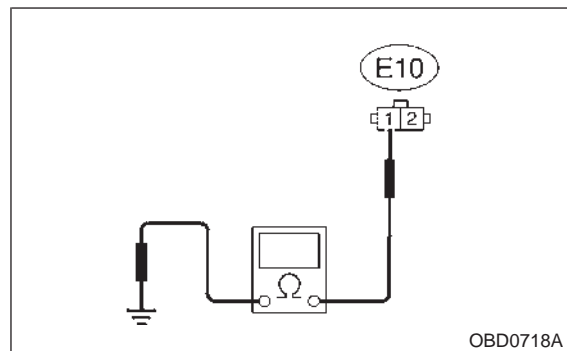
In this case, repair the following:

- Open circuit in harness between crankshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

- NO** : Go to step **10AD2**.

10AD2 : CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between crankshaft position sensor connector and engine ground.

Connector & terminal
(E10) No. 1 — Engine ground:


- CHECK** : **Is the resistance less than 10 Ω ?**
YES : Repair ground short circuit in harness between crankshaft position sensor and ECM connector.

NOTE:

The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.

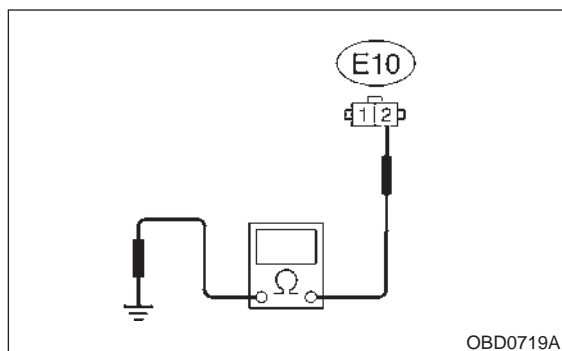
- NO** : Go to step **10AD3**.

10AD3 : CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between crankshaft position sensor connector and engine ground.

Connector & terminal

(E10) No. 2 — Engine ground:



CHECK : **Is the resistance less than 5 Ω ?**

YES : Go to step **10AD4**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between crankshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

10AD4 : CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.

CHECK : **Is the crankshaft position sensor installation bolt tightened securely?**

YES : Go to step **10AD5**.

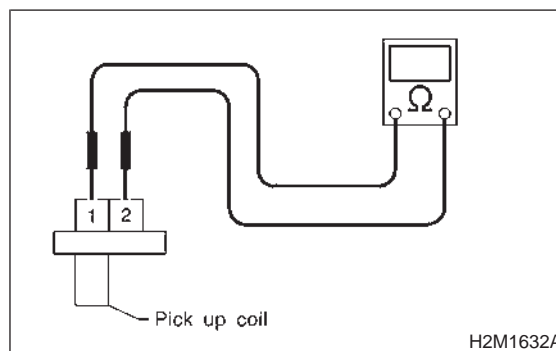
NO : Tighten crankshaft position sensor installation bolt securely.

10AD5 : CHECK CRANKSHAFT POSITION SENSOR.

- 1) Remove crankshaft position sensor.
- 2) Measure resistance between connector terminals of crankshaft position sensor.

Terminals

No. 1 — No. 2:



CHECK : **Is the resistance between 1 and 4 $k\Omega$?**

YES : Repair poor contact in crankshaft position sensor connector.

NO : Replace crankshaft position sensor.
<Ref. to 2-7 [W6A0].>

MEMO:

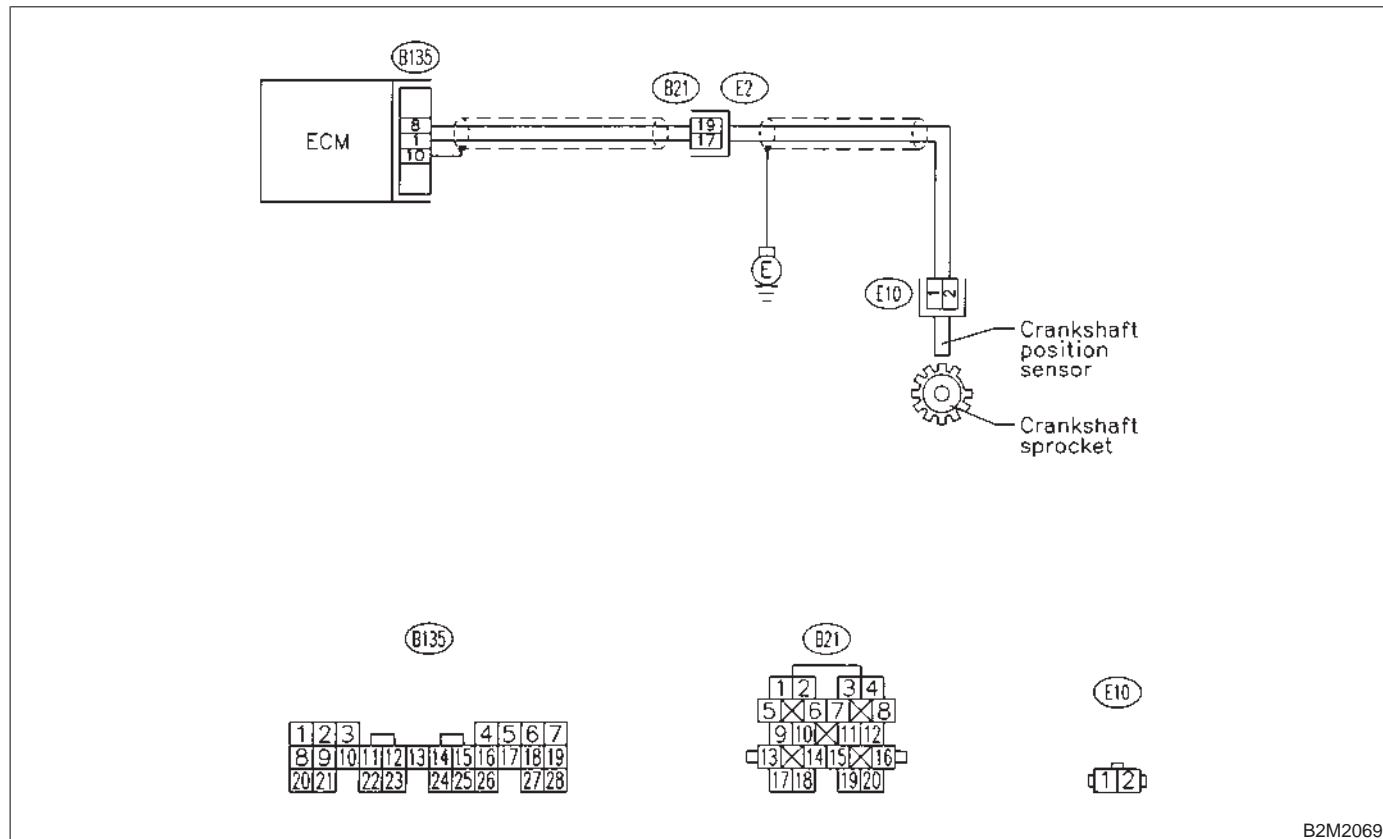
AE: DTC P0336 — CRANKSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Engine stalls.
 - Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

● WIRING DIAGRAM:



B2M2069

10AE1 : CHECK ANY OTHER DTC ON DISPLAY.

- CHECK** : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0335?
- YES** : Inspect DTC P0335 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>
- NO** : Go to step **10AE2**.

10AE2 : CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.

Turn ignition switch to OFF.

- CHECK** : Is the crankshaft position sensor installation bolt tightened securely?
- YES** : Go to step **10AE3**.
- NO** : Tighten crankshaft position sensor installation bolt securely.

10AE3 : CHECK CRANKSHAFT SPROCKET.

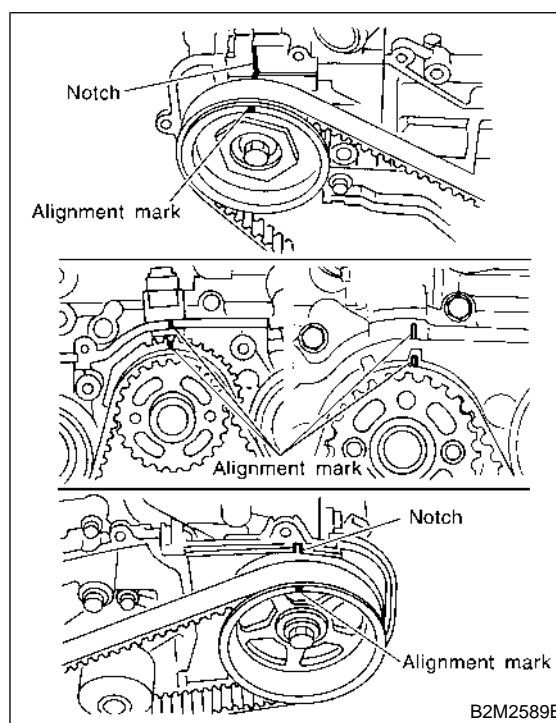
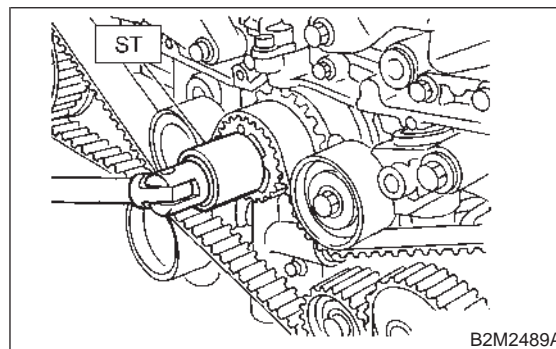
Remove front belt cover. <Ref. to 2-3 [W2A1].>

- CHECK** : **Are crankshaft sprocket teeth cracked or damaged?**
- YES** : Replace crankshaft sprocket. <Ref. to 2-3 [W2A0].>
- NO** : Go to step **10AE4**.

10AE4 : CHECK INSTALLATION CONDITION OF TIMING BELT.

Turn crankshaft using ST, and align alignment mark on crankshaft sprocket. Then, make sure left and right camshaft sprockets are matched with notches (alignment marks of belt cover and cylinder head).

ST 499987500 CRANKSHAFT SOCKET



- CHECK** : **Is timing belt installed properly in accordance with the correct position of crankshaft and camshaft sprockets?**
- YES** : Repair installation condition of timing belt. <Ref. to 2-3 [W2A0].>
- NO** : Replace crankshaft position sensor. <Ref. to 2-7 [W6A0].>

AF: DTC P0340 — CAMSHAFT POSITION SENSOR CIRCUIT MALFUNCTION**• DTC DETECTING CONDITION:**

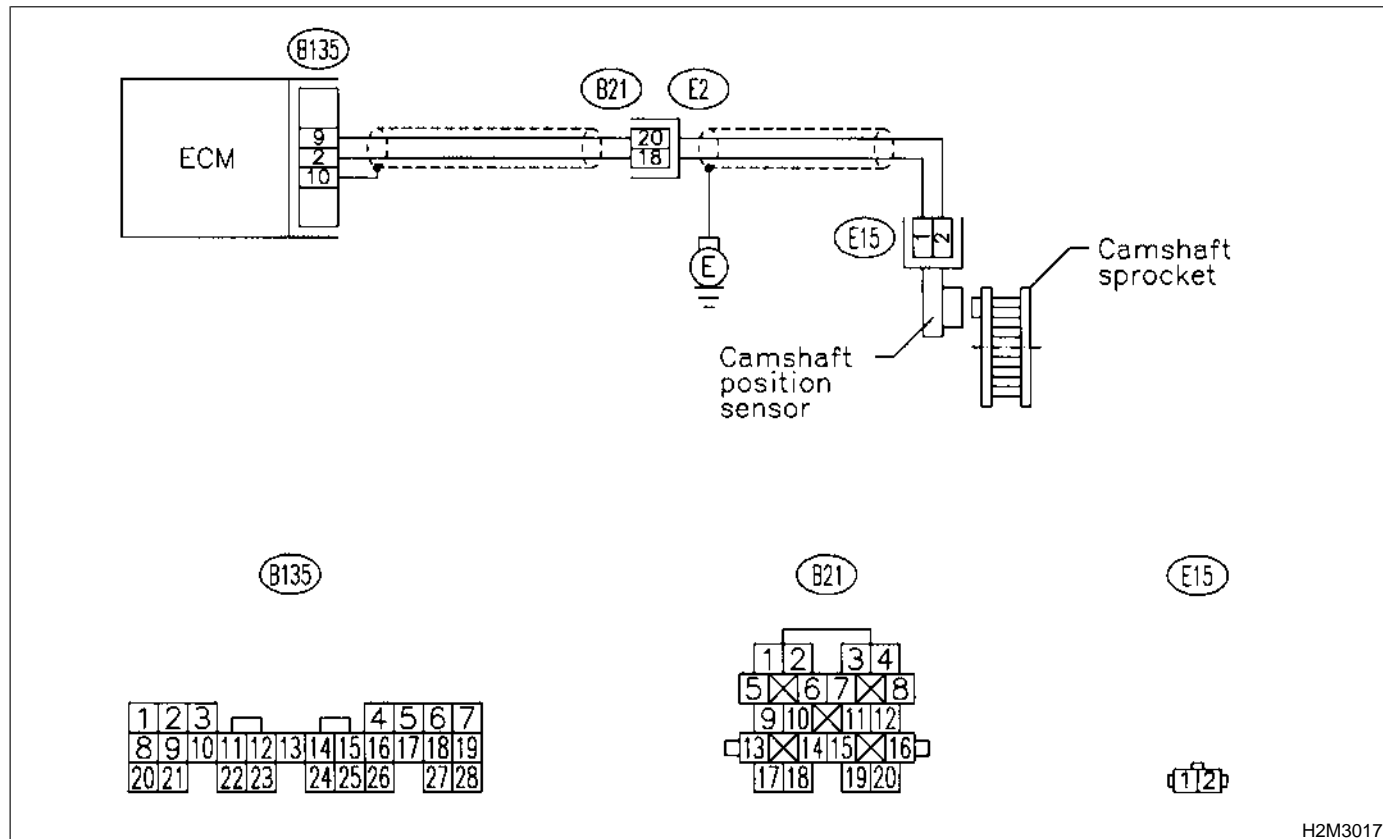
- Immediately at fault recognition

• TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

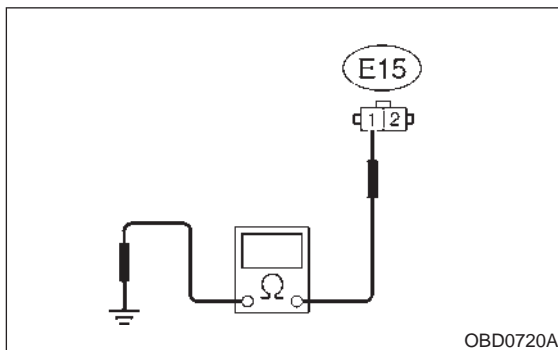
H2M3017

10AF1 : CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from camshaft position sensor.
- 3) Measure resistance of harness between camshaft position sensor connector and engine ground.

Connector & terminal

(E15) No. 1 — Engine ground:



CHECK : Is the resistance more than 100 kΩ?

YES : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between camshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

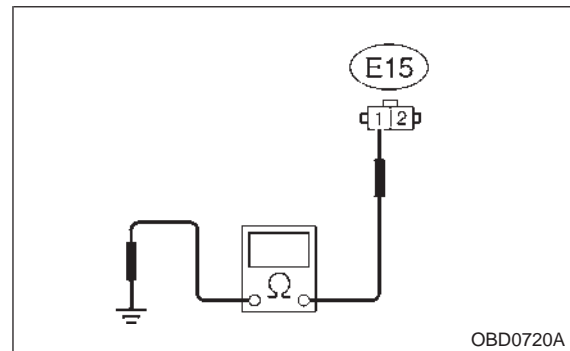
NO : Go to step 10AF2.

10AF2 : CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between camshaft position sensor connector and engine ground.

Connector & terminal

(E15) No. 1 — Engine ground:



CHECK : Is the resistance less than 10 Ω?

YES : Repair ground short circuit in harness between camshaft position sensor and ECM connector.

NOTE:

The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.

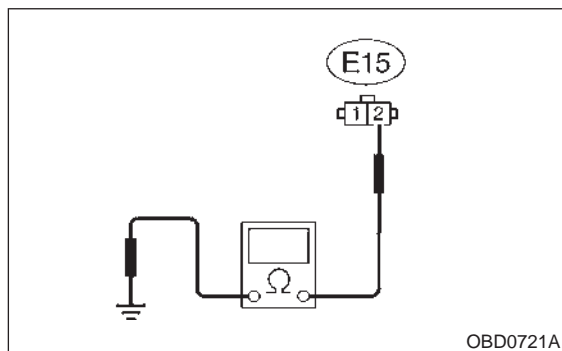
NO : Go to step 10AF3.

10AF3 : CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between camshaft position sensor connector and engine ground.

Connector & terminal

(E15) No. 2 — Engine ground:



CHECK : **Is the resistance less than 5 Ω?**

YES : Go to step **10AF4**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between camshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

10AF4 : CHECK CONDITION OF CAMSHAFT POSITION SENSOR.

CHECK : **Is the camshaft position sensor installation bolt tightened securely?**

YES : Go to step **10AF5**.

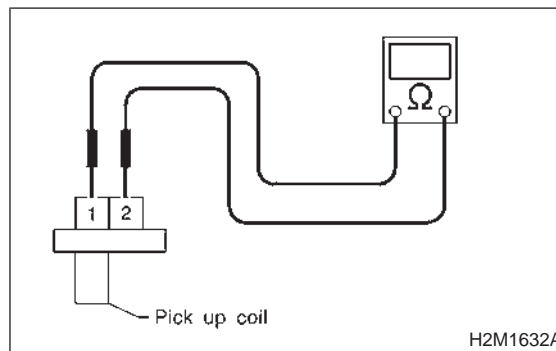
NO : Tighten camshaft position sensor installation bolt securely.

10AF5 : CHECK CAMSHAFT POSITION SENSOR.

- 1) Remove camshaft position sensor.
- 2) Measure resistance between connector terminals of camshaft position sensor.

Terminals

No. 1 — No. 2:



CHECK : **Is the resistance between 1 and 4 kΩ?**

YES : Repair poor contact in camshaft position sensor connector.

NO : Replace camshaft position sensor.
<Ref. to 2-7 [W10A0].>

MEMO:

AG: DTC P0341 — CAMSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —

• DTC DETECTING CONDITION:

- Immediately at fault recognition

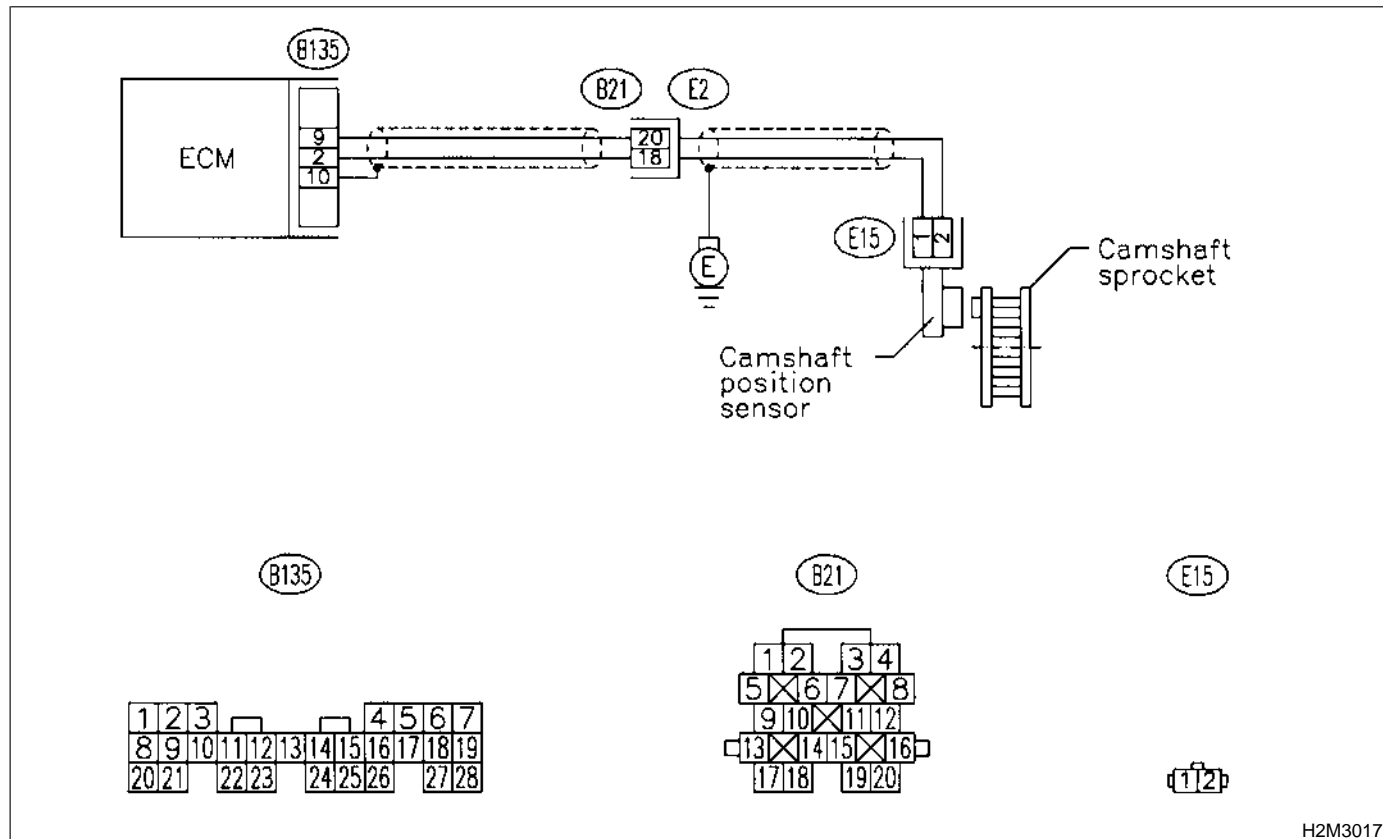
• TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3017

10AG1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0340?

YES : Inspect DTC P0340 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

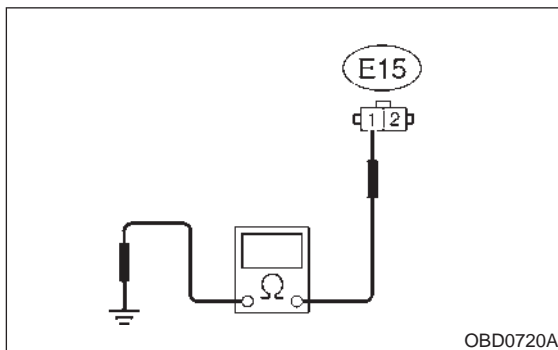
NO : Go to step **10AG2**.

10AG2 : CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from camshaft position sensor.
- 3) Measure resistance of harness between camshaft position sensor connector and engine ground.

Connector & terminal

(E15) No. 1 — Engine ground:



CHECK : Is the resistance more than 100 k Ω ?

YES : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between camshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

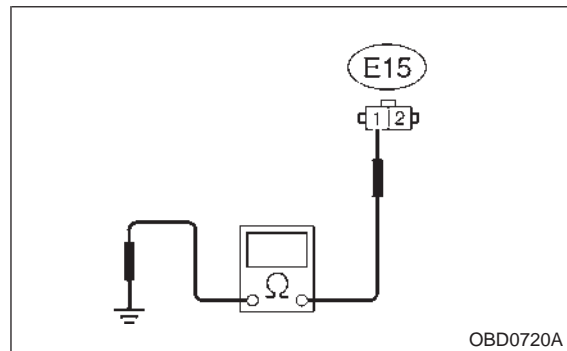
NO : Go to step 10AG3.

10AG3 : CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between camshaft position sensor connector and engine ground.

Connector & terminal

(E15) No. 1 — Engine ground:



CHECK : Is the resistance less than 10 Ω ?

YES : Repair ground short circuit in harness between camshaft position sensor and ECM connector.

NOTE:

The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.

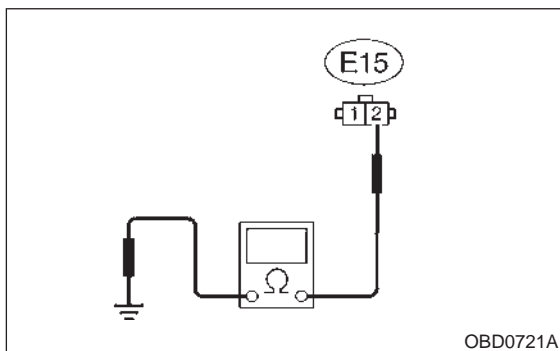
NO : Go to step 10AG4.

10AG4 : CHECK HARNESS BETWEEN CAMSHFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between camshaft position sensor connector and engine ground.

Connector & terminal

(E15) No. 2 — Engine ground:



CHECK : **Is the resistance less than 5 Ω ?**

YES : Go to step **10AG5**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

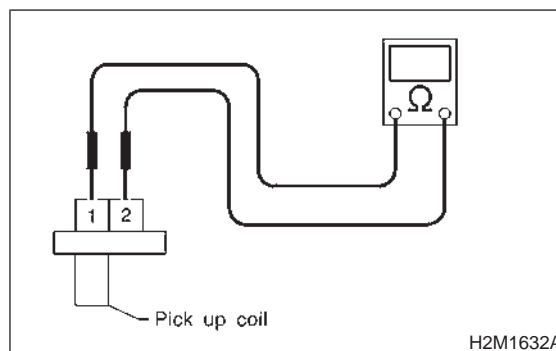
- Open circuit in harness between camshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

10AG5 : CHECK CAMSHAFT POSITION SENSOR.

- 1) Remove camshaft position sensor.
- 2) Measure resistance between connector terminals of camshaft position sensor.

Terminals

No. 1 — No. 2:



CHECK : **Is the resistance between 1 and 4 $k\Omega$?**

YES : Go to step **10AG6**.

NO : Replace camshaft position sensor.
<Ref. to 2-7 [W10A0].>

10AG6 : CHECK CONDITION OF CAMSHAFT POSITION SENSOR.

Turn ignition switch to OFF.

CHECK : **Is the camshaft position sensor installation bolt tightened securely?**

YES : Go to step **10AG7**.

NO : Tighten camshaft position sensor installation bolt securely.

10AG7 : CHECK CAMSHAFT SPROCKET.

Remove front belt cover. <Ref. to 2-3 [W2A1].>

CHECK : **Are camshaft sprocket teeth cracked or damaged?**

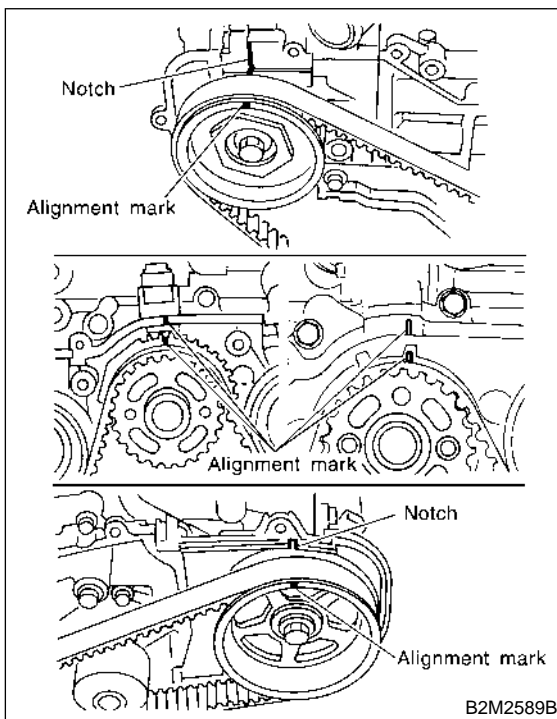
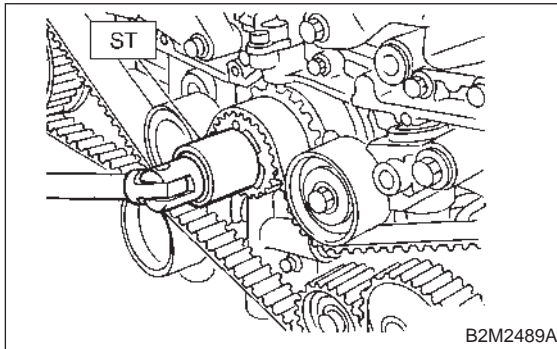
YES : Replace camshaft sprocket. <Ref. to 2-3 [W2A4].>

NO : Go to step **10AG8**.

10AG8 : CHECK INSTALLATION CONDITION OF TIMING BELT.

Turn crankshaft using ST, and align alignment mark on crankshaft sprocket. Then, make sure left and right camshaft sprockets are matched with notches (alignment marks of belt cover and cylinder head).

ST 499987500 CRANKSHAFT SOCKET



- CHECK** : ***Is timing belt installed properly in accordance with the correct position of crankshaft and camshaft sprockets?***
- YES** : Repair installation condition of timing belt. <Ref. to 2-3 [W2A0].>
- NO** : Replace camshaft position sensor. <Ref. to 2-7 [W10A0].>

AH: DTC P0420 — CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD**• DTC DETECTING CONDITION:**

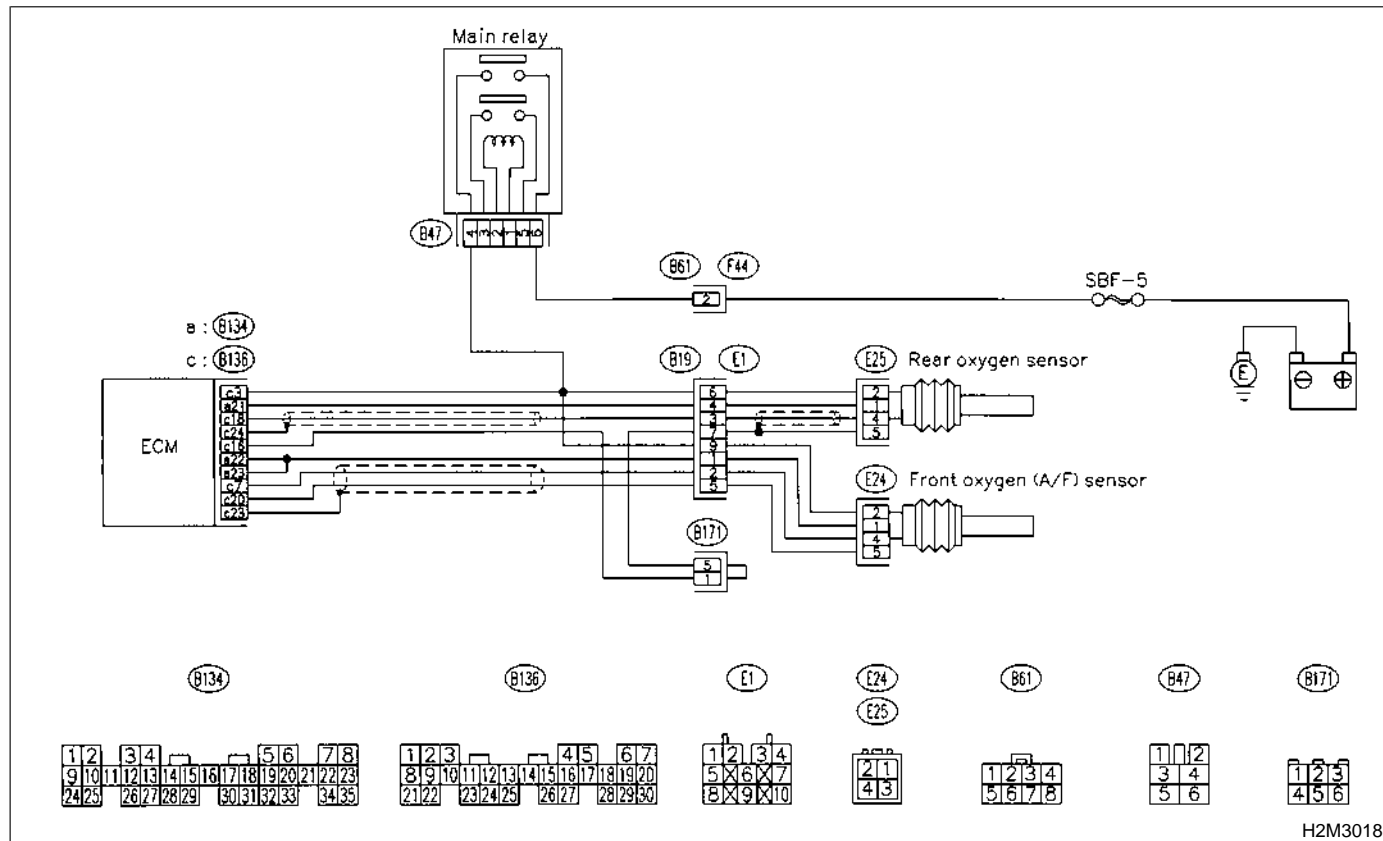
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Engine stalls.
- Idle mixture is out of specifications.

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3018

10AH1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0131, P0132, P0133, P0135, P0136, P0139, P0141, P0301, P0302, P0303, P0304, P1130, P1131, P1134, P1139, P1150 and P1151?

YES : Inspect the relevant DTC using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0420.

NO : Go to step 10AH2.

10AH2 : CHECK EXHAUST SYSTEM.

Check for gas leaks or air suction caused by loose or dislocated nuts and bolts, and open hole at exhaust pipes.

NOTE:

Check the following positions.

- Between cylinder head and front exhaust pipe
- Between front exhaust pipe and front catalytic converter
- Between front catalytic converter and rear catalytic converter

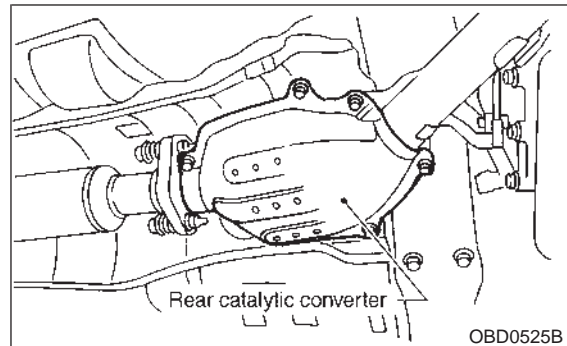
CHECK : Is there a fault in exhaust system?

YES : Repair or replace exhaust system. <Ref. to 2-9 [W1A0].>

NO : Go to step 10AH3.

10AH3 : CHECK REAR CATALYTIC CONVERTER.

Separate rear catalytic converter from rear exhaust pipe.



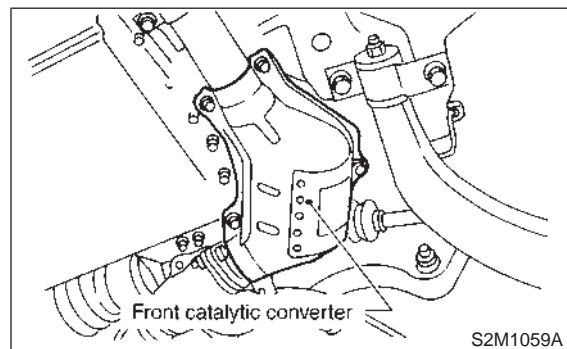
CHECK : Is there damage at rear face of rear catalyst?

YES : Replace front catalytic converter <Ref. to 2-1 [W1A0].> and rear catalytic converter <Ref. to 2-1 [W2A0].>

NO : Go to step 10AH4.

10AH4 : CHECK FRONT CATALYTIC CONVERTER.

Remove front catalytic converter.



CHECK : Is there damage at rear face or front face of front catalyst?

YES : Replace front catalytic converter. <Ref. to 2-1 [W1A0].>

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AI: DTC P0440 — EVAPORATIVE EMISSION CONTROL SYSTEM MALFUNCTION —

- **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

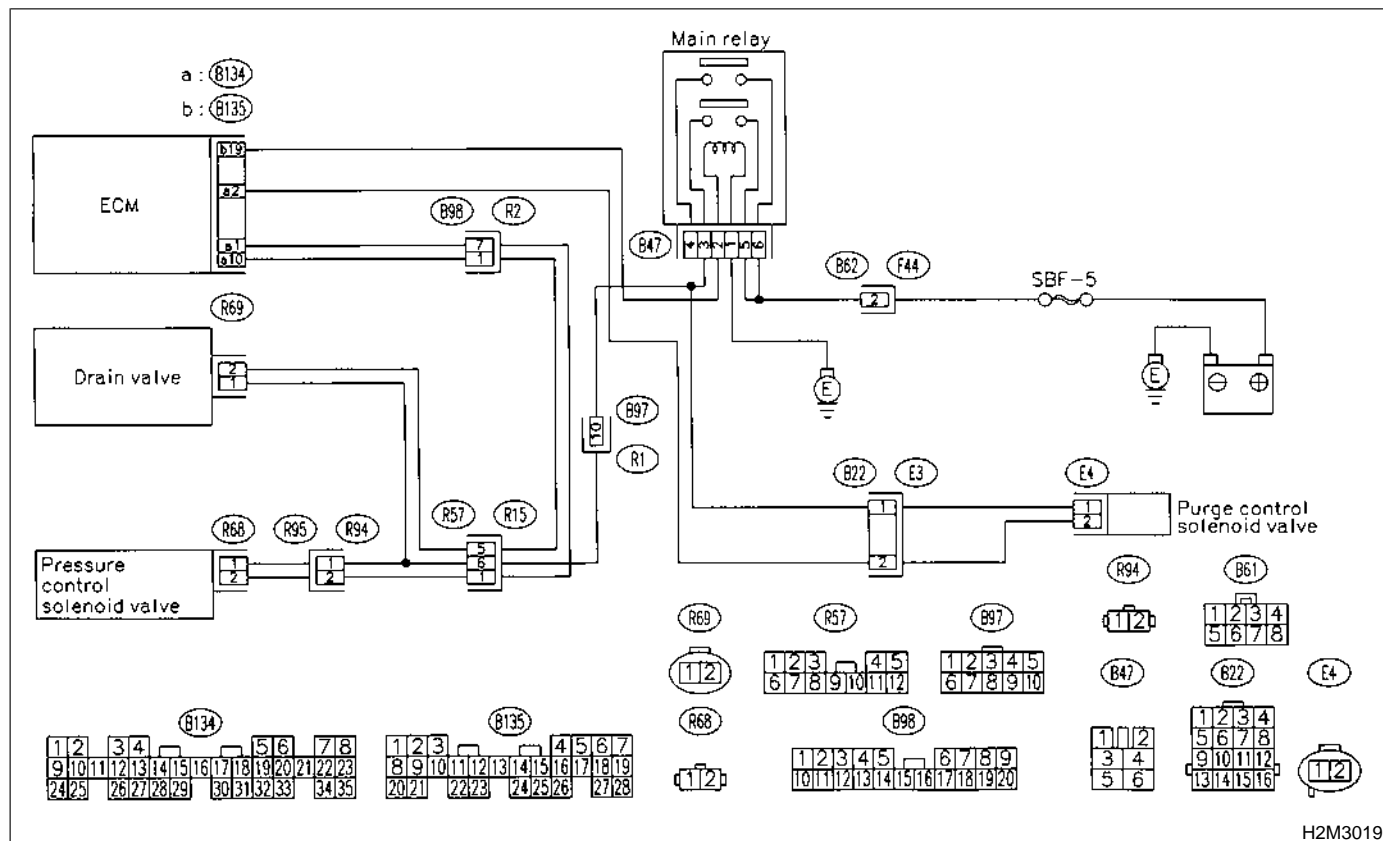
- **TROUBLE SYMPTOM:**

- Gasoline smell

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

- **WIRING DIAGRAM:**



10A11 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Is there any other DTC on display?

YES : Inspect the relevant DTC using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles".
<Ref. to 2-7 [T10A0].>

NO : Go to step **10A12**.

10A12 : CHECK FUEL FILLER CAP.

- 1) Turn ignition switch to OFF.
- 2) Open the fuel flap.

CHECK : Is the fuel filler cap tightened securely?

YES : Go to step **10AI3**.

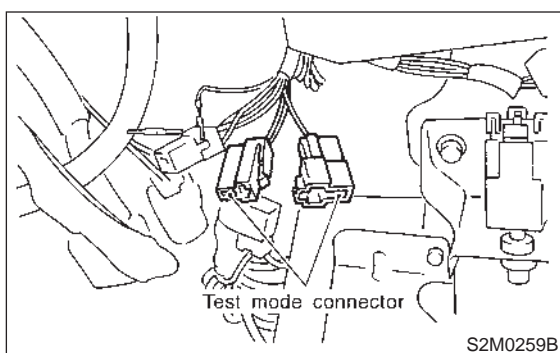
NO : Tighten fuel filler cap securely.

10AI3 : CHECK FUEL FILLER PIPE PACK-ING.

- CHECK** : *Is there any damage to the seal between fuel filler cap and fuel filler pipe?*
- YES** : Repair or replace fuel filler cap and fuel filler pipe. <Ref. to 2-8 [W3A0].>
- NO** : Go to step 10AI4.

10AI4 : CHECK DRAIN VALVE OR VENT CONTROL SOLENOID VALVE.

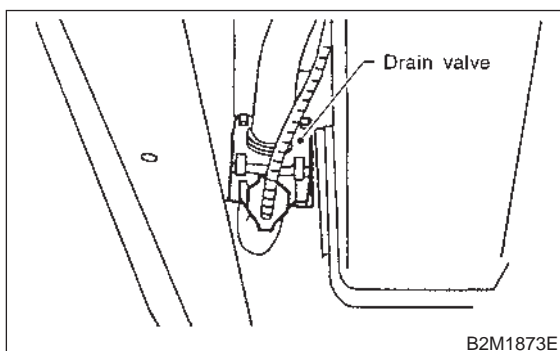
- 1) Connect test mode connector.



- 2) Turn ignition switch to ON.

NOTE:

Drain valve or vent control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

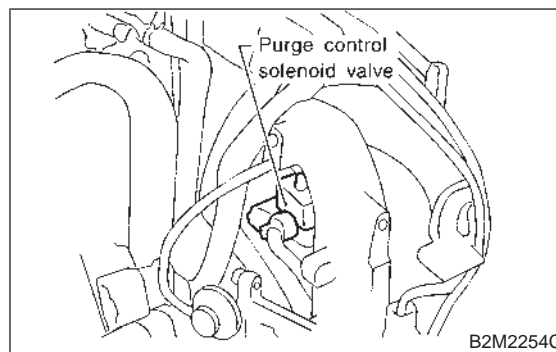


- CHECK** : *Does drain valve produce operating sound?*
- YES** : Go to step 10AI5.
- NO** : Replace drain valve. <Ref. to 2-1 [W13A0].>

10AI5 : CHECK PURGE CONTROL SOLENOID VALVE.

NOTE:

Purge control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

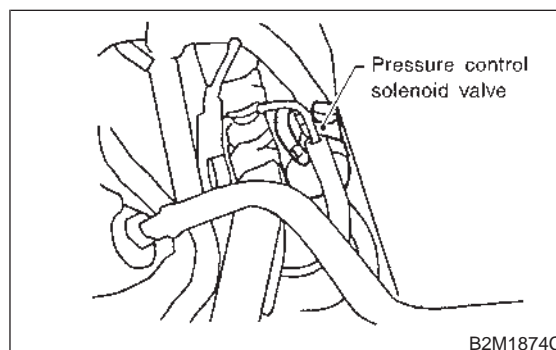


- CHECK** : *Does purge control solenoid valve produce operating sound?*
- YES** : Go to step 10AI6.
- NO** : Replace purge control solenoid valve. <Ref. to 2-1 [W4A0].>

10AI6 : CHECK PRESSURE CONTROL SOLENOID VALVE.

NOTE:

Pressure control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>



- CHECK** : *Does pressure control solenoid valve produce operating sound?*
- YES** : Go to step 10AI7.
- NO** : Replace pressure control solenoid valve. <Ref. to 2-1 [W7A0].>

10AI7 : CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.

Turn ignition switch to OFF.

- CHECK** : ***Does fuel leak in fuel line?***
YES : Repair or replace fuel line. <Ref. to 2-8 [W7A0].>
NO : Go to step **10AI8**.

10AI8 : CHECK CANISTER.

- CHECK** : ***Is there any damage at canister?***
YES : Repair or replace canister. <Ref. to 2-1 [W3A0].>
NO : Go to step **10AI9**.

10AI9 : CHECK FUEL TANK.

- CHECK** : ***Is there any damage at fuel tank?***
YES : Repair or replace fuel tank. <Ref. to 2-8 [W2A0].>
NO : Go to step **10AI10**.

10AI10 : CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.

- CHECK** : ***Are there holes, cracks, clogging or disconnections of hoses or pipes in evaporative emission control system?***
YES : Repair or replace hoses or pipes.
NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

MEMO:

AJ: DTC P0443 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW INPUT —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

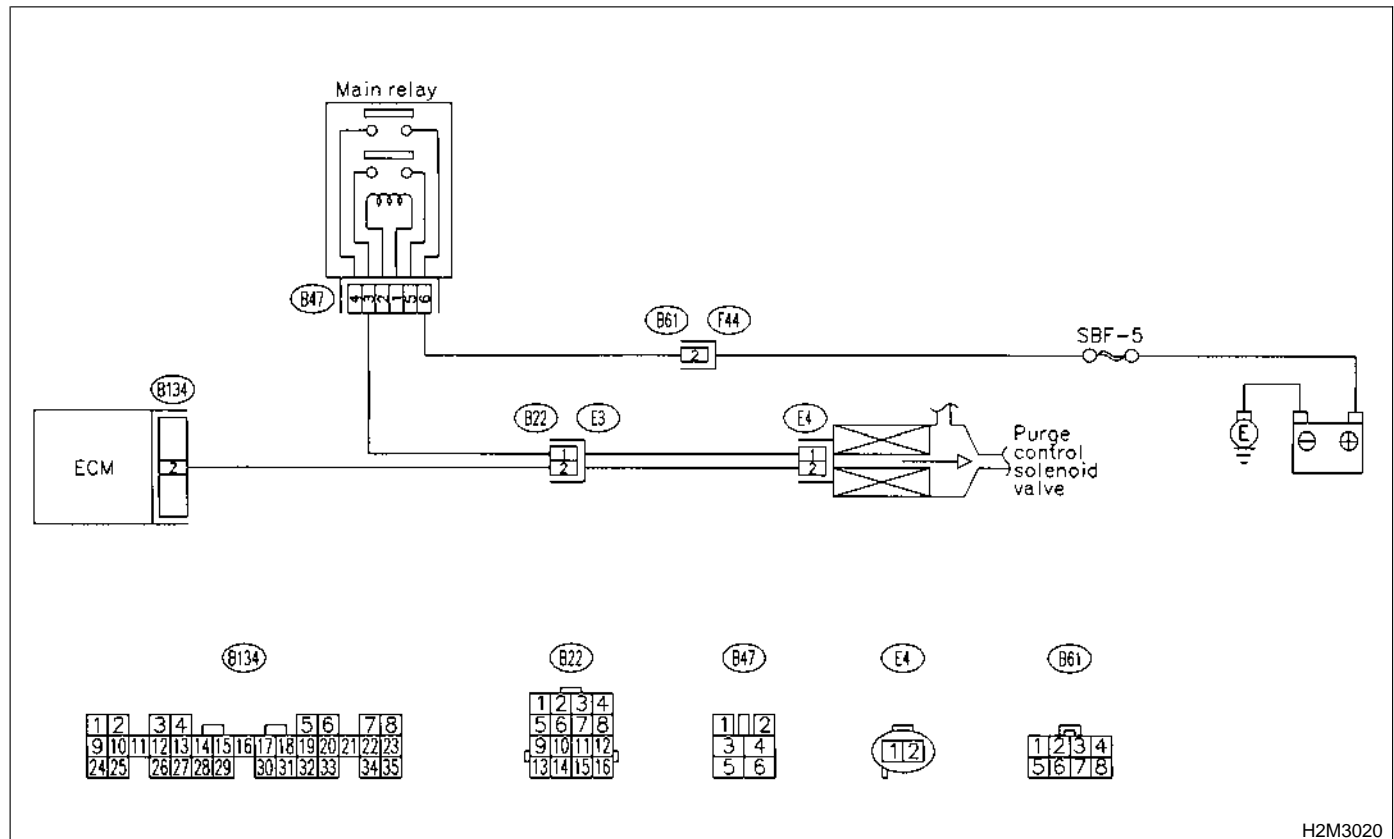
• TROUBLE SYMPTOM:

- Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:



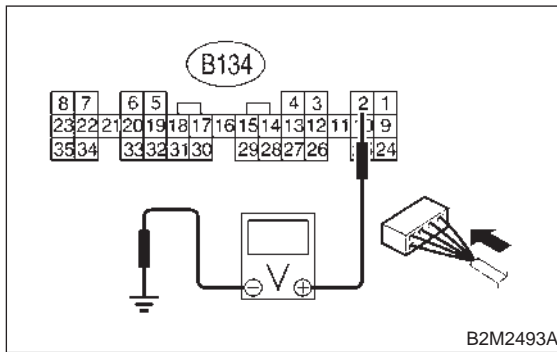
H2M3020

10AJ1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 2 (+) — Chassis ground (-):



CHECK : Is the voltage more than 10 V?

YES : Even if MIL lights up, the circuit has returned to a normal condition at this time. Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

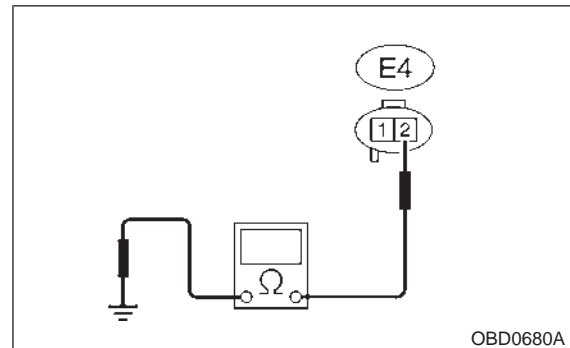
NO : Go to step 10AJ2.

10AJ2 : CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from purge control solenoid valve and ECM.
- 3) Measure resistance of harness between purge control solenoid valve connector and engine ground.

Connector & terminal

(E4) No. 2 — Engine ground:



CHECK : Is the resistance less than 10 Ω?

YES : Repair ground short circuit in harness between ECM and purge control solenoid valve connector.

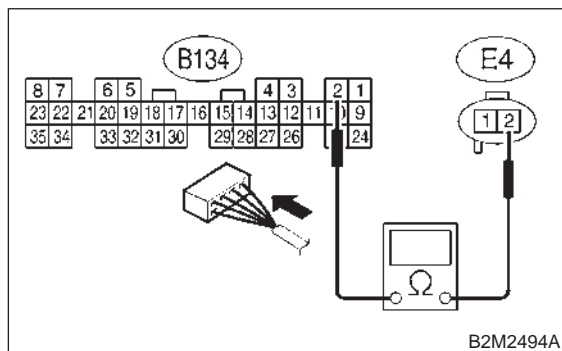
NO : Go to step 10AJ3.

10AJ3 : CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

Measure resistance of harness between ECM and purge control solenoid valve of harness connector.

Connector & terminal

(B134) No. 2 — (E4) No. 2:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 10AJ4.

NO : Repair open circuit in harness between ECM and purge control solenoid valve connector.

NOTE:

In this case, repair the following:

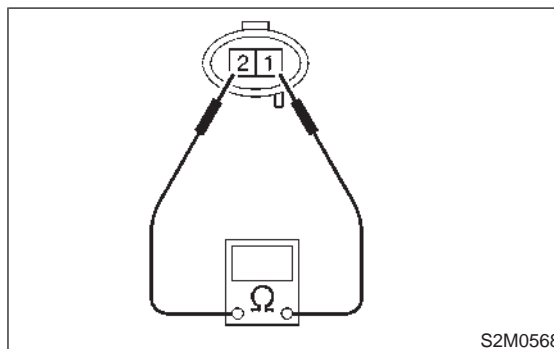
- Open circuit in harness between ECM and purge control solenoid valve connector
- Poor contact in coupling connector (B22)

10AJ4 : CHECK PURGE CONTROL SOLENOID VALVE.

- 1) Remove purge control solenoid valve.
- 2) Measure resistance between purge control solenoid valve terminals.

Terminals

No. 1 — No. 2:



CHECK : Is the resistance between 10 and 100 Ω ?

YES : Go to step 10AJ5.

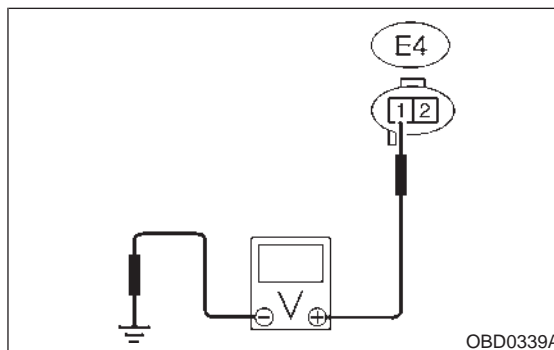
NO : Replace purge control solenoid valve.
<Ref. to 2-1 [W4A0].>

10AJ5 : CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between purge control solenoid valve and engine ground.

Connector & terminal

(E4) No. 1 (+) — Engine ground (-):



CHECK : Is the voltage more than 10 V?

YES : Go to step 10AJ6.

NO : Repair open circuit in harness between main relay and purge control solenoid valve connector.

10AJ6 : CHECK POOR CONTACT.

Check poor contact in purge control solenoid valve connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in purge control solenoid valve connector?*

YES : Repair poor contact in purge control solenoid valve connector.

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AK: DTC P0446 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL LOW INPUT —

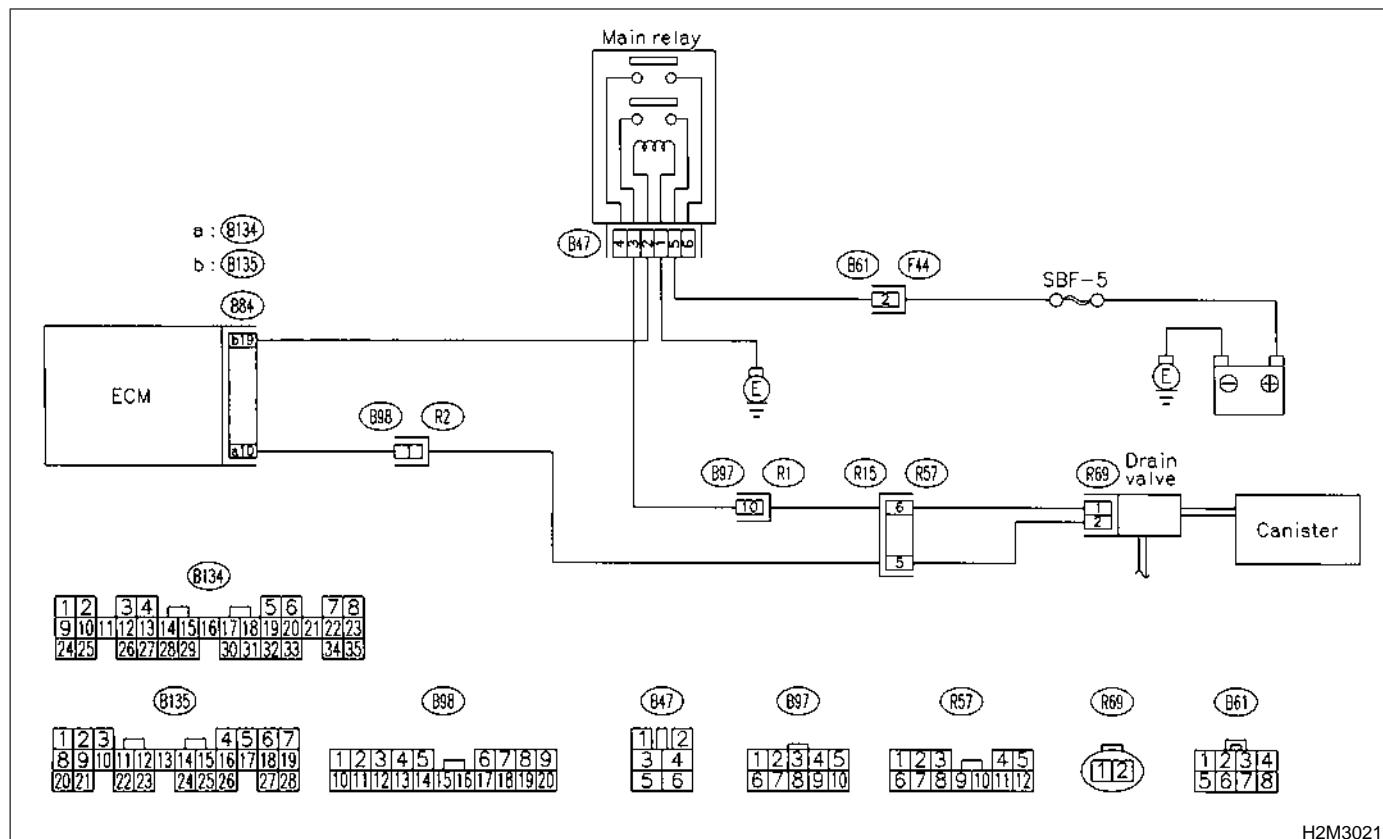
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



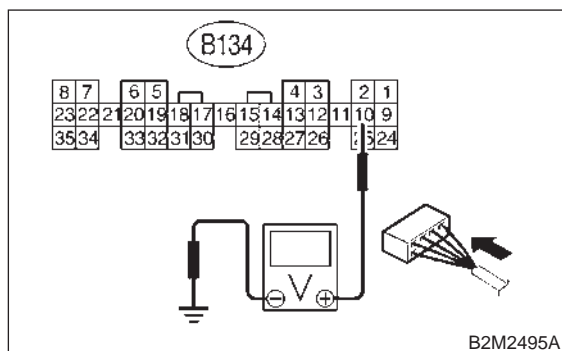
H2M3021

10AK1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 10 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 10AK2.
- NO** : Go to step 10AK3.

10AK2 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : Is there poor contact in ECM connector?
- YES** : Repair poor contact in ECM connector.
- NO** : Even if MIL lights up, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.)

NOTE:

In this case, repair the following:

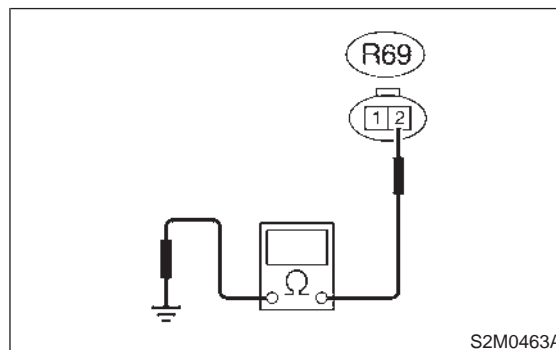
- Poor contact in drain valve connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (B98) and (R57)

10AK3 : CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from drain valve and ECM.
- 3) Measure resistance of harness between drain valve connector and chassis ground.

Connector & terminal

(R69) No. 2 — Chassis ground:



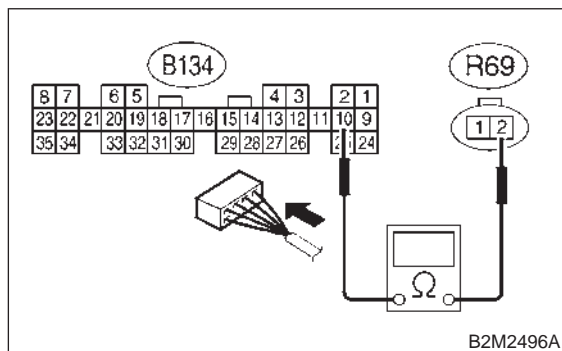
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in harness between ECM and drain valve connector.
- NO** : Go to step 10AK4.

10AK4 : CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.

Measure resistance of harness between ECM and drain valve connector.

Connector & terminal

(B134) No. 10 — (R69) No. 2:



CHECK : **Is the resistance less than 1 Ω ?**

YES : Go to step **10AK5**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

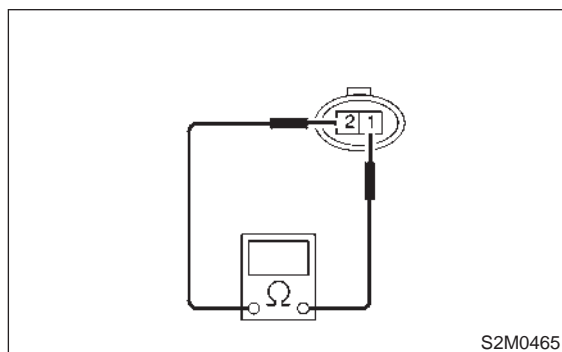
- Open circuit in harness between ECM and drain valve connector
- Poor contact in coupling connectors (B98) and (R57)

10AK5 : CHECK DRAIN VALVE.

Measure resistance between drain valve terminals.

Terminals

No. 1 — No. 2:



CHECK : **Is the resistance between 10 and 100 Ω ?**

YES : Go to step **10AK6**.

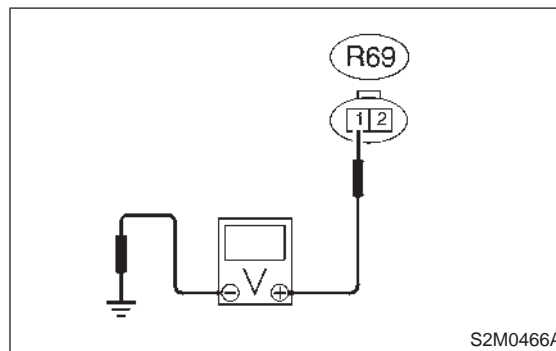
NO : Replace drain valve. <Ref. to 2-1 [W13A0].>

10AK6 : CHECK POWER SUPPLY TO DRAIN VALVE.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between drain valve and chassis ground.

Connector & terminal

(R69) No. 1 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 10 V?**

YES : Go to step **10AK7**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between main relay and drain valve
- Poor contact in coupling connectors (B97) and (R57)
- Poor contact in main relay connector

10AK7 : CHECK POOR CONTACT.

Check poor contact in drain valve connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in drain valve connector?**

YES : Repair poor contact in drain valve connector.

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

MEMO:

AL: DTC P0451 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR RANGE/PERFORMANCE PROBLEM —

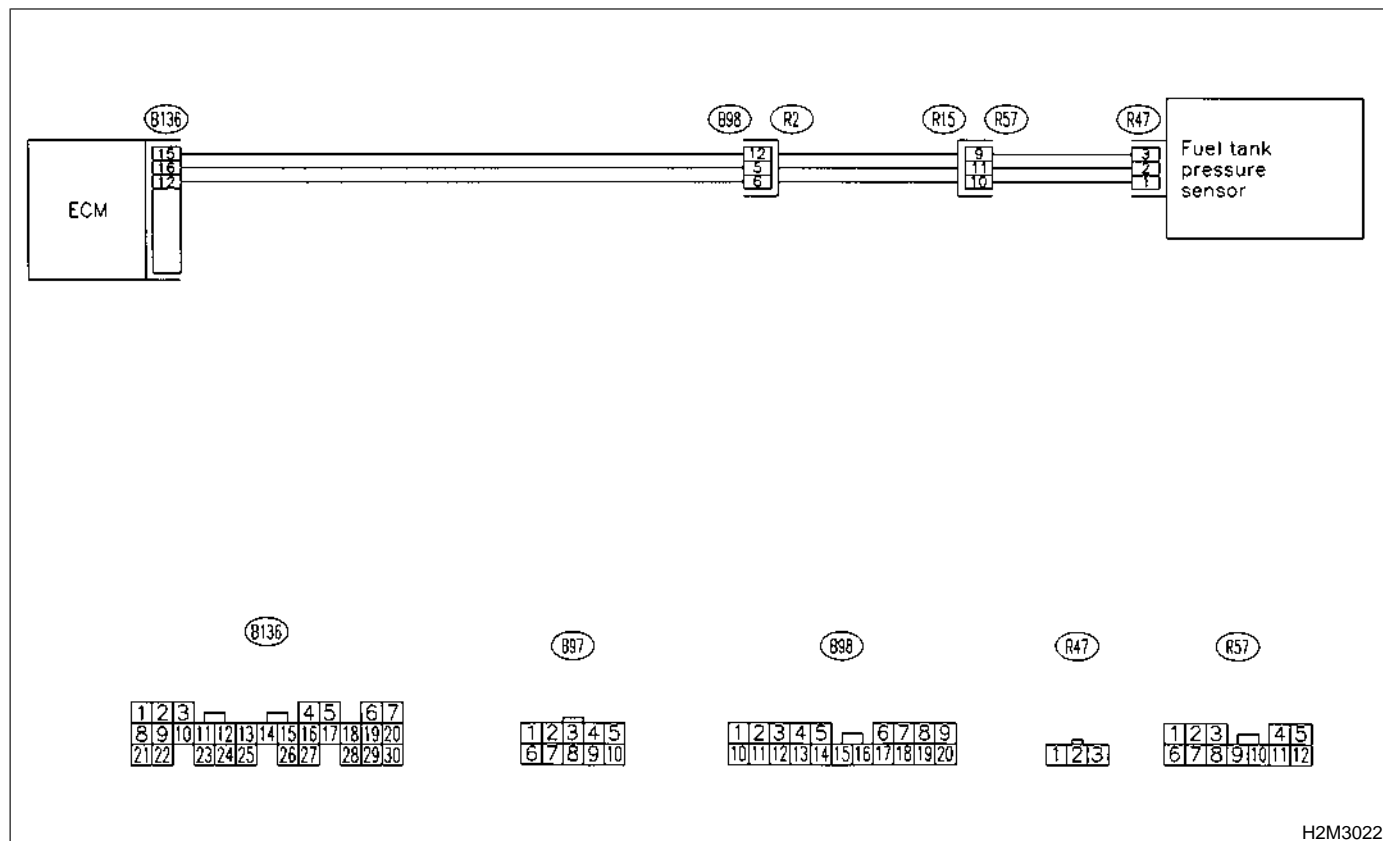
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3022

10AL1 : CHECK ANY OTHER DTC ON DISPLAY.

- CHECK** : *Is there any DTC on display?*
- YES** : Inspect the relevant DTC using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>
- NO** : Go to step **10AL2**.

10AL2 : CHECK FUEL FILLER CAP.

- 1) Turn ignition switch to OFF.
- 2) Open the fuel flap.

- CHECK** : *Is the fuel filler cap tightened securely?*
- YES** : Go to step **10AL3**.
- NO** : Tighten fuel filler cap securely.

**10AL3 : CHECK PRESSURE/VACUUM
LINE.**

NOTE:

Check the following items.

- Disconnection, leakage and clogging of the vacuum hoses and pipes between fuel tank pressure sensor and fuel tank
- Disconnection, leakage and clogging of air ventilation hoses and pipes between fuel filler pipe and fuel tank

CHECK : *Is there a fault in pressure/vacuum line?*

YES : Repair or replace hoses and pipes.

NO : Replace fuel tank pressure sensor.
<Ref. to 2-1 [W6A0].>

AM: DTC P0452 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR LOW INPUT —

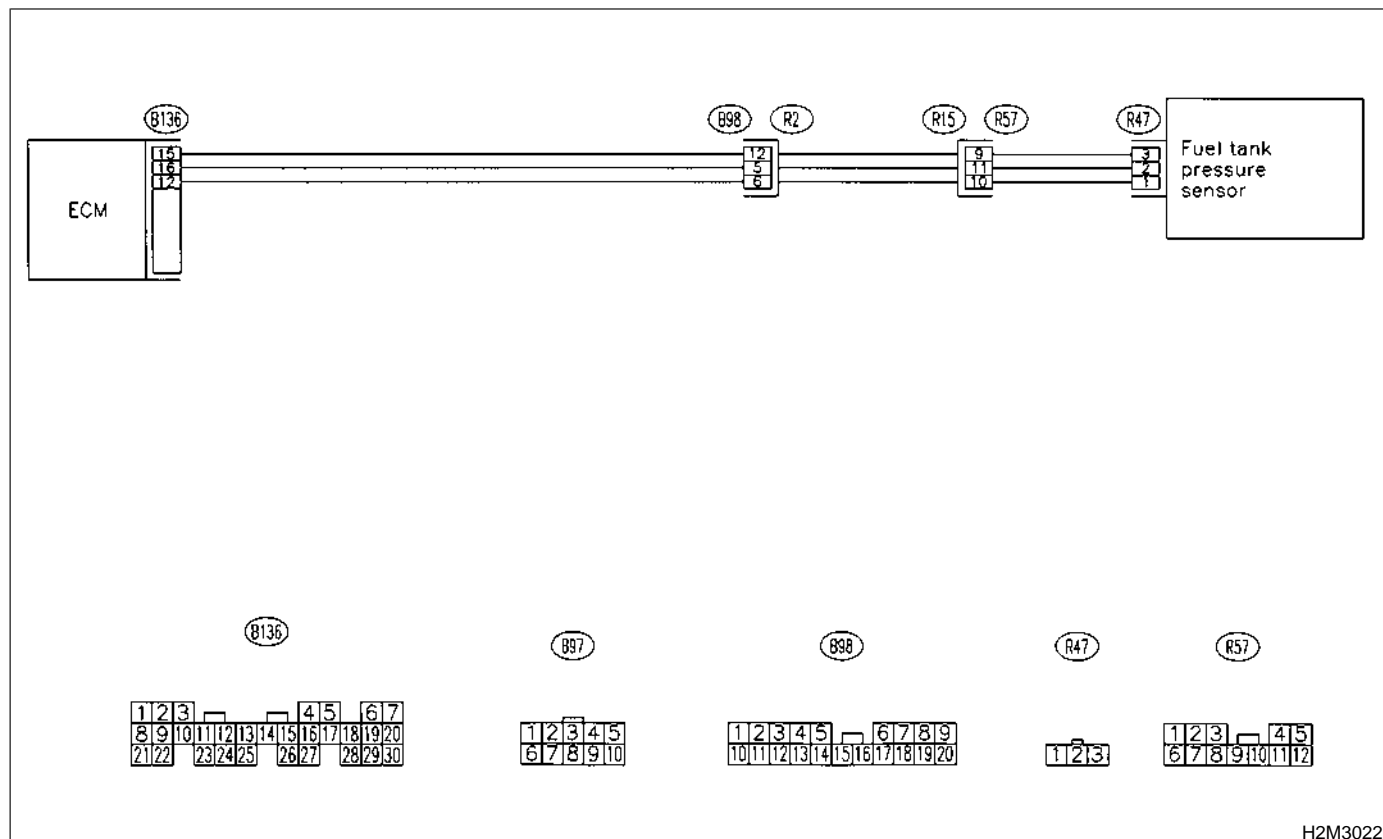
• DTC DETECTING CONDITION:

- Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

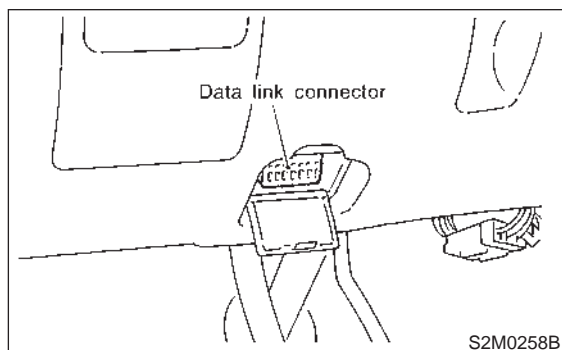
• WIRING DIAGRAM:



H2M3022

10AM1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Remove fuel filler cap.
- 3) Install fuel filler cap.
- 4) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 5) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 6) Read the data of fuel tank pressure sensor signal using Subaru Select Monitor or the OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : Is the value less than -2.8 kPa (-21.0 mmHg , -0.827 inHg)?

YES : Go to step 10AM2.

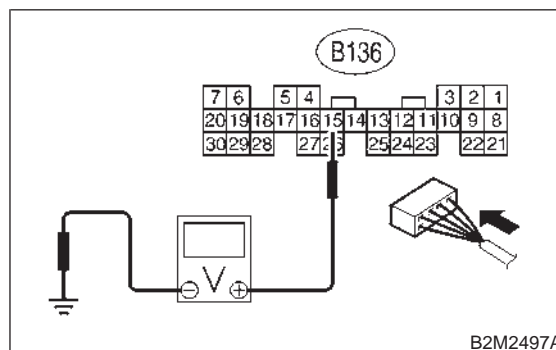
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time.

10AM2 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (—):



CHECK : Is the voltage more than 4.5 V?

YES : Go to step 10AM4.

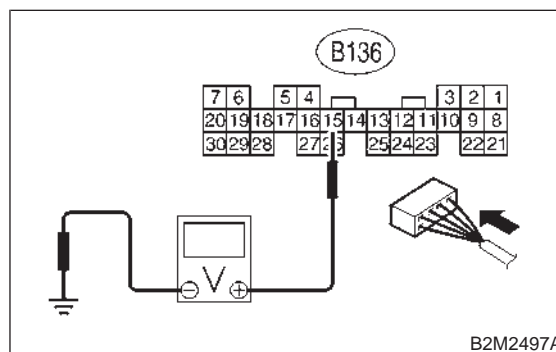
NO : Go to step 10AM3.

10AM3 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (—):



CHECK : Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?

YES : Repair poor contact in ECM connector.

NO : Contact with SOA service.

NOTE:

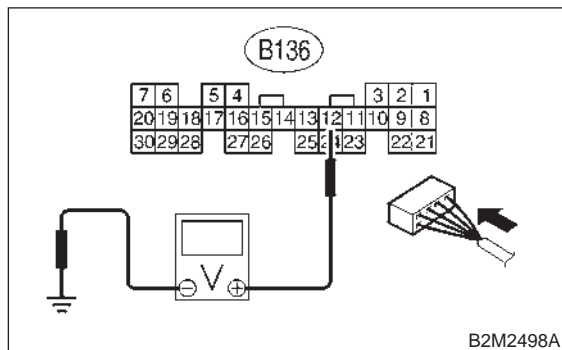
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10AM4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

(B136) No. 12 (+) — Chassis ground (-):



CHECK : **Is the voltage less than 0.2 V?**

YES : Go to step **10AM6**.

NO : Go to step **10AM5**.

**10AM5 : CHECK INPUT SIGNAL FOR ECM.
(USING SUBARU SELECT MONITOR.)**

Read data of fuel tank pressure sensor signal using Subaru Select Monitor.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

CHECK : **Does the value change more than -2.8 kPa (-21.0 mmHg, -0.827 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?**

YES : Repair poor contact in ECM connector.

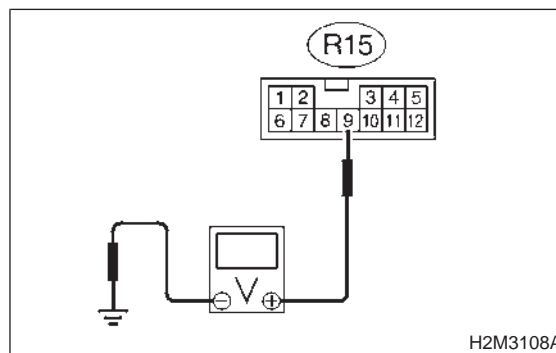
NO : Go to step **10AM6**.

10AM6 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Remove rear seat cushion (Sedan) or move rear seat cushion (Wagon).
- 3) Separate rear wiring harness and fuel tank cord.
- 4) Turn ignition switch to ON.
- 5) Measure voltage between rear wiring harness connector and chassis ground.

Connector & terminal

(R15) No. 9 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 4.5 V?**

YES : Go to step **10AM7**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

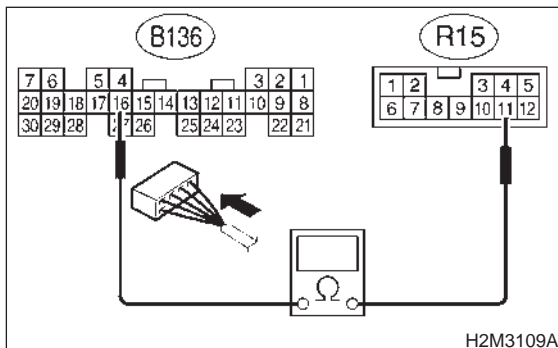
- Open circuit in harness between ECM and rear wiring harness connector (R15)
- Poor contact in coupling connector (B98)

10AM7 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM and rear wiring harness connector.

Connector & terminal

(B136) No. 16 — (R15) No. 11:



- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10AM8.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

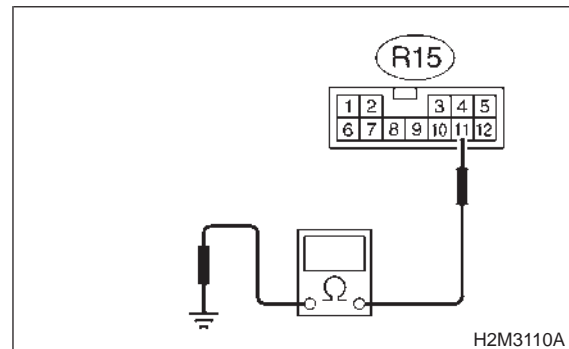
- Open circuit in harness between ECM and rear wiring harness connector (R15)
- Poor contact in coupling connector (B98)

10AM8 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

Measure resistance of harness between rear wiring harness connector and chassis ground.

Connector & terminal

(R15) No. 11 — Chassis ground:



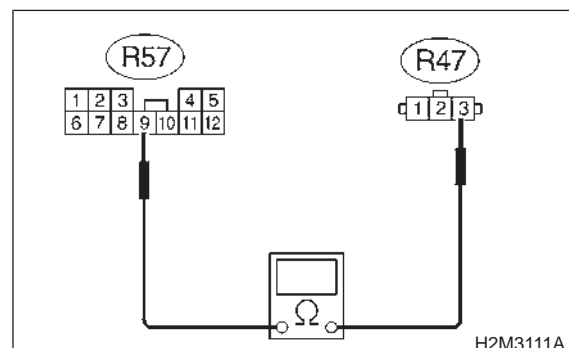
- CHECK** : Is the resistance more than 500 kΩ?
- YES** : Go to step 10AM9.
- NO** : Repair ground short circuit in harness between ECM and rear wiring harness connector (R15).

10AM9 : CHECK FUEL TANK CORD.

- 1) Remove fuel tank. <Ref. to 2-8 [W2A0].>
- 2) Disconnect connector from fuel tank pressure sensor.
- 3) Measure resistance of fuel tank cord.

Connector & terminal

(R57) No. 9 — (R47) No. 3:



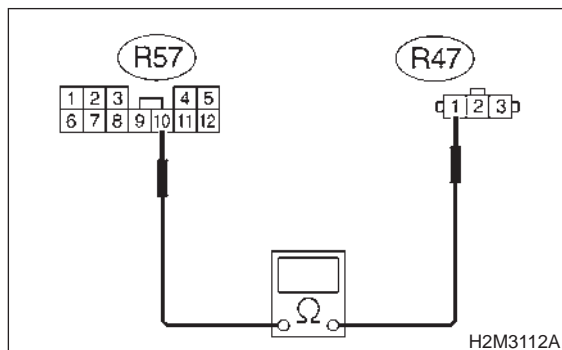
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10AM10.
- NO** : Repair open circuit in fuel tank cord.

10AM10 : CHECK FUEL TANK CORD.

Measure resistance of fuel tank cord.

Connector & terminal

(R57) No. 10 — (R47) No. 1:



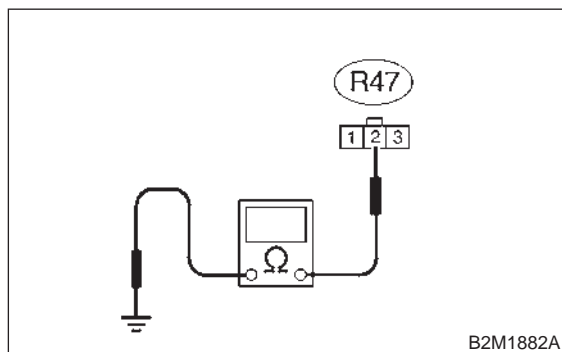
- CHECK** : **Is the resistance less than 1 Ω?**
YES : Go to step **10AM11**.
NO : Repair open circuit in fuel tank cord.

10AM11 : CHECK FUEL TANK CORD.

Measure resistance of harness between fuel tank pressure sensor connector and chassis ground.

Connector & terminal

(R47) No. 2 — Chassis ground:



- CHECK** : **Is the resistance more than 500 kΩ?**
YES : Go to step **10AM12**.
NO : Repair ground short circuit in fuel tank cord.

10AM12 : CHECK POOR CONTACT.

Check poor contact in fuel tank pressure sensor connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : **Is there poor contact in fuel tank pressure sensor connector?**
YES : Repair poor contact in fuel tank pressure sensor connector.
NO : Replace fuel tank pressure sensor. <Ref. to 2-1 [W6A0].>

MEMO:

AN: DTC P0453 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT —

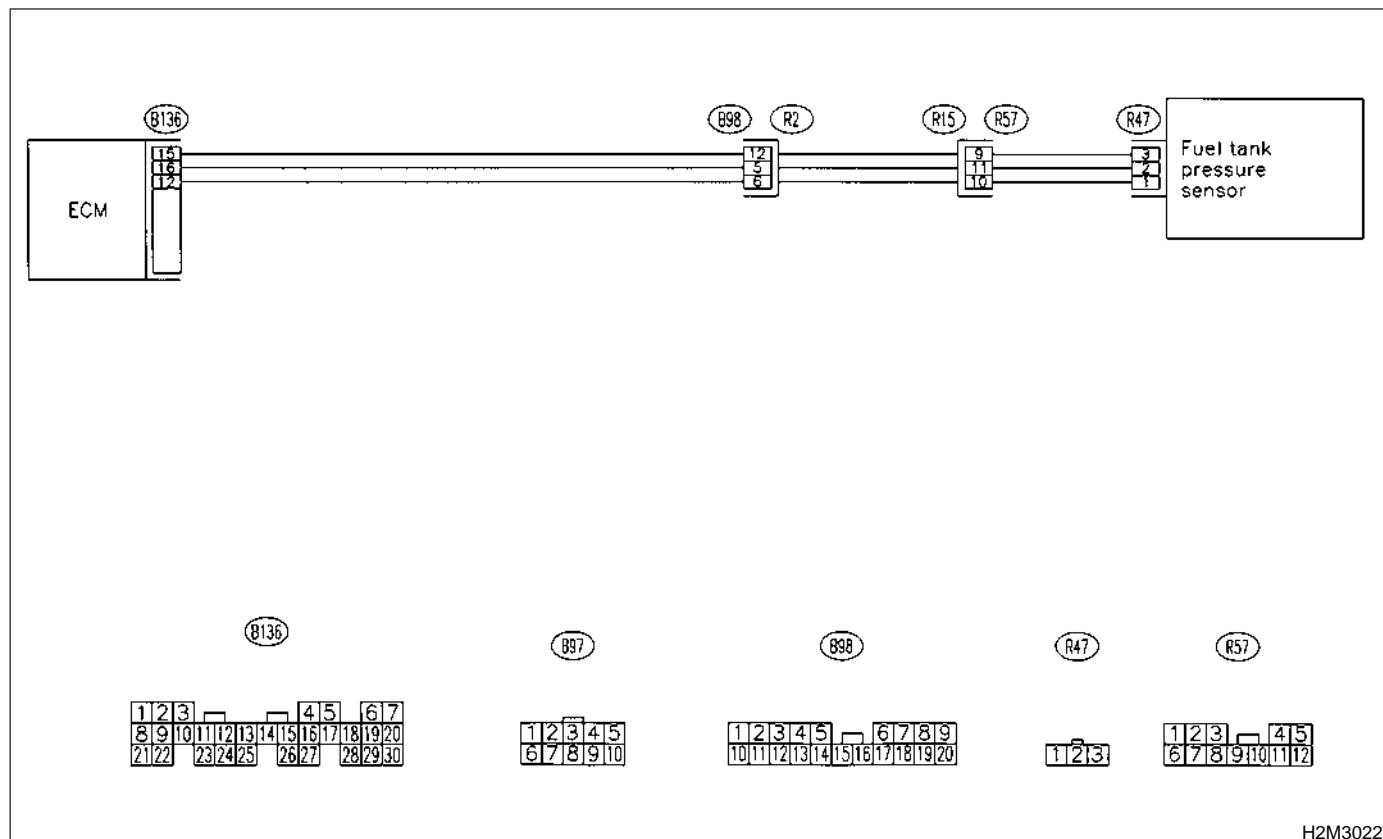
● DTC DETECTING CONDITION:

- Immediately at fault recognition

CAUTION:

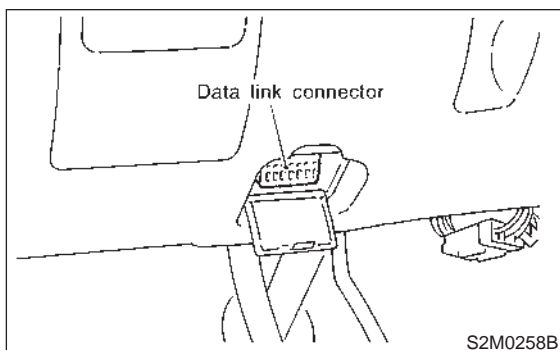
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:



10AN1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Remove fuel filler cap.
- 3) Install fuel filler cap.
- 4) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 5) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 6) Read data of fuel tank pressure sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
- OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

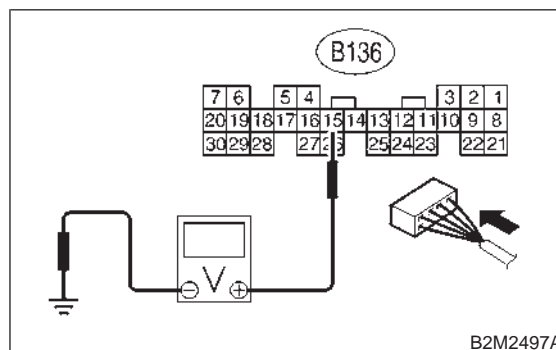
- CHECK** : Is the value more than 2.8 kPa (21.0 mmHg, 0.827 inHg)?
- YES** : Go to step 10AN12.
- NO** : Go to step 10AN2.

10AN2 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



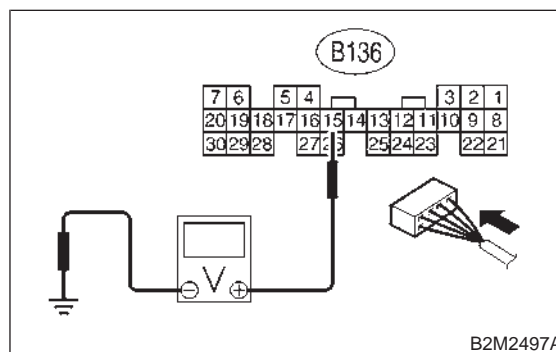
- CHECK** : Is the voltage more than 4.5 V?
- YES** : Go to step 10AN4.
- NO** : Go to step 10AN3.

10AN3 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



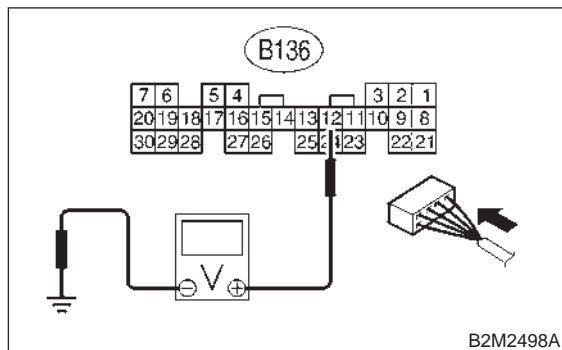
- CHECK** : Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?
- YES** : Repair poor contact in ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

10AN4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

(B136) No. 12 (+) — Chassis ground (-):



CHECK : **Is the voltage less than 0.2 V?**

YES : Go to step **10AN6**.

NO : Go to step **10AN5**.

**10AN5 : CHECK INPUT SIGNAL FOR ECM.
(USING SUBARU SELECT MONITOR.)**

Read data of fuel tank pressure sensor signal using Subaru Select Monitor.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

CHECK : **Does the value change more than -2.8 kPa (-21.0 mmHg, -0.827 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?**

YES : Repair poor contact in ECM connector.

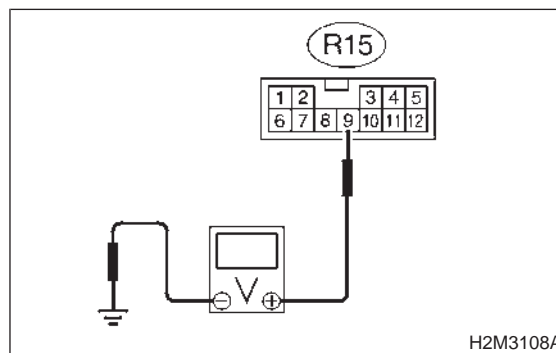
NO : Go to step **10AN6**.

**10AN6 : CHECK HARNESS BETWEEN ECM
AND COUPLING CONNECTOR IN
REAR WIRING HARNESS.**

- 1) Turn ignition switch to OFF.
- 2) Remove rear seat cushion (Sedan) or move rear seat cushion (Wagon).
- 3) Separate rear wiring harness and fuel tank cord.
- 4) Turn ignition switch to ON.
- 5) Measure voltage between rear wiring harness connector and chassis ground.

Connector & terminal

(R15) No. 9 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 4.5 V?**

YES : Go to step **10AN7**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

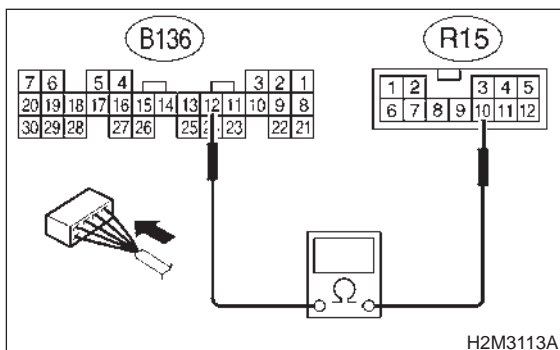
- Open circuit in harness between ECM and rear wiring harness connector (R15)
- Poor contact in coupling connector (B98)

10AN7 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM and rear wiring harness connector.

Connector & terminal

(B136) No. 12 — (R15) No. 10:



- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10AN8.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

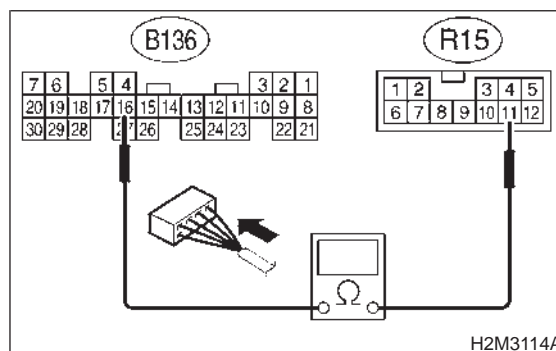
- Open circuit in harness between ECM and rear wiring harness connector (R15)
- Poor contact in coupling connector (B98)

10AN8 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

Measure resistance of harness between rear wiring harness connector and chassis ground.

Connector & terminal

(B136) No. 16 — (R15) No. 11:



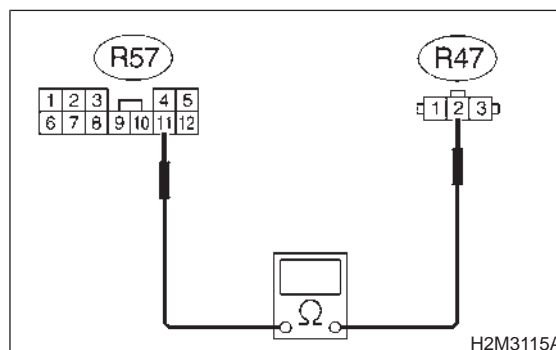
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10AN9.
- NO** : Repair ground short circuit in harness between ECM and rear wiring harness connector (R15).

10AN9 : CHECK FUEL TANK CORD.

- 1) Remove fuel tank. <Ref. to 2-8 [W2A0].>
- 2) Disconnect connector from fuel tank pressure sensor.
- 3) Measure resistance of fuel tank cord.

Connector & terminal

(R57) No. 11 — (R47) No. 2:



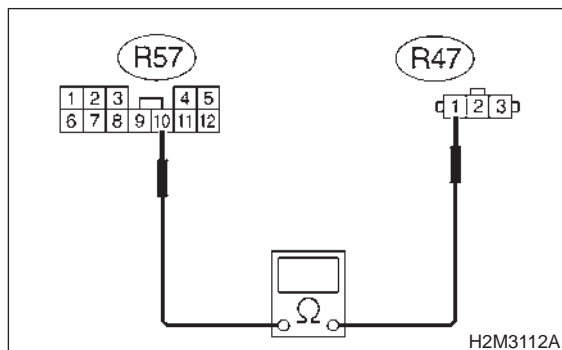
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10AN10.
- NO** : Repair open circuit in fuel tank cord.

10AN10 : CHECK FUEL TANK CORD.

Measure resistance of fuel tank cord.

Connector & terminal

(R57) No. 10 — (R47) No. 1:



- CHECK** : **Is the resistance less than 1 Ω?**
YES : Go to step **10AN11**.
NO : Repair open circuit in fuel tank cord.

10AN11 : CHECK POOR CONTACT.

Check poor contact in fuel tank pressure sensor connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : **Is there poor contact in fuel tank pressure sensor connector?**
YES : Repair poor contact in fuel tank pressure sensor connector.
NO : Replace fuel tank pressure sensor. <Ref. to 2-1 [W6A0].>

10AN12 : CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF and Subaru Select Monitor or the OBD-II general scan tool switch to OFF.
- 2) Remove fuel tank. <Ref. to 2-8 [W2A0].>
- 3) Remove fuel tank cord from fuel tank.
- 4) Connect fuel tank cord to rear wiring harness.
- 5) Remove fuel filler cap.
- 6) Install fuel filler cap.
- 7) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 8) Read data of fuel tank pressure sensor signal using Subaru Select Monitor or the OBD-II general scan tool.

NOTE:

- Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
- OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

- CHECK** : **Is the value more than 2.8 kPa (21.0 mmHg, 0.827 inHg)?**
YES : Repair battery short circuit in harness between ECM and fuel tank pressure sensor connector.
NO : Replace fuel tank pressure sensor. <Ref. to 2-1 [W6A0].>

AO: DTC P0461 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —

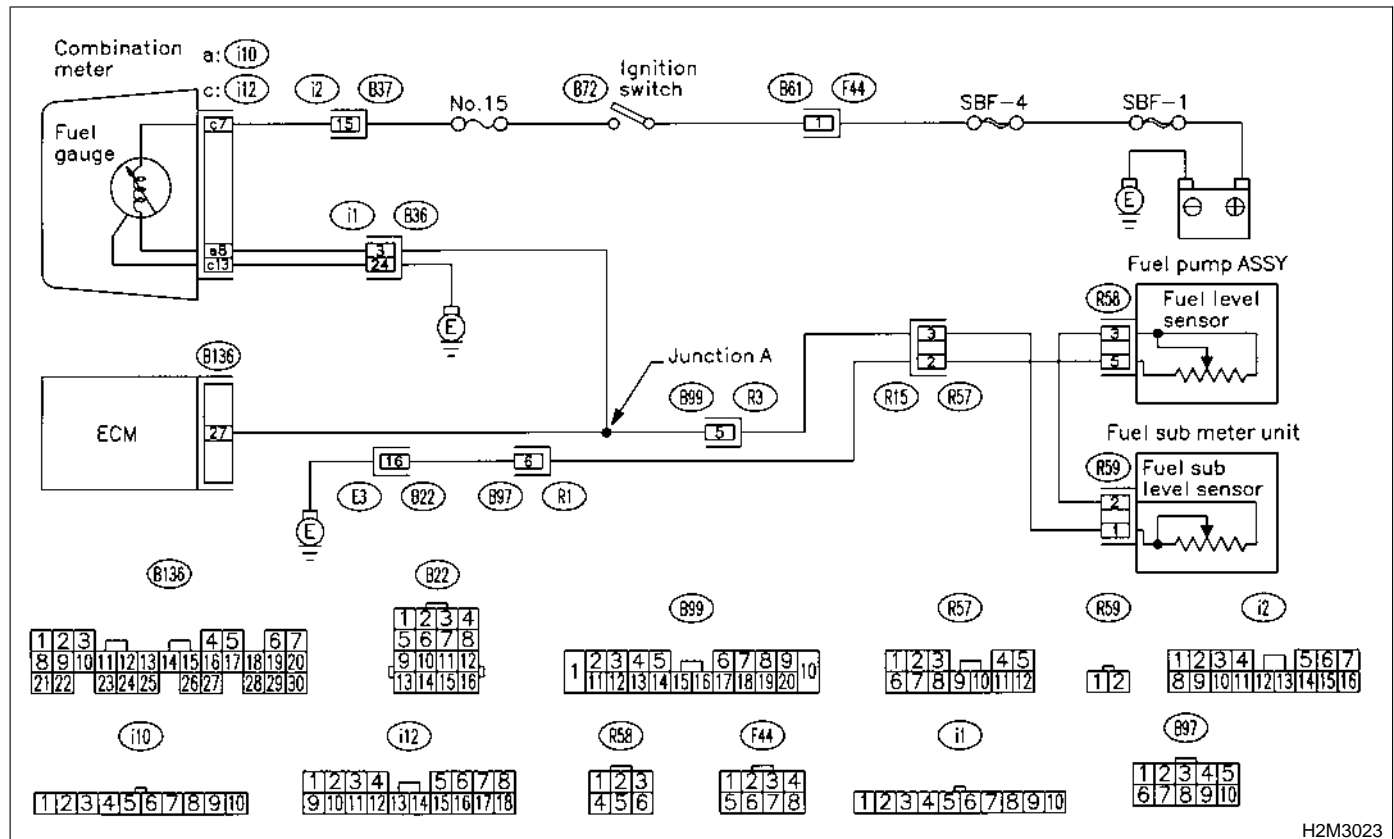
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3023

10A01 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0462 or P0463?

YES : Inspect DTC P0462 or P0463 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

NOTE:

In this case, it is not necessary to inspect this trouble.

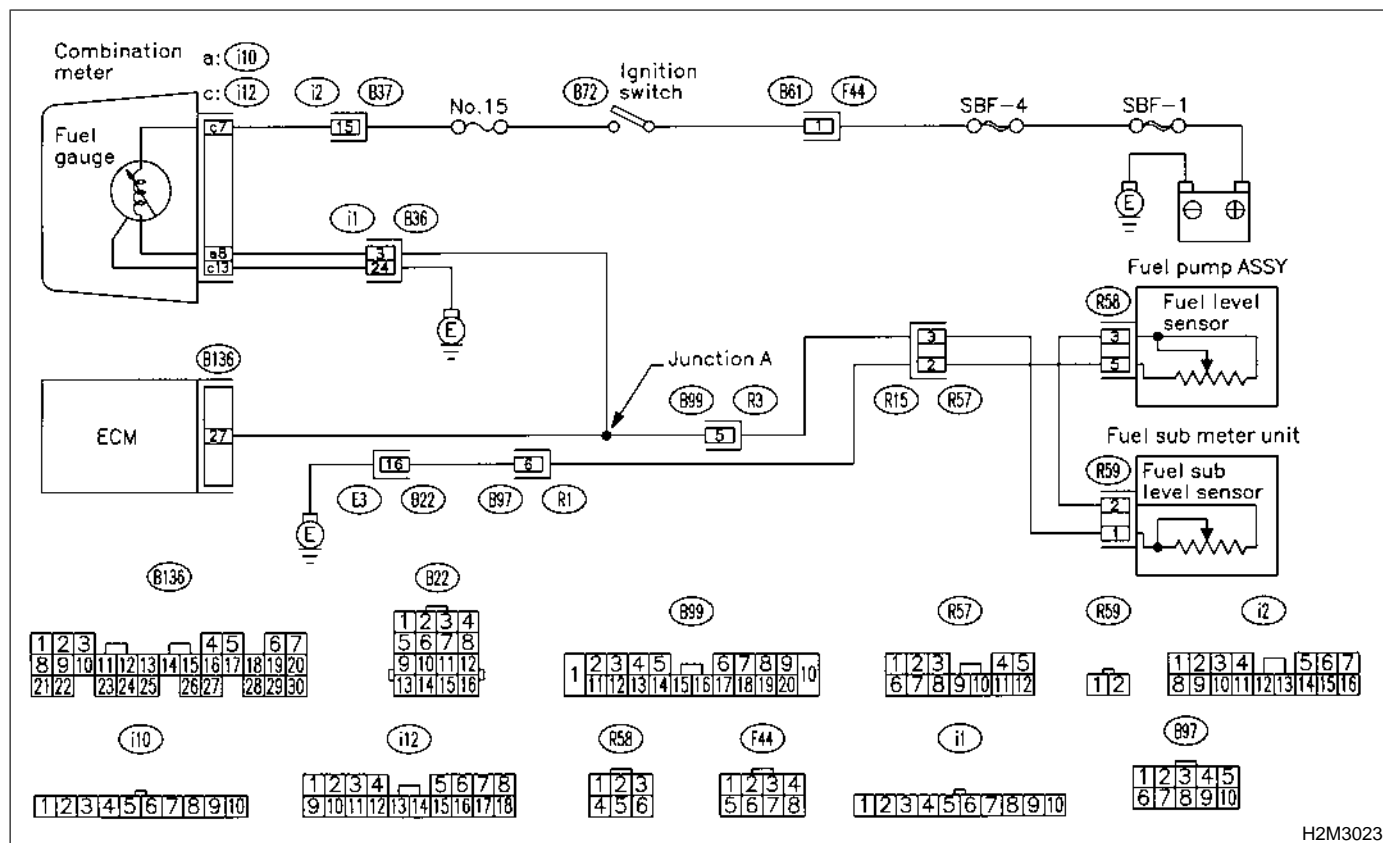
NO : Replace fuel sending unit <Ref. to 2-1 [W8A0].> and fuel sub meter unit <Ref. to 2-1 [W10A0].>

AP: DTC P0462 — FUEL LEVEL SENSOR CIRCUIT LOW INPUT —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

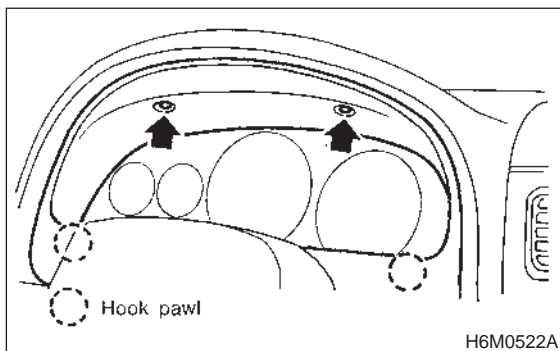
CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

10AP2 : CHECK GROUND CIRCUIT OF COMBINATION METER.

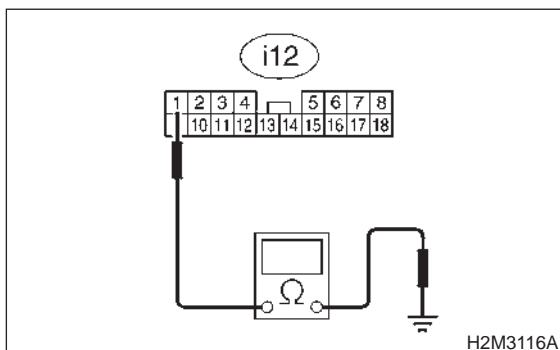
- 1) Turn ignition switch to OFF.
- 2) Pull out combination meter from instrument panel. <Ref. to 6-2 [W8A0].>



- 3) Disconnect connector from combination meter.
- 4) Measure resistance of harness between combination meter connector and chassis ground.

Connector & terminal

(i12) No. 1 — Chassis ground (-):



CHECK : Is resistance less than 5 Ω?

YES : Repair or replace combination meter.
<Ref. to 6-2 [W8A0].>

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

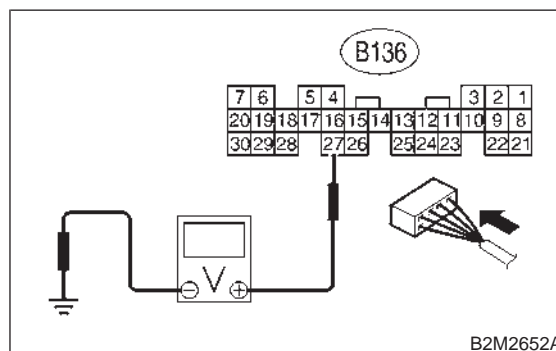
- Open circuit in harness between combination meter connector and grounding terminal
- Poor contact in combination meter connector
- Poor contact in grounding terminal

10AP3 : CHECK INPUT SIGNAL FOR ECM.

- 1) Turn ignition switch to ON. (Engine OFF)
- 2) Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 27 (+) — Chassis ground (-):



CHECK : Is the voltage less than 0.12 V?

YES : Go to step 10AP5.

NO : Go to step 10AP4.

10AP4 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of fuel level sensor signal using Subaru Select Monitor.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

CHECK : Does the value change less than 0.12 V by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?

YES : Repair poor contact in ECM connector.

NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause.

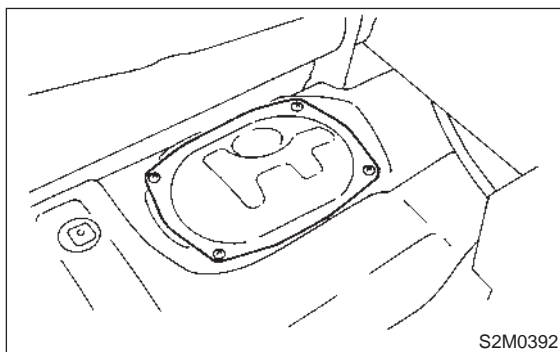
NOTE:

In this case, repair the following:

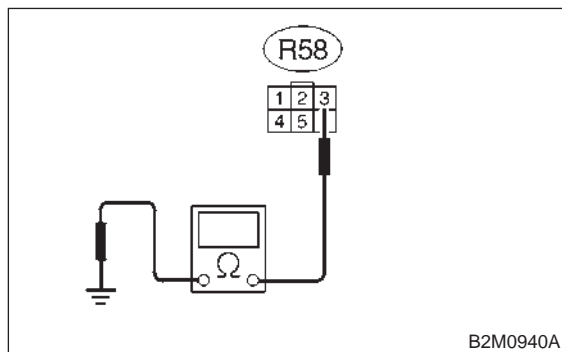
- Poor contact in fuel pump connector
- Poor contact in combination meter connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (i1), (B22), (B99), (B97) and (R57)

10AP5 : CHECK HARNESS BETWEEN ECM, COMBINATION METER AND FUEL PUMP CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Remove fuel pump access hole lid located on the right rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).



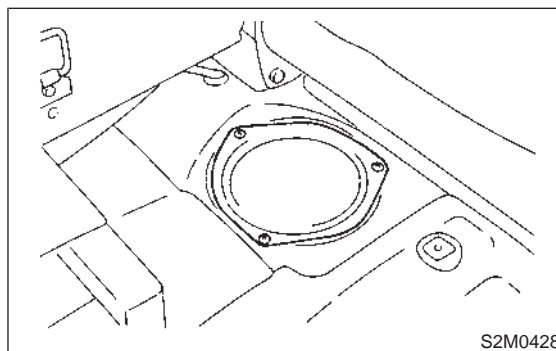
- 3) Disconnect connector from fuel pump.
- 4) Measure resistance of harness between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 3 — Chassis ground:


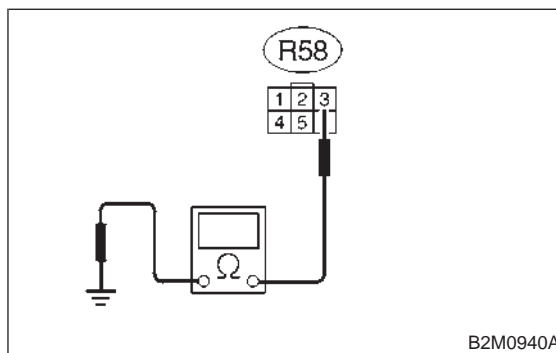
- CHECK** : Is the resistance less than 10 Ω ?
- YES** : Go to step 10AP6.
- NO** : Go to step 10AP11.

10AP6 : CHECK FUEL TANK CORD.

- 1) Remove service hole cover located on the left rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).



- 2) Disconnect connector from fuel sub meter unit.
- 3) Measure resistance of harness between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 3 — Chassis ground:


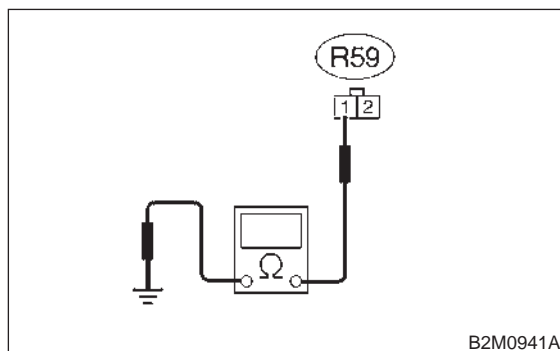
- CHECK** : Is the resistance less than 10 Ω ?
- YES** : Repair ground short circuit in harness between fuel pump and fuel sub meter unit connector.
- NO** : Go to step 10AP7.

10AP7 : CHECK REAR WIRING HARNESS.

- 1) Separate fuel tank cord connector (R57) and rear wiring harness connector (R15).
- 2) Measure resistance of harness between fuel sub meter unit connector and chassis ground.

Connector & terminal

(R59) No. 1 — Chassis ground:



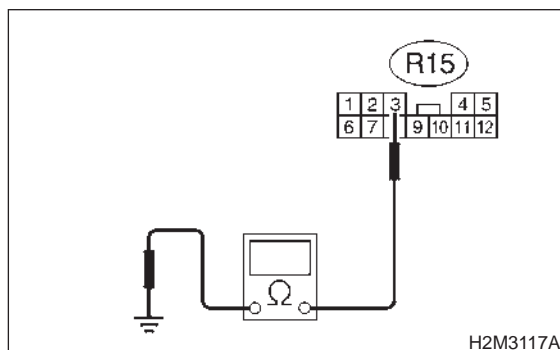
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in fuel tank cord.
- NO** : Go to step 10AP8.

10AP8 : CHECK REAR, BULKHEAD AND INSTRUMENT PANEL WIRING HARNESS.

- 1) Separate rear wiring harness connector (R1) and bulkhead wiring harness connector (B97).
- 2) Measure resistance of harness between rear wiring harness connector and chassis ground.

Connector & terminal

(R15) No. 3 — Chassis ground:



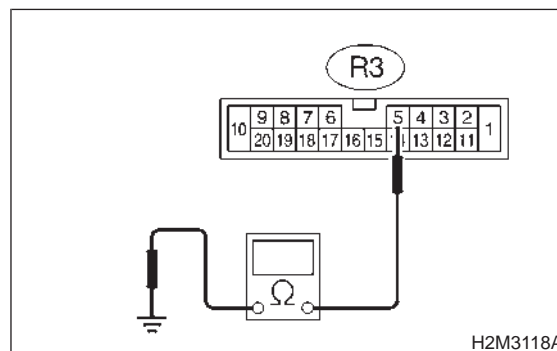
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Go to step 10AP9.
- NO** : Repair ground short circuit in bulkhead wiring harness.

10AP9 : CHECK REAR WIRING HARNESS.

- 1) Separate rear wiring harness connector (R3) and bulkhead wiring harness connector (B99).
- 2) Measure resistance of harness between rear wiring harness connector and chassis ground.

Connector & terminal

(R3) No. 5 — Chassis ground:



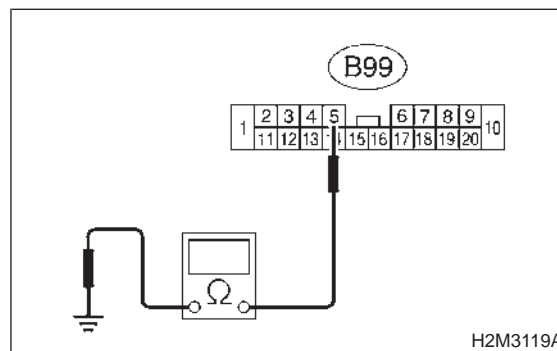
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in rear wiring harness.
- NO** : Go to step 10AP10.

10AP10 : CHECK BULKHEAD WIRING HARNESS.

- 1) Separate bulkhead wiring harness connector (B36) and instrument panel wiring harness connector (i1).
- 2) Measure resistance of harness between bulkhead wiring harness connector and chassis ground.

Connector & terminal

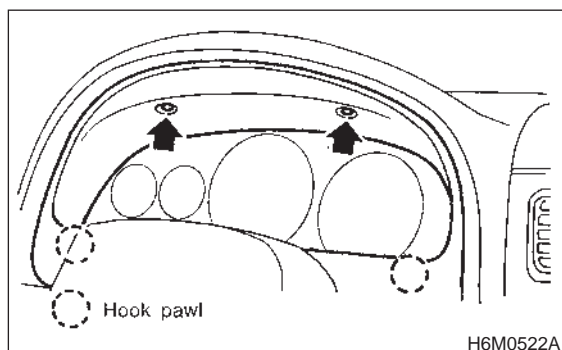
(B99) No. 5 — Chassis ground:



- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in bulkhead wiring harness.
- NO** : Repair ground short circuit in instrument panel wiring harness.

10AP11 : CHECK HARNESS BETWEEN COMBINATION METER AND FUEL PUMP CONNECTOR.

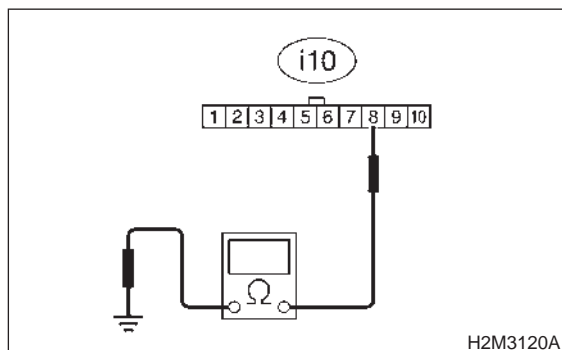
- 1) Connect connector to fuel pump.
- 2) Pull out combination meter from instrument panel. <Ref. to 6-2 [W8A0].>



- 3) Disconnect connector from combination meter.
- 4) Measure resistance of harness between combination meter connector and chassis ground.

Connector & terminal

(i10) No. 8 — Chassis ground:



CHECK : **Is the resistance less than 200 Ω ?**

YES : Go to step **10AP12**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between combination meter connector and junction A on rear wiring harness
- Poor contact in coupling connectors (i1) and (B99)

10AP12 : CHECK COMBINATION METER.

Disconnect connector from combination meter and remove combination meter.

CHECK : **Is the fuel meter installation screw tightened securely?**

YES : Go to step **10AP13**.

NO : Tighten fuel meter installation screw securely.

10AP13 : CHECK COMBINATION METER PRINTED CIRCUIT PLATE.

Remove printed circuit plate assembly from combination meter assembly.

CHECK : **Is there flaw or burning on printed circuit plate assembly?**

YES : Replace printed circuit plate assembly.

NO : Replace fuel meter assembly. <Ref. to 6-2 [W8A0].>

MEMO:

AQ: DTC P0463 — FUEL LEVEL SENSOR CIRCUIT HIGH INPUT —

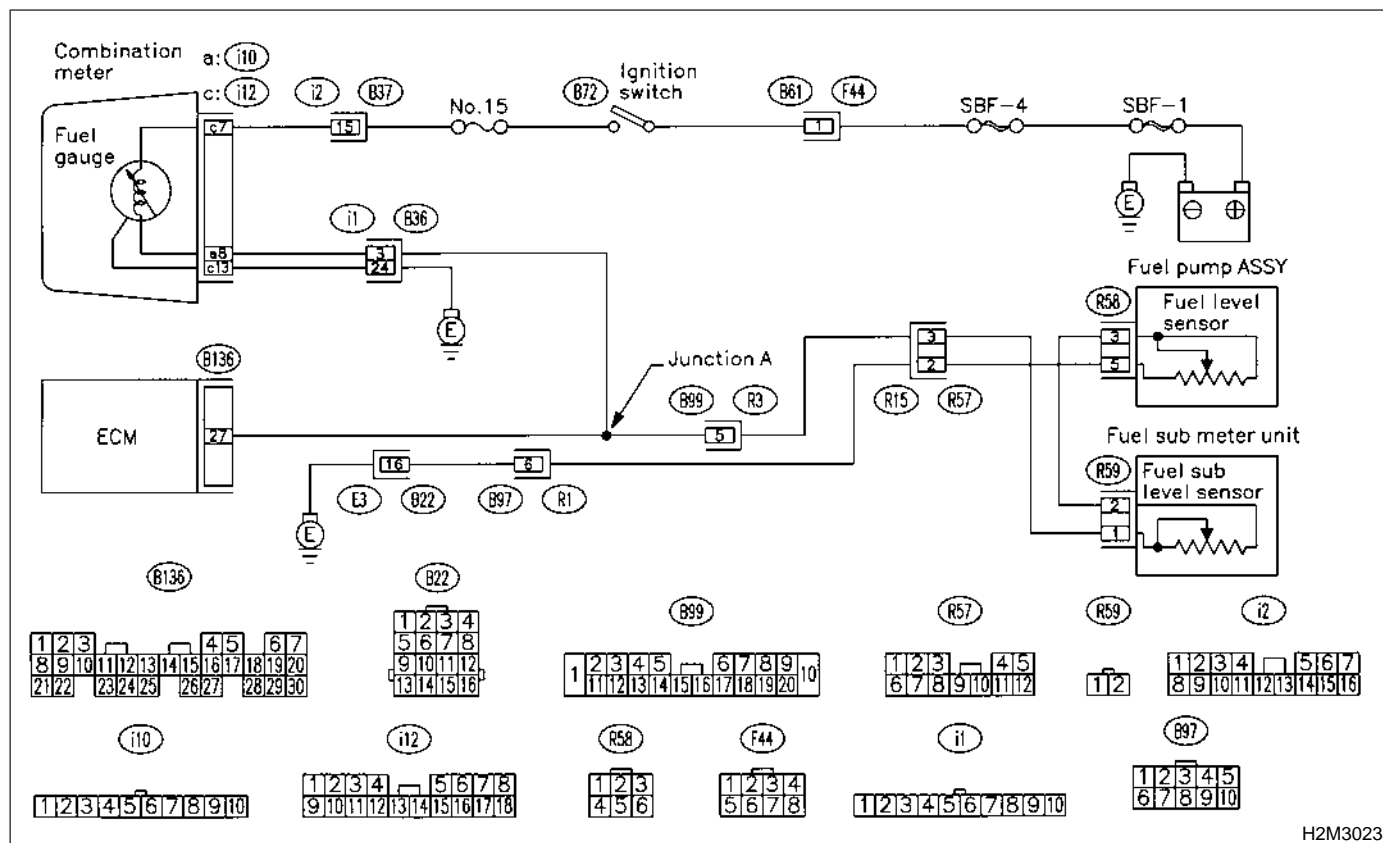
- **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

- **WIRING DIAGRAM:**



H2M3023

10AQ1 : CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.

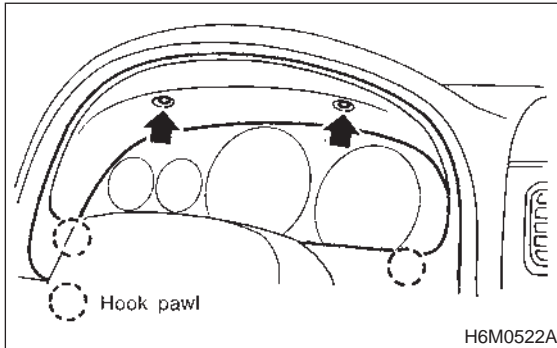
CHECK : Does speedometer and tachometer operate normally?

YES : Go to step **10AQ3**.

NO : Go to step **10AQ2**.

10AQ2 : CHECK GROUND CIRCUIT OF COMBINATION METER.

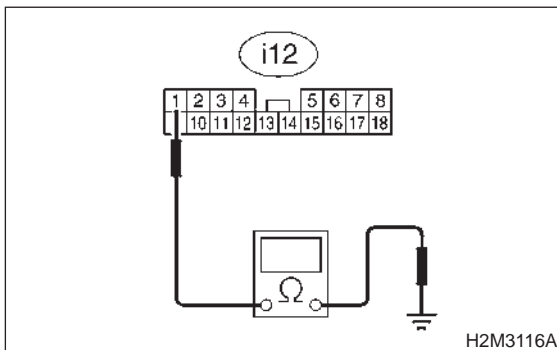
- 1) Turn ignition switch to OFF.
- 2) Pull out combination meter from instrument panel. <Ref. to 6-2 [W8A0].>



- 3) Disconnect connector from combination meter.
- 4) Measure resistance of harness between combination meter connector and chassis ground.

Connector & terminal

(i12) No. 1 — Chassis ground (-):



CHECK : Is resistance less than 5 Ω ?

YES : Repair or replace combination meter.
<Ref. to 6-2 [W8A0].>

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

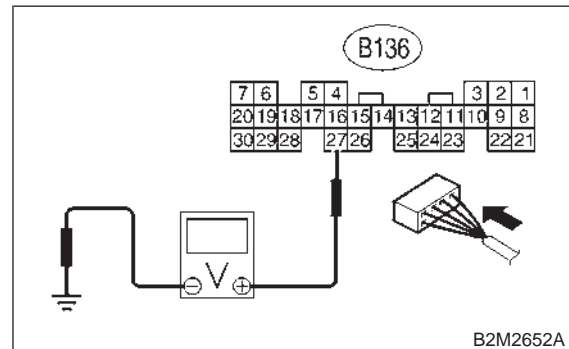
- Open circuit in harness between combination meter connector and grounding terminal
- Poor contact in combination meter connector
- Poor contact in grounding terminal

10AQ3 : CHECK INPUT SIGNAL FOR ECM.

- 1) Turn ignition switch to ON. (Engine OFF)
- 2) Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 27 (+) — Chassis ground (-):



CHECK : Is the voltage more than 4.75 V?

YES : Go to step 10AQ4.

NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause.

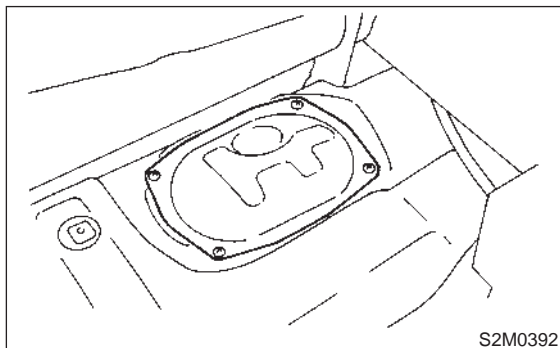
NOTE:

In this case, repair the following:

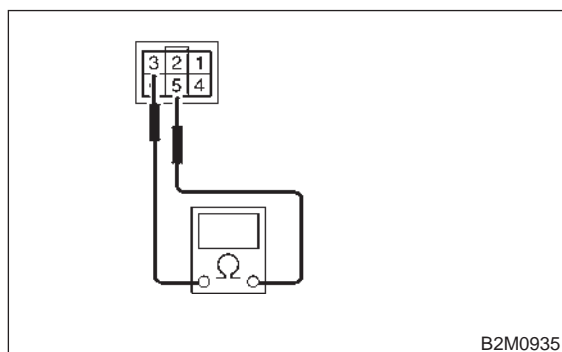
- Poor contact in fuel pump connector
- Poor contact in combination meter connector
- Poor contact in ECM connector
- Poor contact in coupling connector (i1), (B99), (B22), (B97) and (R57)

10AQ4 : CHECK FUEL LEVEL SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Remove fuel pump access hole lid located on the right rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).



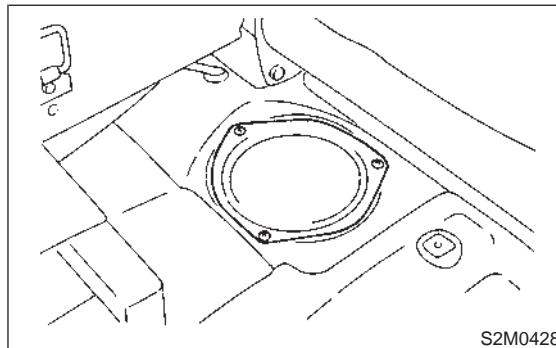
- 3) Disconnect connector from fuel pump.
- 4) Measure resistance between connector terminals of fuel pump.

Terminals**No. 3 — No. 5:**

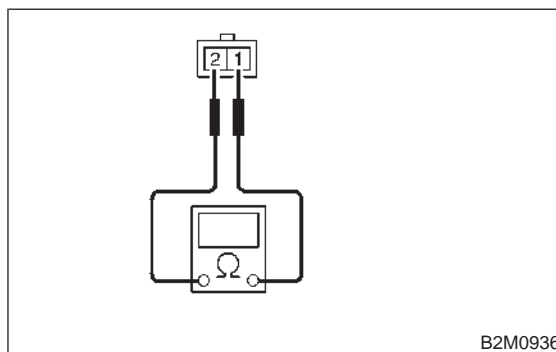
- CHECK** : **Is the resistance less than 100 Ω ?**
- YES** : Go to step **10AQ5**.
- NO** : Replace fuel sending unit. <Ref. to 2-1 [W8A0].>

10AQ5 : CHECK FUEL SUB LEVEL SENSOR.

- 1) Remove service hole cover located on the left rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).



- 2) Disconnect connector from fuel sub meter unit.
- 3) Measure resistance between connector terminals of fuel sub meter unit.

Terminals**No. 1 — No. 2:**

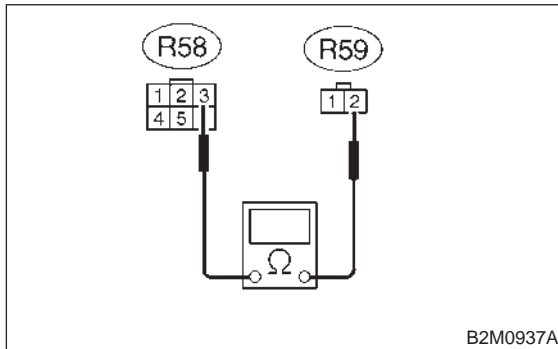
- CHECK** : **Is the resistance less than 100 Ω ?**
- YES** : Go to step **10AQ6**.
- NO** : Replace fuel sub meter unit. <Ref. to 2-1 [W10A0].>

10AQ6 : CHECK HARNESS BETWEEN FUEL PUMP AND FUEL SUB METER UNIT CONNECTOR.

Measure resistance of harness between fuel pump and fuel sub meter unit connector.

Connector & terminal

(R58) No. 3 — (R59) No. 2:



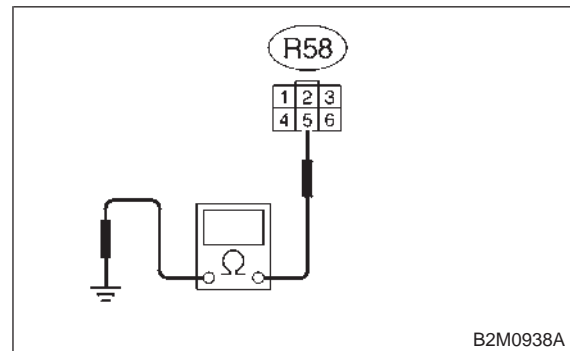
- CHECK** : **Is the resistance less than 1 Ω ?**
- YES** : Go to step **10AQ7**.
- NO** : Repair open circuit in harness between fuel pump and fuel sub meter unit connector.

10AQ7 : CHECK GROUND CIRCUIT OF FUEL LEVEL SENSOR.

Measure resistance of harness between fuel pump connector and chassis ground.

Connector & terminal

(R58) No. 5 — Chassis ground:



- CHECK** : **Is the resistance less than 5 Ω ?**
- YES** : Go to step **10AQ8**.
- NO** : Repair harness and connector.

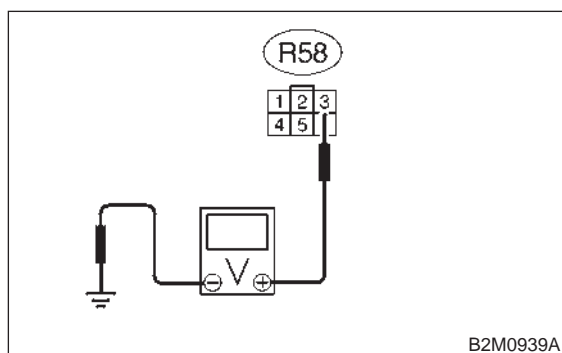
NOTE:

In this case, repair the following:

- Open circuit in harness between fuel pump connector and chassis grounding terminal
- Poor contact in fuel pump connector
- Poor contact in coupling connectors (R57), (B97) and (B22)

10AQ8 : CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONNECTOR.

- 1) Connect connector to fuel sub meter unit.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between fuel pump connector and chassis ground.

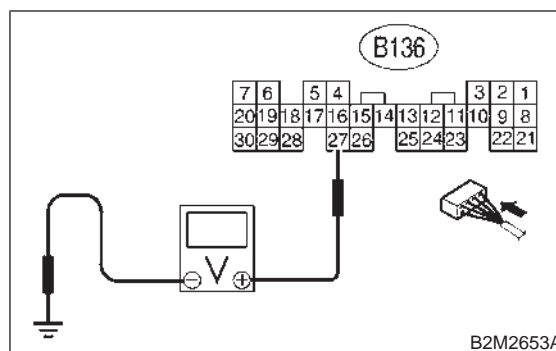
Connector & terminal**(R58) No. 3 (+) — Chassis ground (-):****CHECK** : **Is the voltage less than 1 V?****YES** : Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open circuit in harness between fuel pump connector and junction A on rear wiring harness
- Poor contact in fuel sub meter unit connector
- Poor contact in fuel pump connector
- Poor contact in coupling connector (R57) and (R59)

NO : Go to step **10AQ9**.**10AQ9 : CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONNECTOR.**

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM connector and chassis ground.

Connector & terminal**(B136) No. 27 (+) — Chassis ground (-):****CHECK** : **Is the voltage less than 1 V?****YES** : Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open circuit in harness between ECM connector and junction A on rear wiring harness
- Poor contact in coupling connector (B97)

NO : Repair connector.**NOTE:**

In this case, repair the following:

- Poor contact in fuel pump connector
- Poor contact in fuel sub meter unit
- Poor contact in ECM connector

MEMO:

AR: DTC P0480 — COOLING FAN RELAY 1 CIRCUIT LOW INPUT —**• DTC DETECTING CONDITION:**

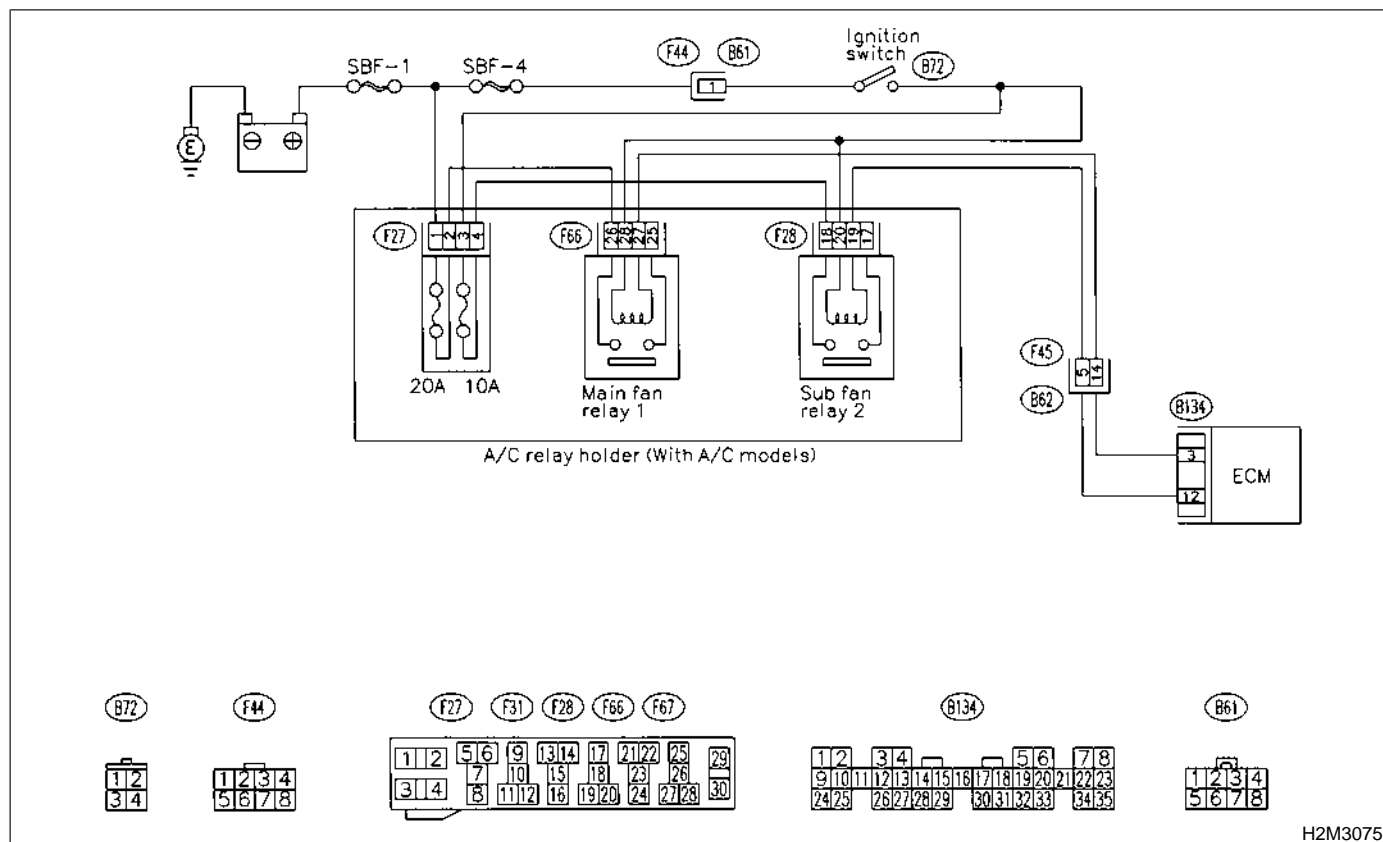
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Radiator fan does not operate properly.
- Overheating

CAUTION:

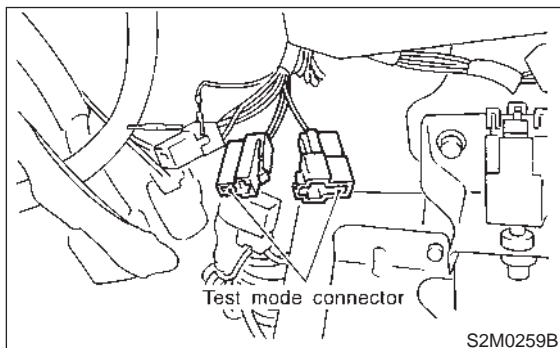
After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

H2M3075

10AR1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to OFF.
- 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



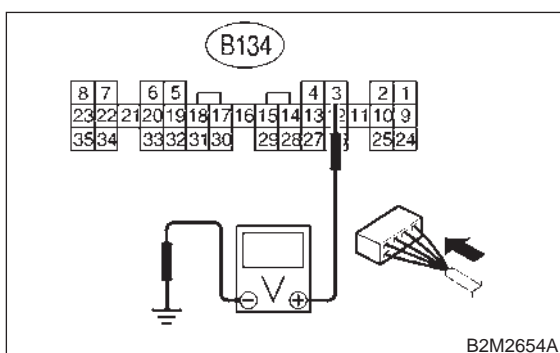
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

NOTE:

Radiator fan relay operation check can be executed using Subaru Select Monitor. For procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

Connector & terminal

(B134) No. 3 (+) — Chassis ground (-):



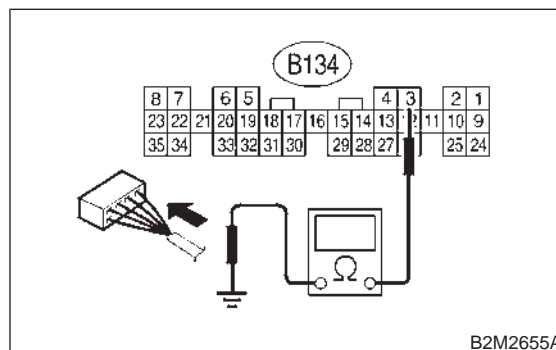
- CHECK** : Does voltage change between 0 and 10 volts?
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 10AR2.

10AR2 : CHECK GROUND SHORT CIRCUIT IN RADIATOR FAN RELAY 1 CONTROL CIRCUIT.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from ECM.
- 3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B134) No. 3 — Chassis ground:



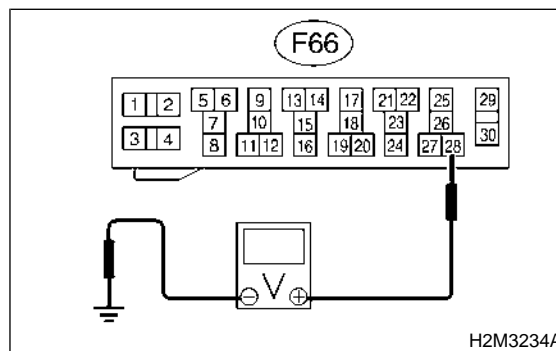
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in radiator fan relay 1 control circuit.
- NO** : Go to step 10AR3.

10AR3 : CHECK POWER SUPPLY FOR RELAY.

- 1) Remove main fan relay from A/C relay holder.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between fuse and relay box (F/B) connector and chassis ground.

Connector & terminal

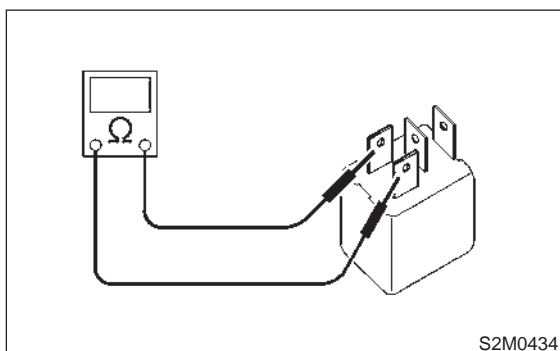
(F66) No. 28 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 10AR4.
- NO** : Repair open circuit in harness between ignition switch and fuse and relay box (F/B) connector.

10AR4 : CHECK MAIN FAN RELAY 1.

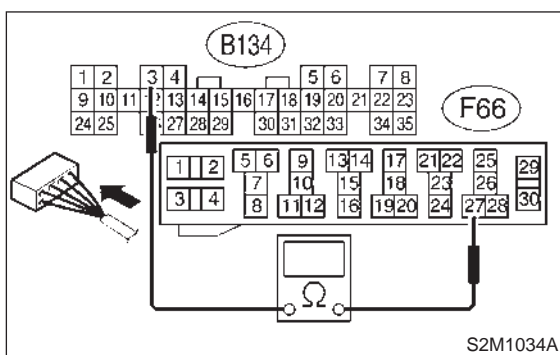
- 1) Turn ignition switch to OFF.
- 2) Measure resistance between main fan relay 1 terminals.

Terminal**No. 27 — No. 28:**

- CHECK** : *Is the resistance between 87 and 107 Ω?*
- YES** : Go to step **10AR5**.
- NO** : Replace main fan relay 1.

10AR5 : CHECK OPEN CIRCUIT IN MAIN FAN RELAY 1 CONTROL CIRCUIT.

Measure resistance of harness between ECM and main fan relay 1 connector.

Connector & terminal**(B134) No. 3 — (F66) No. 27:**

- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step **10AR6**.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and main fan relay 1 connector
- Poor contact in coupling connector (F45)

10AR6 : CHECK POOR CONTACT.

Check poor contact in ECM or main fan relay 1 connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : *Is there poor contact in ECM or main fan relay 1 connector?*
- YES** : Repair poor contact in ECM or main fan relay 1 connector.
- NO** : Contact with SOA service.

MEMO:

AS: DTC P0483 — COOLING FAN FUNCTION PROBLEM —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

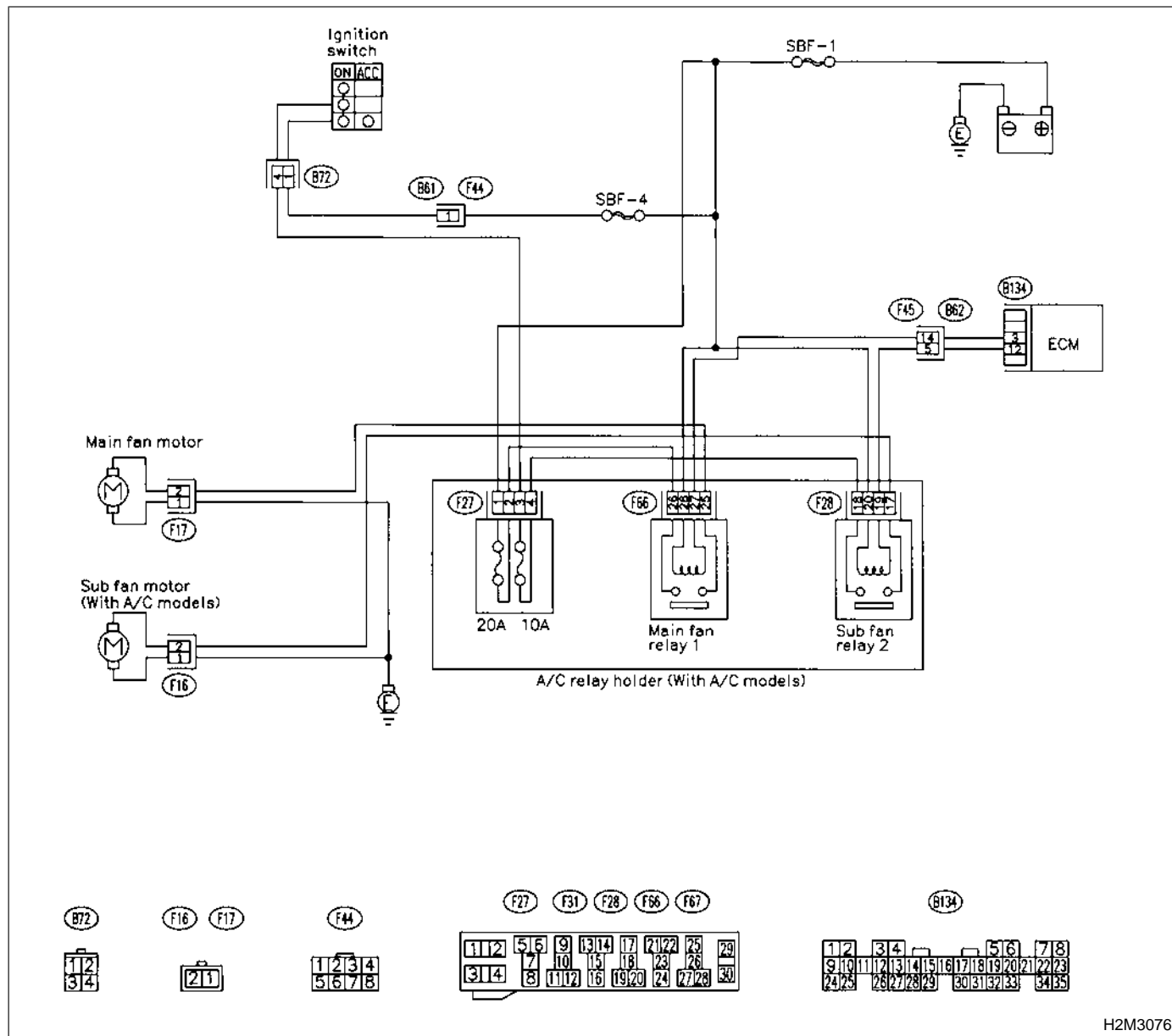
- Occurrence of noise
- Overheating

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

NOTE:

If the vehicle, with the engine idling, is placed very close to a wall or another vehicle, preventing normal cooling function, the OBD system may detect malfunction.

• WIRING DIAGRAM:

H2M3076

10AS1 : CHECK ANY OTHER DTC ON DISPLAY.
--

CHECK: *Is there any other DTC on display?***YES**: Inspect the relevant DTC using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles".
<Ref. to 2-7 [T10A0].>**NO**

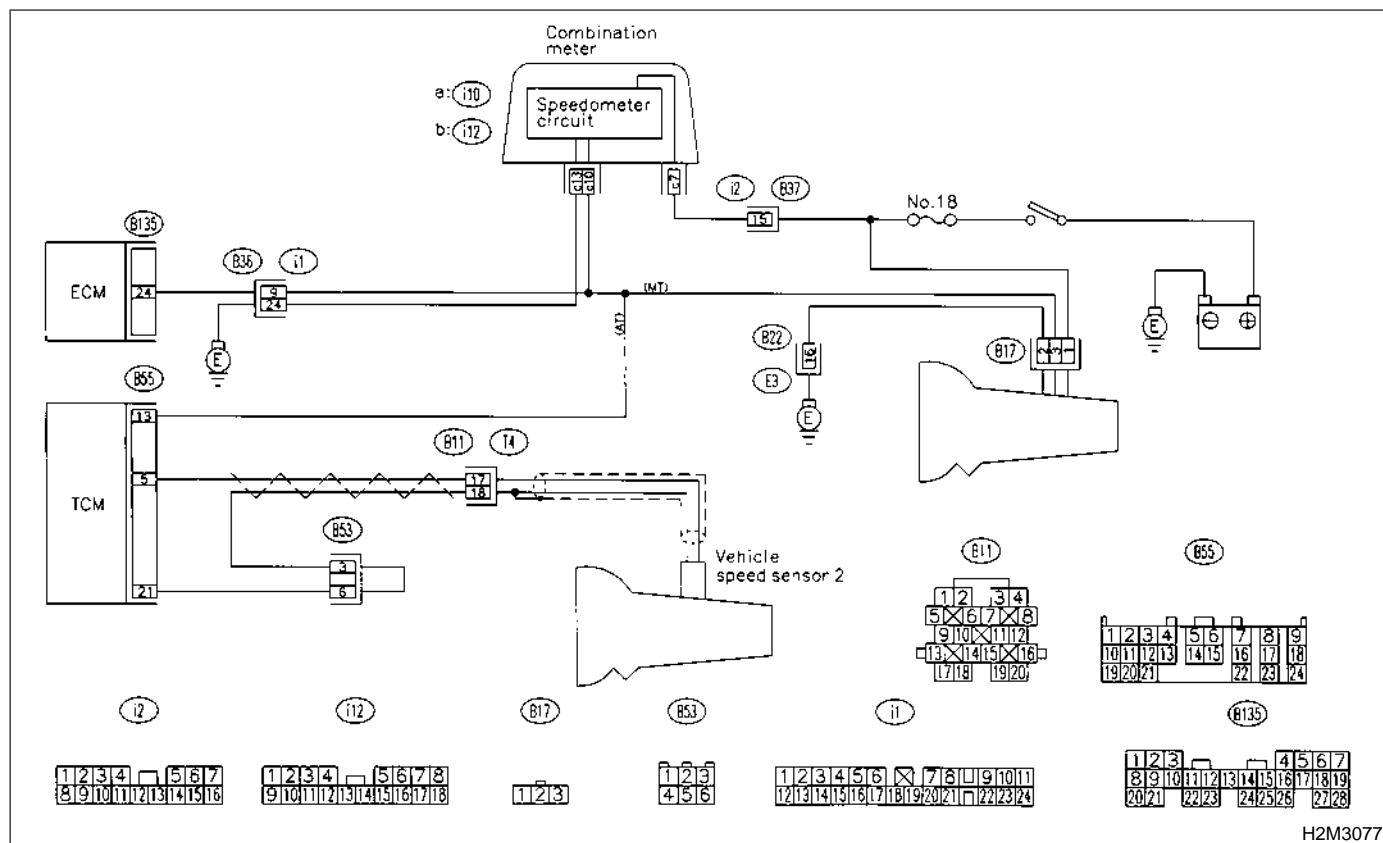
: Check engine cooling system. <Ref. to 2-5 [T100].>

AT: DTC P0500 — VEHICLE SPEED SENSOR MALFUNCTION —**• DTC DETECTING CONDITION:**

- Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3077

10AT1 : CHECK TRANSMISSION TYPE.

- CHECK** : *Is transmission type AT?*
- YES** : Go to step 10AT2.
- NO** : Go to step 10AT3.

10AT2 : CHECK DTC P0720 ON DISPLAY.

- CHECK** : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0720?*
- YES** : Check vehicle speed sensor 2 signal circuit. <Ref. to 3-2 [T8G0].>
- NO** : Go to step 10AT3.

10AT3 : CHECK SPEEDOMETER OPERATION IN COMBINATION METER.

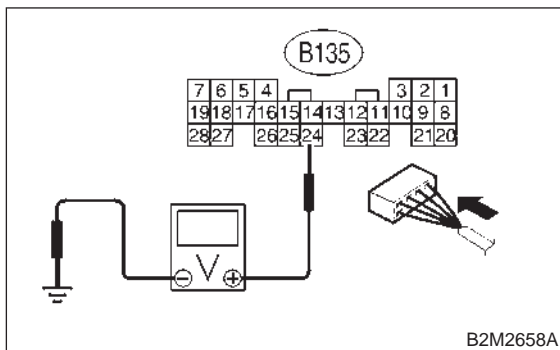
- CHECK** : *Does speedometer operate normally?*
- YES** : Go to step 10AT4.
- NO** : Check speedometer and vehicle speed sensor. <Ref. to 6-2 [K2A4].>

10AT4 : CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from TCM.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 24 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 2 V?**

YES : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and combination meter connector
- Poor contact in ECM connector
- Poor contact in combination meter connector
- Poor contact in coupling connector (B37)

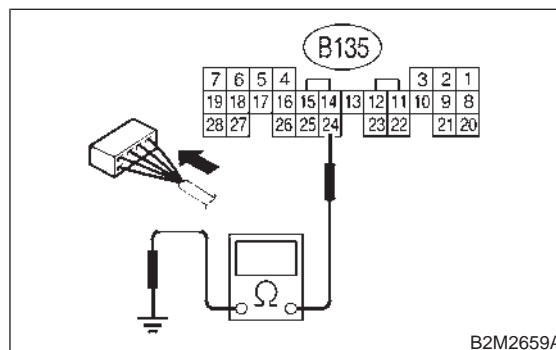
NO : Go to step **10AT5**.

10AT5 : CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B135) No. 24 — Chassis ground:



CHECK : **Is the resistance less than 10 Ω?**

YES : Repair ground short circuit in harness between ECM and combination meter connector.

NO : Repair poor contact in ECM connector.

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Erroneous idling
 - Engine stalls.
 - Engine breathing

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

Wiring diagram for the Idle air control solenoid valve. The diagram shows the ECM connected to the Main relay (B47) and the Idle air control solenoid valve (E7). The Main relay is connected to the ECM (B134) and the Idle air control solenoid valve (E7). The Idle air control solenoid valve is connected to the Main relay (B47) and the ECM (B134). The diagram includes a battery (E) and a fuse (F44). The diagram also shows the pin configurations for the connectors B134, B21, B22, B47, E7, and B61.

Pin configurations for connectors:

- B134:

1	2	3	4			5	6	7	8
9	10	11	12	13	14	15	16	17	18
19	20	21	22	23					
24	25	26	27	28	29	30	31	32	33
34	35								
- B21:

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
- B22:

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
- B47:

1	2	3	4
5	6	7	8
- E7:

1	2	3
4	5	6
- B61:

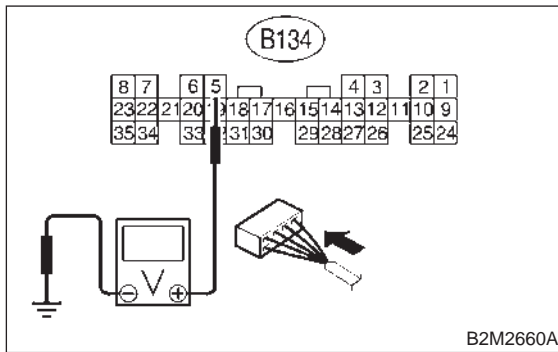
1	2	3	4
5	6	7	8

10AU1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 5 (+) — Chassis ground (-):



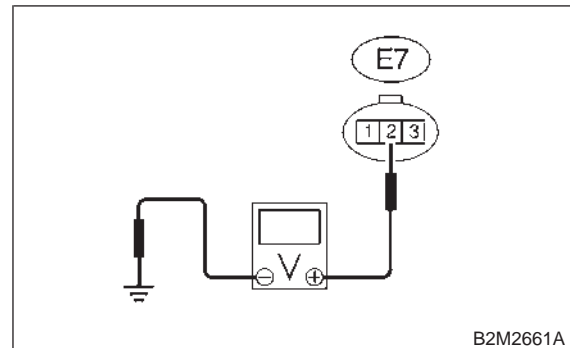
- CHECK** : Is the voltage more than 3 V?
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step **10AU2**.

10AU2 : CHECK POWER SUPPLY TO IDLE AIR CONTROL SOLENOID VALVE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from idle air control solenoid valve.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between idle air control solenoid valve and engine ground.

Connector & terminal

(E7) No. 2 (+) — Engine ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step **10AU3**.
- NO** : Repair harness and connector.

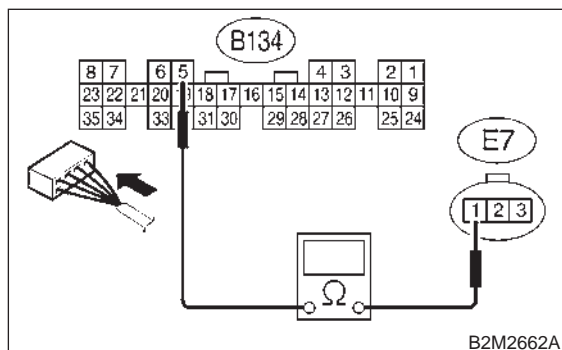
NOTE:

In this case, repair the following:

- Open circuit in harness between idle air control solenoid valve and main relay connector
- Poor contact in coupling connector (B22)

10AU3 : CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM and idle air control solenoid valve connector.

Connector & terminal
(B134) No. 5 — (E7) No. 1:


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step **10AU4**.
- NO** : Repair harness and connector.

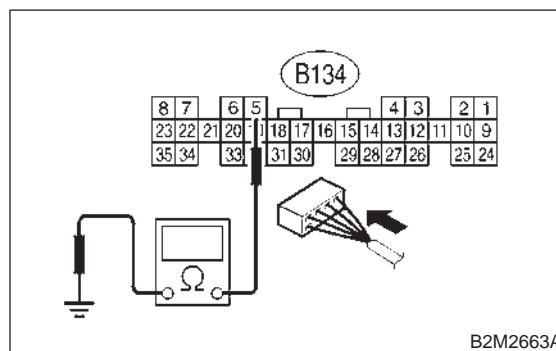
NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and idle air control solenoid valve connector
- Poor contact in coupling connector (B21)

10AU4 : CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.

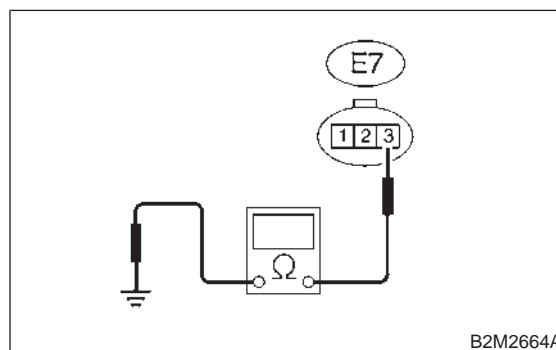
Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B134) No. 5 — Chassis ground:


- CHECK** : Is the resistance less than 10 Ω ?
- YES** : Repair ground short circuit in harness between ECM and idle air control solenoid valve connector.
- NO** : Go to step **10AU5**.

10AU5 : CHECK GROUND CIRCUIT OF IDLE AIR CONTROL SOLENOID VALVE.

Measure resistance of harness between idle air control solenoid valve connector and engine ground.

Connector & terminal
(E7) No. 3 — Engine ground:


- CHECK** : Is the resistance less than 5 Ω ?
- YES** : Go to step **10AU6**.
- NO** : Repair open circuit in harness between idle air control solenoid valve connector and engine ground terminal.

10AU6 : CHECK POOR CONTACT.

Check poor contact in ECM and idle air control solenoid valve connectors. <Ref. to FOREWORD [T3C1].>

- CHECK** : *Is there poor contact in ECM and idle air control solenoid valve connectors?*
- YES** : Repair poor contact in ECM and idle air control solenoid valve connectors.
- NO** : Replace idle air control solenoid valve. <Ref. to 2-7 [W12A1].>

AV: DTC P0506 — IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED**• DTC DETECTING CONDITION:**

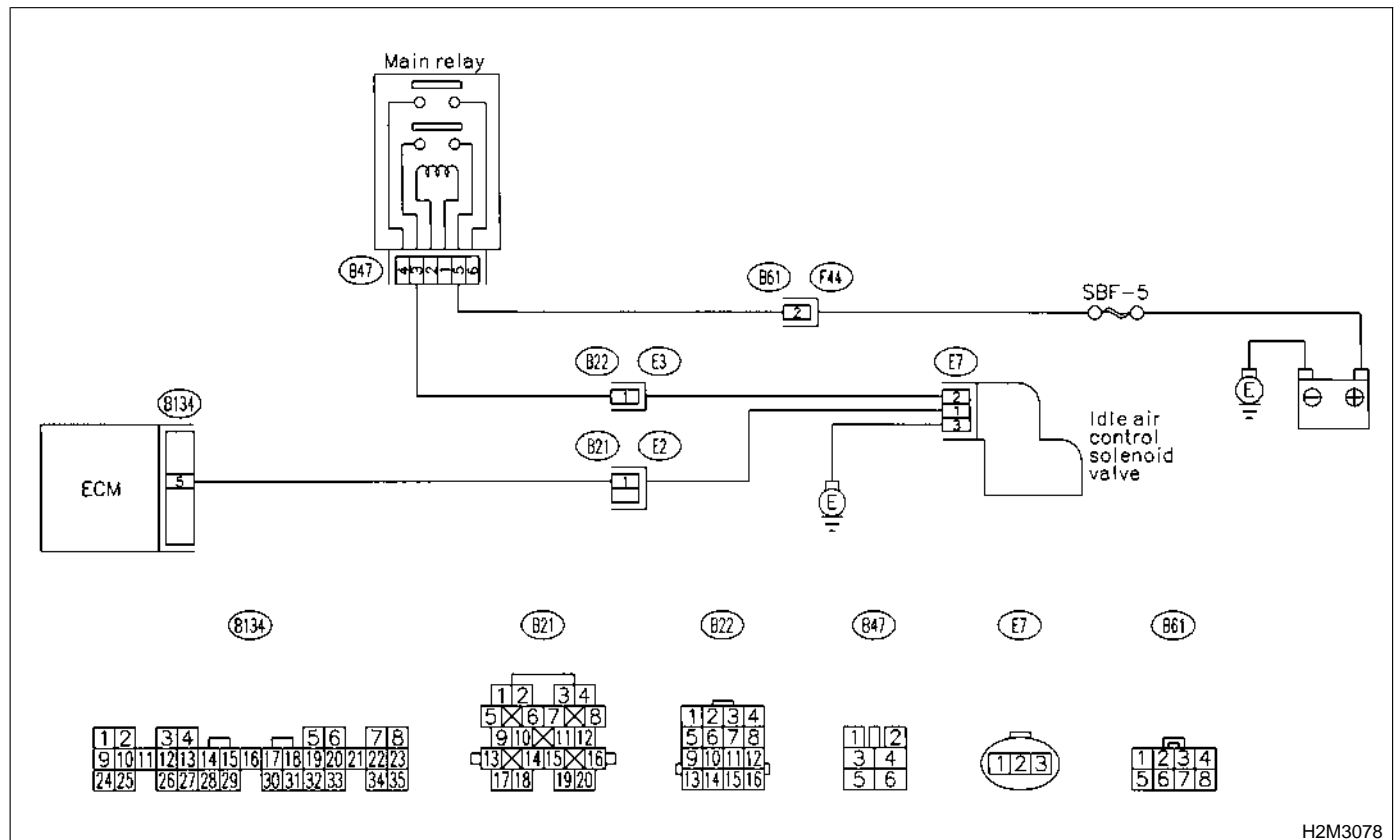
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Engine is difficult to start.
- Engine does not start.
- Erroneous idling
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3078

10AV1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : **Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0505 or P1505?**

YES : Inspect DTC P0505 or P1505 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0506.

NO : Go to step **10AV2**.

10AV2 : CHECK IDLE AIR CONTROL SOLENOID VALVE.

- 1) Turn ignition switch to OFF.
- 2) Remove idle air control solenoid valve from throttle body. <Ref. to 2-7 [W12A1].>
- 3) Using an air gun, force air into idle air control solenoid valve by-pass air inlet. Confirm that forced air subsequently escapes from both main air passage and assist air passage.

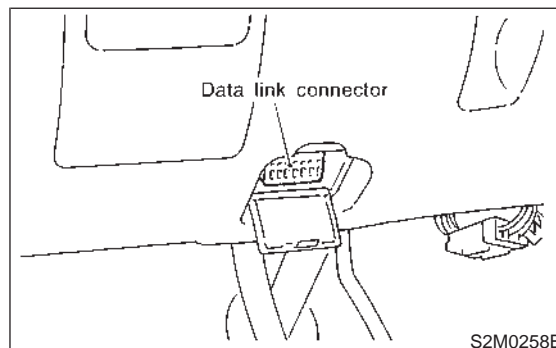
CHECK : **Does air flow out?**

YES : Go to step **10AV4**.

NO : Replace idle air control solenoid valve. <Ref. to 2-7 [W12A1].> After replace, Go to step **10AV3**.

10AV3 : CHECK IDLE AIR CONTROL SOLENOID VALVE DUTY RATIO.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 4) Start engine, and warm-up the engine.
- 5) Turn all accessory switches to OFF.
- 6) Read data of idle air control solenoid valve duty ratio using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Is the value more than 60%?**

YES : Go to step **10AV4**.

NO : END.

10AV4 : CHECK BY-PASS AIR LINE.

- 1) Turn ignition switch to OFF.
- 2) Remove idle air control solenoid valve from throttle body. <Ref. to 2-7 [W12A1].>
- 3) Remove throttle body to intake manifold. <Ref. to 2-7 [W3A1].>
- 4) Confirm that there is no foreign matter stuck in the air by-pass line.
- 5) Using an air gun, force air into solenoid valve installation area and throttle valve interior. Confirm that forced air subsequently escapes from both these areas.

CHECK : ***Does air flow out?***

YES : Replace idle air control solenoid valve.
<Ref. to 2-7 [W12A1].>

NO : Replace throttle body. <Ref. to 2-7 [W3A1].>

AW: DTC P0507 — IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

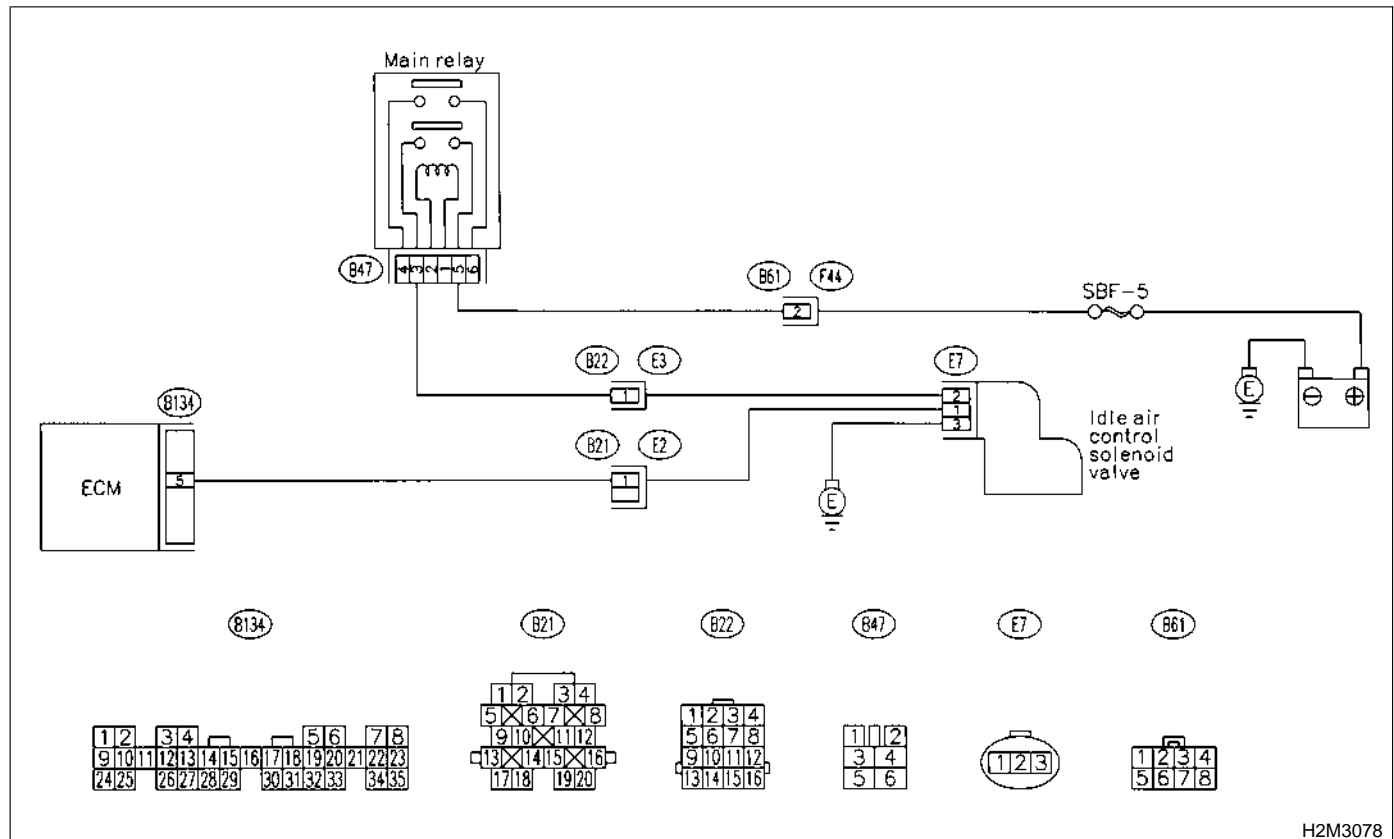
• TROUBLE SYMPTOM:

- Engine keeps running at higher revolution than specified idling revolution.

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3078

10AW1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0505 or P1505?

YES : Inspect DTC P0505 or P1505 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0507.

NO : Go to step 10AW2.

10AW2 : CHECK AIR INTAKE SYSTEM.

1) Turn ignition switch to ON.

2) Start engine, and idle it.

3) Check the following items.

- Loose installation of intake manifold, idle air control solenoid valve and throttle body
- Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket
- Disconnections of vacuum hoses

CHECK : Is there a fault in air intake system?

YES : Repair air suction and leaks.

NO : Replace idle air control solenoid valve. <Ref. to 2-7 [W12A1].>

AX: DTC P0601 — INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR —**• DTC DETECTING CONDITION:**

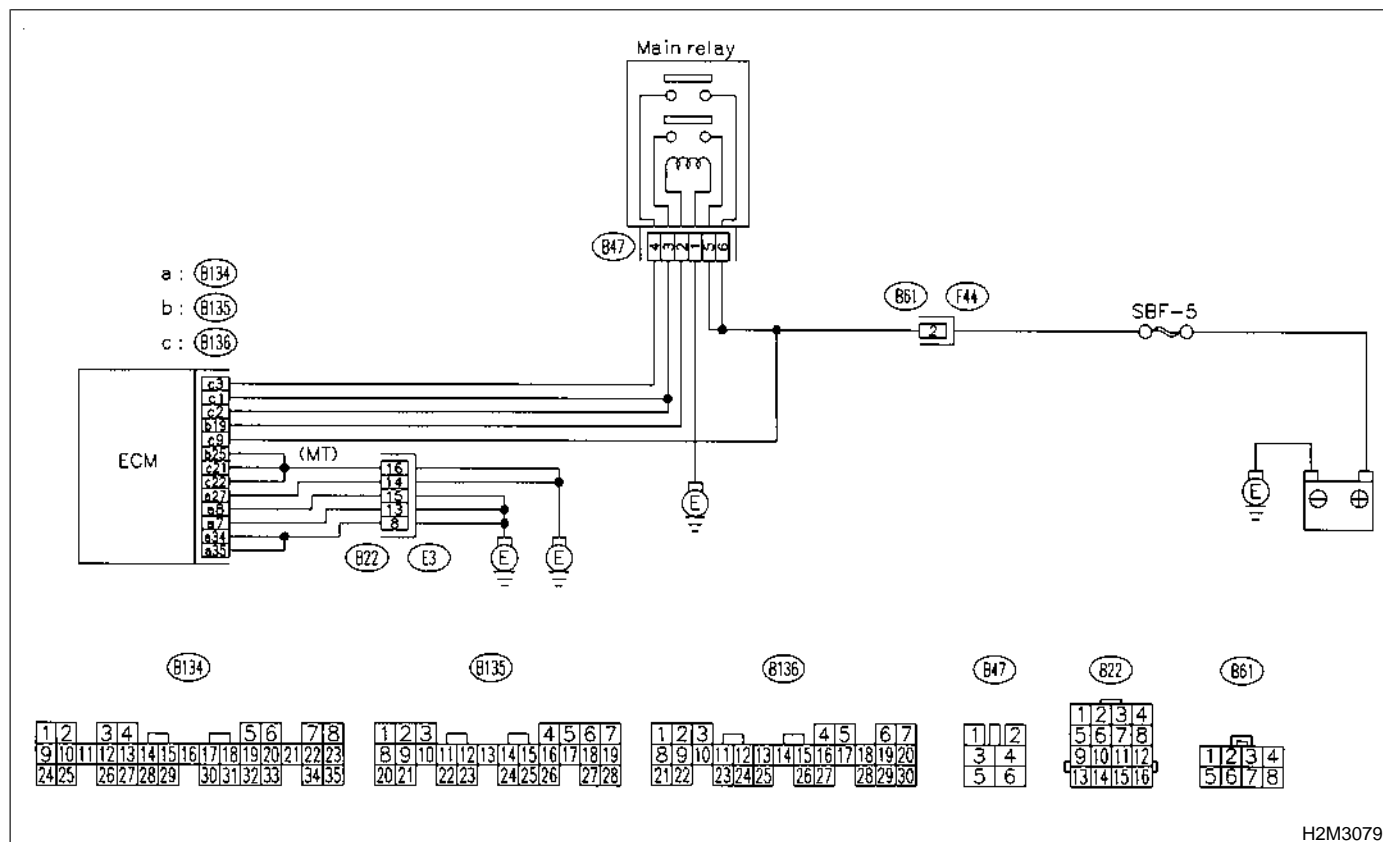
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Engine does not start.
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3079

10AX1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0601?

YES : Replace ECM. <Ref. to 2-7 [W15A0].>

NO : It is not necessary to inspect DTC P0601.

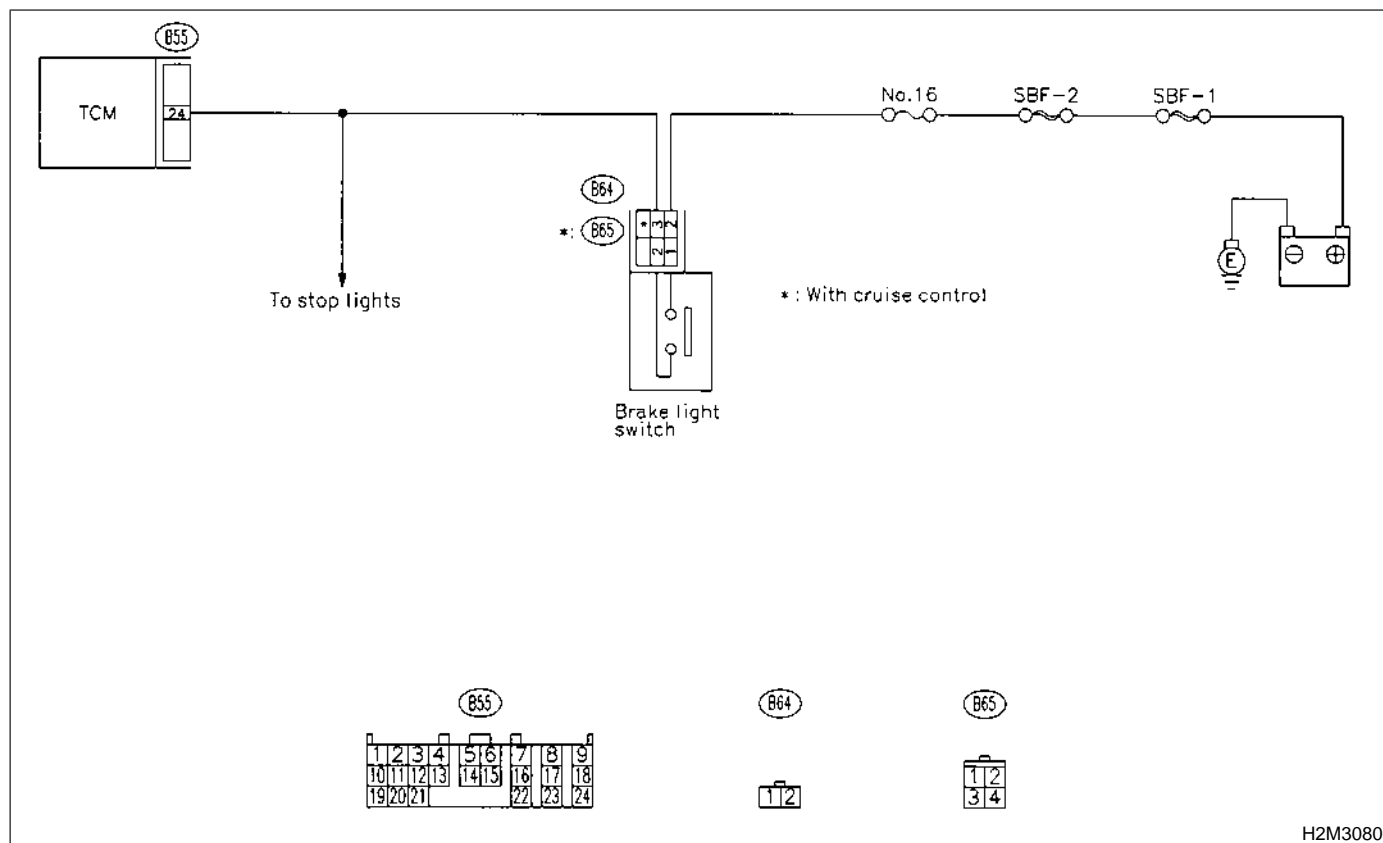
MEMO:

AY: DTC P0703 — BRAKE SWITCH INPUT MALFUNCTION —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

H2M3080

10AY1 : CHECK OPERATION OF BRAKE LIGHT.

- CHECK** : Does brake light come on when depressing the brake pedal?
- YES** : Go to step **10AY2**.
- NO** : Repair or replace brake light circuit.

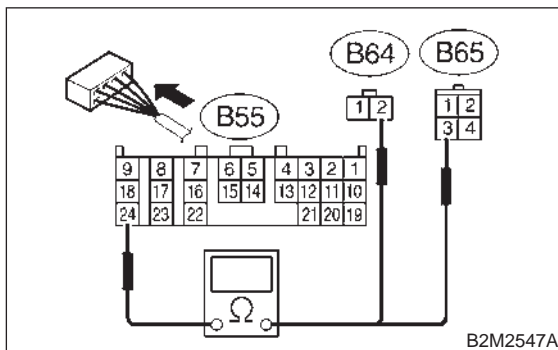
10AY2 : CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.

- 1) Disconnect connectors from TCM and brake light switch.
- 2) Measure resistance of harness between TCM and brake light switch connector.

Connector & terminal

(B55) No. 24 — (B64) No. 2:

(B55) No. 24 — (B65) No. 3 (With cruise control):



- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 10AY3.
- NO** : Repair or replace harness and connector.

NOTE:

In this case, repair the following:

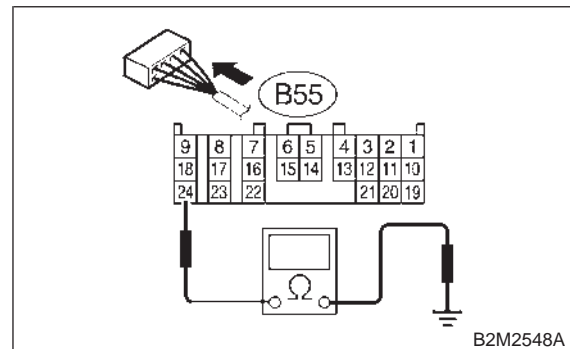
- Open circuit in harness between TCM and brake light switch connector
- Poor contact in TCM connector
- Poor contact in brake light switch connector

10AY3 : CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B55) No. 24 — Chassis ground:



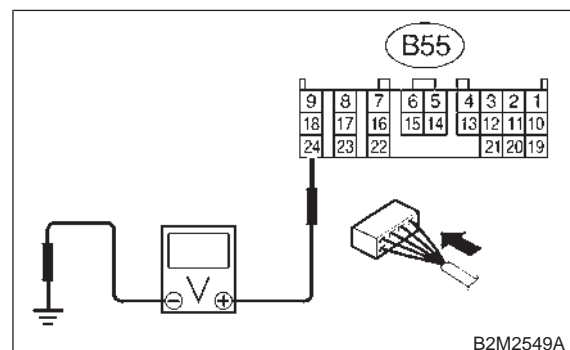
- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 10AY4.
- NO** : Repair ground short circuit in harness between TCM and brake light switch connector.

10AY4 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect connectors to TCM and brake light switch.
- 2) Measure voltage between TCM and chassis ground.

Connector & terminal

(B55) No. 24 (+) — Chassis ground (-):



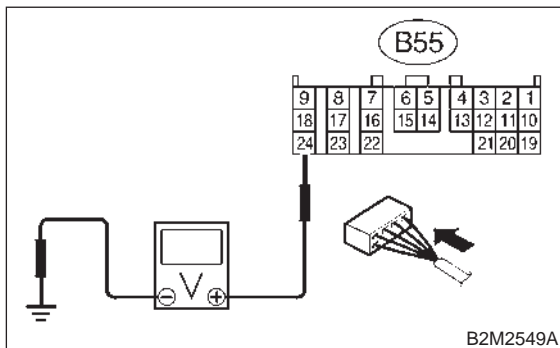
- CHECK** : Is the voltage less than 1 V when releasing the brake pedal?
- YES** : Go to step 10AY5.
- NO** : Adjust or replace brake light switch.
<Ref. to 4-5 [W1A1].>

10AY5 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal

(B55) No. 24 (+) — Chassis ground (–):



- CHECK** : *Is the voltage more than 10 V when depressing the brake pedal?*
- YES** : Go to step **10AY6**.
- NO** : Adjust or replace brake light switch.
<Ref. to 4-5 [W1A1].>

10AY6 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : *Is there poor contact in TCM connector?*
- YES** : Repair poor contact in TCM connector.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

MEMO:

AZ: DTC P0705 — TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

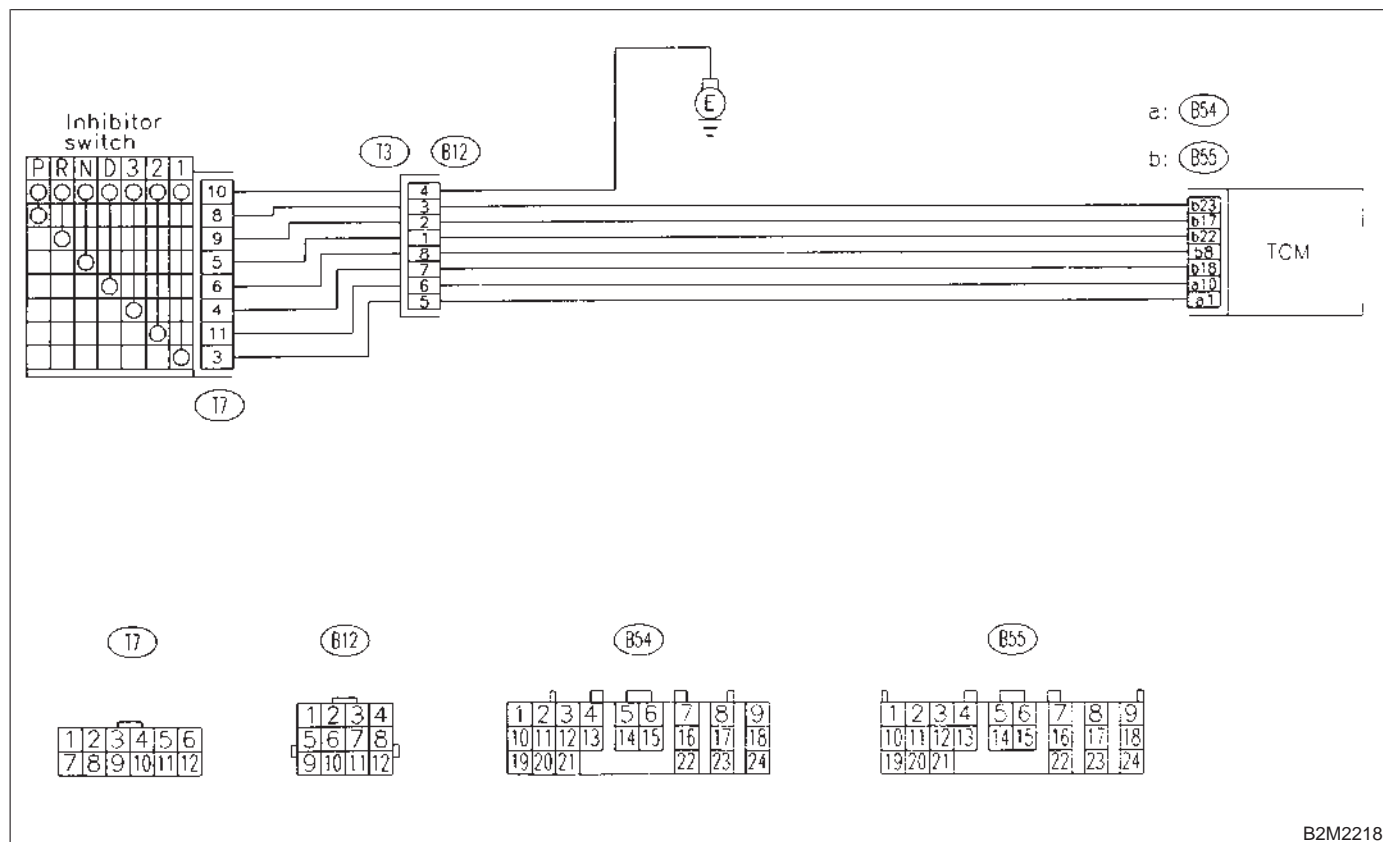
• TROUBLE SYMPTOM:

- Starter does not rotate when selector lever is in "P" or "N" range.
- Starter rotates when selector lever is in "R", "D", "3", "2" or "1" range.
- Engine brake is not effected when selector lever is in "3" range.
- Shift characteristics are erroneous.

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:



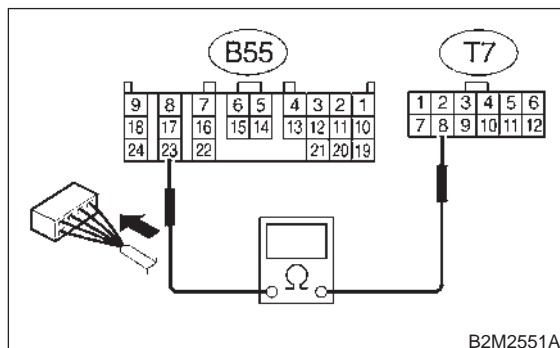
B2M2218

10AZ1 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from TCM and transmission.
- 3) Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal

(B55) No. 23 — (T7) No. 8:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 10AZ2.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

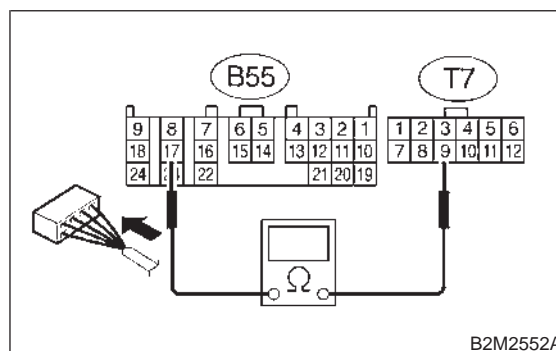
- Open circuit in harness between ECM and inhibitor switch connector
- Poor contact in coupling connector (B12)

10AZ2 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal

(B55) No. 17 — (T7) No. 9:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 10AZ3.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

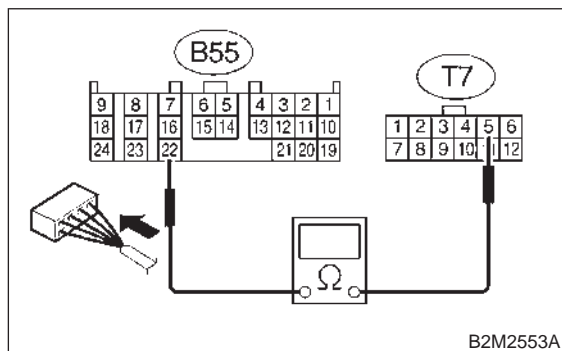
- Open circuit in harness between ECM and inhibitor switch connector
- Poor contact in coupling connector (B12)

10AZ3 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal

(B55) No. 22 — (T7) No. 5:



CHECK : **Is the resistance less than 1 Ω?**

YES : Go to step **10AZ4**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

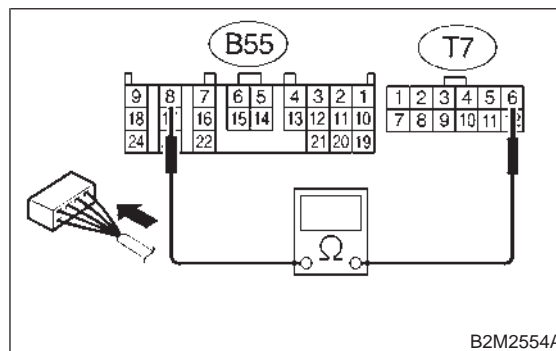
- Open circuit in harness between ECM and inhibitor switch connector.
- Poor contact in coupling connector (B12)

10AZ4 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal

(B55) No. 8 — (T7) No. 6:



CHECK : **Is the resistance less than 1 Ω?**

YES : Go to step **10AZ5**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

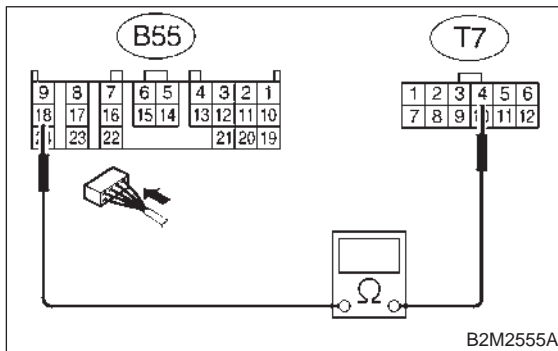
- Open circuit in harness between ECM and inhibitor switch connector.
- Poor contact in coupling connector (B12)

10AZ5 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal

(B55) No. 18 — (T7) No. 4:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 10AZ6.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

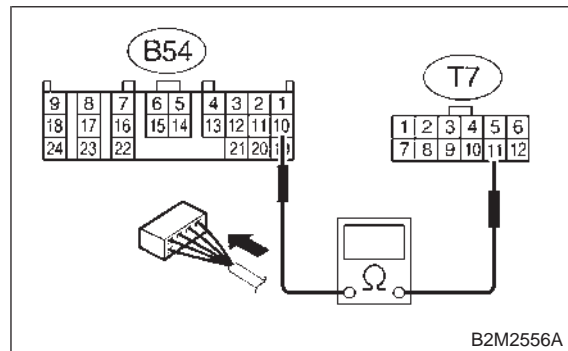
- Open circuit in harness between ECM and inhibitor switch connector.
- Poor contact in coupling connector (B12)

10AZ6 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal

(B54) No. 10 — (T7) No. 11:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 10AZ7.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

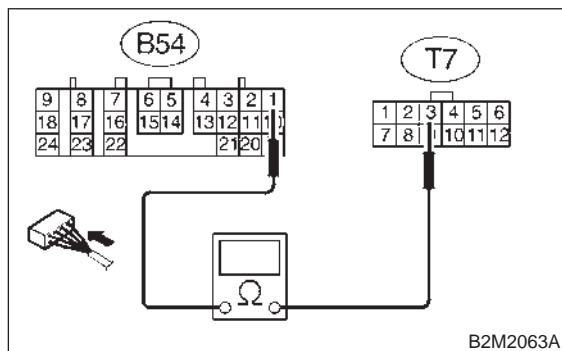
- Open circuit in harness between ECM and inhibitor switch connector.
- Poor contact in coupling connector (B12)

10AZ7 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal

(B54) No. 1 — (T7) No. 3:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 10AZ8.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

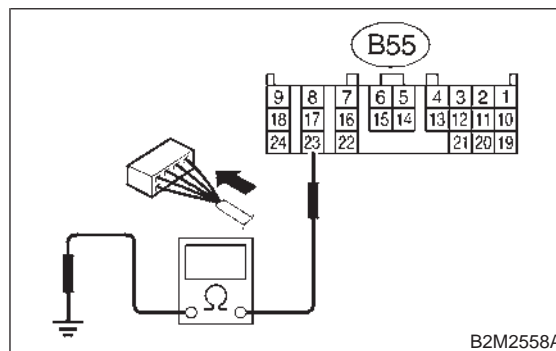
- Open circuit in harness between ECM and inhibitor switch connector.
- Poor contact in coupling connector (B12)

10AZ8 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B55) No. 23 — Chassis ground:



CHECK : Is the resistance more than 1 $M\Omega$?

YES : Go to step 10AZ9.

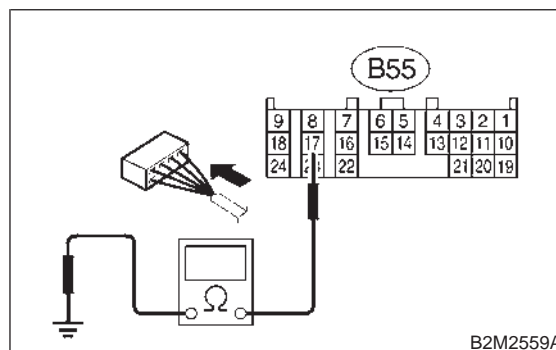
NO : Repair ground short circuit in harness between TCM and transmission harness connector.

10AZ9 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B55) No. 17 — Chassis ground:



CHECK : Is the resistance more than 1 $M\Omega$?

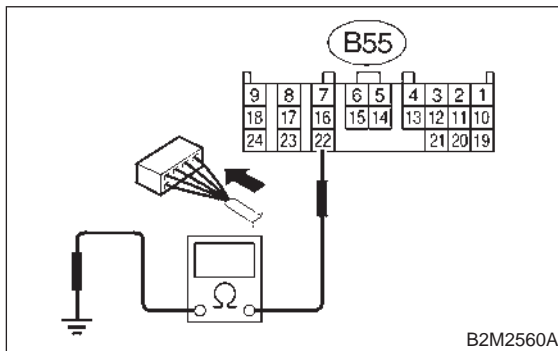
YES : Go to step 10AZ10.

NO : Repair ground short circuit in harness between TCM and transmission harness connector.

10AZ10 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 22 — Chassis ground:

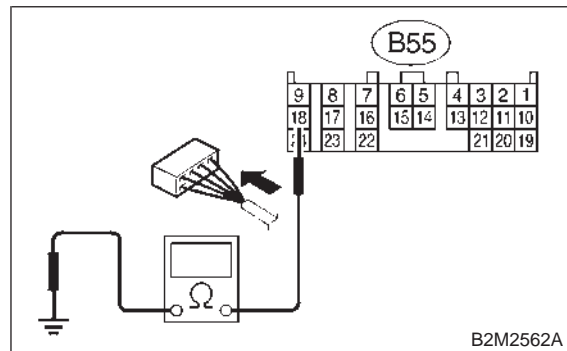


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 10AZ11.
- NO** : Repair ground short circuit in harness between TCM and transmission harness connector.

10AZ12 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 18 — Chassis ground:

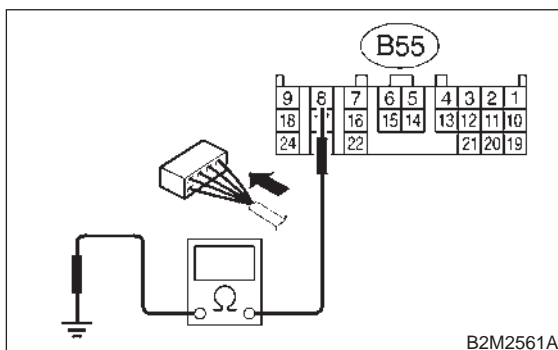


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 10AZ13.
- NO** : Repair ground short circuit in harness between TCM and transmission harness connector.

10AZ11 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 8 — Chassis ground:

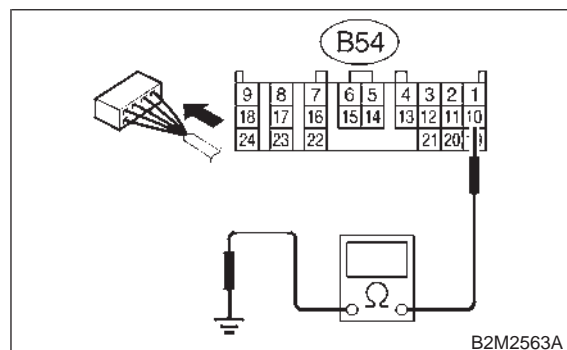


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 10AZ12.
- NO** : Repair ground short circuit in harness between TCM and transmission harness connector.

10AZ13 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B54) No. 10 — Chassis ground:

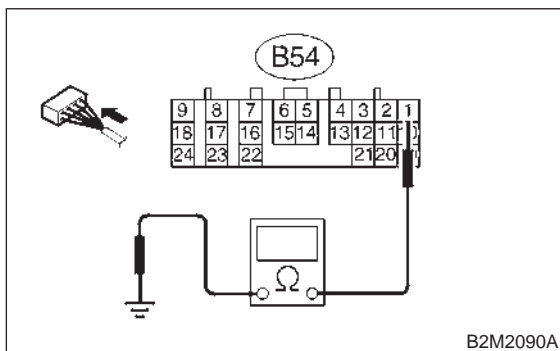


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 10AZ14.
- NO** : Repair ground short circuit in harness between TCM and transmission harness connector.

10AZ14 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B54) No. 1 — Chassis ground:

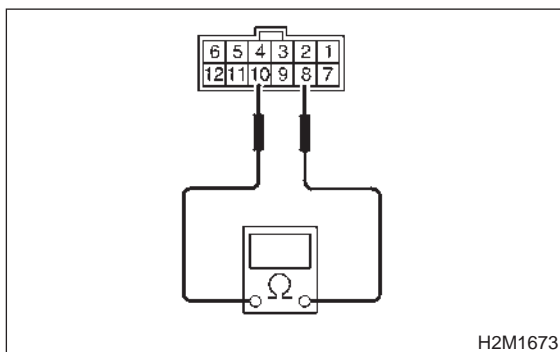


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 10AZ15.
- NO** : Repair ground short circuit in harness between TCM and transmission harness connector.

10AZ15 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever "P" position.

Terminals
No. 8 — No. 10:

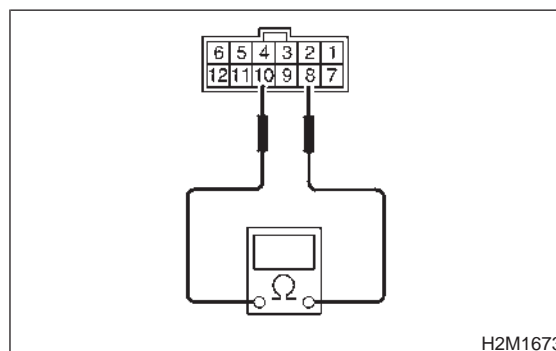


- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10AZ16.
- NO** : Go to step 10AZ29.

10AZ16 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "P" position.

Terminals
No. 8 — No. 10:

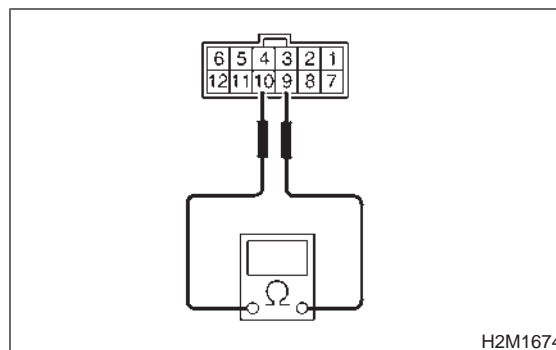


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 10AZ17.
- NO** : Go to step 10AZ29.

10AZ17 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever for "R" position.

Terminals
No. 9 — No. 10:



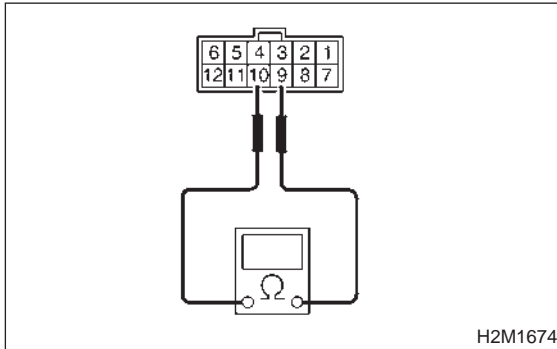
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10AZ18.
- NO** : Go to step 10AZ29.

10AZ18 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "R" position.

Terminals

No. 9 — No. 10:



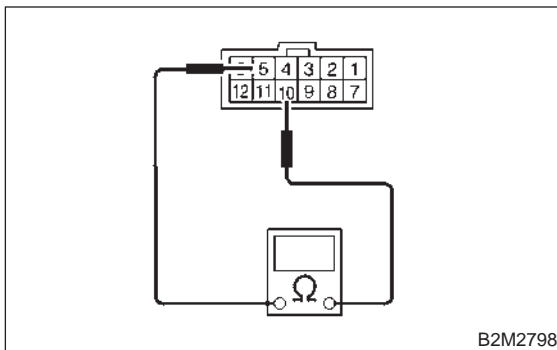
- CHECK** : Is the resistance more than 1 M Ω ?
- YES** : Go to step 10AZ19.
- NO** : Go to step 10AZ29.

10AZ19 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever for "N" position.

Terminals

No. 5 — No. 10:



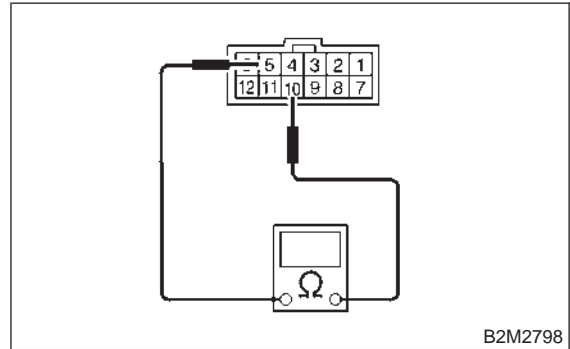
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 10AZ20.
- NO** : Go to step 10AZ29.

10AZ20 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "N" position.

Terminals

No. 5 — No. 10:



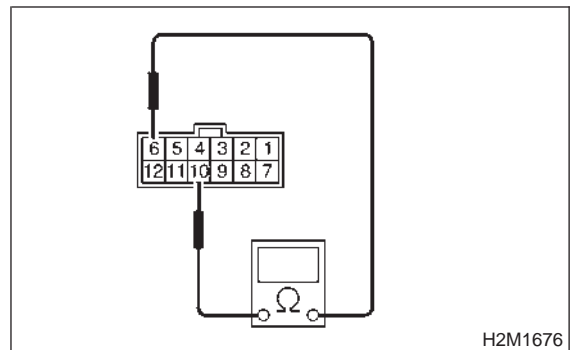
- CHECK** : Is the resistance more than 1 M Ω ?
- YES** : Go to step 10AZ21.
- NO** : Go to step 10AZ29.

10AZ21 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "D" position.

Terminals

No. 6 — No. 10:



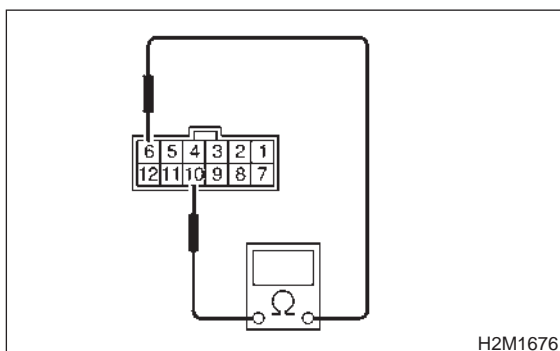
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 10AZ22.
- NO** : Go to step 10AZ29.

10AZ22 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "D" position.

Terminals

No. 6 — No. 10:



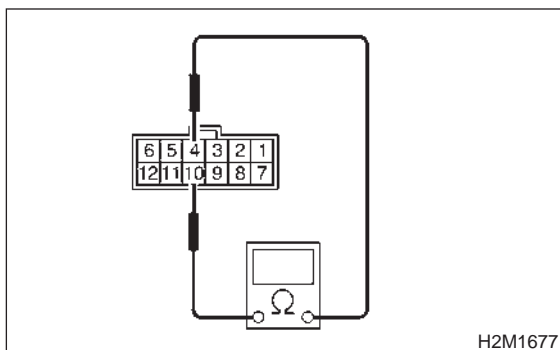
- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 10AZ23.
- NO** : Go to step 10AZ29.

10AZ23 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever for "3" position.

Terminals

No. 4 — No. 10:



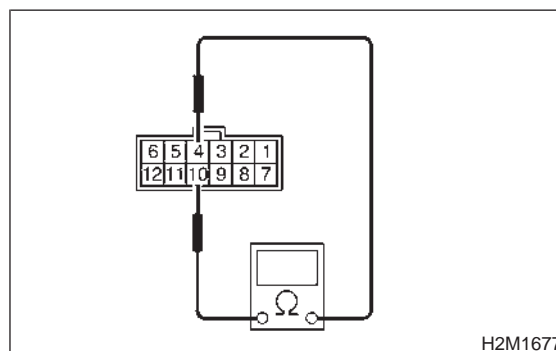
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10AZ24.
- NO** : Go to step 10AZ29.

10AZ24 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "3" position.

Terminals

No. 4 — No. 10:



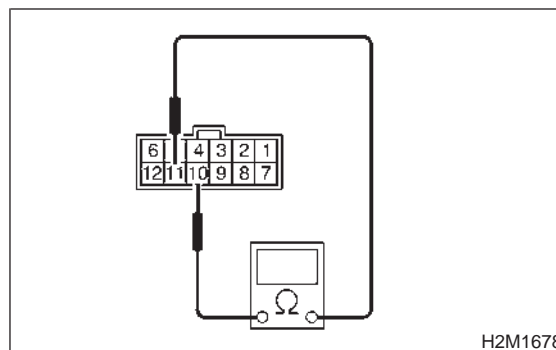
- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 10AZ25.
- NO** : Go to step 10AZ29.

10AZ25 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "2" position.

Terminals

No. 11 — No. 10:



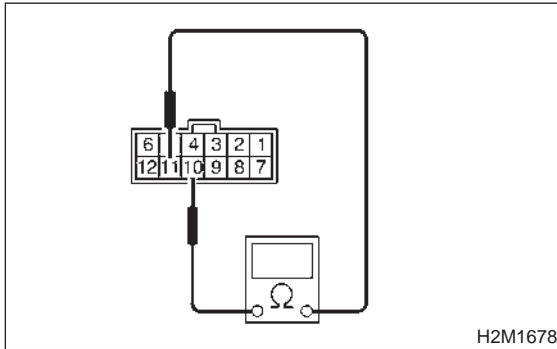
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10AZ26.
- NO** : Go to step 10AZ29.

10AZ26 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "R" position.

Terminals

No. 11 — No. 10:



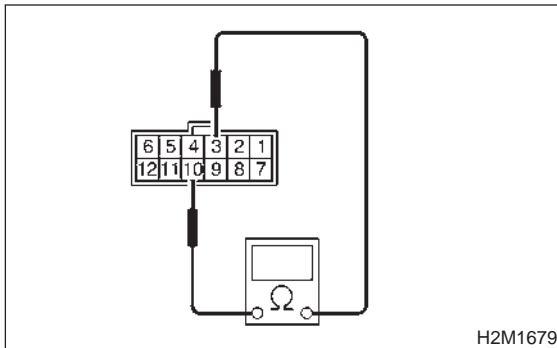
- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 10AZ27.
- NO** : Go to step 10AZ29.

10AZ27 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "1" position.

Terminals

No. 3 — No. 10:



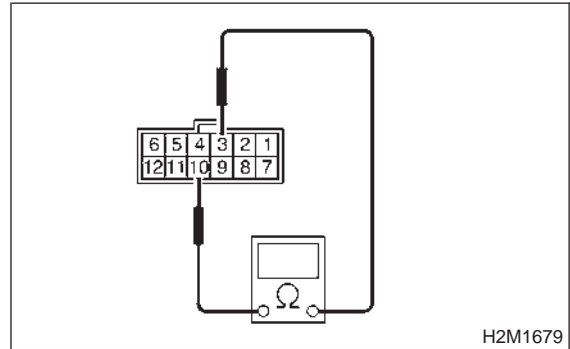
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10AZ28.
- NO** : Go to step 10AZ29.

10AZ28 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "1" position.

Terminals

No. 3 — No. 10:



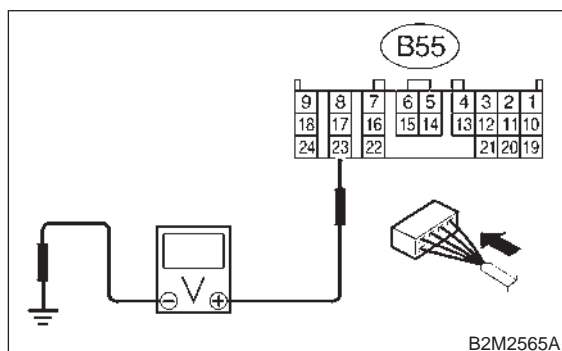
- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 10AZ30.
- NO** : Go to step 10AZ29.

10AZ29 : CHECK SELECTOR CABLE.

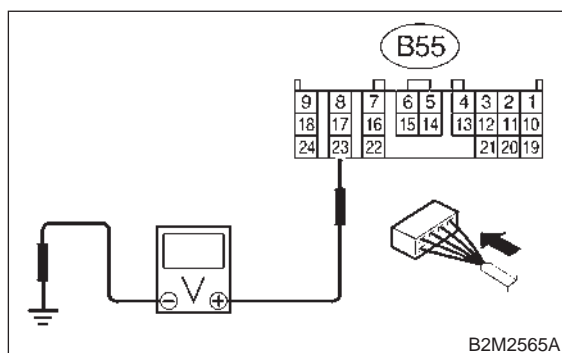
- CHECK** : Is there faulty connection in the selector cable?
- YES** : Repair connection of selector cable.
- NO** : Replace inhibitor switch. <Ref. to 3-2 [W2C0].>

10AZ30 : CHECK INPUT SIGNAL FOR TCM.

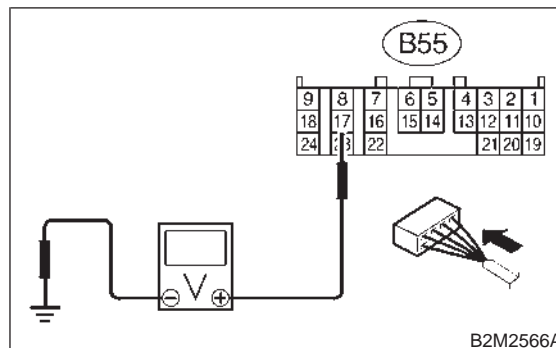
- 1) Turn ignition switch to OFF.
- 2) Connect connector to TCM and transmission.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal**(B55) No. 23 (+) — Chassis ground (-):****CHECK** : **Is the voltage less than 1 V?****YES** : Go to step 10AZ31.**NO** : Go to step 10AZ44.**10AZ31 : CHECK INPUT SIGNAL FOR TCM.**

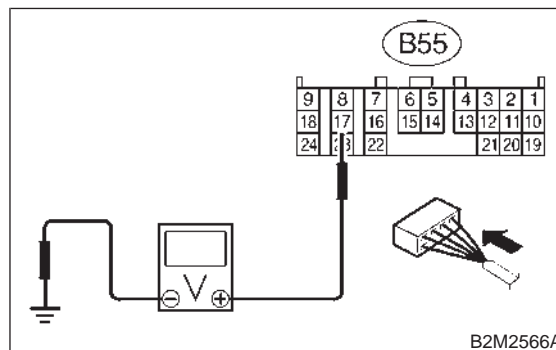
Measure voltage between TCM chassis ground in selector lever except for "P" and "N" positions.

Connector & terminal**(B55) No. 23 (+) — Chassis ground (-):****CHECK** : **Is the voltage more than 8 V?****YES** : Go to step 10AZ32.**NO** : Go to step 10AZ44.**10AZ32 : CHECK INPUT SIGNAL FOR TCM.**

Measure voltage between TCM chassis ground in selector lever "R" position.

Connector & terminal**(B55) No. 17 (+) — Chassis ground (-):****CHECK** : **Is the voltage less than 1 V?****YES** : Go to step 10AZ33.**NO** : Go to step 10AZ44.**10AZ33 : CHECK INPUT SIGNAL FOR TCM.**

Measure voltage between TCM chassis ground in selector lever except for "R" position.

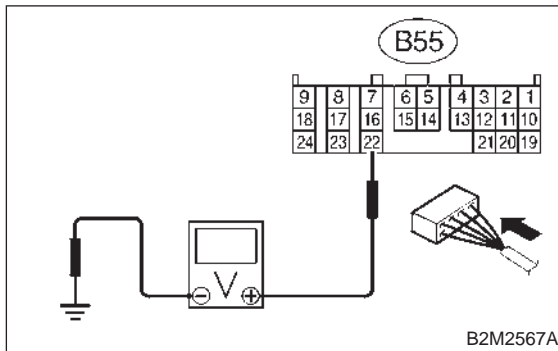
Connector & terminal**(B55) No. 17 (+) — Chassis ground (-):****CHECK** : **Is the voltage more than 6 V?****YES** : Go to step 10AZ34.**NO** : Go to step 10AZ44.

10AZ34 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever "P" and "N" positions.

Connector & terminal

(B55) No. 22 (+) — Chassis ground (-):



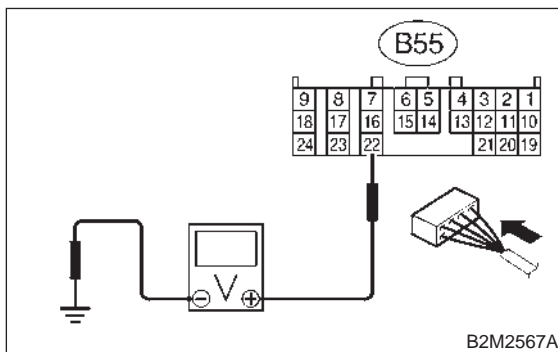
- CHECK** : Is the voltage less than 1 V?
- YES** : Go to step 10AZ35.
- NO** : Go to step 10AZ44.

10AZ35 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever except for "N" and "P" positions.

Connector & terminal

(B55) No. 22 (+) — Chassis ground (-):



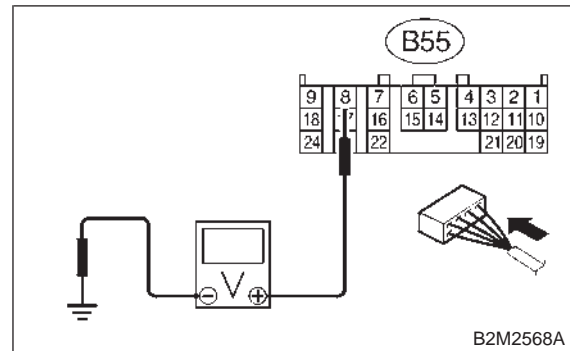
- CHECK** : Is the voltage more than 8 V?
- YES** : Go to step 10AZ36.
- NO** : Go to step 10AZ44.

10AZ36 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground in selector lever "D" position.

Connector & terminal

(B55) No. 8 (+) — Chassis ground (-):



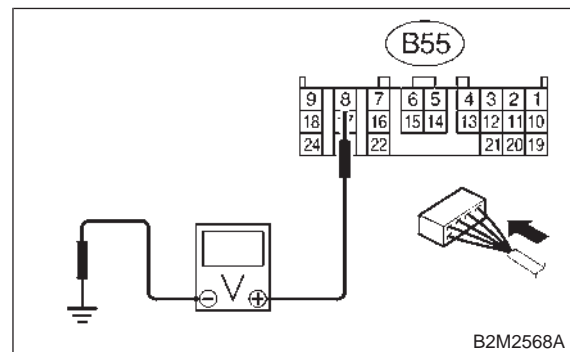
- CHECK** : Is the voltage less than 1 V?
- YES** : Go to step 10AZ37.
- NO** : Go to step 10AZ44.

10AZ37 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever except for "N" and "P" positions.

Connector & terminal

(B55) No. 8 (+) — Chassis ground (-):



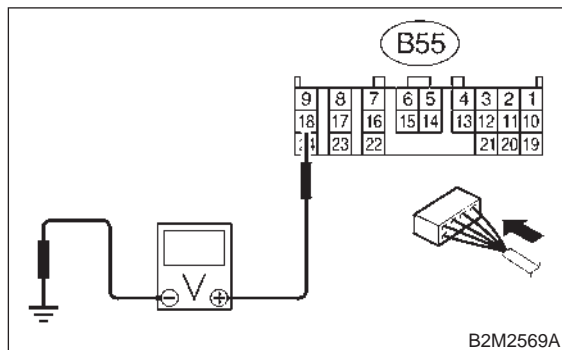
- CHECK** : Is the voltage more than 6 V?
- YES** : Go to step 10AZ38.
- NO** : Go to step 10AZ44.

10AZ38 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever "3" position.

Connector & terminal

(B55) No. 18 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step 10AZ39.

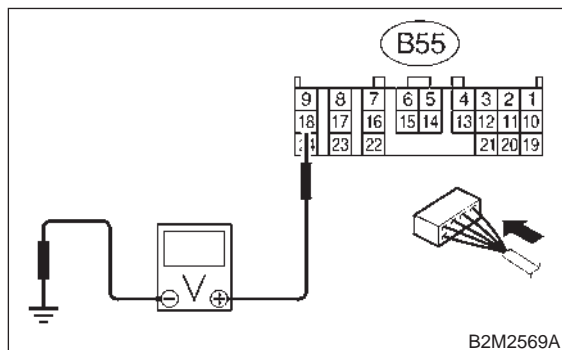
NO : Go to step 10AZ44.

10AZ39 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground in selector lever except for "3" position.

Connector & terminal

(B55) No. 18 (+) — Chassis ground (-):



CHECK : Is the voltage more than 6 V?

YES : Go to step 10AZ40.

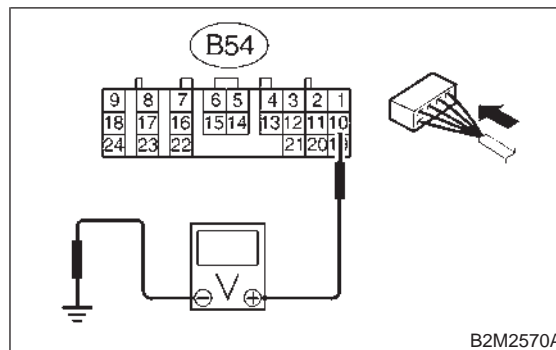
NO : Go to step 10AZ44.

10AZ40 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever "2" position.

Connector & terminal

(B54) No. 10 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step 10AZ41.

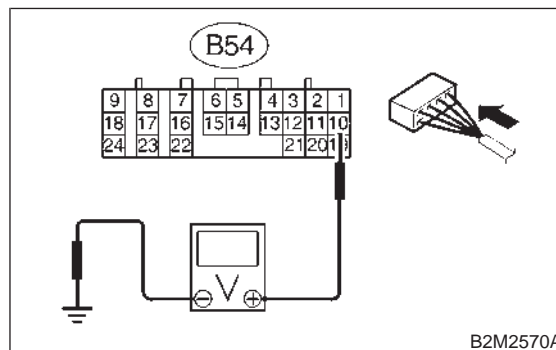
NO : Go to step 10AZ44.

10AZ41 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground in selector lever except for "2" position.

Connector & terminal

(B54) No. 10 (+) — Chassis ground (-):



CHECK : Is the voltage more than 6 V?

YES : Go to step 10AZ42.

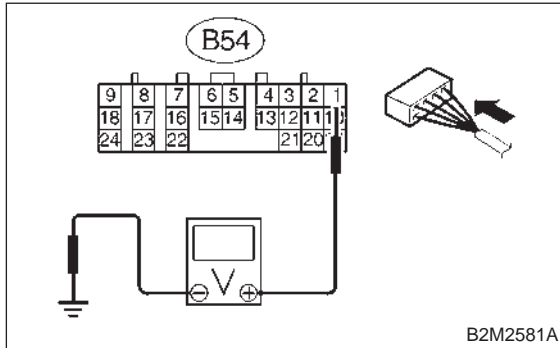
NO : Go to step 10AZ44.

10AZ42 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever "1" position.

Connector & terminal

(B54) No. 1 (+) — Chassis ground (-):



CHECK : **Is the voltage less than 1 V?**

YES : Go to step **10AZ43**.

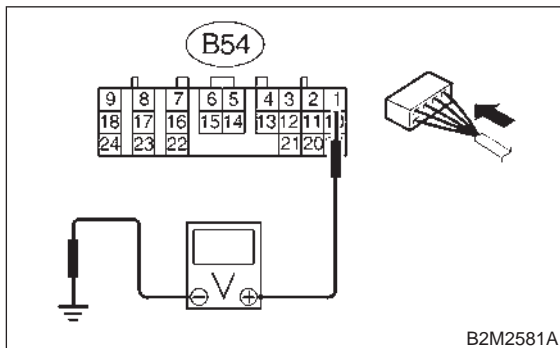
NO : Go to step **10AZ44**.

10AZ43 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever except for "1" position.

Connector & terminal

(B54) No. 1 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 6 V?**

YES : Repair poor contact in TCM connector.

NO : Go to step **10AZ44**.

10AZ44 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in TCM connector?**

YES : Repair poor contact in TCM connector.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

BA: DTC P0710 — TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT MALFUNCTION —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

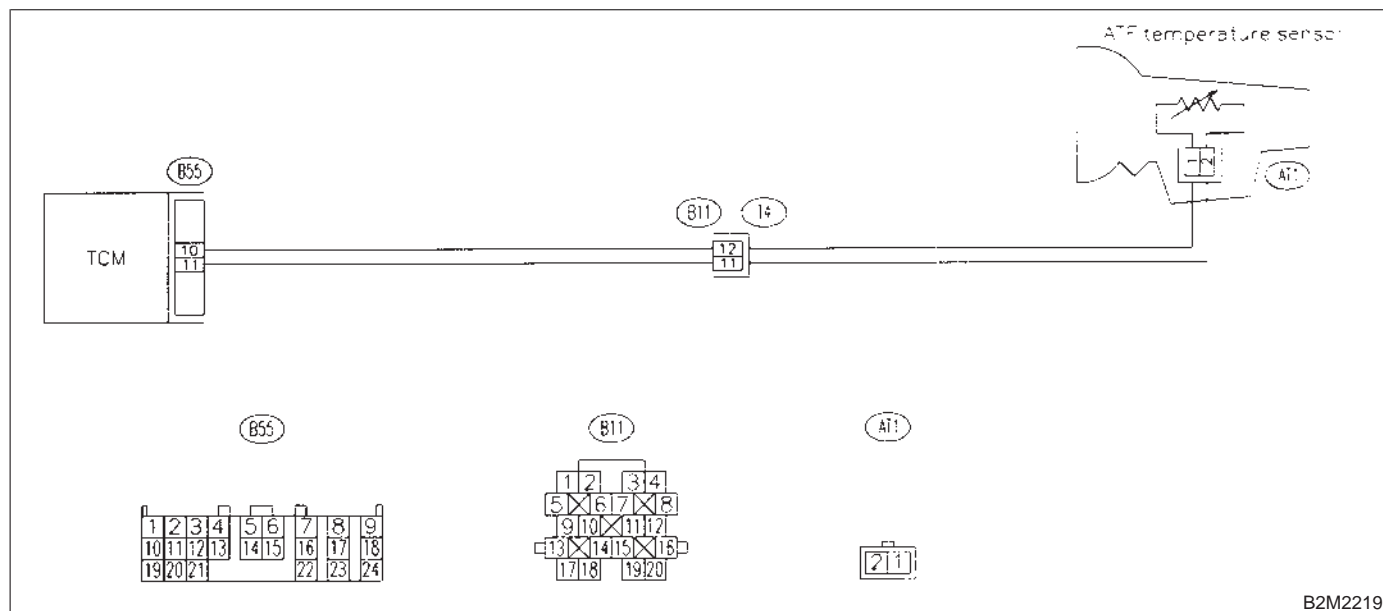
• TROUBLE SYMPTOM:

- No shift up to 4th speed (after engine warm-up)
- No lock-up (after engine warm-up)
- Excessive shift shock

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:



B2M2219

10BA1 : CHECK DTC P0710 ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0710?

YES : Check ATF temperature sensor circuit.
<Ref. to 3-2 [T8E0].>

NO : It is not necessary to inspect DTC P0710.

BB: DTC P0715 — TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT MALFUNCTION —

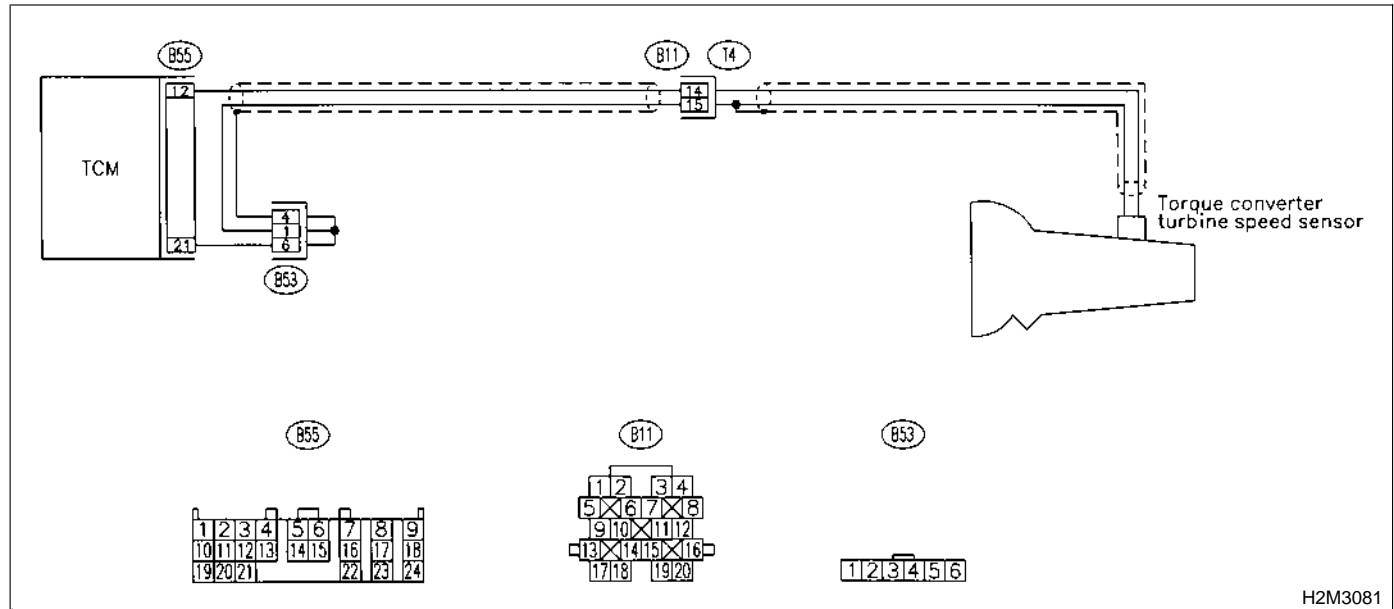
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3081

10BB1 : CHECK DTC P0715 ON DISPLAY.

- CHECK** : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0715?
- YES** : Check torque converter turbine speed sensor circuit. <Ref. to 3-2 [T8H0].>
- NO** : It is not necessary to inspect DTC P0715.

BC: DTC P0720 — OUTPUT SPEED SENSOR (VEHICLE SPEED SENSOR 2) CIRCUIT MALFUNCTION —

● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

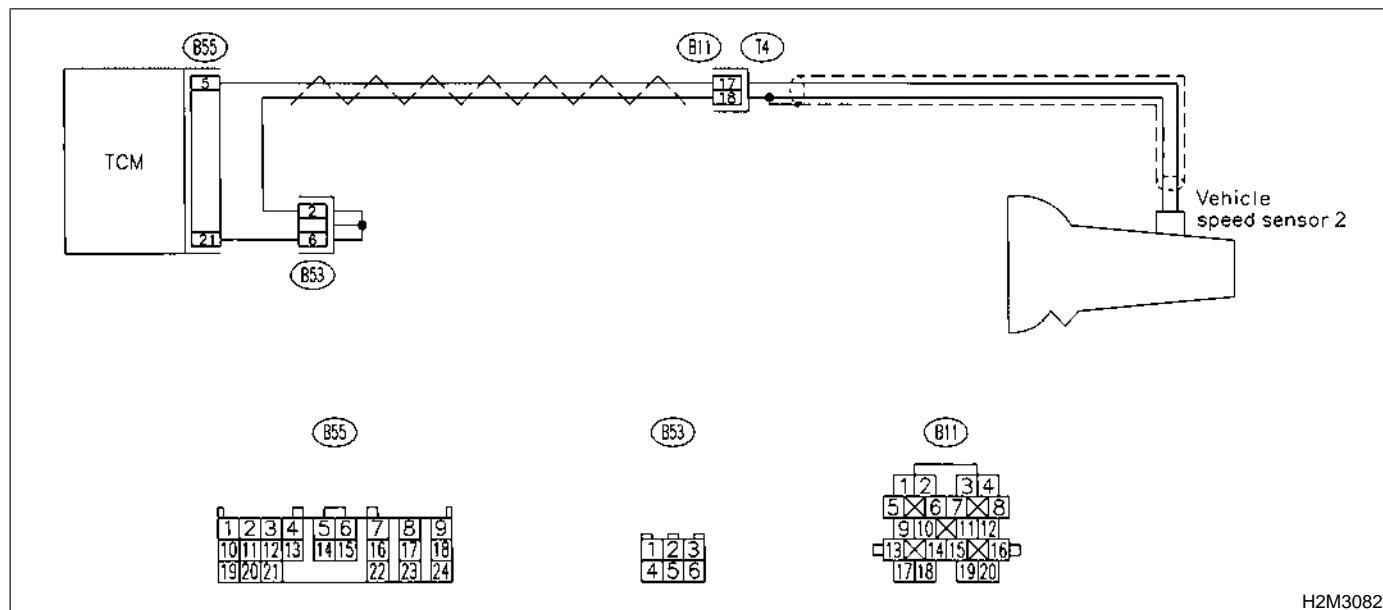
● TROUBLE SYMPTOM:

- No shift or excessive tight corner “braking”

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

● WIRING DIAGRAM:



10BC1 : CHECK DTC P0720 ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0720?

YES : Check vehicle speed sensor 2 circuit.
<Ref. to 3-2 [T8G0].>

NO : It is not necessary to inspect DTC P0720.

BD: DTC P0725 — ENGINE SPEED INPUT CIRCUIT MALFUNCTION —**• DTC DETECTING CONDITION:**

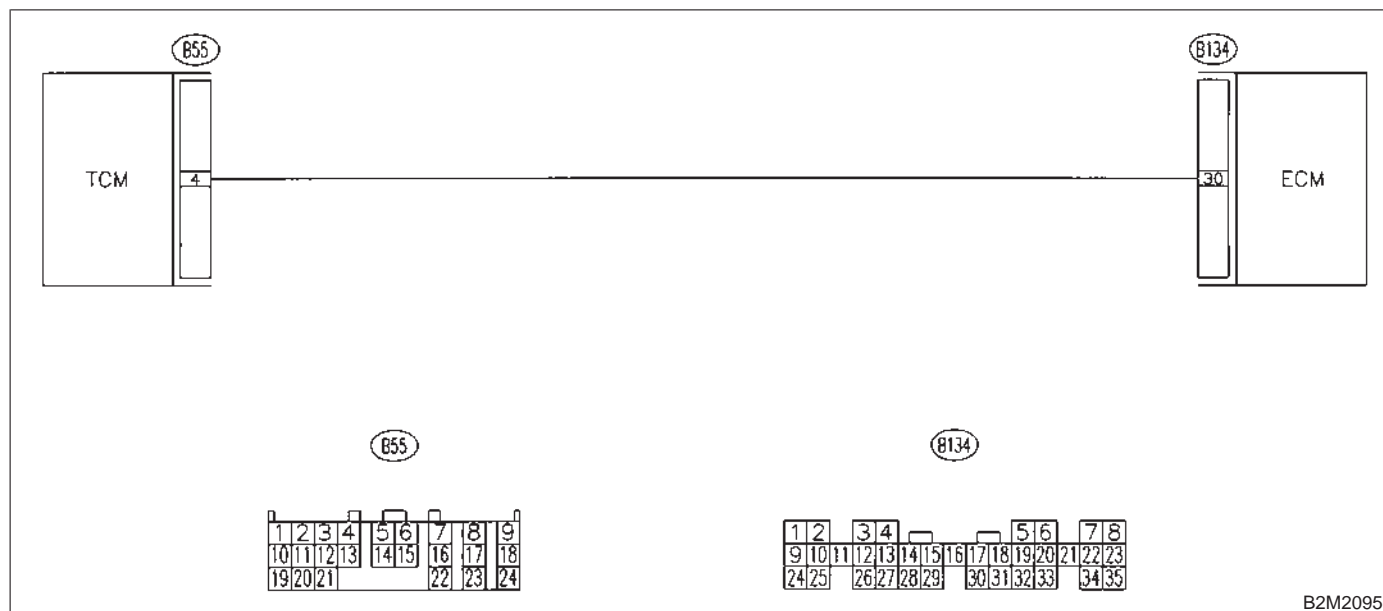
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- No lock-up (after engine warm-up)
- AT diagnostic indicator light (AT OIL TEMP indicator light) remains on when vehicle speed is "0".

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:**10BD1 : CHECK DTC P0725 ON DISPLAY.**

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0725?

YES : Check engine speed input signal circuit. <Ref. to 3-2 [T8C0].>

NO : It is not necessary to inspect DTC P0725.

BE: DTC P0731 — GEAR 1 INCORRECT RATIO —**NOTE:**

For the diagnostic procedure, refer to 2-7 [T10BH0]. <Ref. to 2-7 [T10BH0].>

BF: DTC P0732 — GEAR 2 INCORRECT RATIO —**NOTE:**

For the diagnostic procedure, refer to 2-7 [T10BH0]. <Ref. to 2-7 [T10BH0].>

BG: DTC P0733 — GEAR 3 INCORRECT RATIO —**NOTE:**

For the diagnostic procedure, refer to 2-7 [T10BH0]. <Ref. to 2-7 [T10BH0].>

BH: DTC P0734 — GEAR 4 INCORRECT RATIO —**● DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

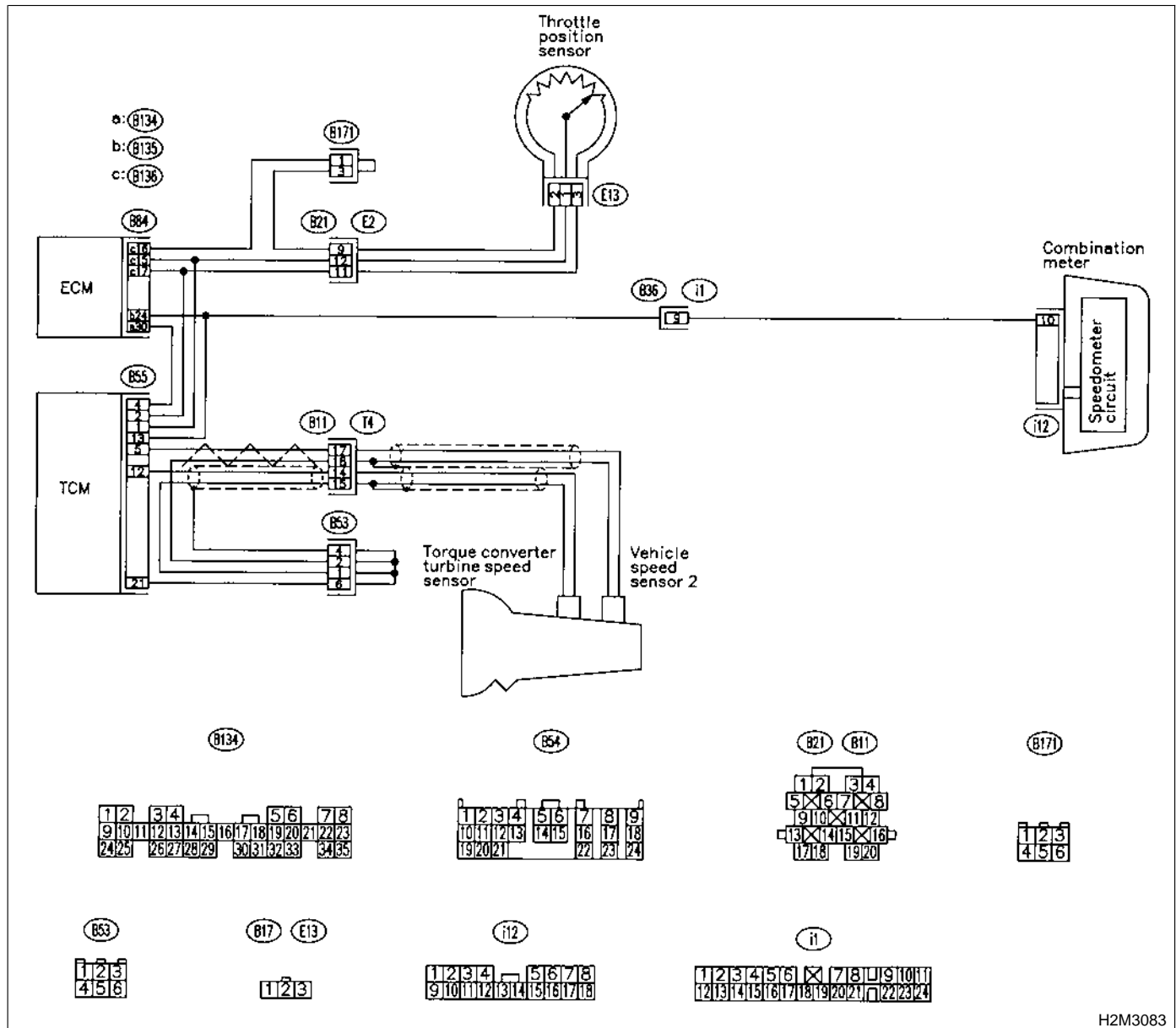
● TROUBLE SYMPTOM:

- Shift point too high or too low; engine brake not effected in “3” range; excessive shift shock; excessive tight corner “braking”

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

● WIRING DIAGRAM:



H2M3083

10BH1 : CHECK ANY OTHER DTC ON DISPLAY.

- CHECK** : *Is there any other DTC on display?*
- YES** : Inspect relevant DTC using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>
- NO** : Go to step **10BH2**.

10BH2 : CHECK THROTTLE POSITION SENSOR CIRCUIT.

Check throttle position sensor circuit. <Ref. to 3-2 [T8F0].>

- CHECK** : *Is there any trouble in throttle position sensor circuit?*
- YES** : Repair or replace throttle position sensor circuit.
- NO** : Go to step **10BH3**.

**10BH3 : CHECK VEHICLE SPEED SENSOR
2 CIRCUIT.**

Check vehicle speed sensor 2 circuit. <Ref. to 3-2 [T8G0].>

- CHECK** : *Is there any trouble in vehicle speed sensor 2 circuit?*
- YES** : Repair or replace vehicle speed sensor 2 circuit.
- NO** : Go to step **10BH4**.

**10BH4 : CHECK TORQUE CONVERTER
TURBINE SPEED SENSOR CIR-
CUIT.**

Check torque converter turbine speed sensor circuit. <Ref. to 3-2 [T8H0].>

- CHECK** : *Is there any trouble in torque converter turbine speed sensor circuit?*
- YES** : Repair or replace torque converter turbine speed sensor circuit.
- NO** : Go to step **10BH5**.

10BH5 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : *Is there poor contact in TCM connector?*
- YES** : Repair poor contact in TCM connector.
- NO** : Go to step **10BH6**.

10BH6 : CHECK MECHANICAL TROUBLE.

Check mechanical trouble in automatic transmission.

- CHECK** : *Is there any mechanical trouble in automatic transmission?*
- YES** : Repair or replace automatic transmission. <Ref. to 3-2 [T1000].>
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

MEMO:

BI: DTC P0740 — TORQUE CONVERTER CLUTCH SYSTEM MALFUNCTION**• DTC DETECTING CONDITION:**

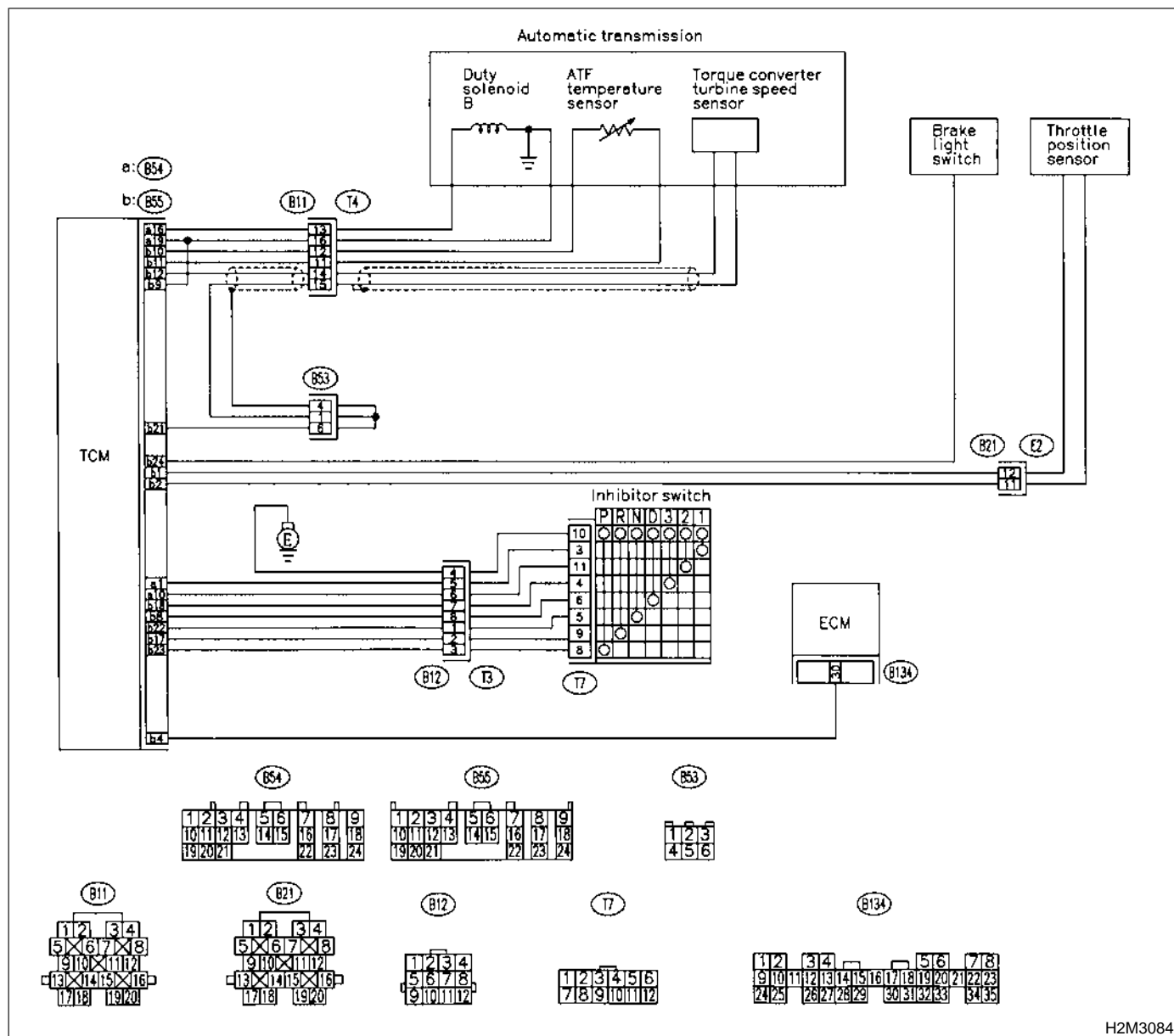
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- No lock-up (after engine warm-up)
- No shift or excessive tight corner "braking"

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3084

10BI1 : CHECK ANY OTHER DTC ON DISPLAY.

- CHECK** : *Is there any other DTC on display?*
- YES** : Inspect the relevant DTC using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>
- NO** : Go to step **10BI2**.

10BI2 : CHECK DUTY SOLENOID B CIRCUIT.

Check duty solenoid B circuit. <Ref. to 3-2 [T8Q0].>

- CHECK** : *Is there any trouble in duty solenoid B circuit?*
- YES** : Repair or replace duty solenoid B circuit.
- NO** : Go to step **10BI3**.

10BI3 : CHECK THROTTLE POSITION SENSOR CIRCUIT.

Check throttle position sensor circuit. <Ref. to 3-2 [T8F0].>

- CHECK** : *Is there any trouble in throttle position sensor circuit?*
- YES** : Repair or replace throttle position sensor circuit.
- NO** : Go to step **10BI4**.

10BI4 : CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT.

Check torque converter turbine speed sensor circuit. <Ref. to 3-2 [T8H0].>

- CHECK** : *Is there any trouble in torque converter turbine speed sensor circuit?*
- YES** : Repair or replace torque converter turbine speed sensor circuit.
- NO** : Go to step **10BI5**.

10BI5 : CHECK INHIBITOR SWITCH CIRCUIT.

Check inhibitor switch circuit. <Ref. to 2-7 [T10AZ0].>

- CHECK** : *Is there any trouble in inhibitor switch circuit?*
- YES** : Repair or replace inhibitor switch circuit.
- NO** : Go to step **10BI6**.

10BI6 : CHECK BRAKE LIGHT SWITCH CIRCUIT.

Check brake light switch circuit. <Ref. to 2-7 [T10AY0].>

- CHECK** : *Is there any trouble in brake light switch circuit?*
- YES** : Repair or replace brake light switch circuit.
- NO** : Go to step **10BI7**.

10BI7 : CHECK ATF TEMPERATURE SENSOR CIRCUIT.

Check ATF temperature sensor circuit. <Ref. to 3-2 [T8E0].>

- CHECK** : *Is there any trouble in ATF temperature sensor circuit?*
- YES** : Repair or replace ATF temperature sensor circuit.
- NO** : Go to step **10BI8**.

10BI8 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : *Is there poor contact in TCM connector?*
- YES** : Repair poor contact in TCM connector.
- NO** : Go to step **10BI9**.

10BI9 : CHECK MECHANICAL TROUBLE.

Check mechanical trouble in automatic transmission.

CHECK : *Is there any mechanical trouble in automatic transmission?*

YES : Repair or replace automatic transmission. <Ref. to 3-2 [T1000].>

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

BJ: DTC P0743 — TORQUE CONVERTER CLUTCH SYSTEM (DUTY SOLENOID B) ELECTRICAL —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

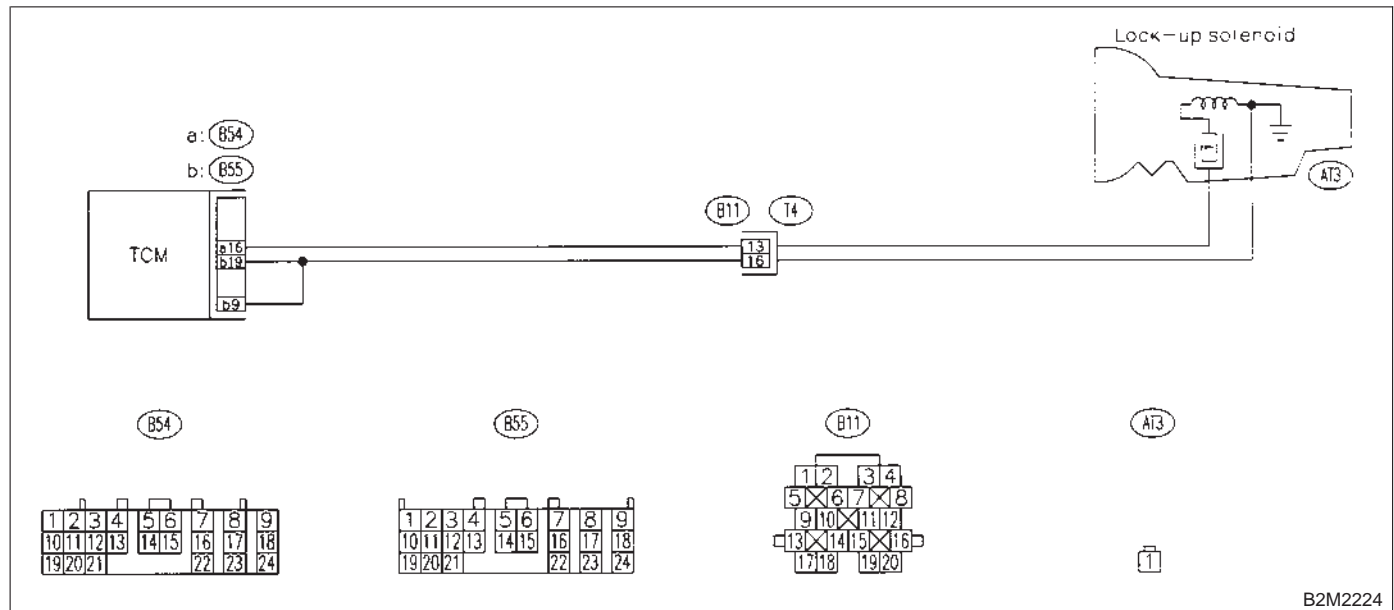
• TROUBLE SYMPTOM:

- No lock-up (after engine warm-up)

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:



B2M2224

10BJ1 : CHECK DTC P0743 ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0743?

YES : Check duty solenoid B circuit. <Ref. to 3-2 [T8Q0].>

NO : It is not necessary to inspect DTC P0743.

BK: DTC P0748 — PRESSURE CONTROL SOLENOID (DUTY SOLENOID A) ELECTRICAL —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

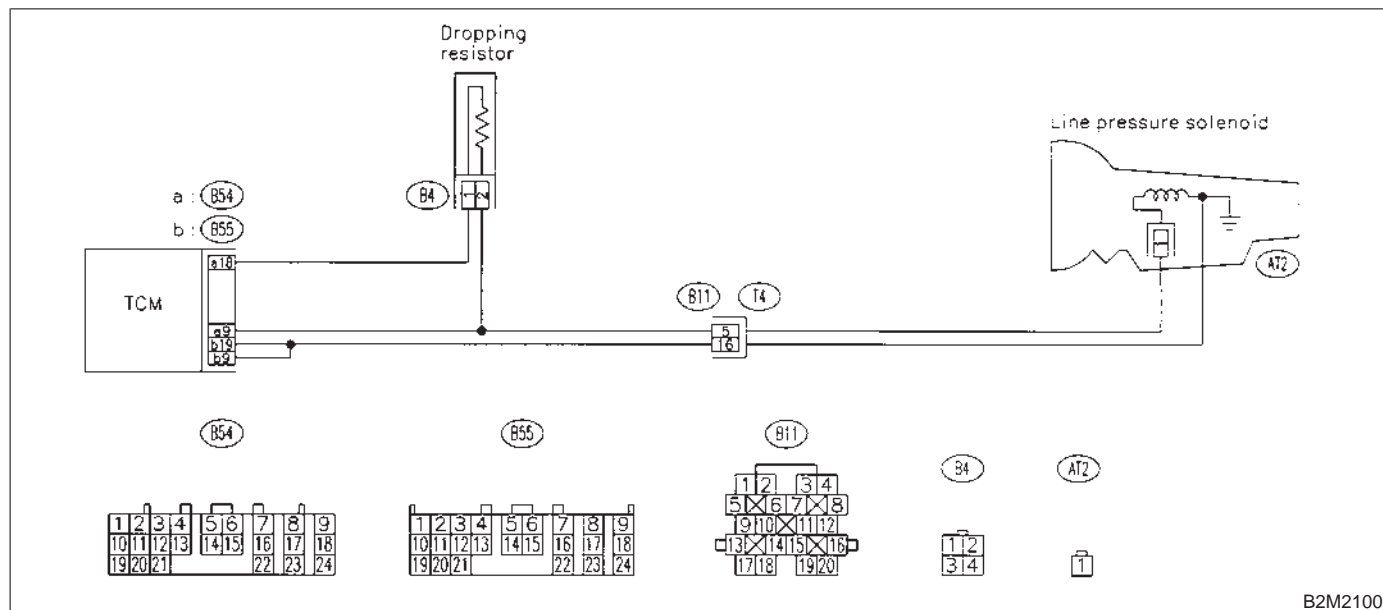
• TROUBLE SYMPTOM:

- Excessive shift shock

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



BL: DTC P0753 — SHIFT SOLENOID A (SHIFT SOLENOID 1) ELECTRICAL —**• DTC DETECTING CONDITION:**

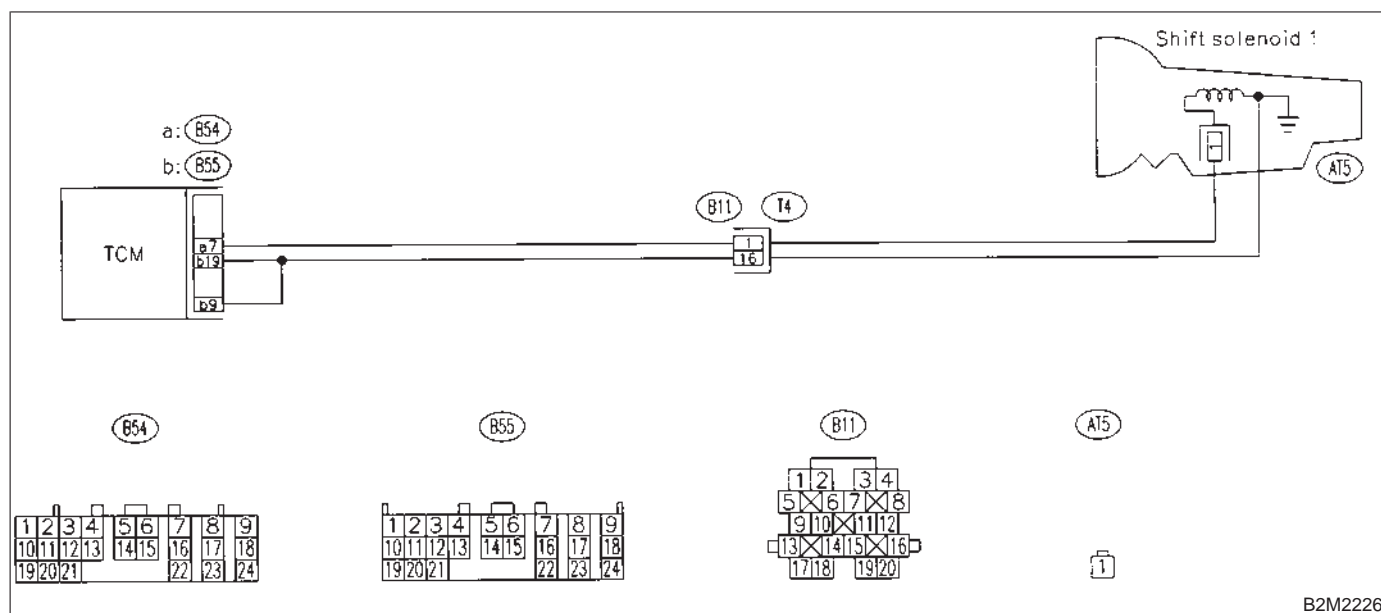
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- No shift

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:**10BL1 : CHECK DTC P0753 ON DISPLAY.**

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0753?

YES : Check shift solenoid 1 circuit. <Ref. to 3-2 [T8K0].>

NO : It is not necessary to inspect DTC P0753.

BM: DTC P0758 — SHIFT SOLENOID B (SHIFT SOLENOID 2) ELECTRICAL**• DTC DETECTING CONDITION:**

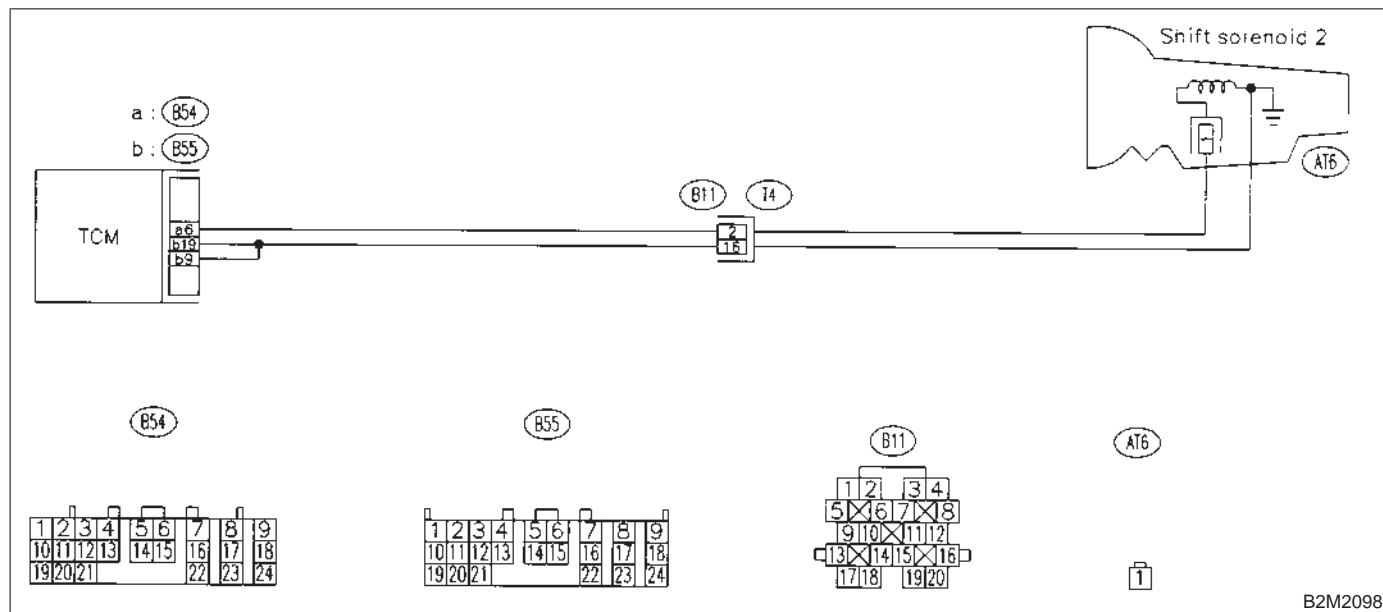
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- No shift

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

B2M2098

10BM1 : CHECK DTC P0758 ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0758?

YES : Check shift solenoid 2 circuit. <Ref. to 3-2 [T8L0].>

NO : It is not necessary to inspect DTC P0758.

BN: DTC P1100 — STARTER SWITCH CIRCUIT LOW INPUT —**• DTC DETECTING CONDITION:**

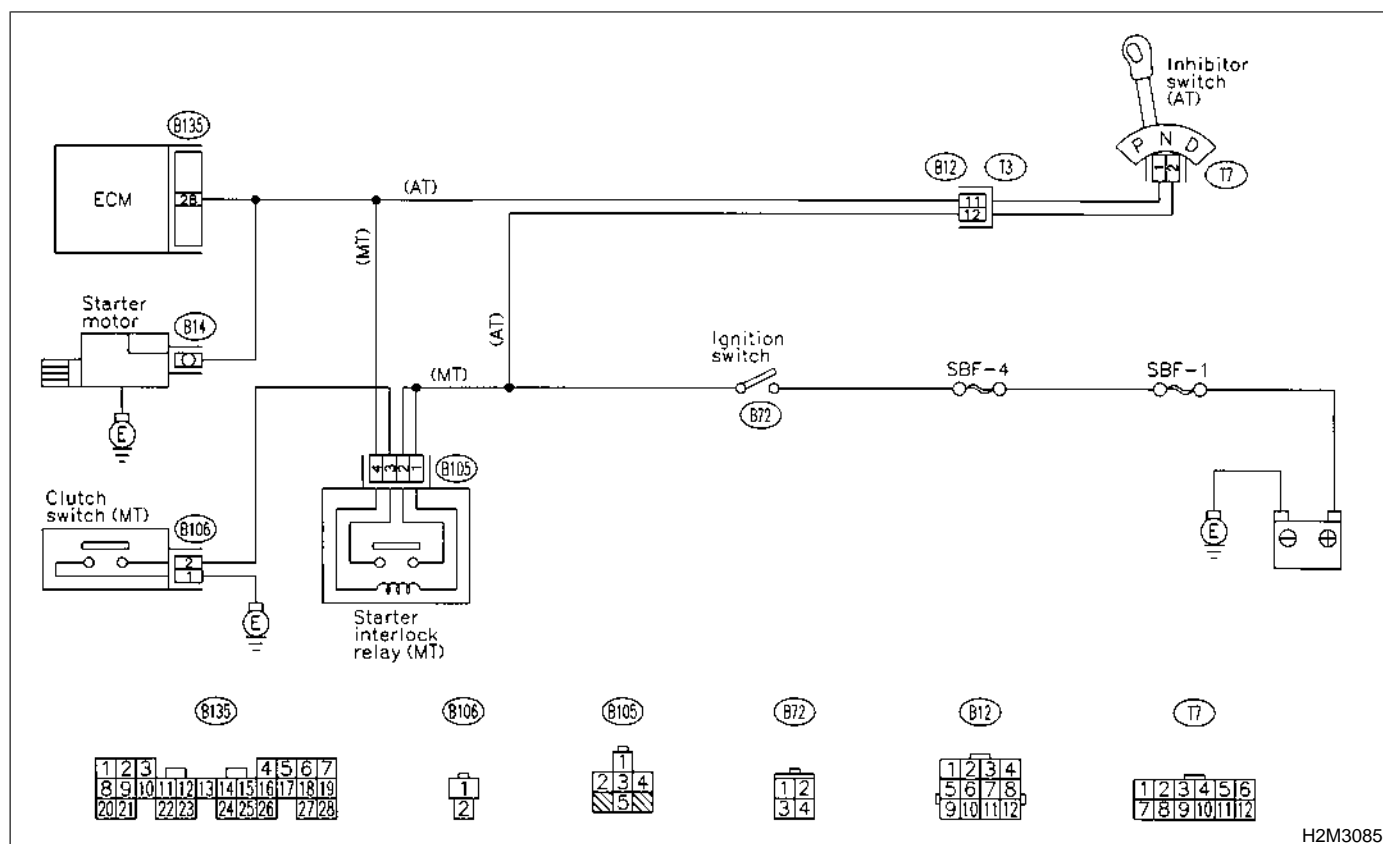
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3085

10BN1 : CHECK OPERATION OF STARTER MOTOR.**NOTE:**

- On AT vehicles, place the inhibitor switch in the "P" or "N" position.
- On MT vehicles, depress the clutch pedal.

CHECK : *Does starter motor operate when ignition switch to "ST"?*

YES : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open or ground short circuit in harness between ECM and starter motor connector.
- Poor contact in ECM connector.

NO : Check starter motor circuit. <Ref. to 2-7 [T8B0].>

BO: DTC P1101 — NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT [MT VEHICLES] —**• DTC DETECTING CONDITION:**

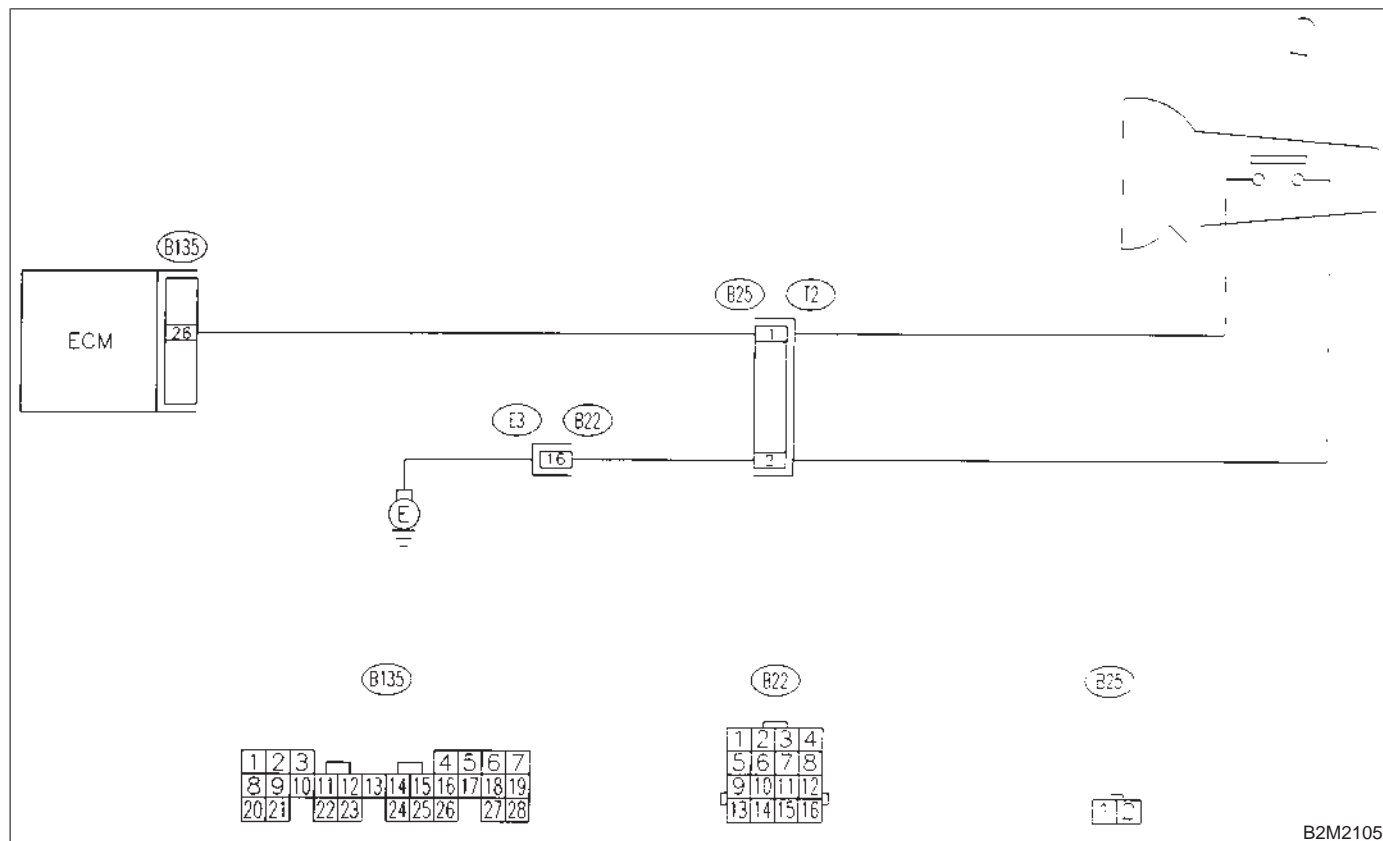
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

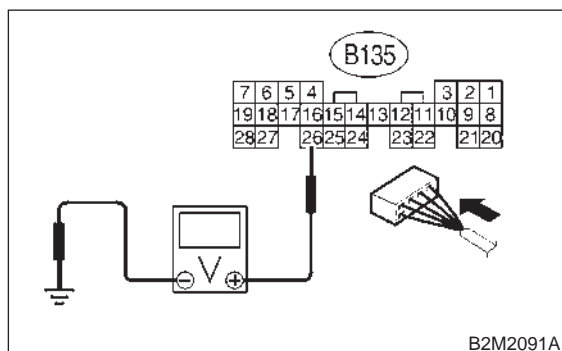
B2M2105

10B01 : CHECK INPUT SIGNAL FOR ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 26 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 10 V in neutral position?**

YES : Go to step 10B02.

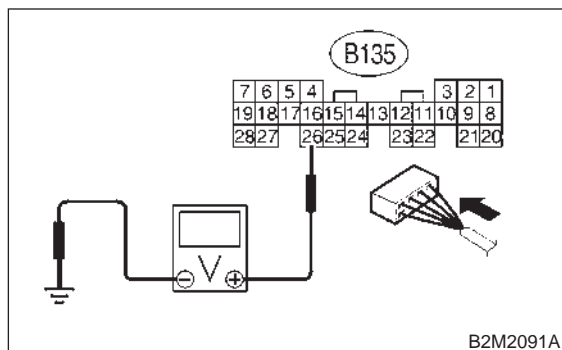
NO : Go to step 10B04.

10B02 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 26 (+) — Chassis ground (-):



CHECK : **Is the voltage less than 1 V in other positions?**

YES : Go to step 10B03.

NO : Go to step 10B04.

10B03 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in ECM connector?**

YES : Repair poor contact in ECM connector.

NO : Contact with SOA service.

NOTE:

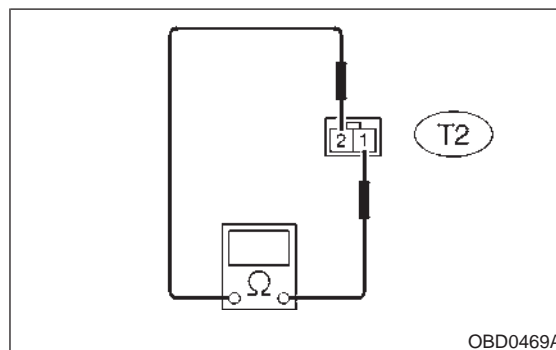
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10B04 : CHECK NEUTRAL POSITION SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission harness.
- 3) Measure resistance between transmission harness and connector terminals.

Connector & terminal

(T2) No. 1 — No. 2:



CHECK : **Is the resistance more than 1 MΩ in neutral position?**

YES : Go to step 10B05.

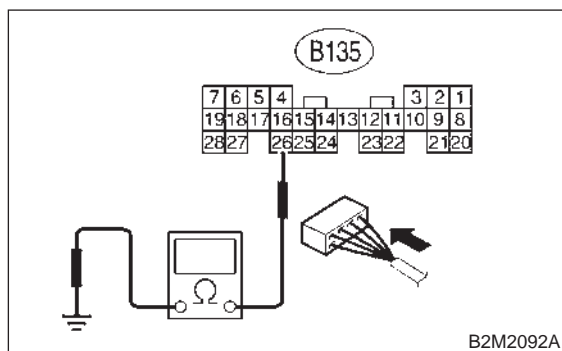
NO : Repair short circuit in transmission harness or replace neutral position switch.

10B05 : CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.

Measure resistance between ECM and chassis ground.

Connector & terminal

(B135) No. 26 — Chassis ground:



CHECK : **Is the resistance less than 10 Ω?**

YES : Repair ground short circuit in harness between ECM and transmission harness connector.

NO : Go to step **10B06**.

10B06 : CHECK POOR CONTACT.

Check poor contact in transmission harness connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in transmission harness connector?**

YES : Repair poor contact in transmission harness connector.

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

MEMO:

BP: DTC P1101 — NEUTRAL POSITION SWITCH CIRCUIT HIGH INPUT [AT VEHICLES] —● **DTC DETECTING CONDITION:**

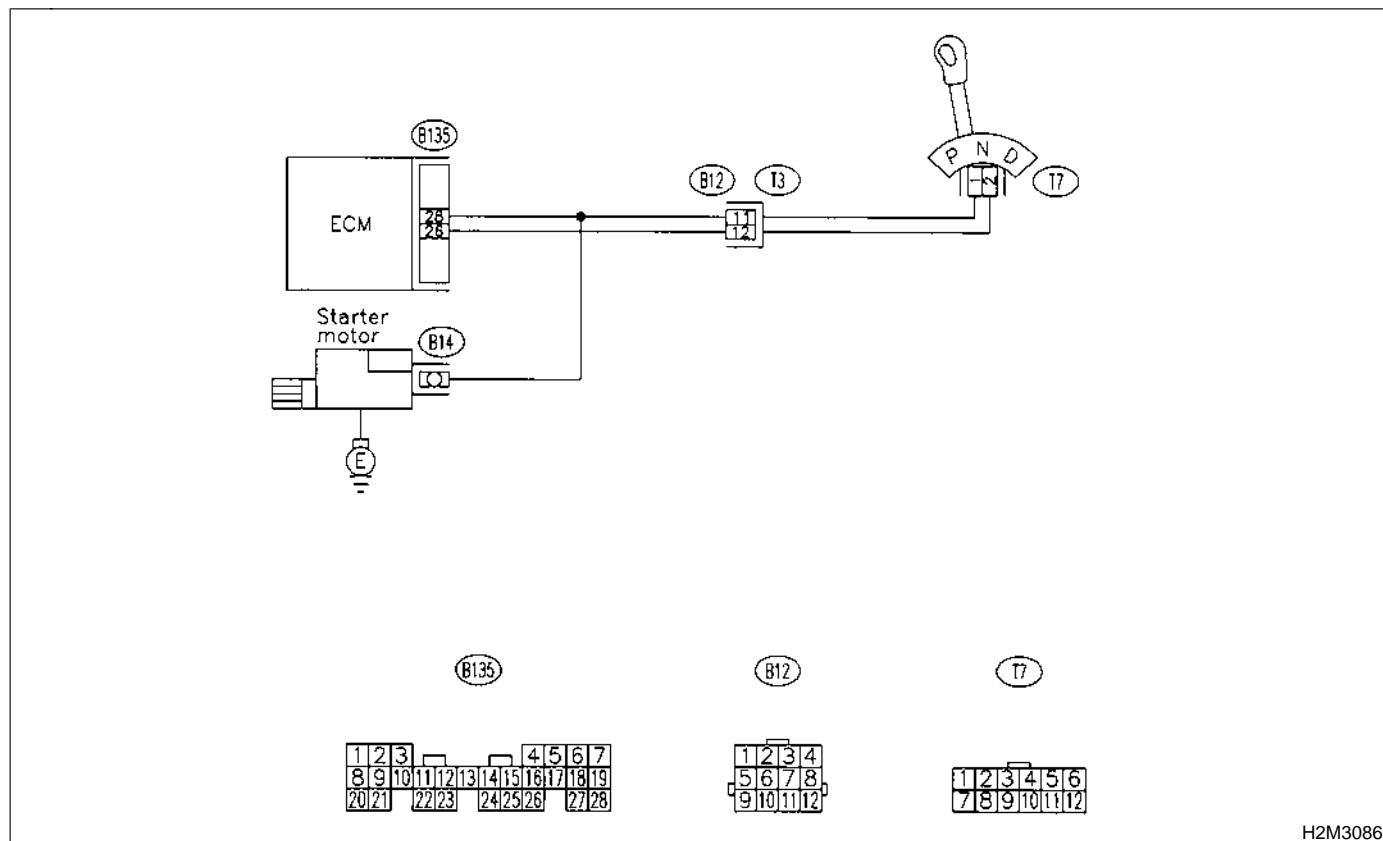
- Two consecutive driving cycles with fault

● **TROUBLE SYMPTOM:**

- Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

● **WIRING DIAGRAM:**

H2M3086

10BP1 : CHECK DTC P0705 ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0705?

YES : Inspect DTC P0705 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

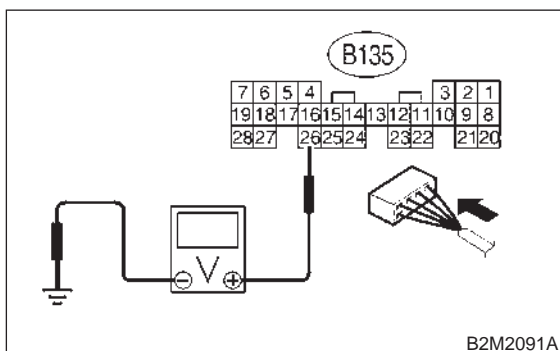
NO : Go to step **10BP2**.

10BP2 : CHECK INPUT SIGNAL FOR ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground in selector lever "N" and "P" positions.

Connector & terminal

(B135) No. 26 (+) — Chassis ground (-):



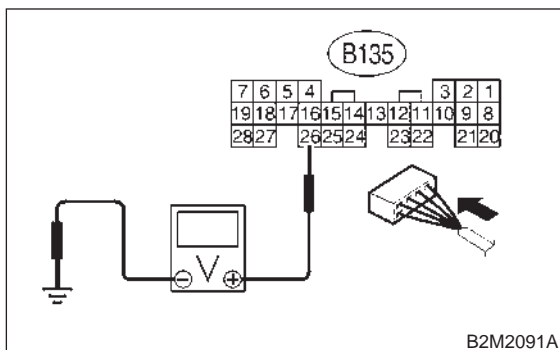
- CHECK** : Is the voltage less than 1 V?
- YES** : Go to step 10BP3.
- NO** : Go to step 10BP5.

10BP3 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground in selector lever except for "N" and "P" positions.

Connector & terminal

(B135) No. 26 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 10BP4.
- NO** : Go to step 10BP5.

10BP4 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : Is there poor contact in ECM connector?
- YES** : Repair poor contact in ECM connector.
- NO** : Contact with SOA service.

NOTE:

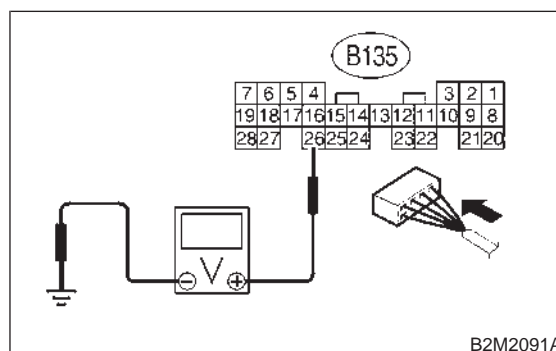
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10BP5 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

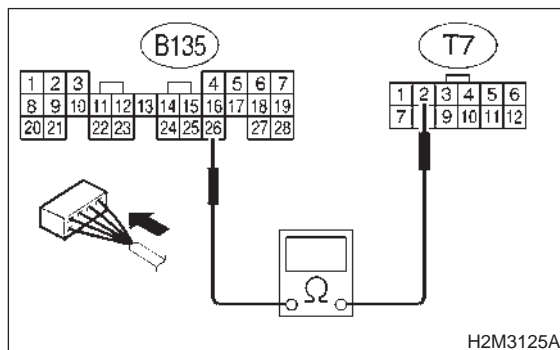
(B135) No. 26 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in harness between ECM and inhibitor switch connector.
- NO** : Go to step 10BP6.

10BP6 : CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from ECM and inhibitor switch.
- 3) Measure resistance of harness between ECM and inhibitor switch connector.

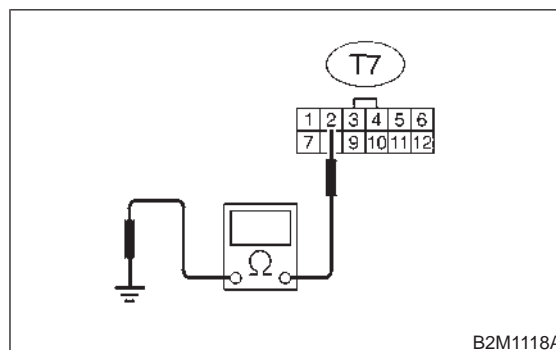
Connector & terminal
(B135) No. 26 — (T7) No. 2:

CHECK : Is the resistance less than 1 Ω ?
YES : Go to step 10BP7.
NO : Repair harness and connector.
NOTE:

In this case, repair the following:

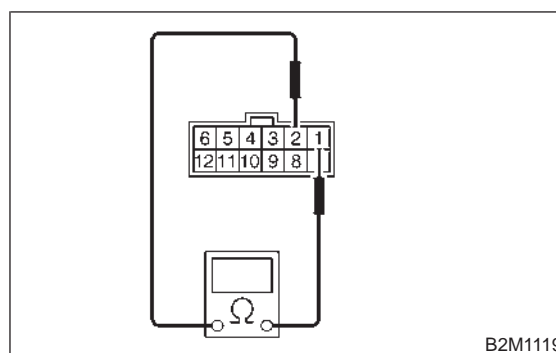
- Open circuit in harness between ECM and inhibitor switch connector
- Poor contact in coupling connector (B12)
- Poor contact in inhibitor switch connector
- Poor contact in ECM connector

10BP7 : CHECK INHIBITOR SWITCH GROUND LINE.

Measure resistance of harness between inhibitor switch connector and engine ground.

Connector & terminal
(T7) No. 2 — Engine ground:

CHECK : Is the resistance less than 5 Ω ?
YES : Go to step 10BP8.
NO : Repair open circuit in inhibitor switch ground line.
10BP8 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever "N" and "P" positions.

Terminals
No. 1 — No. 2:

CHECK : Is the resistance less than 1 Ω ?
YES : Go to step 10BP9.
NO : Replace inhibitor switch. <Ref. to 3-2 [W2C0].>

10BP9 : CHECK SELECTOR CABLE CONNECTION.

CHECK : *Is there any fault in selector cable connection to inhibitor switch?*

YES : Repair selector cable connection. <Ref. to 3-2 [W2A0].>

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

BQ: DTC P1103 — ENGINE TORQUE CONTROL SIGNAL 1 CIRCUIT MALFUNCTION —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

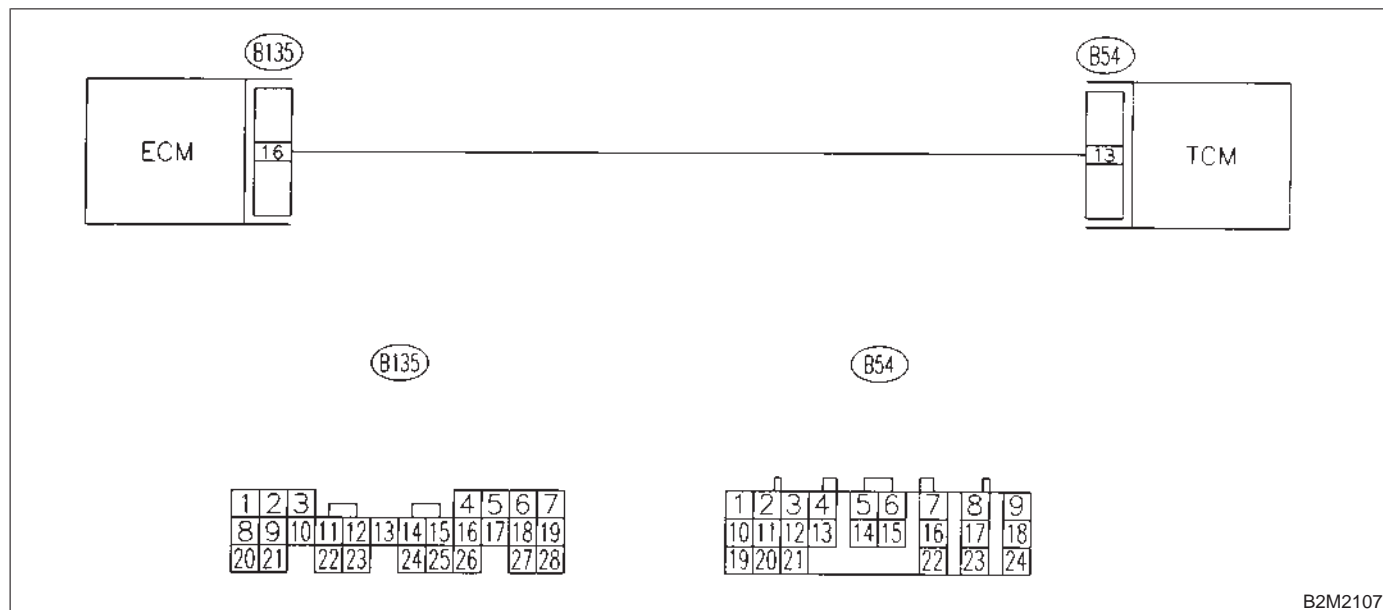
• TROUBLE SYMPTOM:

- Excessive shift shock

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



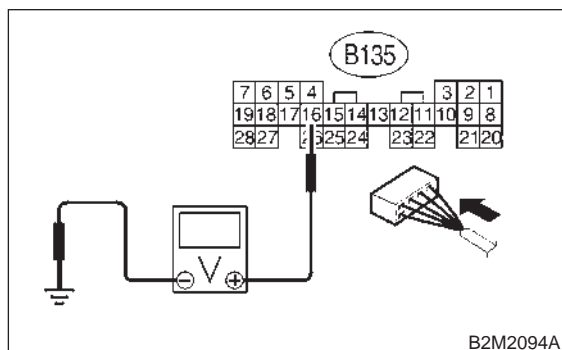
B2M2107

10BQ1 : CHECK INPUT SIGNAL FOR ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 16 (+) — Chassis ground (-):



B2M2094A

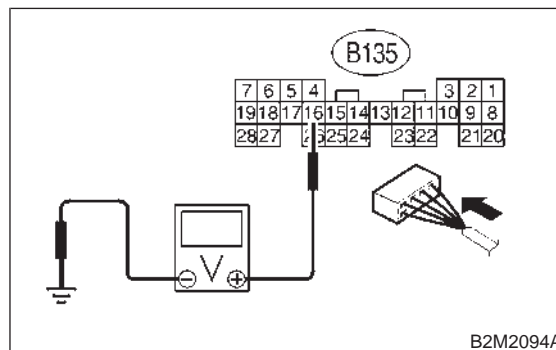
- CHECK** : Is the voltage more than 4.5 V?
- YES** : Go to step 10BQ2.
- NO** : Go to step 10BQ4.

10BQ2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 16 (+) — Chassis ground (-):



B2M2094A

- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in harness between ECM and TCM connector.
- NO** : Go to step 10BQ3.

10BQ3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

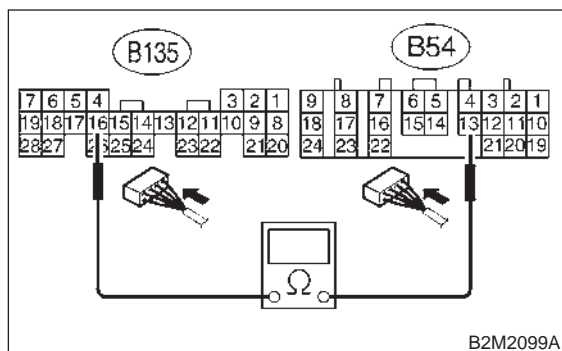
- CHECK** : *Is there poor contact in ECM connector?*
- YES** : Repair poor contact in ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

10BQ4 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from ECM and TCM.
- 3) Measure resistance of harness between ECM and TCM connector.

Connector & terminal

(B135) No. 16 — (B54) No. 13:



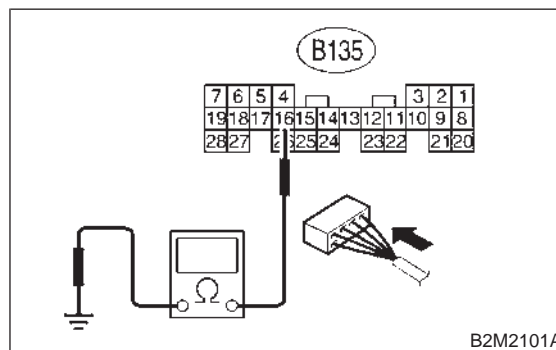
- CHECK** : *Is the resistance less than 1 Ω ?*
- YES** : Go to step 10BQ5.
- NO** : Repair open circuit in harness between ECM and TCM connector.

10BQ5 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B135) No. 16 — Chassis ground:



- CHECK** : *Is the resistance less than 10 Ω ?*
- YES** : Repair ground short circuit in harness between ECM and TCM connector.
- NO** : Go to step 10BQ6.

10BQ6 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : *Is there poor contact in TCM connector?*
- YES** : Repair poor contact in TCM connector.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

BR: DTC P1106 — ENGINE TORQUE CONTROL SIGNAL 2 CIRCUIT MALFUNCTION —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

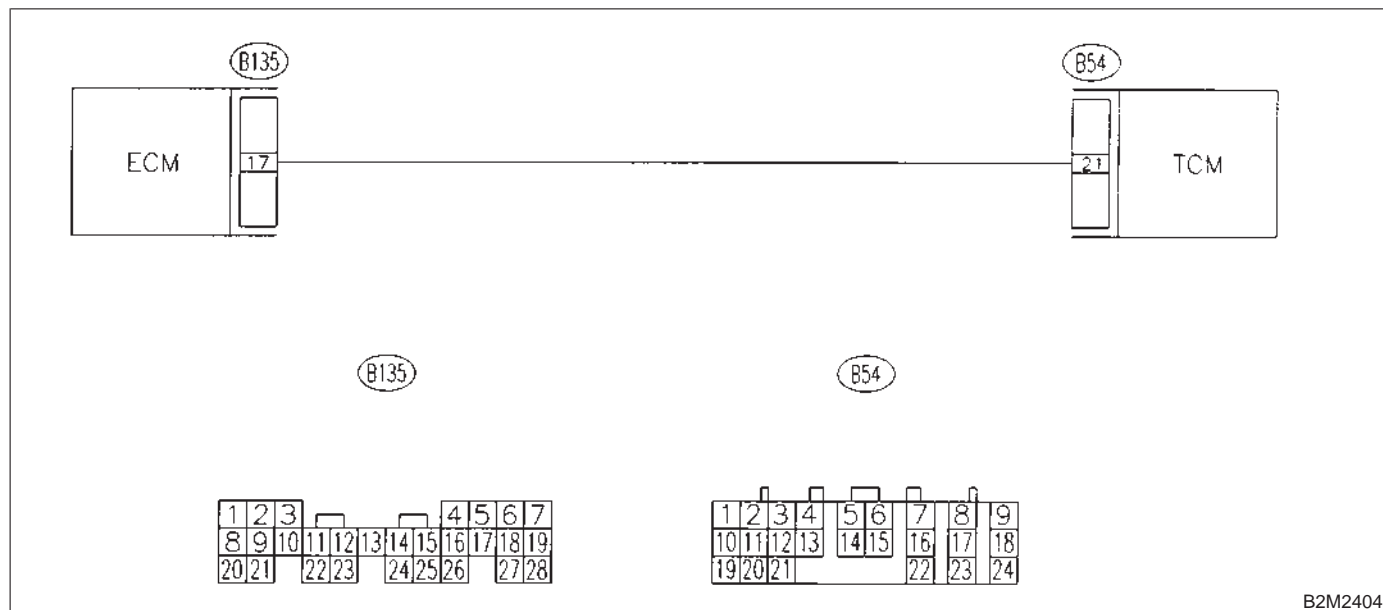
• TROUBLE SYMPTOM:

- Excessive shift shock

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:



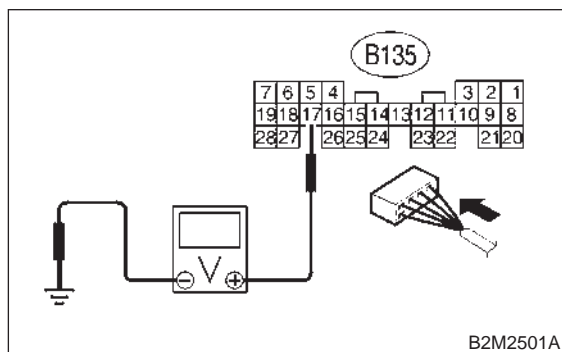
B2M2404

10BR1 : CHECK INPUT SIGNAL FOR ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 17 (+) — Chassis ground (-):



B2M2501A

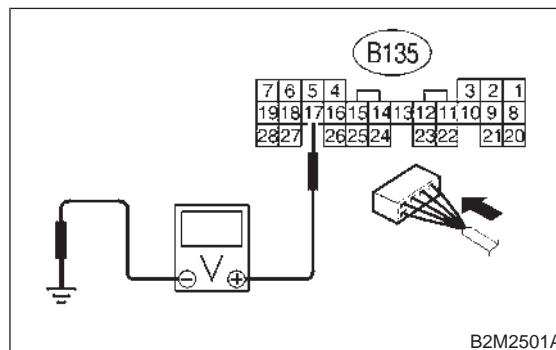
- CHECK** : Is the voltage more than 4.5 V?
- YES** : Go to step 10BR2.
- NO** : Go to step 10BR4.

10BR2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 17 (+) — Chassis ground (-):



B2M2501A

- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in harness between ECM and TCM connector.
- NO** : Go to step 10BR3.

10BR3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

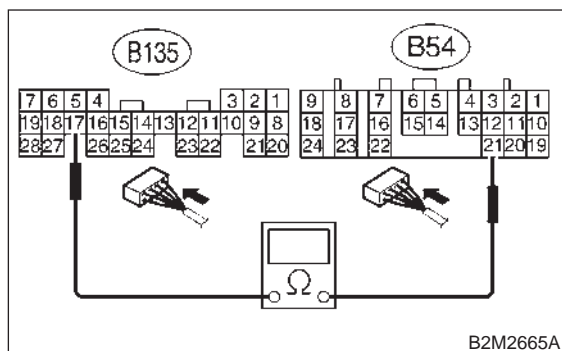
- CHECK** : *Is there poor contact in ECM connector?*
- YES** : Repair poor contact in ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

10BR4 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from ECM and TCM.
- 3) Measure resistance of harness between ECM and TCM connector.

Connector & terminal

(B135) No. 17 — (B54) No. 21:



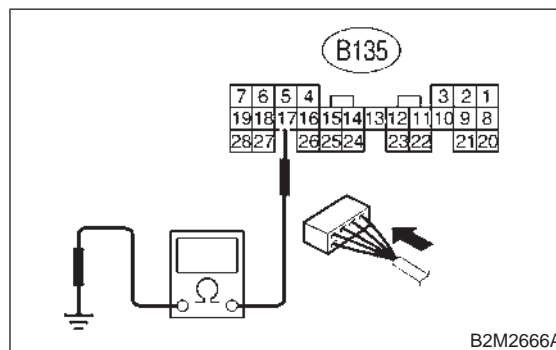
- CHECK** : *Is the resistance less than 1 Ω ?*
- YES** : Go to step 10BR5.
- NO** : Repair open circuit in harness between ECM and TCM connector.

10BR5 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B135) No. 17 — Chassis ground:



- CHECK** : *Is the resistance less than 10 Ω ?*
- YES** : Repair ground short circuit in harness between ECM and TCM connector.
- NO** : Go to step 10BR6.

10BR6 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

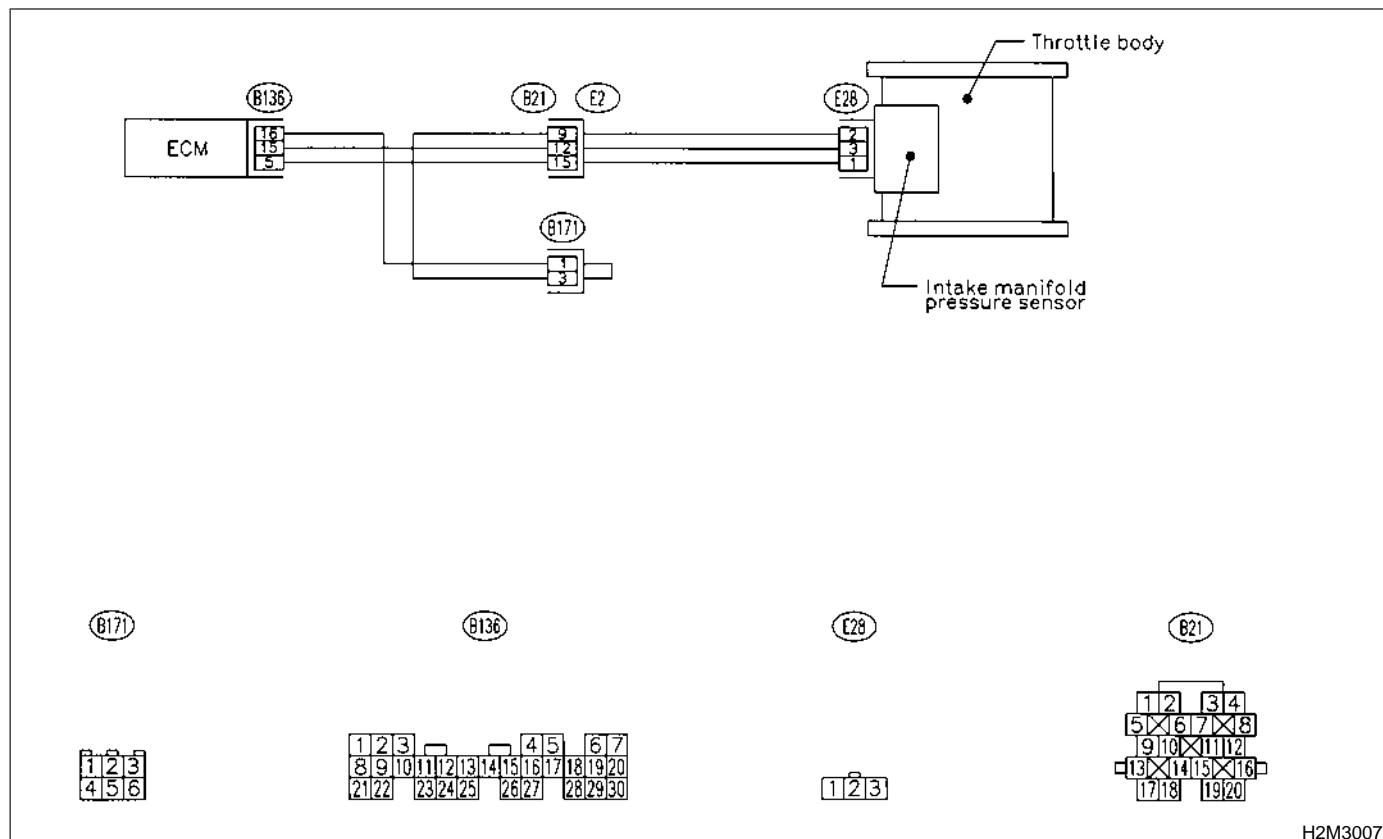
- CHECK** : *Is there poor contact in TCM connector?*
- YES** : Repair poor contact in TCM connector.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

BS: DTC P1110 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT LOW INPUT —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3007

10BS1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1110?

YES : Replace ECM. <Ref. to 2-7 [W15A0].>

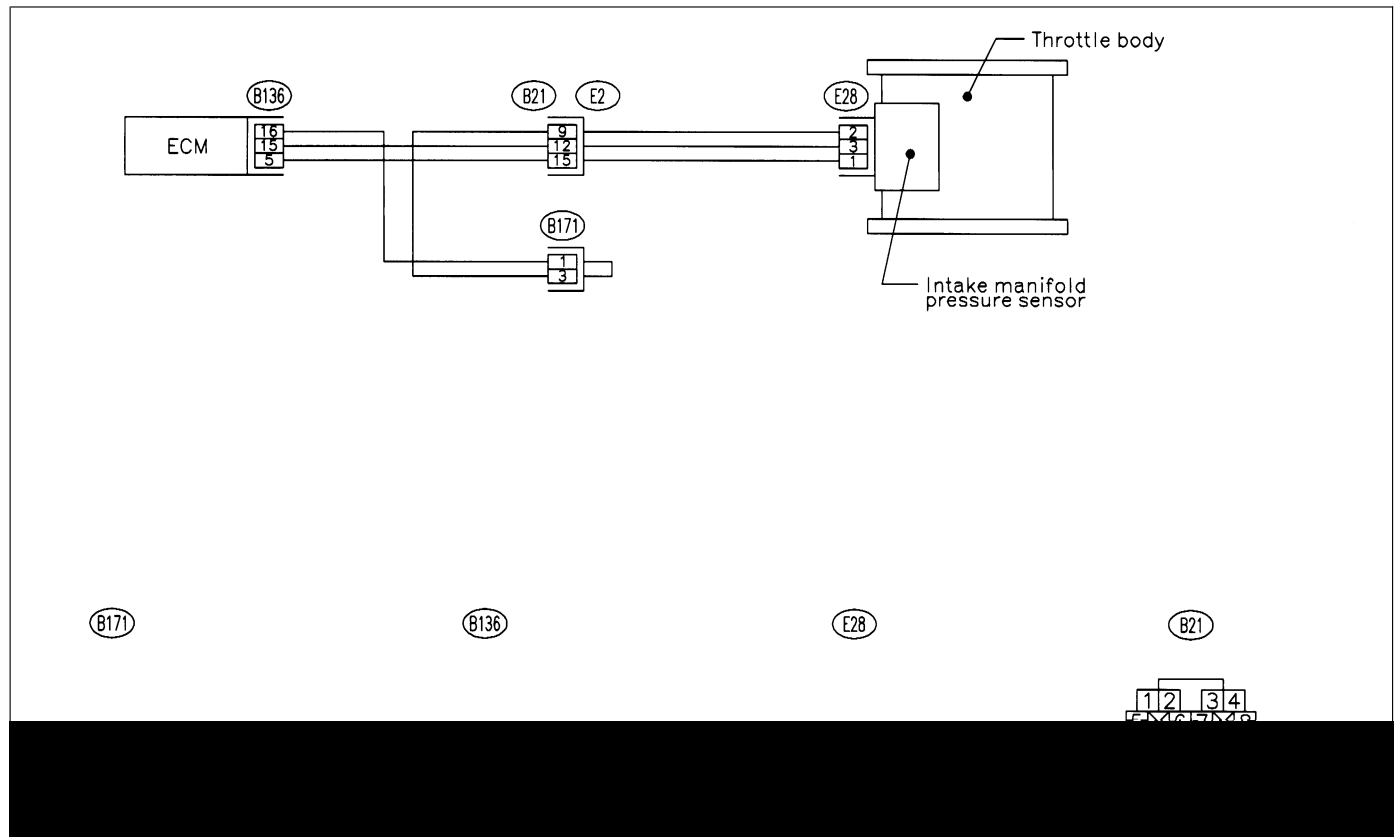
NO : It is not necessary to inspect DTC P1110.

BT: DTC P1111 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT HIGH INPUT —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

10BT1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1111?

YES : Replace ECM. <Ref. to 2-7 [W15A0].>

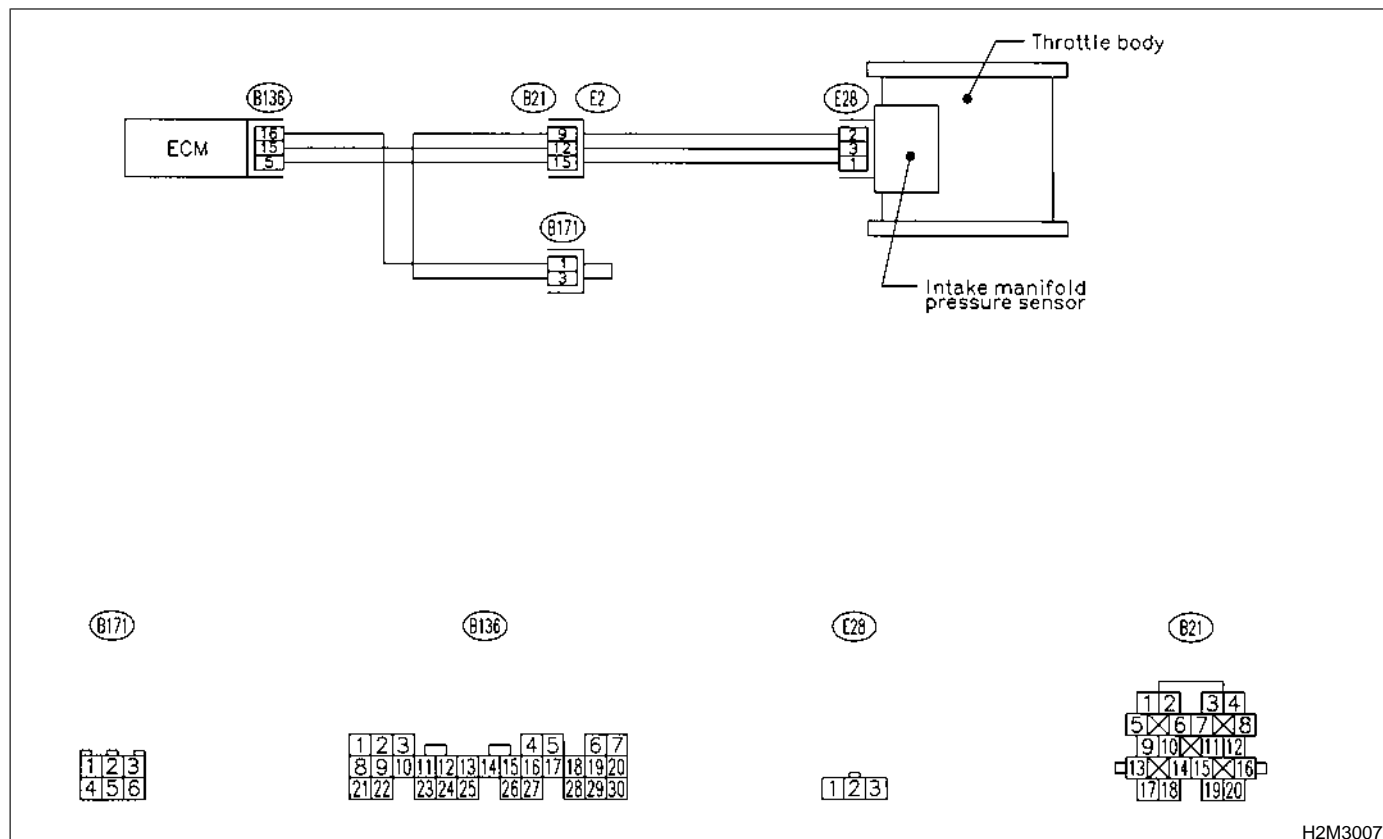
NO : It is not necessary to inspect DTC P1111.

BU: DTC P1112 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3007

10BU1 : CHECK ANY OTHER DTC ON DISPLAY.

- CHECK** : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0106, P0107, P0108, P1110 or P1111?
- YES** : Inspect DTC P0106, P0107, P0108, P1110 or P1111 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

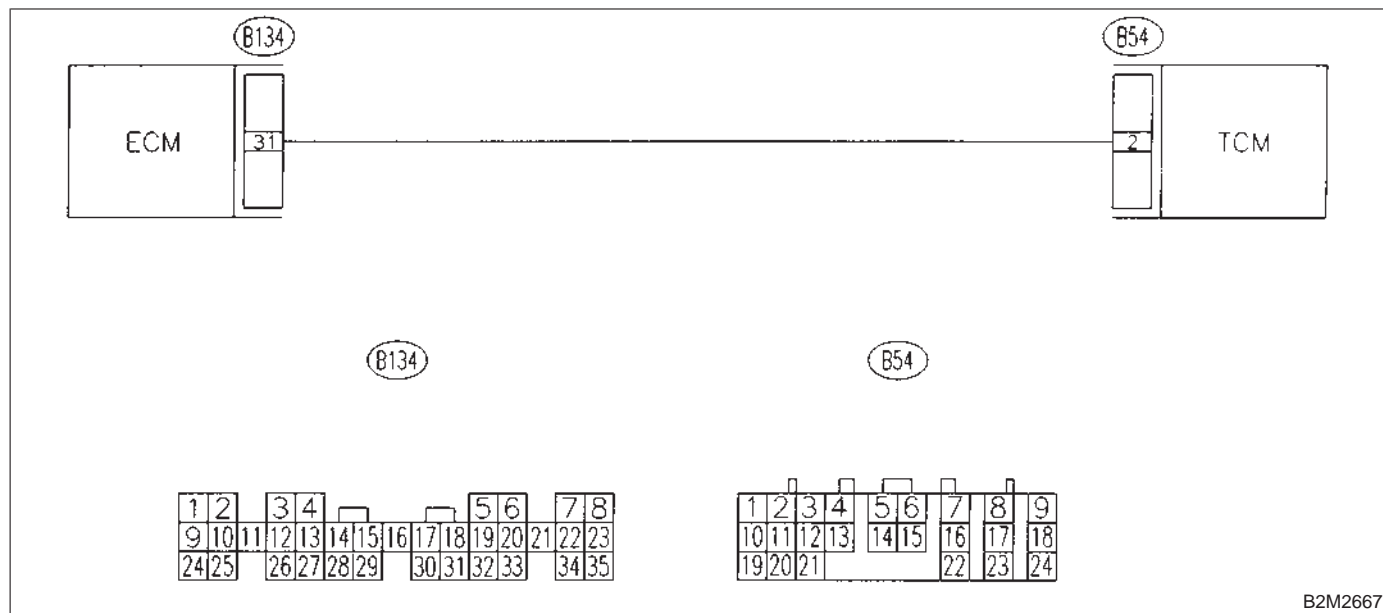
MEMO:

BV: DTC P1115 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT HIGH INPUT —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

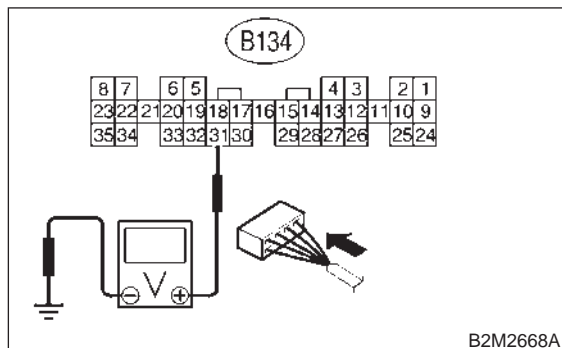
B2M2667

10BV1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Start engine, and warm-up the engine.
- 2) Turn ignition switch to OFF.
- 3) Disconnect connector from TCM.
- 4) Turn ignition switch to ON.
- 5) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 31 (+) — Chassis ground (-):



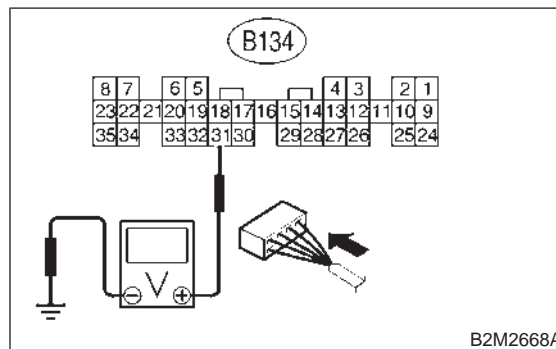
- CHECK** : Is the voltage less than 3 V?
- YES** : Go to step 10BV2.
- NO** : Repair battery short circuit in harness between ECM and TCM connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>

10BV2 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 31 (+) — Chassis ground (-):



- CHECK** : Does the voltage change more than 10 V by shaking harness and connector of ECM while monitoring the value with voltage meter?
- YES** : Repair battery short circuit in harness between ECM and TCM connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Contact with SOA service.

NOTE:

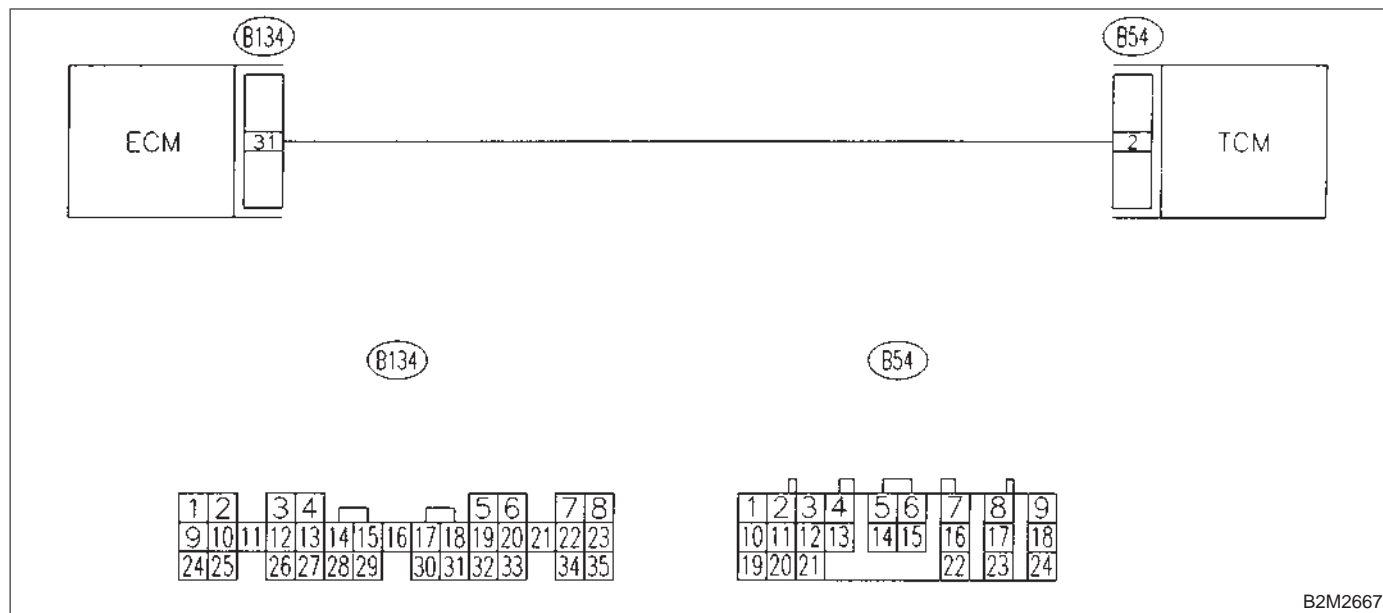
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

BW: DTC P1116 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT LOW INPUT —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

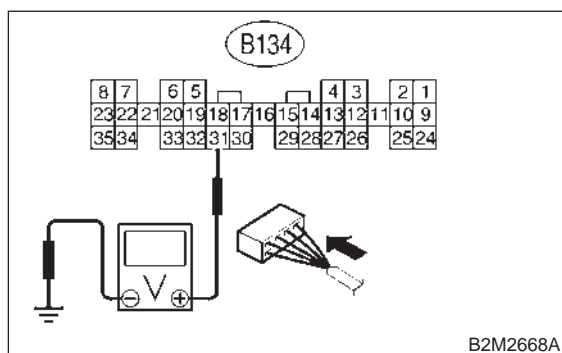
B2M2667

10BW1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Start engine, and warm-up the engine.
- 2) Turn ignition switch to OFF.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 31 (+) — Chassis ground (-):



B2M2668A

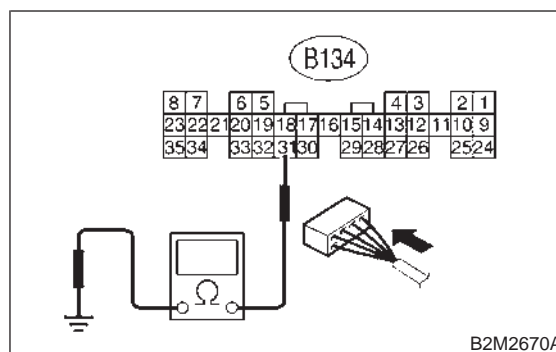
- CHECK** : Is the voltage more than 3 V?
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 10BW2.

10BW2 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from ECM and TCM.
- 3) Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B134) No. 31 — Chassis ground:



B2M2670A

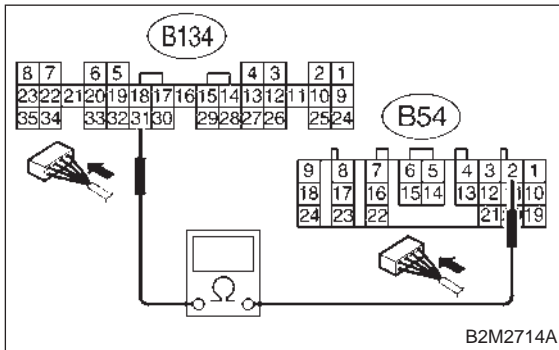
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in harness between ECM and TCM connector.
- NO** : Go to step 10BW3.

**10BW3 : CHECK HARNESS BETWEEN
ECM AND TCM CONNECTOR.**

Measure resistance of harness between ECM and TCM connector.

Connector & terminal

(B134) No. 31 — (B54) No. 2:



- CHECK** : **Is the resistance less than 1 Ω ?**
- YES** : Repair poor contact in ECM or TCM connector.
- NO** : Repair open circuit in harness between ECM and TCM connector.

BX: DTC P1120 — STARTER SWITCH CIRCUIT HIGH INPUT —**• DTC DETECTING CONDITION:**

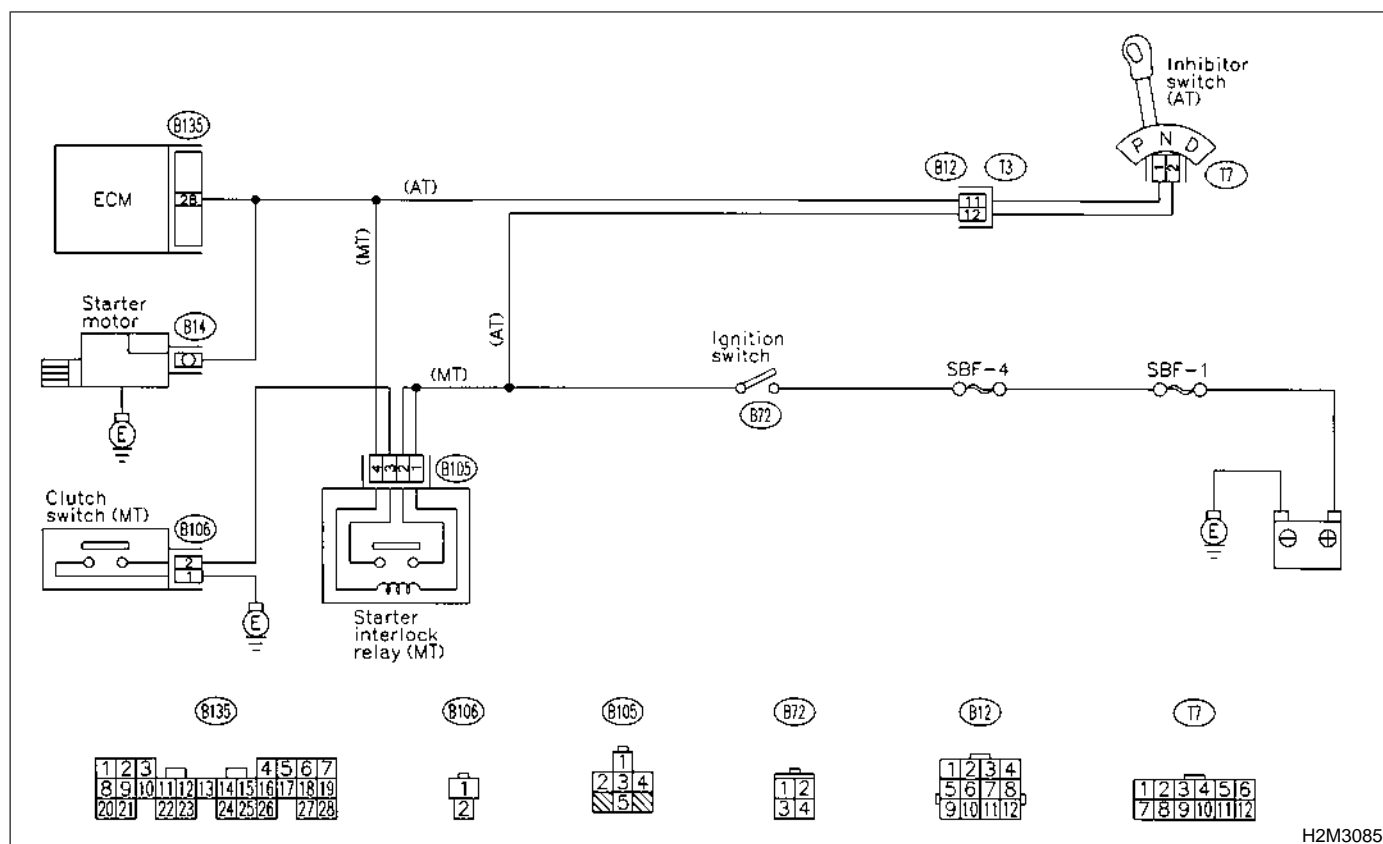
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3085

10BX1 : CHECK OPERATION OF STARTER MOTOR.**NOTE:**

- On AT vehicles, place the inhibitor switch in each position.
- On MT vehicles, depress or release the clutch pedal.

CHECK : *Does starter motor operate when ignition switch to "ON"?*

YES : Repair battery short circuit in starter motor circuit. After repair, replace ECM. <Ref. to 2-7 [W15A0].>

NO : Check starter motor circuit. <Ref. to 2-7 [T8B0].>

MEMO:

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - Erroneous idling

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

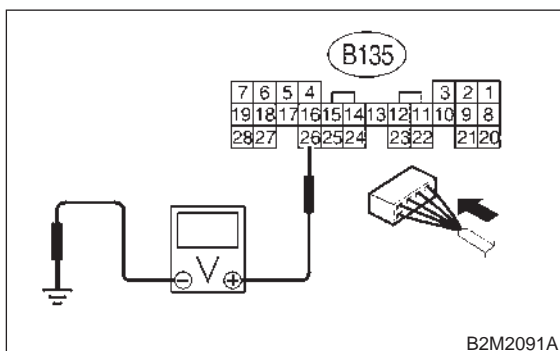
Wiring diagram for the ECM (Engine Control Module) showing connections to the battery, ground, and various sensors. The ECM is connected to the battery (+) through a fuse (B135) and to ground (-) through a fuse (B135). The ECM is also connected to a sensor (E3) through a fuse (B22). The ECM is connected to a sensor (B25) through a fuse (B25). The ECM is connected to a sensor (T2) through a fuse (B25). The ECM is connected to a sensor (B25) through a fuse (B25). The ECM is connected to a sensor (B25) through a fuse (B25).

10BY1 : CHECK INPUT SIGNAL FOR ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 26 (+) — Chassis ground (-):



CHECK : *Is the voltage more than 10 V in neutral position?*

YES : Go to step 10BY2.

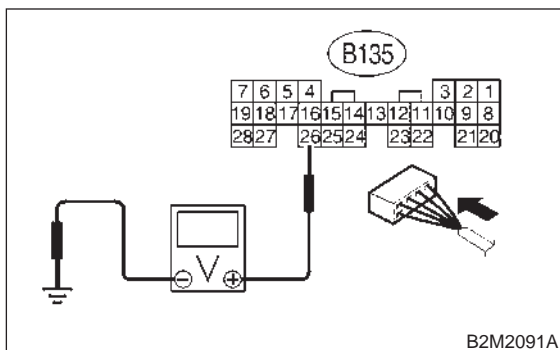
NO : Go to step 10BY4.

10BY2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 26 (+) — Chassis ground (-):



CHECK : *Is the voltage less than 1 V in other positions?*

YES : Go to step 10BY3.

NO : Go to step 10BY4.

10BY3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in ECM connector?*

YES : Repair poor contact in ECM connector.

NO : Contact with SOA service.

NOTE:

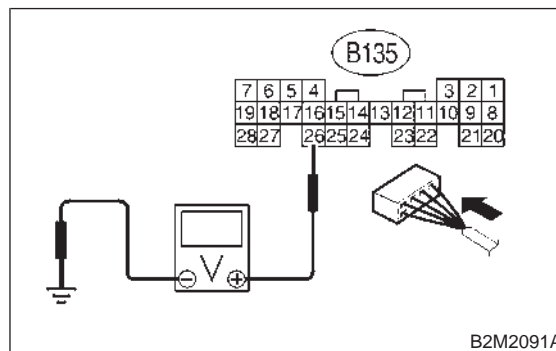
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10BY4 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 26 (+) — Chassis ground (-):



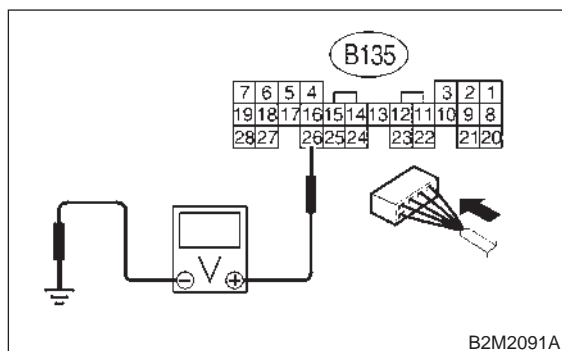
CHECK : *Is the voltage more than 10 V?*

YES : Repair battery short circuit in harness between ECM and transmission harness connector.

NO : Go to step 10BY5.

10BY5 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

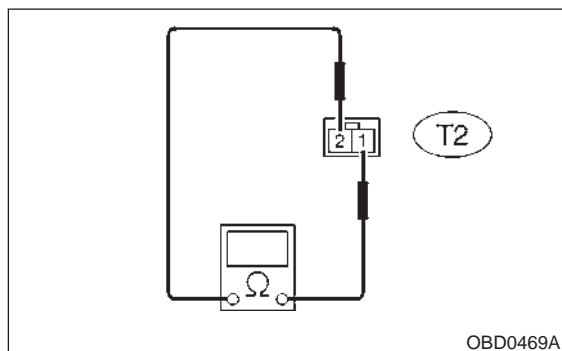
Connector & terminal**(B135) No. 26 (+) — Chassis ground (-):****CHECK** : **Is the voltage more than 10 V?**

YES : Repair battery short circuit in harness between ECM and transmission harness connector.

NO : Go to step **10BY6**.

10BY6 : CHECK NEUTRAL POSITION SWITCH.

Measure resistance between transmission harness connector terminals.

Connector & terminal**(T2) No. 1 — No. 2:**

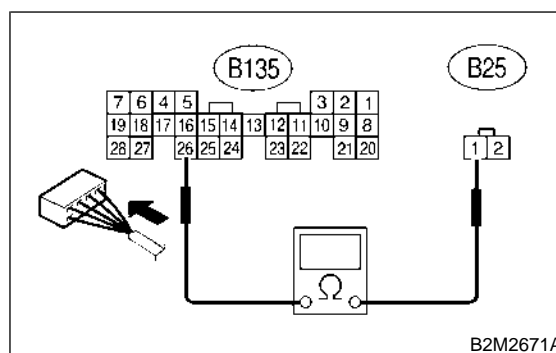
CHECK : **Is the resistance less than 1 Ω in other positions?**

YES : Go to step **10BY7**.

NO : Repair open circuit in transmission harness or replace neutral position switch.

10BY7 : CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.

- 1) Disconnect connector from ECM.
- 2) Measure resistance of harness between ECM and transmission harness connector.

Connector & terminal**(B135) No. 26 — (B25) No. 1:****CHECK** : **Is the resistance less than 1 Ω ?**

YES : Go to step **10BY8**.

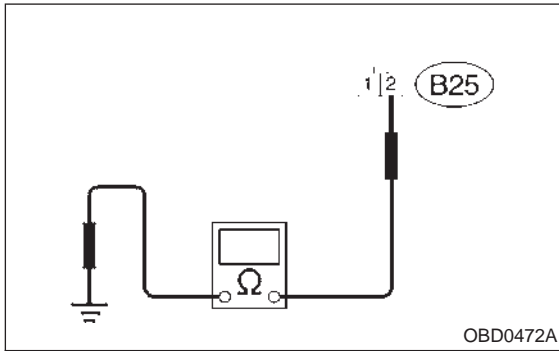
NO : Repair open circuit in harness between ECM and transmission harness connector.

10BY8 : CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.

Measure resistance of harness between transmission harness connector and engine ground.

Connector & terminal

(B25) No. 2 — Engine ground:



CHECK : **Is the resistance less than 5 Ω?**

YES : Go to step **10BY9**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between transmission harness connector and engine grounding terminal
- Poor contact in coupling connector (B22)

10BY9 : CHECK POOR CONTACT.

Check poor contact in transmission harness connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in transmission harness connector?**

YES : Repair poor contact in transmission harness connector.

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

BZ: DTC P1121 — NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT [AT VEHICLES] —● **DTC DETECTING CONDITION:**

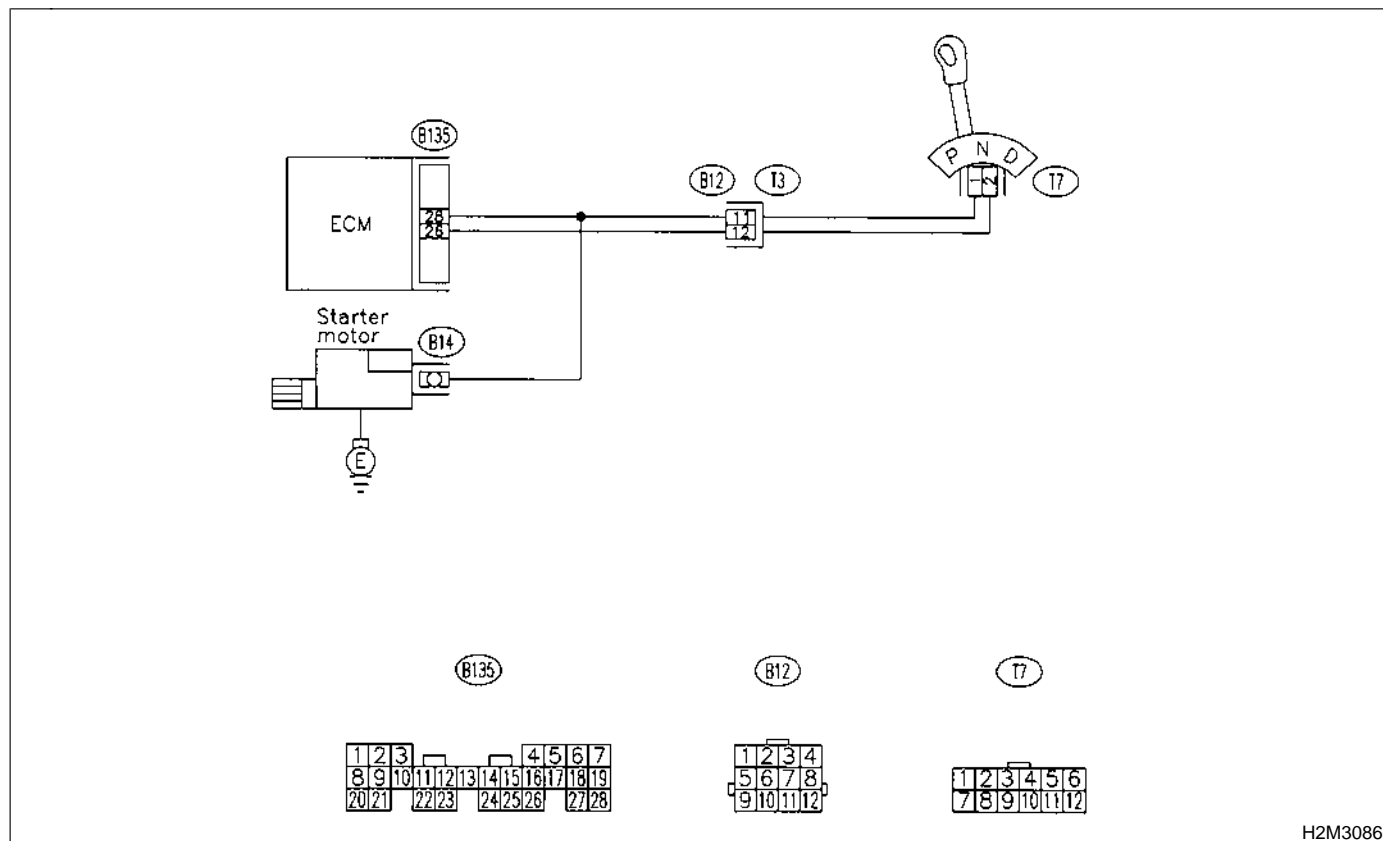
- Two consecutive driving cycles with fault

● **TROUBLE SYMPTOM:**

- Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

● **WIRING DIAGRAM:**

H2M3086

10BZ1 : CHECK DTC P0705 ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0705?*

YES : Inspect DTC P0705 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

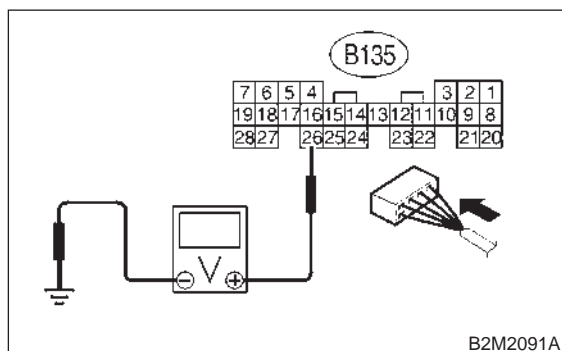
NO : Go to step **10BZ2**.

10BZ2 : CHECK INPUT SIGNAL FOR ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 26 (+) — Chassis ground (-):



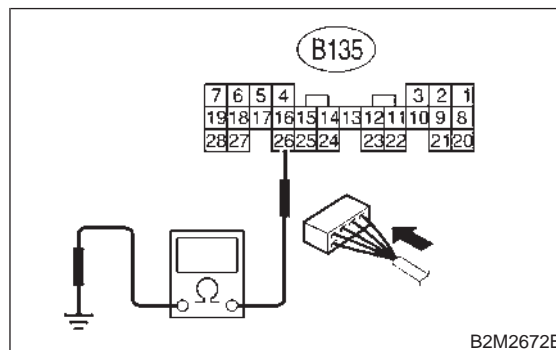
- CHECK** : Is the voltage more than 10 V in other positions?
- YES** : Even if MIL lights up, the circuit has returned to a normal condition at this time.
- NO** : Go to step 10BZ3.

10BZ3 : CHECK HARNESS BETWEEN ECM AND TRANSMISSION HARNESS CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from ECM and transmission harness connector.
- 3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

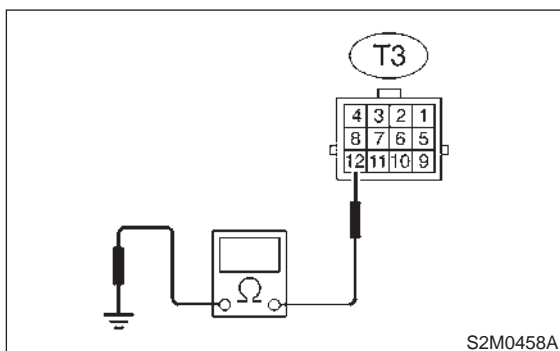
(B135) No. 26 — Chassis ground:



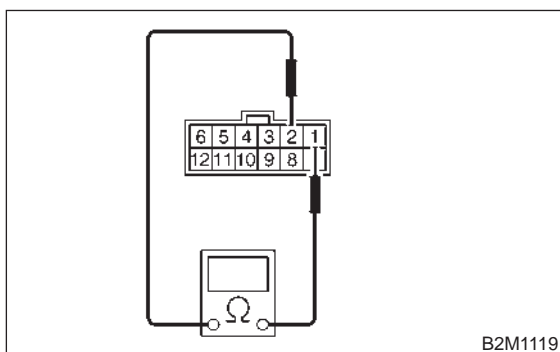
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in harness between ECM and transmission harness connector.
- NO** : Go to step 10BZ4.

10BZ4 : CHECK TRANSMISSION HARNESS CONNECTOR.

- 1) Disconnect connector from inhibitor switch.
- 2) Measure resistance of harness between transmission harness connector and engine ground.

Connector & terminal**(T3) No. 12 — Engine ground:****CHECK** : **Is the resistance less than 10 Ω?****YES** : Repair ground short circuit in harness between transmission harness and inhibitor switch connector.**NO** : Go to step **10BZ5**.**10BZ5 : CHECK INHIBITOR SWITCH.**

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "N" position.

Terminals**No. 1 — No. 2:****CHECK** : **Is the resistance more than 1 MΩ in other positions?****YES** : Go to step **10BZ6**.**NO** : Replace inhibitor switch. <Ref. to 3-2 [W2C0].>**10BZ6 : CHECK SELECTOR CABLE CONNECTION.****CHECK** : **Is there any fault in selector cable connection to inhibitor switch?****YES** : Repair selector cable connection. <Ref. to 3-2 [W2A0].>**NO** : Contact with SOA service.**NOTE:**

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

MEMO:

CA: DTC P1130 — FRONT OXYGEN (A/F) SENSOR CIRCUIT MALFUNCTION (OPEN CIRCUIT) —

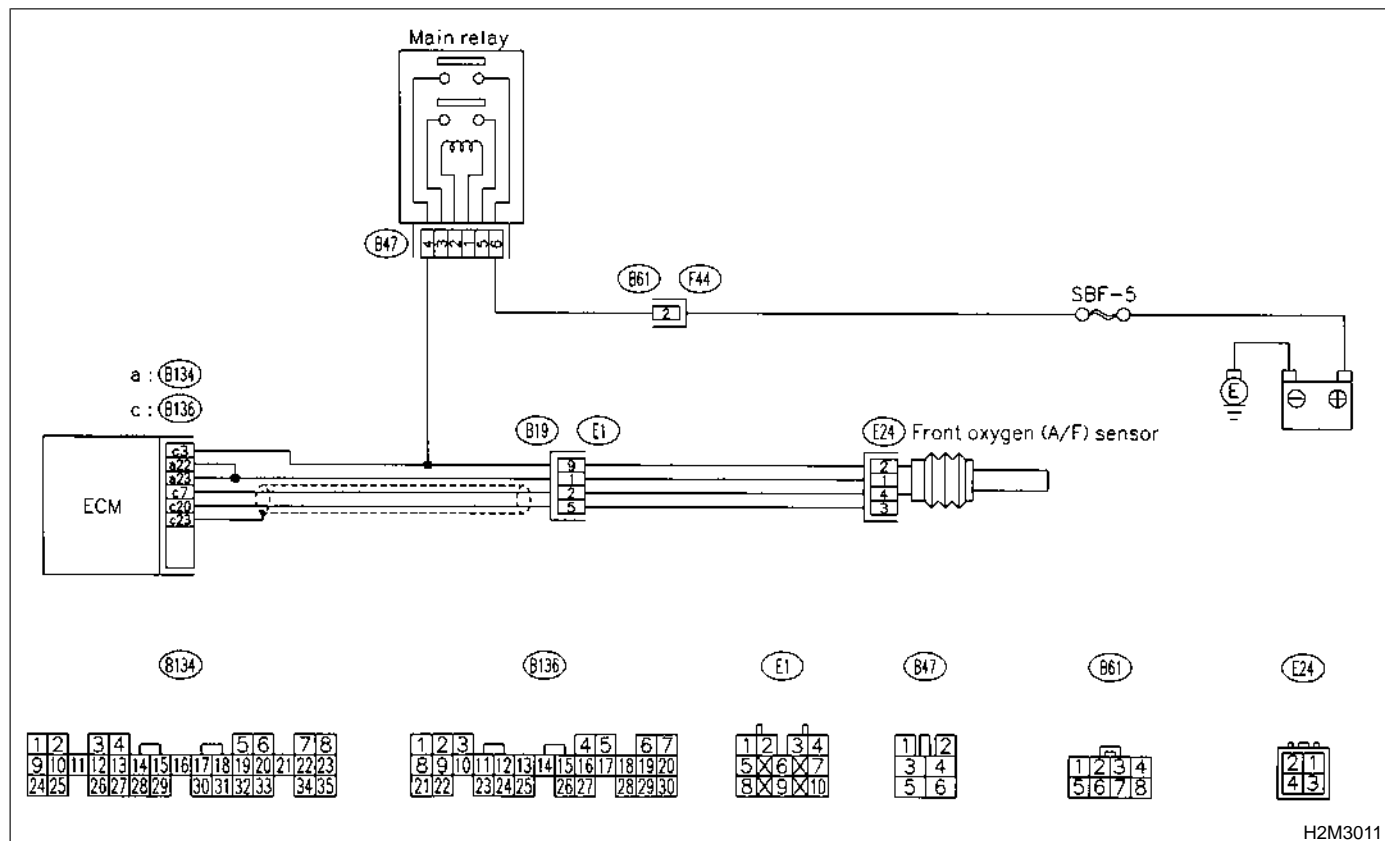
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:



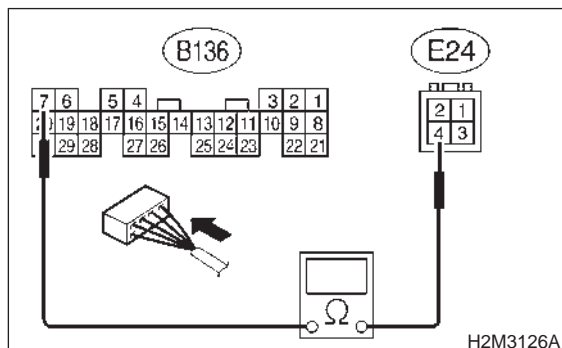
H2M3011

10CA1 : CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from ECM and front oxygen (A/F) sensor connector.
- 3) Measure resistance of harness between ECM and front oxygen (A/F) sensor connector.

Connector & terminal

(B136) No. 7 — (E24) No. 4:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 10CA2.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

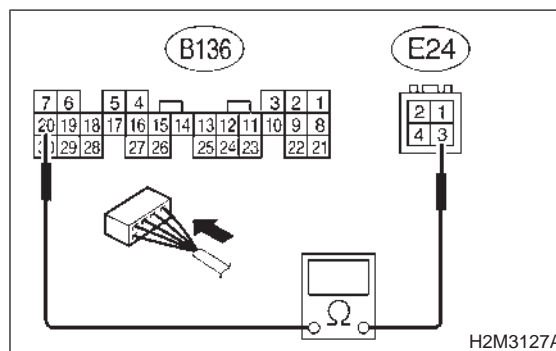
- Open circuit in harness between ECM and coupling connector (E1)
- Open circuit in harness between coupling connector (E1) and front oxygen (A/F) sensor connector
- Poor contact in front oxygen (A/F) sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (E1)

10CA2 : CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

Measure resistance of harness between ECM and front oxygen (A/F) sensor connector.

Connector & terminal

(B136) No. 20 — (E24) No. 3:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 10CA3.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and coupling connector (E1)
- Open circuit in harness between coupling connector (E1) and front oxygen (A/F) sensor connector
- Poor contact in front oxygen (A/F) sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (E1)

10CA3 : CHECK POOR CONTACT.

Check poor contact in front oxygen (A/F) sensor connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in front oxygen (A/F) sensor connector?

YES : Repair poor contact in front oxygen (A/F) sensor connector.

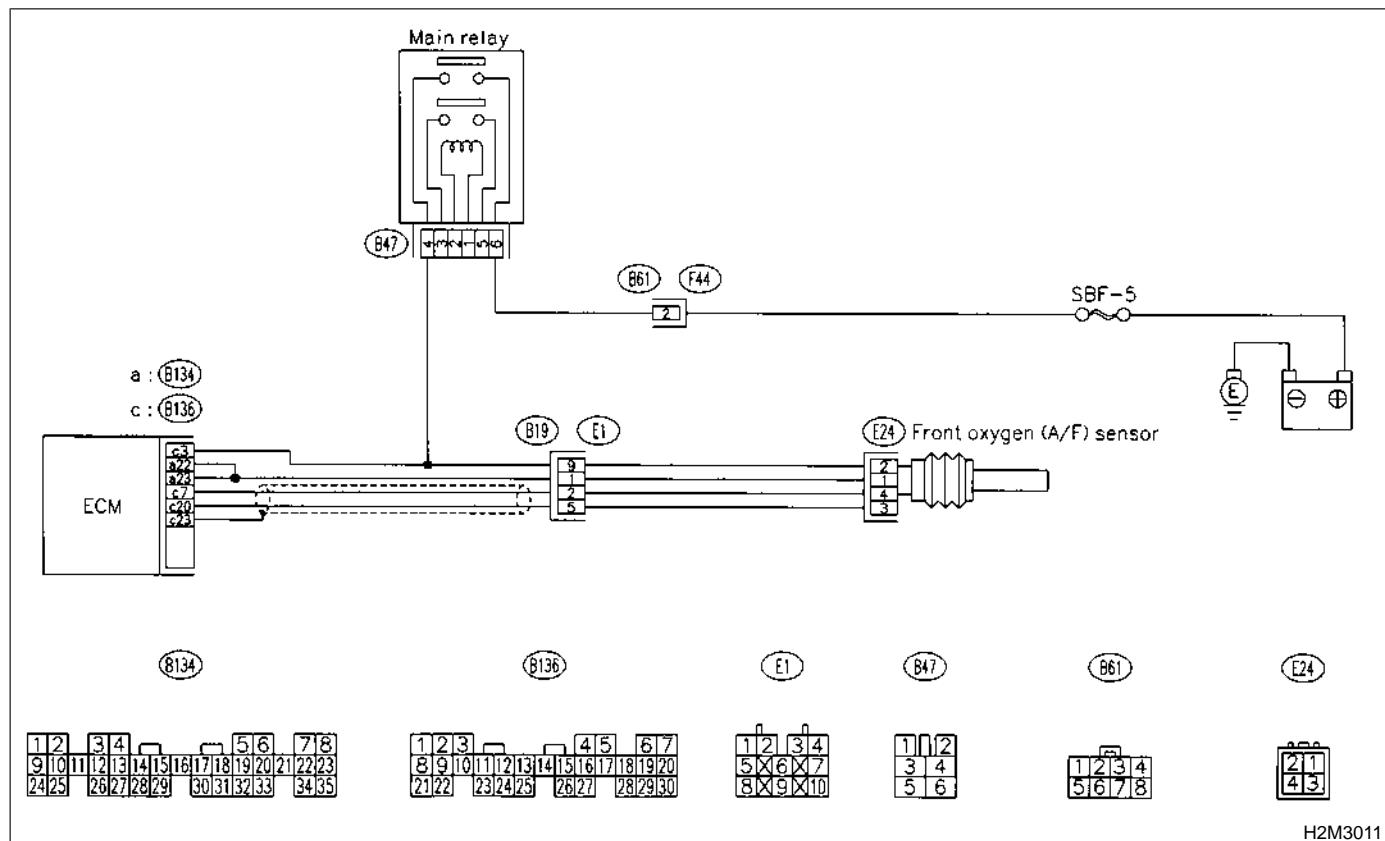
NO : Replace front oxygen (A/F) sensor. <Ref. to 2-7 [W7A0].>

CB: DTC P1131 — FRONT OXYGEN (A/F) SENSOR CIRCUIT MALFUNCTION (SHORT CIRCUIT) —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

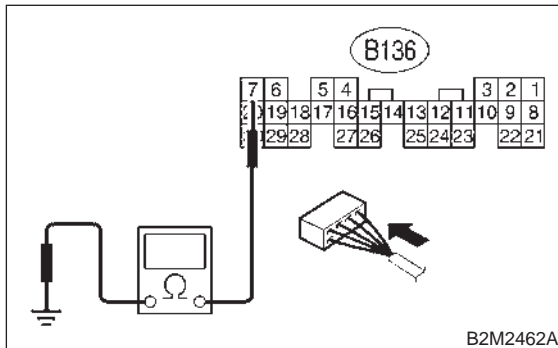
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

10CB1 : CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal
(B136) No. 7 — Chassis ground:

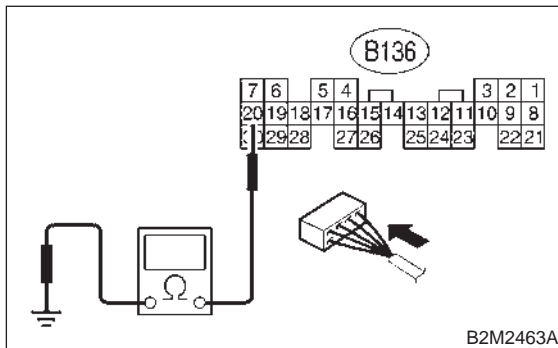


- CHECK** : Is the resistance more than 10 Ω?
- YES** : Go to step 10CB2.
- NO** : Repair ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.

10CB2 : CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal
(B136) No. 20 — Chassis ground:

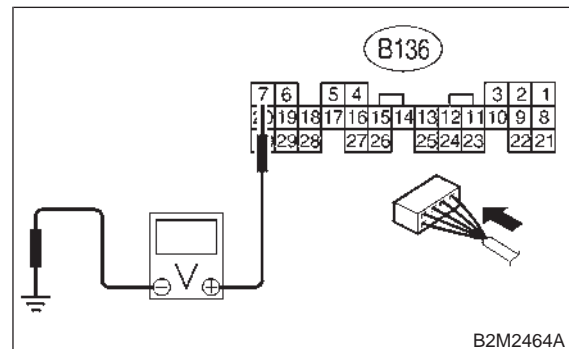


- CHECK** : Is the resistance more than 10 Ω?
- YES** : Go to step 10CB3.
- NO** : Repair ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.

10CB3 : CHECK OUTPUT SIGNAL FOR ECM.

- 1) Connect connector to ECM.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B136) No. 7 (+) — Chassis ground (-):

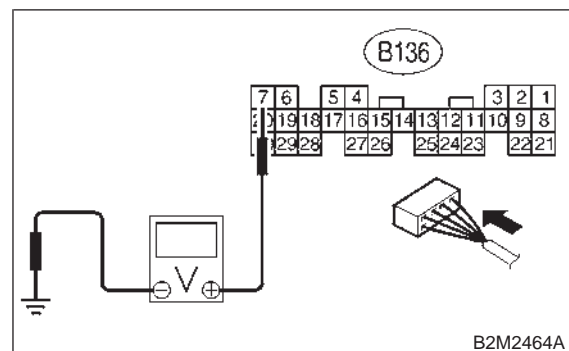


- CHECK** : Is the voltage more than 4.5 V?
- YES** : Go to step 10CB4.
- NO** : Go to step 10CB5.

10CB4 : CHECK OUTPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B136) No. 7 (+) — Chassis ground (-):



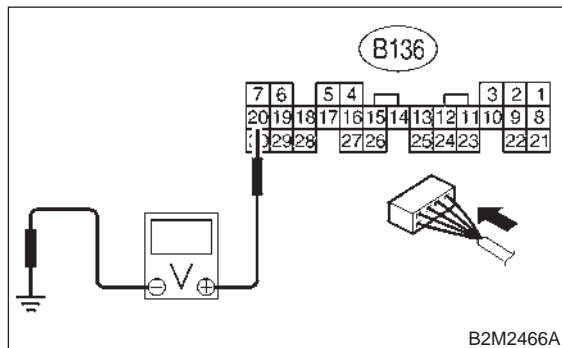
- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Repair poor contact in ECM connector.

10CB5 : CHECK OUTPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 20 (+) — Chassis ground (-):



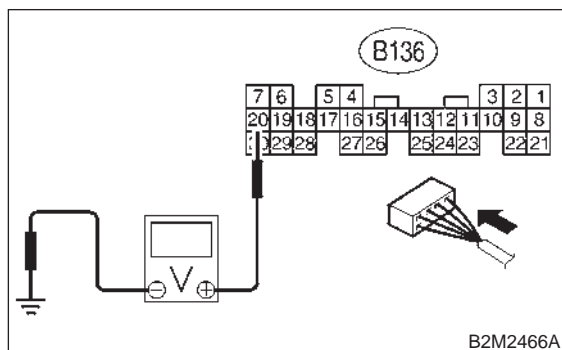
- CHECK** : **Is the voltage more than 4.95 V?**
- YES** : Go to step **10CB6**.
- NO** : Replace front oxygen (A/F) sensor.
<Ref. to 2-7 [W7A0].>

10CB6 : CHECK OUTPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 20 (+) — Chassis ground (-):



- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Repair poor contact in ECM connector.

MEMO:

CC: DTC P1132 — FRONT OXYGEN (A/F) SENSOR HEATER CIRCUIT LOW INPUT —

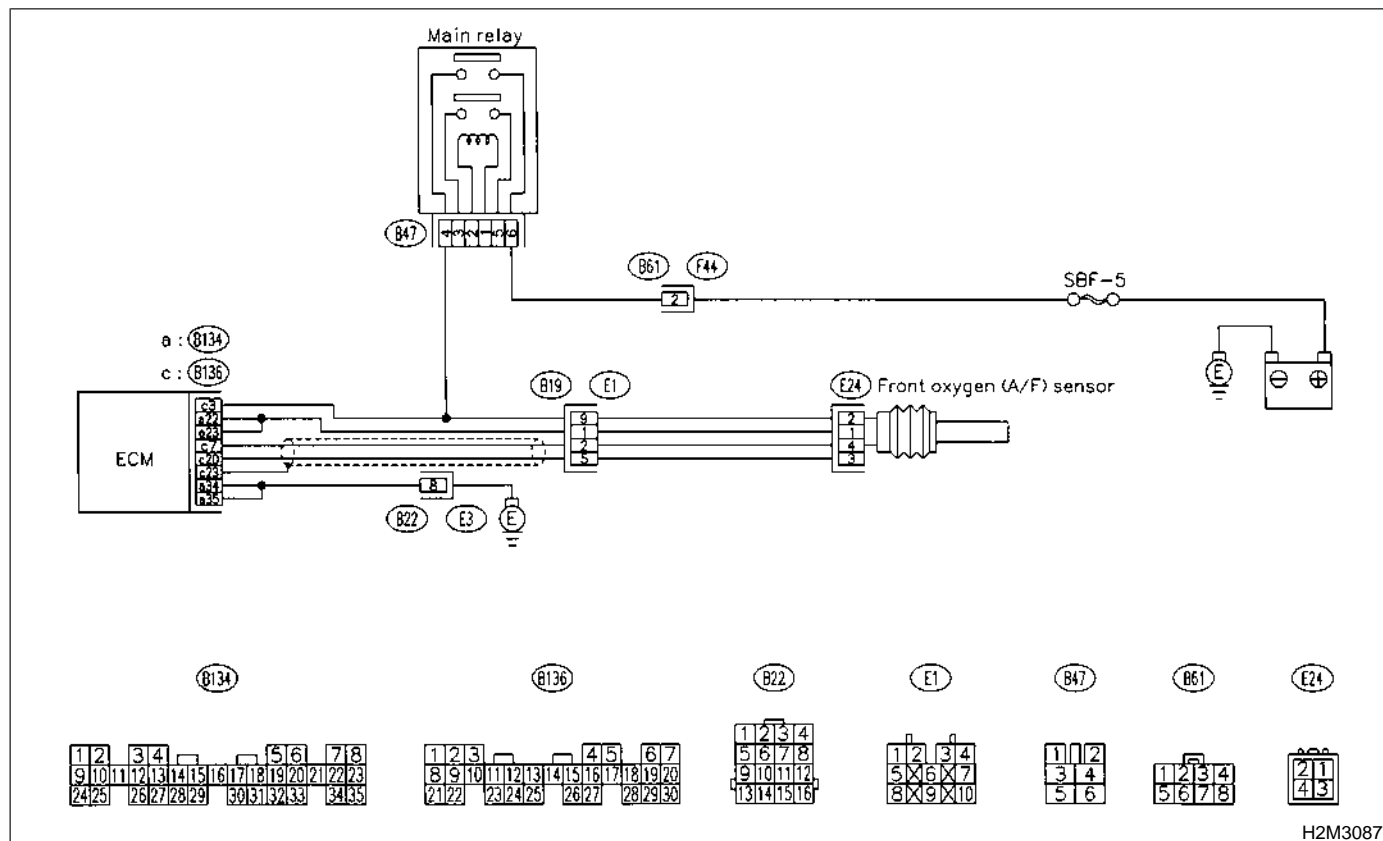
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



10CC1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1132 and P0141 at the same time?

YES : Go to step 10CC2.

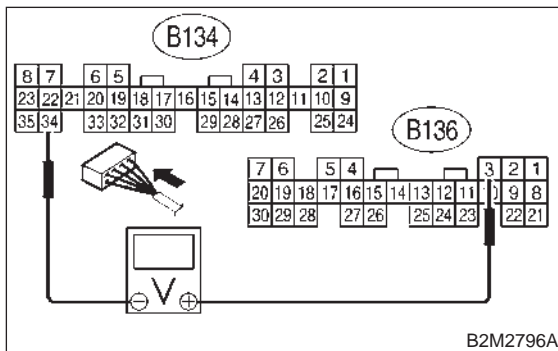
NO : Go to step 10CC5.

10CC2 : CHECK POWER SUPPLY CIRCUIT OF ECM.

- 1) Disconnect connectors from ECM.
- 2) Turn ignition switch to ON.
- 3) Measure power supply voltage between ECM connector terminals.

Connector & terminal

(B136) No. 3 (+) — (B134) No. 34 (-):



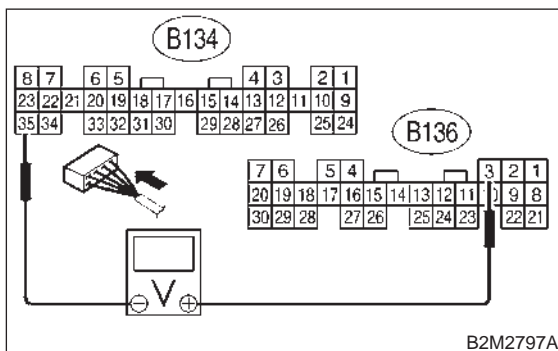
- CHECK** : Is the voltage more than 8 V?
- YES** : Go to step 10CC3.
- NO** : Repair open or ground short circuit in harness of power supply circuit.

10CC3 : CHECK POWER SUPPLY CIRCUIT OF ECM.

Measure power supply voltage between ECM connector terminals.

Connector & terminal

(B136) No. 3 (+) — (B136) No. 35 (-):



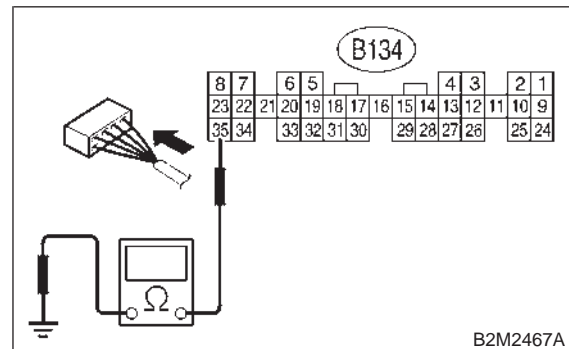
- CHECK** : Is the voltage more than 8 V?
- YES** : Go to step 10CC4.
- NO** : Repair open or ground short circuit in harness of power supply circuit.

10CC4 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B134) No. 35 — Chassis ground:



- CHECK** : Is the resistance less than 5 Ω?
- YES** : Go to step 10CC6.
- NO** : Go to step 10CC5.

10CC5 : CHECK GROUND CIRCUIT OF ECM.

1) Repair harness and connector.

NOTE:

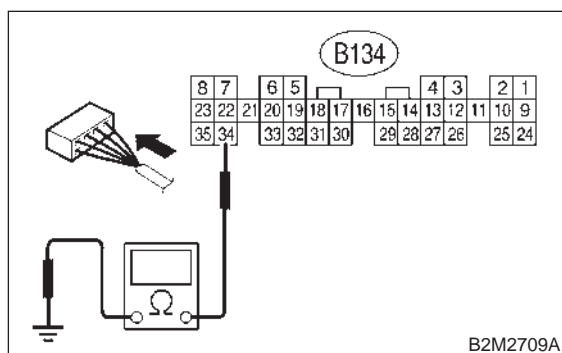
In this case, repair the following:

- Open circuit in harness between ECM and engine ground terminal
- Poor contact in ECM connector
- Poor contact in coupling connector (B22)

2) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B134) No. 34 — Chassis ground:



CHECK : **Is there resistance less than 5 Ω ?**

YES : Go to step **10CC6**.

NO : Repair harness and connector.

NOTE:

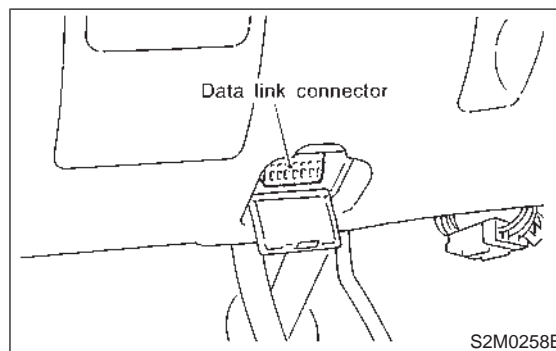
In this case, repair the following:

- Open circuit in harness between ECM and engine ground terminal
- Poor contact in ECM connector
- Poor contact in coupling connector (B22)

10CC6 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.

2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.

4) Start engine

5) Read data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Is the value more than 0.2 A?**

YES : Repair poor contact in connector.

NOTE:

In this case, repair the following:

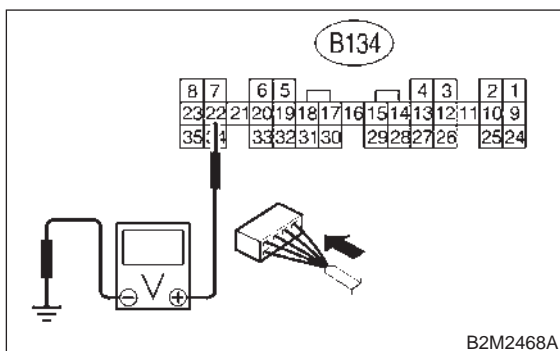
- Poor contact in front oxygen (A/F) sensor connector
- Poor contact in ECM connector

NO : Go to step **10CC7**.

10CC7 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Start and idle the engine.
- 2) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B134) No. 22 (+) — Chassis ground (-):

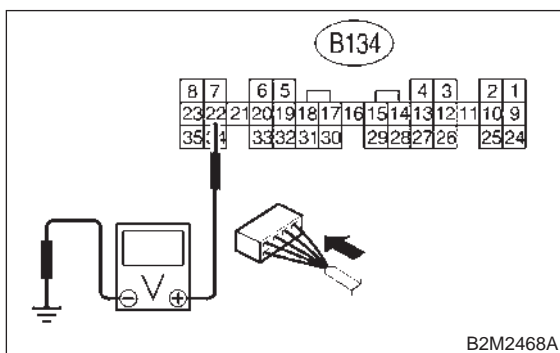


- CHECK** : Is the voltage less than 1.0 V?
- YES** : Go to step 10CC9.
- NO** : Go to step 10CC8.

10CC8 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B134) No. 22 (+) — Chassis ground (-):

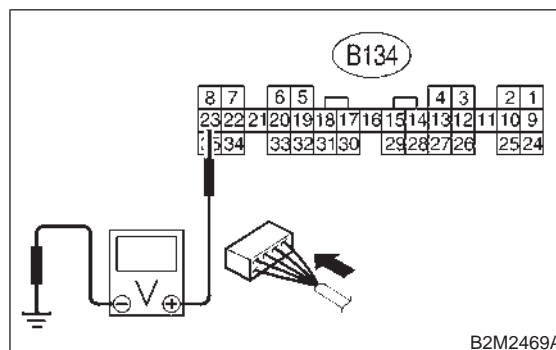


- CHECK** : Does the voltage change less than 1.0 V by shaking harness and connector of ECM while monitoring the value with voltage meter?
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 10CC9.

10CC9 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B134) No. 23 (+) — Chassis ground (-):

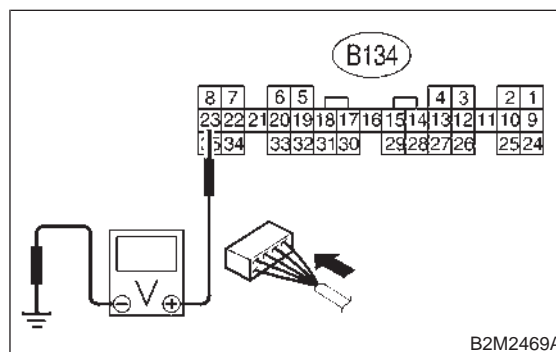


- CHECK** : Is the voltage less than 1.0 V?
- YES** : Go to step 10CC11.
- NO** : Go to step 10CC10.

10CC10 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM connector and chassis ground.

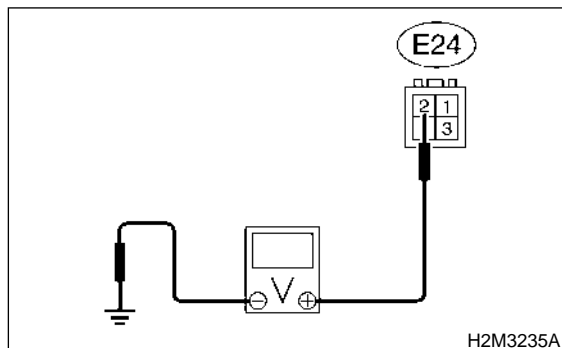
Connector & terminal
(B134) No. 23 (+) — Chassis ground (-):



- CHECK** : Does the voltage change less than 1.0 V by shaking harness and connector of ECM while monitoring the value with voltage meter?
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 10CC11.

10CC11 : CHECK POWER SUPPLY TO FRONT OXYGEN SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from front oxygen sensor.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between front oxygen sensor connector and engine ground.

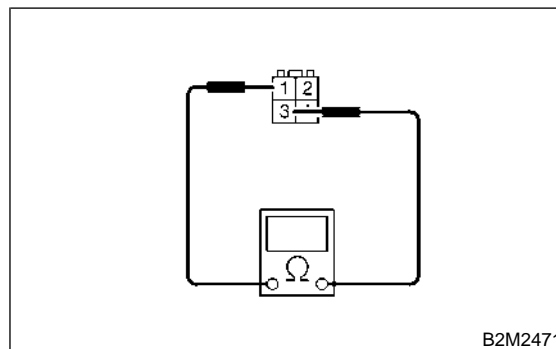
Connector & terminal**(E24) No. 2 (+) — Engine ground (-):****CHECK** : **Is the voltage more than 10 V?****YES** : Go to step **10CC12**.**NO** : Repair power supply line.**NOTE:**

In this case, repair the following:

- Open circuit in harness between main relay and coupling connector (E1)
- Open circuit in harness between coupling connector (E1) and front oxygen (A/F) sensor connector
- Poor contact in front oxygen sensor connector
- Poor contact in main relay connector
- Poor contact in coupling connector (E1)

10CC12 : CHECK FRONT OXYGEN SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between front oxygen sensor connector terminals.

Terminals**No. 3 — No. 1:****CHECK** : **Is the resistance less than 10 Ω?****YES** : Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open or ground short circuit in harness between front oxygen (A/F) sensor and coupling connector (E1)
- Open or ground short circuit in harness between coupling connector (E1) and ECM connector
- Poor contact in front oxygen sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (E1)

NO : Replace front oxygen (A/F) sensor.
<Ref. to 2-7 [W7A0].>

MEMO:

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

Wiring diagram for the front oxygen (A/F) sensor. The diagram shows the ECM connected to the sensor via a multi-pin connector. The ECM pins are labeled with connector codes: a: B134 and c: B136. The sensor connector is labeled E24. The sensor is labeled 'Front oxygen (A/F) sensor'. The diagram also shows the main relay, a fuse F44, and a battery. The sensor is connected to the battery through a fuse F44 and a relay. The sensor is also connected to the ECM through a multi-pin connector. The diagram includes a legend for the connector codes: B134, B136, B22, E1, B47, B61, and E24. The legend shows the pin configurations for each connector.

Legend:

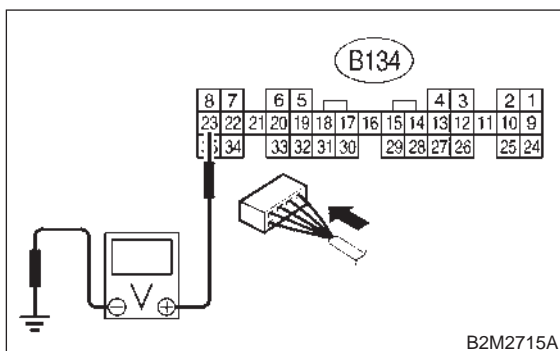
- B134: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
- B136: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
- B22: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
- E1: 1 2 3 4 5 6 7 8 9 10 11 12
- B47: 1 2 3 4 5 6
- B61: 1 2 3 4 5 6 7 8
- E24: 1 2 3 4

10CD1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 23 (+) — Chassis ground (-):



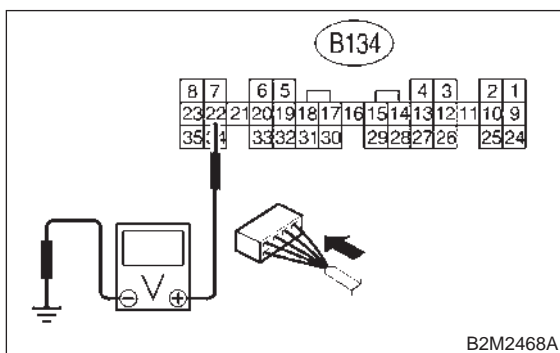
- CHECK** : Is the voltage more than 8 V?
- YES** : Go to step 10CD3.
- NO** : Go to step 10CD2.

10CD2 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

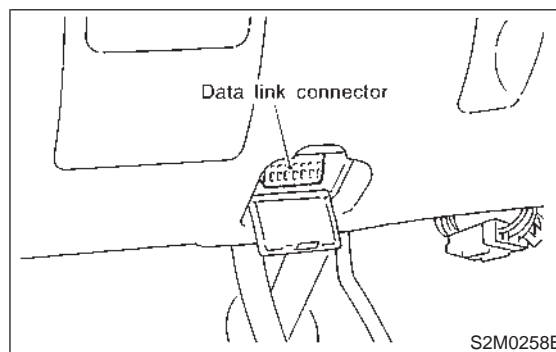
(B134) No. 22 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 8 V?
- YES** : Go to step 10CD3.
- NO** : Go to step 10CD4.

10CD3 : CHECK FRONT OXYGEN (A/F) SENSOR HEATER CURRENT.

- 1) Turn ignition switch to OFF.
- 2) Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.
- 3) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 4) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 5) Read data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or the OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.

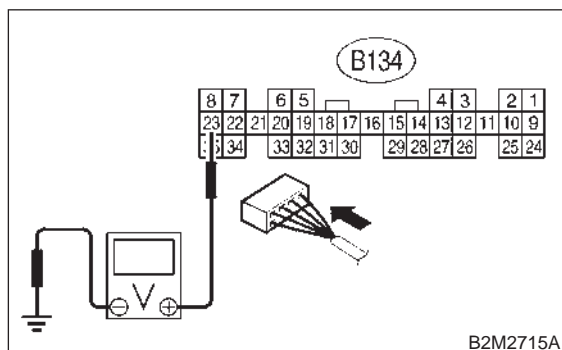
- CHECK** : Is the value more than 2.3 A?
- YES** : Replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : END

10CD4 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 23 (+) — Chassis ground (-):



CHECK : Does the voltage change more than 8 V by shaking harness and connector of ECM while monitoring the value with voltage meter?

YES : Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.

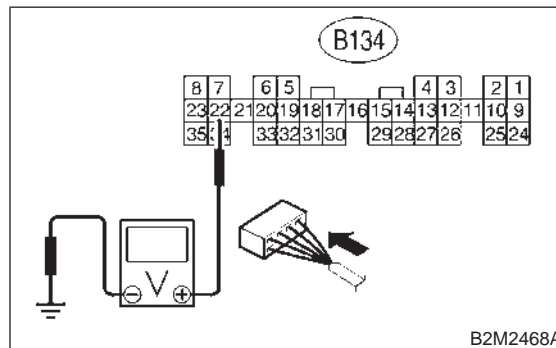
NO : Go to step **10CD5**.

10CD5 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 22 (+) — Chassis ground (-):



CHECK : Does the voltage change more than 8 V by shaking harness and connector of ECM while monitoring the value with voltage meter?

YES : Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.

NO : END

CE: DTC P1134 — FRONT OXYGEN (A/F) SENSOR MICRO-COMPUTER PROBLEM —

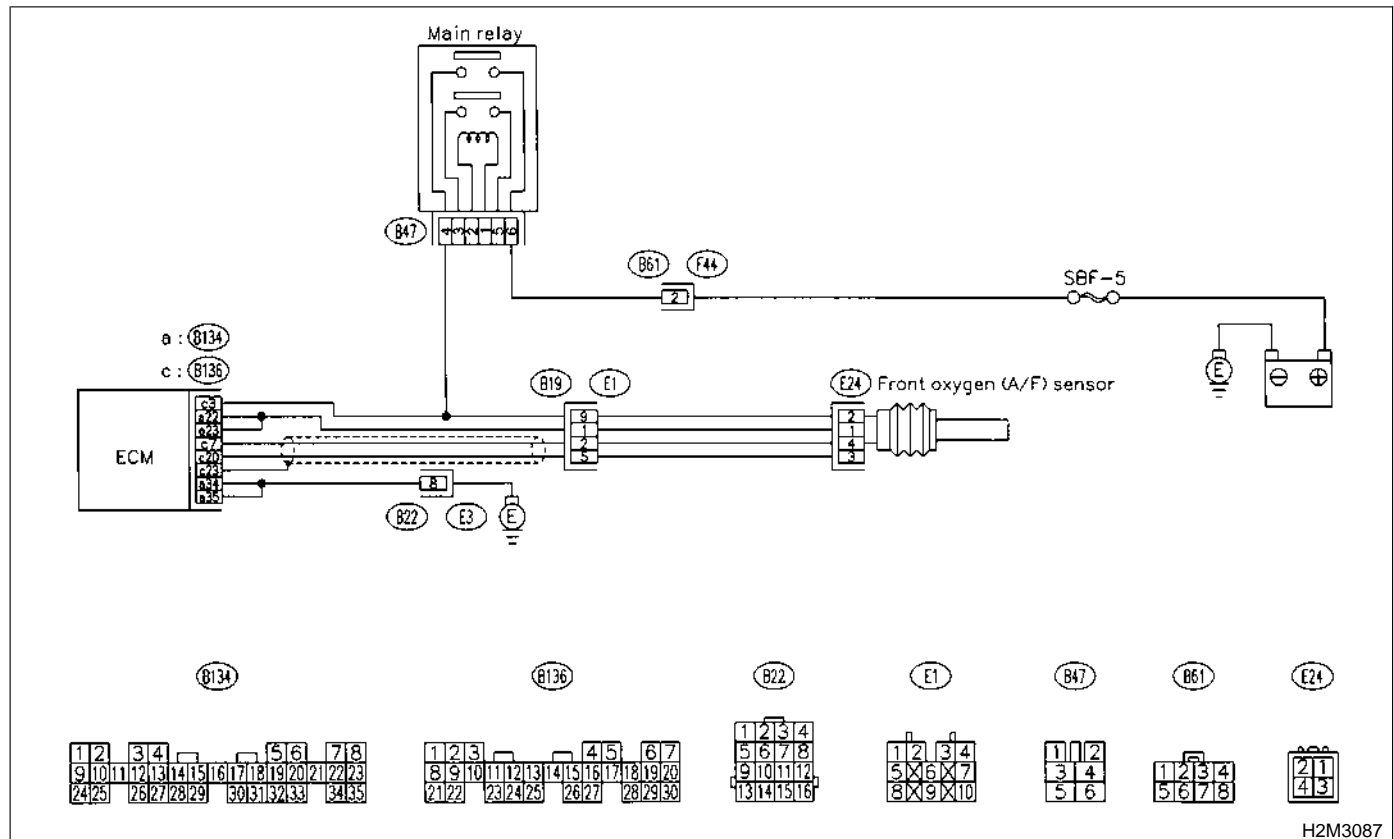
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:



10CE1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1134?

YES : Replace ECM. <Ref. to 2-7 [W15A0].>

NO : It is not necessary to inspect DTC P1134.

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

Wiring diagram for the main relay and front oxygen sensor. The diagram shows the ECM connected to the main relay (B47) and the front oxygen sensor (E24). The main relay is connected to the battery (E) through a fuse (F44) and a switch (S8F-5). The front oxygen sensor is connected to the ECM through a connector (B19) and a terminal (E1). The ECM is connected to the battery (E) through a terminal (E3) and a terminal (E22). The diagram includes labels for the ECM, Main relay, Front oxygen (A/F) sensor, and various connectors and terminals.

ECM

Main relay

Front oxygen (A/F) sensor

B47

B61

F44

S8F-5

E

B19

E1

E24

B22

E3

E

B134

B136

B22

E1

B47

B61

E24

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6

1 2 3 4 5 6 7 8

2 1 4 3

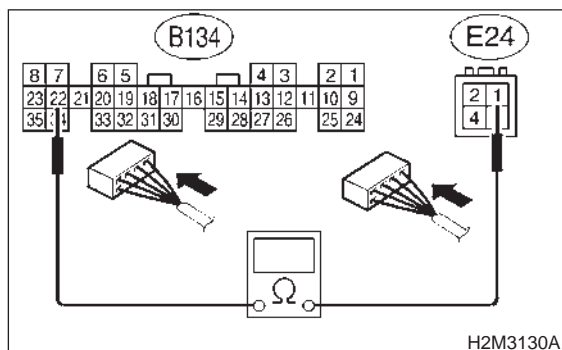
H2M3087

10CF1 : CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

- 1) Start engine, and warm-up the engine.
- 2) Turn ignition switch to OFF.
- 3) Disconnect connectors from ECM and front oxygen (A/F) sensor.
- 4) Measure resistance of harness between ECM and front oxygen (A/F) sensor connector.

Connector & terminal

(B134) No. 22 — (E24) No. 1:



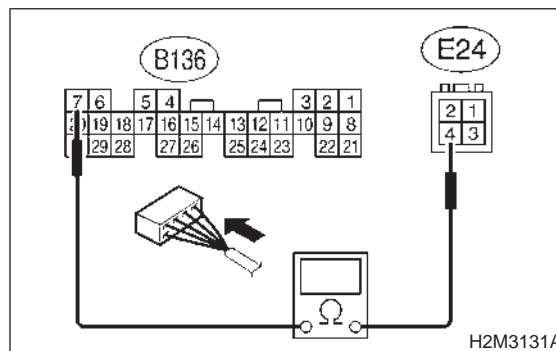
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10CF2.
- NO** : Repair open circuit in harness between ECM and front oxygen (A/F) sensor connector.

10CF2 : CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

Measure resistance of harness between ECM and front oxygen (A/F) sensor connector.

Connector & terminal

(B136) No. 7 — (E24) No. 4:



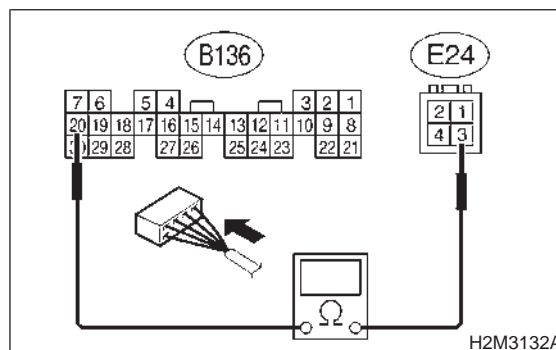
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10CF3.
- NO** : Repair open circuit in harness between ECM and front oxygen (A/F) sensor connector.

10CF3 : CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

Measure resistance of harness between ECM and front oxygen (A/F) sensor connector.

Connector & terminal

(B136) No. 20 — (E24) No. 3:



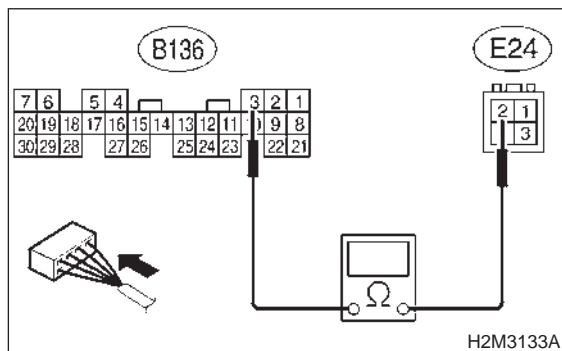
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10CF4.
- NO** : Repair open circuit in harness between ECM and front oxygen (A/F) sensor connector.

10CF4 : CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

Measure resistance of harness between ECM and front oxygen (A/F) sensor connector.

Connector & terminal

(B136) No. 3 — (E24) No. 2:



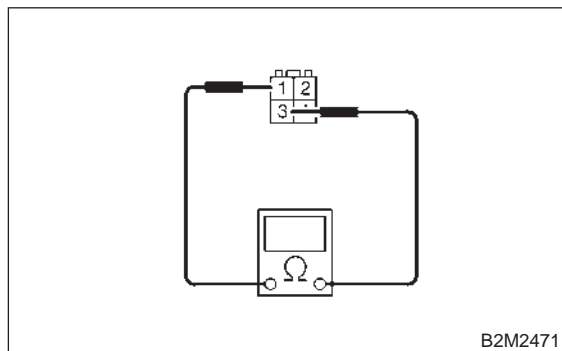
- CHECK** : **Is the resistance less than 1 Ω ?**
- YES** : Go to step **10CF5**.
- NO** : Repair open circuit in harness between ECM and front oxygen (A/F) sensor connector.

10CF5 : CHECK FRONT OXYGEN (A/F) SENSOR.

Measure resistance between front oxygen (A/F) sensor connector terminals.

Terminals

No. 3 — No. 1:



- CHECK** : **Is the resistance less than 5 Ω ?**
- YES** : Go to step **10CF6**.
- NO** : Replace front oxygen (A/F) sensor.
<Ref. to 2-7 [W7A0].>

10CF6 : CHECK POOR CONTACT.

Check poor contact in ECM and front oxygen (A/F) sensor connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : **Is there poor contact in ECM or front oxygen (A/F) sensor connector?**
- YES** : Repair poor contact in ECM or front oxygen (A/F) sensor connector.
- NO** : Replace front oxygen (A/F) sensor.
<Ref. to 2-7 [W7A0].>

MEMO:

CG: DTC P1142 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

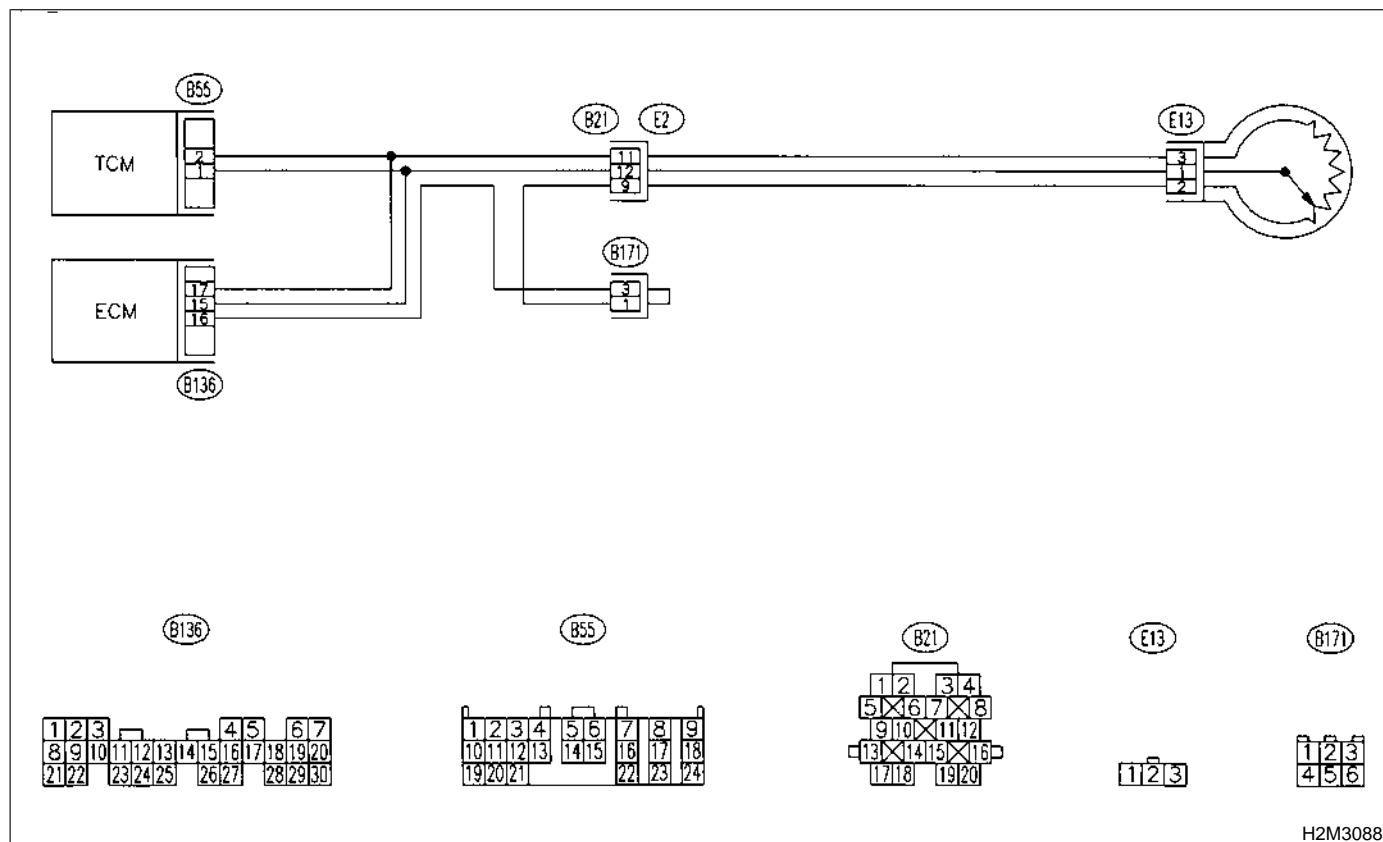
• TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3088

10CG1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0106, P0107, P0108, P0122 or P0123?*

YES : Inspect DTC P0106, P0107, P0108, P0122 or P0123 using "12. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

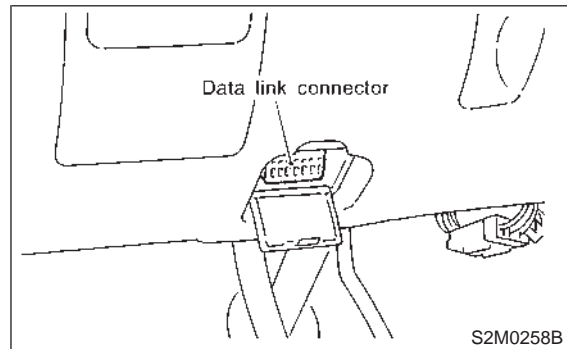
NOTE:

In this case, it is not necessary to inspect DTC P1142.

NO : Go to step **10CG2**.

10CG2 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the value less than 0 kPa (0 mmHg, 0 inHg)?*

YES : Replace intake manifold pressure sensor. <Ref. to 2-7 [W20A0].>

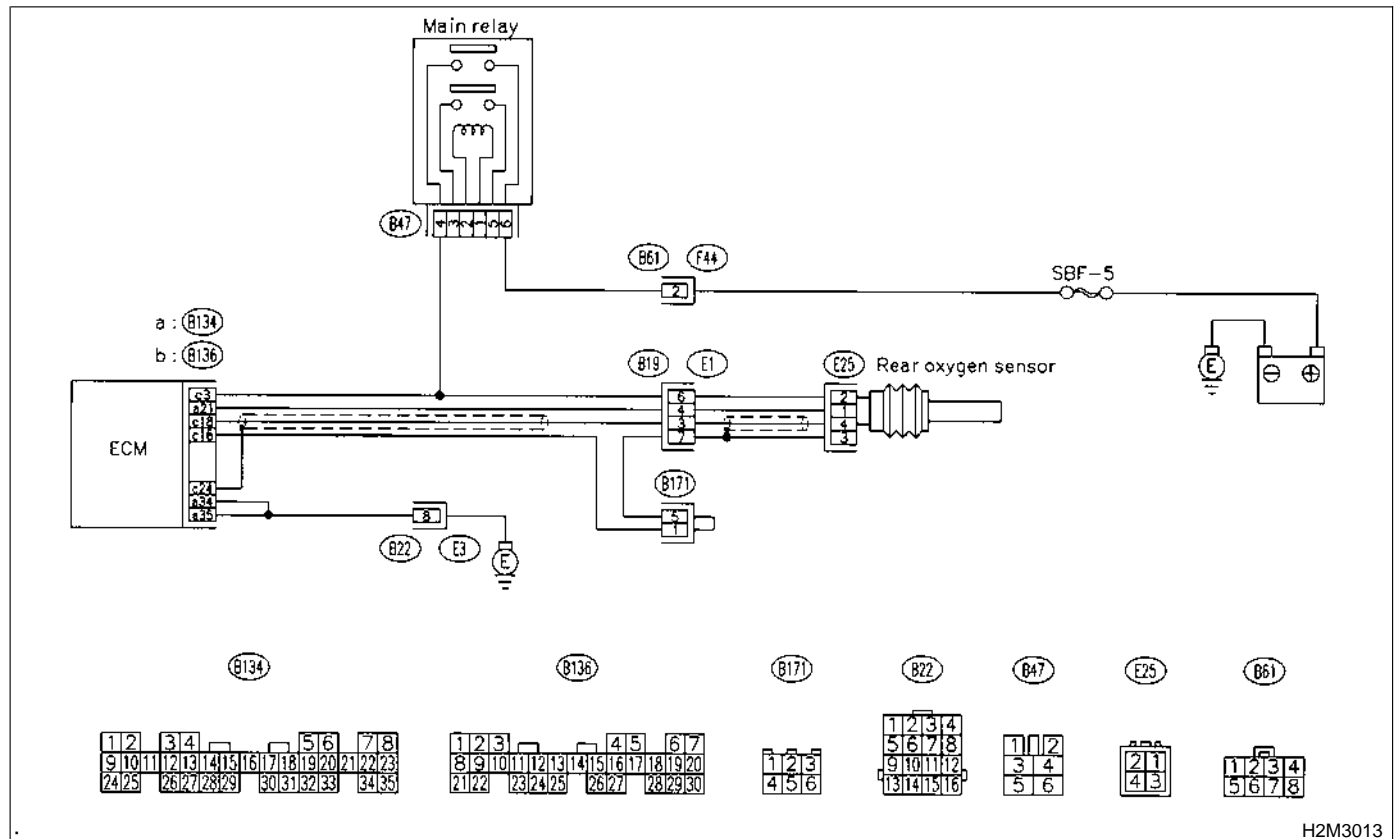
NO : Replace throttle position sensor. <Ref. to 2-7 [W9A1].>

CH: DTC P1151 — REAR OXYGEN SENSOR HEATER CIRCUIT HIGH INPUT**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

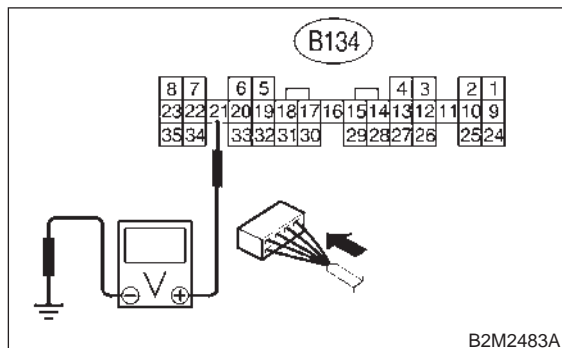
H2M3013

10CH1 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 21 (+) — Chassis ground (-):



CHECK : Is the voltage more than 8 V?

YES : Go to step 10CH2.

NO : Go to step 10CH3.

10CH2 : CHECK DTC P1151 ON DISPLAY.

- 1) Turn ignition switch to OFF.
- 2) Repair battery short circuit in harness between ECM and rear oxygen sensor connector.
- 3) Operate the INSPECTION MODE. <Ref. to 2-7 [T3E1].>

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1151?

YES : Replace ECM. <Ref. to 2-7 [W15A0].>

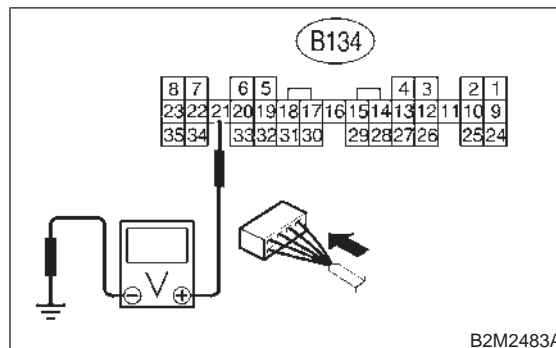
NO : END

10CH3 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 21 (+) — Chassis ground (-):



CHECK : Does the voltage change more than 8 V by shaking harness and connector of ECM while monitoring the value with voltage meter?

YES : Repair poor contact in ECM connector.

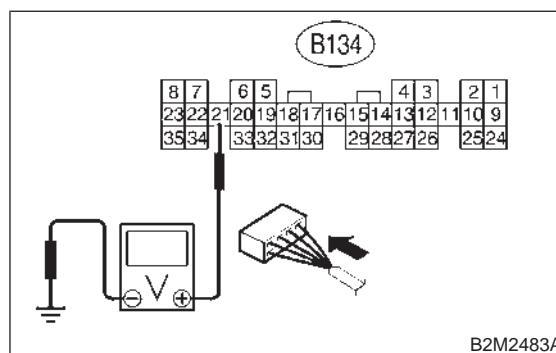
NO : Go to step 10CH4.

10CH4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 21 (+) — Chassis ground (-):



CHECK : Does the voltage change more than 8 V by shaking harness and connector of rear oxygen sensor while monitoring the value with voltage meter?

YES : Repair poor contact in rear oxygen sensor connector.

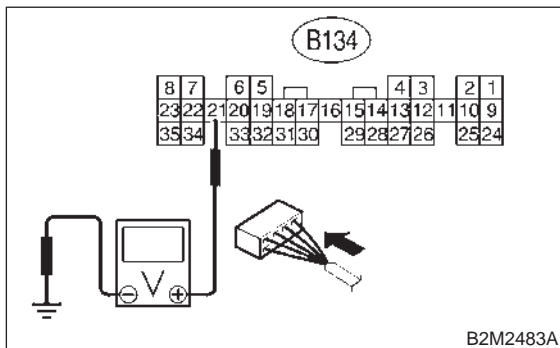
NO : Go to step 10CH5.

10CH5 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 21 (+) — Chassis ground (-):



CHECK : **Does the voltage change more than 8 V by shaking coupling connector (E1) while monitoring the value with voltage meter?**

YES : Repair poor contact in coupling connector.

NO : Even if MIL lights up, the circuit has returned to normal condition at this time.

MEMO:

CI: DTC P1400 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE CIRCUIT LOW INPUT —

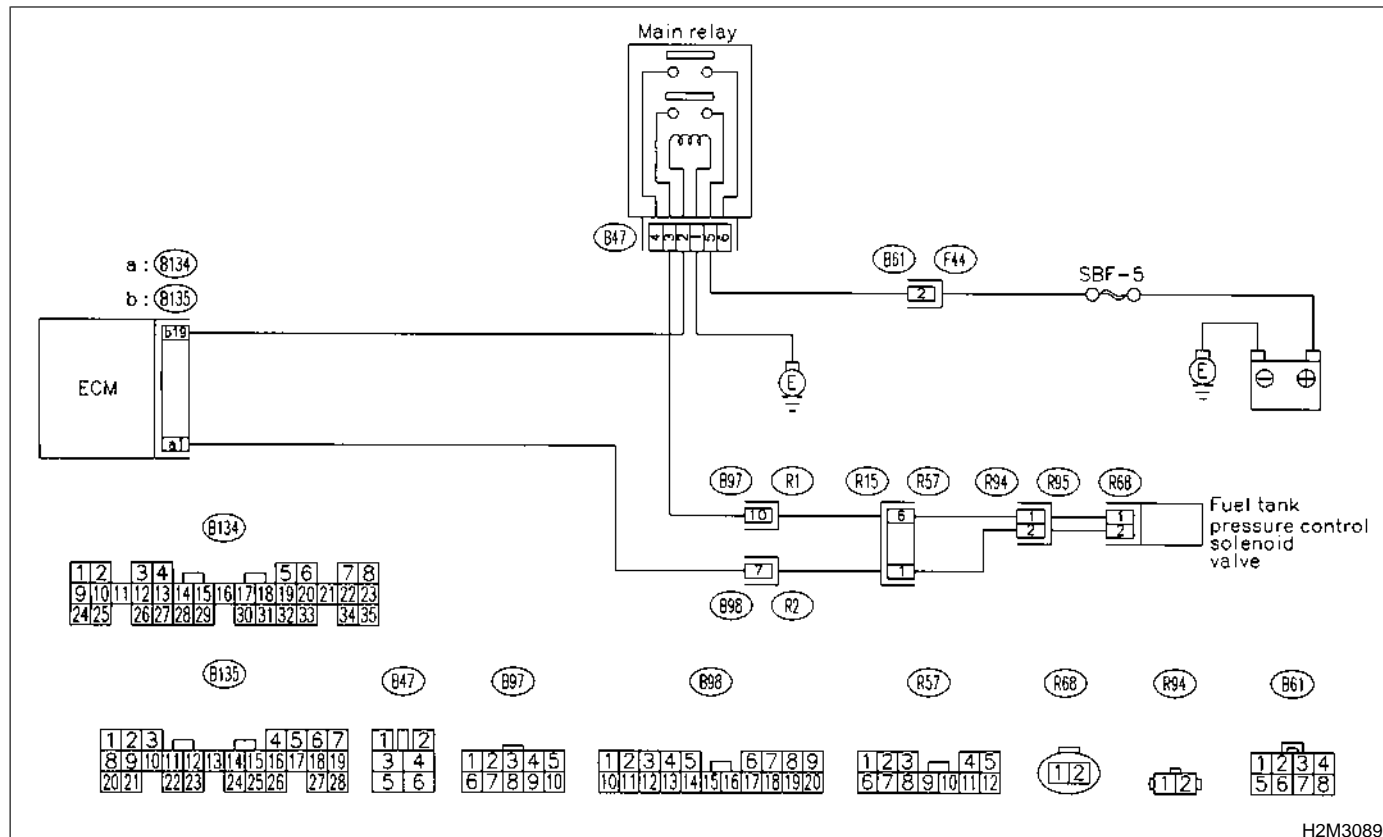
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



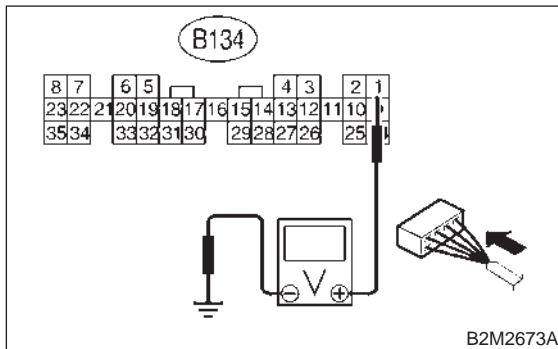
H2M3089

10C11 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 1 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 10C12.
- NO** : Go to step 10C13.

10C12 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : Is there poor contact in ECM connector?
- YES** : Repair poor contact in ECM connector.
- NO** : Contact with SOA service.

NOTE:

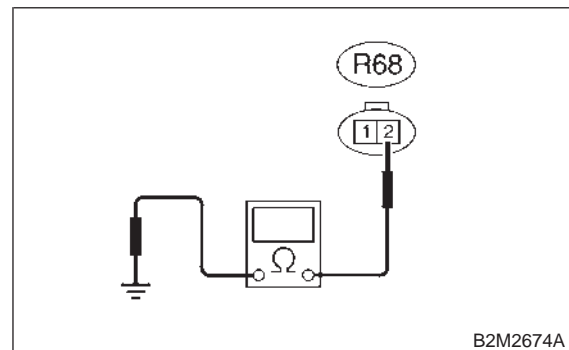
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10C13 : CHECK HARNESS BETWEEN FUEL TANK PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from fuel tank pressure control solenoid valve and ECM.
- 3) Measure resistance of harness between fuel tank pressure control solenoid valve connector and chassis ground.

Connector & terminal

(R68) No. 2 — Chassis ground:



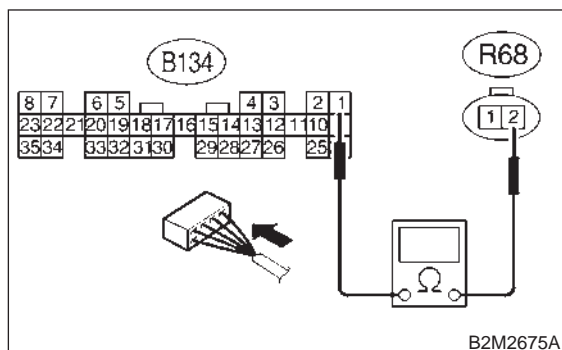
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in harness between ECM and fuel tank pressure control solenoid valve connector.
- NO** : Go to step 10C14.

10CI4 : CHECK HARNESS BETWEEN FUEL TANK PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

Measure resistance of harness between ECM and fuel tank pressure control solenoid valve connector.

Connector & terminal

(B134) No. 1 — (R68) No. 2:



- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 10CI5.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

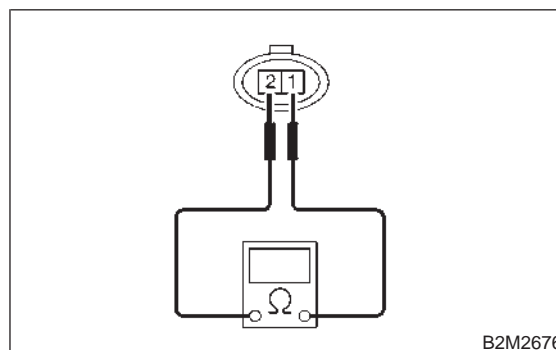
- Open circuit in harness between ECM and fuel tank pressure control solenoid valve connector
- Poor contact in coupling connectors (B98), (R94) and (R57)

10CI5 : CHECK FUEL TANK PRESSURE CONTROL SOLENOID VALVE.

Measure resistance between fuel tank pressure control solenoid valve terminals.

Terminals

No. 1 — No. 2:



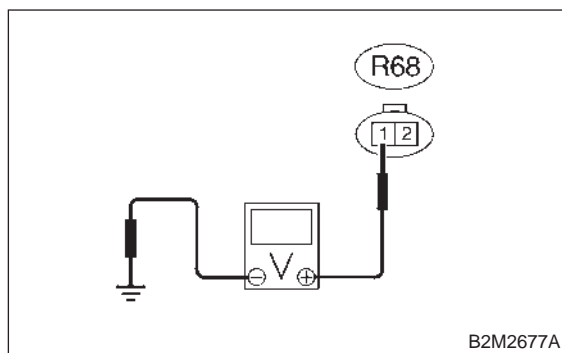
- CHECK** : Is the resistance between 10 and 100 Ω ?
- YES** : Go to step 10CI6.
- NO** : Replace fuel tank pressure control solenoid valve. <Ref. to 2-1 [W6A0].>

10CI6 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE CONTROL SOLENOID VALVE.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between fuel tank pressure control solenoid valve and chassis ground.

Connector & terminal

(R68) No. 1 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 10 V?**

YES : Go to step **10CI7**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between main relay and fuel tank pressure control solenoid valve connector
- Poor contact in coupling connectors (B97), (R94) and (R57)
- Poor contact in main relay connector

10CI7 : CHECK POOR CONTACT.

Check poor contact in fuel tank pressure control solenoid valve connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in fuel tank pressure control solenoid valve connector?**

YES : Repair poor contact in fuel tank pressure control solenoid valve connector.

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

CJ: DTC P1420 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE CIRCUIT HIGH INPUT —

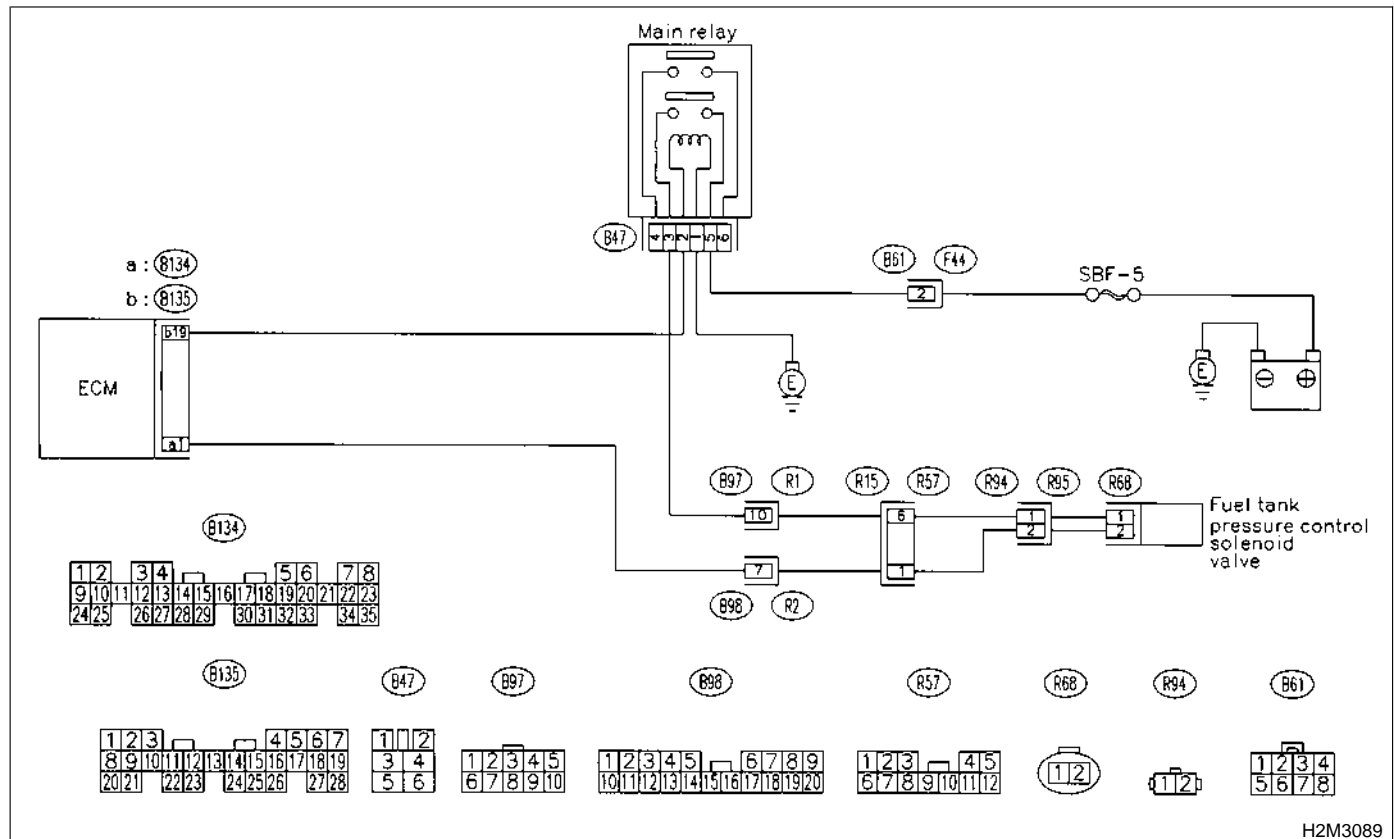
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

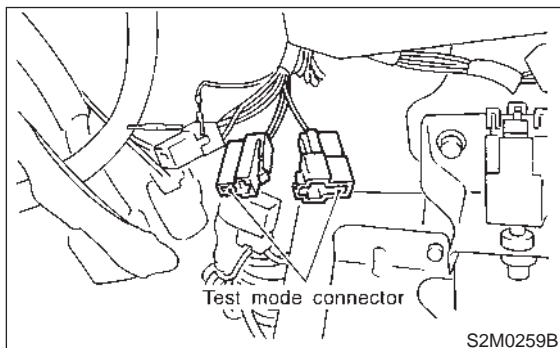
• WIRING DIAGRAM:



H2M3089

10CJ1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to OFF.
- 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



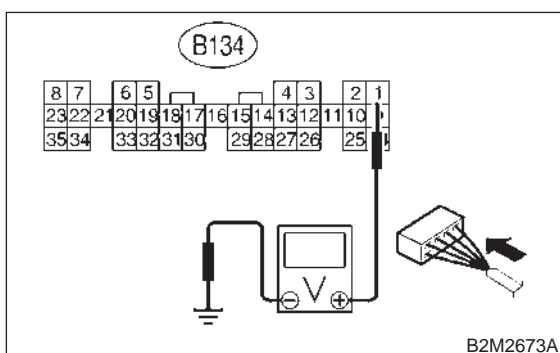
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

NOTE:

Fuel tank pressure control solenoid valve operation check can be executed using Subaru Select Monitor. For procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

Connector & terminal

(B134) No. 1 (+) — Chassis ground (-):



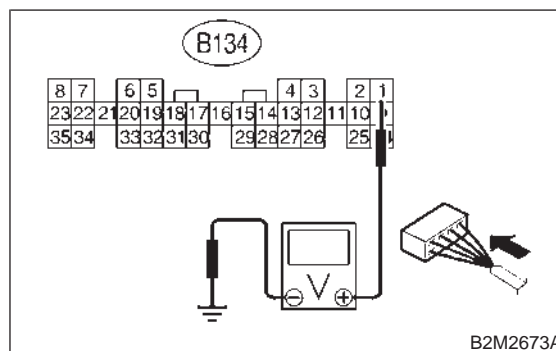
- CHECK** : Does voltage change between 0 and 10 volts?
- YES** : Go to step 10CJ2.
- NO** : Even if MIL light up, the circuit has returned to a normal condition at this time. In this case, repair poor contact in ECM connector.

10CJ2 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 1 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 10CJ4.
- NO** : Go to step 10CJ3.

10CJ3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

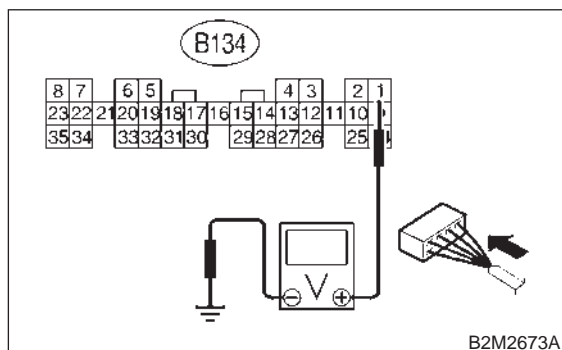
- CHECK** : Is there poor contact in ECM connector?
- YES** : Repair poor contact in ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

10CJ4 : CHECK HARNESS BETWEEN FUEL TANK PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from fuel tank pressure control solenoid valve.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 1 (+) — Chassis ground (-):



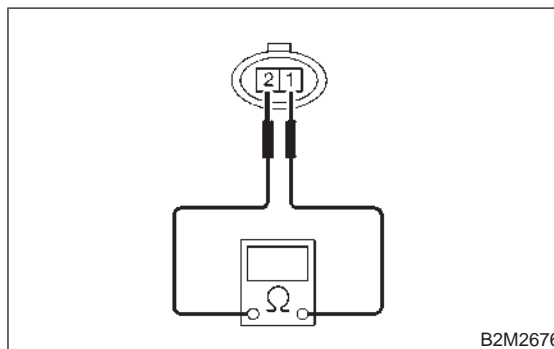
- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair battery short circuit in harness between ECM and fuel tank pressure control solenoid valve connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Go to step **10CJ5**.

10CJ5 : CHECK FUEL TANK PRESSURE CONTROL SOLENOID VALVE.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between fuel tank pressure control solenoid valve terminals.

Terminals

No. 1 — No. 2:



- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Replace fuel tank pressure control solenoid valve <Ref. to 2-1 [W7A0].> and ECM <Ref. to 2-7 [W15A0].>.
- NO** : Go to step **10CJ6**.

10CJ6 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : **Is there poor contact in ECM connector?**
- YES** : Repair poor contact in ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

MEMO:

CK: DTC P1422 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH INPUT —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

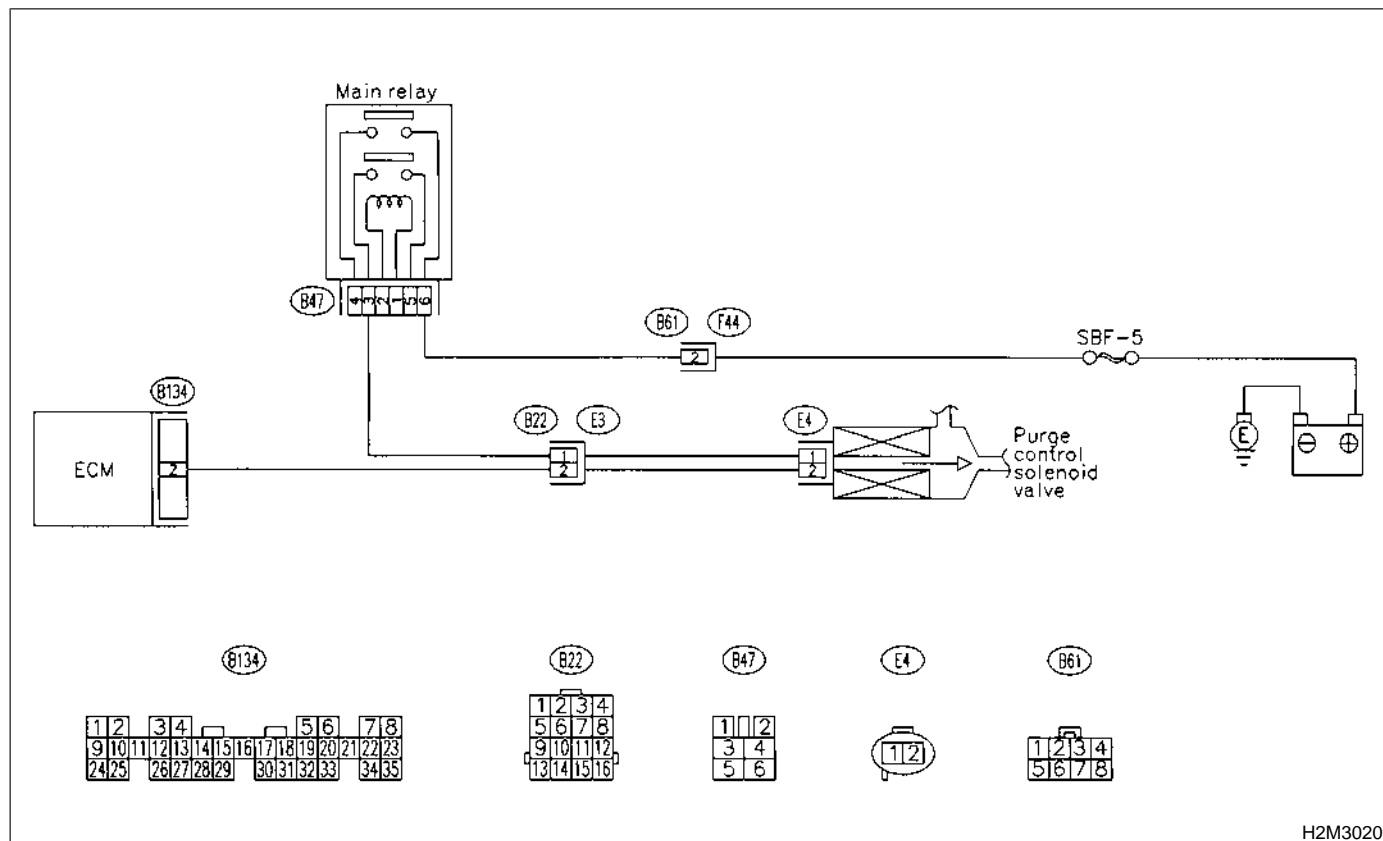
• TROUBLE SYMPTOM:

- Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

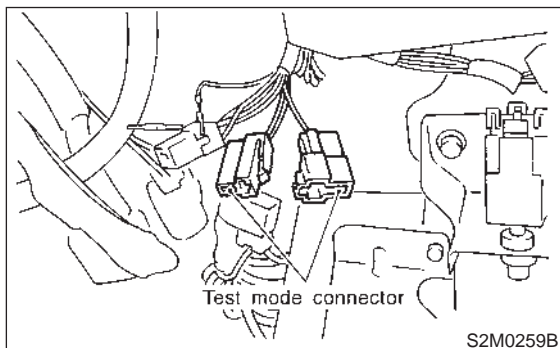
• WIRING DIAGRAM:



H2M3020

10CK1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to OFF.
- 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



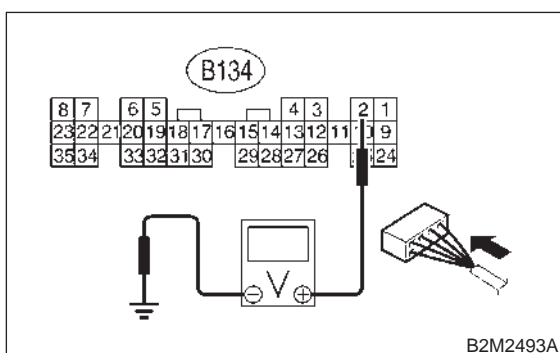
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

NOTE:

Purge control solenoid valve operation check can be executed using Subaru Select Monitor. For procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

Connector & terminal

(B134) No. 2 (+) — Chassis ground (-):



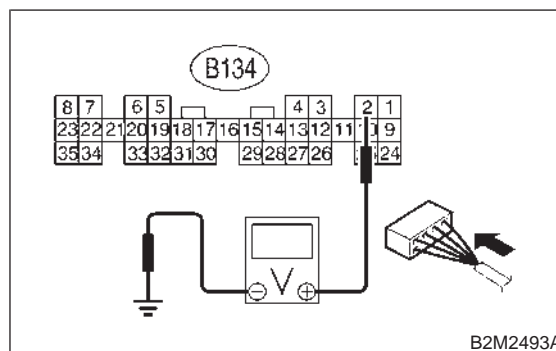
- CHECK** : Does voltage change between 0 and 10 volts?
- YES** : Go to step 10CK2.
- NO** : Even if MIL light up, the circuit has returned to a normal condition at this time. In this case, repair poor contact in ECM connector.

10CK2 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 2 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 10CK4.
- NO** : Go to step 10CK3.

10CK3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

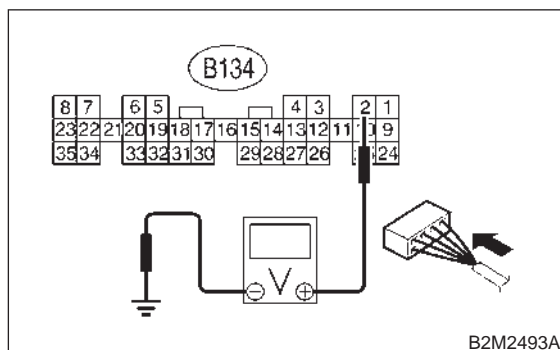
- CHECK** : Is there poor contact in ECM connector?
- YES** : Repair poor contact in ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

10CK4 : CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from purge control solenoid valve.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 2 (+) — Chassis ground (-):



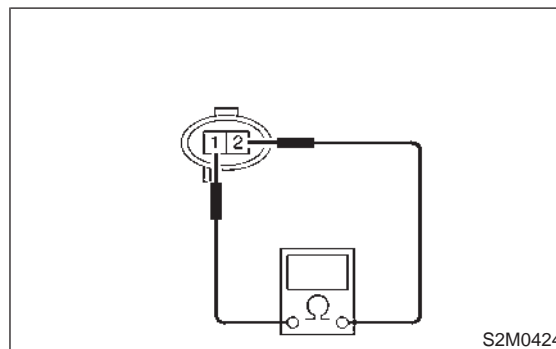
- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair battery short circuit in harness between ECM and purge control solenoid valve connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Go to step **10CK5**.

10CK5 : CHECK PURGE CONTROL SOLENOID VALVE.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between purge control solenoid valve terminals.

Terminals

No. 1 — No. 2:



- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Replace purge control solenoid valve <Ref. to 2-1 [W4A0].> and ECM <Ref. to 2-7 [W15A0].>.
- NO** : Go to step **10CK6**.

10CK6 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : **Is there poor contact in ECM connector?**
- YES** : Repair poor contact in ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

MEMO:

CL: DTC P1423 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL HIGH INPUT —

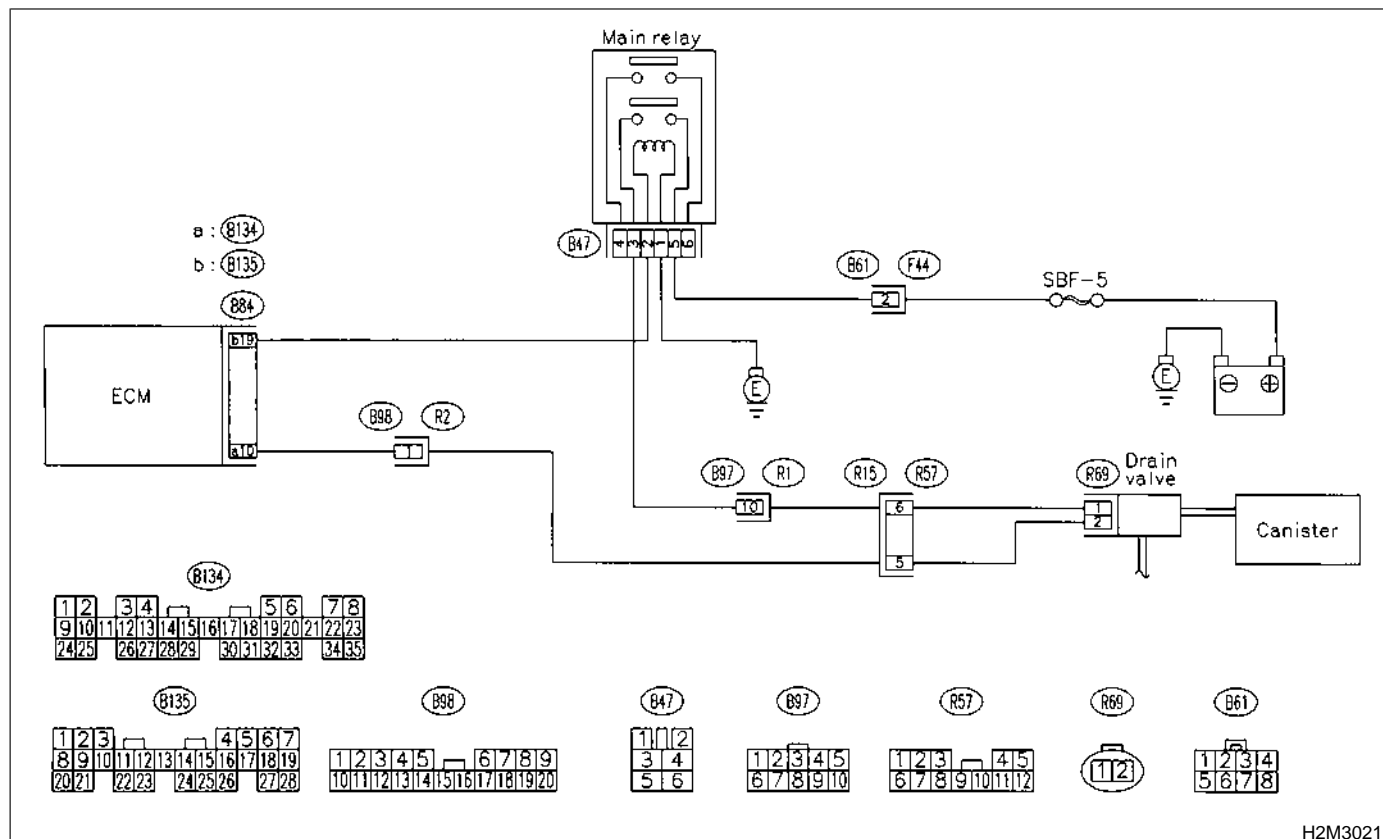
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

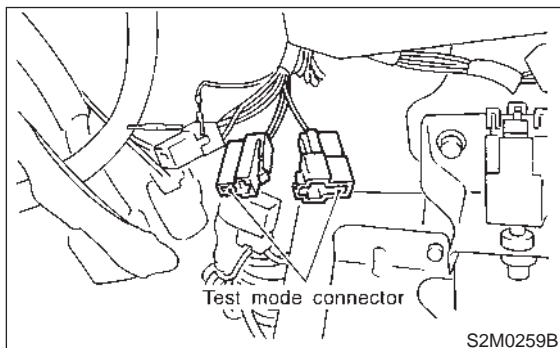
• WIRING DIAGRAM:



H2M3021

10CL1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to OFF.
- 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



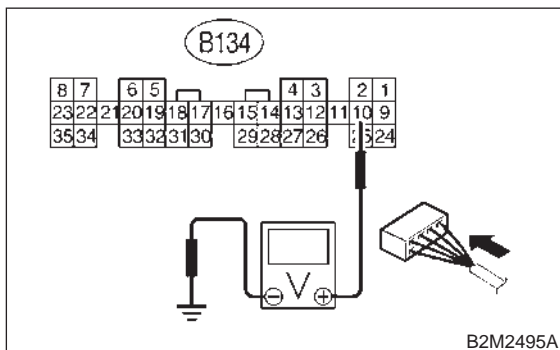
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

NOTE:

Drain valve operation check can be executed using Subaru Select Monitor. For procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

Connector & terminal

(B134) No. 10 (+) — Chassis ground (-):



CHECK : Does voltage change between 0 and 10 volts?

YES : Go to step 10CL2.

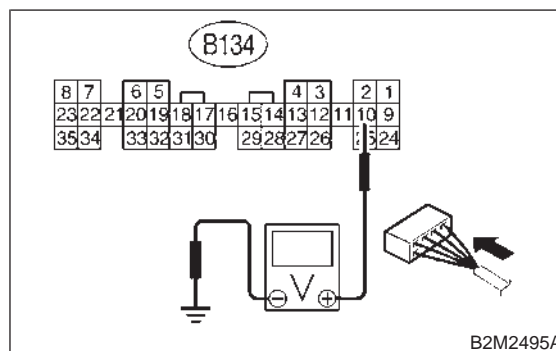
NO : Even if MIL light up, the circuit has returned to a normal condition at this time. In this case, repair poor contact in ECM connector.

10CL2 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 10 (+) — Chassis ground (-):



CHECK : Is the voltage more than 10 V?

YES : Go to step 10CL4.

NO : Go to step 10CL3.

10CL3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in ECM connector?

YES : Repair poor contact in ECM connector.

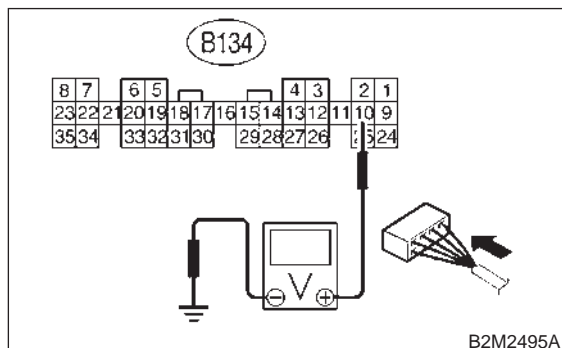
NO : Replace ECM. <Ref. to 2-7 [W15A0].>

10CL4 : CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from drain valve.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 10 (+) — Chassis ground (-):



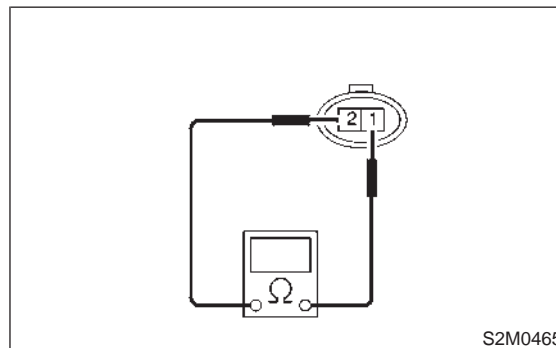
- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair battery short circuit in harness between ECM and drain valve connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Go to step **10CL5**.

10CL5 : CHECK DRAIN VALVE.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between drain valve terminals.

Terminals

No. 1 — No. 2:



- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Replace drain valve <Ref. to 2-1 [W13A0].> and ECM <Ref. to 2-7 [W15A0].>.
- NO** : Go to step **10CL6**.

10CL6 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : **Is there poor contact in ECM connector?**
- YES** : Repair poor contact in ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

MEMO:

CM: DTC P1443 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL FUNCTION PROBLEM —

• DTC DETECTING CONDITION:

- Immediately after fault occurrence

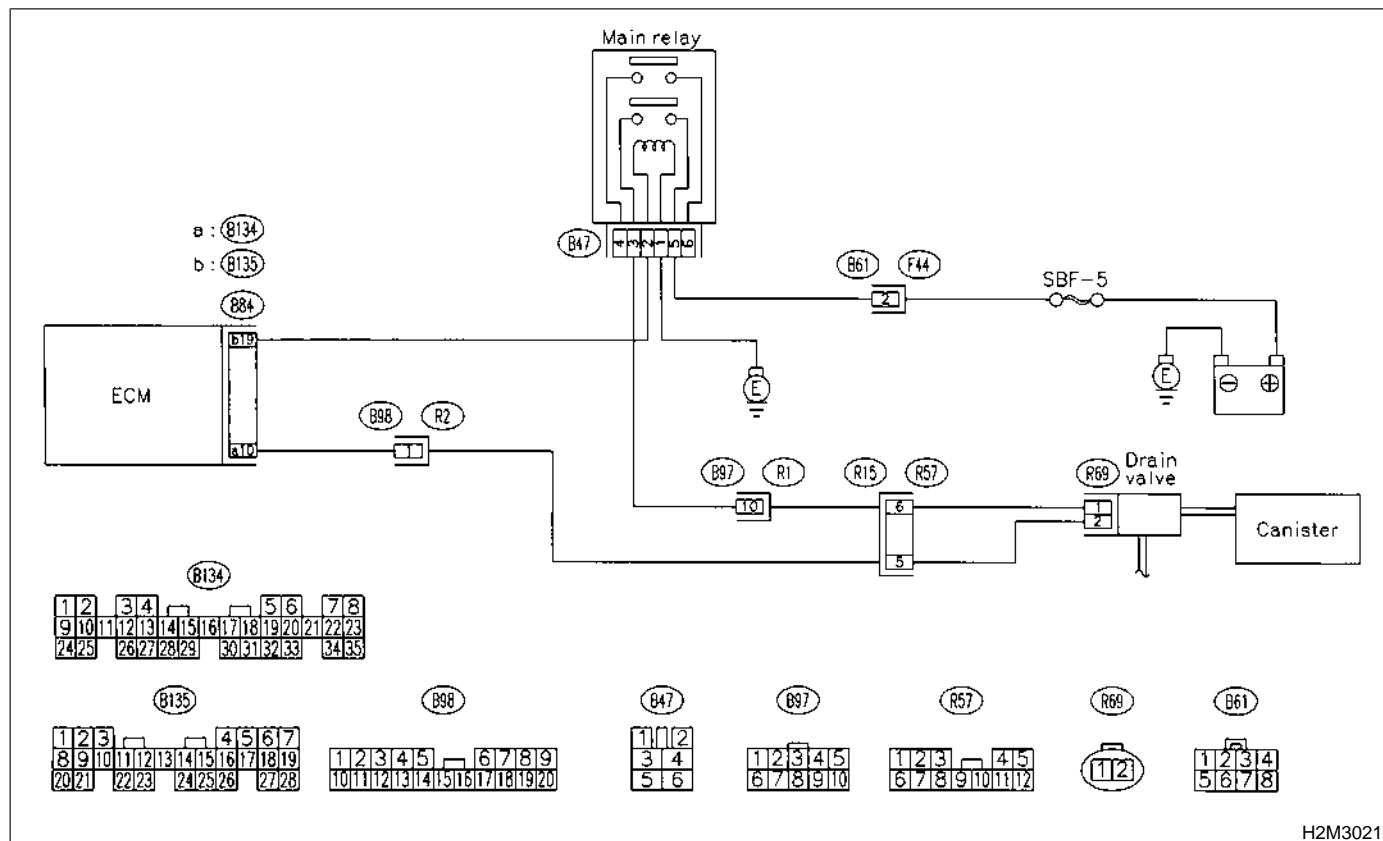
• TROUBLE SYMPTOM:

- Improper fuel supply

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3021

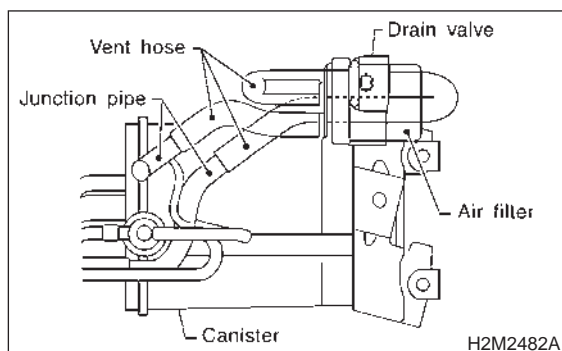
10CM1 : CHECK ANY OTHER DTC ON DISPLAY.

- CHECK** : Is there any other DTC on display?
- YES** : Inspect the relevant DTC using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>
- NO** : Go to step 10CM2.

10CM2 : CHECK VENT LINE HOSES.

Check the following items.

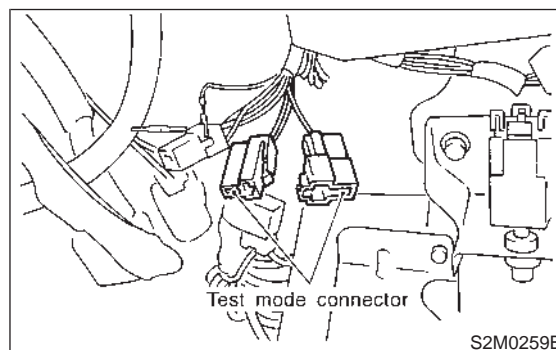
- Clogging of vent hoses between canister and drain valve
- Clogging of vent hose between drain valve and air filter
- Clogging of vent hose between air filter and junction pipe
- Clogging of junction pipe
- Clogging of air filter



- CHECK** : ***Is there a fault in vent line?***
- YES** : Repair or replace the faulty part.
- NO** : Go to step **10CM3**.

10CM3 : CHECK DRAIN VALVE OPERATION.

- 1) Turn ignition switch to OFF.
- 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



- 3) Turn ignition switch to ON.

NOTE:

Drain valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to the "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

- CHECK** : ***Does drain valve produce operating sound?***

- YES** : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

- NO** : Replace drain valve. <Ref. to 2-1 [W13A0].>

CN: DTC P1505 — IDLE CONTROL SYSTEM CIRCUIT HIGH INPUT —**• DTC DETECTING CONDITION:**

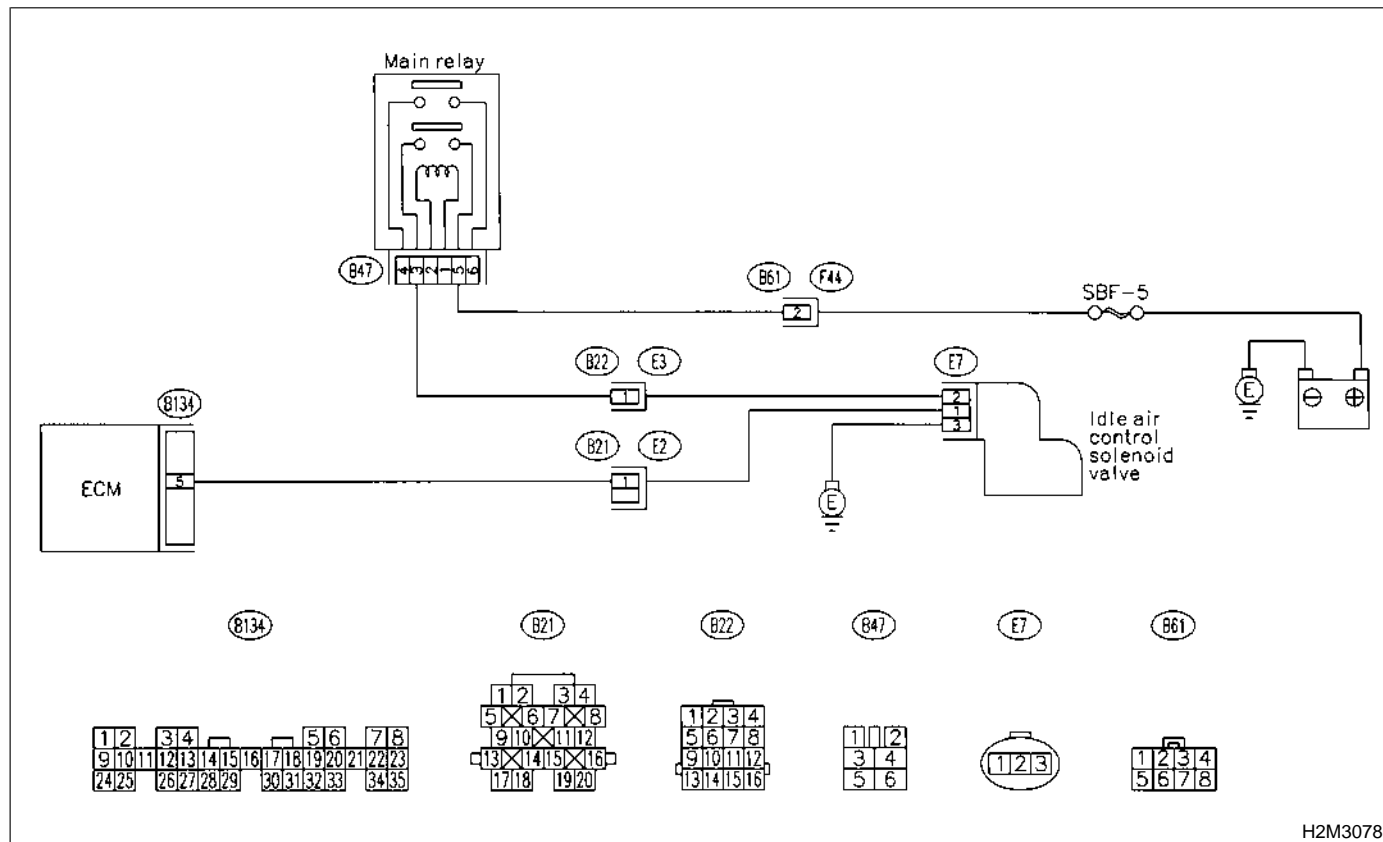
- Immediately at fault recognition

• TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

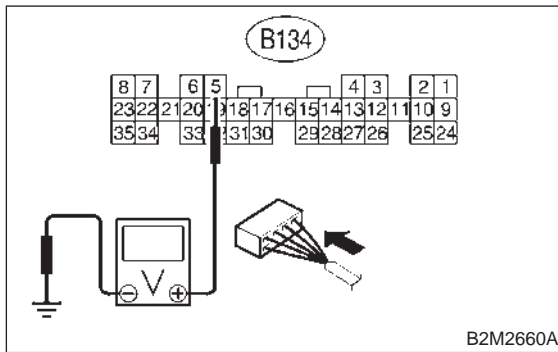
H2M3078

10CN1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 5 (+) — Chassis ground (-):



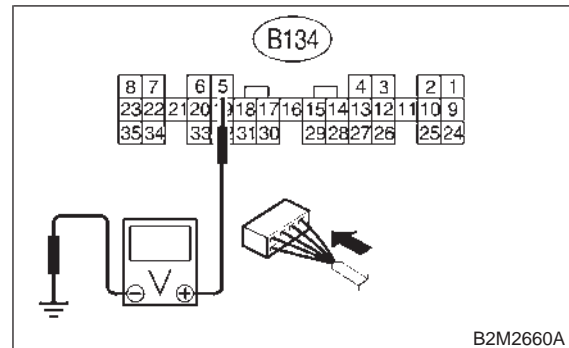
- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 10CN2.
- NO** : Go to step 10CN3.

10CN2 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from idle air control solenoid valve.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 5 (+) — Chassis ground (-):



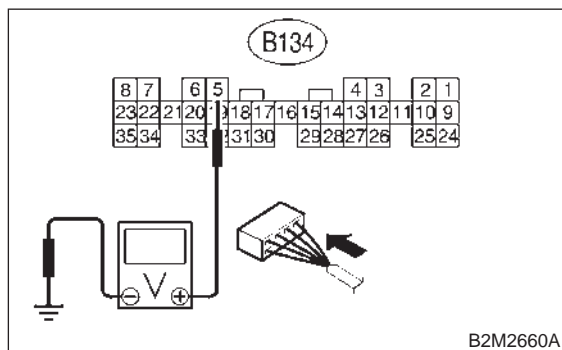
- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in harness between ECM and idle air control solenoid valve connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Replace idle air control solenoid valve <Ref. to 2-7 [W12A1].> and ECM <Ref. to 2-7 [W15A0].>.

10CN3 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 5 (+) — Chassis ground (-):



CHECK : **Does the voltage change more than 10 V by shaking harness and connector of ECM while monitoring the value with voltage meter?**

YES : Repair battery short circuit in harness between ECM and idle air control solenoid valve connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>

NO : Contact with SOA service.

NOTE:

Inseption by DTM is required, because probable cause is deterioration of multiple parts.

CO: DTC P1507 — IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE) —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

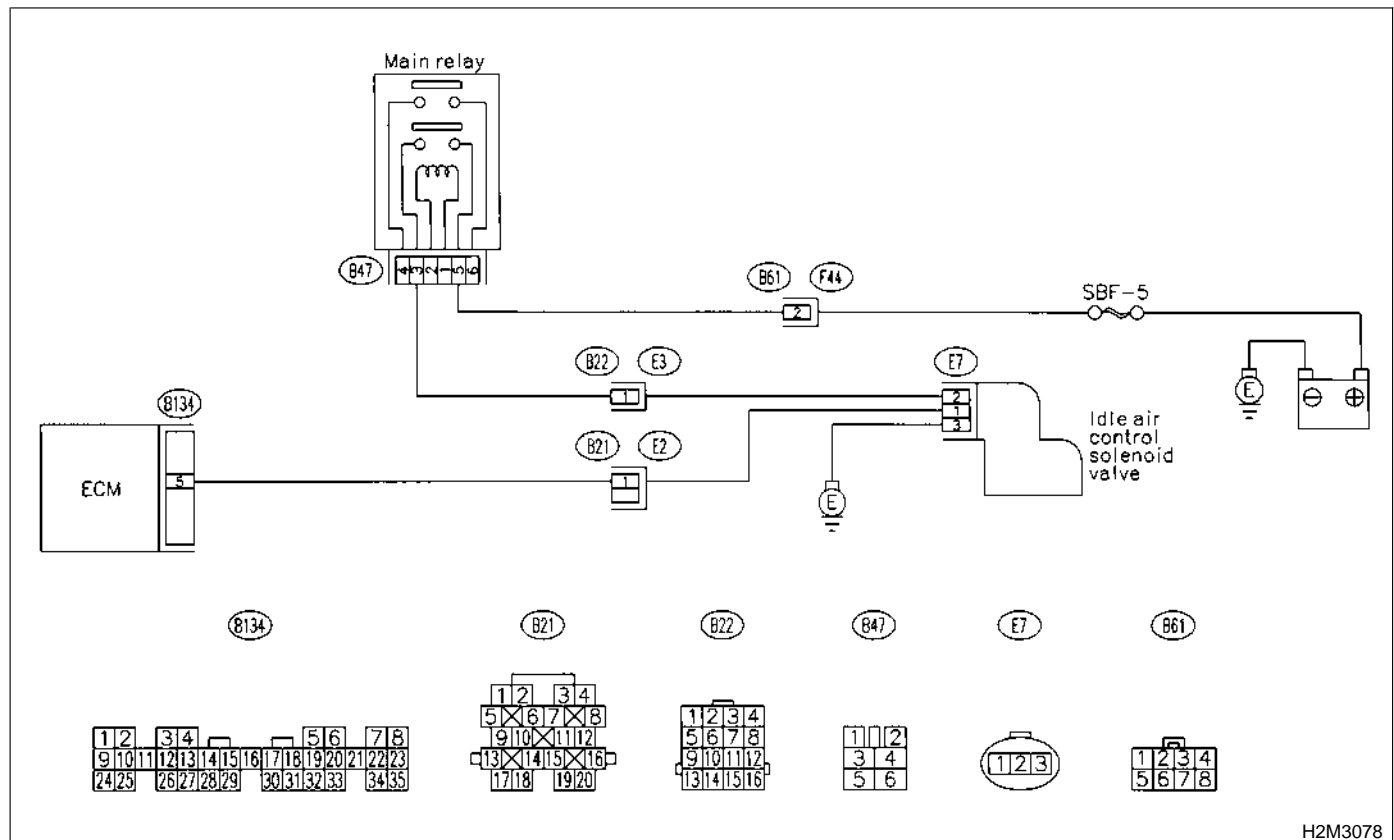
• TROUBLE SYMPTOM:

- Engine keeps running at higher revolution than specified idling revolution.

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3078

10CO1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0116 or P0117 or P0505 or P1505?

YES : Inspect DTC P0116 or P0117 or P0505 or P1505 using "10. Diagnostics Chart with Trouble Code for 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T10A0].>

NOTE:

In this case, it is not necessary to inspect DTC P1507.

NO : Go to step 10CO2.

10CO2 : CHECK AIR INTAKE SYSTEM.

- 1) Turn ignition switch to ON.
- 2) Start engine, and idle it.
- 3) Check the following items.
 - Loose installation of intake manifold, idle air control solenoid valve and throttle body
 - Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket
 - Disconnections of vacuum hoses

CHECK : Is there a fault in air intake system?

YES : Repair air suction and leaks.

NO : Replace idle air control solenoid valve. <Ref. to 2-7 [W12A1].>

CP: DTC P1520 — COOLING FAN RELAY 1 CIRCUIT HIGH INPUT —**• DTC DETECTING CONDITION:**

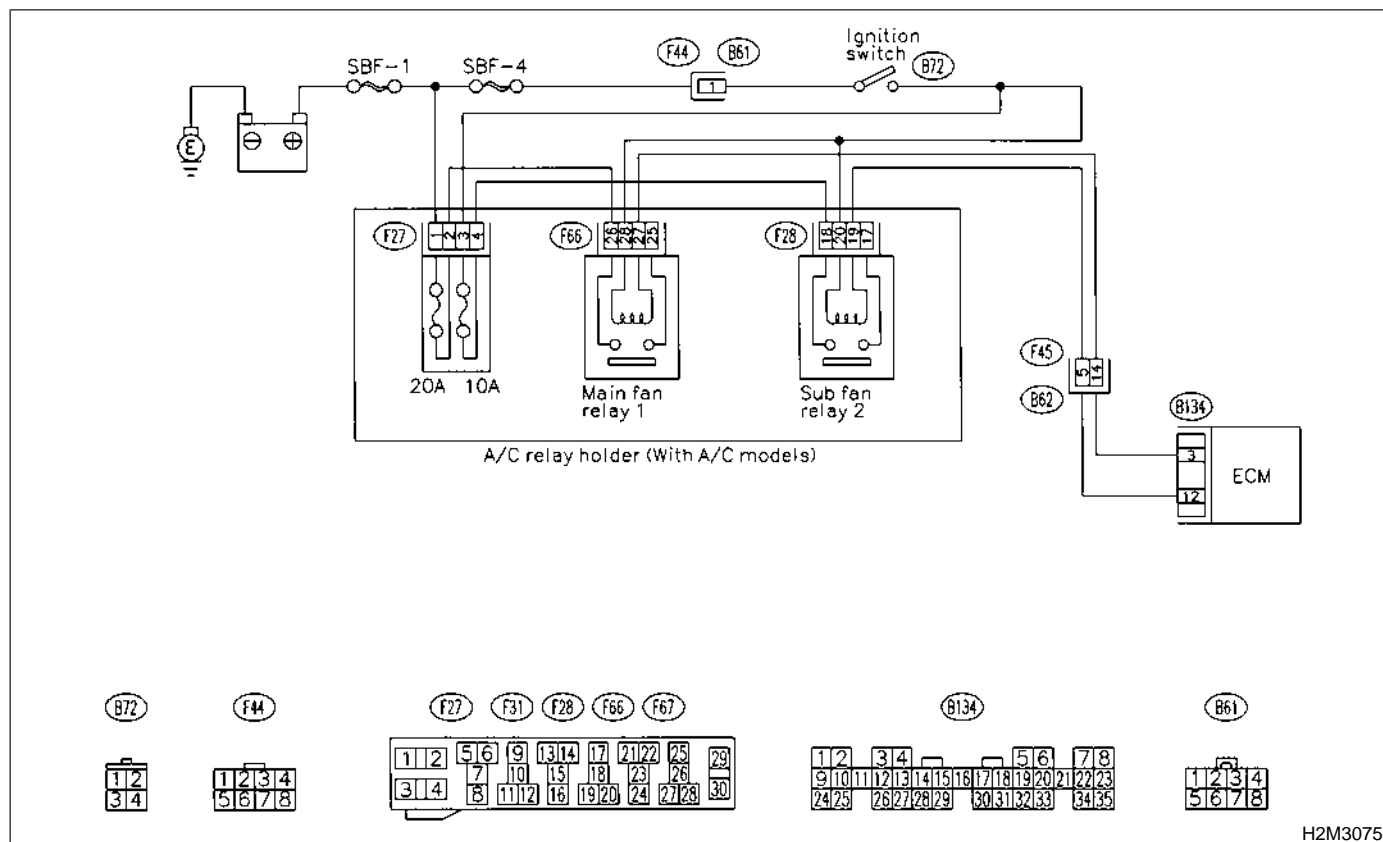
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Radiator fan does not operate properly.
- Overheating

CAUTION:

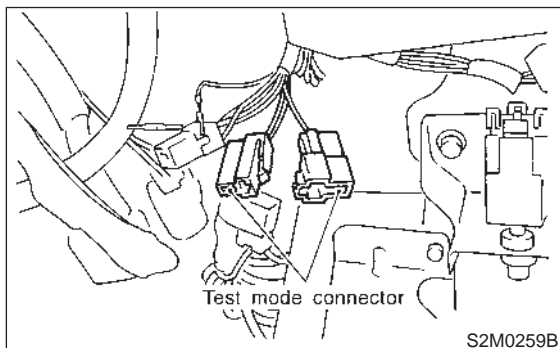
After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

H2M3075

10CP1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to OFF.
- 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



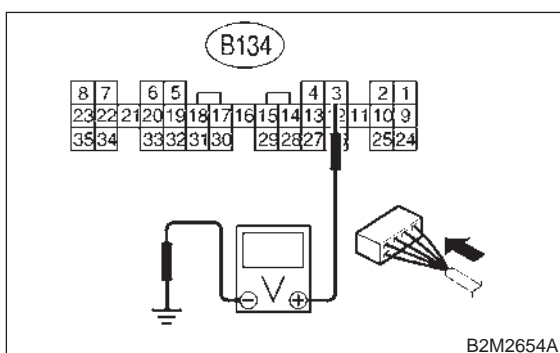
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

NOTE:

Radiator fan relay operation check can be executed using Subaru Select Monitor. For procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

Connector & terminal

(B134) No. 3 (+) — Chassis ground (-):



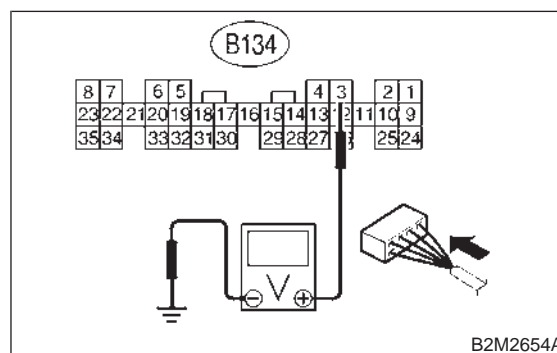
- CHECK** : Does voltage change between 0 and 10 volts?
- YES** : Even if MIL lights up, the circuit has returned to a normal condition at this time. In this case, repair poor contact in ECM connector.
- NO** : Go to step 10CP2.

10CP2 : CHECK SHORT CIRCUIT IN RADIATOR FAN RELAY 1 CONTROL CIRCUIT.

- 1) Turn ignition switch to OFF.
- 2) Remove main fan relay 1 and sub fan relay 1. (with A/C models)
Remove main fan relay. (without A/C models)
- 3) Disconnect test mode connector.
- 4) Turn ignition switch to ON.
- 5) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 3 (+) — Chassis ground (-):



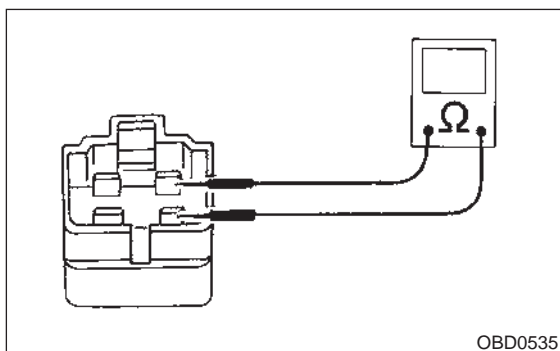
- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in radiator fan relay 1 control circuit. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Go to step 10CP3.

10CP3 : CHECK VEHICLE MODEL.

- CHECK** : Is the vehicle equipped with A/C?
- YES** : Go to step 10CP4.
- NO** : Go to step 10CP6.

10CP4 : CHECK MAIN FAN RELAY 1.

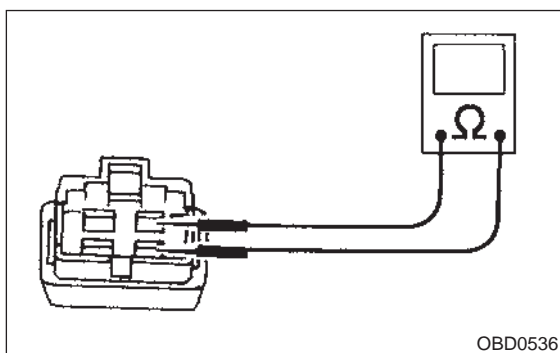
- 1) Turn ignition switch to OFF.
- 2) Remove main fan relay 1.
- 3) Measure resistance between main fan relay 1 terminals.

Terminal**No. 1 — No. 3:**

- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Replace main fan relay 1 and ECM <Ref. to 2-7 [W15A0].>
- NO** : Go to step **10CP5**.

10CP5 : CHECK SUB FAN RELAY 1.

- 1) Remove sub fan relay 1.
- 2) Measure resistance between sub fan relay 1 terminals.

Terminal**No. 1 — No. 3**

- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Replace sub fan relay 1 and ECM <Ref. to 2-7 [W15A0].>
- NO** : Go to step **10CP6**.

10CP6 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : **Is there poor contact in ECM connector?**
- YES** : Repair poor contact in ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

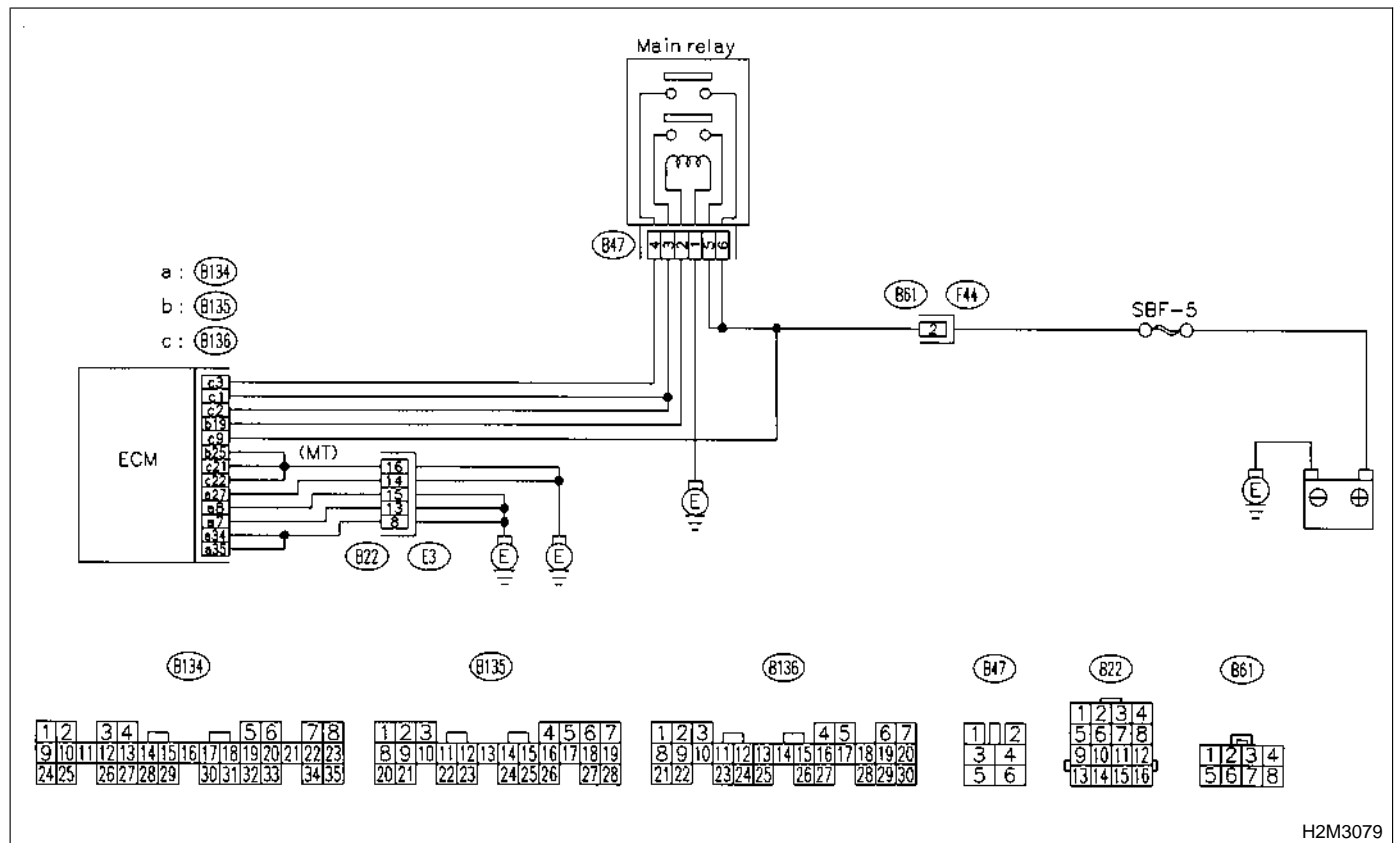
MEMO:

CQ: DTC P1560 — BACK-UP VOLTAGE CIRCUIT MALFUNCTION —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

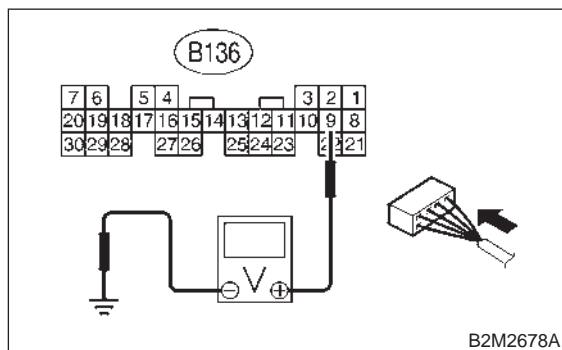
H2M3079

10CQ1 : CHECK INPUT SIGNAL FOR ECM.

- 1) Turn ignition switch to OFF.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B136) No. 9 (+) — Chassis ground (-):



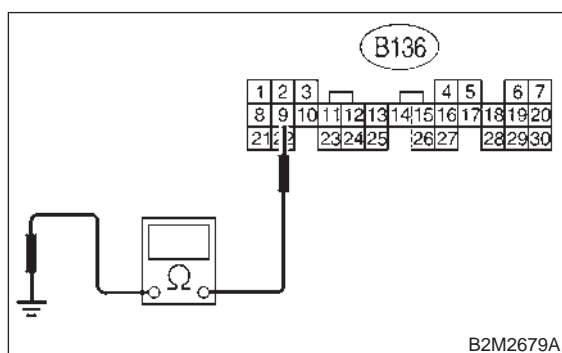
- CHECK** : Is the voltage more than 10 V?
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 10CQ2.

10CQ2 : CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.

- 1) Disconnect connector from ECM.
- 2) Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B136) No. 9 — Chassis ground:



- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in harness between ECM connector and battery terminal.
- NO** : Go to step 10CQ3.

10CQ3 : CHECK FUSE SBF-2.

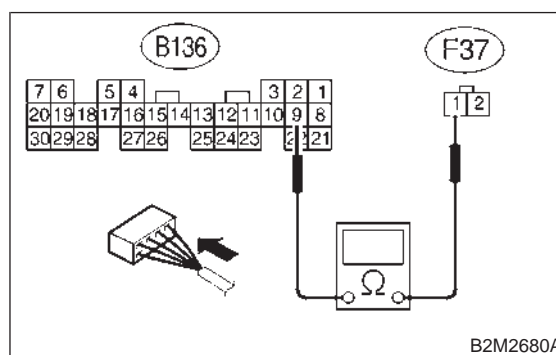
- CHECK** : Is fuse blown?
- YES** : Replace fuse. <Ref. to 6-3 [D6B0].>
- NO** : Go to step 10CQ4.

10CQ4 : CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.

- 1) Disconnect connector from main fuse box.
- 2) Measure resistance of harness between ECM and main fuse box connector.

Connector & terminal

(B136) No. 9 — (F37) No. 1:



- CHECK** : Is the resistance less than 1 Ω?
- YES** : Repair poor contact in ECM and main fuse box connector.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and main fuse box connector
- Poor contact in coupling connector (F44)
- Poor contact in ECM connector
- Poor contact in main fuse box connector

CR: DTC P1700 — THROTTLE POSITION SENSOR CIRCUIT MALFUNCTION FOR AUTOMATIC TRANSMISSION —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

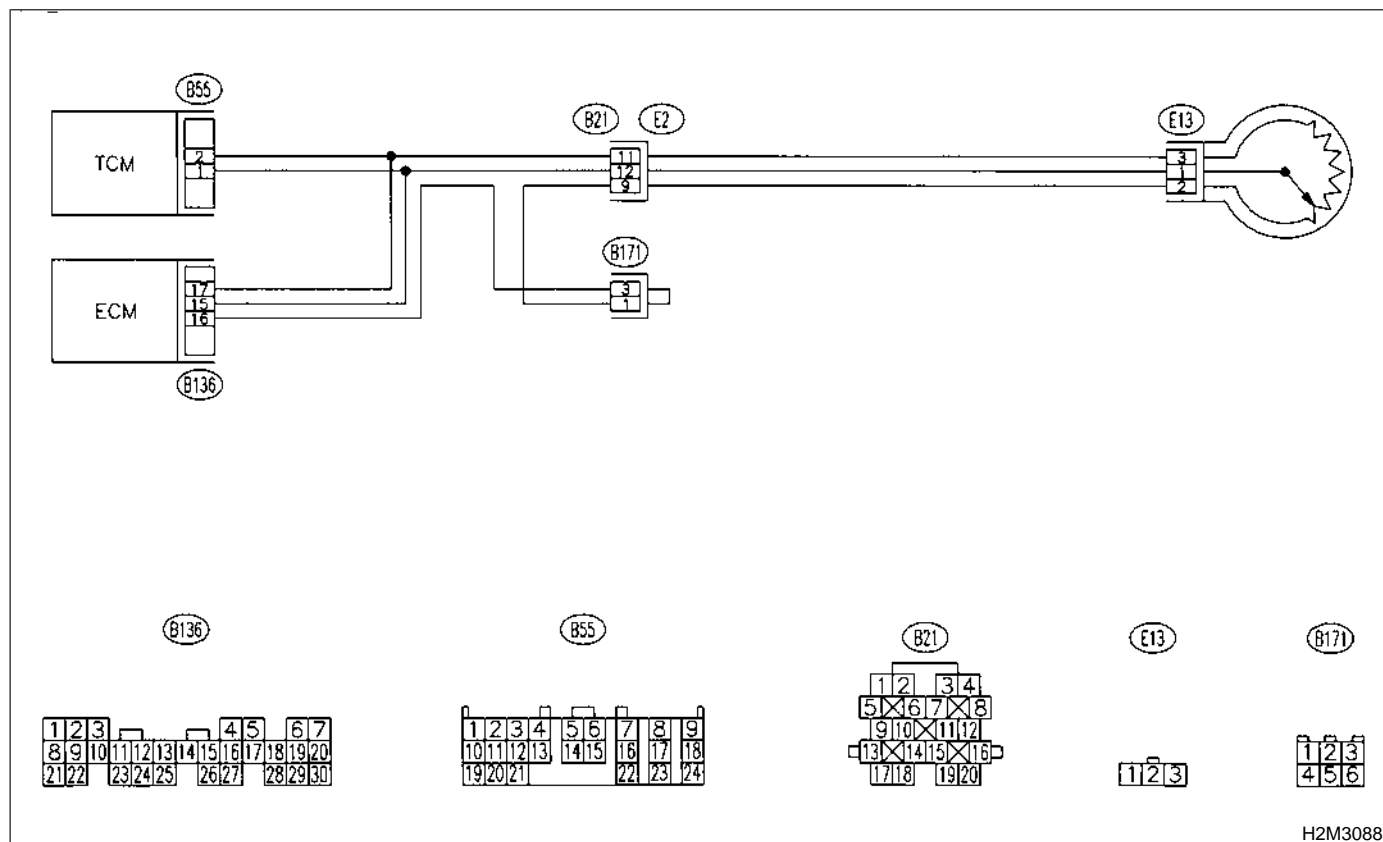
• TROUBLE SYMPTOM:

- Shift point too high or too low; engine brake not effected in "3" range; excessive shift shock; excessive tight corner "braking"

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3088

10CR1 : CHECK DTC P1700 ON DISPLAY.

- CHECK** : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1700?
- YES** : Check throttle position sensor circuit. <Ref. to 3-2 [T8F0].>
- NO** : It is not necessary to inspect DTC P1700.

MEMO:

CS: DTC P1701 — CRUISE CONTROL SET SIGNAL CIRCUIT MALFUNCTION FOR AUTOMATIC TRANSMISSION —

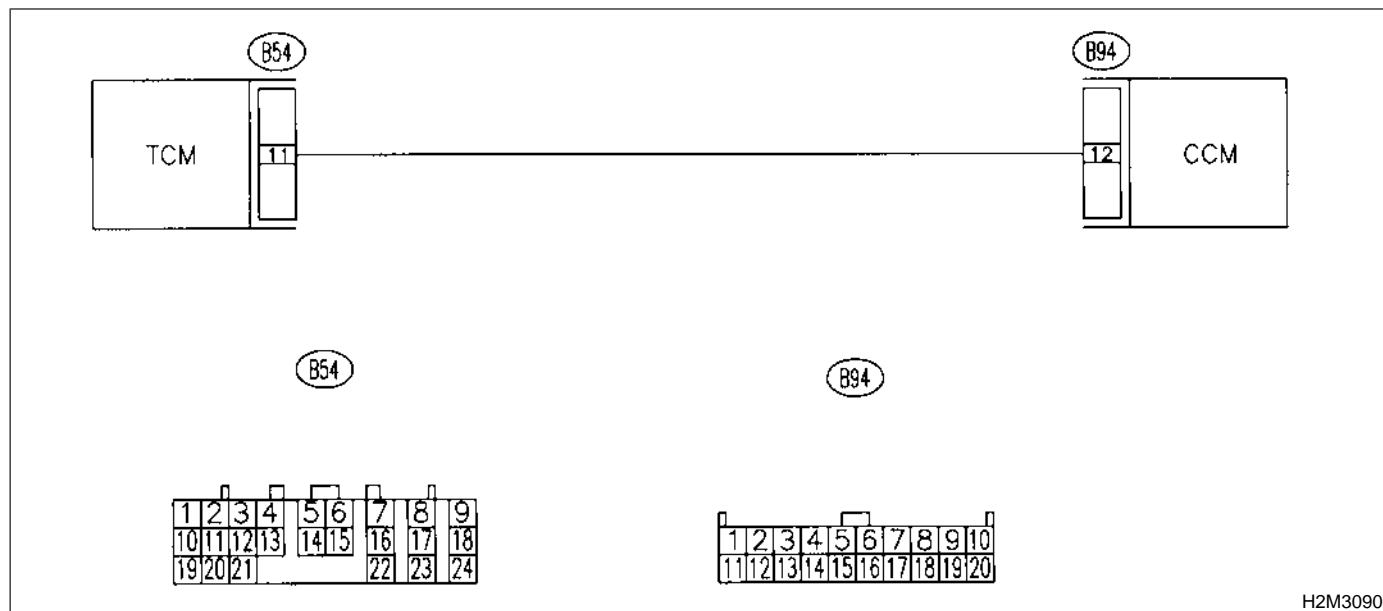
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

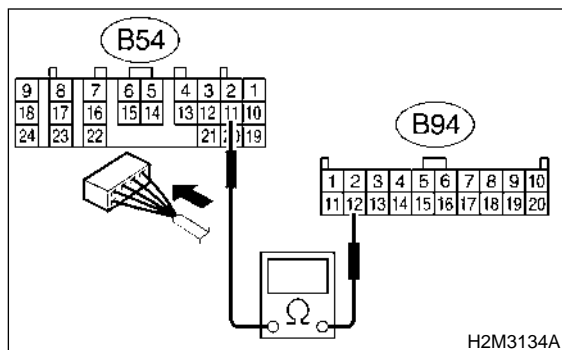


10CS1 : CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from TCM and CCM.
- 3) Measure resistance of harness between TCM and CCM connector.

Connector & terminal

(B54) No. 11 — (B94) No. 12:



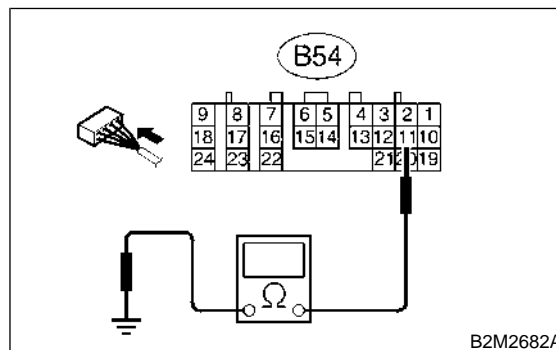
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 10CS2.
- NO** : Repair open circuit in harness between TCM and CCM connector.

10CS2 : CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B54) No. 11 — Chassis ground:



- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair short circuit in harness between TCM and CCM connector.
- NO** : Go to step 10CS3.

10CS3 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect connector to TCM and CCM.
- 2) Lift-up the vehicle or set the vehicle on free rollers.

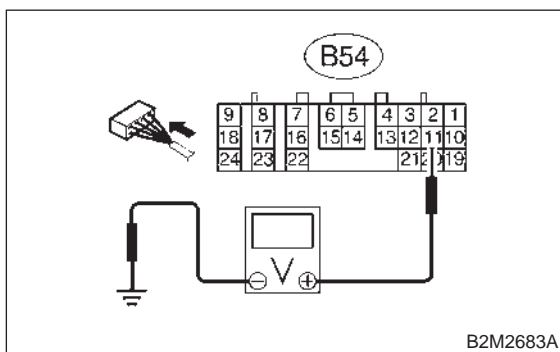
CAUTION:

On AWD models, raise all wheels off ground.

- 3) Start the engine.
- 4) Cruise control main switch to ON.
- 5) TCS OFF switch to ON. (with TCS models only)
- 6) Move selector lever to "D" and slowly increase vehicle speed to 50 km/h (31 MPH).
- 7) Cruise control set switch to ON.
- 8) Measure voltage between TCM and chassis ground.

Connector & terminal

(B54) No. 11 (+) — Chassis ground (-):



CHECK : **Is the resistance less than 1 V?**

YES : Go to step **10CS4**.

NO : Check cruise control set circuit.

10CS4 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in TCM connector?**

YES : Repair poor contact in TCM connector.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

Diagram illustrating the connection between the ECM (Engine Control Module) and the TCM (Transmission Control Module) via the B135/B54 connector.

The ECM is connected to the TCM through a 4-pin cable. The connection is labeled B135 on the ECM side and B54 on the TCM side.

The pinout for the ECM (B135) is as follows:

1	2	3				4	5	6	7		
8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28			

The pinout for the TCM (B54) is as follows:

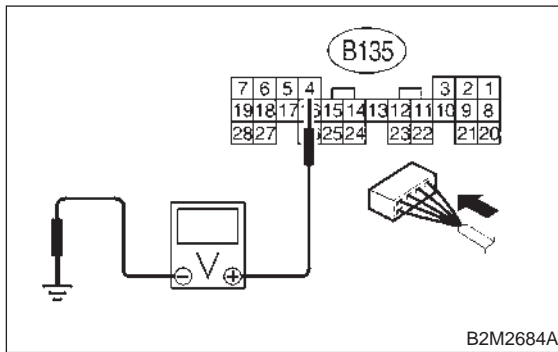
1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21				22	23	24

10CT1 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 4 (+) — Chassis ground (-):



- CHECK** : Is the voltage less than 1 V?
- YES** : Go to step 10CT2.
- NO** : Even if MIL lights up, the circuit has returned to a normal condition at this time.

NOTE:

In this case, repair the following:

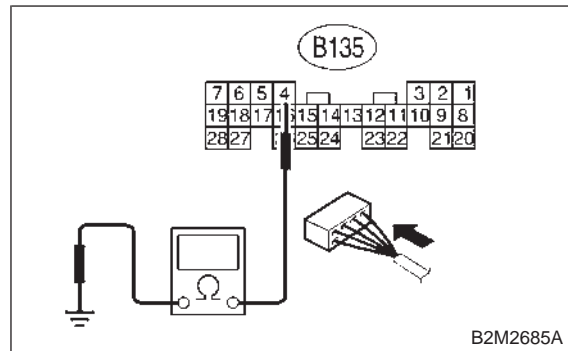
- Poor contact in ECM connector
- Poor contact in TCM connector

10CT2 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM and TCM.
- 3) Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B135) No. 4 — Chassis ground:



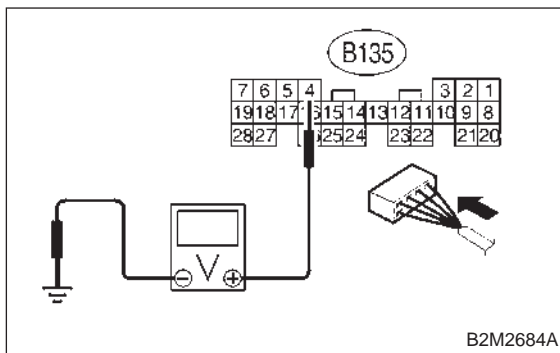
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in harness between ECM and TCM connector.
- NO** : Go to step 10CT3.

10CT3 : CHECK OUTPUT SIGNAL FOR ECM.

- 1) Connect connector to ECM.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 4 (+) — Chassis ground (-):



- CHECK** : **Is the voltage more than 5 V?**
- YES** : Replace TCM. <Ref. to 3-2 [W22A0].>
- NO** : Repair poor contact in ECM connector.

CU: DTC P1703 — LOW CLUTCH TIMING CONTROL SOLENOID VALVE CIRCUIT MALFUNCTION —

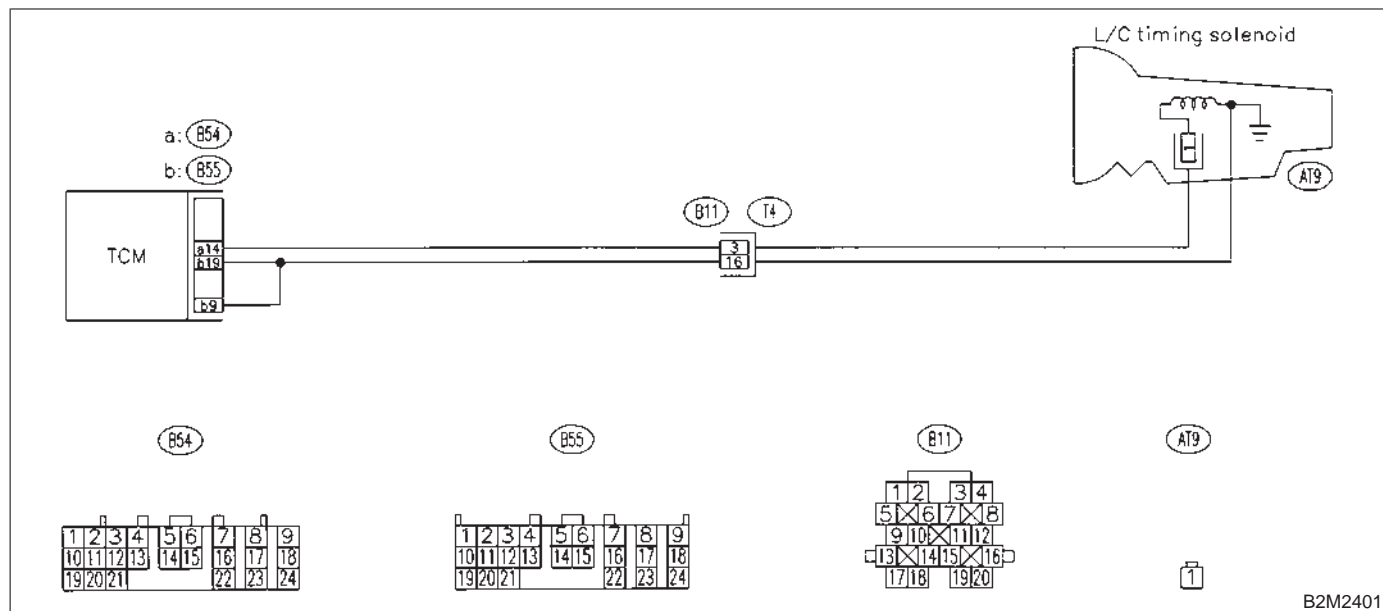
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



B2M2401

10CU1 : CHECK DTC P1703 ON DISPLAY.

- CHECK** : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1703?
- YES** : Check low clutch timing control solenoid valve circuit. <Ref. to 3-2 [T8M0].>
- NO** : It is not necessary to inspect DTC P1703.

CV: DTC P1704 — 2-4 BRAKE TIMING CONTROL SOLENOID VALVE CIRCUIT MALFUNCTION —

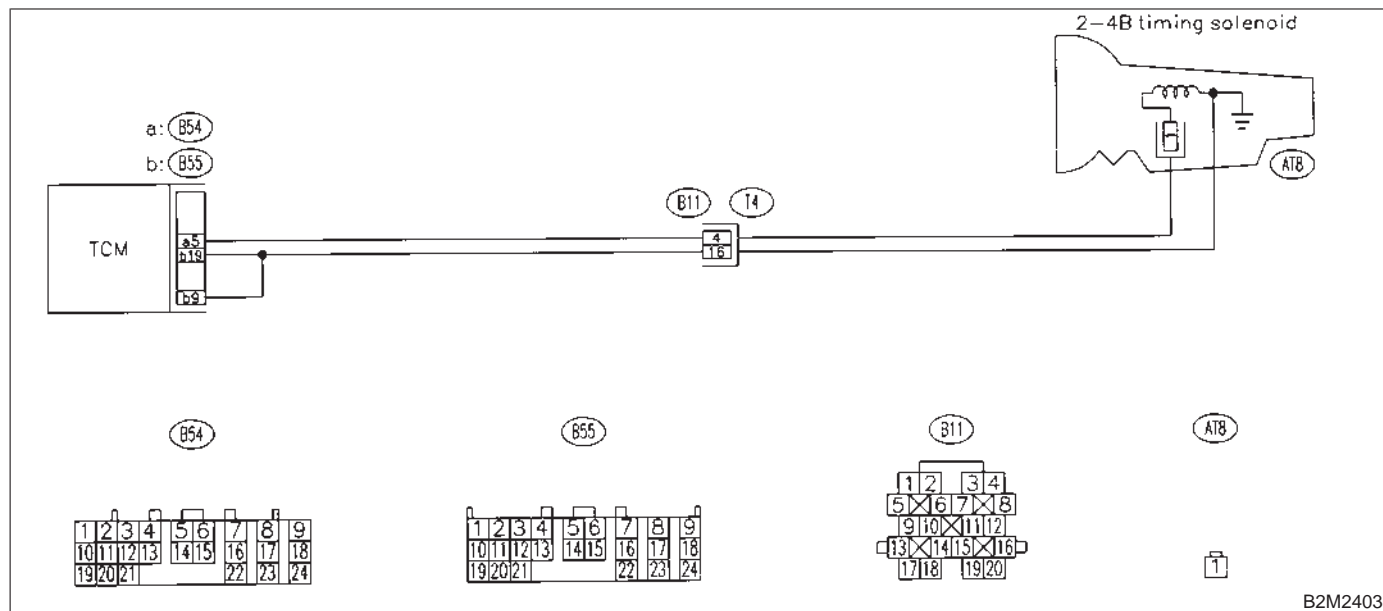
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



10CV1 : CHECK DTC P1704 ON DISPLAY.

- CHECK** : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1704?
- YES** : Check 2-4 brake timing control solenoid valve circuit. <Ref. to 3-2 [T8N0].>
- NO** : It is not necessary to inspect DTC P1704.

CW: DTC P1705 — 2-4 BRAKE PRESSURE CONTROL SOLENOID VALVE (DUTY SOLENOID D) CIRCUIT MALFUNCTION —

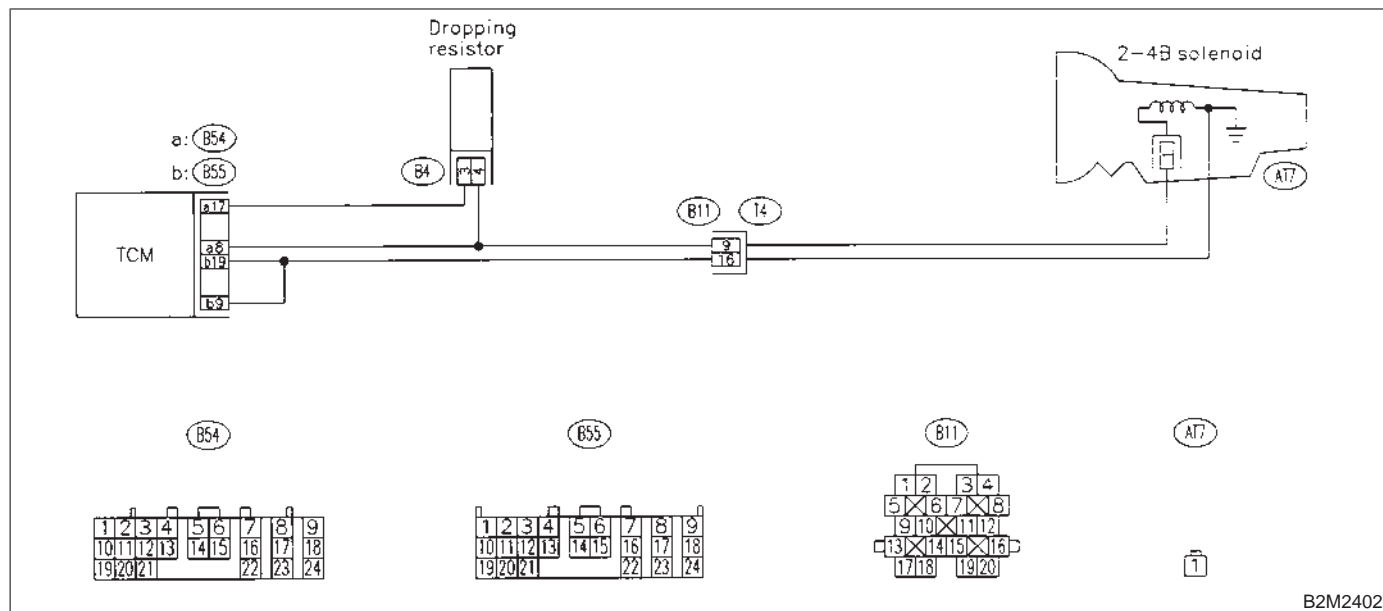
● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:



B2M2402

10CW1 : CHECK DTC P1705 ON DISPLAY.

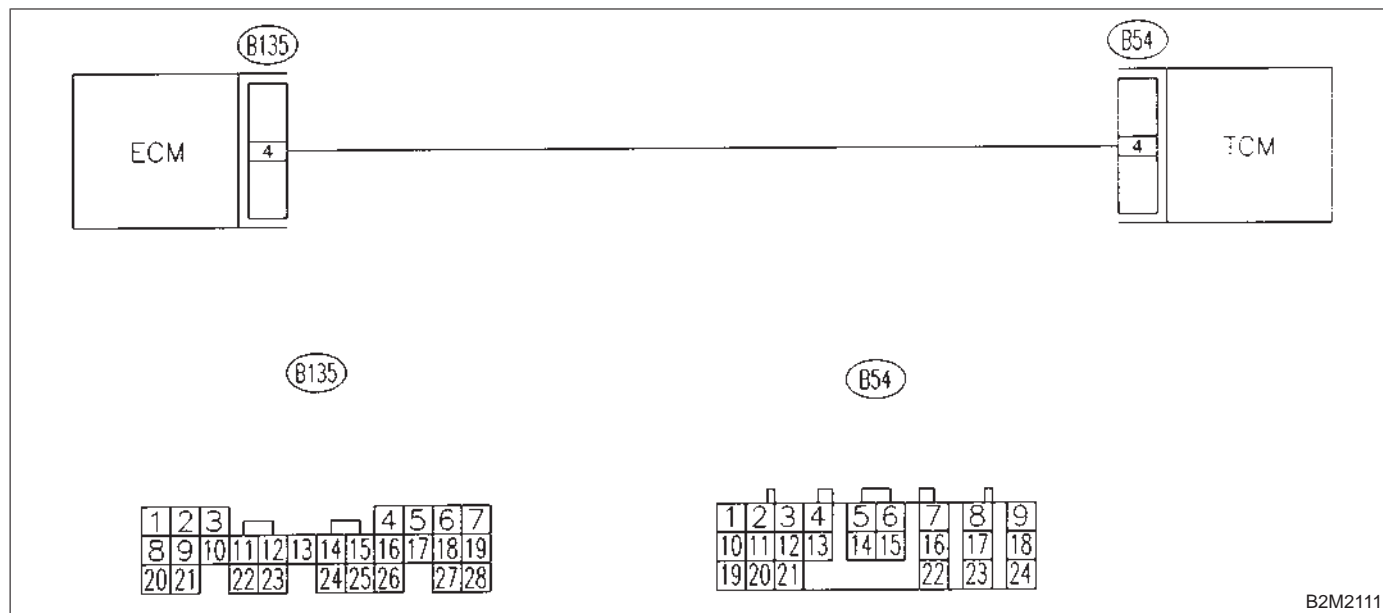
- CHECK** : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1705?
- YES** : Check 2-4 brake pressure control solenoid valve circuit. <Ref. to 3-2 [T8P0].>
- NO** : It is not necessary to inspect DTC P1705.

CX: DTC P1722 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT HIGH INPUT —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

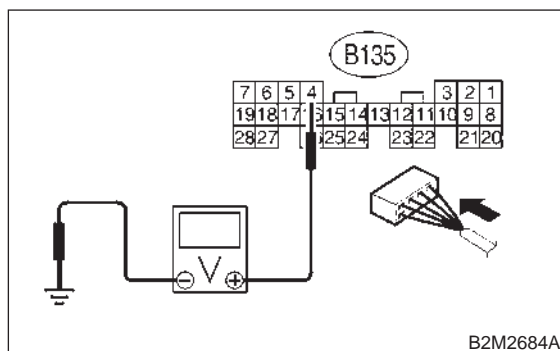
B2M2111

10CX1 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 4 (+) — Chassis ground (-):



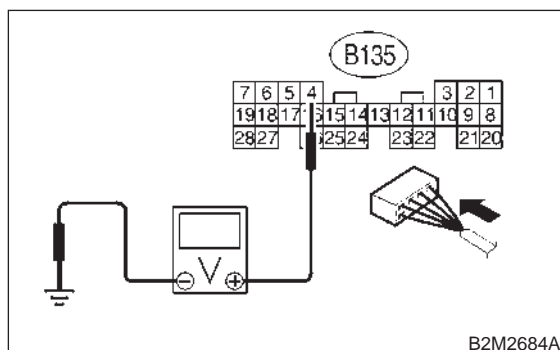
- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in harness between ECM and TCM connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Go to step 10CX2.

10CX2 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B135) No. 4 (+) — Chassis ground (-):



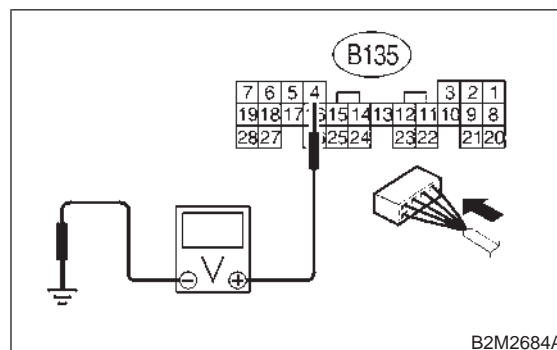
- CHECK** : Is the voltage more than 4 V?
- YES** : Go to step 10CX5.
- NO** : Go to step 10CX3.

10CX3 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B135) No. 4 (+) — Chassis ground (-):



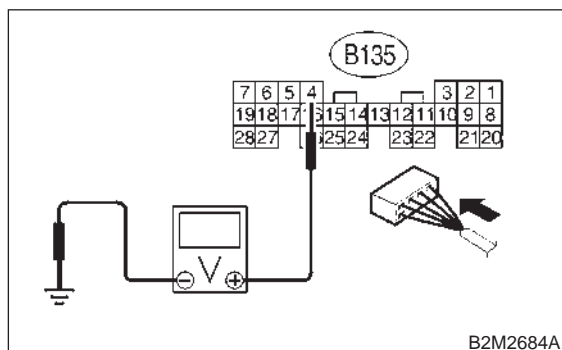
- CHECK** : Is the voltage less than 1 V?
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 10CX4.

10CX4 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 4 (+) — Chassis ground (-):



CHECK : Does the voltage change from 1 V to 4 V while monitoring the value with voltage meter?

YES : Even if MIL lights up, the circuit has returned to a normal condition at this time.

NOTE:

In this case, repair the following:

- Poor contact in ECM connector
- Poor contact in TCM connector

NO : Contact with SOA service.

NOTE:

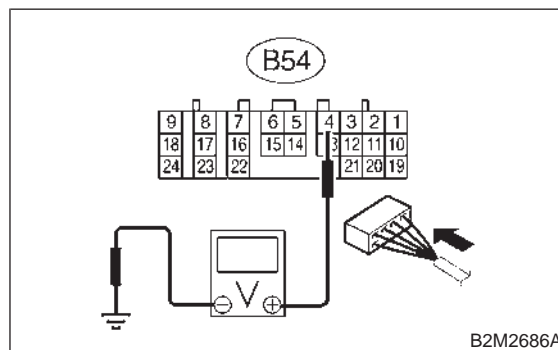
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10CX5 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

Measure voltage between TCM and chassis ground.

Connector & terminal

(B54) No. 4 (+) — Chassis ground (-):



CHECK : Is the voltage more than 4 V?

YES : Go to step 10CX6.

NO : Repair open circuit in harness between ECM and TCM connector.

10CX6 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in TCM connector?

YES : Repair poor contact in TCM connector.

NO : Check TCM power supply line and grounding line.

CY: DTC P1742 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT MALFUNCTION —

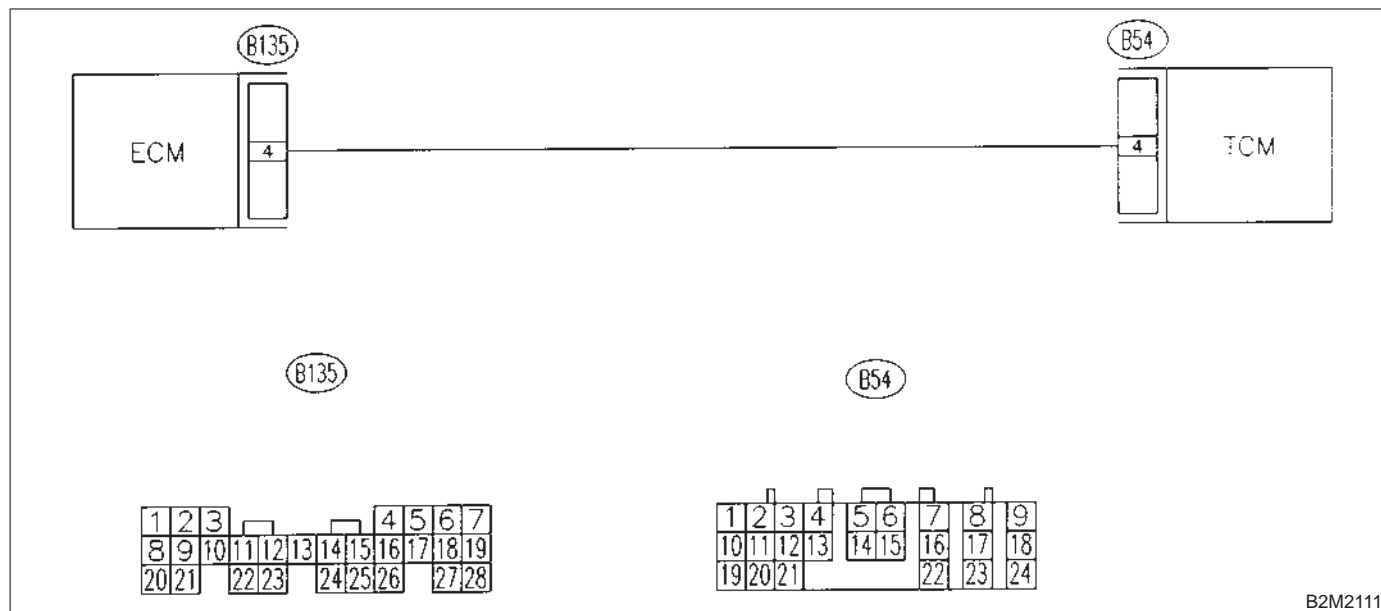
● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

● WIRING DIAGRAM:



B2M2111

10CY1 : CHECK DRIVING CONDITION.

- 1) Start and warm-up the engine until the radiator fan makes one complete rotation.
- 2) Drive the vehicle.

CHECK : *Is AT shift control functioning properly?*

YES : Go to step 10CY2.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

10CY2 : CHECK ACCESSORY.

CHECK : *Are car phone and/or CB installed on vehicle?*

YES : Repair grounding line of car phone or CB system.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles

A: DIAGNOSTIC TROUBLE CODE (DTC) LIST

DTC No.	Item	Index
P0101	Mass air flow sensor circuit range/performance problem (high input)	<Ref. to 2-7 [T11B0].>
P0102	Mass air flow sensor circuit low input	<Ref. to 2-7 [T11C0].>
P0103	Mass air flow sensor circuit high input	<Ref. to 2-7 [T11D0].>
P0106	Pressure sensor circuit range/performance problem	<Ref. to 2-7 [T11E0].>
P0107	Pressure sensor circuit low input	<Ref. to 2-7 [T11F0].>
P0108	Pressure sensor circuit high input	<Ref. to 2-7 [T11G0].>
P0116	Engine coolant temperature sensor circuit low input	<Ref. to 2-7 [T11H0].>
P0117	Engine coolant temperature sensor circuit high input	<Ref. to 2-7 [T11I0].>
P0121	Throttle position sensor circuit range/performance problem (high input)	<Ref. to 2-7 [T11J0].>
P0122	Throttle position sensor circuit low input	<Ref. to 2-7 [T11K0].>
P0123	Throttle position sensor circuit high input	<Ref. to 2-7 [T11L0].>
P0125	Insufficient coolant temperature for closed loop fuel control	<Ref. to 2-7 [T11M0].>
P0130	Front oxygen sensor circuit malfunction	<Ref. to 2-7 [T11N0].>
P0133	Front oxygen sensor circuit slow response	<Ref. to 2-7 [T11O0].>
P0135	Front oxygen sensor heater circuit malfunction	<Ref. to 2-7 [T11P0].>
P0136	Rear oxygen sensor circuit malfunction	<Ref. to 2-7 [T11Q0].>
P0139	Rear oxygen sensor circuit slow response	<Ref. to 2-7 [T11R0].>
P0141	Rear oxygen sensor heater circuit malfunction	<Ref. to 2-7 [T11S0].>
P0170	Fuel trim malfunction	<Ref. to 2-7 [T11T0].>
P0181	Fuel temperature sensor A circuit range/performance problem	<Ref. to 2-7 [T11U0].>
P0182	Fuel temperature sensor A circuit low input	<Ref. to 2-7 [T11V0].>
P0183	Fuel temperature sensor A circuit high input	<Ref. to 2-7 [T11W0].>
P0301	Cylinder 1 misfire detected	<Ref. to 2-7 [T11X0].>
P0302	Cylinder 2 misfire detected	<Ref. to 2-7 [T11Y0].>
P0303	Cylinder 3 misfire detected	<Ref. to 2-7 [T11Z0].>

DTC No.	Item	Index
P0304	Cylinder 4 misfire detected	<Ref. to 2-7 [T11AA0].>
P0325	Knock sensor circuit high input	<Ref. to 2-7 [T11AB0].>
P0335	Crankshaft position sensor circuit malfunction	<Ref. to 2-7 [T11AC0].>
P0336	Crankshaft position sensor circuit range/performance problem	<Ref. to 2-7 [T11AD0].>
P0340	Camshaft position sensor circuit malfunction	<Ref. to 2-7 [T11AE0].>
P0341	Camshaft position sensor circuit range/performance problem	<Ref. to 2-7 [T11AF0].>
P0420	Catalyst system efficiency below threshold	<Ref. to 2-7 [T11AG0].>
P0440	Evaporative emission control system malfunction	<Ref. to 2-7 [T11AH0].>
P0443	Evaporative emission control system purge control valve circuit low input	<Ref. to 2-7 [T11AI0].>
P0446	Evaporative emission control system vent control low input	<Ref. to 2-7 [T11AJ0].>
P0451	Evaporative emission control system pressure sensor range/performance problem	<Ref. to 2-7 [T11AK0].>
P0452	Evaporative emission control system pressure sensor low input	<Ref. to 2-7 [T11AL0].>
P0453	Evaporative emission control system pressure sensor high input	<Ref. to 2-7 [T11AM0].>
P0461	Fuel level sensor circuit range/performance problem	<Ref. to 2-7 [T11AN0].>
P0462	Fuel level sensor circuit low input	<Ref. to 2-7 [T11AO0].>
P0463	Fuel level sensor circuit high input	<Ref. to 2-7 [T11AP0].>
P0480	Cooling fan relay 1 circuit low input	<Ref. to 2-7 [T11AQ0].>
P0483	Cooling fan function problem	<Ref. to 2-7 [T11AR0].>
P0500	Vehicle speed sensor malfunction	<Ref. to 2-7 [T11AS0].>
P0506	Idle control system RPM lower than expected	<Ref. to 2-7 [T11AT0].>
P0507	Idle control system RPM higher than expected	<Ref. to 2-7 [T11AU0].>
P0601	Internal control module memory check sum error	<Ref. to 2-7 [T11AV0].>
P0703	Brake switch input malfunction	<Ref. to 2-7 [T11AW0].>
P0705	Transmission range sensor circuit malfunction	<Ref. to 2-7 [T11AX0].>
P0710	Transmission fluid temperature sensor circuit malfunction	<Ref. to 2-7 [T11AY0].>
P0715	Torque converter turbine speed sensor circuit malfunction	<Ref. to 2-7 [T11AZ0].>
P0720	Output speed sensor (vehicle speed sensor 2) circuit malfunction	<Ref. to 2-7 [T11BA0].>

DTC No.	Item	Index
P0725	Engine speed input circuit malfunction	<Ref. to 2-7 [T11BB0].>
P0731	Gear 1 incorrect ratio	<Ref. to 2-7 [T11BC0].>
P0732	Gear 2 incorrect ratio	<Ref. to 2-7 [T11BD0].>
P0733	Gear 3 incorrect ratio	<Ref. to 2-7 [T11BE0].>
P0734	Gear 4 incorrect ratio	<Ref. to 2-7 [T11BF0].>
P0740	Torque converter clutch system malfunction	<Ref. to 2-7 [T11BG0].>
P0743	Torque converter clutch system (Solenoid B) electrical	<Ref. to 2-7 [T11BH0].>
P0748	Pressure control solenoid (Duty solenoid A) electrical	<Ref. to 2-7 [T11BI0].>
P0753	Shift solenoid A (Shift solenoid 1) electrical	<Ref. to 2-7 [T11BJ0].>
P0758	Shift solenoid B (Shift solenoid 2) electrical	<Ref. to 2-7 [T11BK0].>
P1100	Starter switch circuit low input	<Ref. to 2-7 [T11BL0].>
P1101	Neutral position switch circuit low input [MT vehicles]	<Ref. to 2-7 [T11BM0].>
P1101	Neutral position switch circuit high input [AT vehicles]	<Ref. to 2-7 [T11BN0].>
P1102	Pressure sources switching solenoid valve circuit low input	<Ref. to 2-7 [T11BO0].>
P1103	Engine torque control signal 1 circuit malfunction	<Ref. to 2-7 [T11BP0].>
P1106	Engine torque control signal 2 circuit malfunction	<Ref. to 2-7 [T11BQ0].>
P1115	Engine torque control cut signal circuit high input	<Ref. to 2-7 [T11BR0].>
P1116	Engine torque control cut signal circuit low input	<Ref. to 2-7 [T11BS0].>
P1120	Starter switch circuit high input	<Ref. to 2-7 [T11BT0].>
P1121	Neutral position switch circuit high input [MT vehicles]	<Ref. to 2-7 [T11BU0].>
P1121	Neutral position switch circuit low input [AT vehicles]	<Ref. to 2-7 [T11BV0].>
P1122	Pressure sources switching solenoid valve circuit high input	<Ref. to 2-7 [T11BW0].>
P1141	Mass air flow sensor circuit range/performance problem (low input)	<Ref. to 2-7 [T11BX0].>
P1142	Throttle position sensor circuit range/performance problem (low input)	<Ref. to 2-7 [T11BY0].>
P1143	Pressure sensor circuit range/performance problem (low input)	<Ref. to 2-7 [T11BZ0].>
P1144	Pressure sensor circuit range/performance problem (high input)	<Ref. to 2-7 [T11CA0].>
P1150	Front oxygen sensor heater circuit high input	<Ref. to 2-7 [T11CB0].>

DTC No.	Item	Index
P1151	Rear oxygen sensor heater circuit high input	<Ref. to 2-7 [T11CC0].>
P1325	Knock sensor circuit low input	<Ref. to 2-7 [T11CD0].>
P1400	Fuel tank pressure control solenoid valve circuit low input	<Ref. to 2-7 [T11CE0].>
P1420	Fuel tank pressure control solenoid valve circuit high input	<Ref. to 2-7 [T11CF0].>
P1422	Evaporative emission control system purge control valve circuit high input	<Ref. to 2-7 [T11CG0].>
P1423	Evaporative emission control system vent control high input	<Ref. to 2-7 [T11CH0].>
P1442	Fuel level sensor circuit range/performance problem 2	<Ref. to 2-7 [T11CI0].>
P1443	Evaporative emission control system vent control function problem	<Ref. to 2-7 [T11CJ0].>
P1507	Idle control system malfunction (fail-safe)	<Ref. to 2-7 [T11CK0].>
P1510	Idle air control solenoid valve signal 1 circuit low input	<Ref. to 2-7 [T11CL0].>
P1511	Idle air control solenoid valve signal 1 circuit high input	<Ref. to 2-7 [T11CM0].>
P1512	Idle air control solenoid valve signal 2 circuit low input	<Ref. to 2-7 [T11CN0].>
P1513	Idle air control solenoid valve signal 2 circuit high input	<Ref. to 2-7 [T11CO0].>
P1514	Idle air control solenoid valve signal 3 circuit low input	<Ref. to 2-7 [T11CP0].>
P1515	Idle air control solenoid valve signal 3 circuit high input	<Ref. to 2-7 [T11CQ0].>
P1516	Idle air control solenoid valve signal 4 circuit low input	<Ref. to 2-7 [T11CR0].>
P1517	Idle air control solenoid valve signal 4 circuit high input	<Ref. to 2-7 [T11CS0].>
P1520	Cooling fan relay 1 circuit high input	<Ref. to 2-7 [T11CT0].>
P1540	Vehicle speed sensor malfunction 2	<Ref. to 2-7 [T11CU0].>
P1560	Back-up voltage circuit malfunction	<Ref. to 2-7 [T11CV0].>
P1700	Throttle position sensor circuit malfunction for automatic transmission	<Ref. to 2-7 [T11CW0].>
P1701	Cruise control set signal circuit malfunction for automatic transmission	<Ref. to 2-7 [T11CX0].>
P1702	Automatic transmission diagnosis input signal circuit low input	<Ref. to 2-7 [T11CY0].>
P1703	Low clutch timing control solenoid valve circuit malfunction	<Ref. to 2-7 [T11CZ0].>
P1704	2-4 brake timing control solenoid valve circuit malfunction	<Ref. to 2-7 [T11DA0].>
P1705	2-4 brake pressure control solenoid valve (Duty solenoid D) circuit malfunction	<Ref. to 2-7 [T11DB0].>
P1722	Automatic transmission diagnosis input signal circuit high input	<Ref. to 2-7 [T11DC0].>

DTC No.	Item	Index
P1742	Automatic transmission diagnosis input signal circuit malfunction	<Ref. to 2-7 [T11DD0].>

MEMO:

B: DTC P0101 — MASS AIR FLOW SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

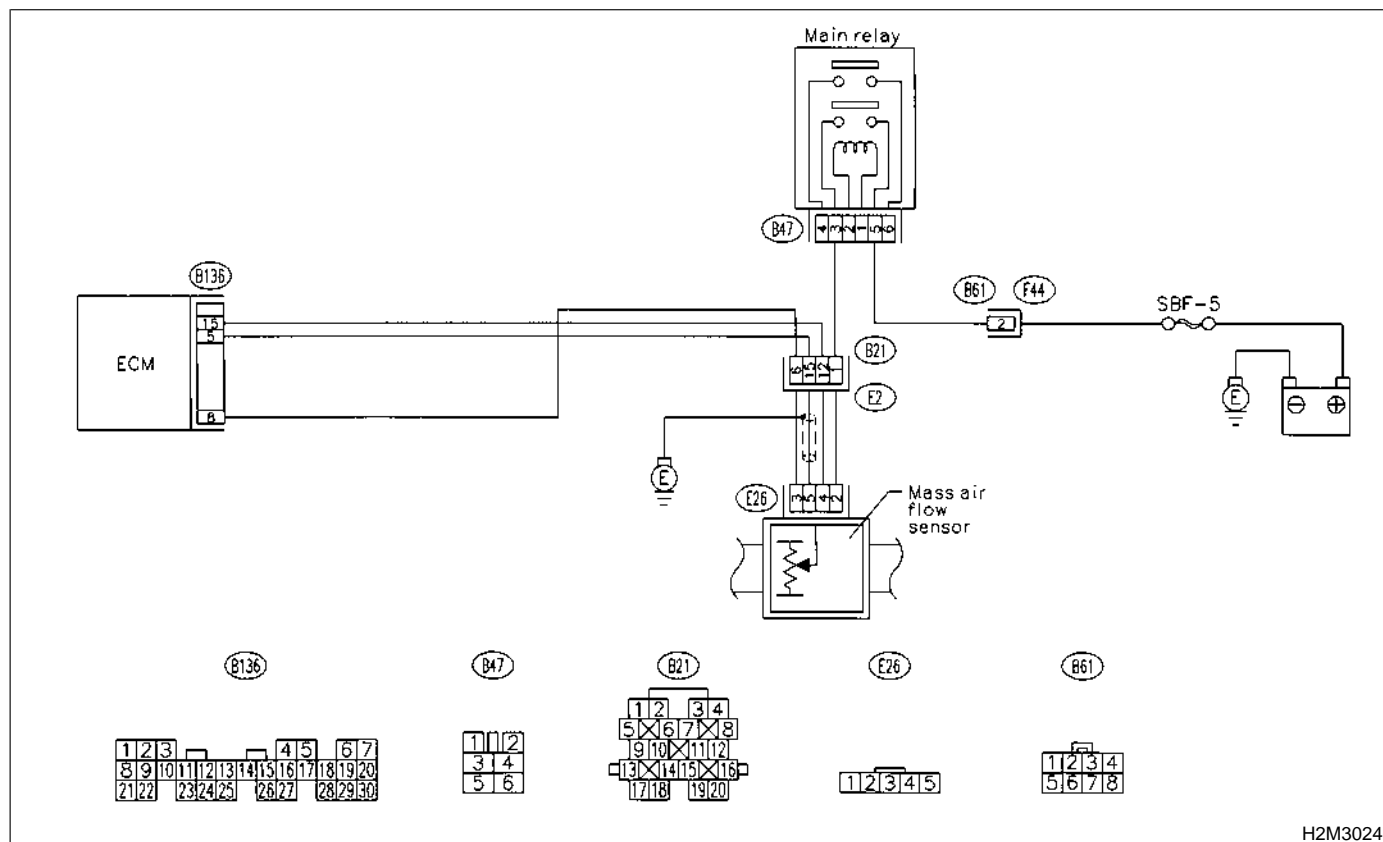
• TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3024

11B1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0102 or P0103?

YES : Inspect DTC P0102 or P0103 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0101.

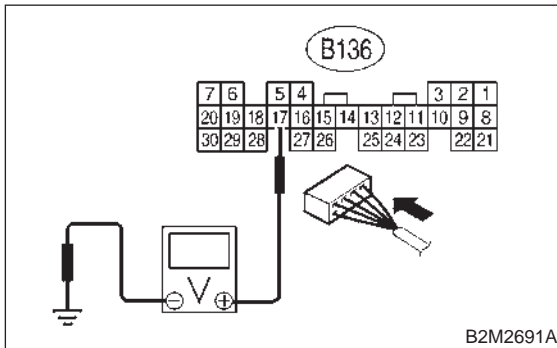
NO : Go to step 11B2.

11B2 : CHECK INPUT SIGNAL FOR ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM connector and chassis ground while throttle valve is fully closed.

Connector & terminal

(B136) No. 17 (+) — Chassis ground (-):



CHECK : Is the voltage between 0.2 V and 1.0 V?

YES : Go to step 11B3.

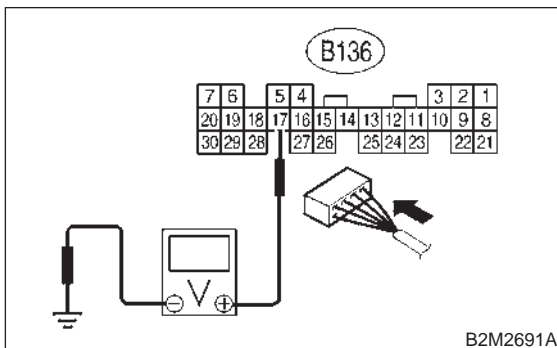
NO : Check throttle position sensor circuit.
<Ref. to 2-7 [T11K0].>

11B3 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground while throttle valve is fully opened.

Connector & terminal

(B136) No. 17 (+) — Chassis ground (-):



CHECK : Is the voltage between 4.2 V and 4.7 V?

YES : Replace mass air flow sensor. <Ref. to 2-7 [W2A0].>

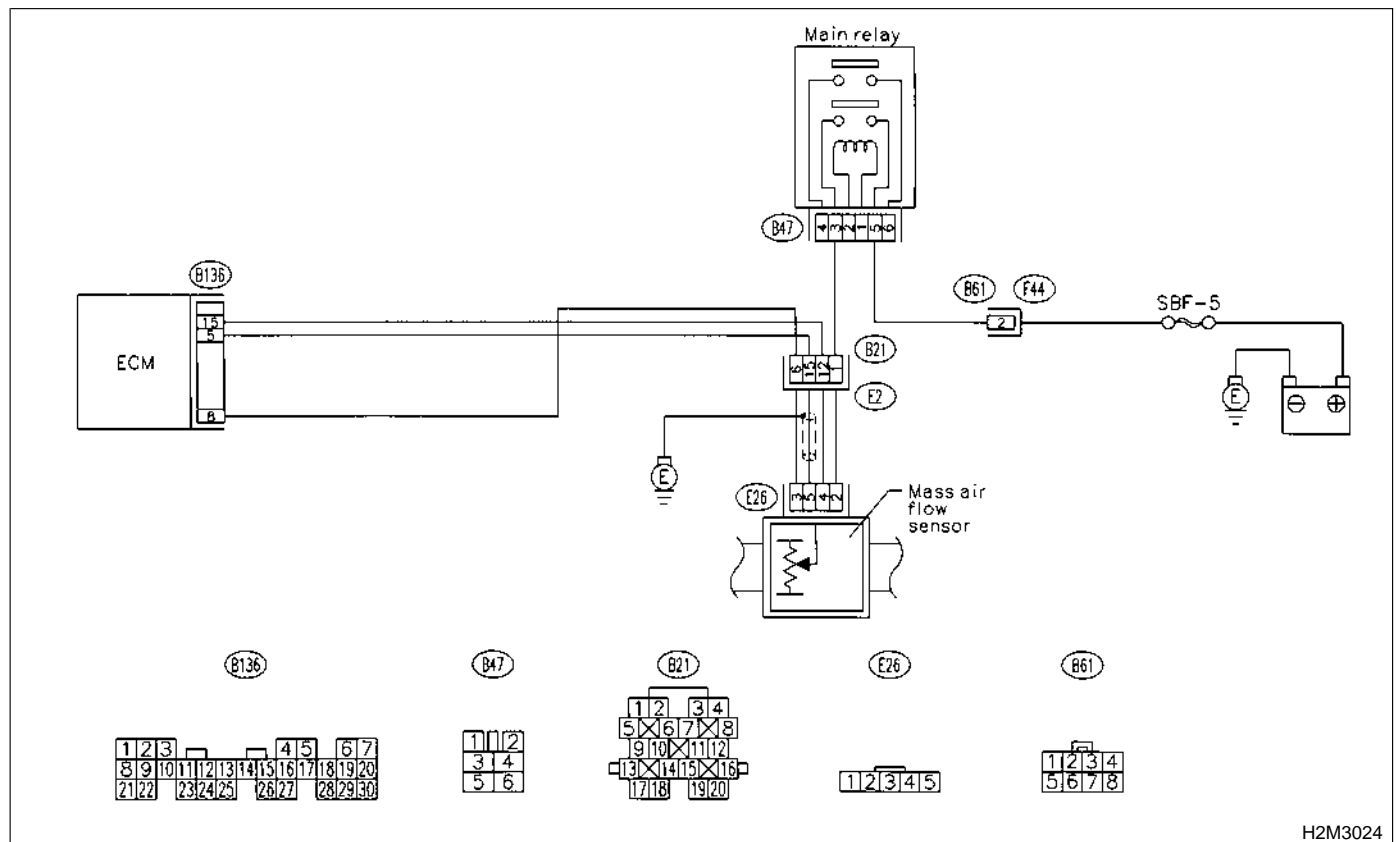
NO : Check throttle position sensor circuit.
<Ref. to 2-7 [T11K0].>

C: DTC P0102 — MASS AIR FLOW SENSOR CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Erroneous idling
 - Engine stalls.
 - Poor driving performance

CAUTION:

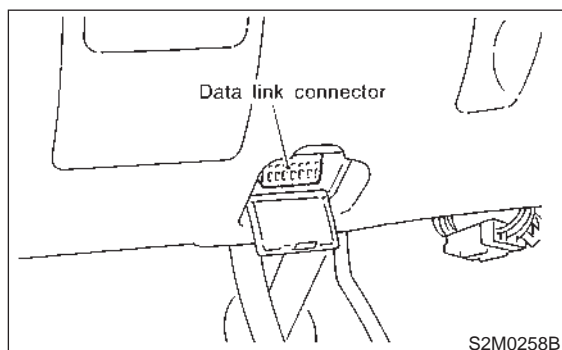
After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

● **WIRING DIAGRAM:**

H2M3024

11C1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read data of mass air flow sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the value equal to or more than 0 g/sec (0 lb/min) or 0.3 V and equal to or less than 186 g/sec (25 lb/min) or 5.0 V?*

YES : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the mass air flow sensor.

NOTE:

In this case, repair the following:

- Open or ground short circuit in harness between mass air flow sensor and ECM connector
- Poor contact in mass air flow sensor or ECM connector

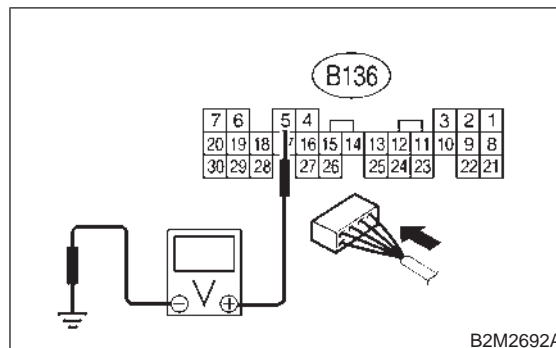
NO : Go to step 11C2.

11C2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground while engine is idling.

Connector & terminal

(B136) No. 5 (+) — Chassis ground (-):



CHECK : *Is the voltage less than 0.3 V?*

YES : Go to step 11C4.

NO : Go to step 11C3.

11C3 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR)

Measure voltage between ECM connector and chassis ground while engine is idling.

CHECK : *Does the voltage change more than 0.3 V by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?*

YES : Repair poor contact in ECM connector.

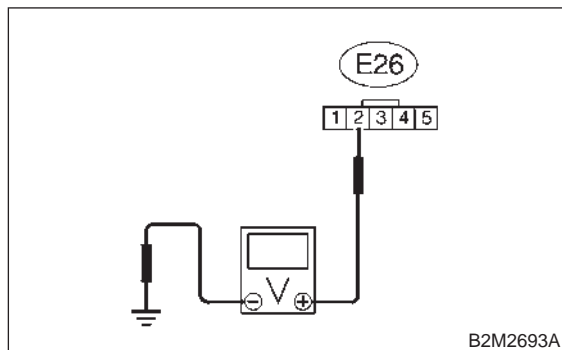
NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

11C4 : CHECK POWER SUPPLY TO MASS AIR FLOW SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from mass air flow sensor.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between mass air flow sensor connector and engine ground.

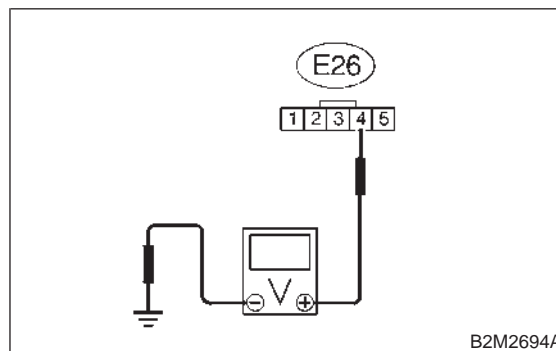
Connector & terminal**(E26) No. 2 (+) — Engine ground (-):****CHECK** : **Is the voltage more than 10 V?****YES** : Go to step 11C5.**NO** : Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open or ground short circuit in harness between main relay and mass air flow sensor connector
- Poor contact in main relay connector
- Poor contact in coupling connector (B21)

11C5 : CHECK POWER SUPPLY TO MASS AIR FLOW SENSOR.

Measure voltage between mass air flow sensor connector and engine ground.

Connector & terminal**(E26) No. 4 (+) — Engine ground (-):****CHECK** : **Is the voltage more than 4 V?****YES** : Go to step 11C6.**NO** : Repair harness and connector.**NOTE:**

In this case, repair the following:

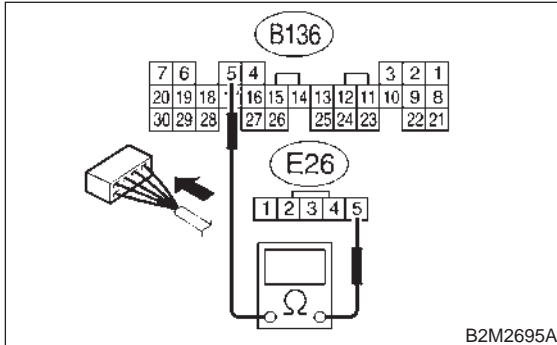
- Open or ground short circuit in harness between ECM and mass air flow sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

11C6 : CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM and mass air flow sensor connector.

Connector & terminal

(B136) No. 5 — (E26) No. 5:



- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 11C7.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

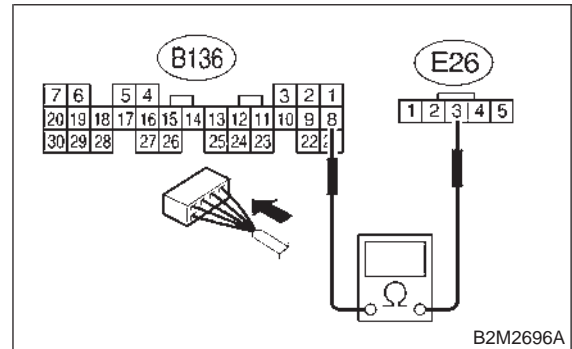
- Open circuit in harness between ECM and mass air flow sensor connector
- Poor contact in mass air flow sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

11C7 : CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.

Measure resistance of harness between ECM and mass air flow sensor connector.

Connector & terminal

(B136) No. 8 — (E26) No. 3:



- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 11C8.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

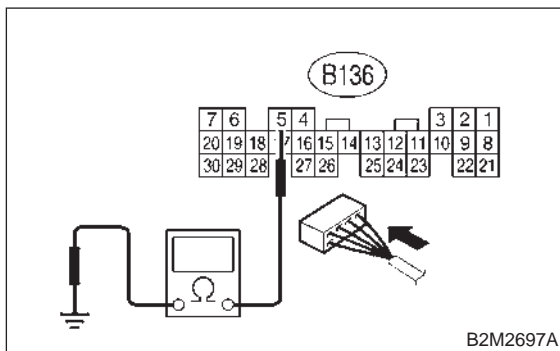
- Open circuit in harness between ECM and mass air flow sensor connector
- Poor contact in mass air flow sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

**11C8 : CHECK HARNESS BETWEEN ECM
AND MASS AIR FLOW SENSOR
CONNECTOR.**

Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B136) No. 5 — Chassis ground:



- CHECK** : **Is the resistance more than 1 MΩ?**
- YES** : Replace mass air flow sensor. <Ref. to 2-7 [W2A0].>
- NO** : Repair ground short circuit in harness between ECM and mass air flow sensor connector.

MEMO:

D: DTC P0103 — MASS AIR FLOW SENSOR CIRCUIT HIGH INPUT —**• DTC DETECTING CONDITION:**

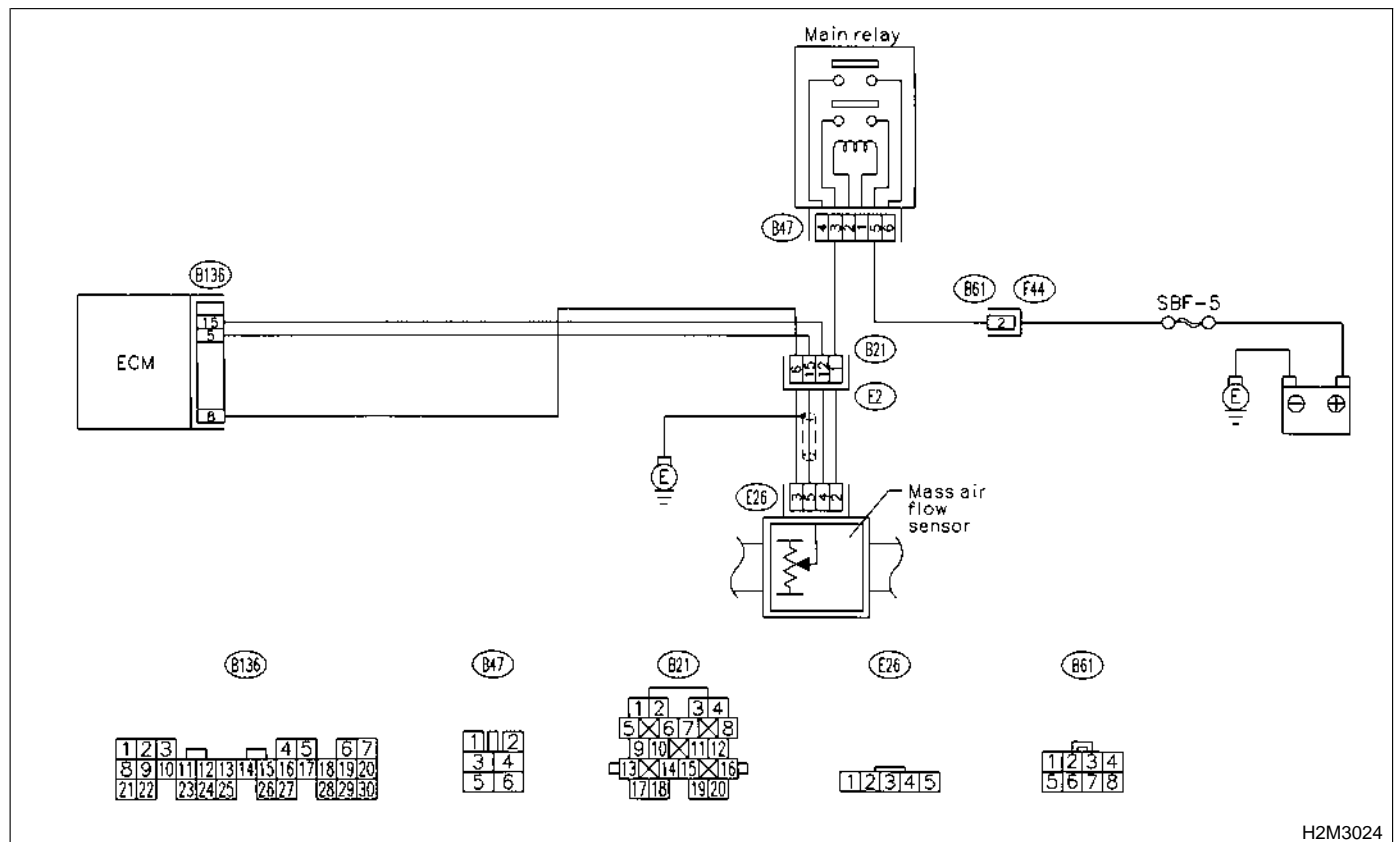
- Immediately at fault recognition

• TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

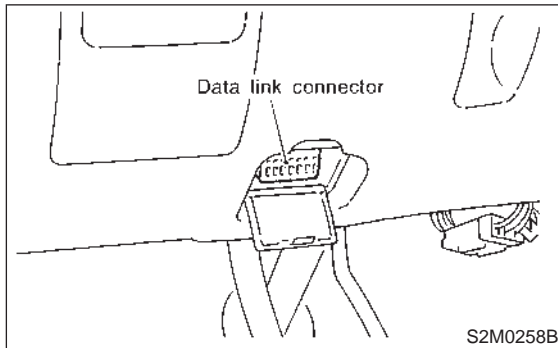
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

H2M3024

11D1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read data of mass air flow sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the value equal to or more than 0 g/sec (0 lb/min) or 0.3 V and equal to or less than 186 g/sec (25 lb/min) or 5.0 V?*

YES : Even if MIL lights up, the circuit has returned to a normal condition at this time.

NO : Go to step 11D2.

11D2 : CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF and Subaru Select Monitor or the OBD-II general scan tool switch to OFF.
- 2) Disconnect connector from mass air flow sensor.
- 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 4) Read data of mass air flow sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the value more than 186 g/sec (25 lb/min) or 5 V?*

YES : Repair battery short circuit in harness between mass air flow sensor and ECM connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>

NO : Replace mass air flow sensor. <Ref. to 2-7 [W2A0].>

E: DTC P0106 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —

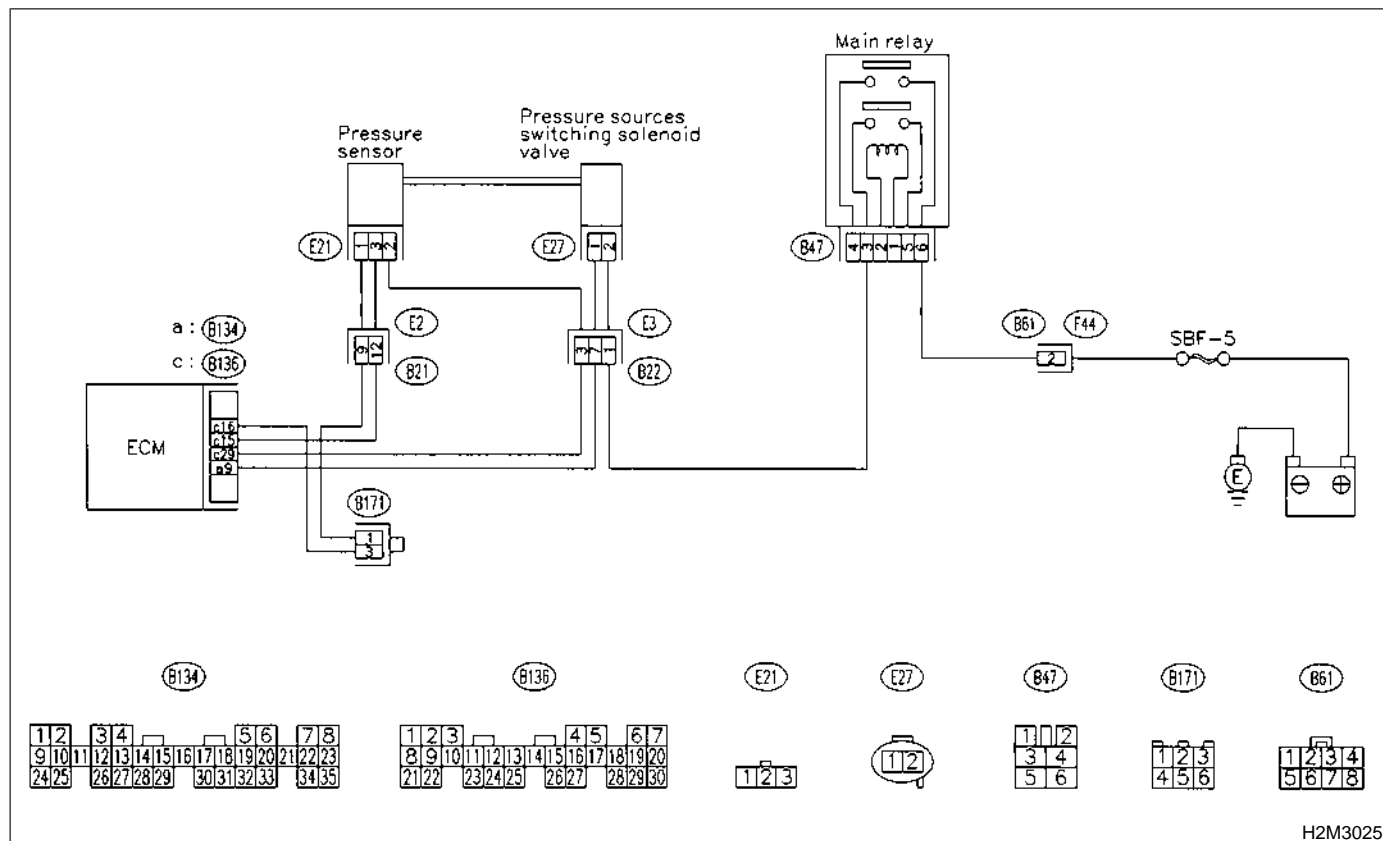
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



11E1 : CHECK ANY OTHER DTC ON DISPLAY.

NOTE:

In this case, it is not necessary to inspect DTC P0106.

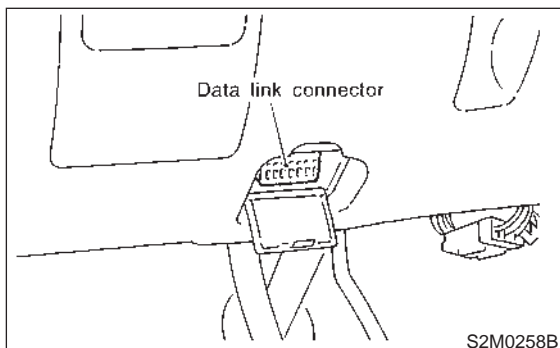
CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0107, P0108, P1102 OR P1122?

YES : Inspect DTC P0107, P0108, P1102 OR P1122 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NO : Go to step 11E2.

11E2 : CHECK IDLE SWITCH SIGNAL.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor switch to ON.
- 4) Operate the LED operation mode for engine using Subaru Select Monitor.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to 2-7 [T3C8].>

CHECK : **Does the LED of {Idle Switch Signal} come on?**

YES : Go to step 11E3.

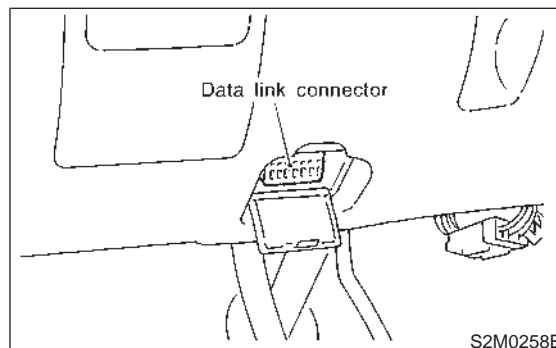
NO : Check throttle position sensor circuit.
<Ref. to 2-7 [T11K0].>

NOTE:

In this case, it is not necessary to inspect DTC P0106.

11E3 : CHECK DATA FOR CONTROL.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch ON and Subaru Select Monitor or the OBD-II general scan tool switch ON.
- 4) Start engine.
- 5) Read data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Is the value more than 85 kPa (638 mmHg, 25.12 inHg)?**

YES : Go to step 11E6.

NO : Go to step 11E4.

11E4 : CHECK DATA FOR CONTROL.

Read data of atmospheric absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

CHECK : **Is the value less than 32 kPa (240 mmHg, 9.45 inHg)?**

YES : Go to step 11E7.

NO : Go to step 11E5.

11E5 : CHECK DATA FOR CONTROL.

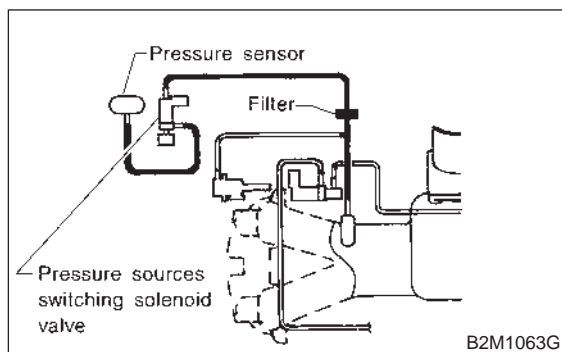
Read data of atmospheric absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

- CHECK** : **Is the value more than 133 kPa (998 mmHg, 39.29 inHg)?**
- YES** : Replace pressure sensor. <Ref. to 2-7 [W11A0].>
- NO** : Repair poor contact in pressure sensor connector, pressure sources switching solenoid valve connector, and ECM connector.

11E6 : CHECK VACUUM HOSES.

Check the following items.

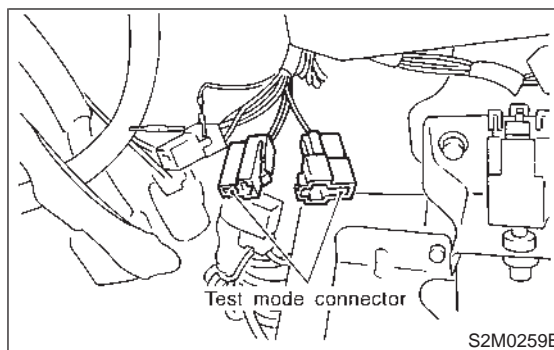
- Disconnection of the vacuum hose from pressure sources switching solenoid valve to intake manifold
- Holes in the vacuum hose between pressure sources switching solenoid valve to intake manifold
- Clogging of the vacuum hose between pressure sources switching solenoid valve to intake manifold
- Disconnection of the vacuum hose from pressure sensor to pressure sources switching solenoid valve
- Holes in the vacuum hose between pressure sensor and pressure sources switching solenoid valve
- Clogging of the vacuum hose between pressure sensor and pressure sources switching solenoid valve
- Clogging of the filter



- CHECK** : **Is there a fault in vacuum hose?**
- YES** : Repair or replace hoses or filter.
- NO** : Go to step **11E7**.

11E7 : CHECK PRESSURE SOURCES SWITCHING SOLENOID VALVE.

- 1) Turn ignition switch to OFF.
- 2) Connect test mode connector.



- 3) Turn ignition switch to ON.

NOTE:

Pressure sources switching solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to the "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

- CHECK** : **Does pressure sources switching solenoid valve produce operating sound? (ON ⇔ OFF each 1.5 sec.)**
- YES** : Replace pressure sensor. <Ref. to 2-7 [W11A0].>
- NO** : Replace pressure sources switching solenoid valve. <Ref. to 2-7 [W13A0].>

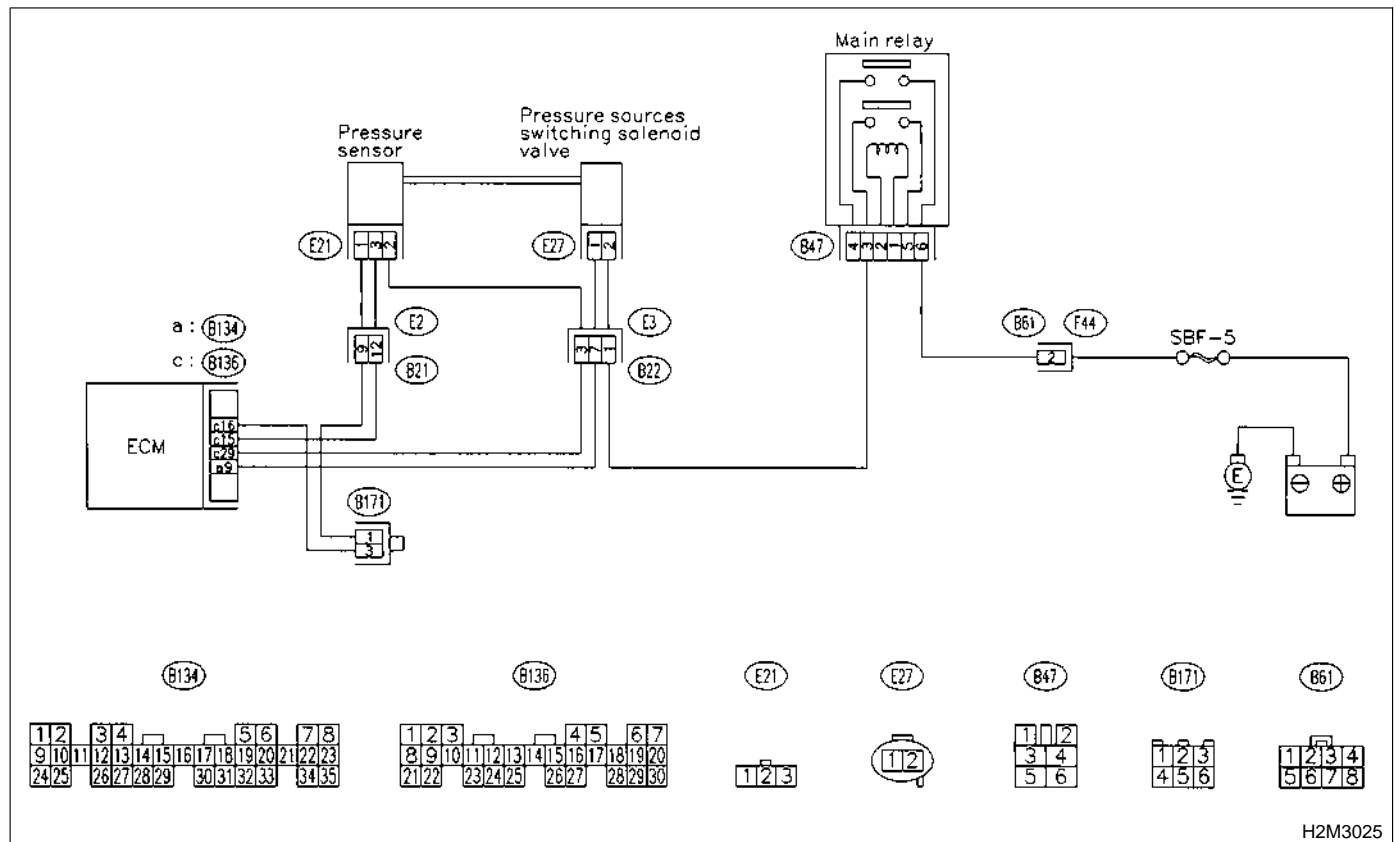
MEMO:

F: DTC P0107 — PRESSURE SENSOR CIRCUIT LOW INPUT —**• DTC DETECTING CONDITION:**

- Immediately at fault recognition

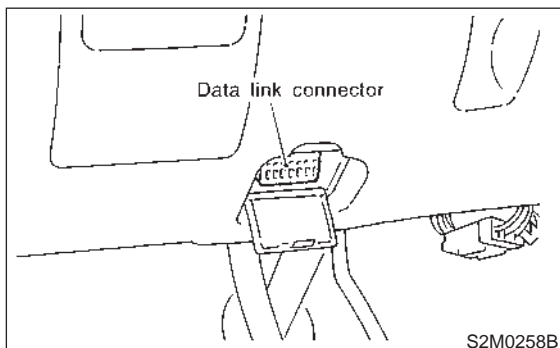
CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

11F1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the value less than 0 kPa (0 mmHg, 0 inHg)?*

YES : Go to step 11F3.

NO : Go to step 11F2.

11F2 : CHECK POOR CONTACT.

Check poor contact in ECM and pressure sensor connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in ECM or pressure sensor connector?*

YES : Repair poor contact in ECM or pressure sensor connector.

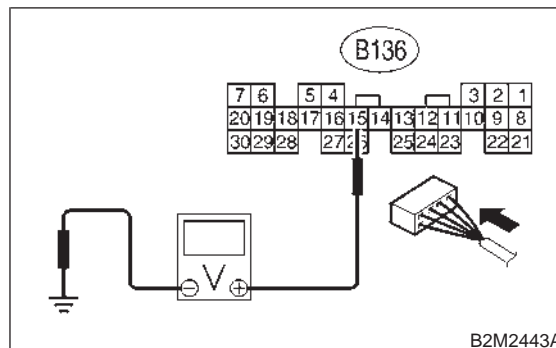
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time.

11F3 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : *Is the voltage more than 4.5 V?*

YES : Go to step 11F5.

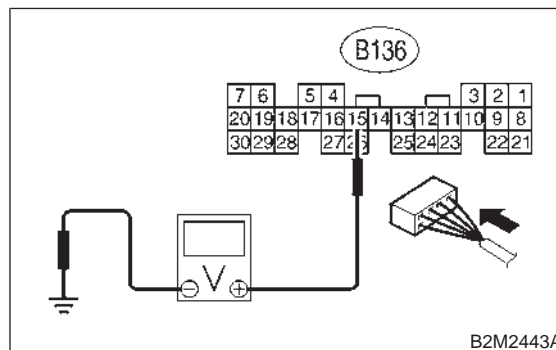
NO : Go to step 11F4.

11F4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : *Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?*

YES : Repair poor contact in ECM connector.

NO : Contact with SOA service.

NOTE:

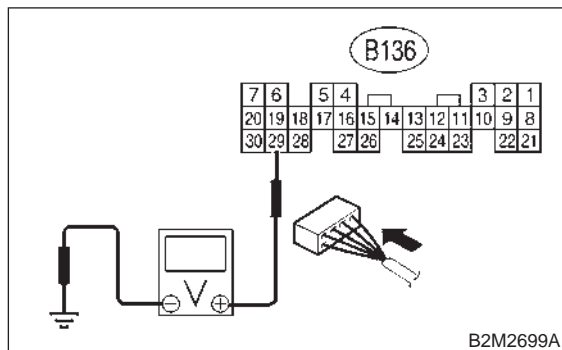
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

11F5 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

(B136) No. 29 (+) — Chassis ground (-):



CHECK : *Is the voltage less than 0.2 V?*

YES : Go to step 11F7.

NO : Go to step 11F6.

11F6 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of atmospheric absolute pressure signal using Subaru Select Monitor.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

CHECK : *Does the value change more than 0 kPa (0 mmHg, 0 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru select monitor?*

YES : Repair poor contact in ECM connector.

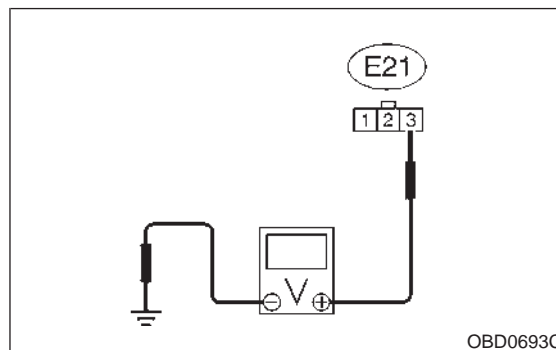
NO : Go to step 11F7.

11F7 : CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from pressure sensor.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between pressure sensor connector and engine ground.

Connector & terminal

(E21) No. 3 (+) — Engine ground (-):



CHECK : *Is the voltage more than 4.5 V?*

YES : Go to step 11F8.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

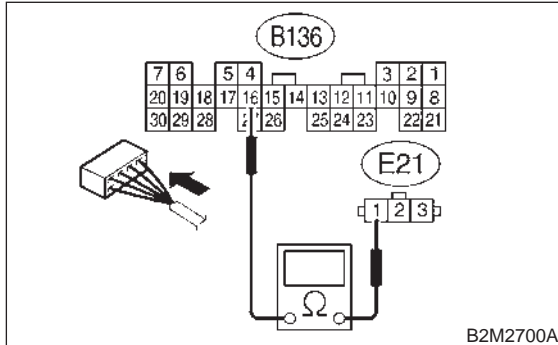
- Open circuit in harness between ECM and pressure sensor connector
- Poor contact in coupling connector (B21)

11F8 : CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM and pressure sensor connector.

Connector & terminal

(B136) No. 16 — (E21) No. 1:



- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 11F9.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

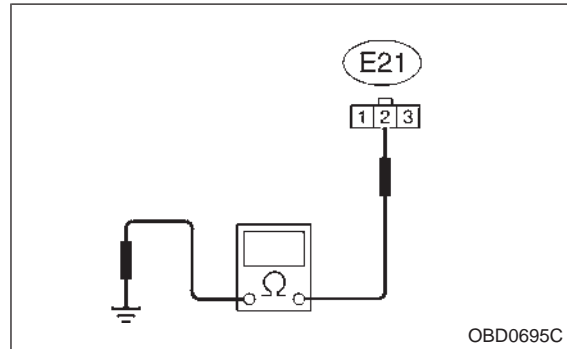
- Open circuit in harness between ECM and pressure sensor connector
- Poor contact in coupling connector (B21)

11F9 : CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.

Measure resistance of harness between pressure sensor connector and engine ground.

Connector & terminal

(E21) No. 2 — Engine ground:



- CHECK** : Is the resistance more than 500 $k\Omega$?
- YES** : Go to step 11F10.
- NO** : Repair ground short circuit in harness between ECM and pressure sensor connector.

11F10 : CHECK POOR CONTACT.

Check poor contact in pressure sensor connector.
<Ref. to FOREWORD [T3C1].>

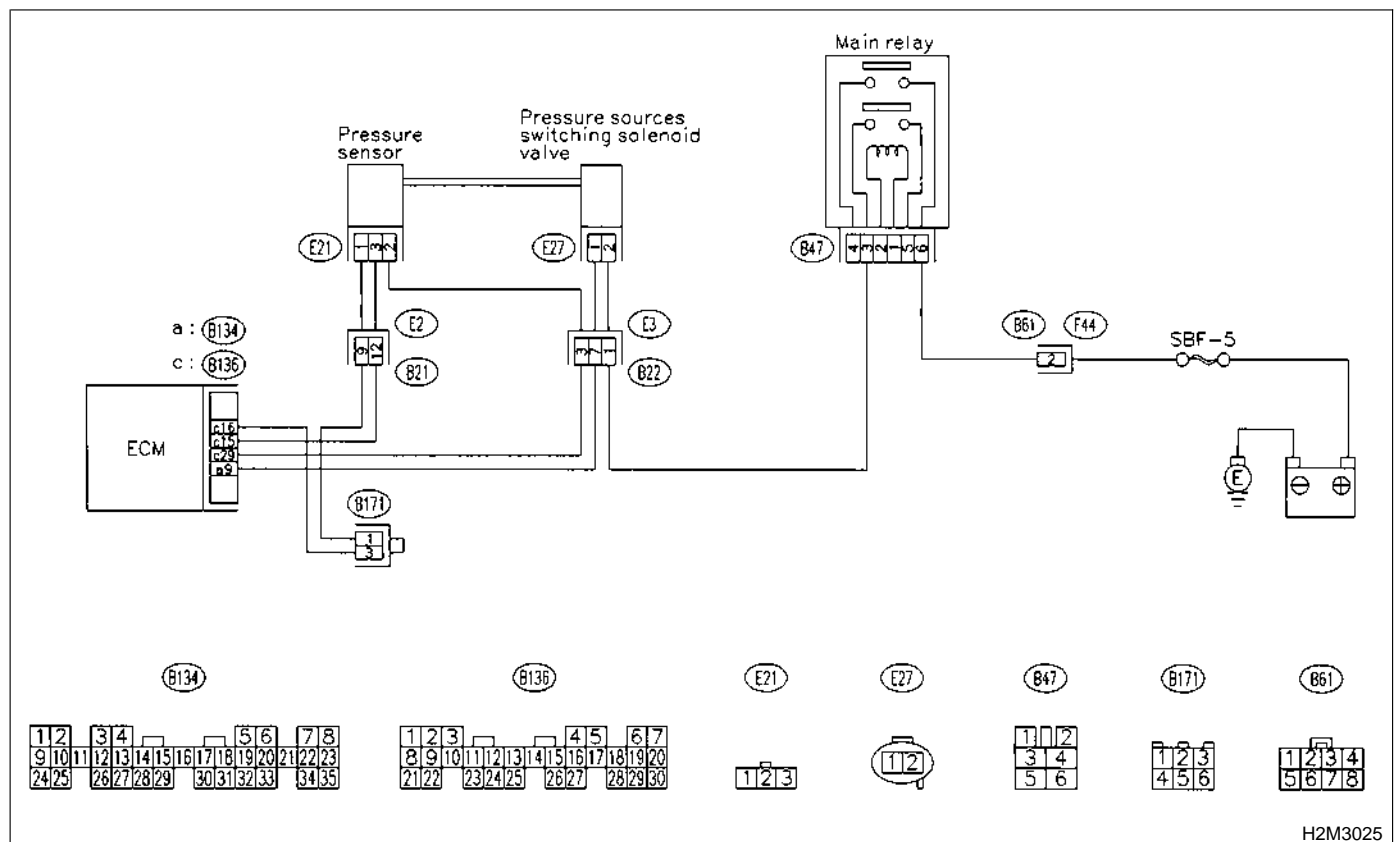
- CHECK** : Is there poor contact in pressure sensor connector?
- YES** : Repair poor contact in pressure sensor connector.
- NO** : Replace pressure sensor. <Ref. to 2-7 [W11A0].>

G: DTC P0108 — PRESSURE SENSOR CIRCUIT HIGH INPUT —**• DTC DETECTING CONDITION:**

- Immediately at fault recognition

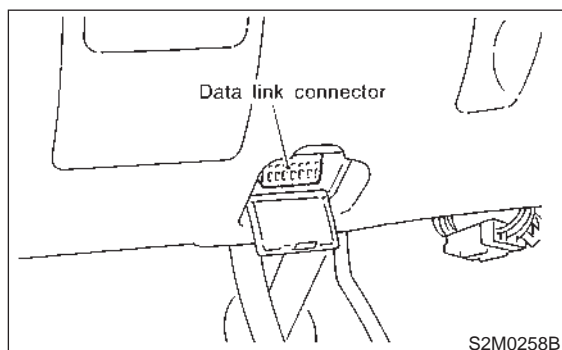
CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

11G1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : Is the value more than 140 kPa (1,050 mmHg, 41.34 inHg)?

YES : Go to step 11G10.

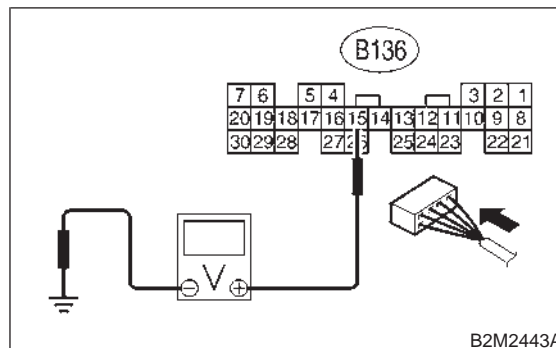
NO : Go to step 11G2.

11G2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : Is the voltage more than 4.5 V?

YES : Go to step 11G4.

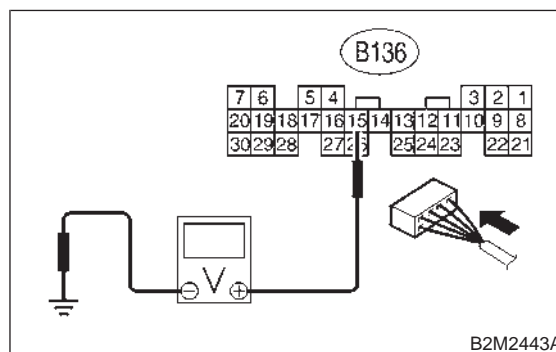
NO : Go to step 11G3.

11G3 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?

YES : Repair poor contact in ECM connector.

NO : Contact with SOA service.

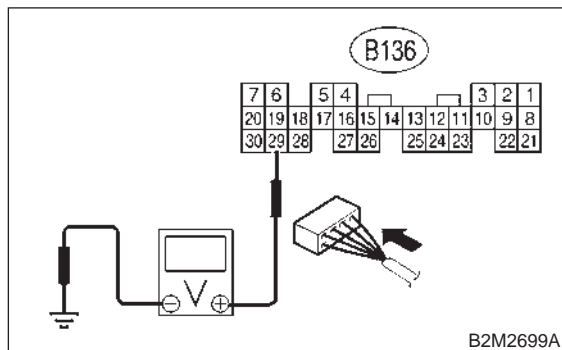
NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

11G4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B136) No. 29 (+) — Chassis ground (-):



- CHECK** : *Is the voltage less than 0.2 V?*
- YES** : Go to step 11G6.
- NO** : Go to step 11G5.

11G5 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of atmospheric absolute pressure signal using Subaru Select Monitor.

NOTE:

- Subaru Select Monitor

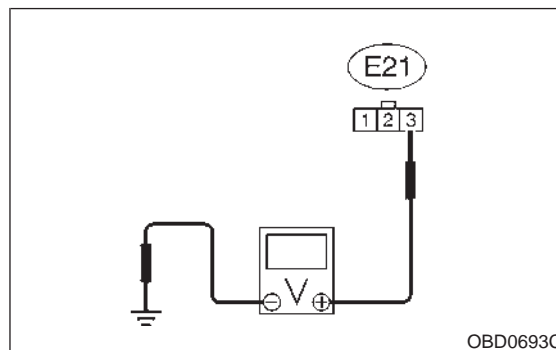
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- CHECK** : *Does the value change more than 0 kPa (0 mmHg, 0 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru select monitor?*
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 11G6.

11G6 : CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.

- Turn ignition switch to OFF.
- Disconnect connector from pressure sensor.
- Turn ignition switch to ON.
- Measure voltage between pressure sensor connector and engine ground.

Connector & terminal
(E21) No. 3 (+) — Engine ground (-):



- CHECK** : *Is the voltage more than 4.5 V?*
- YES** : Go to step 11G7.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

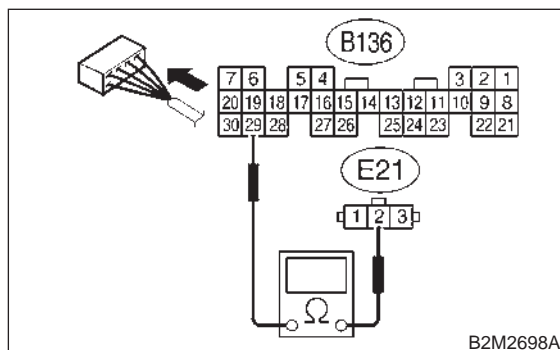
- Open circuit in harness between ECM and pressure sensor connector
- Poor contact in coupling connector (B21)

11G7 : CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM and pressure sensor connector.

Connector & terminal

(B136) No. 29 — (E21) No. 2:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 11G8.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

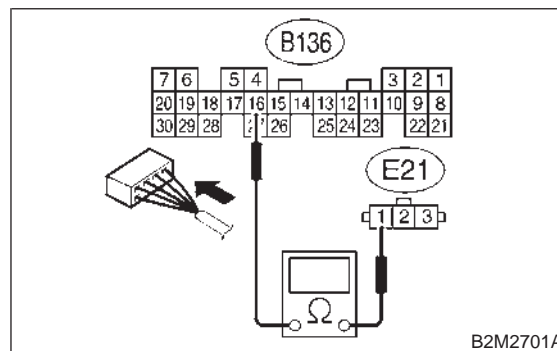
- Open circuit in harness between ECM and pressure sensor connector
- Poor contact in coupling connector (B22)

11G8 : CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.

Measure resistance of harness between ECM and pressure sensor connector.

Connector & terminal

(B136) No. 16 — (E21) No. 1:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 11G9.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and pressure sensor connector
- Poor contact in coupling connector (B21)

11G9 : CHECK POOR CONTACT.

Check poor contact in pressure sensor connector.
<Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in pressure sensor connector?

YES : Repair poor contact in pressure sensor connector.

NO : Replace pressure sensor. <Ref. to 2-7 [W11A0].>

**11G10 : CHECK HARNESS BETWEEN ECM
AND PRESSURE SENSOR CON-
NECTOR.**

- 1) Turn ignition switch to OFF and Subaru Select Monitor or the OBD-II general scan tool switch to OFF.
- 2) Disconnect connector from pressure sensor.
- 3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 4) Read data of intake manifold absolute pressure signal using Subaru select monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value more than 140 kPa (1,050 mmHg, 41.34 inHg)?***

YES : Repair battery short circuit in harness between ECM and pressure sensor connector.

NO : Replace pressure sensor. <Ref. to 2-7 [W11A0].>

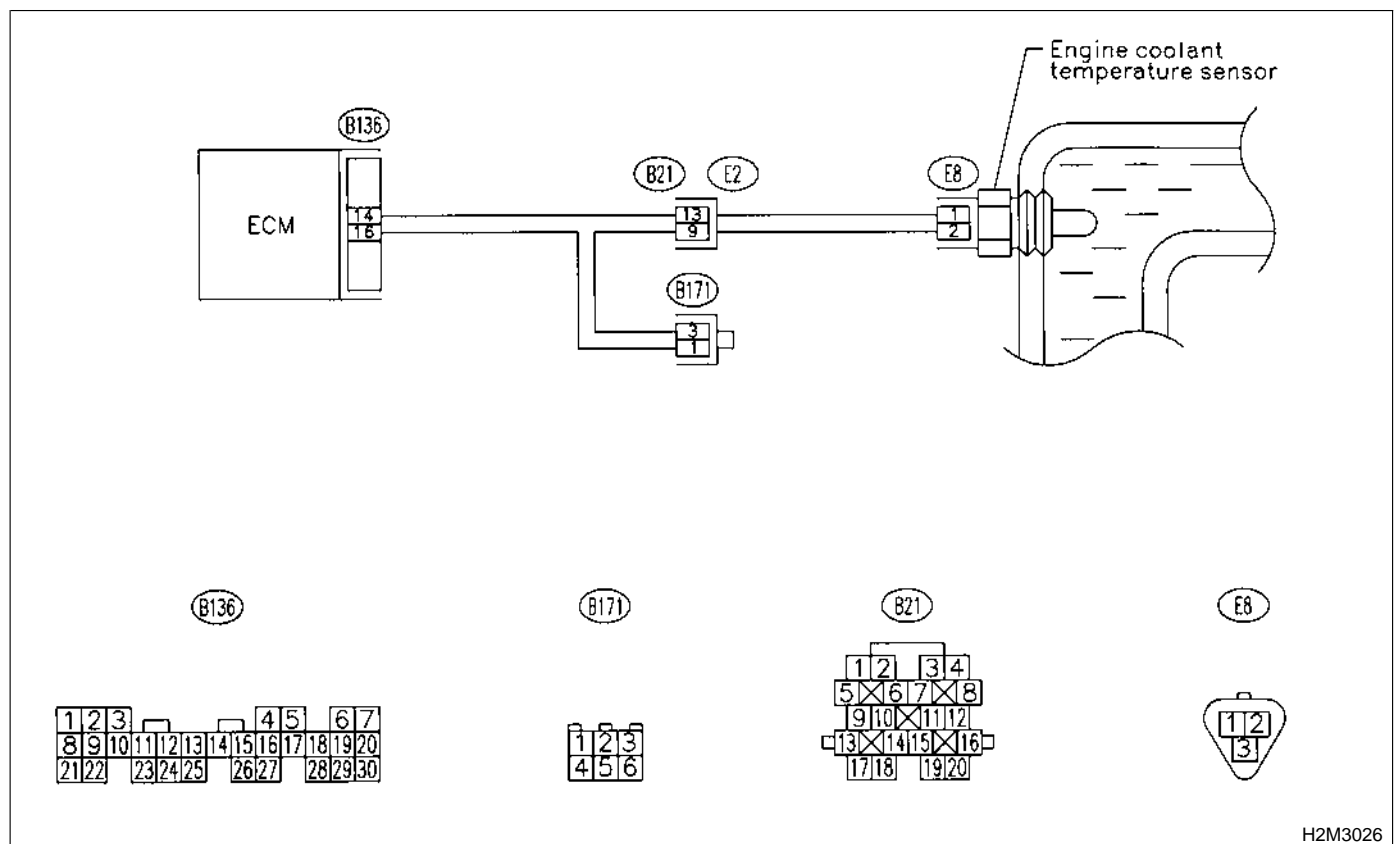
MEMO:

H: DTC P0116 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Hard to start
 - Erroneous idling
 - Poor driving performance

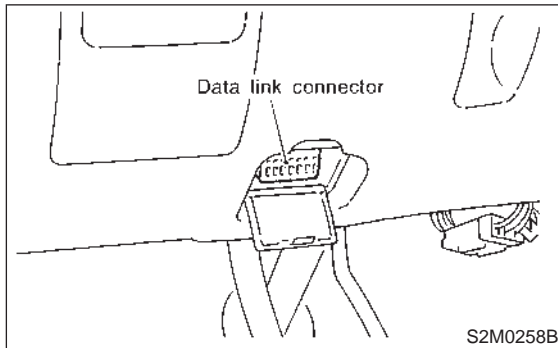
CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

● **WIRING DIAGRAM:**

11H1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
- OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the value greater than 150°C (300°F)?*

YES : Go to step 11H2.

NO : Repair poor contact.

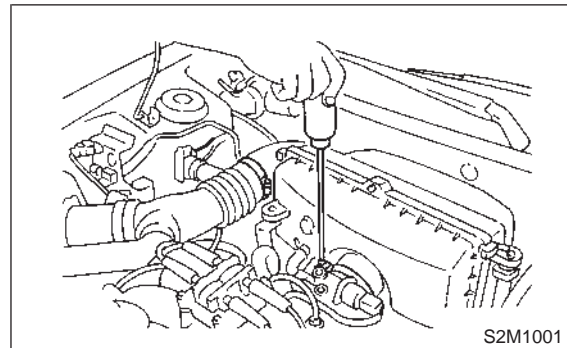
NOTE:

In this case, repair the following:

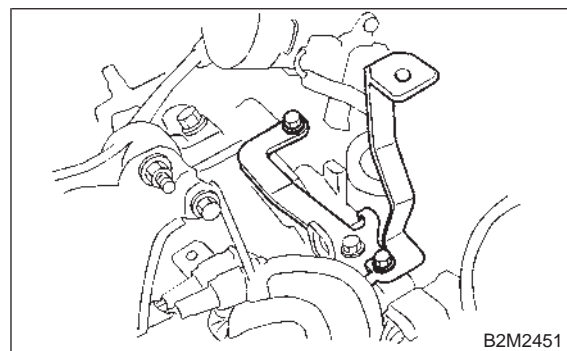
- Poor contact in engine coolant temperature sensor
- Poor contact in ECM
- Poor contact in coupling connector (B21)

11H2 : CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.

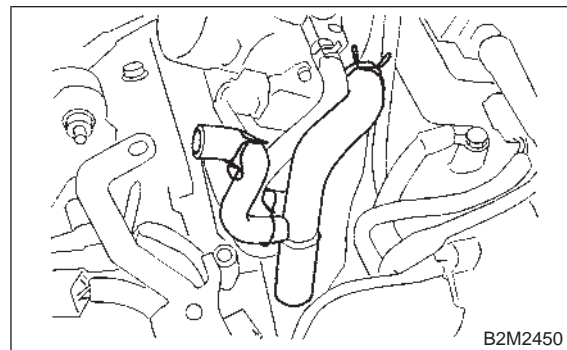
- 1) Turn ignition switch to OFF.
- 2) Remove air intake duct and air intake chamber assembly as a unit.



- 3) Remove engine harness connector bracket from cylinder block.



- 4) Remove blow-by hoses.



- 5) Disconnect connector from engine coolant temperature sensor.
- 6) Turn ignition switch and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 7) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

- CHECK** : ***Is the value less than -40°C (-40°F)?***
- YES** : Replace engine coolant temperature sensor. <Ref. to 2-7 [W5A2].>
- NO** : Repair ground short circuit in harness between engine coolant temperature sensor and ECM connector.

MEMO:

I: DTC P0117 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH INPUT —**• DTC DETECTING CONDITION:**

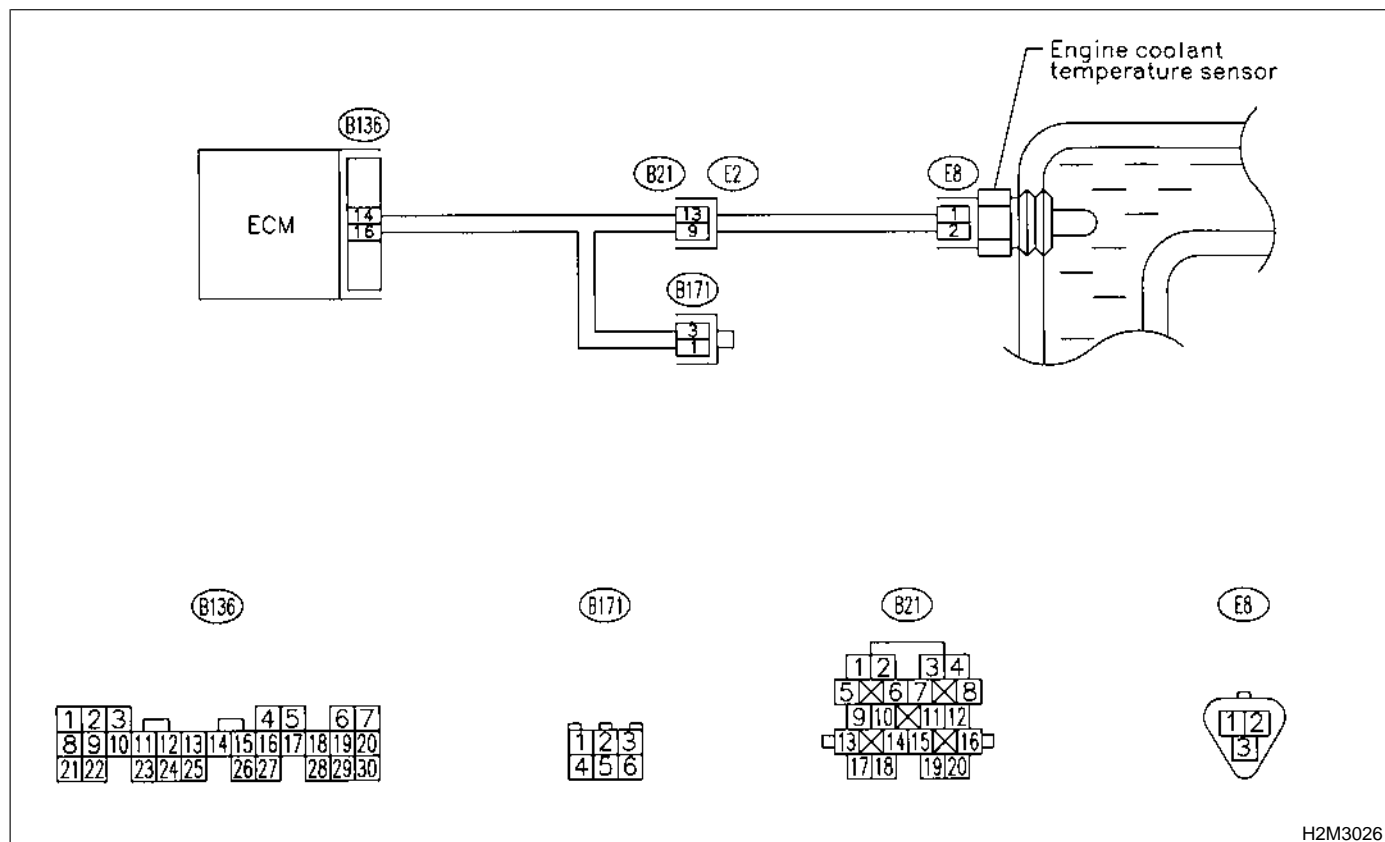
- Immediately at fault recognition

• TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

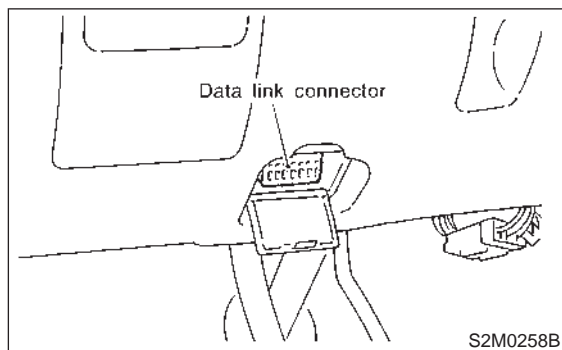
After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3026

11I1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : Is the value less than -40°C (-40°F)?

YES : Go to step 11I2.

NO : Repair poor contact.

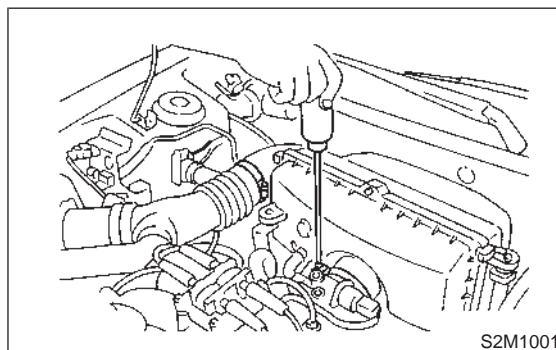
NOTE:

In this case, repair the following:

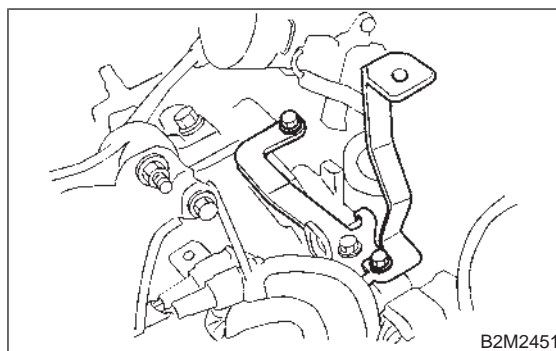
- Poor contact in engine coolant temperature sensor
- Poor contact in ECM
- Poor contact in coupling connector (B21)

11I2 : CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.

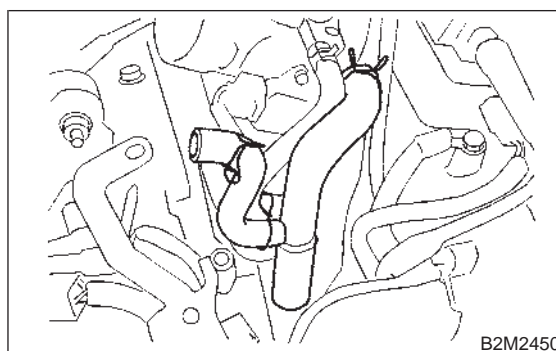
- 1) Turn ignition switch to OFF.
- 2) Remove air intake duct and air intake chamber assembly as a unit.



- 3) Remove engine harness connector bracket from cylinder block.



- 4) Remove blow-by hoses.

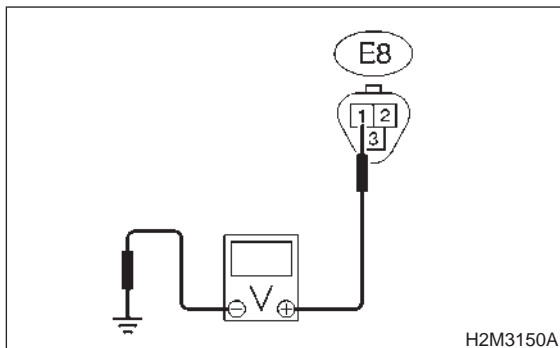


- 5) Disconnect connector from engine coolant temperature sensor.

6) Measure voltage between engine coolant temperature sensor connector and engine ground.

Connector & terminal

(E8) No. 1 (+) — Engine ground (-):



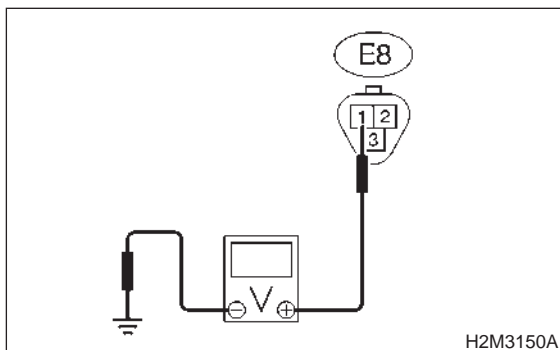
- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair battery short circuit in harness between ECM and engine coolant temperature sensor connector.
- NO** : Go to step 11I3.

11I3 : CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between engine coolant temperature sensor connector and engine ground.

Connector & terminal

(E8) No. 1 (+) — Engine ground (-):



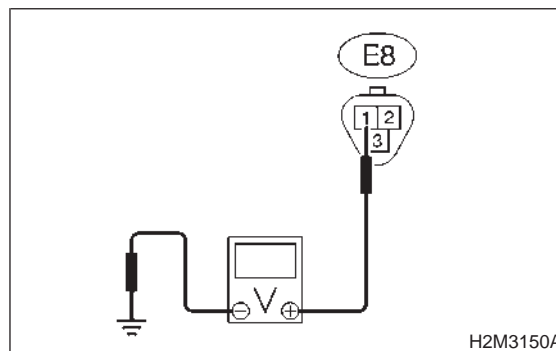
- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair battery short circuit in harness between ECM and engine coolant temperature sensor connector.
- NO** : Go to step 11I4.

11I4 : CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.

Measure voltage between engine coolant temperature sensor connector and engine ground.

Connector & terminal

(E8) No. 1 (+) — Engine ground (-):



- CHECK** : **Is the voltage more than 4 V?**
- YES** : Go to step 11I5.
- NO** : Repair harness and connector.

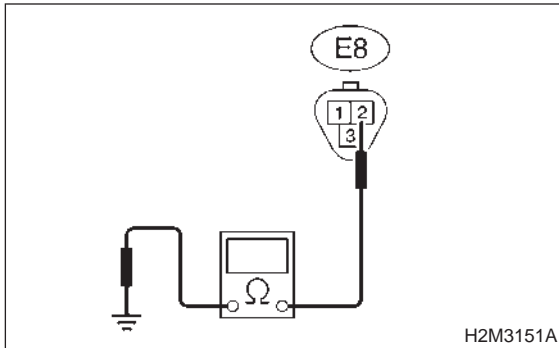
NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and engine coolant temperature sensor connector
- Poor contact in engine coolant temperature sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

**11I5 : CHECK HARNESS BETWEEN
ENGINE COOLANT TEMPERATURE
SENSOR AND ECM CONNECTOR.**

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between engine coolant temperature sensor connector and engine ground.

Connector & terminal**(E8) No. 2 — Engine ground:****CHECK** : **Is the resistance less than 5 Ω?****YES** : Replace engine coolant temperature sensor. <Ref. to 2-7 [W5A2].>**NO** : Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open circuit in harness between ECM and engine coolant temperature sensor connector
- Poor contact in engine coolant temperature sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

J: DTC P0121 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

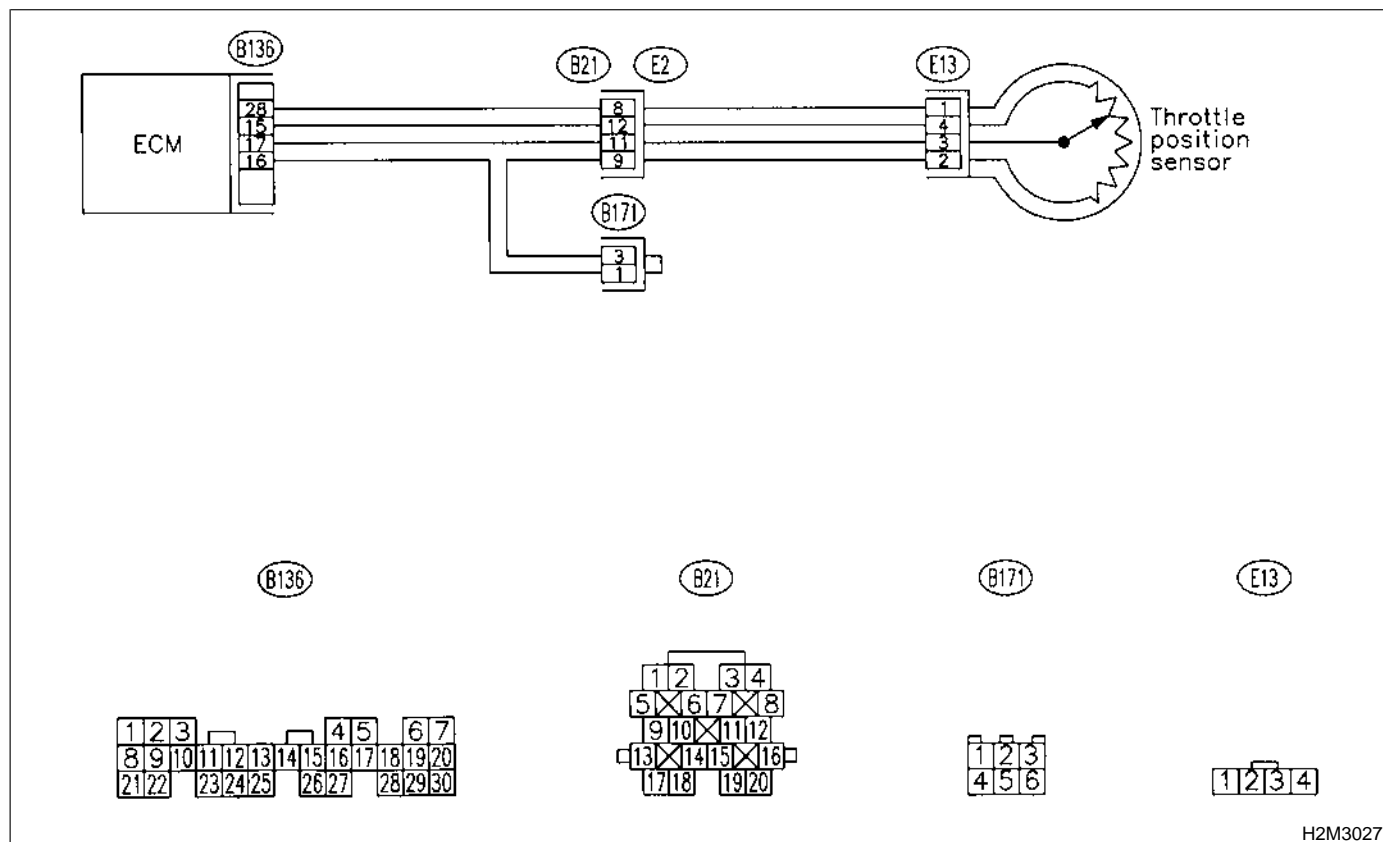
• TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:



H2M3027

11J1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0122 or P0123?*

YES : Inspect DTC P0122 or P0123 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0121.

NO : Replace throttle position sensor. <Ref. to 2-7 [W9A2].>

K: DTC P0122 — THROTTLE POSITION SENSOR CIRCUIT LOW INPUT —● **DTC DETECTING CONDITION:**

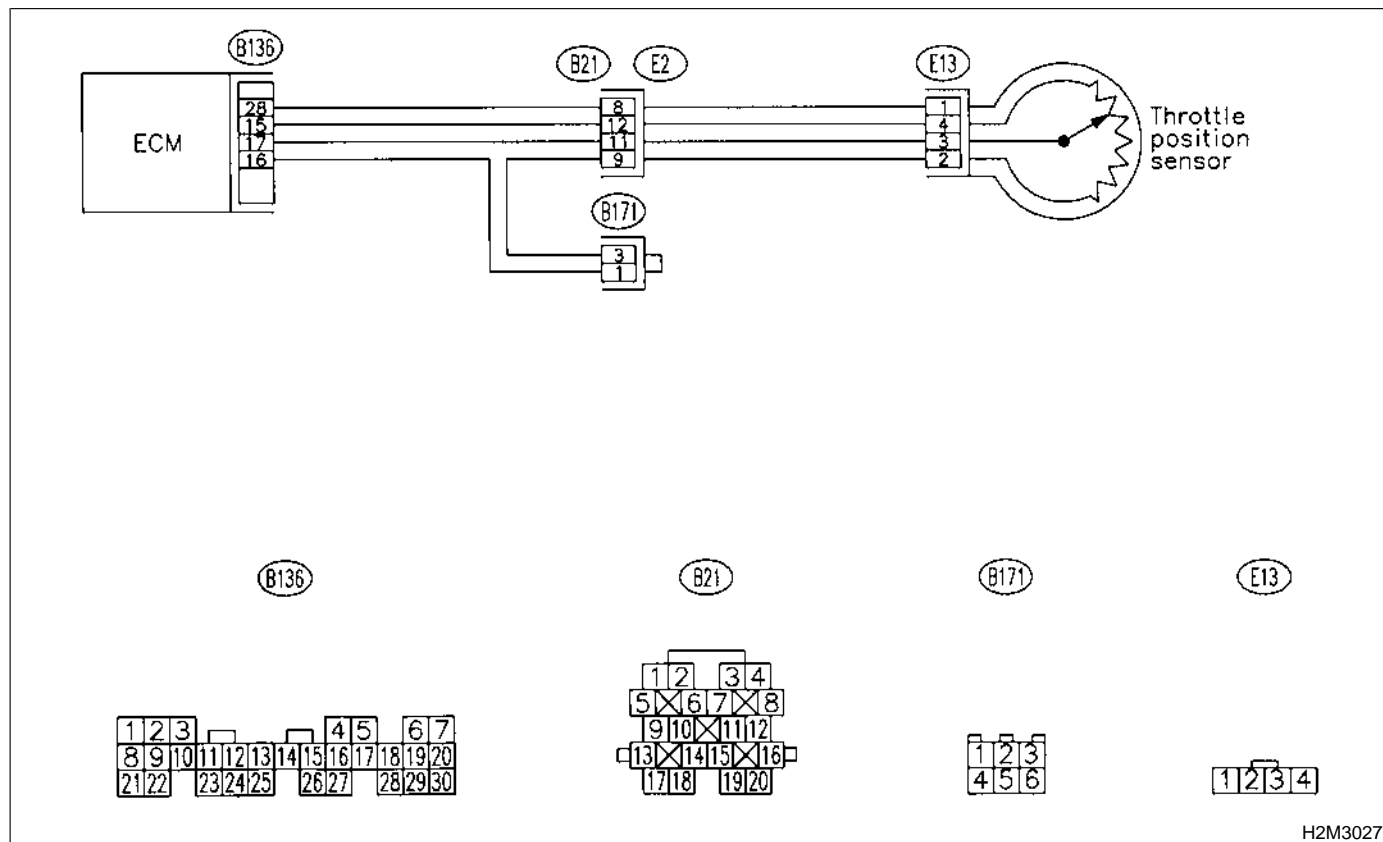
- Immediately at fault recognition

● **TROUBLE SYMPTOM:**

- Erroneous idling
- Engine stalls.
- Poor driving performance

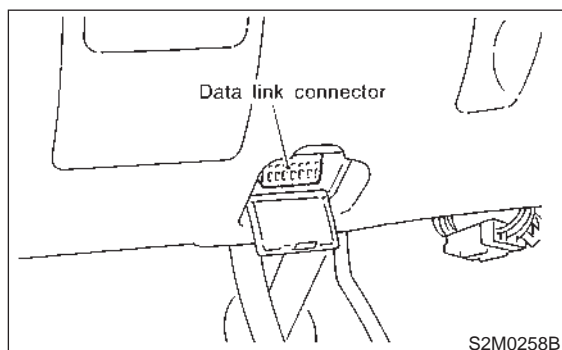
CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

● **WIRING DIAGRAM:**

11K1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
- OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the value less than 0.1 V?*

YES : Go to step 11K2.

NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause.

NOTE:

In this case, repair the following:

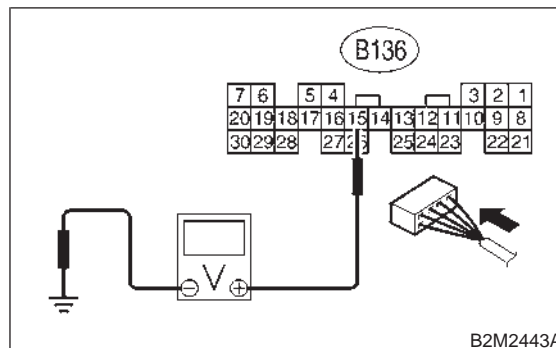
- Poor contact in throttle position sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

11K2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground while throttle valve is fully closed.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : *Is the voltage more than 4.5 V?*

YES : Go to step 11K4.

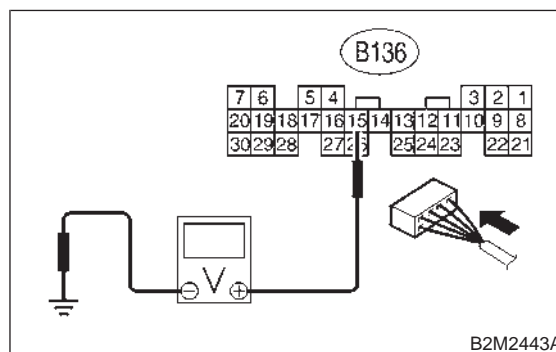
NO : Go to step 11K3.

11K3 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : *Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?*

YES : Repair poor contact in ECM connector.

NO : Contact with SOA service.

NOTE:

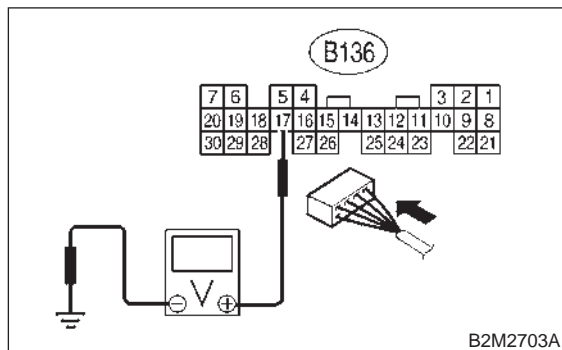
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

11K4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 17 (+) — Chassis ground (-):



- CHECK** : *Is the voltage less than 0.1 V?*
- YES** : Go to step 11K6.
- NO** : Go to step 11K5.

11K5 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Measure voltage between ECM connector and chassis ground.

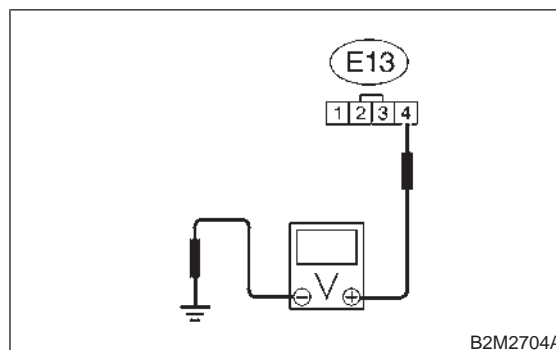
- CHECK** : *Does the voltage change more than 0.1 V by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?*
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 11K6.

11K6 : CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from throttle position sensor.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between throttle position sensor connector and engine ground.

Connector & terminal

(E13) No. 4 (+) — Engine ground (-):



- CHECK** : *Is the voltage more than 4.5 V?*
- YES** : Go to step 11K7.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

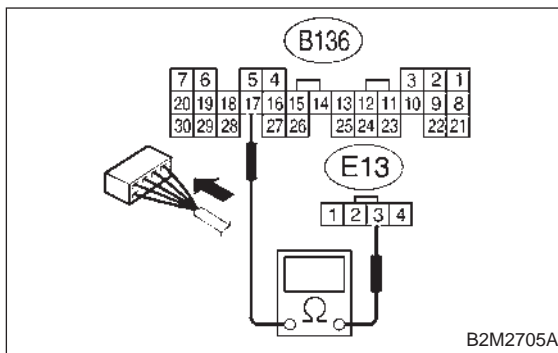
- Open circuit in harness between throttle position sensor and ECM connector
- Poor contact in throttle position sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

11K7 : CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between ECM connector and throttle position sensor connector.

Connector & terminal

(B136) No. 17 — (E13) No. 3:



- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 11K8.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

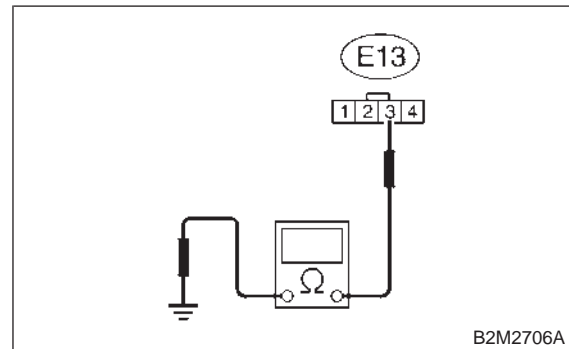
- Open circuit in harness between throttle position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in throttle position sensor connector
- Poor contact in coupling connector (B21)

11K8 : CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.

Measure resistance of harness between throttle position sensor connector and engine ground.

Connector & terminal

(E13) No. 3 — Engine ground:



- CHECK** : Is the resistance less than 10 Ω ?
- YES** : Repair ground short circuit in harness between throttle position sensor and ECM connector.
- NO** : Go to step 11K9.

11K9 : CHECK POOR CONTACT.

Check poor contact in throttle position sensor connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : Is there poor contact in throttle position sensor connector?
- YES** : Repair poor contact in throttle position sensor connector.
- NO** : Replace throttle position sensor. <Ref. to 2-7 [W9A2].>

L: DTC P0123 — THROTTLE POSITION SENSOR CIRCUIT HIGH INPUT —**• DTC DETECTING CONDITION:**

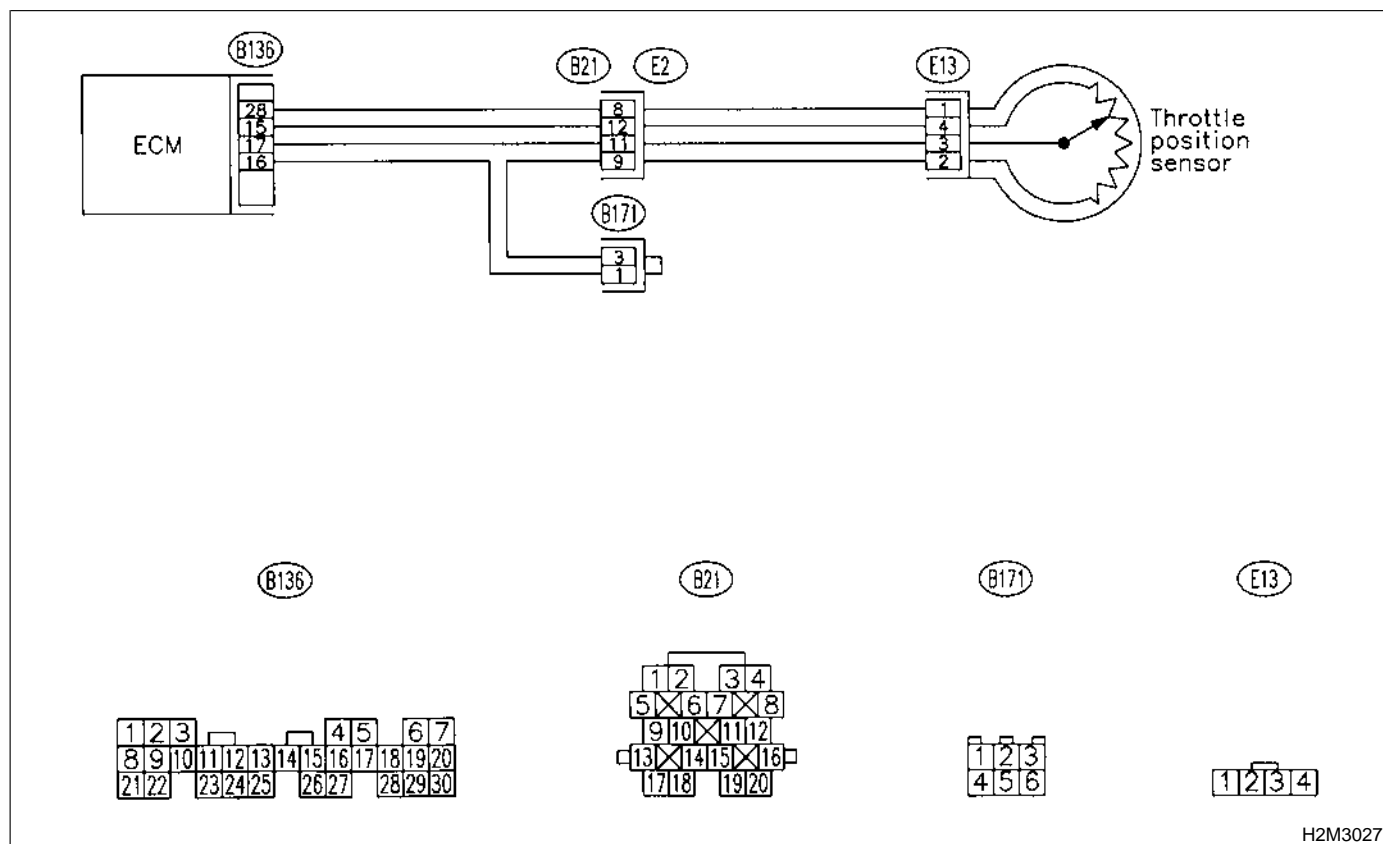
- Immediately at fault recognition

• TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

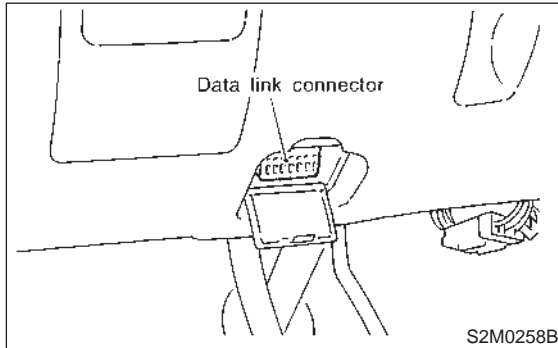
CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

11L1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Is the value more than 4.9 V?**

YES : Go to step 11L2.

NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause.

NOTE:

In this case, repair the following:

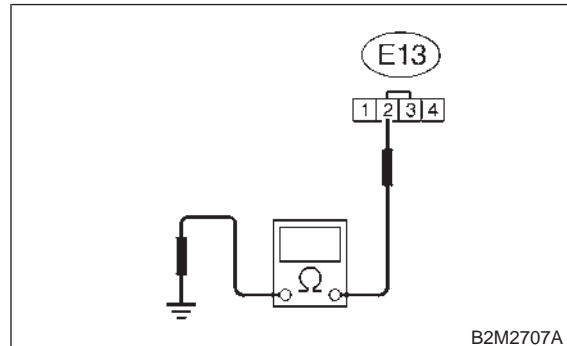
- Poor contact in throttle position sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)
- Poor contact in joint connector (B171)

11L2 : CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from throttle position sensor.
- 3) Measure resistance of harness between throttle position sensor connector and engine ground.

Connector & terminal

(E13) No. 2 — Engine ground:



CHECK : **Is the resistance less than 5 Ω?**

YES : Go to step 11L3.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

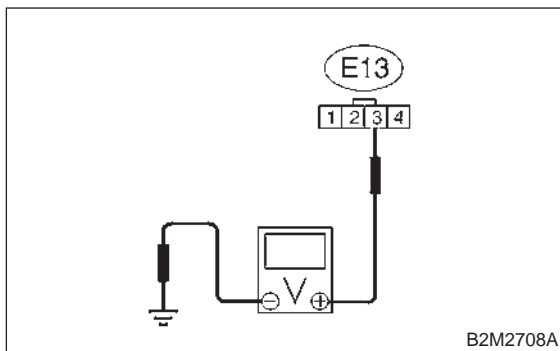
- Open circuit in harness between throttle position sensor and ECM connector
- Poor contact in coupling connector (B21)
- Poor contact in joint connector (B171)

11L3 : CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between throttle position sensor connector and engine ground.

Connector & terminal

(E13) No. 3 (+) — Engine ground (-):



- CHECK** : **Is the voltage more than 4.9 V?**
- YES** : Repair battery short circuit in harness between throttle position sensor and ECM connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Replace throttle position sensor. <Ref. to 2-7 [W9A2].>

M: DTC P0125 — INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL —

● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

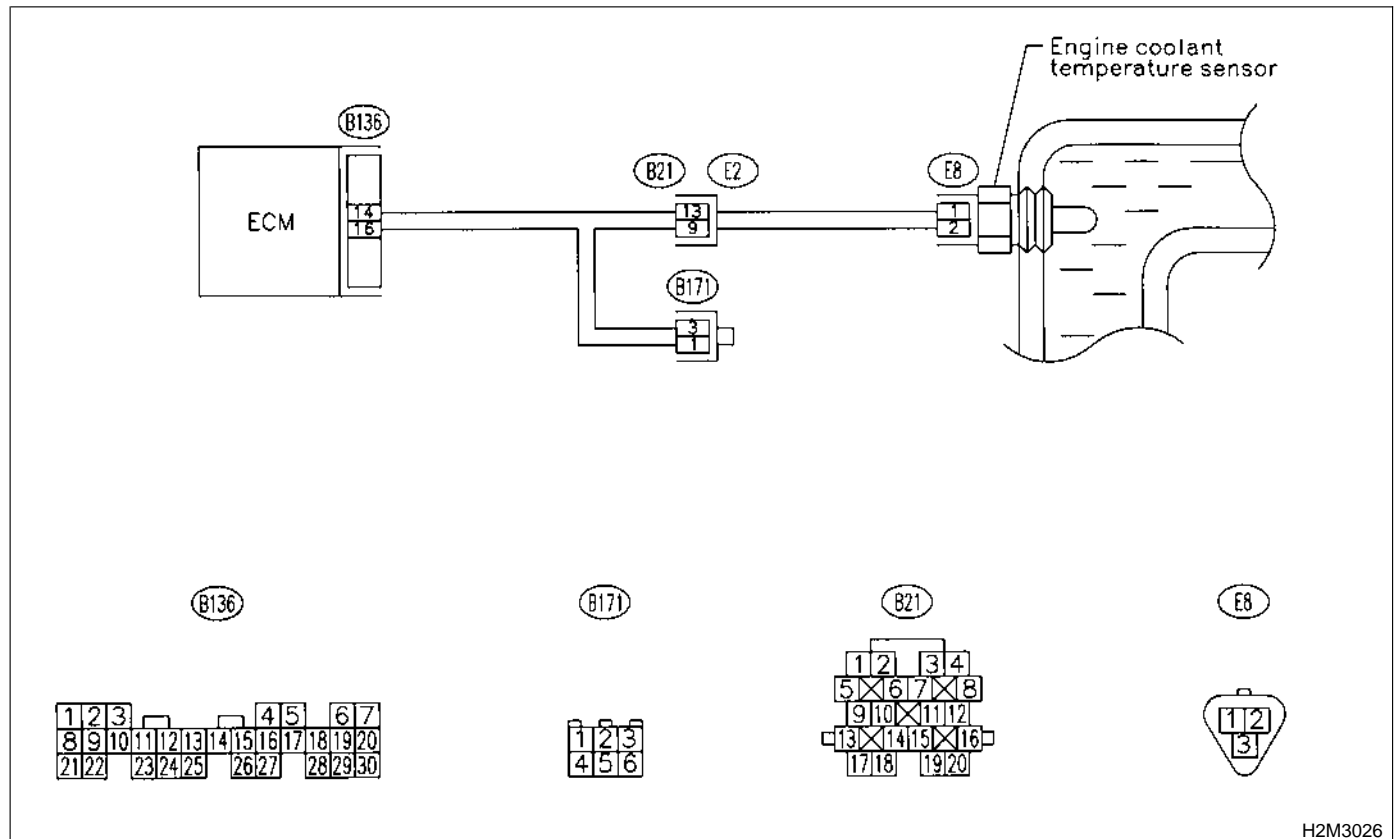
● TROUBLE SYMPTOM:

- Engine would not return to idling.

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:



H2M3026

11M1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0116 or P0117?

YES : Inspect DTC P0116 or P0117 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0125.

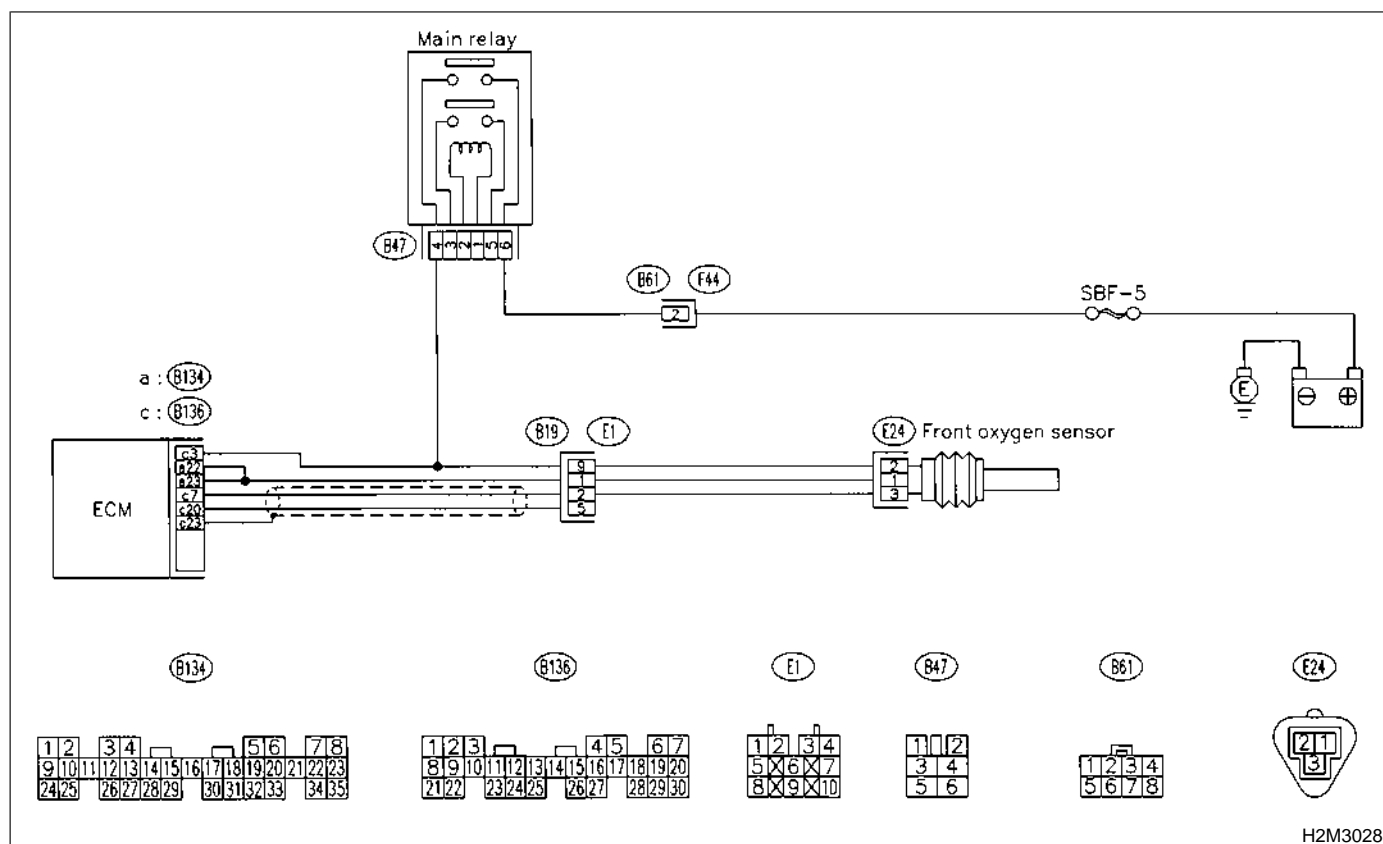
NO : Replace engine coolant temperature sensor. <Ref. to 2-7 [W5A2].>

N: DTC P0130 — FRONT OXYGEN SENSOR CIRCUIT MALFUNCTION —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:
11N1 : CHECK FOR OTHER CAUSES AFFECTING EXHAUST GAS.
NOTE:

- Check for use of improper fuel.
- Check if engine oil or coolant level is extremely low.

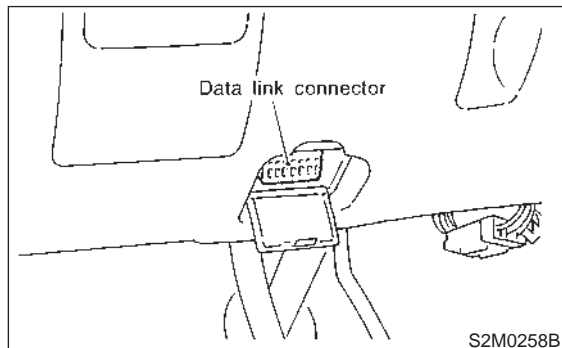
CHECK : *Is CO % more than 2 % after engine warm-up?*

YES : Check fuel system.

NO : Go to step 11N2.

11N2 : CHECK FRONT OXYGEN SENSOR DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect the Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Start engine and Turn the Subaru Select Monitor and the OBD-II general scan tool switch to ON.
- 4) Warm-up the engine until coolant temperature is above 70°C (160°F) and keep the engine speed at 2,000 rpm to 3,000 rpm for one minute.
- 5) Read data of front oxygen sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ OXYGEN SENSOR MONITORING TEST RESULTS DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C7].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the difference of voltage less than 0.1 V between the value of max. output and min. output?*

YES : Go to step 11N3.

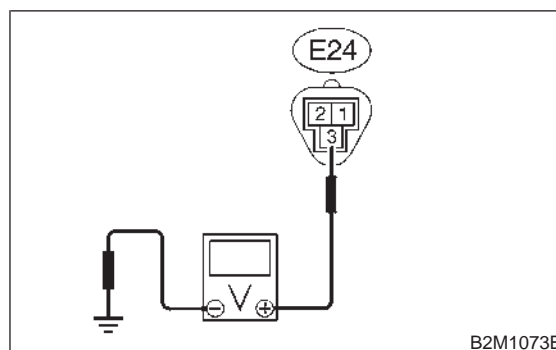
NO : Replace front oxygen sensor. <Ref. to 2-7 [W7A0].>

11N3 : CHECK HARNESS BETWEEN FRONT OXYGEN SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from front oxygen sensor.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between front oxygen sensor harness connector and engine ground.

Connector & terminal

(E24) No. 3 (+) — Engine ground (-):



CHECK : *Is the voltage more than 0.2 V?*

YES : Go to step 11N4.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and front oxygen sensor connector
- Poor contact in the ECM connector

11N4 : CHECK POOR CONTACT.

Check poor contact in front oxygen sensor connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in front oxygen sensor connector?*

YES : Repair poor contact in front oxygen sensor connector.

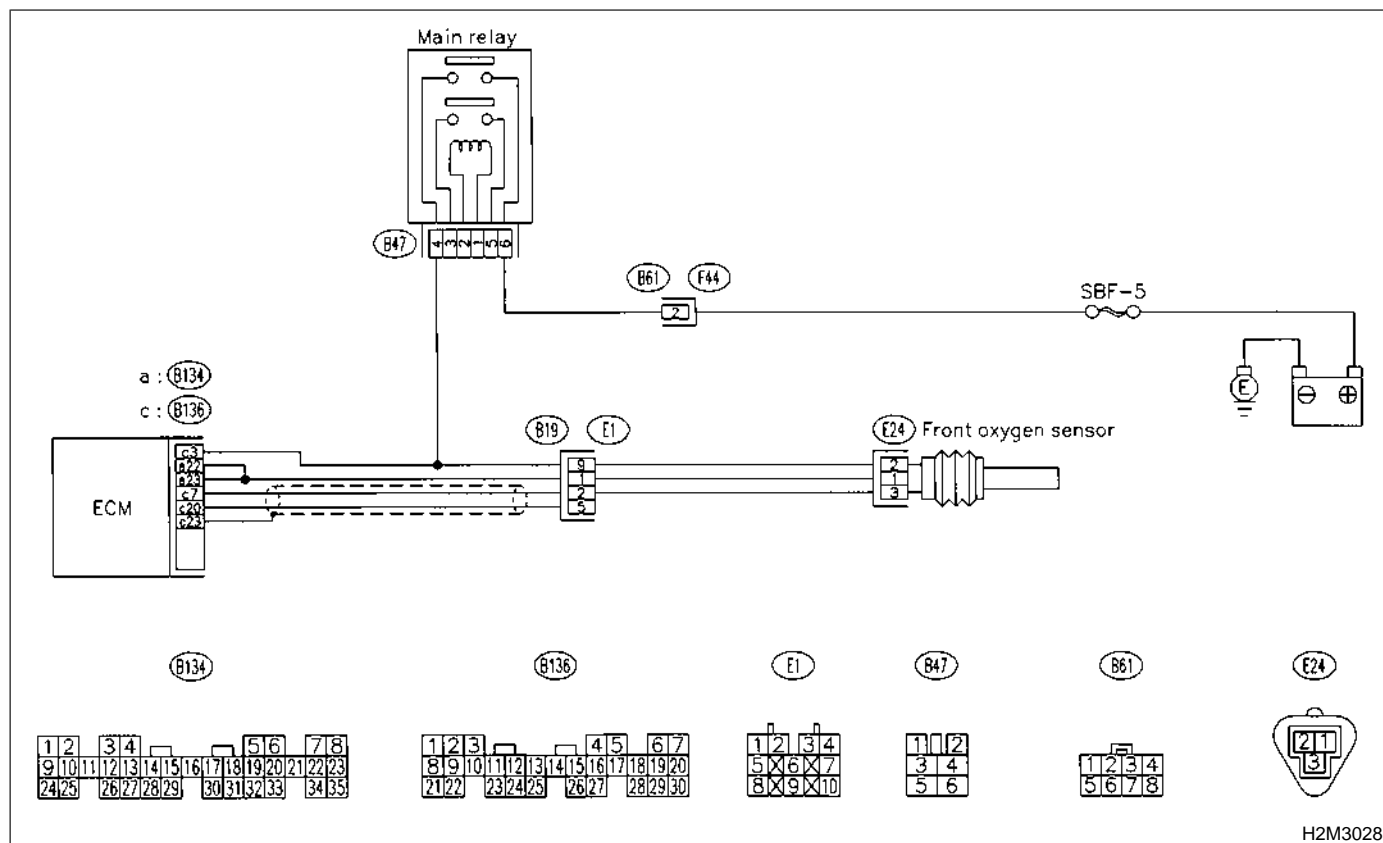
NO : Replace front oxygen sensor. <Ref. to 2-7 [W7A0].>

O: DTC P0133 — FRONT OXYGEN SENSOR CIRCUIT SLOW RESPONSE —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:**1101 : CHECK ANY OTHER DTC ON DISPLAY.**

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0130?

YES : Inspect DTC P0130 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0133.

NO : Go to step 1102.

1102 : CHECK EXHAUST SYSTEM.**NOTE:**

Check the following items.

- Loose installation of front portion of exhaust pipe onto cylinder heads
- Loose connection between front exhaust pipe and front catalytic converter
- Damage of exhaust pipe resulting in a hole

CHECK : Is there a fault in exhaust system?

YES : Repair exhaust system.

NO : Replace front oxygen sensor. <Ref. to 2-7 [W7A0].>

MEMO:

P: DTC P0135 — FRONT OXYGEN SENSOR HEATER CIRCUT MALFUNCTION —

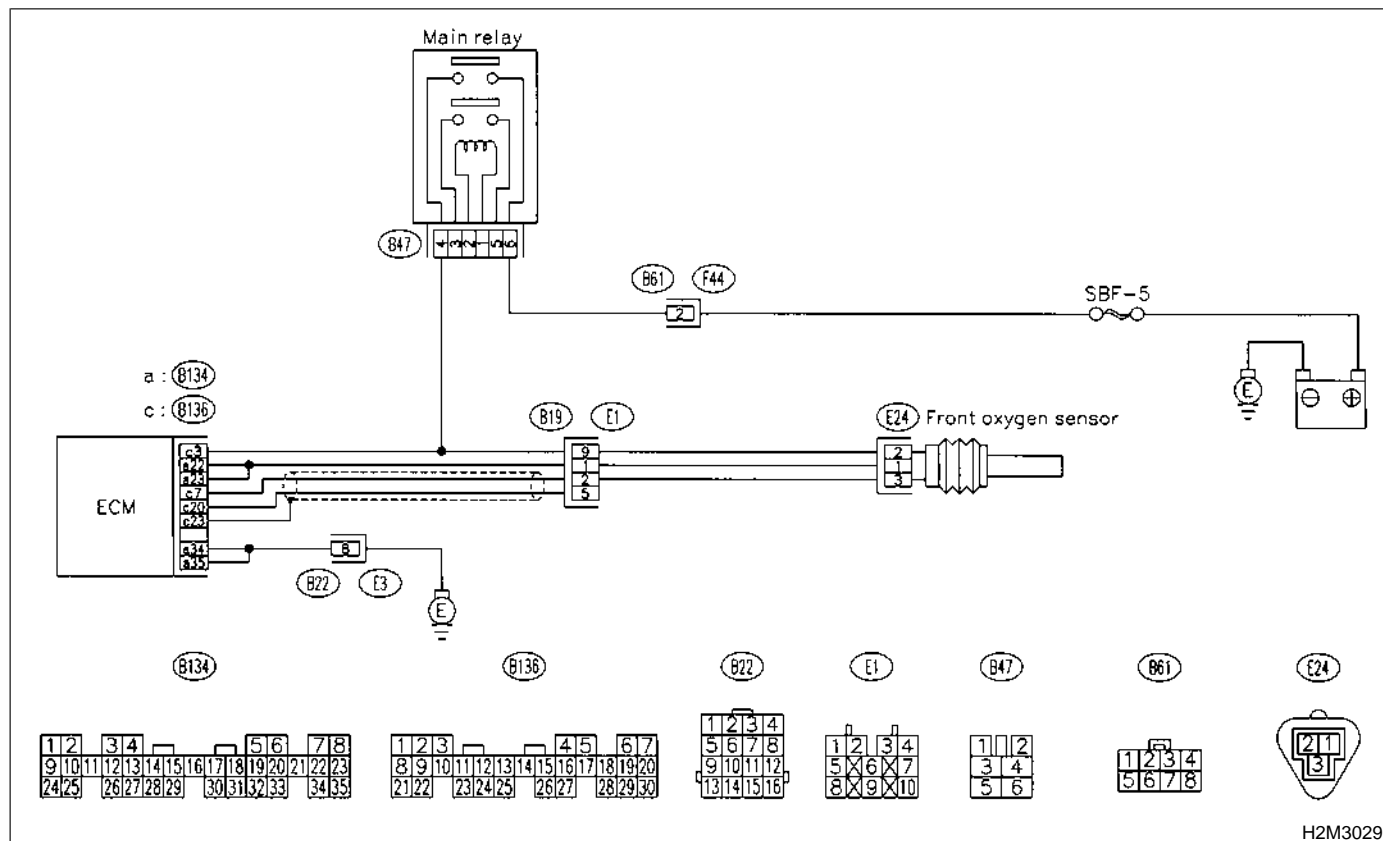
● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:



H2M3029

11P1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0135 and P0141 at the same time?

YES : Go to step 11P2.

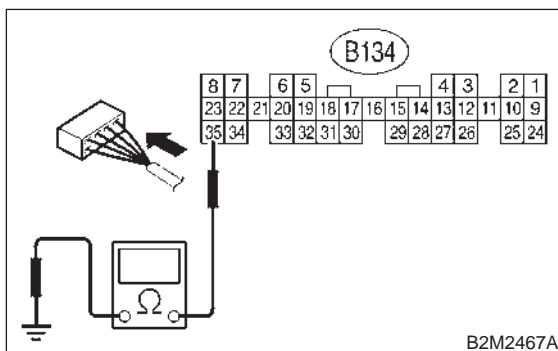
NO : Go to step 11P4.

11P2 : CHECK GROUND CIRCUIT OF ECM.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B134) No. 35 — Chassis ground:



- CHECK** : Is the resistance less than 5 Ω ?
- YES** : Go to step 11P4.
- NO** : Go to step 11P3.

11P3 : CHECK GROUND CIRCUIT OF ECM.

- 1) Repair harness and connector.

NOTE:

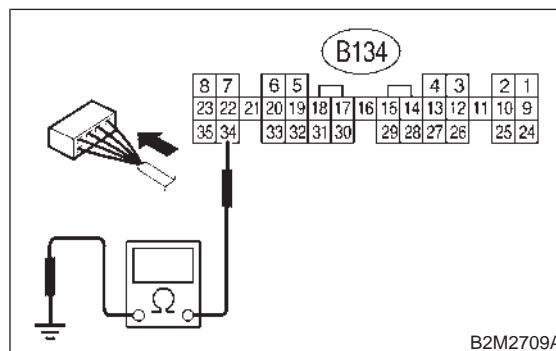
In this case, repair the following:

- Open circuit in harness between ECM and engine ground terminal
- Poor contact in ECM connector
- Poor contact in coupling connector (B22)

- 2) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B134) No. 34 — Chassis ground:



- CHECK** : Is the resistance less than 5 Ω ?
- YES** : Go to step 11P4.
- NO** : Repair harness and connector.

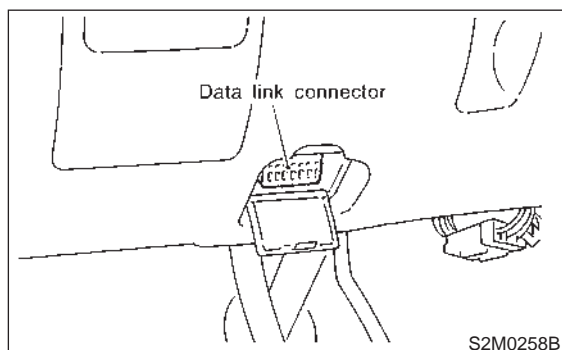
NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and engine ground terminal
- Poor contact in ECM connector
- Poor contact in coupling connector (B22)

11P4 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Start engine
- 5) Read data of front oxygen sensor heater current using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the value more than 0.2 A?*

YES : Repair connector.

NOTE:

In this case, repair the following:

- Poor contact in front oxygen sensor connector
- Poor contact in ECM connector

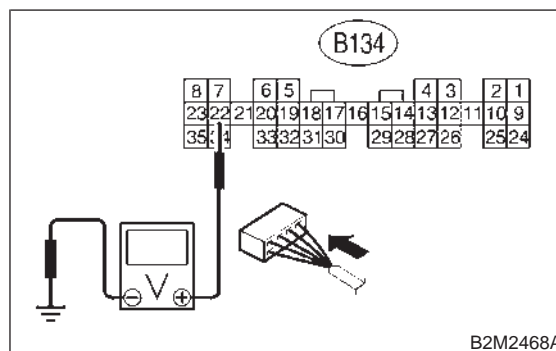
NO : Go to step 11P5.

11P5 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Start and idle the engine.
- 2) Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 22 (+) — Chassis ground (-):



CHECK : *Is the voltage less than 1.0 V?*

YES : Go to step 11P11.

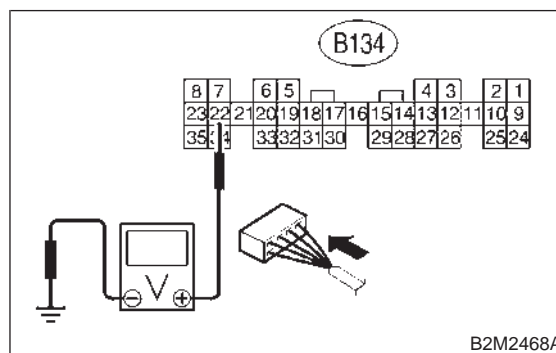
NO : Go to step 11P6.

11P6 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 22 (+) — Chassis ground (-):



CHECK : *Does the voltage change less than 1.0 V by shaking harness and connector of ECM while monitoring the value with voltage meter?*

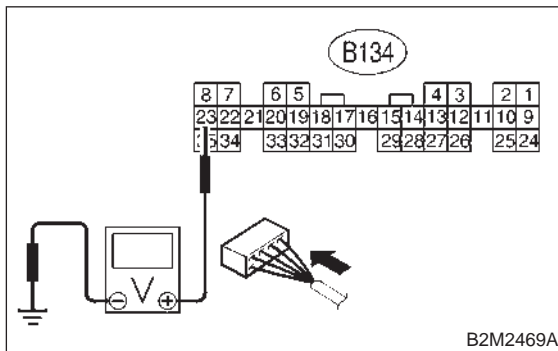
YES : Repair poor contact in ECM connector.

NO : Go to step 11P7.

11P7 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B134) No. 23 (+) — Chassis ground (-):

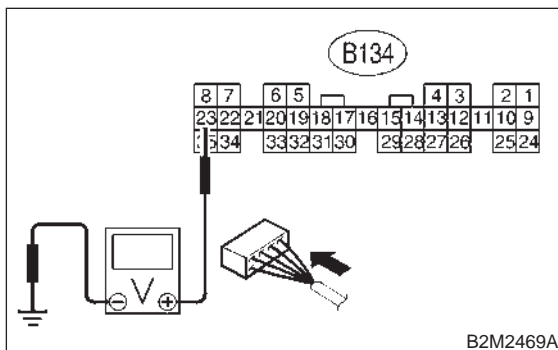


- CHECK** : Is the voltage less than 1.0 V?
- YES** : Go to step 11P11.
- NO** : Go to step 11P8.

11P8 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B134) No. 23 (+) — Chassis ground (-):

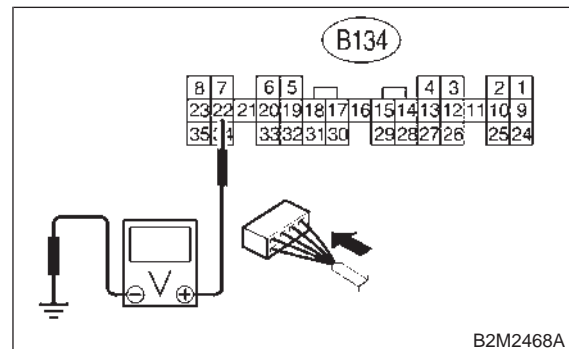


- CHECK** : Does the voltage change less than 1.0 V by shaking harness and connector of ECM while monitoring the value with voltage meter?
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 11P9.

11P9 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Disconnect connector from front oxygen sensor.
- 2) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B134) No. 22 (+) — Chassis ground (-):

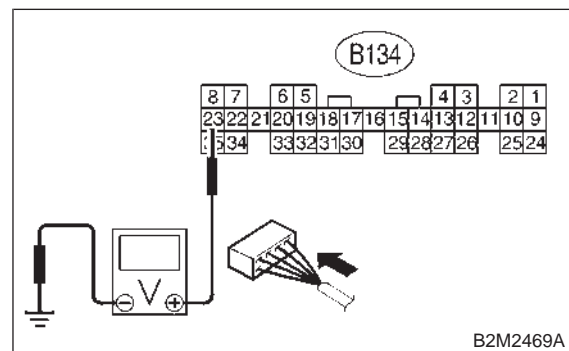


- CHECK** : Is the voltage less than 1.0 V?
- YES** : Go to step 11P10.
- NO** : Repair battery short circuit in harness between ECM and front oxygen sensor connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>

11P10 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM connector and chassis ground.

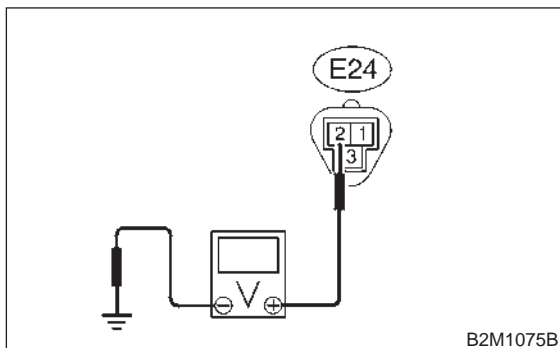
Connector & terminal
(B134) No. 23 (+) — Chassis ground (-):



- CHECK** : Is the voltage less than 1.0 V?
- YES** : Replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Repair battery short circuit in harness between ECM and front oxygen sensor connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>

11P11 : CHECK POWER SUPPLY TO FRONT OXYGEN SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from front oxygen sensor.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between front oxygen sensor connector and engine ground.

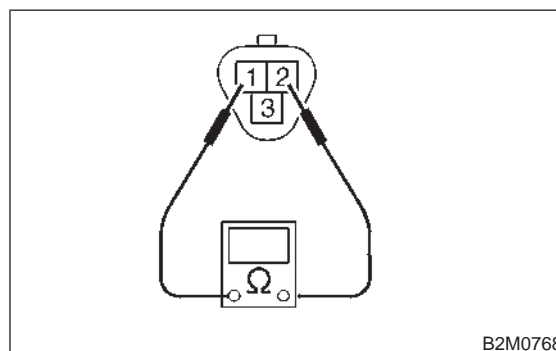
Connector & terminal**(E24) No. 2 (+) — Engine ground (-):****CHECK** : **Is the voltage more than 10 V?****YES** : Go to step 11P12.**NO** : Repair power supply line.**NOTE:**

In this case, repair the following:

- Open circuit in harness between main relay and front oxygen sensor connector
- Poor contact in front oxygen sensor connector
- Poor contact in main relay connector

11P12 : CHECK FRONT OXYGEN SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between front oxygen sensor connector terminals.

Terminals**No. 1 — No. 2:****CHECK** : **Is the resistance less than 30 Ω?****YES** : Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open circuit in harness between front oxygen sensor and ECM connector
- Poor contact in front oxygen sensor connector
- Poor contact in ECM connector

NO : Replace front oxygen sensor. <Ref. to 2-7 [W7A0].>

Q: DTC P0136 — REAR OXYGEN SENSOR CIRCUIT MALFUNCTION —

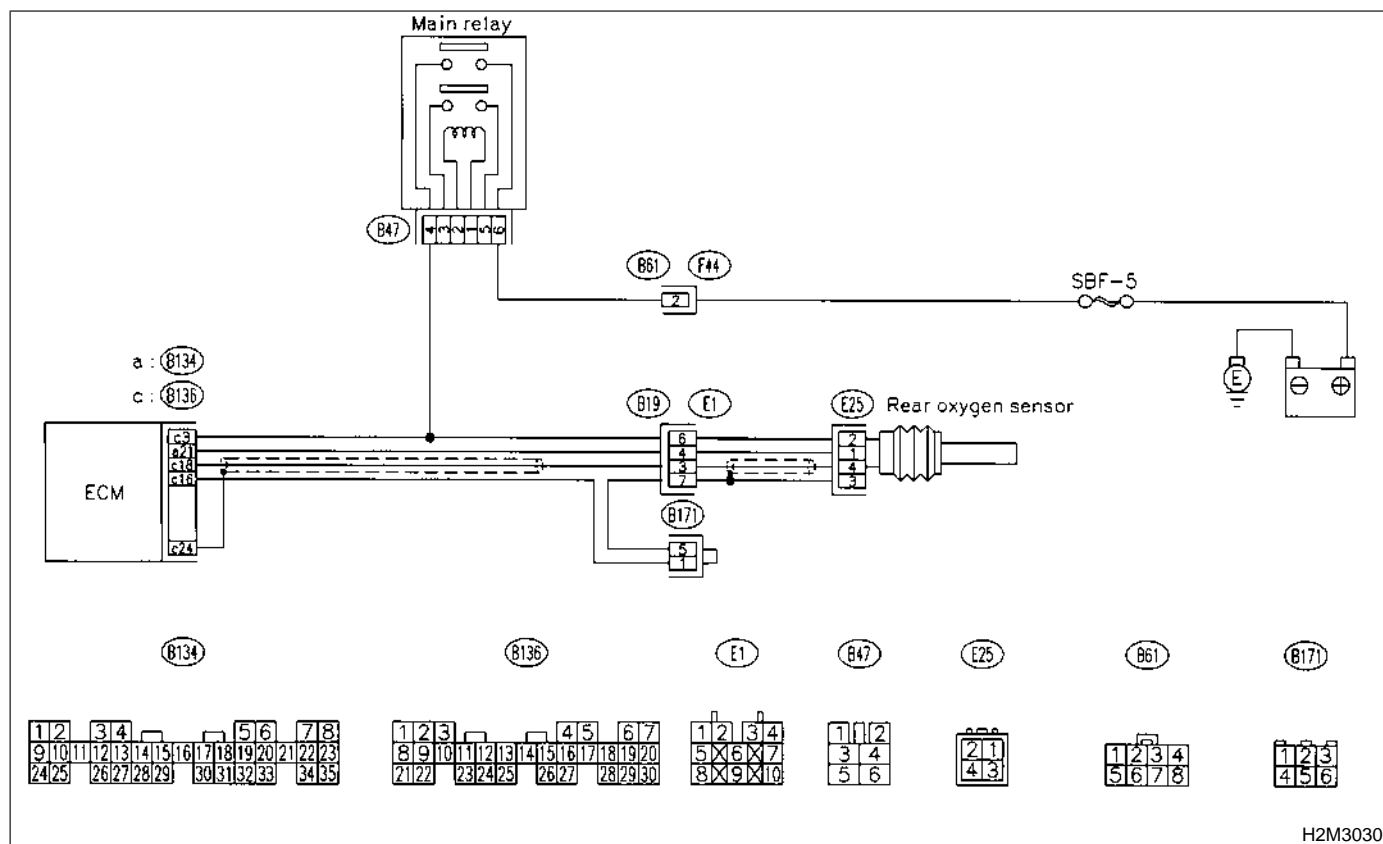
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3030

11Q1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0130?

YES : Go to step 11Q2.

NO : Go to step 11Q3.

11Q2 : CHECK FAILURE CAUSE OF P0130.

Inspect DTC P0130 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

CHECK : Is the failure cause of P0130 in the fuel system?

YES : Check fuel system.

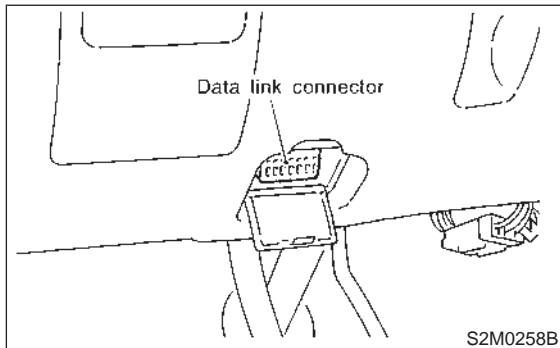
NOTE:

In this case, it is not necessary to inspect DTC P0136.

NO : Go to step 11Q3.

11Q3 : CHECK REAR OXYGEN SENSOR DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or OBD-II general scan tool to data link connector.



- 3) Start the engine, and turn Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Warm-up the engine until engine coolant temperature is above 70°C (160°F), and keep the engine speed at 2,000 rpm to 3,000 rpm for two minutes.
- 5) Read data of rear oxygen sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Does the value fluctuate?**

YES : Go to step 11Q7.

NO : Go to step 11Q4.

11Q4 : CHECK REAR OXYGEN SENSOR DATA.

Read data of rear oxygen sensor signal using Subaru Select Monitor or OBD-II General Scan Tool.

CHECK : **Is the value fixed between 0.2 and 0.4 V?**

YES : Go to step 11Q5.

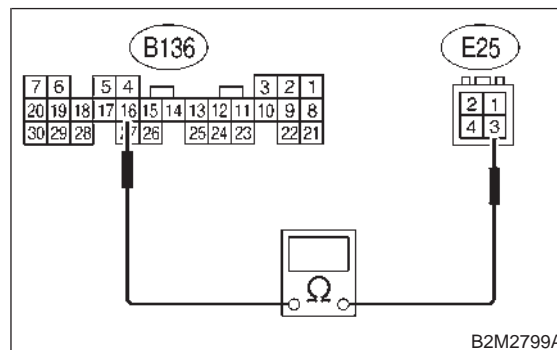
NO : Replace rear oxygen sensor. <Ref. to 2-7 [W8A0].>

11Q5 : CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from ECM and rear oxygen sensor.
- 3) Measure resistance of harness between ECM and rear oxygen sensor connector.

Connector & terminal

(B136) No. 16 — (E25) No. 3:



CHECK : **Is the resistance more than 3 Ω?**

YES : Repair open circuit in harness between ECM and rear oxygen sensor connector.

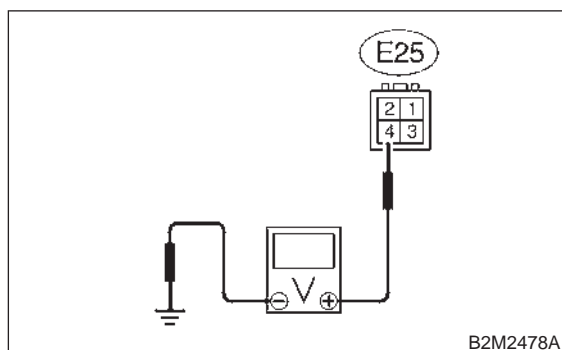
NO : Go to step 11Q6.

11Q6 : CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from rear oxygen sensor.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between rear oxygen sensor harness connector and engine ground or chassis ground.

Connector & terminal

(E25) No. 4 (+) — Engine ground (-):



- CHECK** : **Is the voltage more than 0.2 V?**
- YES** : Replace rear oxygen sensor. <Ref. to 2-7 [W8A0].>
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between rear oxygen sensor and ECM connector
- Poor contact in rear oxygen sensor connector
- Poor contact in ECM connector

11Q7 : CHECK EXHAUST SYSTEM.

Check exhaust system parts.

NOTE:

Check the following items.

- Loose installation of portions
- Damage (crack, hole etc.) of parts
- Looseness and ill fitting of parts between front oxygen sensor and rear oxygen sensor

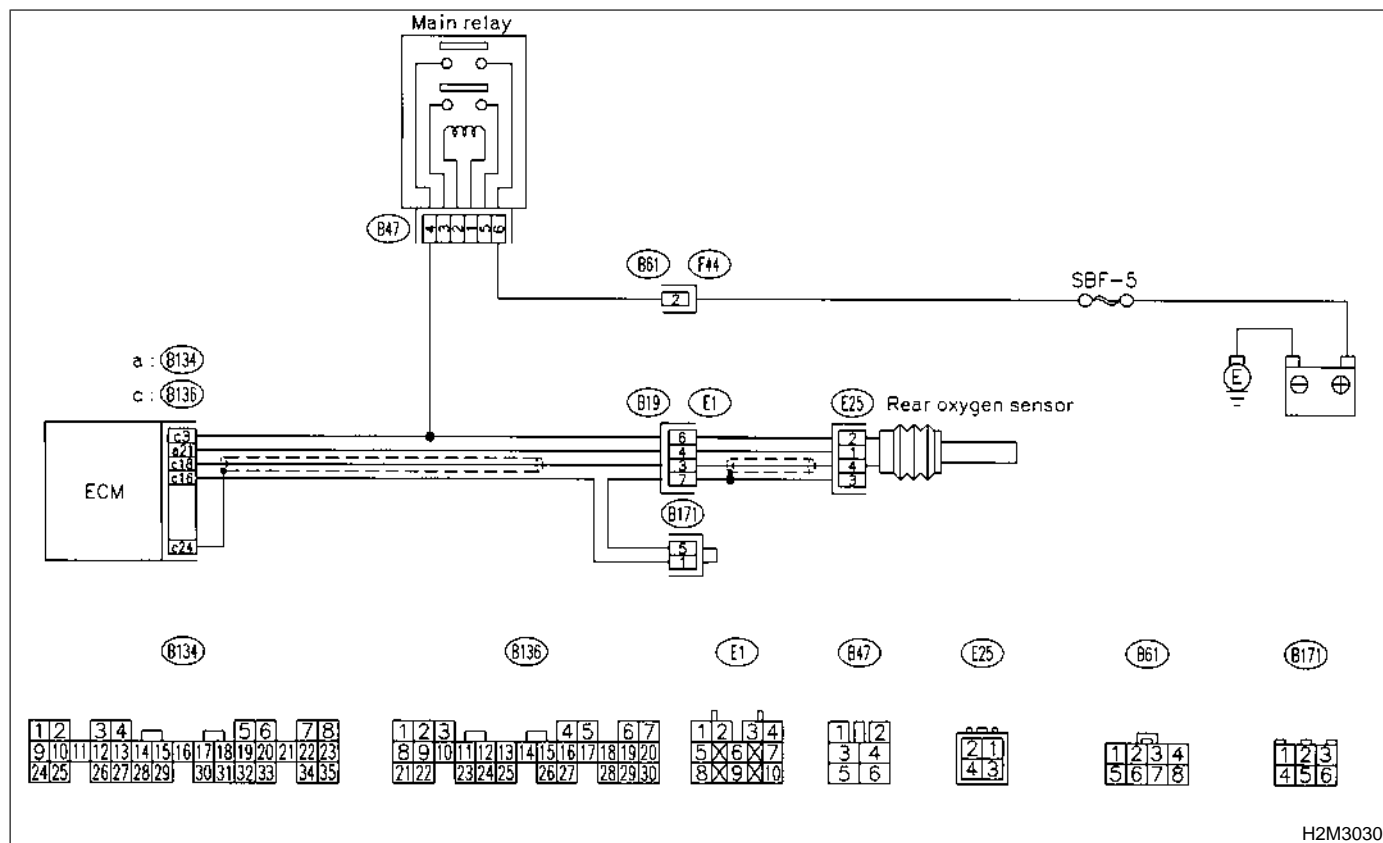
- CHECK** : **Is there a fault in exhaust system?**
- YES** : Repair or replace faulty parts.
- NO** : Replace rear oxygen sensor. <Ref. to 2-7 [W8A0].>

R: DTC P0139 — REAR OXYGEN SENSOR CIRCUIT SLOW RESPONSE —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3030

11R1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0136?

YES : Inspect DTC P0136 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0139.

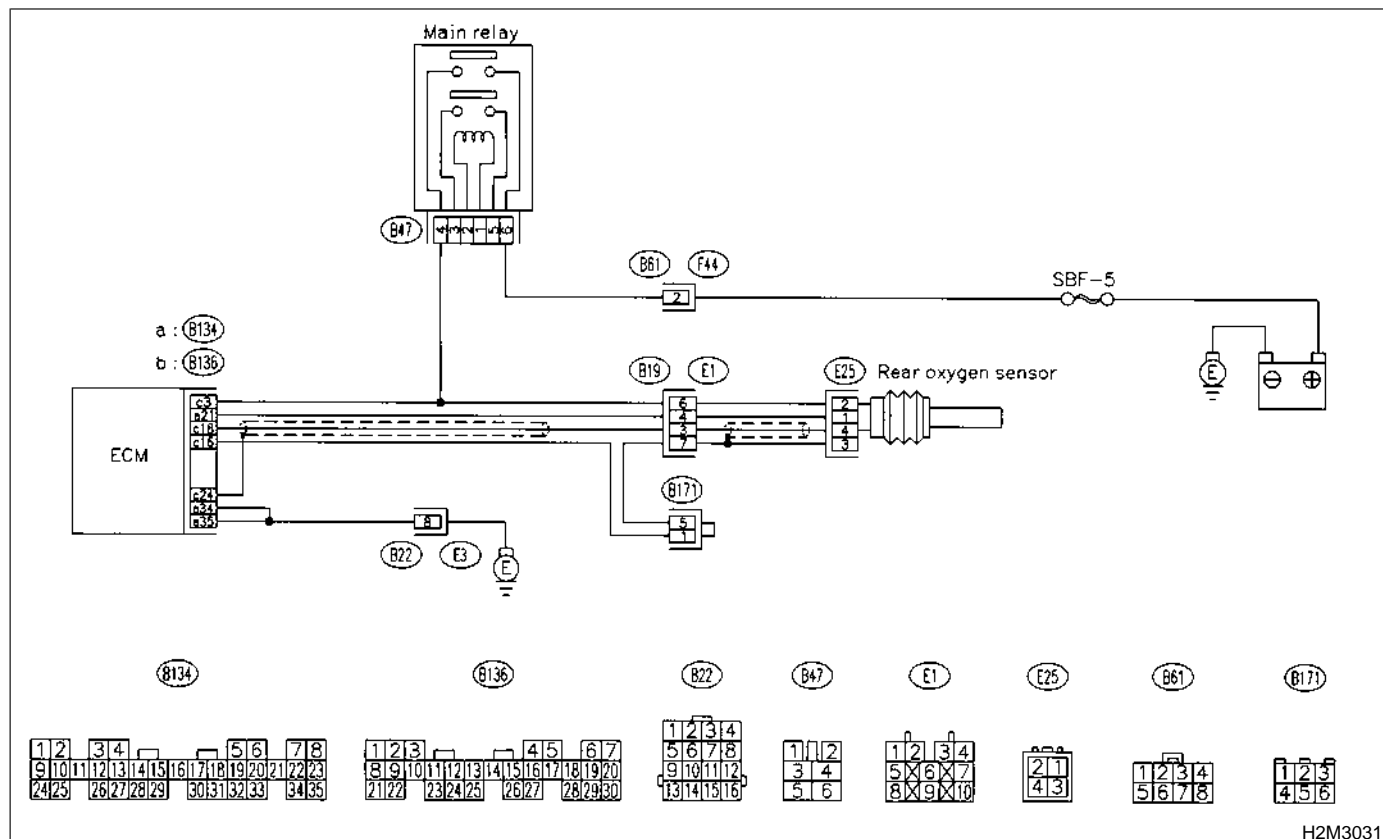
NO : Replace rear oxygen sensor. <Ref. to 2-7 [W8A0].>

S: DTC P0141 — REAR OXYGEN SENSOR HEATER CIRCUIT MALFUNCTION**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

11S1 : CHECK ANY OTHER DTC ON DISPLAY.

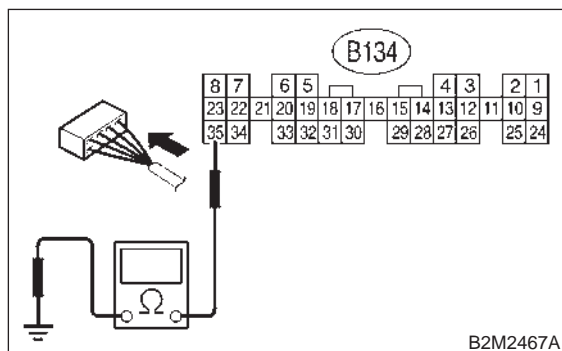
CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0141 and P0135 at the same time?

YES : Go to step 11S2.

NO : Go to step 11S3.

11S2 : CHECK GROUND CIRCUIT OF ECM.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal**(B134) No. 35 — Chassis ground:****CHECK** : Is the resistance less than 5 Ω?**YES** : Go to step 11S4.**NO** : Go to step 11S3.**11S3 : CHECK GROUND CIRCUIT OF ECM.**

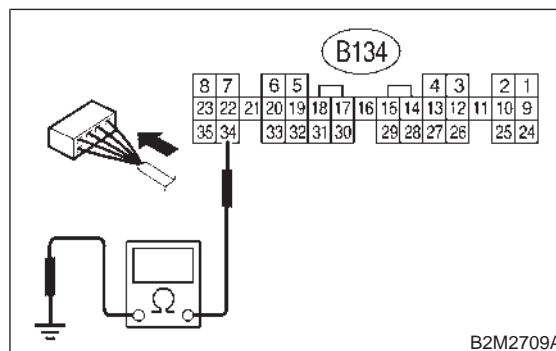
- 1) Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and engine ground terminal
- Poor contact in ECM connector
- Poor contact in coupling connector (B22)

- 2) Measure resistance of harness between ECM connector and chassis ground.

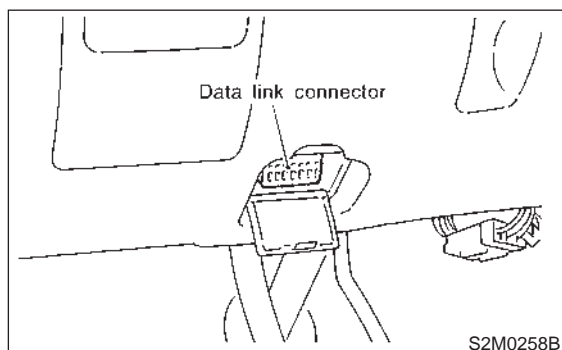
Connector & terminal**(B134) No. 34 — Chassis ground:****CHECK** : Is the resistance less than 5 Ω?**YES** : Go to step 11S4.**NO** : Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open circuit in harness between ECM and engine ground terminal
- Poor contact in ECM connector
- Poor contact in coupling connector (B22)

11S4 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read data of rear oxygen sensor heater current using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
- OBD-II scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : Is the value more than 0.2 A?

YES : Repair connector.

NOTE:

In this case, repair the following:

- Poor contact in rear oxygen sensor connector
- Poor contact in rear oxygen sensor connecting harness connector
- Poor contact in ECM connector

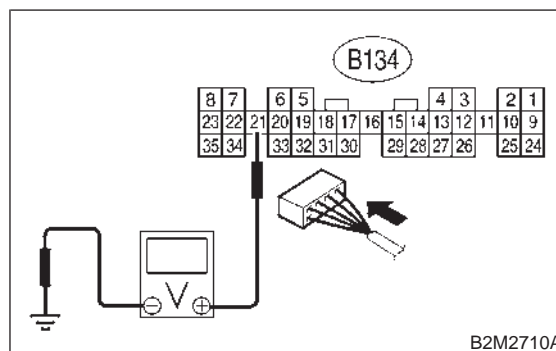
NO : Go to step 11S5.

11S5 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Start and idle the engine.
- 2) Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 21 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1.0 V?

YES : Go to step 11S8.

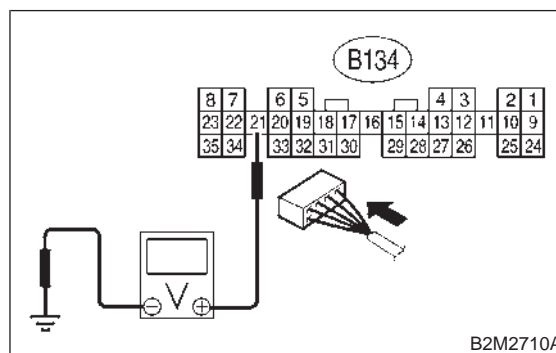
NO : Go to step 11S6.

11S6 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 21 (+) — Chassis ground (-):



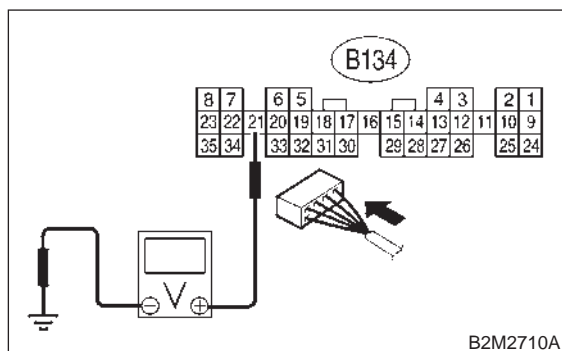
CHECK : Does the voltage change less than 1.0 V by shaking harness and connector of ECM while monitoring the value with voltage meter?

YES : Repair poor contact in ECM connector.

NO : Go to step 11S7.

11S7 : CHECK OUTPUT SIGNAL FROM ECM.

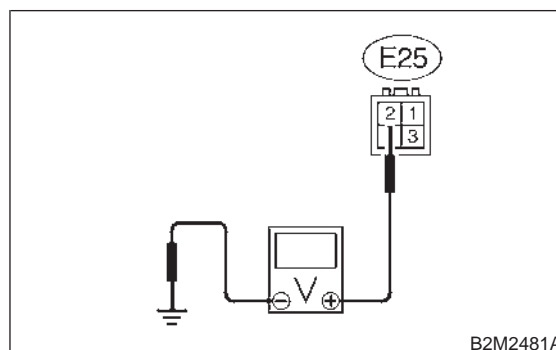
- 1) Disconnect connector from rear oxygen sensor.
- 2) Measure voltage between ECM connector and chassis ground.

Connector & terminal**(B134) No. 21 (+) — Chassis ground (-):**

- CHECK** : **Is the voltage less than 1.0 V?**
- YES** : Replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Repair battery short circuit in harness between ECM and rear oxygen sensor connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>

11S8 : CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from rear oxygen sensor.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between rear oxygen sensor connector and engine ground or chassis ground.

Connector & terminal**(E25) No. 2 (+) — Chassis ground (-):**

- CHECK** : **Is the voltage more than 10 V?**
- YES** : Go to step 11S9.
- NO** : Repair power supply line.

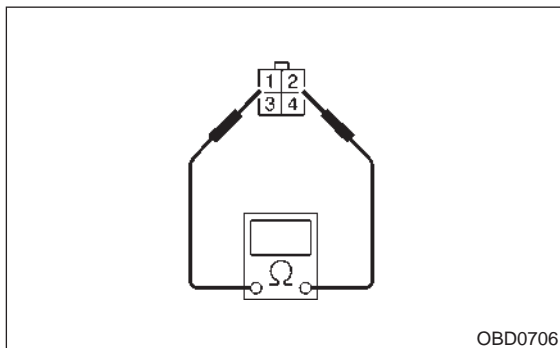
NOTE:

In this case, repair the following:

- Open circuit in harness between main relay and rear oxygen sensor connector
- Poor contact in rear oxygen sensor connector
- Poor contact in coupling connector (E1)

11S9 : CHECK REAR OXYGEN SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between rear oxygen sensor connector terminals.

Terminals**No. 1 — No. 2:****CHECK** : **Is the resistance less than 30 Ω ?****YES** : Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open circuit in harness between rear oxygen sensor and ECM connector
- Poor contact in rear oxygen sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (E1)

NO : Replace rear oxygen sensor. <Ref. to 2-7 [W8A0].>

MEMO:

T: DTC P0170 — FUEL TRIM MALFUNCTION —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

11T1 : CHECK EXHAUST SYSTEM.

CHECK : *Are there holes or loose bolts on exhaust system?*

YES : Repair exhaust system.

NO : Go to step 11T2.

11T2 : CHECK AIR INTAKE SYSTEM.

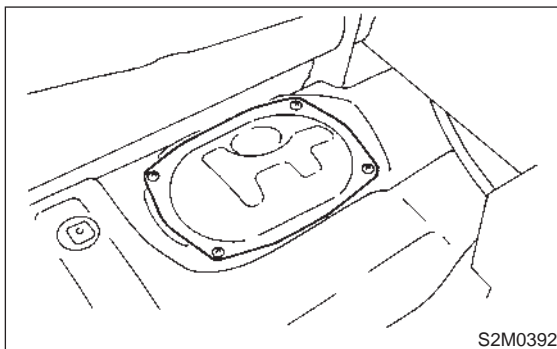
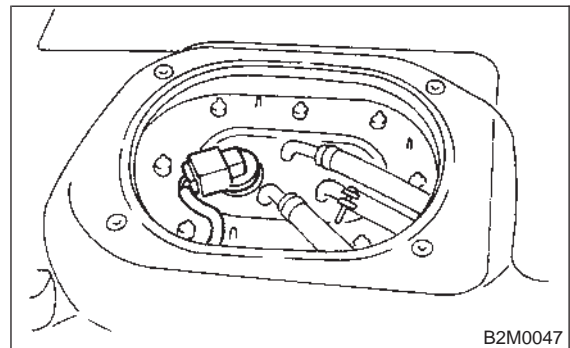
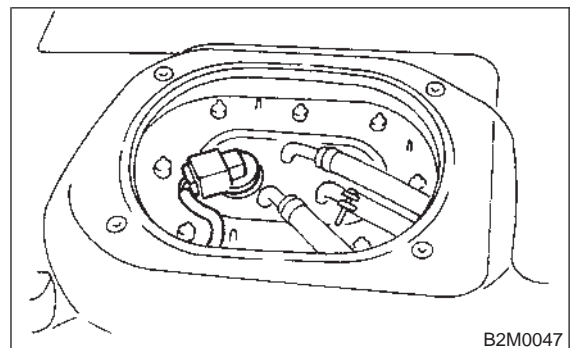
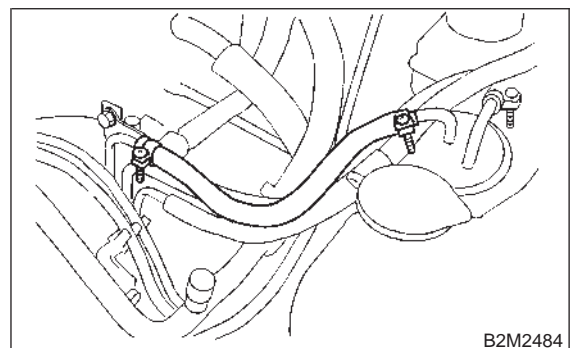
CHECK : *Are there holes, loose bolts or disconnection of hose on air intake system?*

YES : Repair air intake system.

NO : Go to step 11T3.

11T3 : CHECK FUEL PRESSURE.**1) Release fuel pressure.**

- (1) Remove fuel pump access hole lid located on the right rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).

**(2) Disconnect connector from fuel tank.****(3) Start the engine, and run it until it stalls.****(4) After stopping the engine, crank the engine for 5 to 7 seconds to reduce fuel pressure.****(5) Turn ignition switch to OFF.****(6) Remove fuel filler cap.****2) Connect connector to fuel tank.****3) Disconnect fuel delivery hose from fuel filter, and connect fuel pressure gauge.****4) Install fuel filler cap.**

5) Start the engine and idle while gear position is neutral.

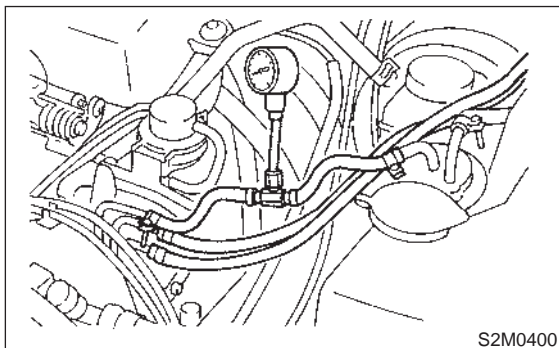
6) Measure fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold.

WARNING:

Before removing fuel pressure gauge, release fuel pressure.

NOTE:

If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.



CHECK : **Is fuel pressure between 284 and 314 kPa (2.9 — 3.2 kg/cm², 41 — 46 psi)?**

YES : Go to step 11T4.

NO : Repair the following items.

Fuel pressure too high	<ul style="list-style-type: none"> ● Clogged fuel return line or bent hose
Fuel pressure too low	<ul style="list-style-type: none"> ● Improper fuel pump discharge ● Clogged fuel supply line

11T4 : CHECK FUEL PRESSURE.

After connecting pressure regulator vacuum hose, measure fuel pressure.

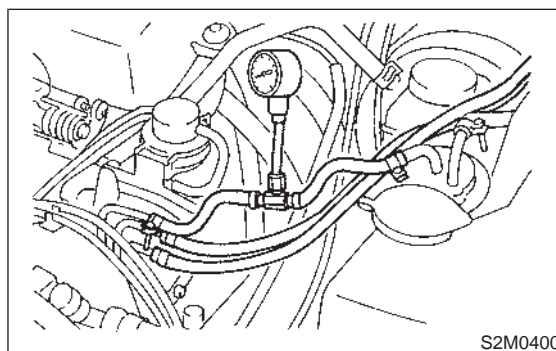
WARNING:

Before removing fuel pressure gauge, release fuel pressure.

NOTE:

● If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.

● If out of specification as measured at this step, check or replace pressure regulator and pressure regulator vacuum hose.



CHECK : **Is fuel pressure between 206 and 235 kPa (2.1 — 2.4 kg/cm², 30 — 34 psi)?**

YES : Go to step 11T5.

NO : Repair the following items.

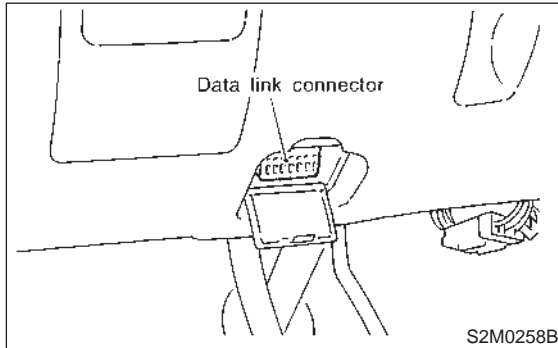
Fuel pressure too high	<ul style="list-style-type: none"> ● Faulty pressure regulator ● Clogged fuel return line or bent hose
Fuel pressure too low	<ul style="list-style-type: none"> ● Faulty pressure regulator ● Improper fuel pump discharge ● Clogged fuel supply line

NOTE:

The fuel pressure gauge resisters 10 to 20 kPa (0.1 to 0.2 kg/cm², 1.4 to 2.8 psi) higher than standard values during high-altitude operations.

11T5 : CHECK ENGINE COOLANT TEMPERATURE SENSOR. < REF. TO 2-7 [T11H0].> OR <REF. TO 2-7 [T11I0].>

- 1) Turn ignition switch to OFF.
- 2) Connect the Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Start the engine and warm-up completely.
- 4) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is temperature greater than 60°C (140°F)?*

YES : Go to step 11T6.

NO : Replace engine coolant temperature sensor. <Ref. to 2-7 [W5A2].>

11T6 : CHECK MASS AIR FLOW SENSOR.

- 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F).
- 2) Place the selector lever in "N" or "P" position.
- 3) Turn A/C switch to OFF.
- 4) Turn all accessory switches to OFF.
- 5) Read data of mass flow sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

Specification:

Engine speed	Specified value
Idling	2.2 — 4.2 (g/sec)
2,500 rpm	8.6 — 14.5 (g/sec)

CHECK : *Is the voltage within the specifications?*

YES : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

NO : Replace mass air flow sensor. <Ref. to 2-7 [W2A0].>

U: DTC P0181 — FUEL TEMPERATURE SENSOR A CIRCUIT RANGE/PERFORMANCE PROBLEM —

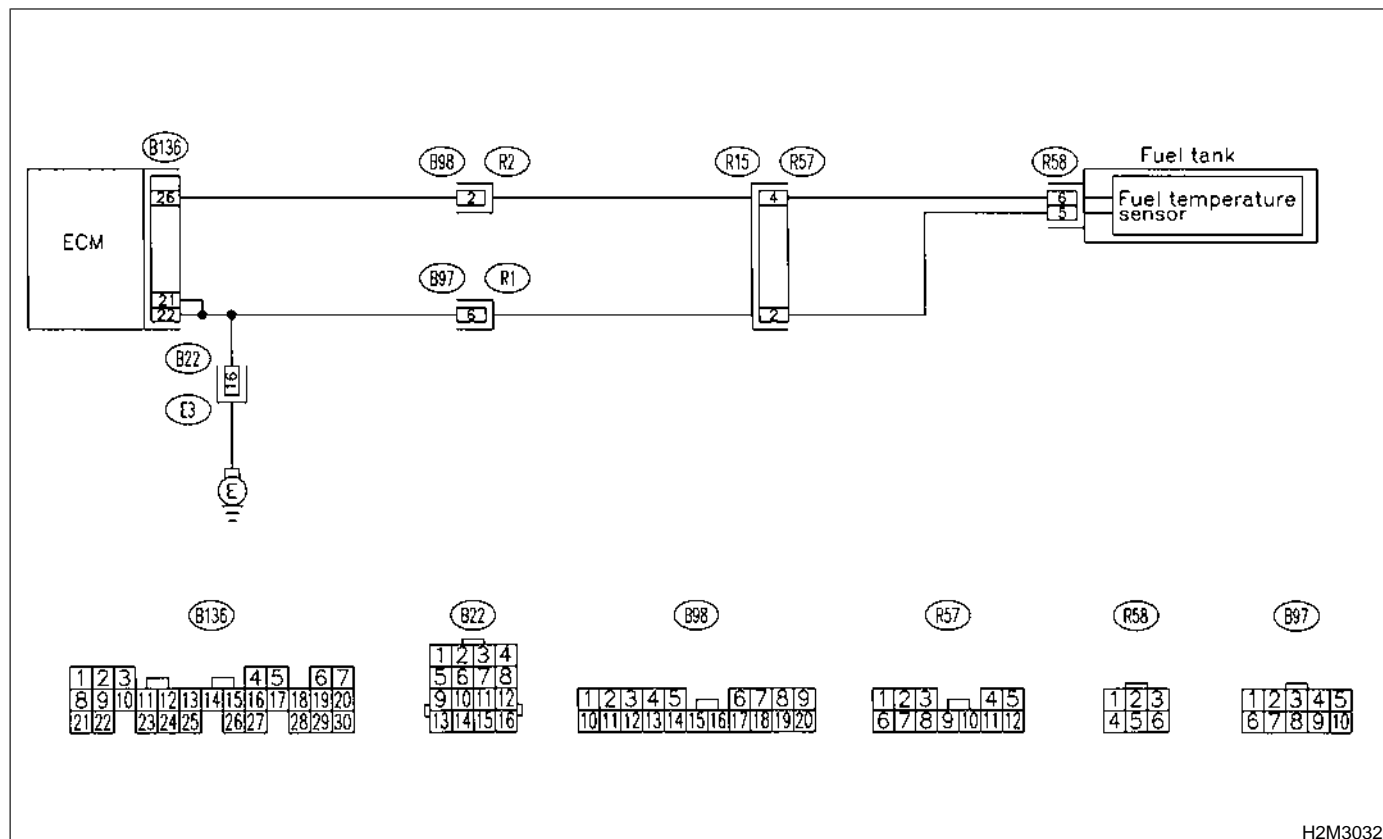
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3032

11U1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0182 or P0183?

YES : Inspect DTC P0182 or P0183 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0181.

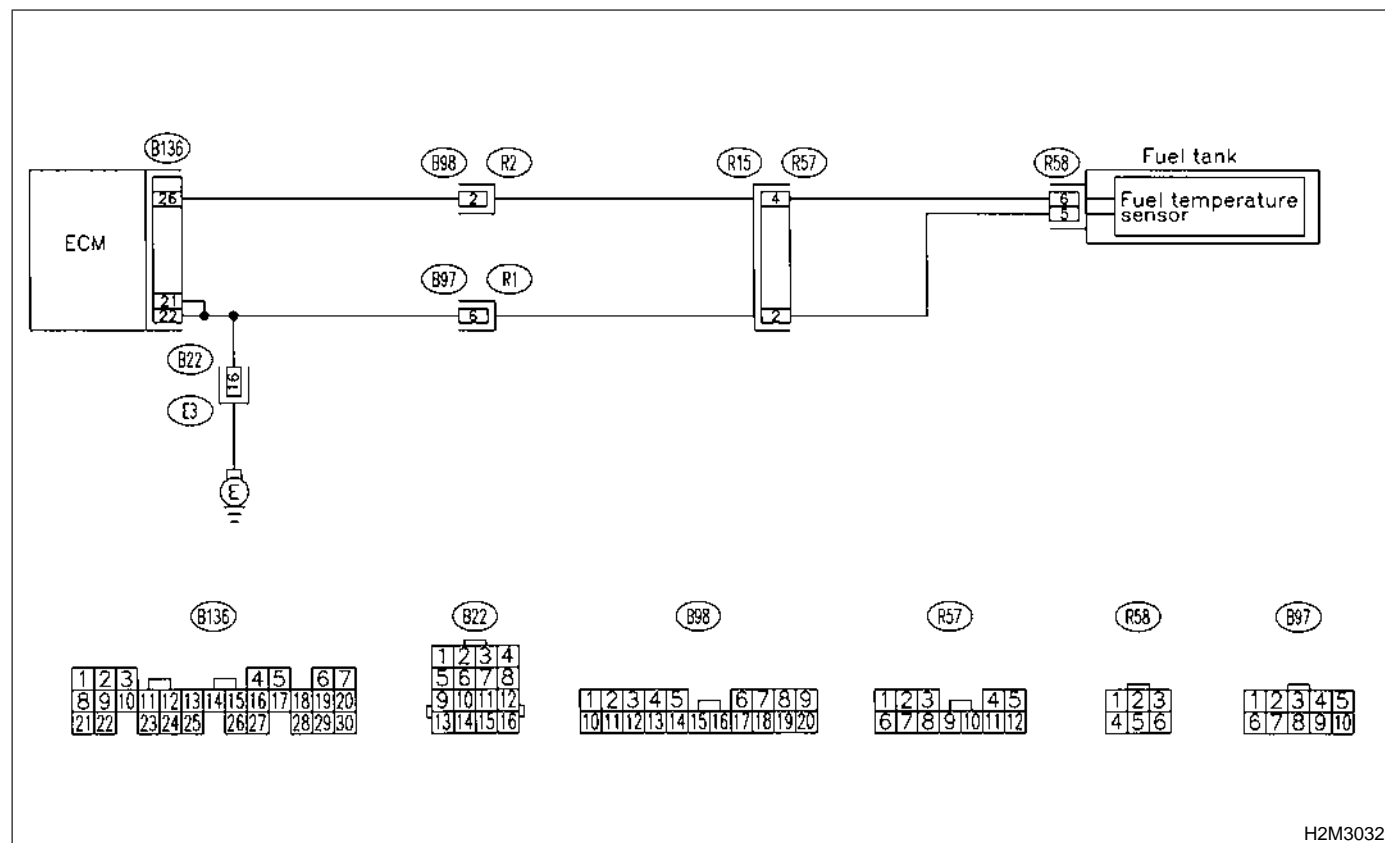
NO : Replace fuel temperature sensor. <Ref. to 2-1 [W5A0].>

V: DTC P0182 — FUEL TEMPERATURE SENSOR A CIRCUIT LOW INPUT —**• DTC DETECTING CONDITION:**

- Immediately at fault recognition

CAUTION:

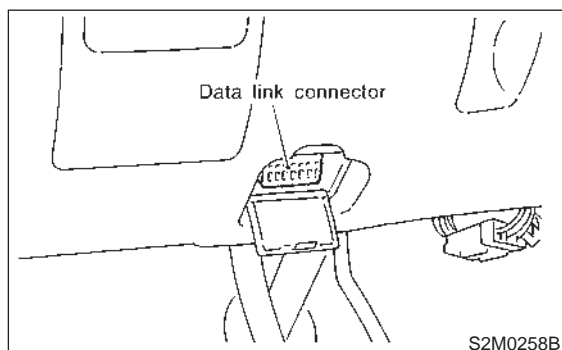
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3032

11V1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read data of fuel temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

● OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

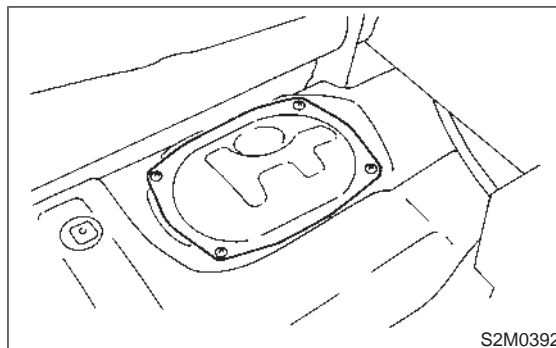
CHECK : **Is the value greater than 150°C (300°F)?**

YES : Go to step 11V2.

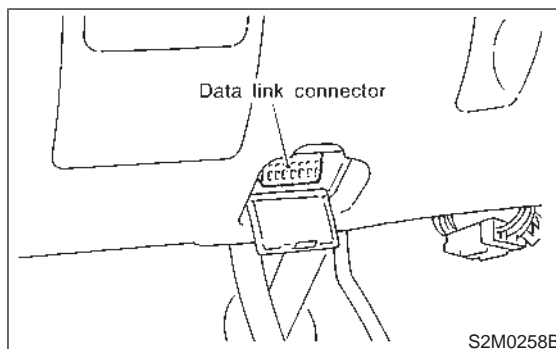
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time.

11V2 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Remove access hole lid.



- 3) Disconnect connector from fuel pump.
- 4) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 5) Turn ignition switch and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 6) Read data of fuel temperature sensor signal using Subaru Select Monitor or the OBD-II general scan tool.

NOTE:
● Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

● OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Is the value less than -40°C (-40°F)?**

YES : Replace fuel temperature sensor. <Ref. to 2-1 [W5A0].>

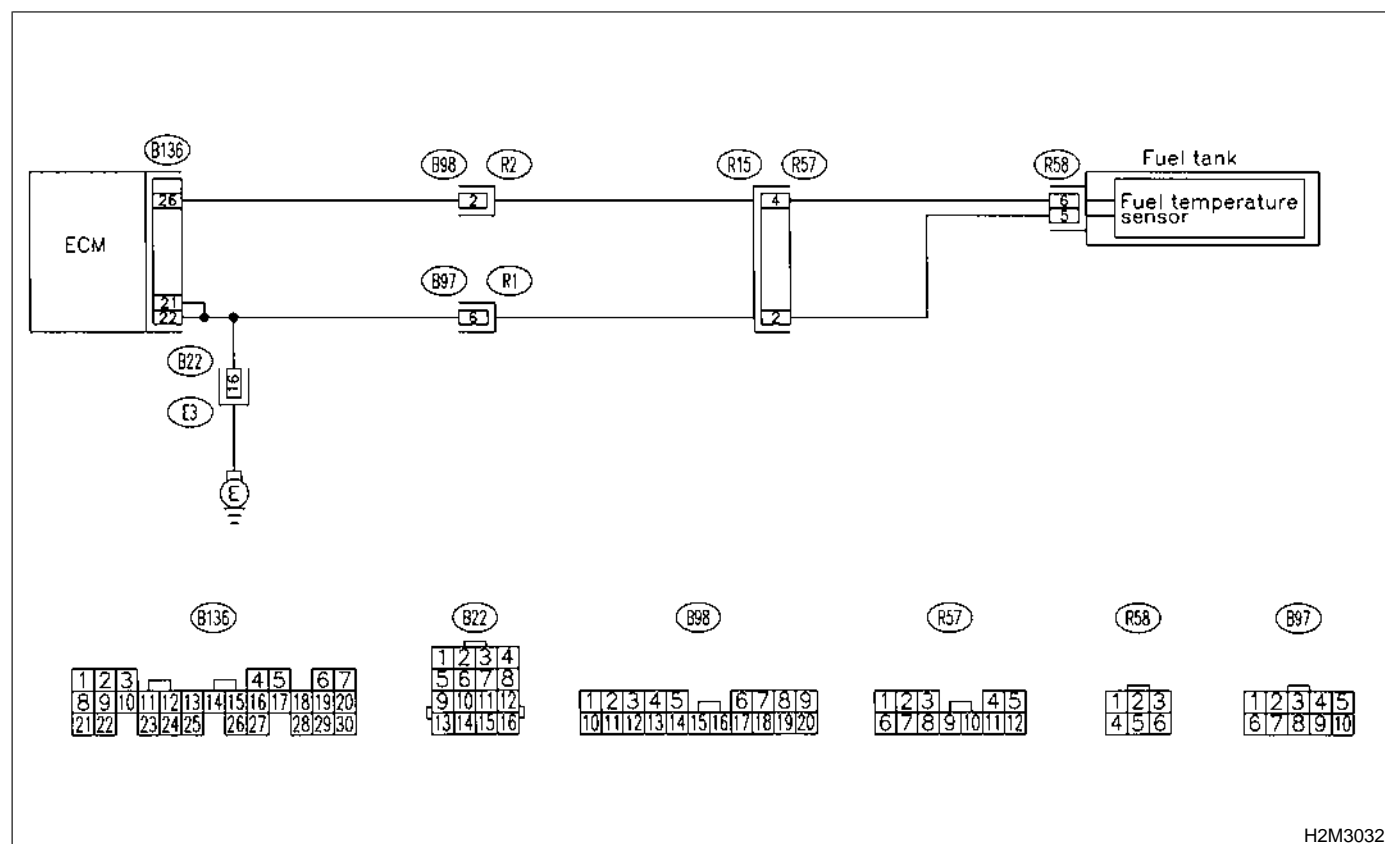
NO : Repair ground short circuit in harness between fuel pump and ECM connector.

W: DTC P0183 — FUEL TEMPERATURE SENSOR A CIRCUIT HIGH INPUT —● **DTC DETECTING CONDITION:**

- Immediately at fault recognition

CAUTION:

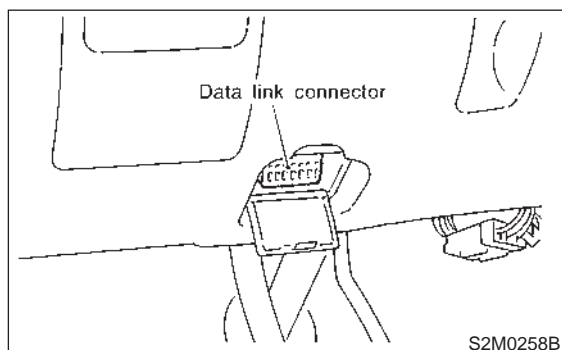
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● **WIRING DIAGRAM:**

H2M3032

11W1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 4) Start engine.
- 5) Read data of fuel temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Is the value less than -40°C (-40°F)?**

YES : Go to step 11W2.

NO : Repair poor contact.

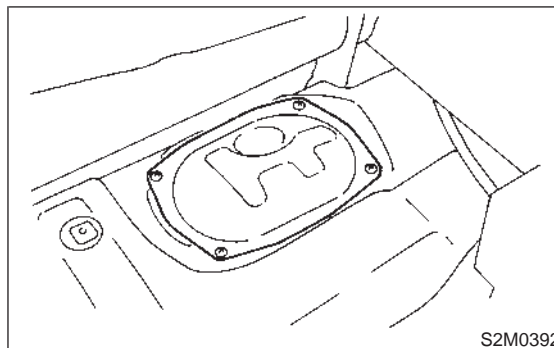
NOTE:

In this case, repair the following:

- Poor contact in fuel pump connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (B22), (B98), (B97) and (R57)

11W2 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

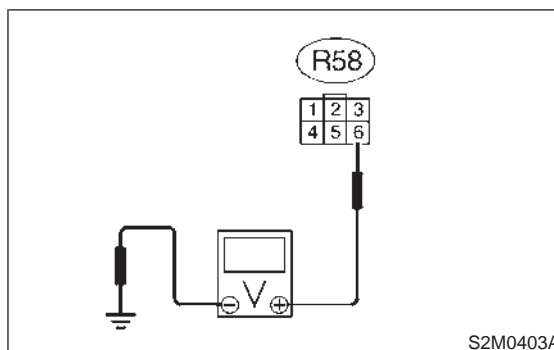
- 1) Turn ignition switch to OFF.
- 2) Remove access hole lid.



- 3) Disconnect connector from fuel pump.
- 4) Measure voltage between fuel pump connector and chassis ground.

Connector & terminal

(R58) No. 6 (+) — Chassis ground (-):



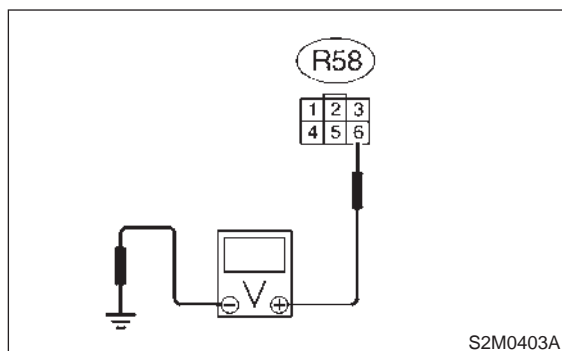
CHECK : **Is the voltage more than 10 V?**

YES : Repair battery short circuit in harness between ECM and fuel pump connector.

NO : Go to step 11W3.

11W3 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

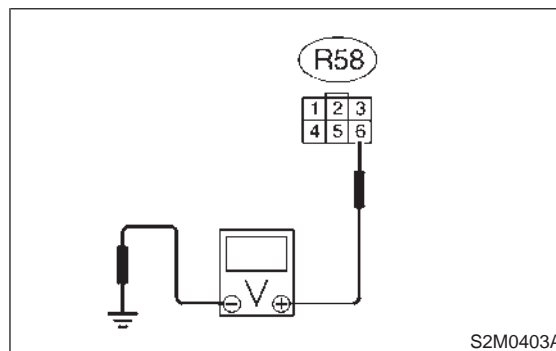
- 1) Turn ignition switch to ON.
- 2) Measure voltage between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 6 (+) — Chassis ground (-):


- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair battery short circuit in harness between ECM and fuel pump connector.
- NO** : Go to step 11W4.

11W4 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

Measure voltage between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 6 (+) — Chassis ground (-):


- CHECK** : **Is the voltage more than 4 V?**
- YES** : Go to step 11W5.
- NO** : Repair harness and connector.

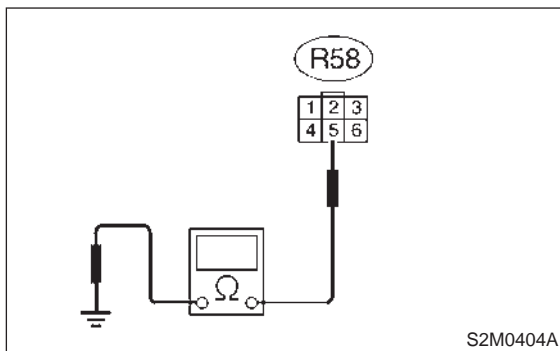
NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and fuel pump connector
- Poor contact in fuel pump connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (B98) and (R57)

11W5 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between fuel pump connector and chassis ground.

Connector & terminal**(R58) No. 5 — Chassis ground:****CHECK : Is the resistance less than 5 Ω ?****YES :** Replace fuel temperature sensor. <Ref. to 2-1 [W5A0].>**NO :** Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open circuit in harness between ECM and fuel pump connector
- Poor contact in fuel pump connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (B22), (B97) and (R57)

X: DTC P0301 — CYLINDER 1 MISFIRE DETECTED —

NOTE:

For the diagnostic procedure, refer to 2-7 [T14AA1]. <Ref. to 2-7 [T11AA0].>

Y: DTC P0302 — CYLINDER 2 MISFIRE DETECTED —

NOTE:

For the diagnostic procedure, refer to 2-7 [T14AA1]. <Ref. to 2-7 [T11AA0].>

Z: DTC P0303 — CYLINDER 3 MISFIRE DETECTED —

NOTE:

For the diagnostic procedure, refer to 2-7 [T14AA1]. <Ref. to 2-7 [T11AA0].>

AA: DTC P0304 — CYLINDER 4 MISFIRE DETECTED —**• DTC DETECTING CONDITION:**

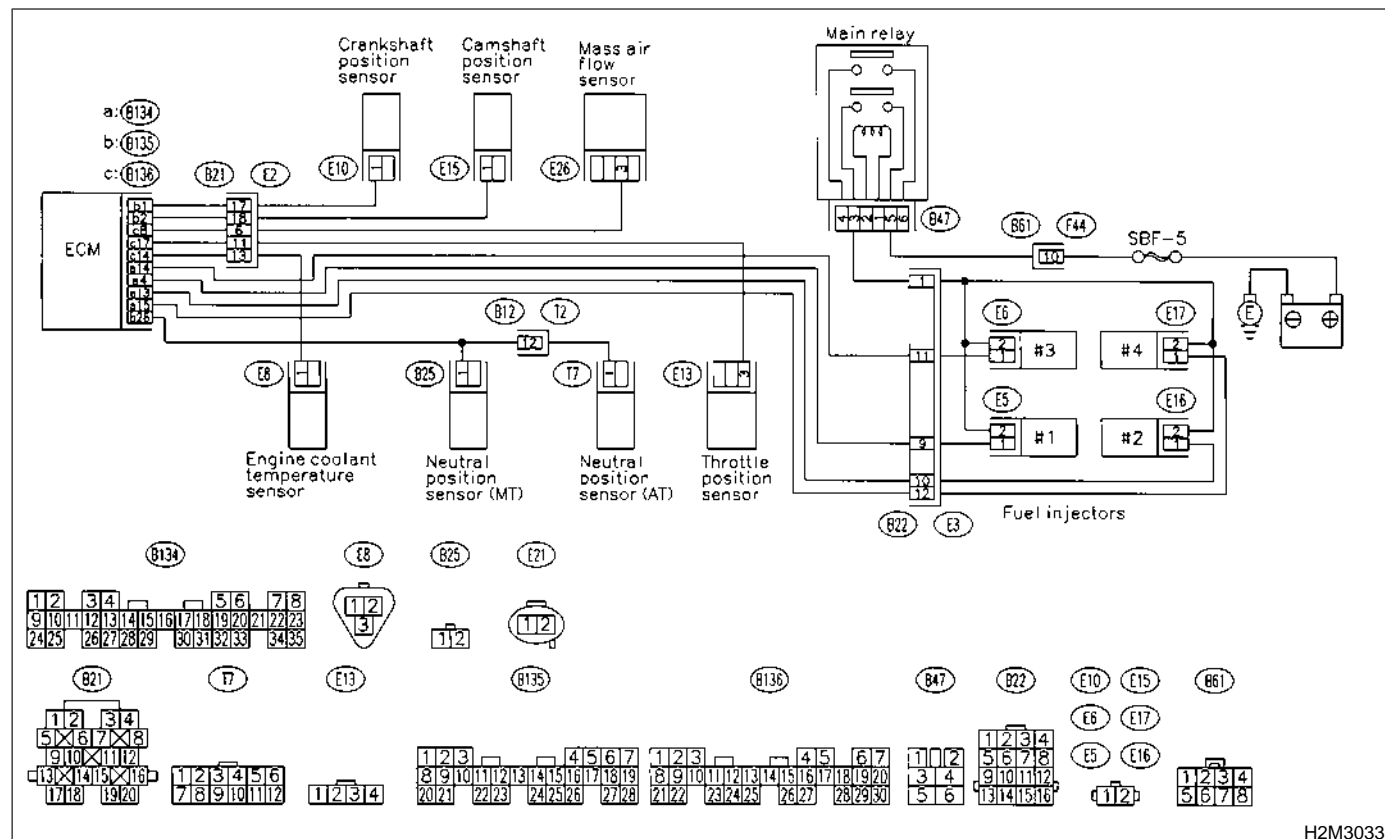
- Two consecutive driving cycles with fault
- Immediately at fault recognition (A misfire which could damage catalyst occurs.)

• TROUBLE SYMPTOM:

- Engine stalls.
- Erroneous idling
- Rough driving

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3033

11AA1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0101, P0102, P0103, P0116, P0117 or P0125?

YES : Inspect DTC P0101, P0102, P0103, P0116, P0117 or P0125 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0301, P0302, P0303 and P0304.

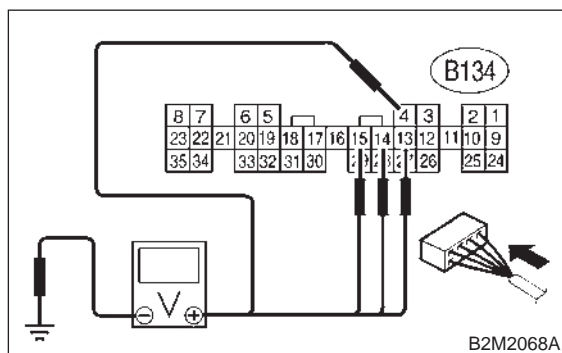
NO : Go to step 11AA2.

11AA2 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM connector and chassis ground on faulty cylinders.

Connector & terminal

- #1; (B134) No. 4 (+) — Chassis ground (-):
- #2; (B134) No. 13 (+) — Chassis ground (-):
- #3; (B134) No. 14 (+) — Chassis ground (-):
- #4; (B134) No. 15 (+) — Chassis ground (-):



CHECK : Is the voltage more than 10 V?

YES : Go to step 11AA7.

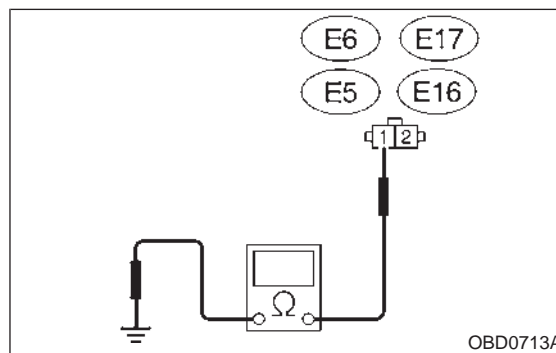
NO : Go to step 11AA3.

11AA3 : CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from fuel injector on faulty cylinders.
- 3) Measure voltage between ECM connector and engine ground on faulty cylinders.

Connector & terminal

- #1; (E5) No. 1 — Engine ground:
- #2; (E16) No. 1 — Engine ground:
- #3; (E6) No. 1 — Engine ground:
- #4; (E17) No. 1 — Engine ground:



CHECK : Is the resistance less than 10 Ω?

YES : Repair ground short circuit in harness between fuel injector and ECM connector.

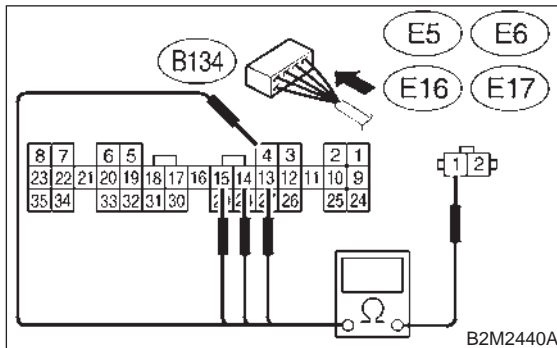
NO : Go to step 11AA4.

11AA4 : CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.

Measure resistance of harness connector between ECM connector and fuel injector on faulty cylinders.

Connector & terminal

- #1; (B134) No. 4 — (E5) No. 1:
- #2; (B134) No. 13 — (E16) No. 1:
- #3; (B134) No. 14 — (E6) No. 1:
- #4; (B134) No. 15 — (E17) No. 1:



- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 11AA5.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

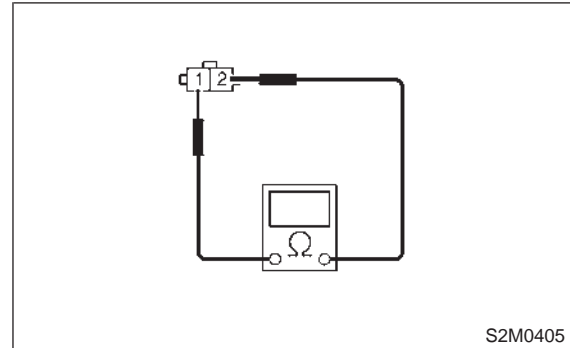
- Open circuit in harness between ECM and fuel injector connector
- Poor contact in coupling connector (B22)

11AA5 : CHECK FUEL INJECTOR.

Measure resistance between fuel injector terminals on faulty cylinder.

Terminals

No. 1 — No. 2:



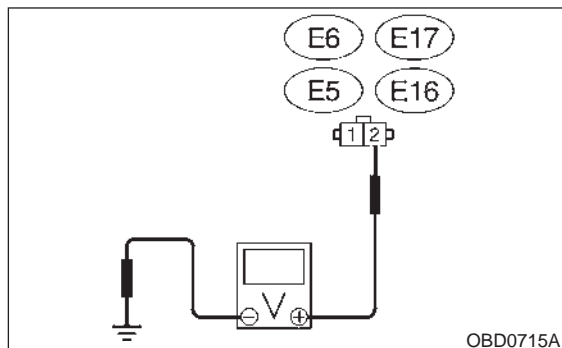
- CHECK** : Is the resistance between 5 and 20 Ω ?
- YES** : Go to step 11AA6.
- NO** : Replace faulty fuel injector. <Ref. to 2-7 [W14A0].>

11AA6 : CHECK POWER SUPPLY LINE.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between fuel injector and engine ground on faulty cylinders.

Connector & terminal

- #1; (E5) No. 2 (+) — Engine ground (-):
 #2; (E16) No. 2 (+) — Engine ground (-):
 #3; (E6) No. 2 (+) — Engine ground (-):
 #4; (E17) No. 2 (+) — Engine ground (-):



- CHECK** : **Is the voltage more than 10 V?**
YES : Repair poor contact in all connectors in fuel injector circuit.
NO : Repair harness and connector.

NOTE:

In this case, repair the following:

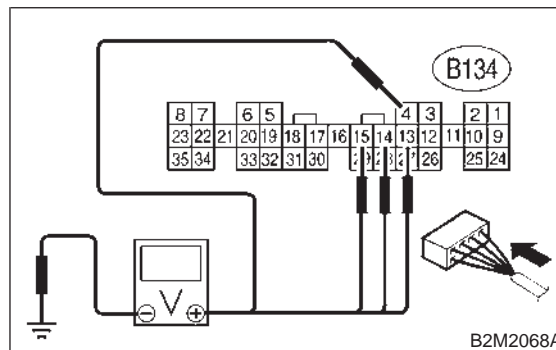
- Open circuit in harness between main relay and fuel injector connector on faulty cylinders
- Poor contact in coupling connector (B22)
- Poor contact in main relay connector
- Poor contact in fuel injector connector on faulty cylinders

11AA7 : CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from fuel injector on faulty cylinder.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM connector and chassis ground on faulty cylinders.

Connector & terminal

- #1; (B134) No. 4 (+) — Chassis ground (-):
 #2; (B134) No. 13 (+) — Chassis ground (-):
 #3; (B134) No. 14 (+) — Chassis ground (-):
 #4; (B134) No. 15 (+) — Chassis ground (-):



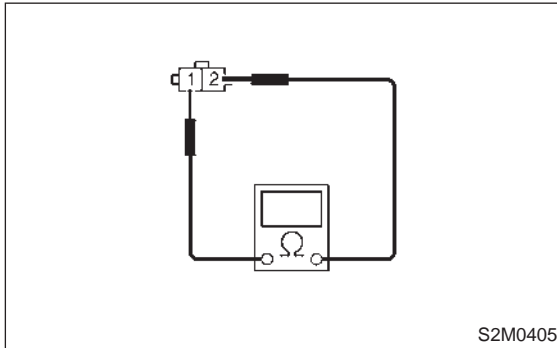
- CHECK** : **Is the voltage more than 10 V?**
YES : Repair battery short circuit in harness between ECM and fuel injector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
NO : Go to step 11AA8.

11AA8 : CHECK FUEL INJECTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between fuel injector terminals on faulty cylinder.

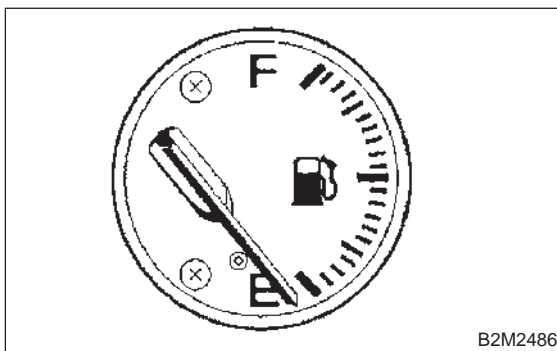
Terminals

No. 1 — No. 2 :



- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Replace faulty fuel injector <Ref. to 2-7 [W14A0].> and ECM <Ref. to 2-7 [W15A0].>.
- NO** : Go to step 11AA9.

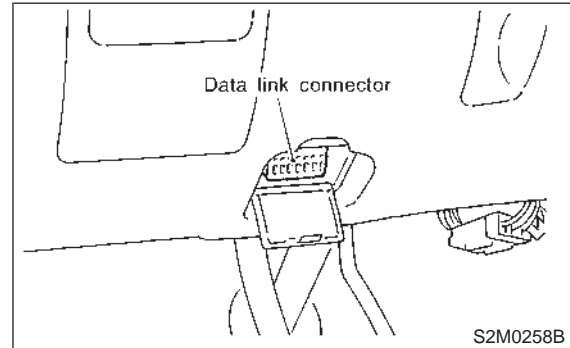
11AA9 : CHECK FUEL LEVEL.



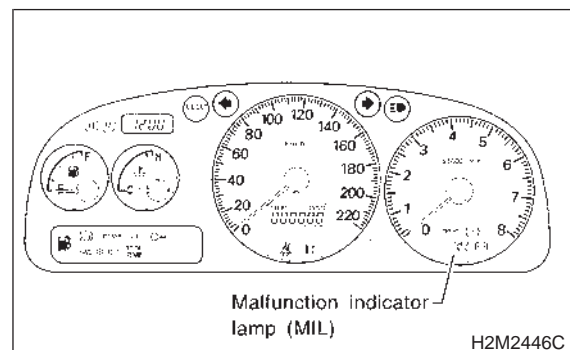
- CHECK** : *Is fuel meter indication (in combination meter) higher than the "Lower" level?*
- YES** : Go to step 11AA10.
- NO** : Replenish fuel so fuel meter indication is higher than the "Lower" level. After refuel, Go to step 11AA10. <Ref. to 2-7 [T11AA10].>

11AA10 : CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor to the data link connector.



- 3) Clear memory using Subaru Select Monitor. <Ref. to 2-7 [T3D0].>
- 4) Start engine, and drive the vehicle more than 10 minutes.



- CHECK** : *Is the MIL coming on or blinking?*
- YES** : Go to step 11AA12.
- NO** : Go to step 11AA11.

11AA11 : CHECK CAUSE OF MISFIRE DIAGNOSED.

CHECK : *Was the cause of misfire diagnosed when the engine is running?*

YES : Finish diagnostics operation, if the engine has no abnormality.

NOTE:

Ex. Remove spark plug cord, etc.

NO : Repair poor contact.

NOTE:

In this case, repair the following:

- Poor contact in ignitor connector
- Poor contact in ignition coil connector
- Poor contact in fuel injector connector on faulty cylinders
- Poor contact in ECM connector
- Poor contact in coupling connector (B22)

11AA12 : CHECK AIR INTAKE SYSTEM.

CHECK : *Is there a fault in air intake system?*

YES : Repair air intake system.

NOTE:

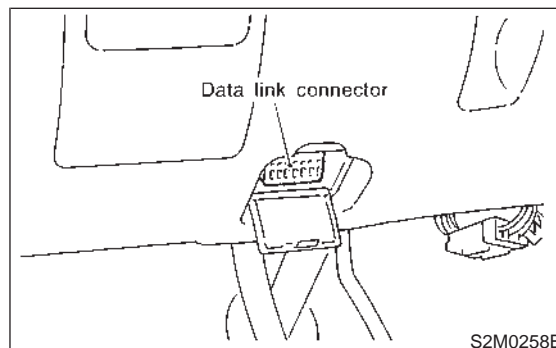
Check the following items:

- Are there air leaks or air suction caused by loose or dislocated nuts and bolts?
- Are there cracks or any disconnection of hoses?

NO : Go to step 11AA13.

11AA13 : CHECK MISFIRE SYMPTOM.

- 1) Turn ignition switch to OFF.
- 2) Connect the Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch to ON, and turn Subaru Select Monitor or OBD-II general scan tool switch to ON.

- 4) Read diagnostic trouble code (DTC).

● Subaru Select Monitor

<Ref. to 2-7 [T3C2].>

● OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.

NOTE:

Perform diagnosis according to the items listed below.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate only one DTC?*

YES : Go to step 11AA18.

NO : Go to step 11AA14.

11AA14 : CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0301 and P0302?*

YES : Go to step 11AA19.

NO : Go to step 11AA15.

11AA15 : CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0303 and P0304?*

YES : Go to step 11AA20.

NO : Go to step 11AA16.

11AA16 : CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0301 and P0303?*

YES : Go to step 11AA21.

NO : Go to step 11AA17.

11AA17 : CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0302 and P0304?*

YES : Go to step 11AA22.

NO : Go to step 11AA18.

11AA18 : ONLY ONE CYLINDER

CHECK : *Is there a fault in that cylinder?*

YES : Repair or replace faulty parts.

NOTE:

Check the following items.

- Spark plug
- Spark plug cord
- Fuel injector
- Compression ratio

NO : Go to DTC P0170. <Ref. to 2-7 [T11T0].>

11AA19 : GROUP OF #1 AND #2 CYLINDERS

CHECK : *Are there faults in #1 and #2 cylinders?*

YES : Repair or replace faulty parts.

NOTE:

- Check the following items.
- Spark plugs
- Fuel injectors
- Ignition coil
- Compression ratio
- If no abnormal is discovered, check for "8. D: IGNITION CONTROL SYSTEM" of #1 and #2 cylinders side. <Ref. to 2-7 [T8D0].>

NO : Go to DTC P0170. <Ref. to 2-7 [T11T0].>

11AA20 : GROUP OF #3 AND #4 CYLINDERS

CHECK : *Are there faults in #3 and #4 cylinders?*

YES : Repair or replace faulty parts.

NOTE:

- Check the following items.
- Spark plugs
- Fuel injectors
- Ignition coil
- If no abnormal is discovered, check for "8. D: IGNITION CONTROL SYSTEM" of #3 and #4 cylinders side. <Ref. to 2-7 [T8D0].>

NO : Go to DTC P0170. <Ref. to 2-7 [T11T0].>

11AA21 : GROUP OF #1 AND #3 CYLINDERS

CHECK : *Are there faults in #1 and #3 cylinders?*

YES : Repair or replace faulty parts.

NOTE:

Check the following items.

- Spark plugs
- Fuel injectors
- Skipping timing belt teeth

NO : Go to DTC P0170. <Ref. to 2-7 [T11T0].>

11AA22 : GROUP OF #2 AND #4 CYLINDERS

CHECK : *Are there faults in #2 and #4 cylinders?*

YES : Repair or replace faulty parts.

NOTE:

Check the following items.

- Spark plugs
- Fuel injectors
- Compression ratio
- Skipping timing belt teeth

NO : Go to DTC P0170. <Ref. to 2-7 [T11T0].>

11AA23 : CYLINDER AT RANDOM

CHECK : *Is the engine idle rough?*

YES : Go to DTC P0170. <Ref. to 2-7 [T11T0].>

NO : Repair or replace faulty parts.

NOTE:

Check the following items.

- Spark plugs
- Fuel injectors
- Compression ratio

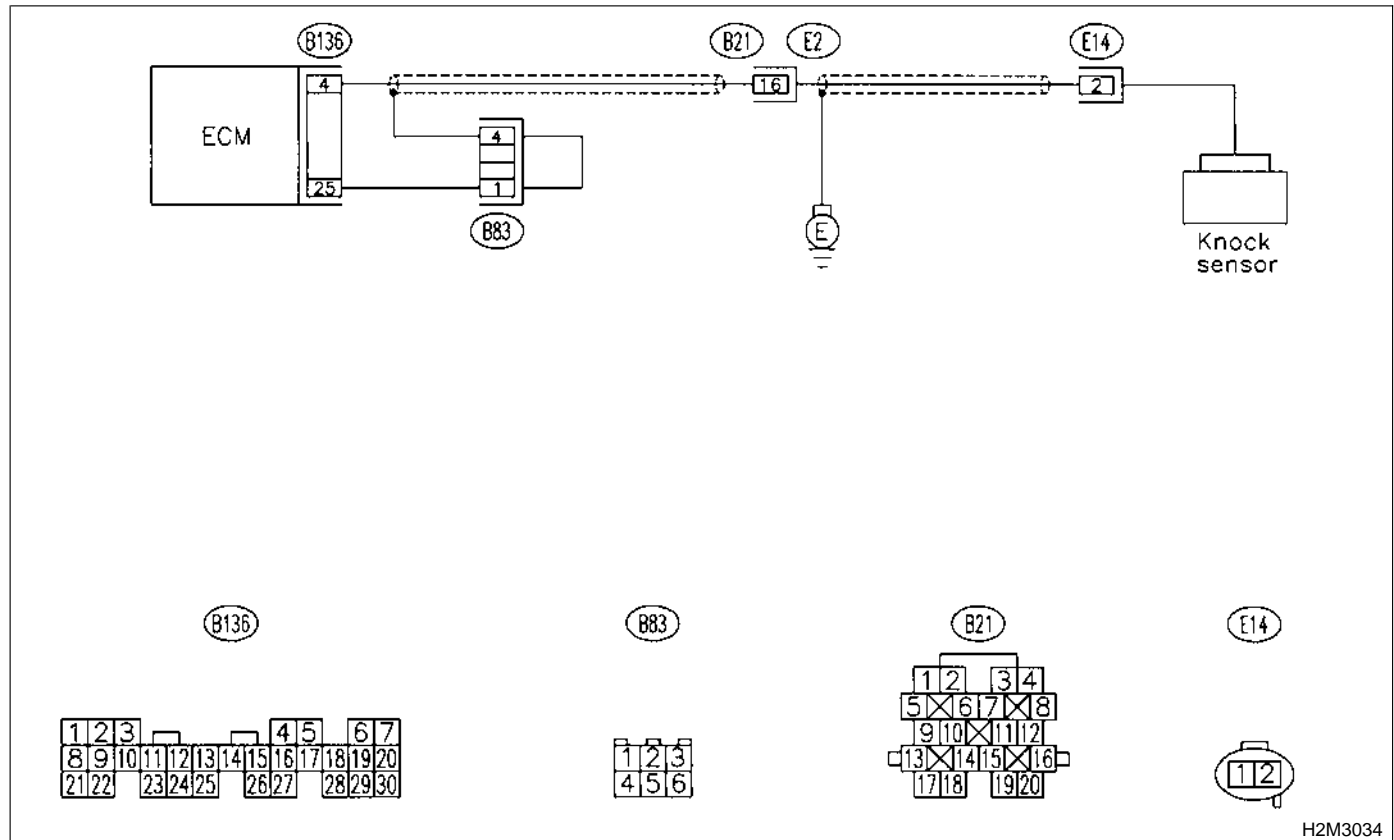
AB: DTC P0325 — KNOCK SENSOR CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Poor driving performance
 - Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

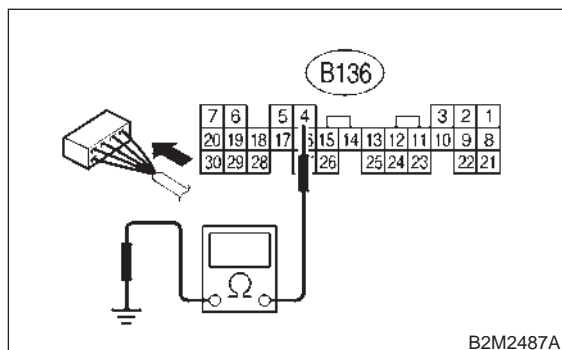
● WIRING DIAGRAM:



H2M3034

11AB1 : CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.

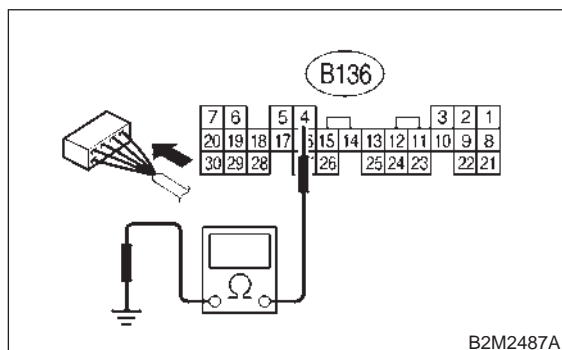
- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance between ECM harness connector and chassis ground.

Connector & terminal
(B136) No. 4 — Chassis ground:


- CHECK** : Is the resistance more than 700 k Ω ?
- YES** : Go to step 11AB3.
- NO** : Go to step 11AB2.

11AB2 : CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.

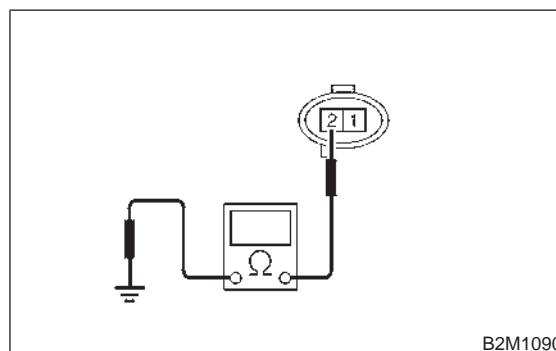
Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal
(B136) No. 4 — Chassis ground:


- CHECK** : Is the resistance less than 400 k Ω ?
- YES** : Go to step 11AB5.
- NO** : Go to step 11AB6.

11AB3 : CHECK KNOCK SENSOR.

- 1) Disconnect connector from knock sensor.
- 2) Measure resistance between knock sensor connector terminal and engine ground.

Terminal
No. 2 — Engine ground:


- CHECK** : Is the resistance more than 700 k Ω ?
- YES** : Go to step 11AB4.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between knock sensor and ECM connector
- Poor contact in knock sensor connector
- Poor contact in coupling connector (B21)

11AB4 : CHECK CONDITION OF KNOCK SENSOR INSTALLATION.

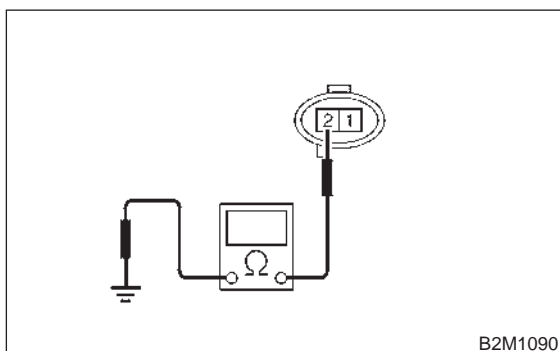
- CHECK** : Is the knock sensor installation bolt tightened securely?
- YES** : Replace knock sensor. <Ref. to 2-7 [W19A0].>
- NO** : Tighten knock sensor installation bolt securely.

11AB5 : CHECK KNOCK SENSOR.

- 1) Disconnect connector from knock sensor.
- 2) Measure resistance between knock sensor connector terminal and engine ground.

Terminal

No. 2 — Engine ground:



- CHECK** : Is the resistance less than 400 k Ω ?
- YES** : Replace knock sensor. <Ref. to 2-7 [W19A0].>
- NO** : Repair ground short circuit in harness between knock sensor connector and ECM connector.

NOTE:

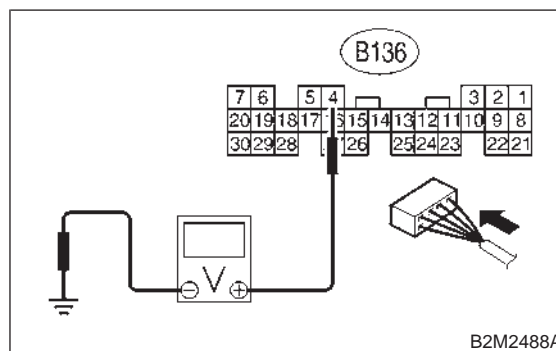
The harness between both connectors is shielded. Repair short circuit of harness together with shield.

11AB6 : CHECK INPUT SIGNAL FOR ECM.

- 1) Connect connectors to ECM and knock sensor.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between ECM and chassis ground.

Connector & terminal

(B136) No. 4 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 2 V?
- YES** : Even if MIL lights up, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.)

NOTE:

In this case, repair the following:

- Poor contact in knock sensor connector
 - Poor contact in ECM connector
 - Poor contact in coupling connector (B21)
- NO** : Repair poor contact in ECM connector.

MEMO:

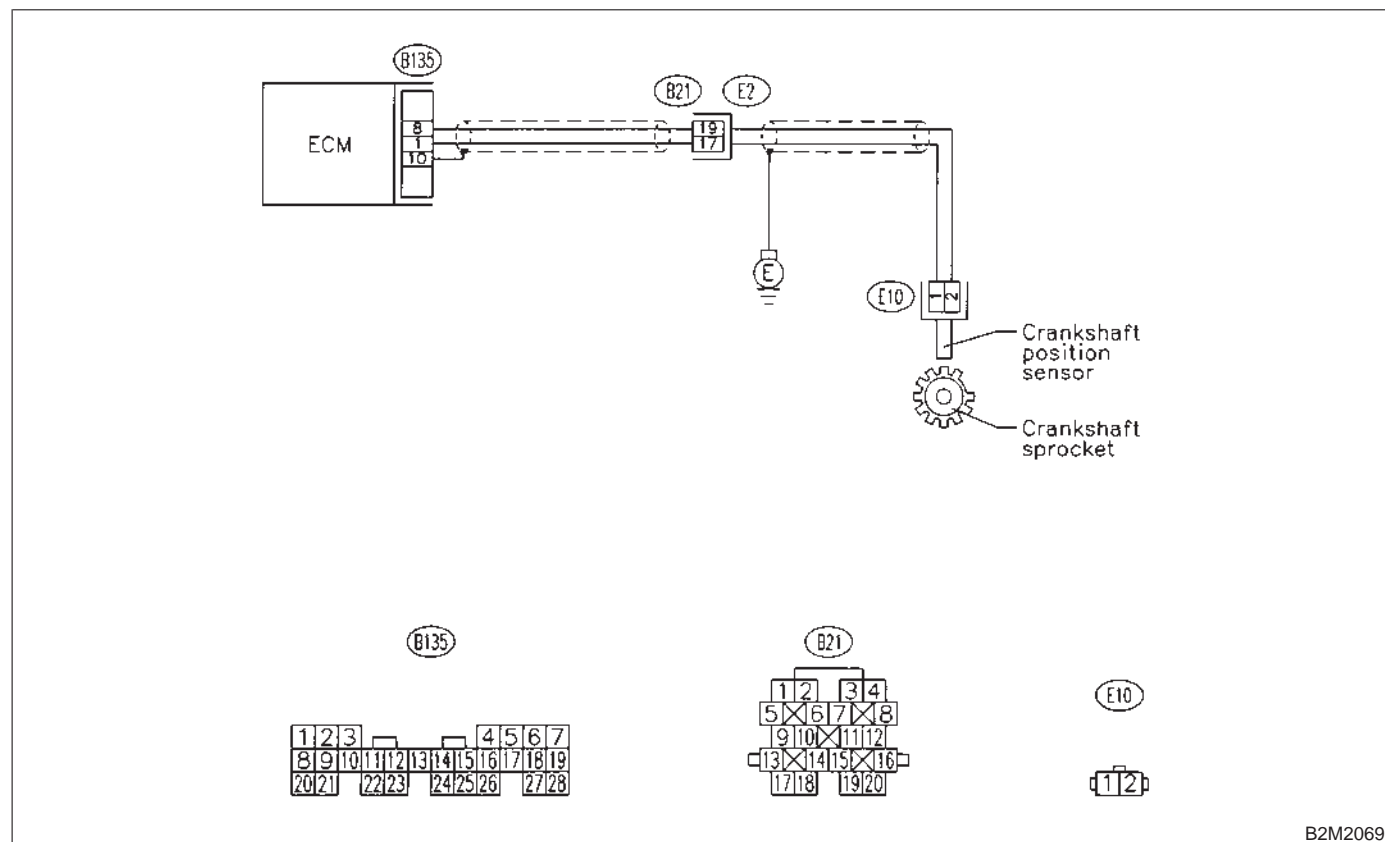
AC: DTC P0335 — CRANKSHAFT POSITION SENSOR CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Engine stalls.
 - Failure of engine to start

CAUTION:

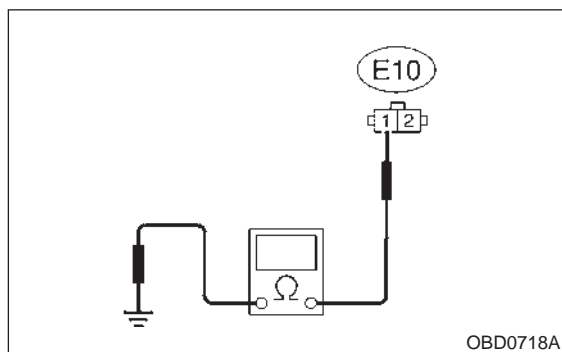
After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

● WIRING DIAGRAM:



11AC1 : CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from crankshaft position sensor.
- 3) Measure resistance of harness between crankshaft position sensor connector and engine ground.

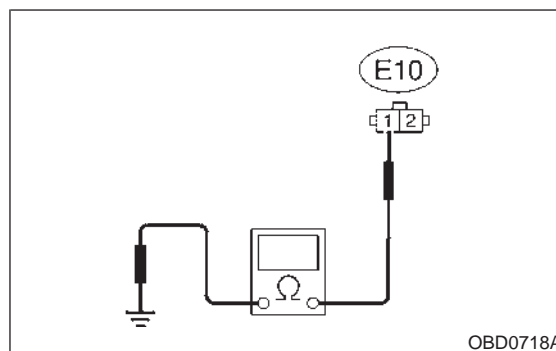
Connector & terminal
(E10) No. 1 — Engine ground:

CHECK : Is the resistance more than 100 kΩ?
YES : Repair harness and connector.
NOTE:

In this case, repair the following:

- Open circuit in harness between crankshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

NO : Go to step 11AC2.
11AC2 : CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between crankshaft position sensor connector and engine ground.

Connector & terminal
(E10) No. 1 — Engine ground:

CHECK : Is the resistance less than 10 Ω?
YES : Repair ground short circuit in harness between crankshaft position sensor and ECM connector.
NOTE:

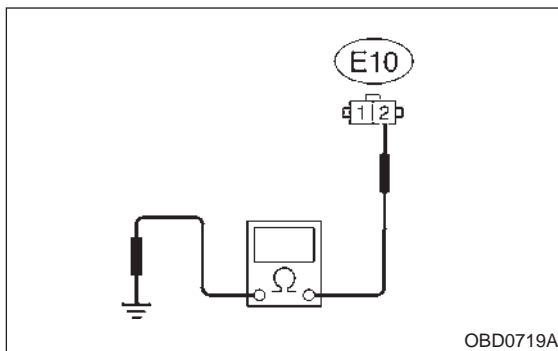
The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.

NO : Go to step 11AC3.

11AC3 : CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between crankshaft position sensor connector and engine ground.

Connector & terminal
(E10) No. 2 — Engine ground:



- CHECK** : Is the resistance less than 5 Ω ?
YES : Go to step 11AC4.
NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between crankshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

11AC4 : CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.

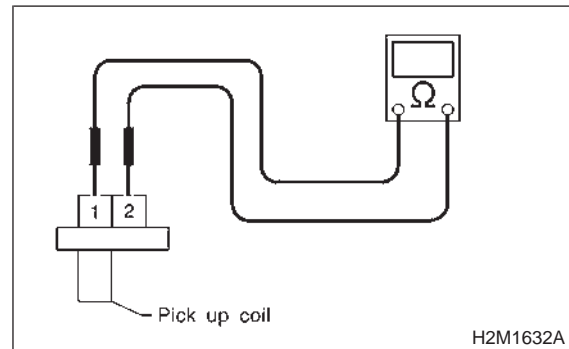
- CHECK** : Is the crankshaft position sensor installation bolt tightened securely?
YES : Go to step 11AC5.
NO : Tighten crankshaft position sensor installation bolt securely.

11AC5 : CHECK CRANKSHAFT POSITION SENSOR.

- 1) Remove crankshaft position sensor.
- 2) Measure resistance between connector terminals of crankshaft position sensor.

Terminals

No. 1 — No. 2:



- CHECK** : Is the resistance between 1 and 4 $k\Omega$?
YES : Repair poor contact in crankshaft position sensor connector.
NO : Replace crankshaft position sensor.
 <Ref. to 2-7 [W6A0].>

MEMO:

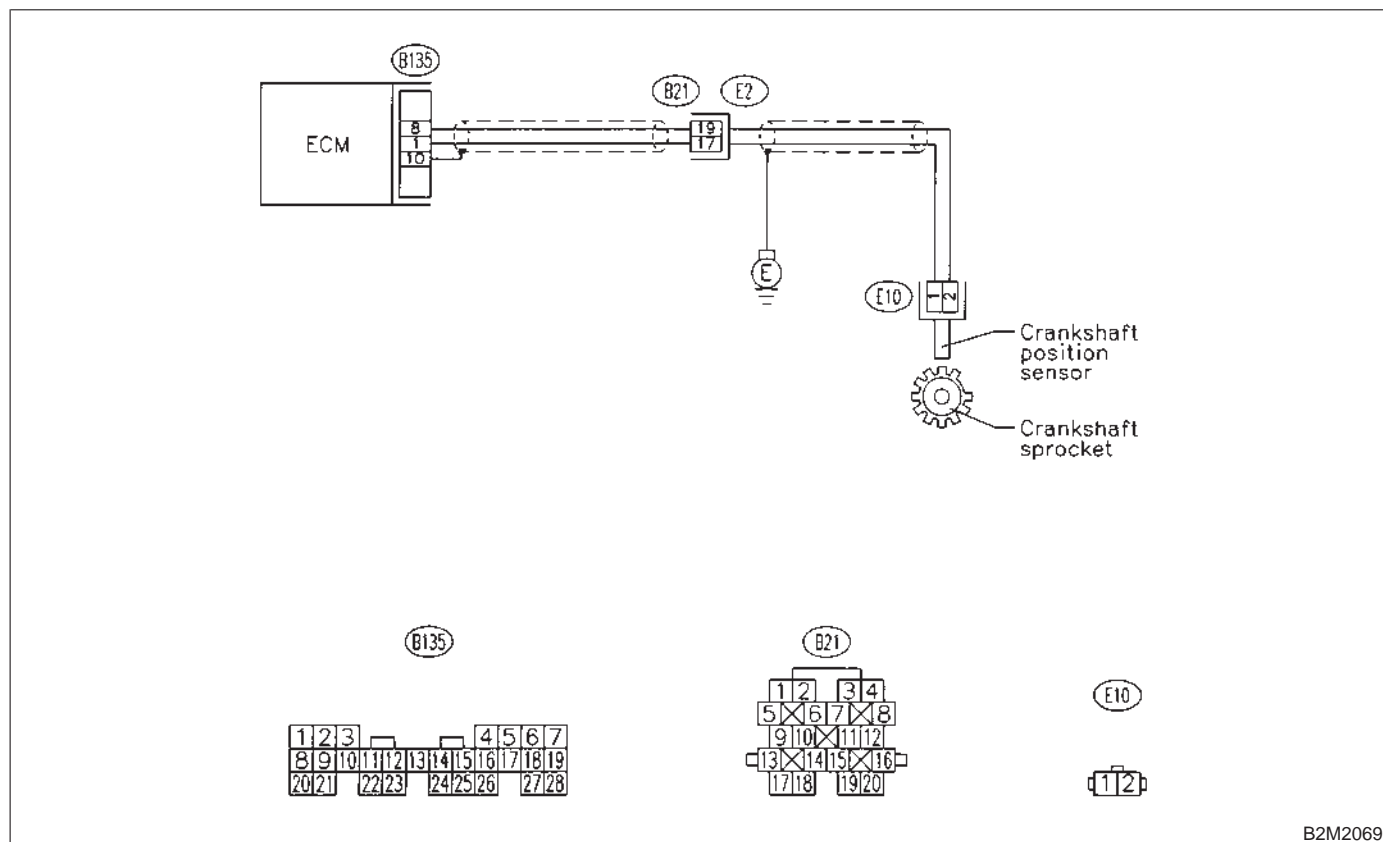
AD: DTC P0336 — CRANKSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Engine stalls.
 - Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:



B2M2069

11AD1 : CHECK ANY OTHER DTC ON DISPLAY.

- CHECK** : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0335?
- YES** : Inspect DTC P0335 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>
- NO** : Go to step 11AD2.

11AD2 : CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.

Turn ignition switch to OFF.

- CHECK** : Is the crankshaft position sensor installation bolt tightened securely?
- YES** : Go to step 11AD3.
- NO** : Tighten crankshaft position sensor installation bolt securely.

11AD3 : CHECK CRANKSHAFT SPROCKET.

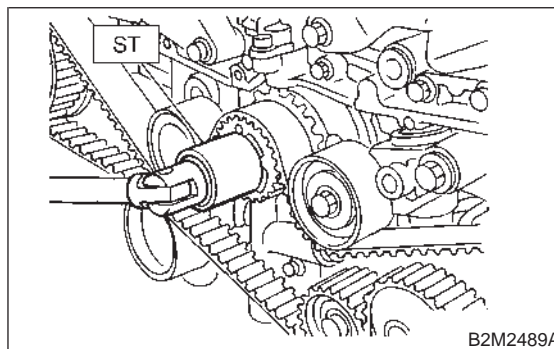
Remove front belt cover. <Ref. to 2-3 [W2A1].>

- CHECK** : ***Are there any cracks or damages in the crankshaft sprocket teeth?***
- YES** : Replace crankshaft sprocket. <Ref. to 2-3 [W2A4].>
- NO** : Go to step **11AD4**.

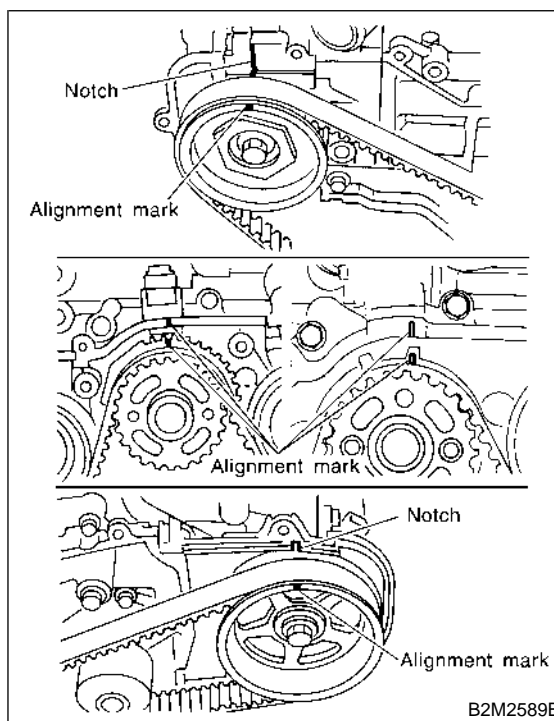
11AD4 : CHECK INSTALLATION CONDITION OF TIMING BELT.

Turn crankshaft using ST, and align alignment mark on crankshaft sprocket. Then, make sure left and right camshaft sprockets are matched with notches (alignment marks of belt cover and cylinder head).

ST 499987500 CRANKSHAFT SOCKET



B2M2489A



B2M2589B

- CHECK** : ***Is timing belt installed properly in accordance with the correct position of crankshaft and camshaft sprockets?***
- YES** : Repair installation condition of timing belt. <Ref. to 2-3 [W2A0].>
- NO** : Replace crankshaft position sensor. <Ref. to 2-7 [W6A0].>

AE: DTC P0340 — CAMSHAFT POSITION SENSOR CIRCUIT MALFUNCTION

• DTC DETECTING CONDITION:

- Immediately at fault recognition

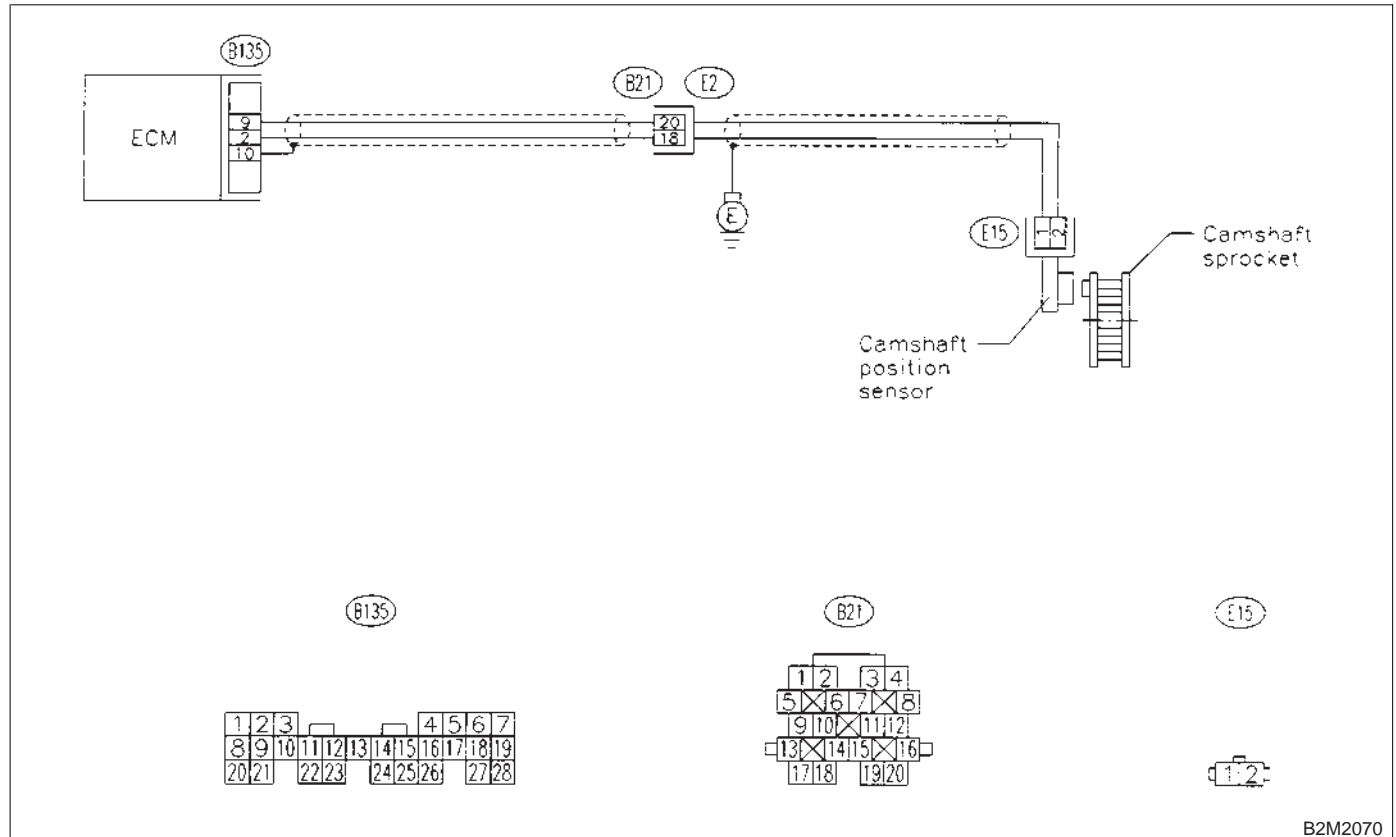
• TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

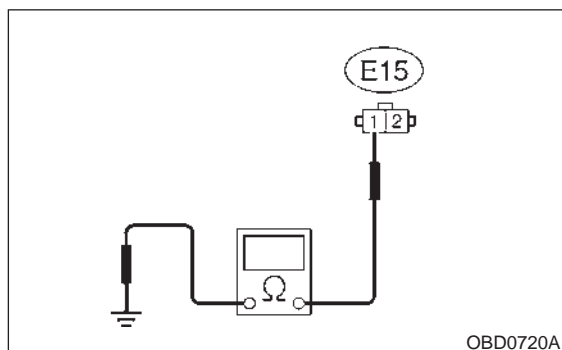
• WIRING DIAGRAM:



B2M2070

11AE1 : CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from camshaft position sensor.
- 3) Measure resistance of harness between camshaft position sensor connector and engine ground.

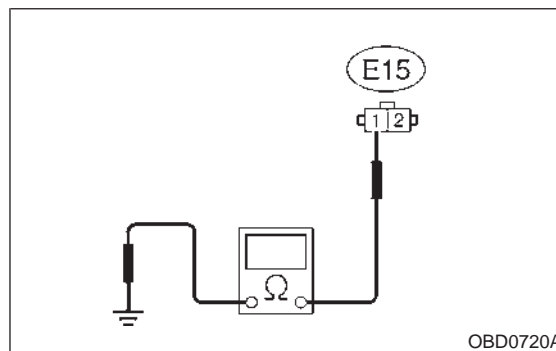
Connector & terminal
(E15) No. 1 — Engine ground:

CHECK : Is the resistance more than 100 k Ω ?
YES : Repair harness and connector.
NOTE:

In this case, repair the following:

- Open circuit in harness between camshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

NO : Go to step 11AE2.
11AE2 : CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between camshaft position sensor connector and engine ground.

Connector & terminal
(E15) No. 1 — Engine ground:

CHECK : Is the resistance less than 10 Ω ?
YES : Repair ground short circuit in harness between camshaft position sensor and ECM connector.
NOTE:

The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.

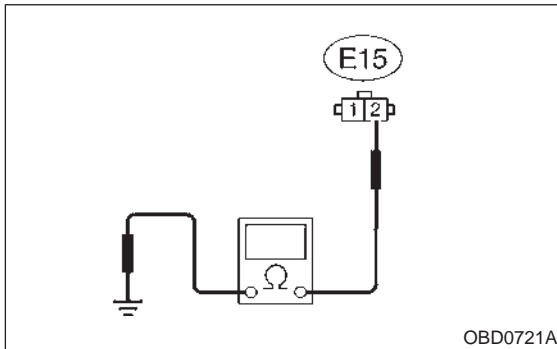
NO : Go to step 11AE3.

11AE3 : CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between camshaft position sensor connector and engine ground.

Connector & terminal

(E15) No. 2 — Engine ground:



- CHECK** : Is the resistance less than 5 Ω ?
- YES** : Go to step 11AE4.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between camshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

11AE4 : CHECK CONDITION OF CAMSHAFT POSITION SENSOR.

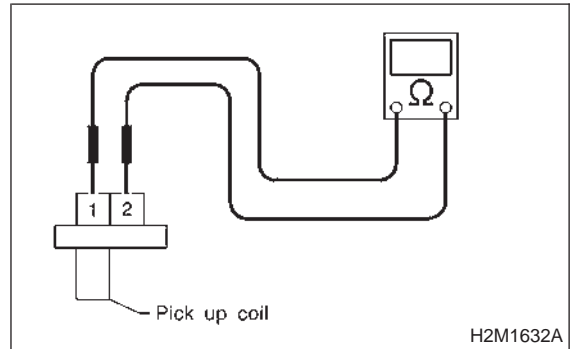
- CHECK** : Is the camshaft position sensor installation bolt tightened securely?
- YES** : Go to step 11AE5.
- NO** : Tighten camshaft position sensor installation bolt securely.

11AE5 : CHECK CAMSHAFT POSITION SENSOR.

- 1) Remove camshaft position sensor.
- 2) Measure resistance between connector terminals of camshaft position sensor.

Terminals

No. 1 — No. 2:



- CHECK** : Is the resistance between 1 and 4 $k\Omega$?
- YES** : Repair poor contact in camshaft position sensor connector.
- NO** : Replace camshaft position sensor.
<Ref. to 2-7 [W10A0].>

MEMO:

AF: DTC P0341 — CAMSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —

● DTC DETECTING CONDITION:

- Immediately at fault recognition

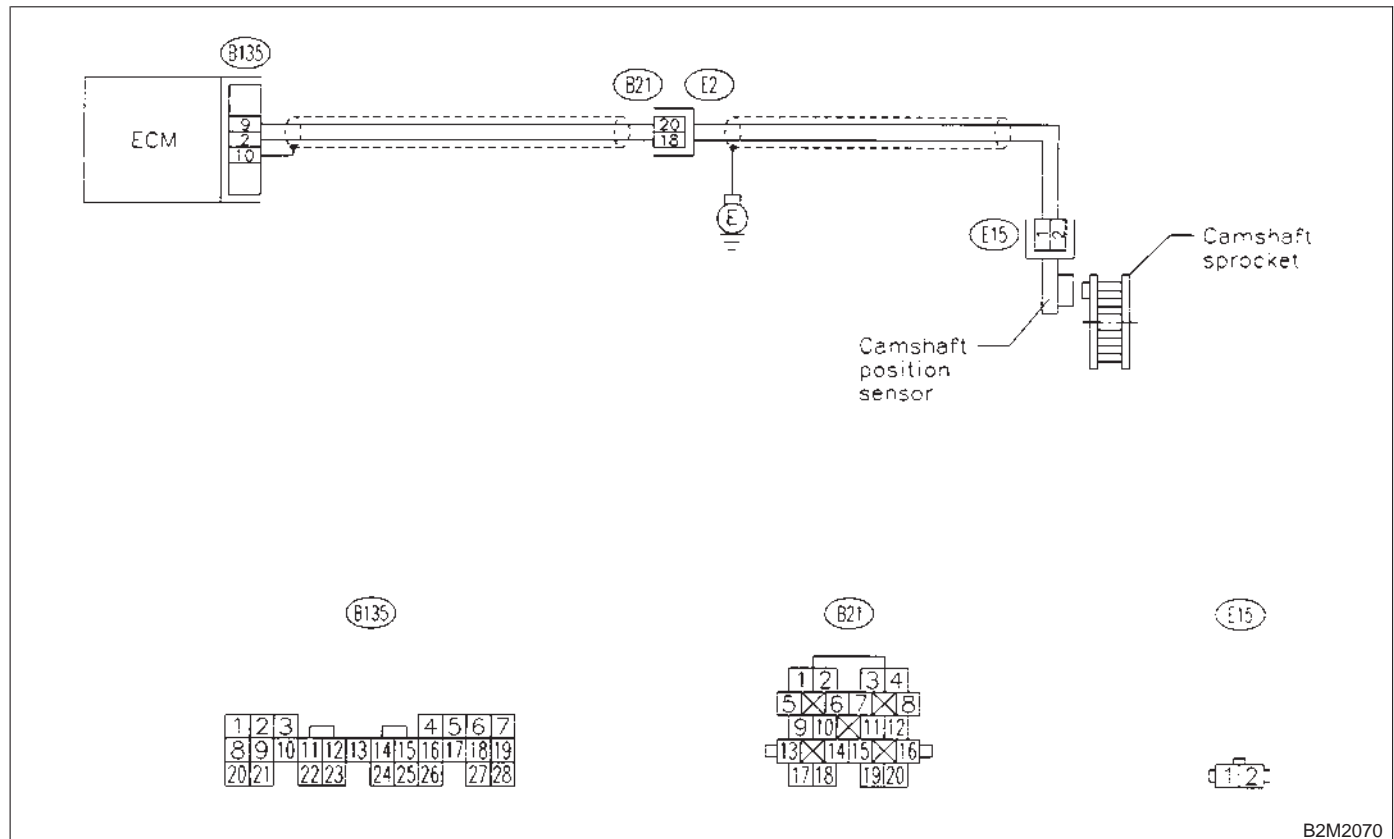
● TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:

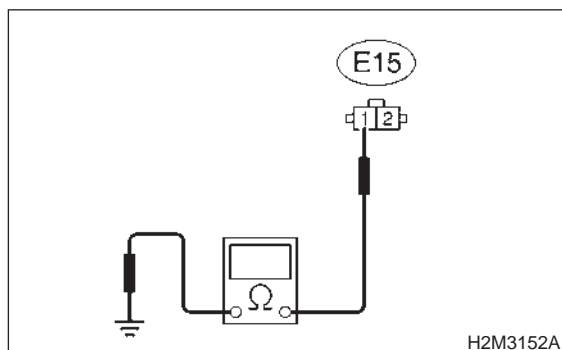


11AF1 : CHECK ANY OTHER DTC ON DISPLAY.

- CHECK** : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0340?
- YES** : Inspect DTC P0340 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>
- NO** : Go to step 11AF2.

11AF2 : CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from camshaft position sensor.
- 3) Measure resistance of harness between camshaft position sensor connector and engine ground.

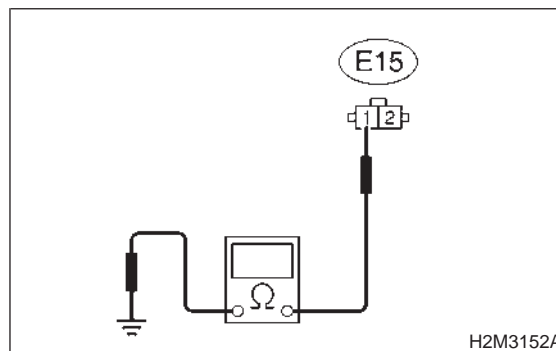
Connector & terminal
(E15) No. 1 — Engine ground:

CHECK : Is the resistance more than 100 kΩ?
YES : Repair harness and connector.
NOTE:

In this case, repair the following:

- Open circuit in harness between camshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

NO : Go to step 11AF3.
11AF3 : CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between camshaft position sensor connector and engine ground.

Connector & terminal
(E15) No. 1 — Engine ground:

CHECK : Is the resistance less than 10 Ω?
YES : Repair ground short circuit in harness between camshaft position sensor and ECM connector.
NOTE:

The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.

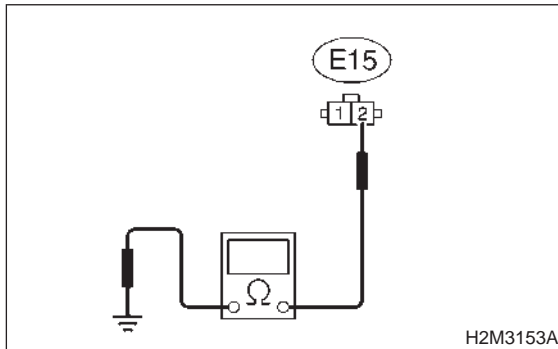
NO : Go to step 11AF4.

11AF4 : CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between camshaft position sensor connector and engine ground.

Connector & terminal

(E15) No. 2 — Engine ground:



- CHECK** : Is the resistance less than 5 Ω?
- YES** : Go to step 11AF5.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

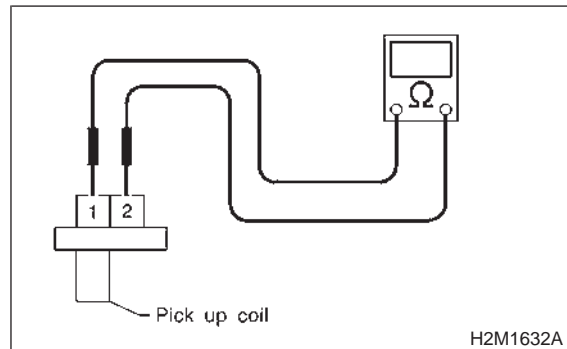
- Open circuit in harness between camshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

11AF5 : CHECK CAMSHAFT POSITION SENSOR.

- 1) Remove camshaft position sensor.
- 2) Measure resistance between connector terminals of camshaft position sensor.

Terminals

No. 1 — No. 2:



- CHECK** : Is the resistance between 1 and 4 kΩ?
- YES** : Go to step 11AF6.
- NO** : Replace camshaft position sensor. <Ref. to 2-7 [W10A0].>

11AF6 : CHECK CONDITION OF CAMSHAFT POSITION SENSOR.

Turn ignition switch to OFF.

- CHECK** : Is the camshaft position sensor installation bolt tightened securely?
- YES** : Go to step 11AF7.
- NO** : Tighten camshaft position sensor installation bolt securely.

11AF7 : CHECK CAMSHAFT SPROCKET.

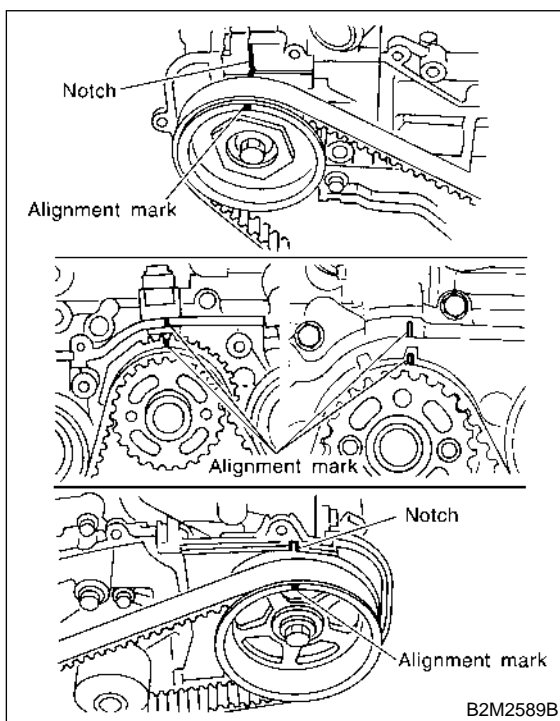
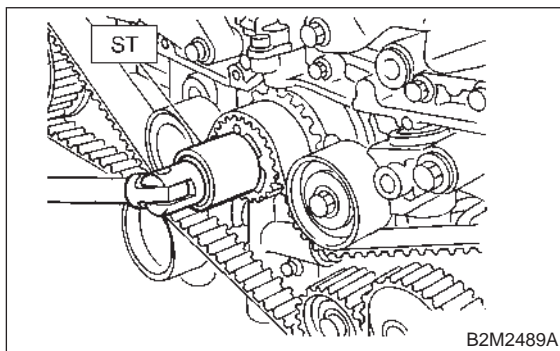
Remove front belt cover. <Ref. to 2-3 [W2A1].>

- CHECK** : Are there any cracks or damages in the camshaft sprocket teeth?
- YES** : Replace camshaft sprocket. <Ref. to 2-3 [W2A4].>
- NO** : Go to step 11AF8.

11AF8 : CHECK INSTALLATION CONDITION OF TIMING BELT.

Turn crankshaft using ST, and align alignment mark on crankshaft sprocket. Then, make sure left and right camshaft sprockets are matched with notches (alignment marks of belt cover and cylinder head).

ST 499987500 CRANKSHAFT SOCKET



- CHECK** : ***Is timing belt installed properly in accordance with the correct position of crankshaft and camshaft sprockets?***
- YES** : Repair installation condition of timing belt. <Ref. to 2-3 [W2A0].>
- NO** : Replace camshaft position sensor. <Ref. to 2-7 [W10A0].>

AG: DTC P0420 — CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD

- **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

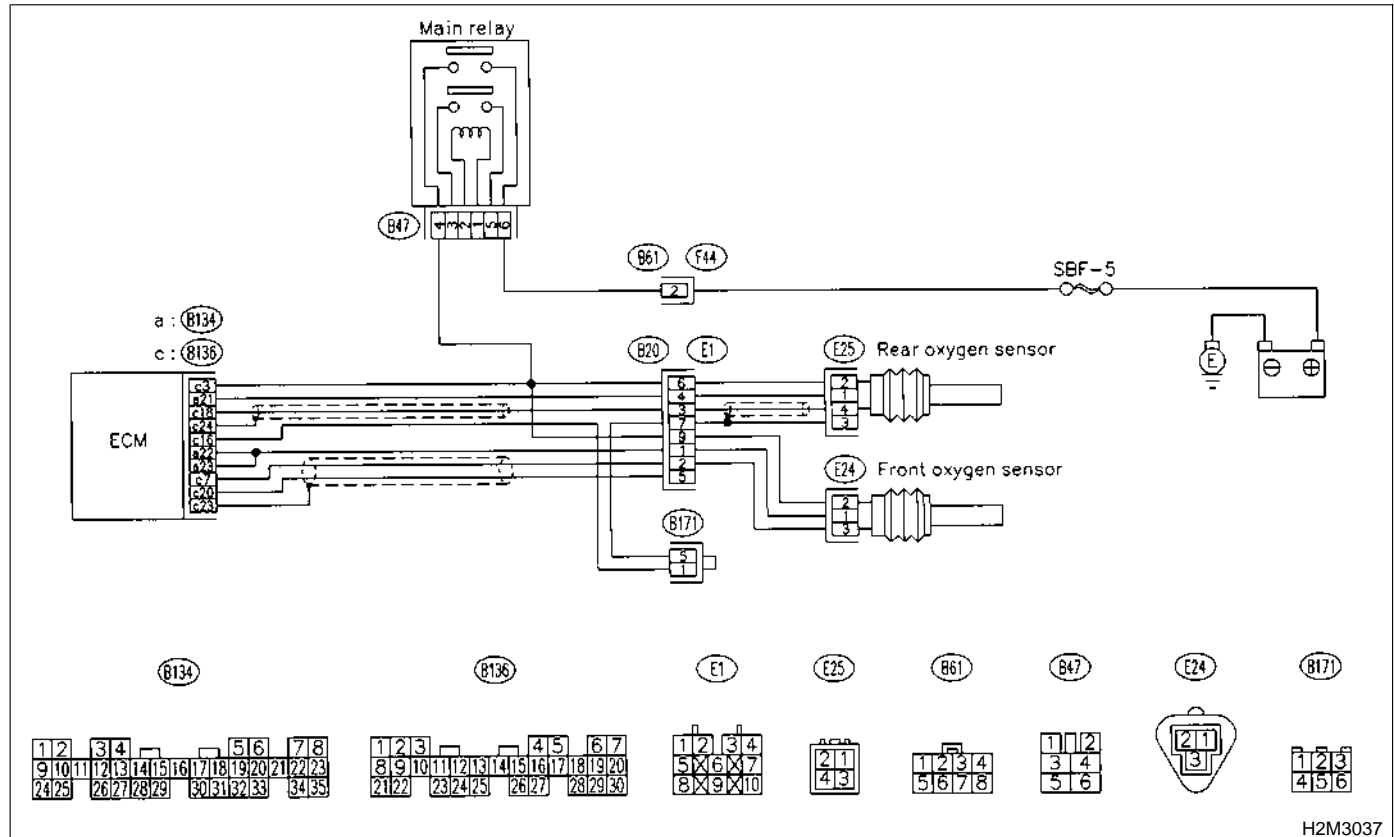
- **TROUBLE SYMPTOM:**

- Engine stalls.
- Idle mixture is out of specifications.

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

- **WIRING DIAGRAM:**



11AG1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0130, P0133, P0135, P0136, P0139, P0141, P0301, P0302, P0303, P0304, P1150 and P1151?*

YES : Inspect the relevant DTC using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0420.

NO : Go to step **11AG2**.

11AG2 : CHECK EXHAUST SYSTEM.

Check for gas leaks or air suction caused by loose or dislocated nuts and bolts, and open hole at exhaust pipes.

NOTE:

Check the following positions.

- Between cylinder head and front exhaust pipe
- Between front exhaust pipe and front catalytic converter
- Between front catalytic converter and rear catalytic converter

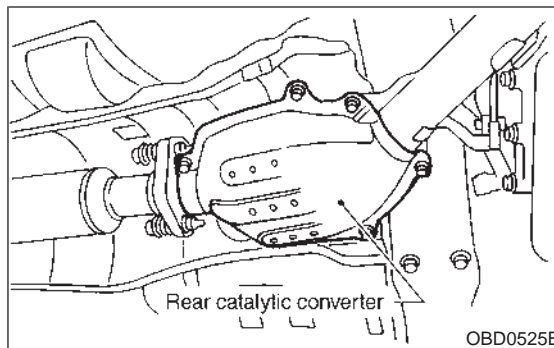
CHECK : *Is there a fault in exhaust system?*

YES : Repair or replace exhaust system. <Ref. to 2-9 [W1A0].>

NO : Go to step **11AG3**.

11AG3 : CHECK REAR CATALYTIC CONVERTER.

Separate rear catalytic converter from rear exhaust pipe.



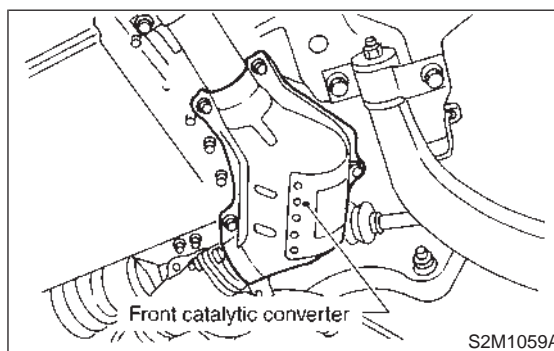
CHECK : *Is there damage at rear face of rear catalyst?*

YES : Replace front catalytic converter <Ref. to 2-1 [W1A0].> and rear catalytic converter <Ref. to 2-1 [W2A0].>

NO : Go to step **11AG4**.

11AG4 : CHECK FRONT CATALYTIC CONVERTER.

Remove front catalytic converter.



CHECK : *Is there damage at rear face or front face of front catalyst?*

YES : Replace front catalytic converter. <Ref. to 2-1 [W1A0].>

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AH: DTC P0440 — EVAPORATIVE EMISSION CONTROL SYSTEM MALFUNCTION —

- **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

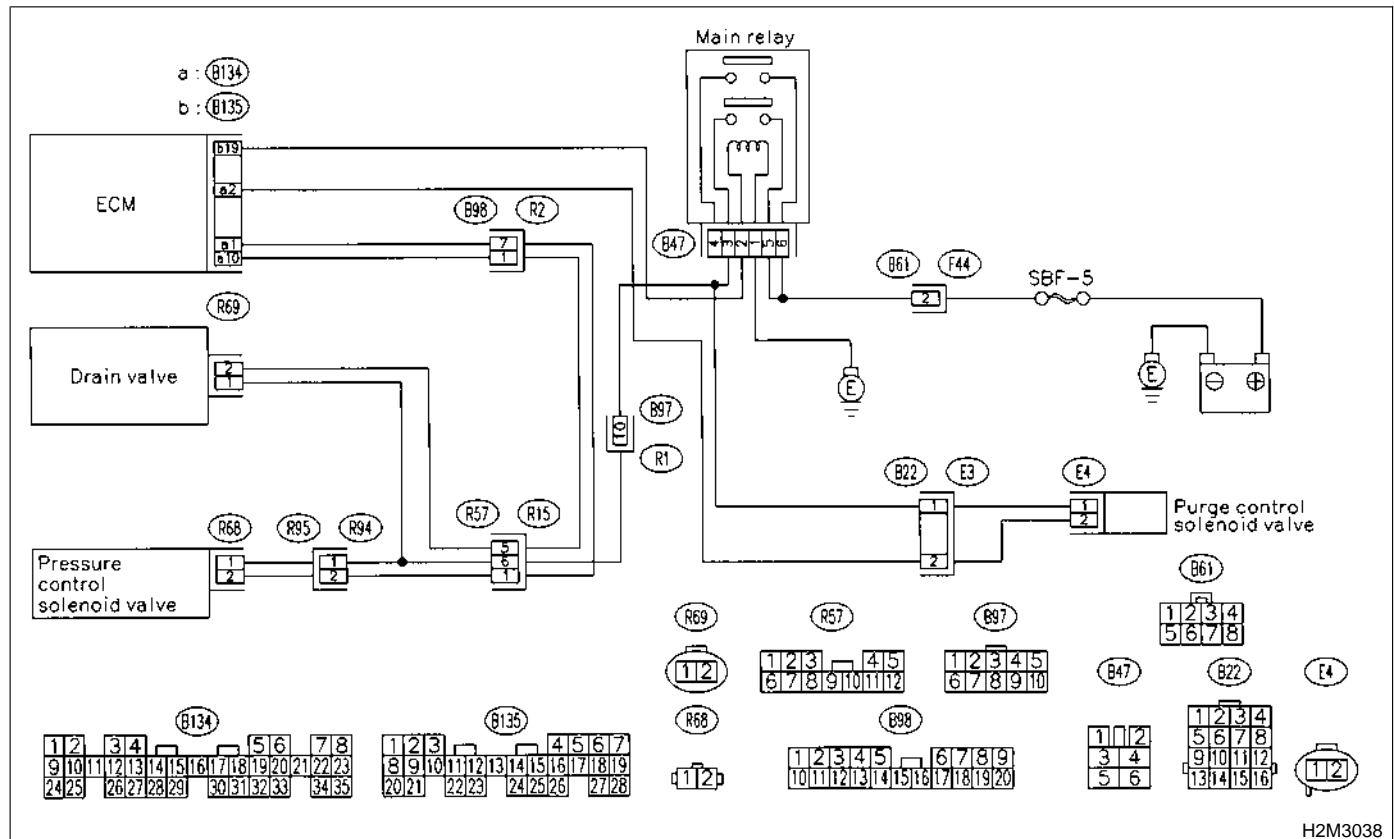
- **TROUBLE SYMPTOM:**

- Gasoline smell

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

- **WIRING DIAGRAM:**



11AH1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Is there any other DTC on display?

YES : Inspect the relevant DTC using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NO : Go to step 11AH2.

11AH2 : CHECK FUEL FILLER CAP.

- 1) Turn ignition switch to OFF.
- 2) Open the fuel flap.

CHECK : Is the fuel filler cap tightened securely?

YES : Go to step 11AH3.

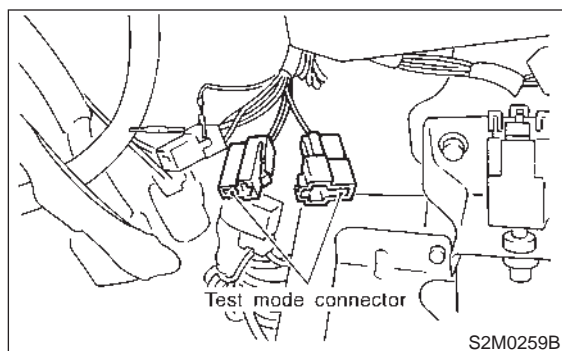
NO : Tighten fuel filler cap securely.

11AH3 : CHECK FUEL FILLER PIPE PACKING.

- CHECK** : *Is there any damage to the seal between fuel filler cap and fuel filler pipe?*
- YES** : Repair or replace fuel filler cap and fuel filler pipe. <Ref. to 2-8 [W3A0].>
- NO** : Go to step 11AH4.

11AH4 : CHECK DRAIN VALVE OR VENT CONTROL SOLENOID VALVE.

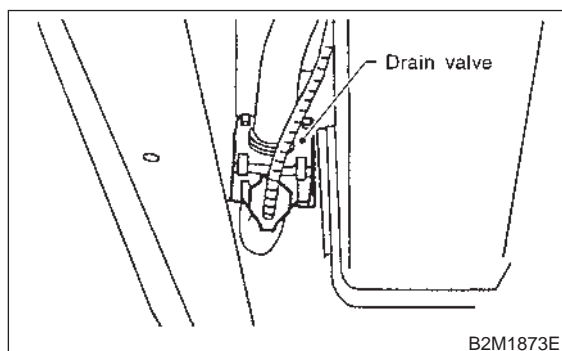
- 1) Connect test mode connector.



- 2) Turn ignition switch to ON.

NOTE:

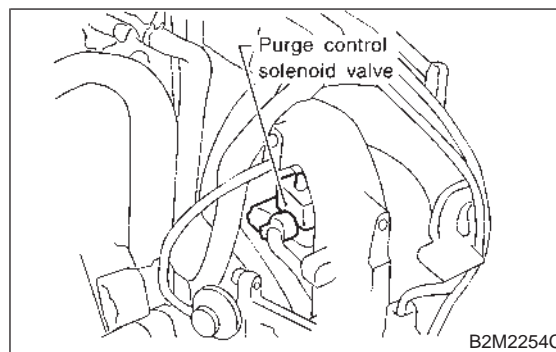
Drain valve or vent control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>



- CHECK** : *Does drain valve produce operating sound?*
- YES** : Go to step 11AH5.
- NO** : Replace drain valve. <Ref. to 2-1 [W13A0].>

11AH5 : CHECK PURGE CONTROL SOLENOID VALVE.**NOTE:**

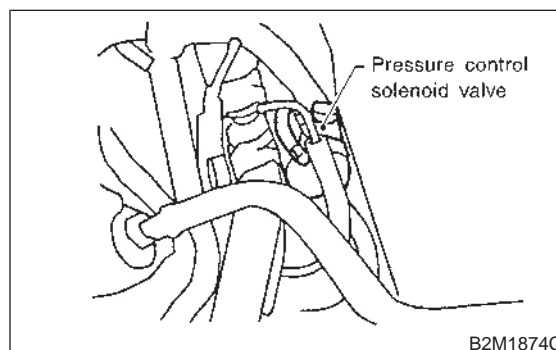
Purge control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>



- CHECK** : *Does purge control solenoid valve produce operating sound?*
- YES** : Go to step 11AH6.
- NO** : Replace purge control solenoid valve. <Ref. to 2-1 [W4A0].>

11AH6 : CHECK PRESSURE CONTROL SOLENOID VALVE.**NOTE:**

Pressure control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>



- CHECK** : *Does pressure control solenoid valve produce operating sound?*
- YES** : Go to step 11AH7.
- NO** : Replace pressure control solenoid valve. <Ref. to 2-1 [W7A0].>

11AH7 : CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.

Turn ignition switch to OFF.

- CHECK** : ***Does fuel leak in fuel line?***
YES : Repair or replace fuel line. <Ref. to 2-8 [W7A0].>
NO : Go to step 11AH8.

11AH8 : CHECK CANISTER.

- CHECK** : ***Is there any damage at canister?***
YES : Repair or replace canister. <Ref. to 2-1 [W3A0].>
NO : Go to step 11AH9.

11AH9 : CHECK FUEL TANK.

- CHECK** : ***Is there any damage at fuel tank?***
YES : Repair or replace fuel tank. <Ref. to 2-8 [W2A0].>
NO : Go to step 11AH10.

11AH10 : CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.

- CHECK** : ***Are there holes, cracks, clogging or disconnections of hoses or pipes in evaporative emission control system?***
YES : Repair or replace hoses or pipes.
NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

MEMO:

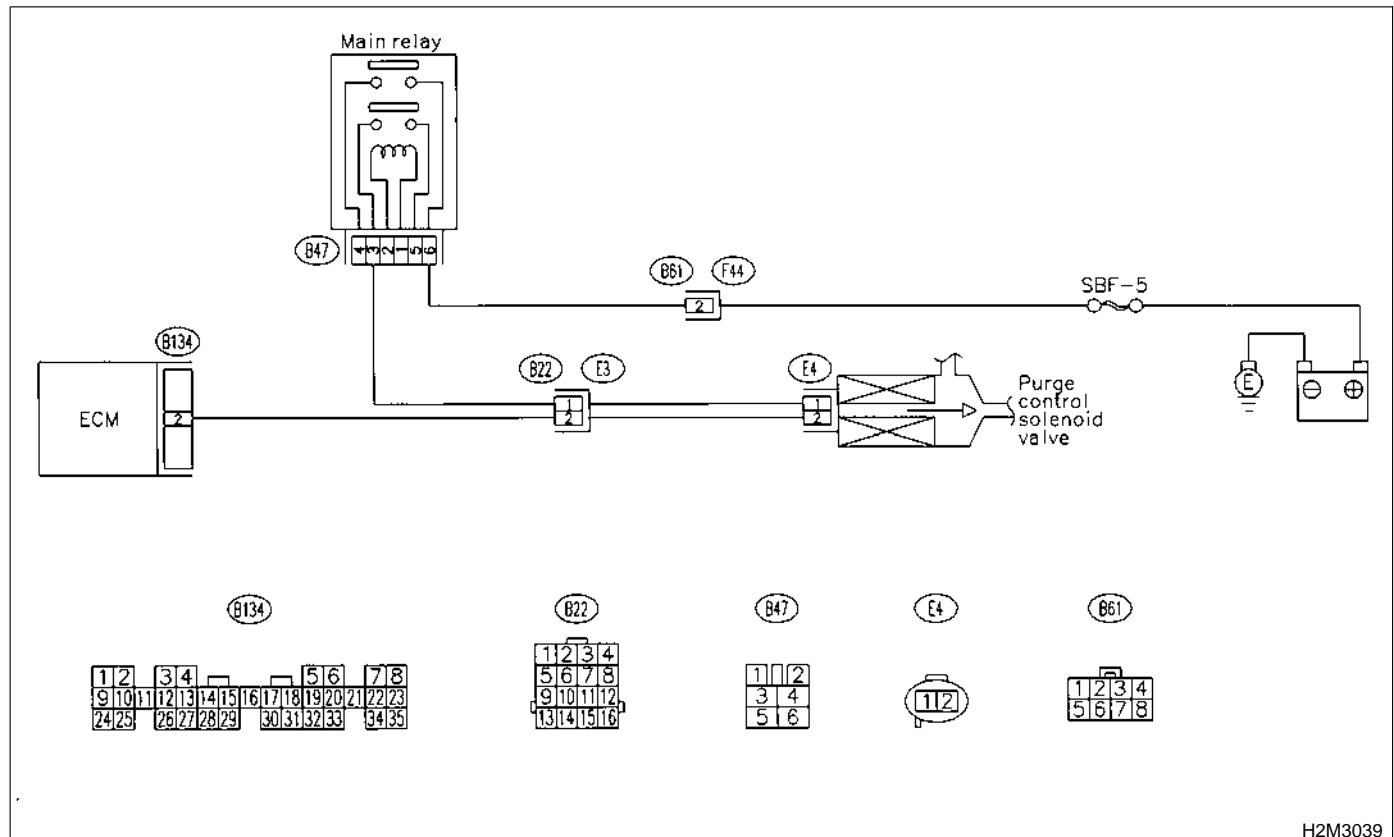
AI: DTC P0443 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

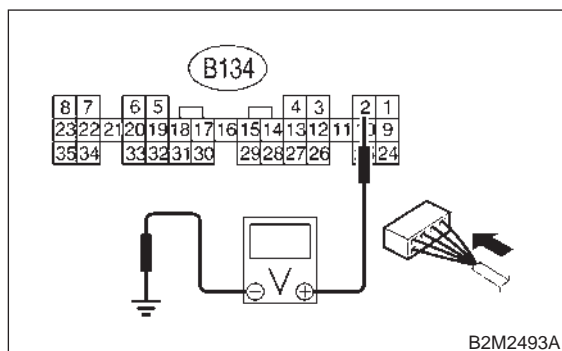
● WIRING DIAGRAM:



H2M3039

11A11 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal**(B134) No. 2 (+) — Chassis ground (-):****CHECK : Is the voltage more than 10 V?**

YES : Even if MIL lights up, the circuit has returned to a normal condition at this time. Contact with SOA service.

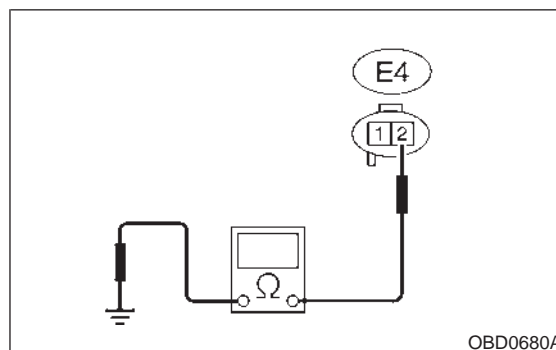
NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

NO : Go to step **11A12**.

11A12 : CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from purge control solenoid valve and ECM.
- 3) Measure resistance of harness between purge control solenoid valve connector and engine ground.

Connector & terminal**(E4) No. 2 — Engine ground:****CHECK : Is the resistance less than 10 Ω?**

YES : Repair ground short circuit in harness between ECM and purge control solenoid valve connector.

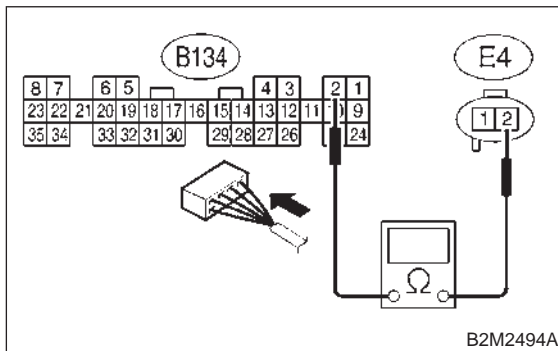
NO : Go to step **11A13**.

11A13 : CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

Measure resistance of harness between ECM and purge control solenoid valve of harness connector.

Connector & terminal

(B134) No. 2 — (E4) No. 2:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 11A14.

NO : Repair open circuit in harness between ECM and purge control solenoid valve connector.

NOTE:

In this case, repair the following:

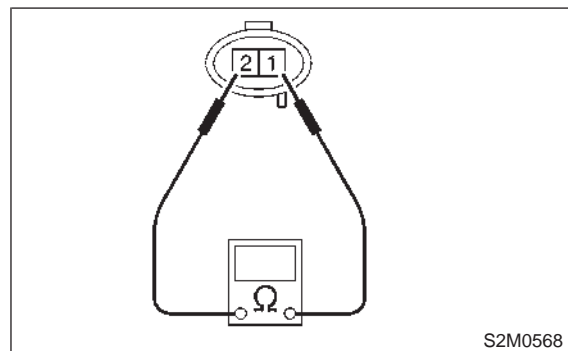
- Open circuit in harness between ECM and purge control solenoid valve connector
- Poor contact in coupling connector (B22)

11A14 : CHECK PURGE CONTROL SOLENOID VALVE.

- 1) Remove purge control solenoid valve.
- 2) Measure resistance between purge control solenoid valve terminals.

Terminals

No. 1 — No. 2:



CHECK : Is the resistance between 10 and 100 Ω ?

YES : Go to step 11A15.

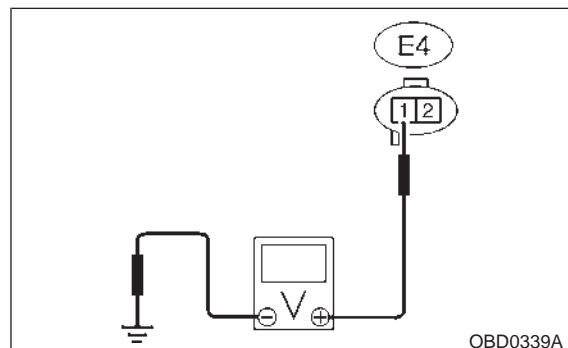
NO : Replace purge control solenoid valve.
<Ref. to 2-1 [W4A0].>

11A15 : CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between purge control solenoid valve and engine ground.

Connector & terminal

(E4) No. 1 (+) — Engine ground (-):



CHECK : Is the voltage more than 10 V?

YES : Go to step 11A16.

NO : Repair open circuit in harness between main relay and purge control solenoid valve connector.

11AI6 : CHECK POOR CONTACT.

Check poor contact in purge control solenoid valve connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in purge control solenoid valve connector?*

YES : Repair poor contact in purge control solenoid valve connector.

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AJ: DTC P0446 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL LOW INPUT —

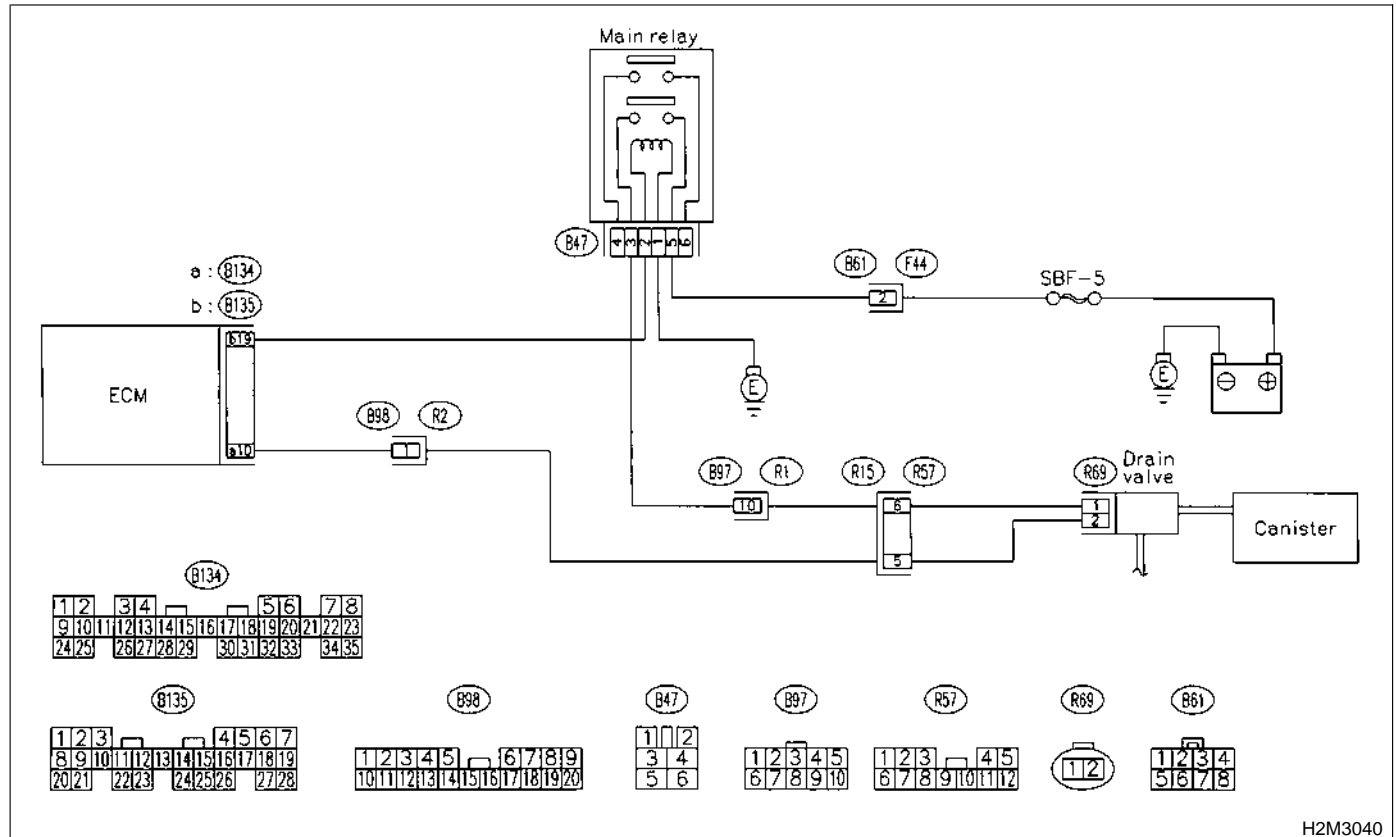
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

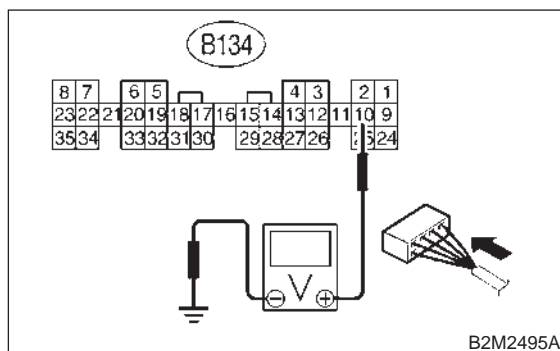
• WIRING DIAGRAM:



H2M3040

11AJ1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal**(B134) No. 10 (+) — Chassis ground (-):**

- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 11AJ2.
- NO** : Go to step 11AJ3.

11AJ2 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : Is there poor contact in ECM connector?
- YES** : Repair poor contact in ECM connector.
- NO** : Even if MIL lights up, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.)

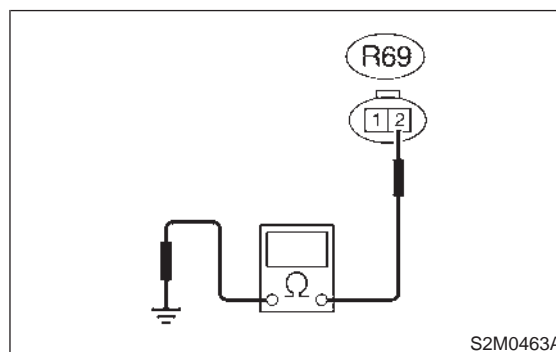
NOTE:

In this case, repair the following:

- Poor contact in drain valve connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (B97), (B98) and (R57)

11AJ3 : CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from drain valve and ECM.
- 3) Measure resistance of harness between drain valve connector and chassis ground.

Connector & terminal**(R69) No. 2 — Chassis ground:**

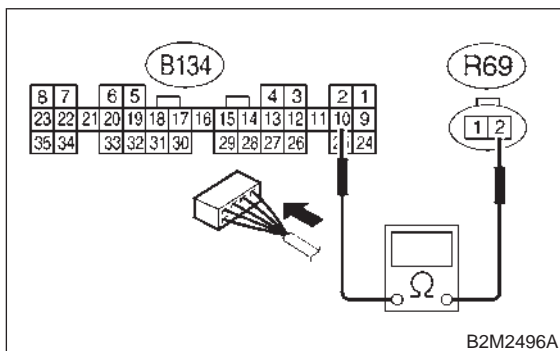
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in harness between ECM and drain valve connector.
- NO** : Go to step 11AJ4.

11AJ4 : CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.

Measure resistance of harness between ECM and drain valve connector.

Connector & terminal

(B134) No. 10 — (R69) No. 2:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 11AJ5.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

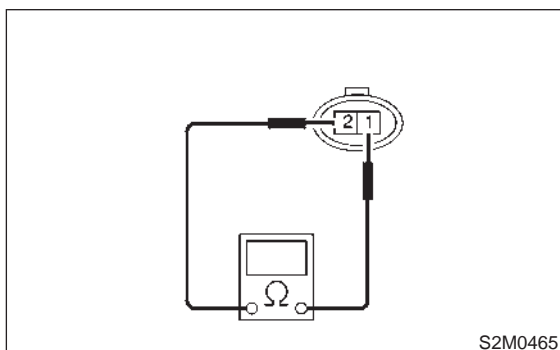
- Open circuit in harness between ECM and drain valve connector
- Poor contact in coupling connectors (B98) and (R57)

11AJ5 : CHECK DRAIN VALVE.

Measure resistance between drain valve terminals.

Terminals

No. 1 — No. 2:



CHECK : Is the resistance between 10 and 100 Ω ?

YES : Go to step 11AJ6.

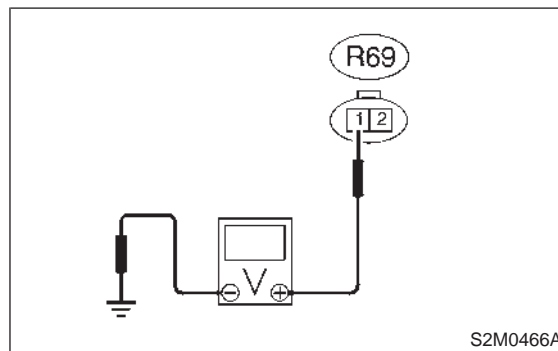
NO : Replace drain valve. <Ref. to 2-1 [W13A0].>

11AJ6 : CHECK POWER SUPPLY TO DRAIN VALVE.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between drain valve and chassis ground.

Connector & terminal

(R69) No. 1 (+) — Chassis ground (-):



CHECK : Is the voltage more than 10 V?

YES : Go to step 11AJ7.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between main relay and drain valve
- Poor contact in coupling connectors (B97) and (R57)
- Poor contact in main relay connector

11AJ7 : CHECK POOR CONTACT.

Check poor contact in drain valve connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in drain valve connector?

YES : Repair poor contact in drain valve connector.

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

MEMO:

AK: DTC P0451 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR RANGE/PERFORMANCE PROBLEM —

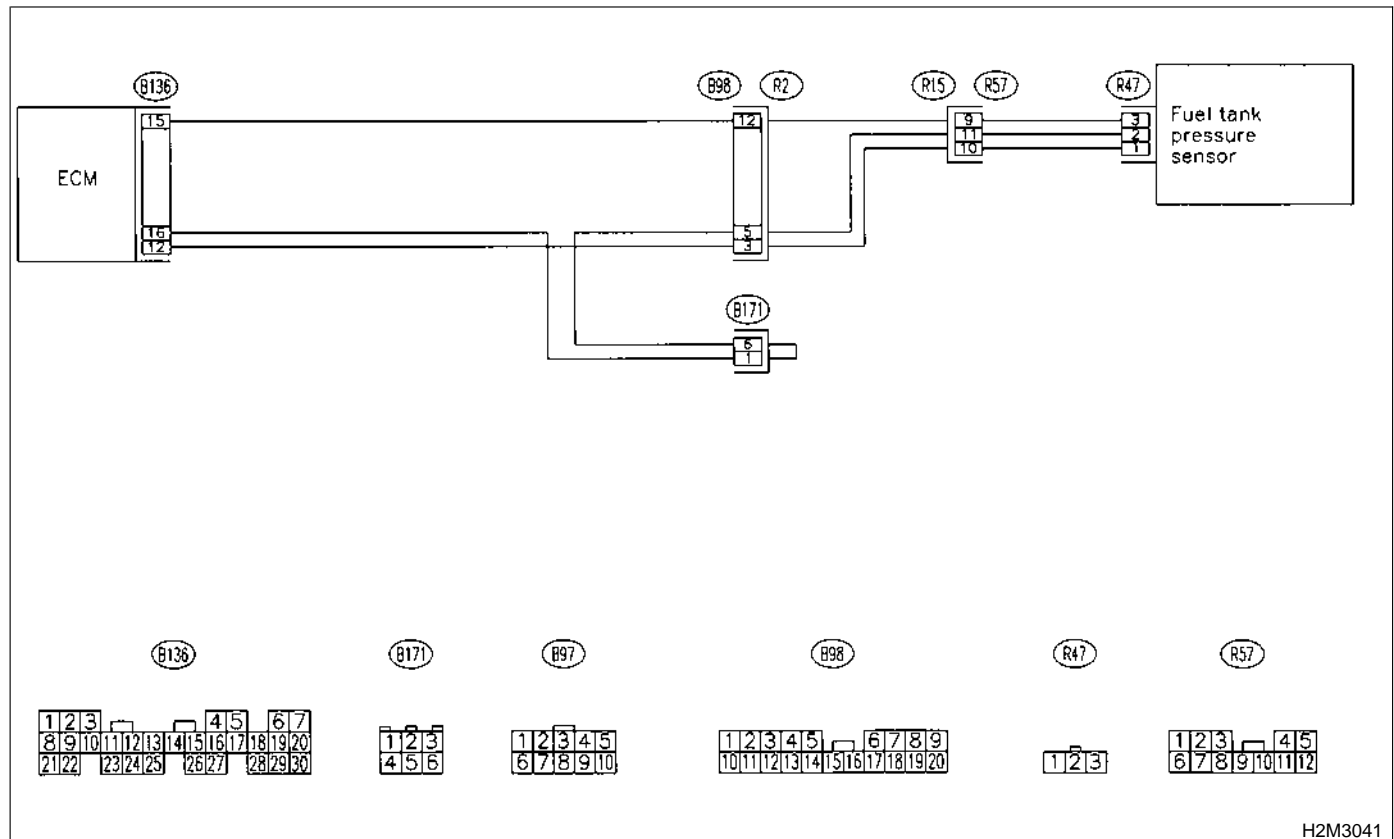
● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:



H2M3041

11AK1 : CHECK ANY OTHER DTC ON DISPLAY.

- CHECK** : *Is there any DTC on display?*
- YES** : Inspect the relevant DTC using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>
- NO** : Go to step **11AK2**.

11AK2 : CHECK FUEL FILLER CAP.

- Turn ignition switch to OFF.
- Open the fuel flap.

- CHECK** : *Is the fuel filler cap tightened securely?*
- YES** : Go to step **11AK3**.
- NO** : Tighten fuel filler cap securely.

11AK3 : CHECK PRESSURE/VACUUM LINE.
--

NOTE:

Check the following items.

- Disconnection, leakage and clogging of the vacuum hoses and pipes between fuel tank pressure sensor and fuel tank
- Disconnection, leakage and clogging of air ventilation hoses and pipes between fuel filler pipe and fuel tank

CHECK : ***Is there a fault in pressure/vacuum line?***

YES : Repair or replace hoses and pipes.

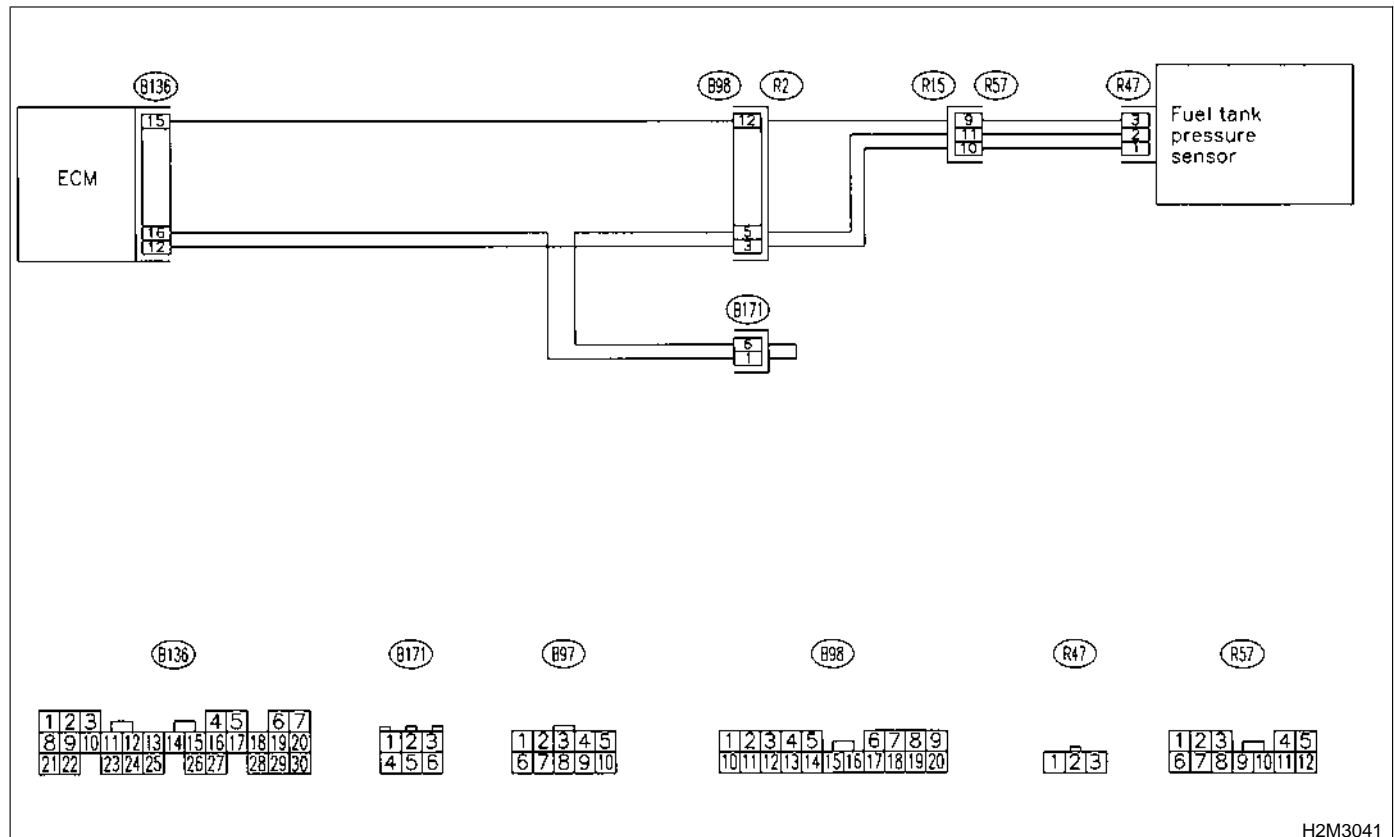
NO : Replace fuel tank pressure sensor.
<Ref. to 2-1 [W6A0].>

AL: DTC P0452 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR LOW INPUT —**• DTC DETECTING CONDITION:**

- Immediately at fault recognition

CAUTION:

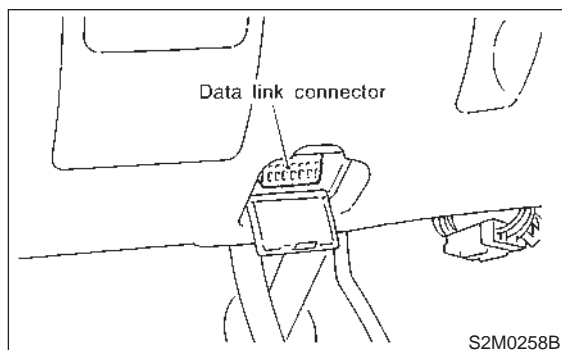
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3041

11AL1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Remove fuel filler cap.
- 3) Install fuel filler cap.
- 4) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 5) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.

- 6) Read the data of fuel tank pressure sensor signal using Subaru Select Monitor or the OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : *Is the value less than -2.8 kPa (-21.0 mmHg, -0.827 inHg)?*

YES : Go to step 11AL2.

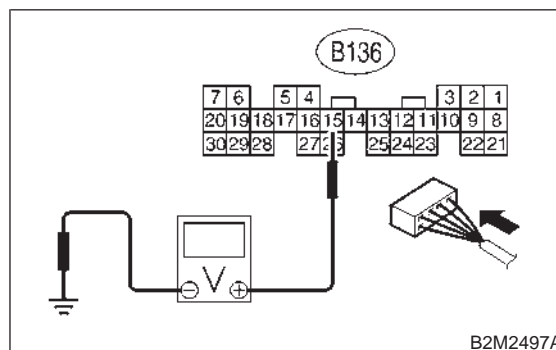
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time.

11AL2 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : *Is the voltage more than 4.5 V?*

YES : Go to step 11AL4.

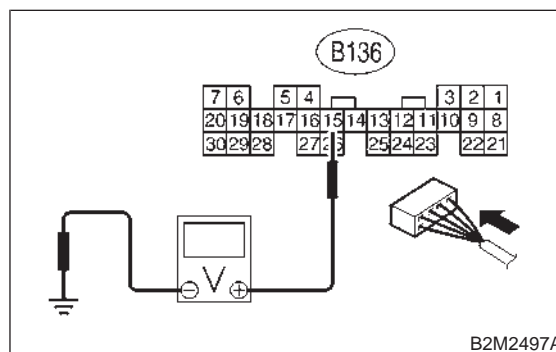
NO : Go to step 11AL3.

11AL3 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : *Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?*

YES : Repair poor contact in ECM connector.

NO : Contact with SOA service.

NOTE:

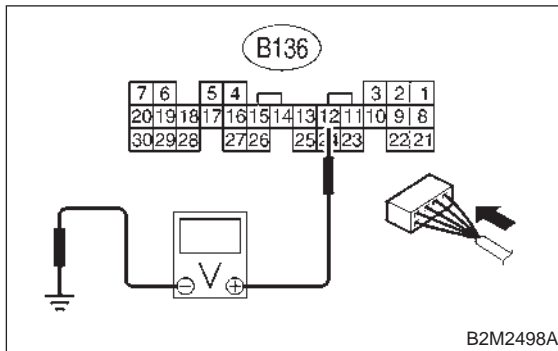
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

11AL4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

(B136) No. 12 (+) — Chassis ground (-):



- CHECK** : Is the voltage less than 0.2 V?
- YES** : Go to step 11AL6.
- NO** : Go to step 11AL5.

11AL5 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of fuel tank pressure sensor signal using Subaru Select Monitor.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

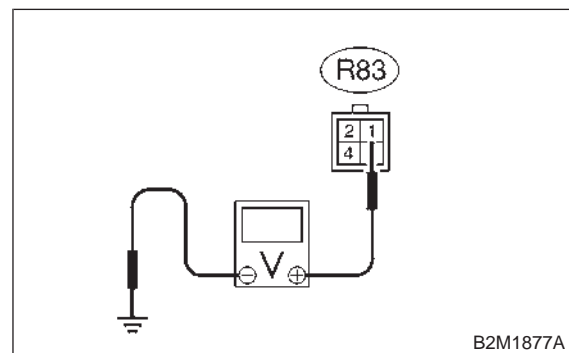
- CHECK** : Does the value change more than -2.8 kPa (-21.0 mmHg, -0.827 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 11AL6.

11AL6 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

- Turn ignition switch to OFF.
- Remove rear seat cushion (Sedan) or move rear seat cushion (Wagon).
- Separate rear wiring harness and fuel tank cord.
- Turn ignition switch to ON.
- Measure voltage between rear wiring harness connector and chassis ground.

Connector & terminal

(R83) No. 1 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 4.5 V?
- YES** : Go to step 11AL7.
- NO** : Repair harness and connector.

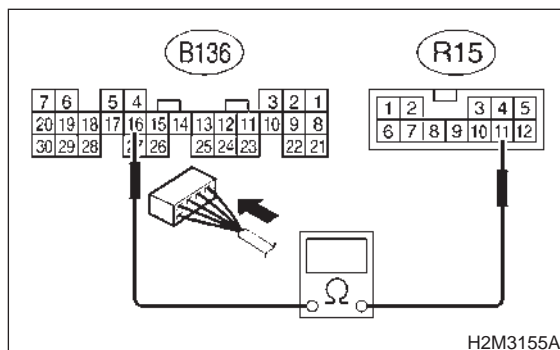
NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and rear wiring harness connector (R83)
- Poor contact in coupling connector (B98)

11AL7 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM and rear wiring harness connector.

Connector & terminal
(B136) No. 16 — (R15) No. 11:


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 11AL8.
- NO** : Repair harness and connector.

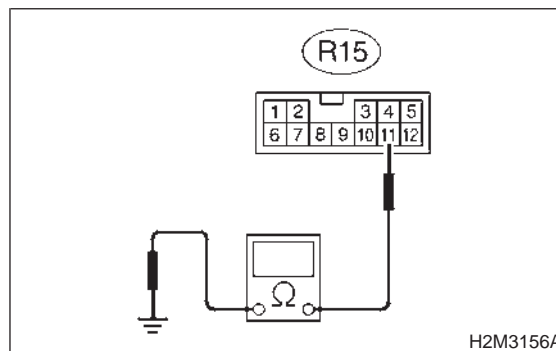
NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and rear wiring harness connector (R15)
- Poor contact in coupling connector (B98)

11AL8 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

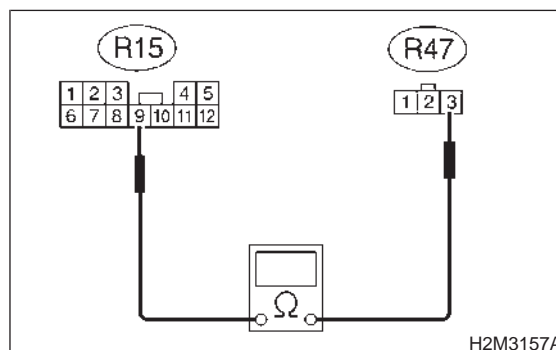
Measure resistance of harness between rear wiring harness connector and chassis ground.

Connector & terminal
(R15) No. 11 — Chassis ground:


- CHECK** : Is the resistance more than 500 $k\Omega$?
- YES** : Go to step 11AL9.
- NO** : Repair ground short circuit in harness between ECM and rear wiring harness connector (R15).

11AL9 : CHECK FUEL TANK CORD.

- 1) Remove fuel tank. <Ref. to 2-8 [W2A0].>
- 2) Disconnect connector from fuel tank pressure sensor.
- 3) Measure resistance of fuel tank cord.

Connector & terminal
(R15) No. 9 — (R47) No. 3:


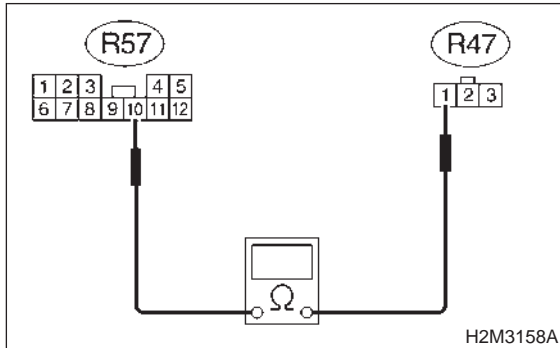
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 11AL10.
- NO** : Repair open circuit in fuel tank cord.

11AL10 : CHECK FUEL TANK CORD.

Measure resistance of fuel tank cord.

Connector & terminal

(R57) No. 10 — (R47) No. 1:



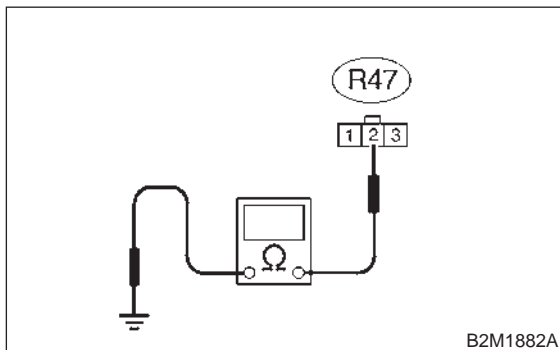
- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step 11AL11.
- NO** : Repair open circuit in fuel tank cord.

11AL11 : CHECK FUEL TANK CORD.

Measure resistance of harness between fuel tank pressure sensor connector and chassis ground.

Connector & terminal

(R47) No. 2 — Chassis ground:



- CHECK** : *Is the resistance more than 500 kΩ?*
- YES** : Go to step 11AL12.
- NO** : Repair ground short circuit in fuel tank cord.

11AL12 : CHECK POOR CONTACT.

Check poor contact in fuel tank pressure sensor connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : *Is there poor contact in fuel tank pressure sensor connector?*
- YES** : Repair poor contact in fuel tank pressure sensor connector.
- NO** : Replace fuel tank pressure sensor. <Ref. to 2-1 [W6A0].>

MEMO:

AM: DTC P0453 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT —

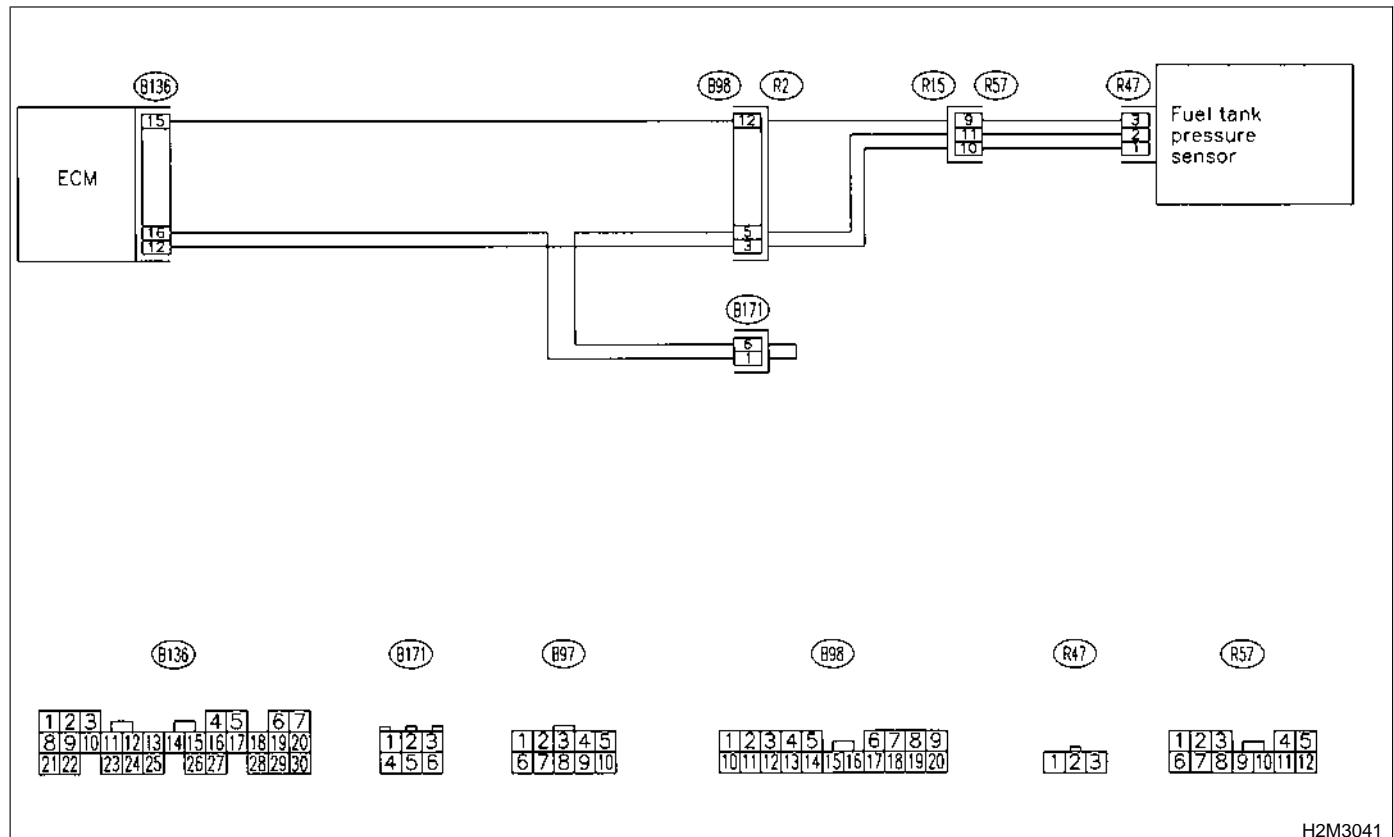
● DTC DETECTING CONDITION:

- Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

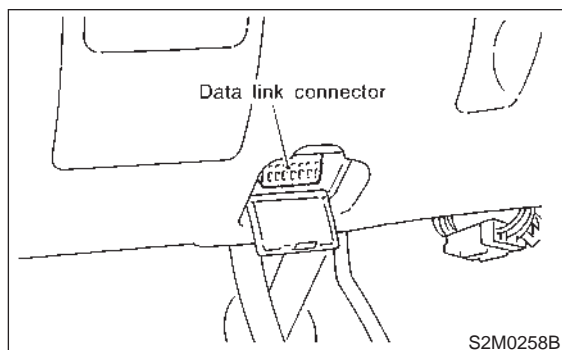
● WIRING DIAGRAM:



H2M3041

11AM1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

- 1) Turn ignition switch to OFF.
- 2) Remove fuel filler cap.
- 3) Install fuel filler cap.
- 4) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 5) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.

- 6) Read data of fuel tank pressure sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Is the value more than 2.8 kPa (21.0 mmHg, 0.827 inHg)?**

YES : Go to step 11AM12.

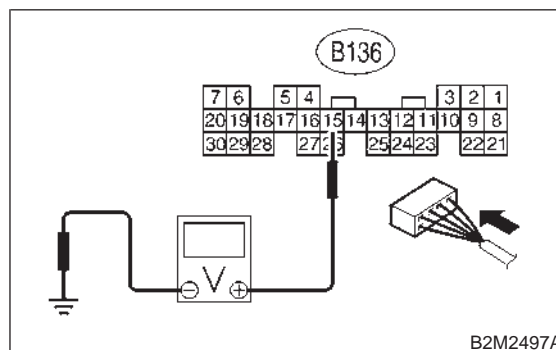
NO : Go to step 11AM2.

11AM2 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 4.5 V?**

YES : Go to step 11AM4.

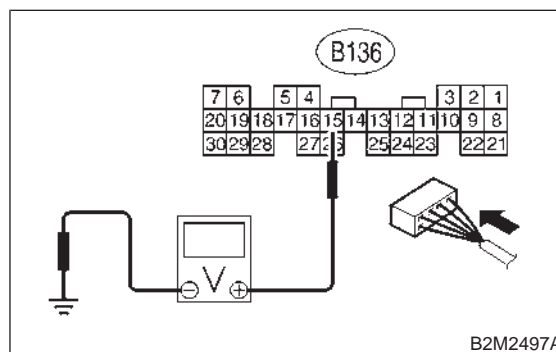
NO : Go to step 11AM3.

11AM3 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : **Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?**

YES : Repair poor contact in ECM connector.

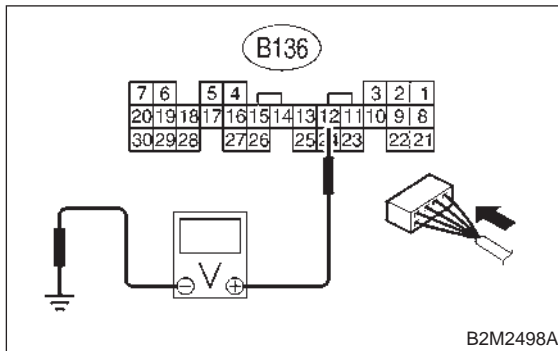
NO : Replace ECM. <Ref. to 2-7 [W15A0].>

11AM4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

(B136) No. 12 (+) — Chassis ground (-):



- CHECK** : Is the voltage less than 0.2 V?
- YES** : Go to step 11AM6.
- NO** : Go to step 11AM5.

11AM5 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of fuel tank pressure sensor signal using Subaru Select Monitor.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

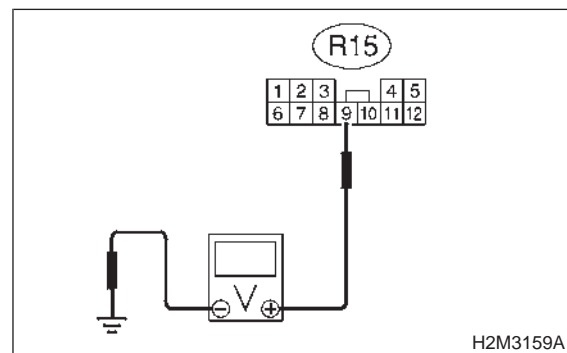
- CHECK** : Does the value change more than -2.8 kPa (-21.0 mmHg, -0.827 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 11AM6.

11AM6 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

- Turn ignition switch to OFF.
- Remove rear seat cushion (Sedan) or move rear seat cushion (Wagon).
- Separate rear wiring harness and fuel tank cord.
- Turn ignition switch to ON.
- Measure voltage between rear wiring harness connector and chassis ground.

Connector & terminal

(R15) No. 9 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 4.5 V?
- YES** : Go to step 11AM7.
- NO** : Repair harness and connector.

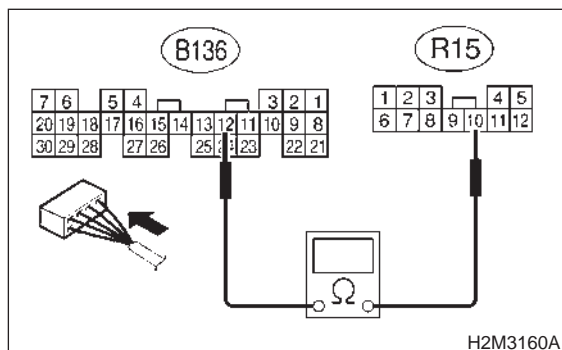
NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and rear wiring harness connector (R15)
- Poor contact in coupling connector (B98)

11AM7 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM and rear wiring harness connector.

Connector & terminal
(B136) No. 12 — (R15) No. 10:


- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 11AM8.
- NO** : Repair harness and connector.

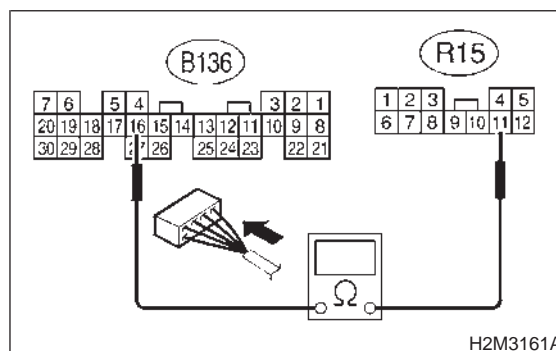
NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and rear wiring harness connector (R15)
- Poor contact in coupling connector (B98)

11AM8 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

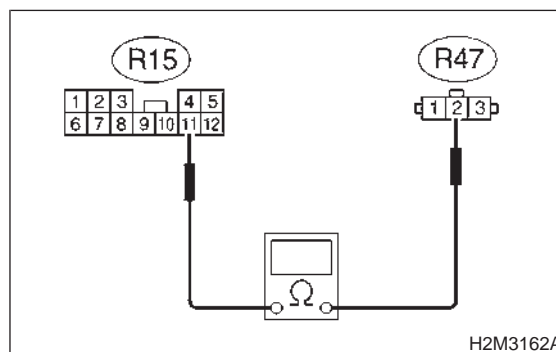
Measure resistance of harness between rear wiring harness connector and chassis ground.

Connector & terminal
(B136) No. 16 — (R15) No. 11:


- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 11AM9.
- NO** : Repair ground short circuit in harness between ECM and rear wiring harness connector (R83).

11AM9 : CHECK FUEL TANK CORD.

- 1) Remove fuel tank. <Ref. to 2-8 [W2A0].>
- 2) Disconnect connector from fuel tank pressure sensor.
- 3) Measure resistance of fuel tank cord.

Connector & terminal
(R15) No. 11 — (R47) No. 2:


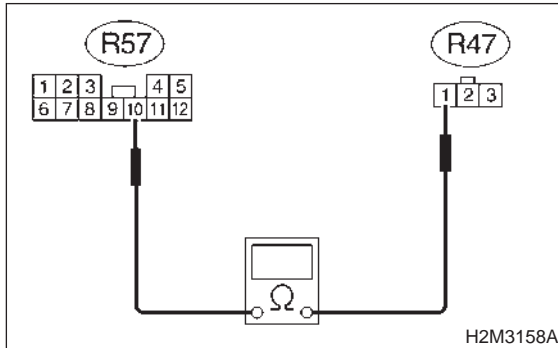
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 11AM10.
- NO** : Repair open circuit in fuel tank cord.

11AM10 : CHECK FUEL TANK CORD.

Measure resistance of fuel tank cord.

Connector & terminal

(R57) No. 10 — (R47) No. 1:



- CHECK** : **Is the resistance less than 1 Ω ?**
YES : Go to step 11AM11.
NO : Repair open circuit in fuel tank cord.

11AM11 : CHECK POOR CONTACT.

Check poor contact in fuel tank pressure sensor connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : **Is there poor contact in fuel tank pressure sensor connector?**
YES : Repair poor contact in fuel tank pressure sensor connector.
NO : Replace fuel tank pressure sensor. <Ref. to 2-1 [W6A0].>

11AM12 : CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.

- 1) Turn ignition switch to OFF and Subaru Select Monitor or the OBD-II general scan tool switch to OFF.
- 2) Remove fuel tank. <Ref. to 2-8 [W2A0].>
- 3) Remove fuel tank cord from fuel tank.
- 4) Connect fuel tank cord to rear wiring harness.
- 5) Remove fuel filler cap.
- 6) Install fuel filler cap.
- 7) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
- 8) Read data of fuel tank pressure sensor signal using Subaru Select Monitor or the OBD-II general scan tool.

NOTE:

- Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
- OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

- CHECK** : **Is the value more than 2.8 kPa (21.0 mmHg, 0.827 inHg)?**
YES : Repair battery short circuit in harness between ECM and fuel tank pressure sensor connector.
NO : Replace fuel tank pressure sensor. <Ref. to 2-1 [W6A0].>

AN: DTC P0461 — FUEL LEVEL SENSOR CIRCUIT RANGE/ PERFORMANCE PROBLEM —

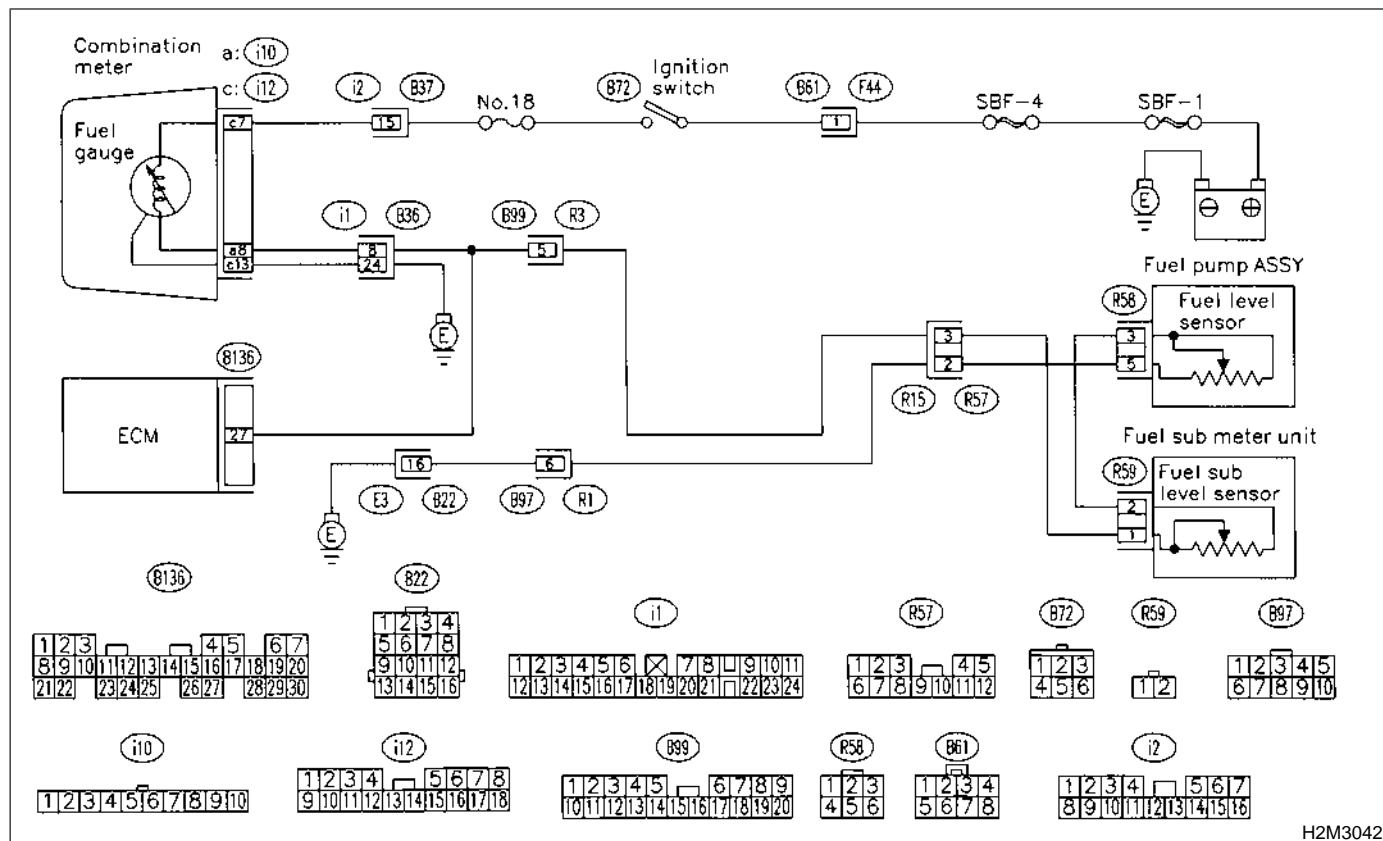
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3042

11AN1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0462 or P0463?

YES : Inspect DTC P0462 or P0463 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NOTE:

In this case, it is not necessary to inspect this trouble.

NO : Replace fuel sending unit <Ref. to 2-1 [W8A0].> and fuel sub meter unit <Ref. to 2-1 [W10A0].>

AO: DTC P0462 — FUEL LEVEL SENSOR CIRCUIT LOW INPUT —

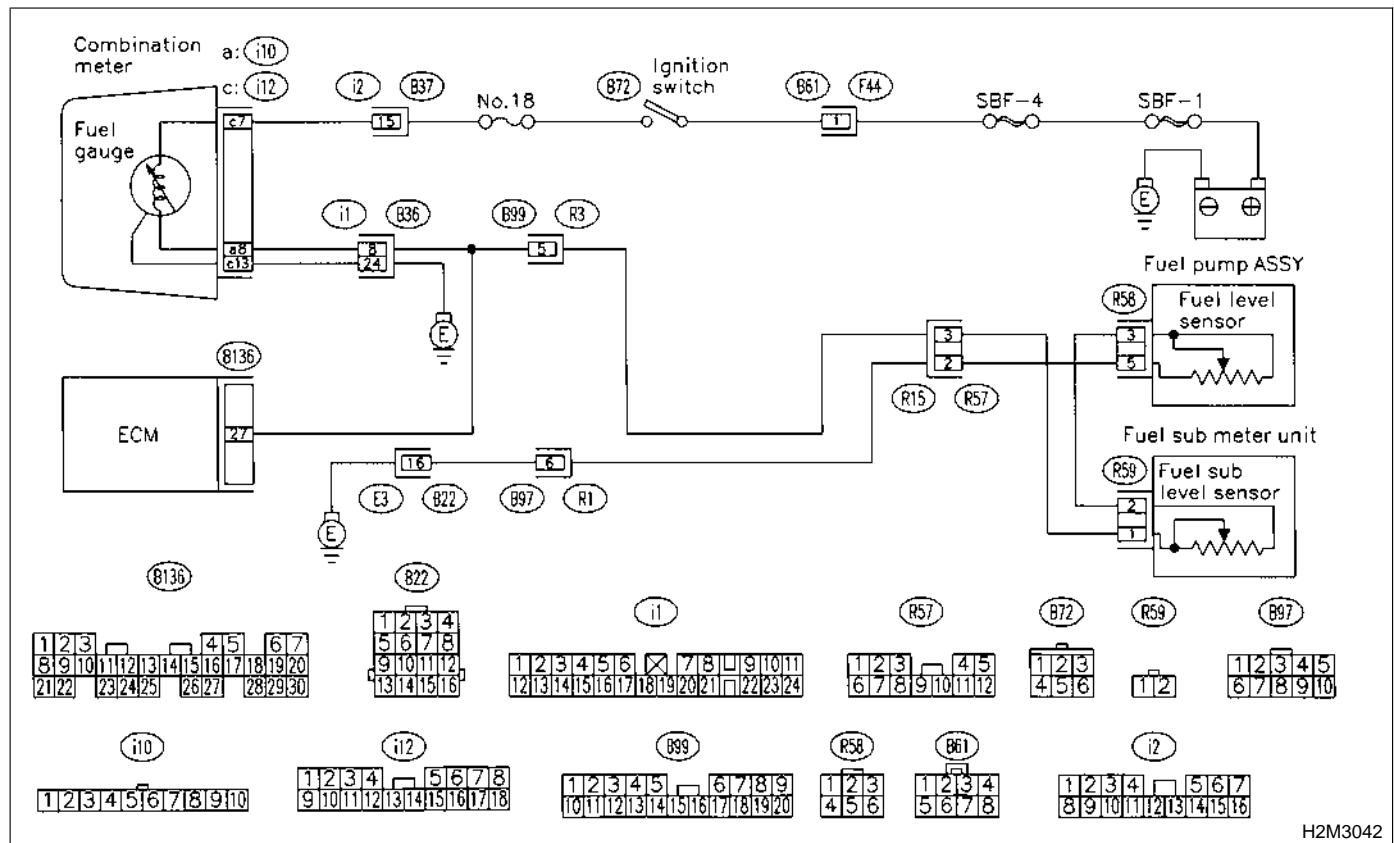
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



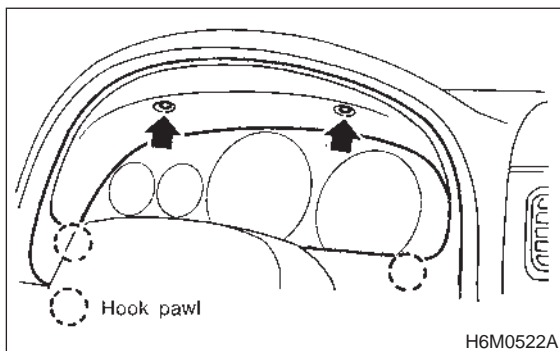
H2M3042

11A01 : CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.

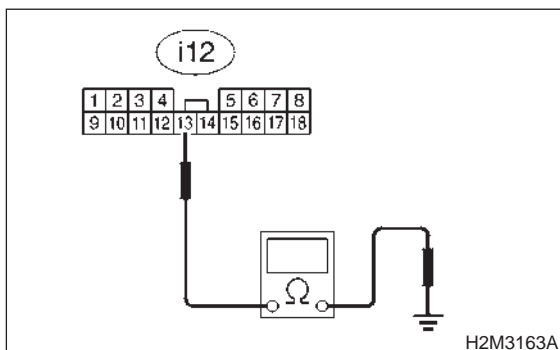
- CHECK** : Does speedometer and tachometer operate normally?
- YES** : Go to step 11A03.
- NO** : Go to step 11A02.

11A02 : CHECK GROUND CIRCUIT OF COMBINATION METER.

- 1) Turn ignition switch to OFF.
- 2) Pull out combination meter from instrument panel. <Ref. to 6-2 [W8A0].>



- 3) Disconnect connector from combination meter.
- 4) Measure resistance of harness between combination meter connector and chassis ground.

Connector & terminal**(i12) No. 13 — Chassis ground (-):**

- CHECK** : **Is resistance less than 5 Ω ?**
- YES** : Repair or replace combination meter. <Ref. to 6-2 [W8A0].>
- NO** : Repair harness and connector.

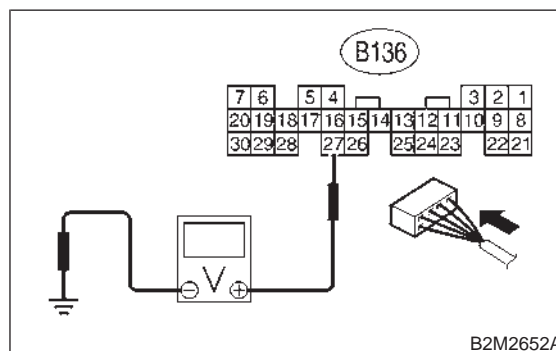
NOTE:

In this case, repair the following:

- Open circuit in harness between combination meter connector and grounding terminal
- Poor contact in combination meter connector
- Poor contact in grounding terminal

11A03 : CHECK INPUT SIGNAL FOR ECM.

- 1) Turn ignition switch to ON. (Engine OFF)
- 2) Measure voltage between ECM connector and chassis ground.

Connector & terminal**(B136) No. 27 (+) — Chassis ground (-):**

- CHECK** : **Is the voltage less than 0.12 V?**
- YES** : Go to step 11A05.
- NO** : Go to step 11A04.

11A04 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of fuel level sensor signal using Subaru Select Monitor.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- CHECK** : **Does the value change less than 0.12 V by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?**
- YES** : Repair poor contact in ECM connector.
- NO** : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause.

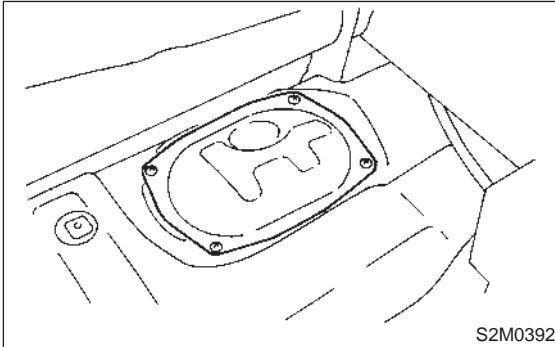
NOTE:

In this case, repair the following:

- Poor contact in fuel pump connector
- Poor contact in combination meter connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (i1), (B22), (B99), (B97) and (R57)

11A05 : CHECK HARNESS BETWEEN ECM, COMBINATION METER AND FUEL PUMP CONNECTOR.

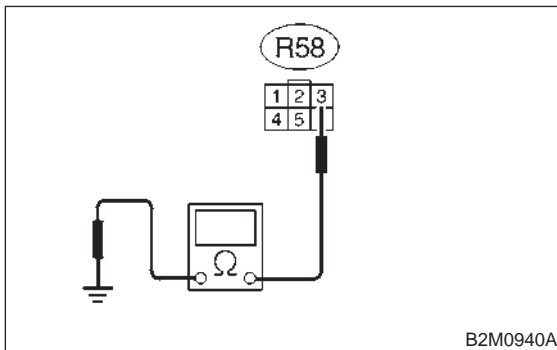
- 1) Turn ignition switch to OFF.
- 2) Remove fuel pump access hole lid located on the right rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).



- 3) Disconnect connector from fuel pump.
- 4) Measure resistance of harness between fuel pump connector and chassis ground.

Connector & terminal

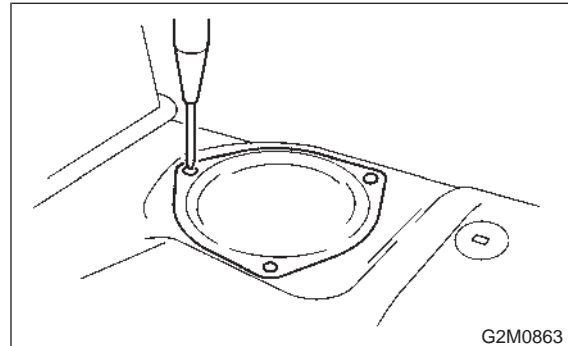
(R58) No. 3 — Chassis ground:



- CHECK** : Is the resistance less than 10 Ω?
- YES** : Go to step 11A06.
- NO** : Go to step 11A011.

11A06 : CHECK FUEL TANK CORD.

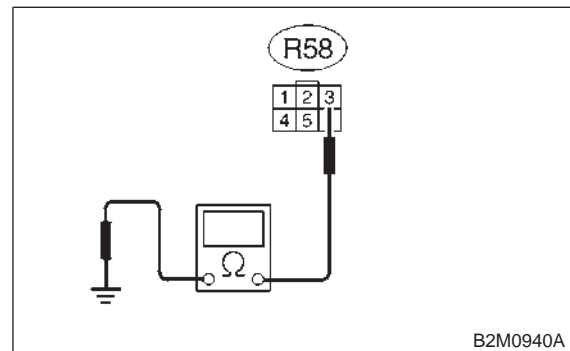
- 1) Remove service hole cover located on the left rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).



- 2) Disconnect connector from fuel sub meter unit.
- 3) Measure resistance of harness between fuel pump connector and chassis ground.

Connector & terminal

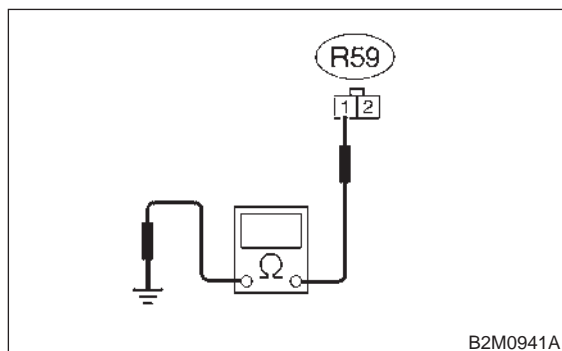
(R58) No. 3 — Chassis ground:



- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in harness between fuel pump and fuel sub meter unit connector.
- NO** : Go to step 11A07.

11A07 : CHECK REAR WIRING HARNESS.

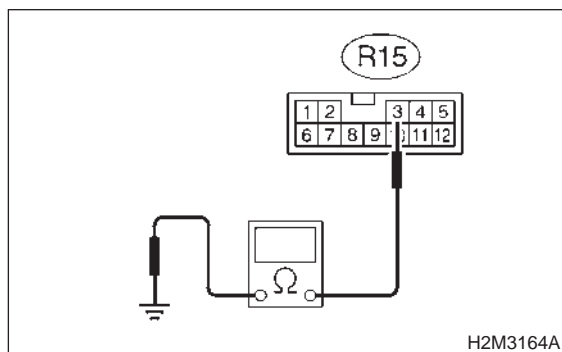
- 1) Separate fuel tank cord connector (R57) and rear wiring harness connector (R15).
- 2) Measure resistance of harness between fuel sub meter unit connector and chassis ground.

Connector & terminal**(R59) No. 1 — Chassis ground:**

- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in fuel tank cord.
- NO** : Go to step 11A08.

11A08 : CHECK REAR, BULKHEAD AND INSTRUMENT PANEL WIRING HARNESS.

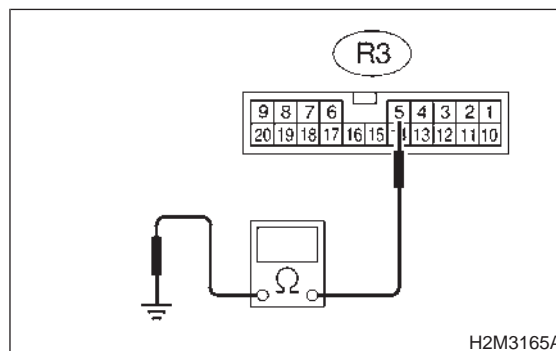
- 1) Separate rear wiring harness connector (R3) and bulkhead wiring harness connector (B99).
- 2) Measure resistance of harness between rear wiring harness connector and chassis ground.

Connector & terminal**(R15) No. 3 — Chassis ground:**

- CHECK** : Is the resistance less than 10 Ω?
- YES** : Go to step 11A09.
- NO** : Repair ground short circuit in bulkhead wiring harness.

11A09 : CHECK REAR WIRING HARNESS.

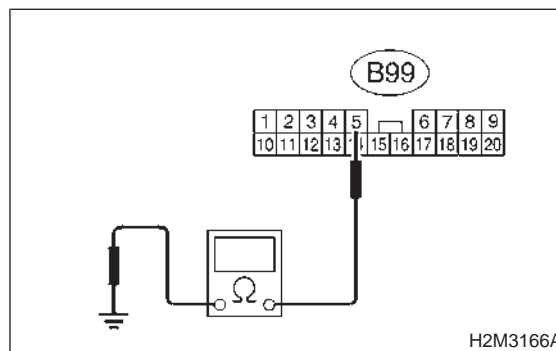
- 1) Separate rear wiring harness connector (R3) and bulkhead wiring harness connector (B99).
- 2) Measure resistance of harness between rear wiring harness connector and chassis ground.

Connector & terminal**(R3) No. 5 — Chassis ground:**

- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in rear wiring harness.
- NO** : Go to step 11A010.

11A010 : CHECK BULKHEAD WIRING HARNESS.

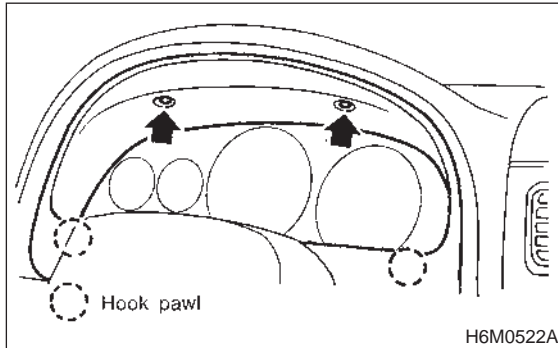
- 1) Separate bulkhead wiring harness connector (B38) and instrument panel wiring harness connector (i3).
- 2) Measure resistance of harness between bulkhead wiring harness connector and chassis ground.

Connector & terminal**(B99) No. 5 — Chassis ground:**

- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in bulkhead wiring harness.
- NO** : Repair ground short circuit in instrument panel wiring harness.

11A011 : CHECK HARNESS BETWEEN COMBINATION METER AND FUEL PUMP CONNECTOR.

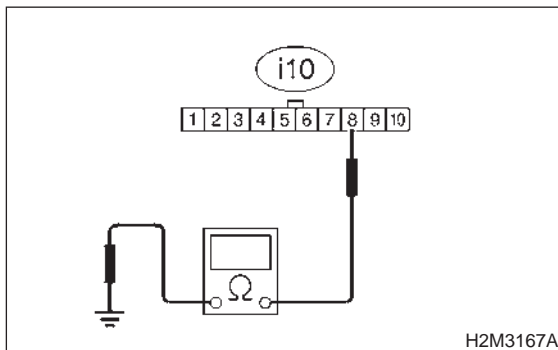
- 1) Connect connector to fuel pump.
- 2) Pull out combination meter from instrument panel. <Ref. to 6-2 [W8A0].>



- 3) Disconnect connector from combination meter.
- 4) Measure resistance of harness between combination meter connector and chassis ground.

Connector & terminal

(i10) No. 8 — Chassis ground:



CHECK : *Is the resistance less than 200 Ω?*

YES : Go to step 11A012.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between combination meter connector and junction A on rear wiring harness
- Poor contact in coupling connectors (i1) and (B99)

11A012 : CHECK COMBINATION METER.

Disconnect connector from combination meter and remove combination meter.

CHECK : *Is the fuel meter installation screw tightened securely?*

YES : Go to step 11A013.

NO : Tighten fuel meter installation screw securely.

11A013 : CHECK COMBINATION METER PRINTED CIRCUIT PLATE.

Remove printed circuit plate assembly from combination meter assembly.

CHECK : *Is there flaw or burning on printed circuit plate assembly?*

YES : Replace printed circuit plate assembly.

NO : Replace fuel meter assembly. <Ref. to 6-2 [W8A0].>

MEMO:

AP: DTC P0463 — FUEL LEVEL SENSOR CIRCUIT HIGH INPUT —

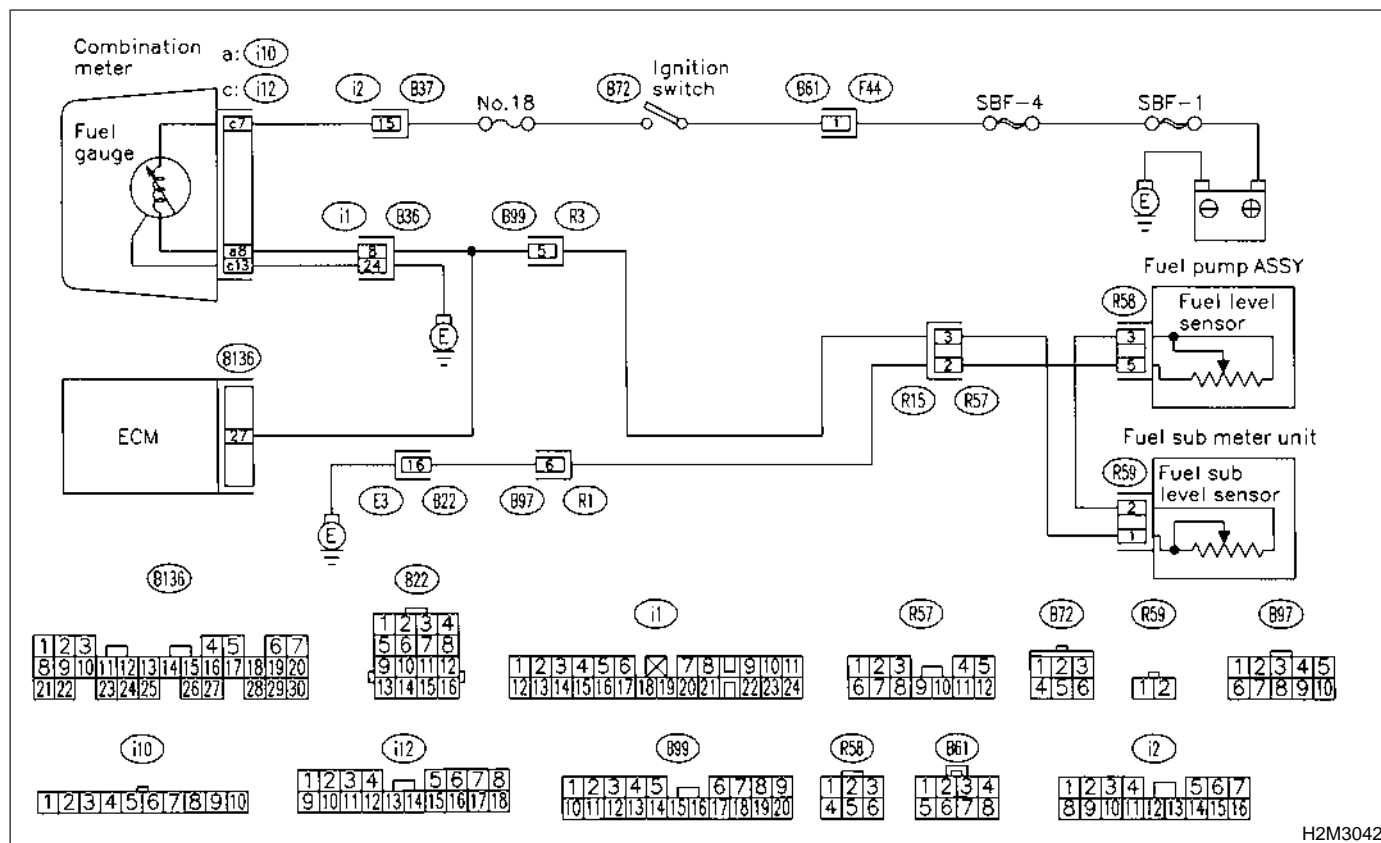
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:



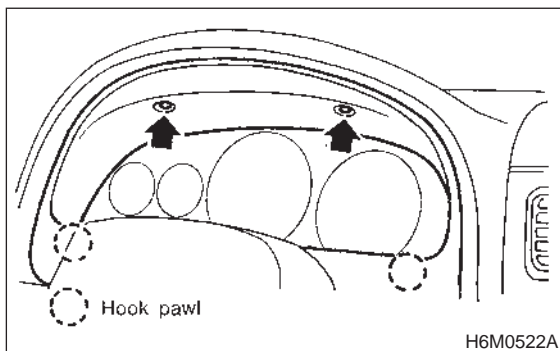
H2M3042

11AP1 : CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.

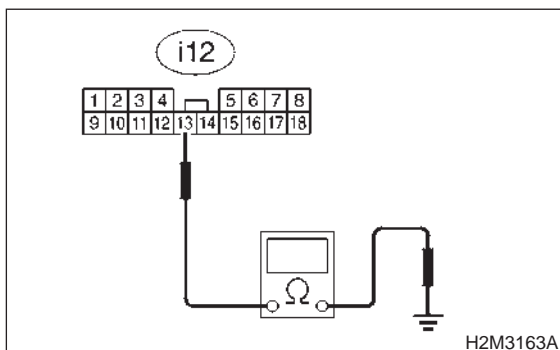
- CHECK** : Does speedometer and tachometer operate normally?
- YES** : Go to step 11AP3.
- NO** : Go to step 11AP2.

11AP2 : CHECK GROUND CIRCUIT OF COMBINATION METER.

- 1) Turn ignition switch to OFF.
- 2) Pull out combination meter from instrument panel. <Ref. to 6-2 [W8A0].>



- 3) Disconnect connector from combination meter.
- 4) Measure resistance of harness between combination meter connector and chassis ground.

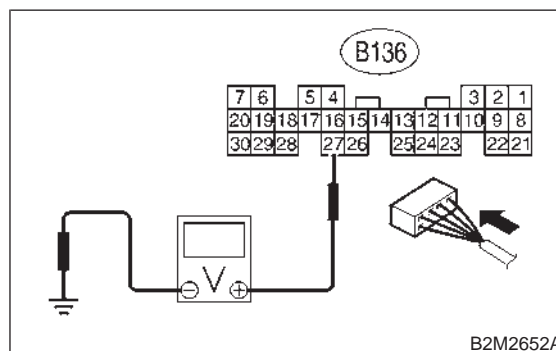
Connector & terminal**(i12) No. 13 — Chassis ground (-):****CHECK** : **Is resistance less than 5 Ω ?****YES** : Repair or replace combination meter.
<Ref. to 6-2 [W8A0].>**NO** : Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open circuit in harness between combination meter connector and grounding terminal
- Poor contact in combination meter connector
- Poor contact in grounding terminal

11AP3 : CHECK INPUT SIGNAL FOR ECM.

- 1) Turn ignition switch to ON. (Engine OFF)
- 2) Measure voltage between ECM connector and chassis ground.

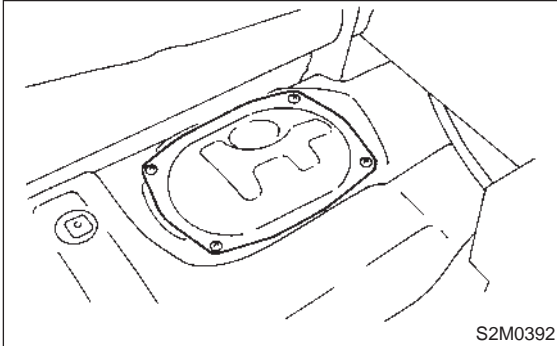
Connector & terminal**(B136) No. 27 (+) — Chassis ground (-):****CHECK** : **Is the voltage more than 4.75 V?****YES** : Go to step 11AP4.**NO** : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause.**NOTE:**

In this case, repair the following:

- Poor contact in fuel pump connector
- Poor contact in combination meter connector
- Poor contact in ECM connector
- Poor contact in coupling connector (i1), (B99), (B22), (B97) and (R57)

11AP4 : CHECK FUEL LEVEL SENSOR.

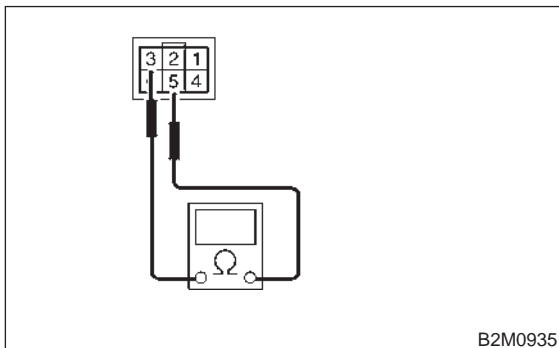
- 1) Turn ignition switch to OFF.
- 2) Remove fuel pump access hole lid located on the right rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).



- 3) Disconnect connector from fuel pump.
- 4) Measure resistance between connector terminals of fuel pump.

Terminals

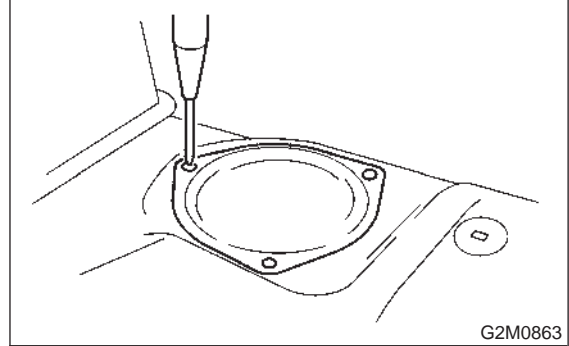
No. 3 — No. 5:



- CHECK** : Is the resistance less than 100 Ω ?
- YES** : Go to step 11AP5.
- NO** : Replace fuel sending unit. <Ref. to 2-1 [W8A0].>

11AP5 : CHECK FUEL SUB LEVEL SENSOR.

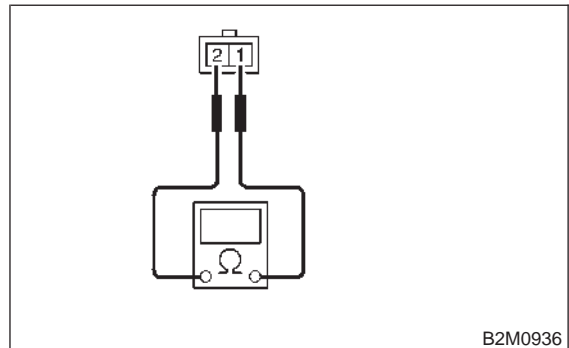
- 1) Remove service hole cover located on the left rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).



- 2) Disconnect connector from fuel sub meter unit.
- 3) Measure resistance between connector terminals of fuel sub meter unit.

Terminals

No. 1 — No. 2:



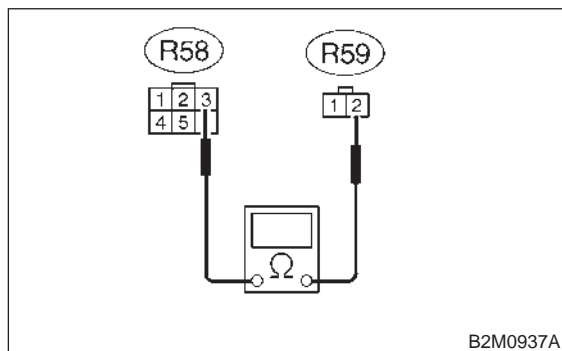
- CHECK** : Is the resistance less than 100 Ω ?
- YES** : Go to step 11AP6.
- NO** : Replace fuel sub meter unit. <Ref. to 2-1 [W10A0].>

11AP6 : CHECK HARNESS BETWEEN FUEL PUMP AND FUEL SUB METER UNIT CONNECTOR.

Measure resistance of harness between fuel pump and fuel sub meter unit connector.

Connector & terminal

(R58) No. 3 — (R59) No. 2:



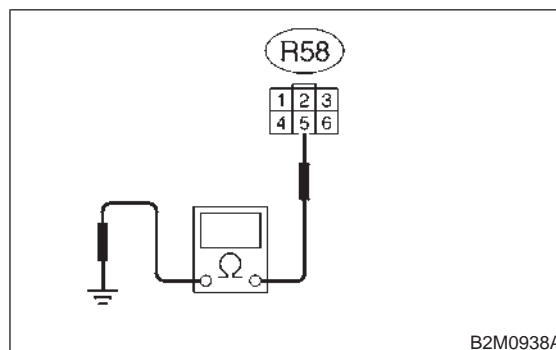
- CHECK** : **Is the resistance less than 1 Ω ?**
- YES** : Go to step 11AP7.
- NO** : Repair open circuit in harness between fuel pump and fuel sub meter unit connector.

11AP7 : CHECK GROUND CIRCUIT OF FUEL LEVEL SENSOR.

Measure resistance of harness between fuel pump connector and chassis ground.

Connector & terminal

(R58) No. 5 — Chassis ground:



- CHECK** : **Is the resistance less than 5 Ω ?**
- YES** : Go to step 11AP8.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

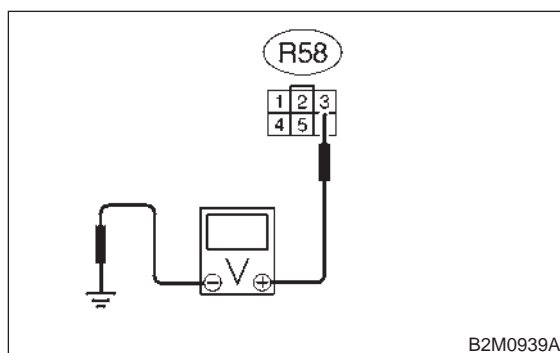
- Open circuit in harness between fuel pump connector and chassis grounding terminal
- Poor contact in fuel pump connector
- Poor contact in coupling connectors (R57), (B97) and (B22)

11AP8 : CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONNECTOR.

- 1) Connect connector to fuel sub meter unit.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between fuel pump connector and chassis ground.

Connector & terminal

(R58) No. 3 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between fuel pump connector and junction A on rear wiring harness
- Poor contact in fuel sub meter unit connector
- Poor contact in fuel pump connector
- Poor contact in coupling connector (R57)

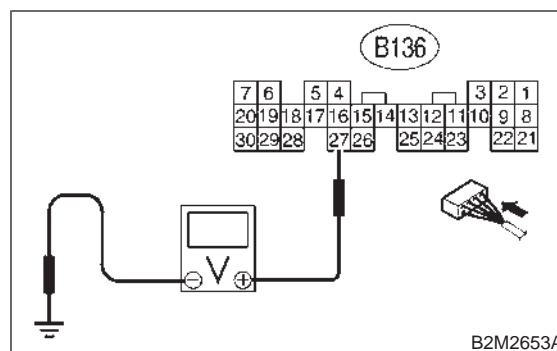
NO : Go to step 11AP9.

11AP9 : CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 27 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ECM connector and junction A on rear wiring harness
- Poor contact in coupling connector (B97)

NO : Repair connector.

NOTE:

In this case, repair the following:

- Poor contact in fuel pump connector
- Poor contact in fuel sub meter unit
- Poor contact in ECM connector

MEMO:

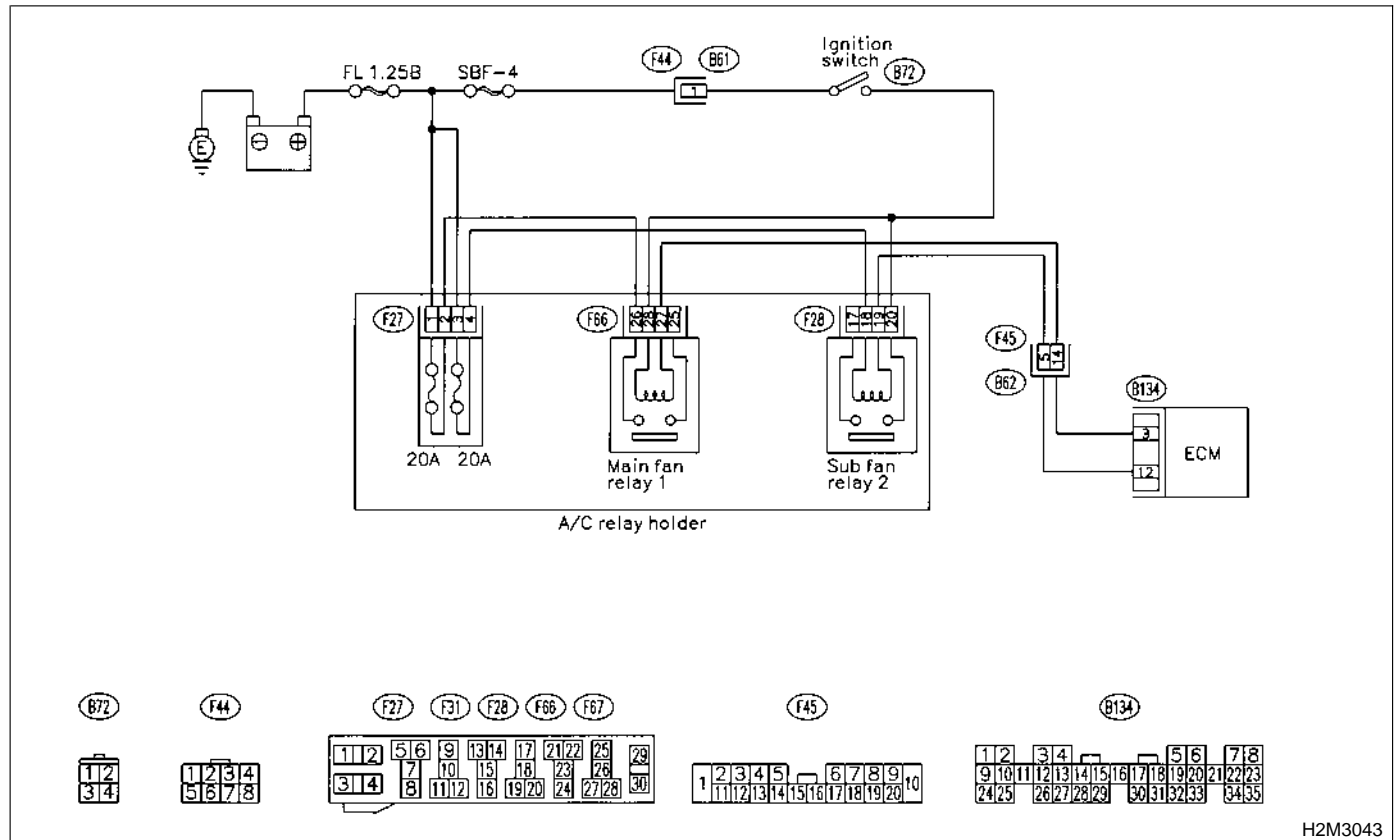
AQ: DTC P0480 — COOLING FAN RELAY 1 CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - Radiator fan does not operate properly.
 - Overheating

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

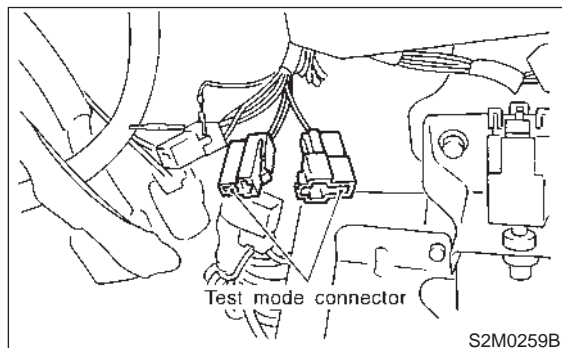
● WIRING DIAGRAM:



H2M3043

11AQ1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to OFF.
- 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



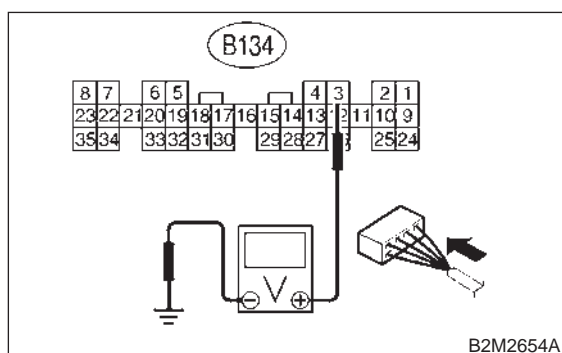
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

NOTE:

Radiator fan relay operation check can be executed using Subaru Select Monitor. For procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

Connector & terminal

(B134) No. 3 (+) — Chassis ground (-):



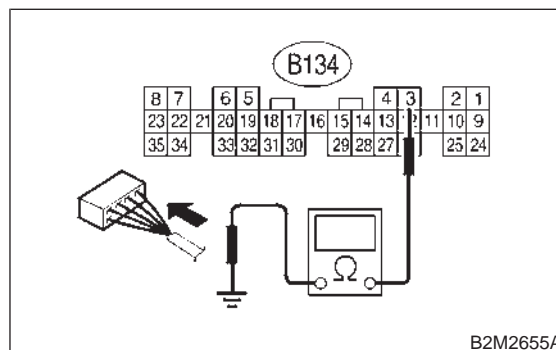
- CHECK** : Does voltage change between 0 and 10 volts?
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 11AQ2.

11AQ2 : CHECK GROUND SHORT CIRCUIT IN RADIATOR FAN RELAY 1 CONTROL CIRCUIT.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from ECM.
- 3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B134) No. 3 — Chassis ground:



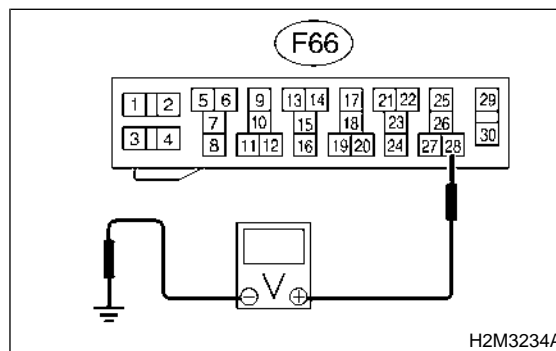
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in radiator fan relay 1 control circuit.
- NO** : Go to step 11AQ3.

11AQ3 : CHECK POWER SUPPLY FOR RELAY.

- 1) Remove main fan relay from A/C relay holder.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between fuse and relay box (F/B) connector and chassis ground.

Connector & terminal

(F66) No. 28 (+) — Chassis ground (-):



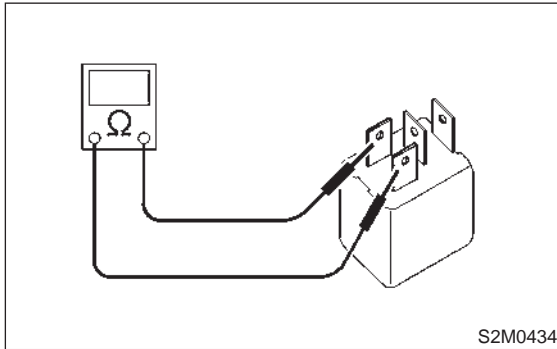
- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 11AQ4.
- NO** : Repair open circuit in harness between ignition switch and fuse and relay box (F/B) connector.

11AQ4 : CHECK MAIN FAN RELAY 1.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between main fan relay 1 terminals.

Terminal

No. 27 — No. 28:



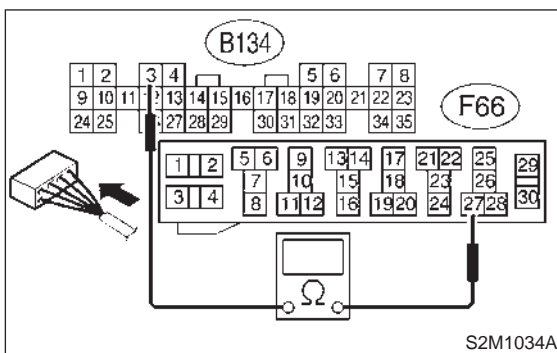
- CHECK** : *Is the resistance between 87 and 107 Ω?*
- YES** : Go to step 11AQ5.
- NO** : Replace main fan relay 1.

11AQ5 : CHECK OPEN CIRCUIT IN MAIN FAN RELAY CONTROL CIRCUIT.

Measure resistance of harness between ECM and main fan relay connector.

Connector & terminal

(B134) No. 3 — (F66) No. 27:



- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step 11AQ6.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and main fan relay 1 connector
- Poor contact in coupling connector (F45)

11AQ6 : CHECK POOR CONTACT.

Check poor contact in ECM or main fan relay 1 connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : *Is there poor contact in ECM or main fan relay 1 connector?*
- YES** : Repair poor contact in ECM or main fan relay 1 connector.
- NO** : Contact with SOA service.

MEMO:

AR: DTC P0483 — COOLING FAN FUNCTION PROBLEM —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Occurrence of noise
- Overheating

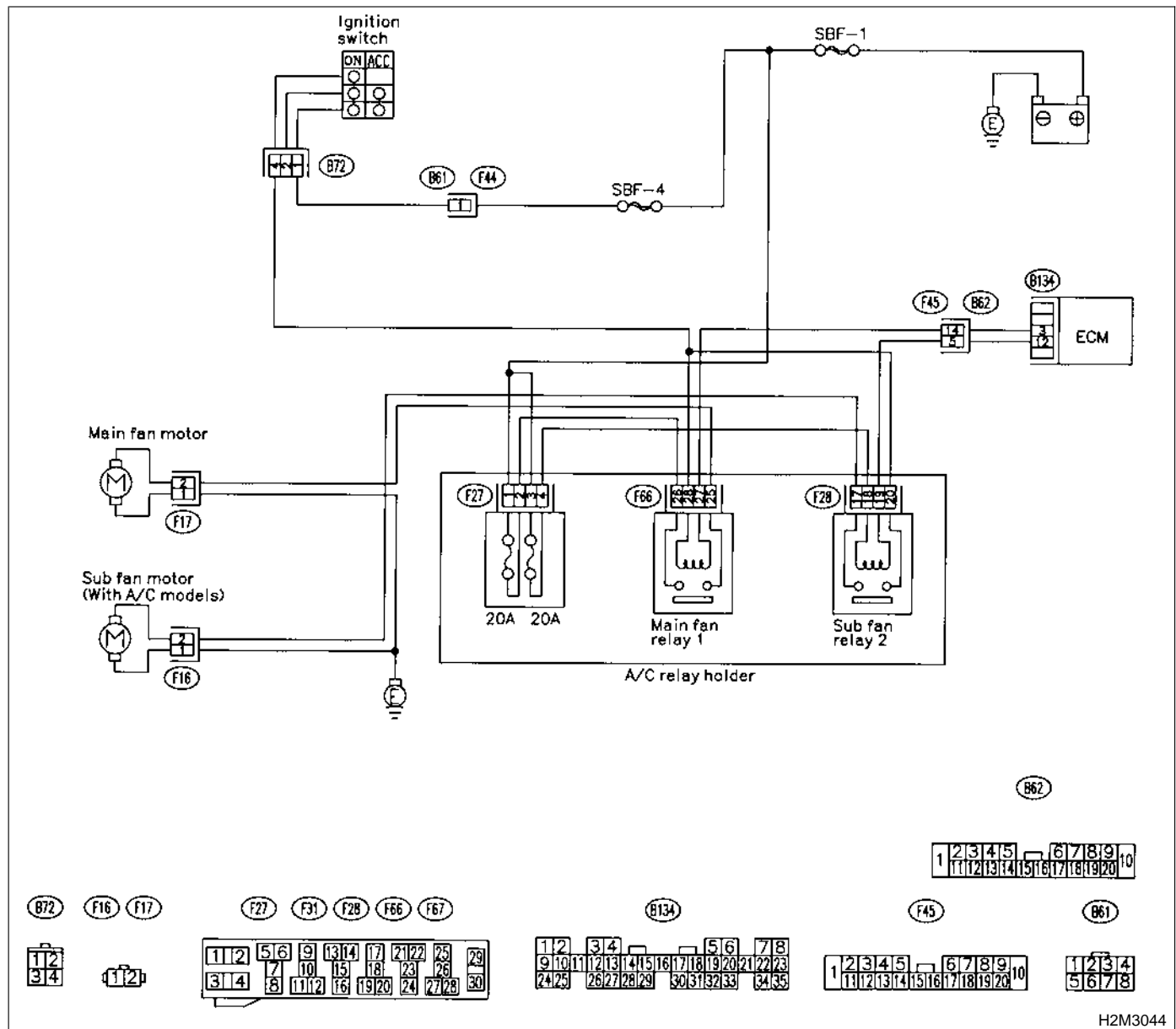
CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

NOTE:

If the vehicle, with the engine idling, is placed very close to a wall or another vehicle, preventing normal cooling function, the OBD system may detect malfunction.

• WIRING DIAGRAM:



H2M3044

11AR1 : CHECK ANY OTHER DTC ON DISPLAY.
--

- CHECK** : *Is there any other DTC on display?*
- YES** : Inspect the relevant DTC using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>
- NO** : Check engine cooling system. <Ref. to 2-5 [T100].>

AS: DTC P0500 — VEHICLE SPEED SENSOR MALFUNCTION —

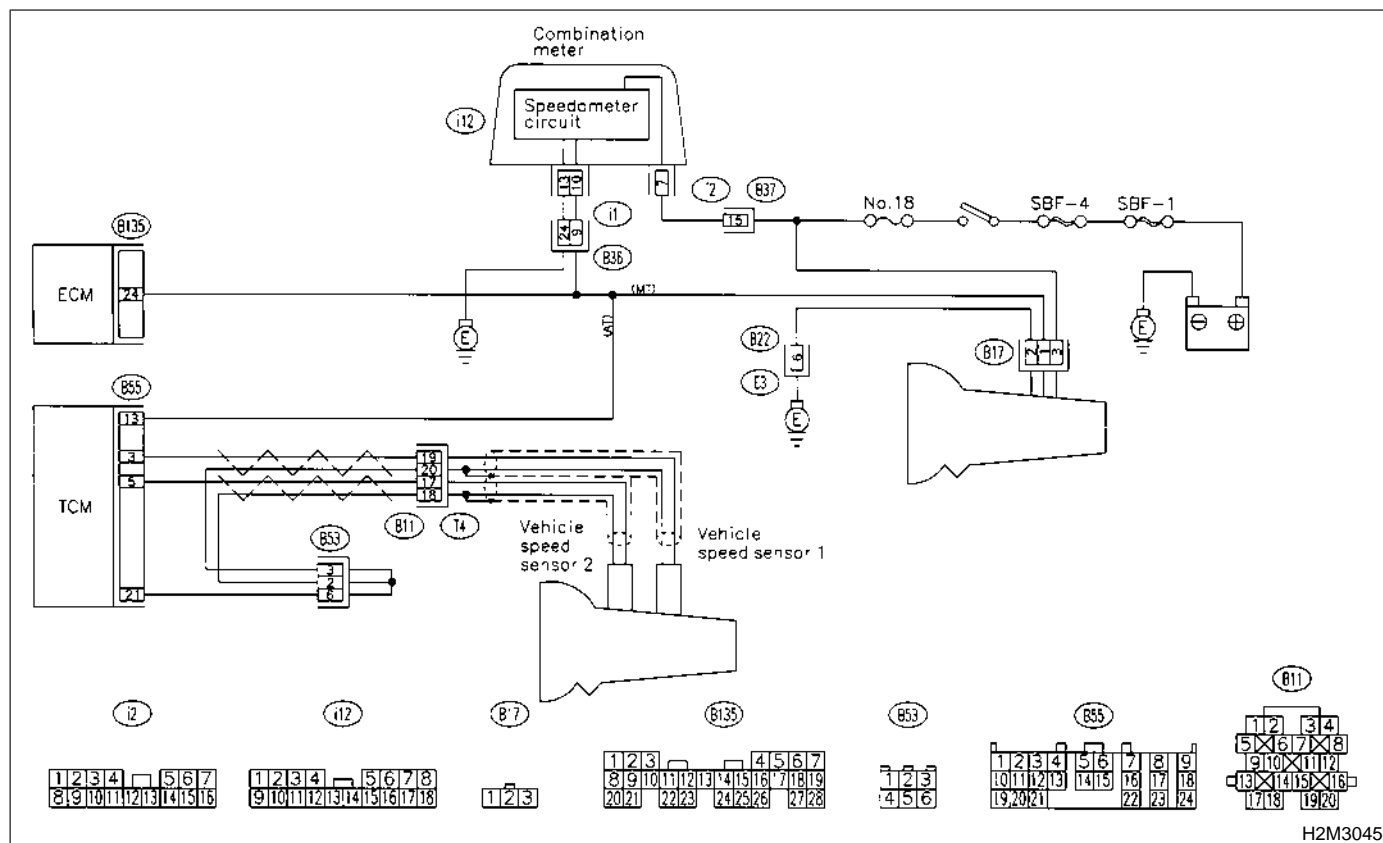
• DTC DETECTING CONDITION:

- Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:



H2M3045

11AS1 : CHECK TRANSMISSION TYPE.

CHECK : *Is transmission type AT?*

YES : Go to step 11AS2.

NO : Go to step 11AS3.

11AS2 : CHECK DTC P0720 ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0720?*

YES : Check vehicle speed sensor 2 signal circuit. <Ref. to 3-2 [T8G0].>

NO : Go to step 11AS3.

11AS3 : CHECK SPEEDOMETER OPERATION IN COMBINATION METER.

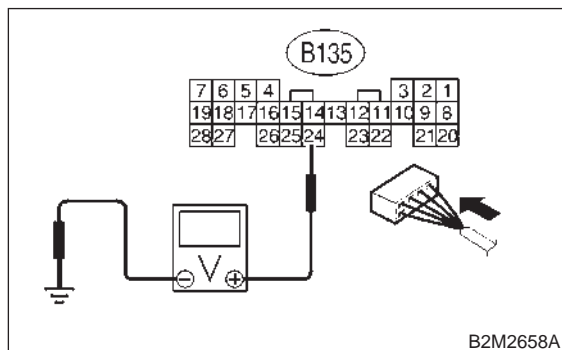
CHECK : *Does speedometer operate normally?*

YES : Go to step 11AS4.

NO : Check speedometer and vehicle speed sensor. <Ref. to 6-2 [K2A4].>

11AS4 : CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from TCM.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

Connector & terminal
(B135) No. 24 (+) — Chassis ground (—):

CHECK : **Is the voltage more than 2 V?**
YES : Repair harness and connector.

NOTE:

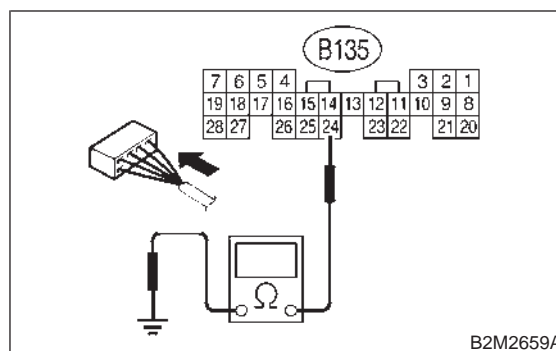
In this case, repair the following:

- Open circuit in harness between ECM and combination meter connector
- Poor contact in ECM connector
- Poor contact in combination meter connector
- Poor contact in coupling connector (B36)

NO : Go to step **11AS5**.

11AS5 : CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal
(B135) No. 24 — Chassis ground:

CHECK : **Is the resistance less than 10 Ω?**
YES : Repair ground short circuit in harness between ECM and combination meter connector.

NO : Repair poor contact in ECM connector.

AT: DTC P0506 — IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED**• DTC DETECTING CONDITION:**

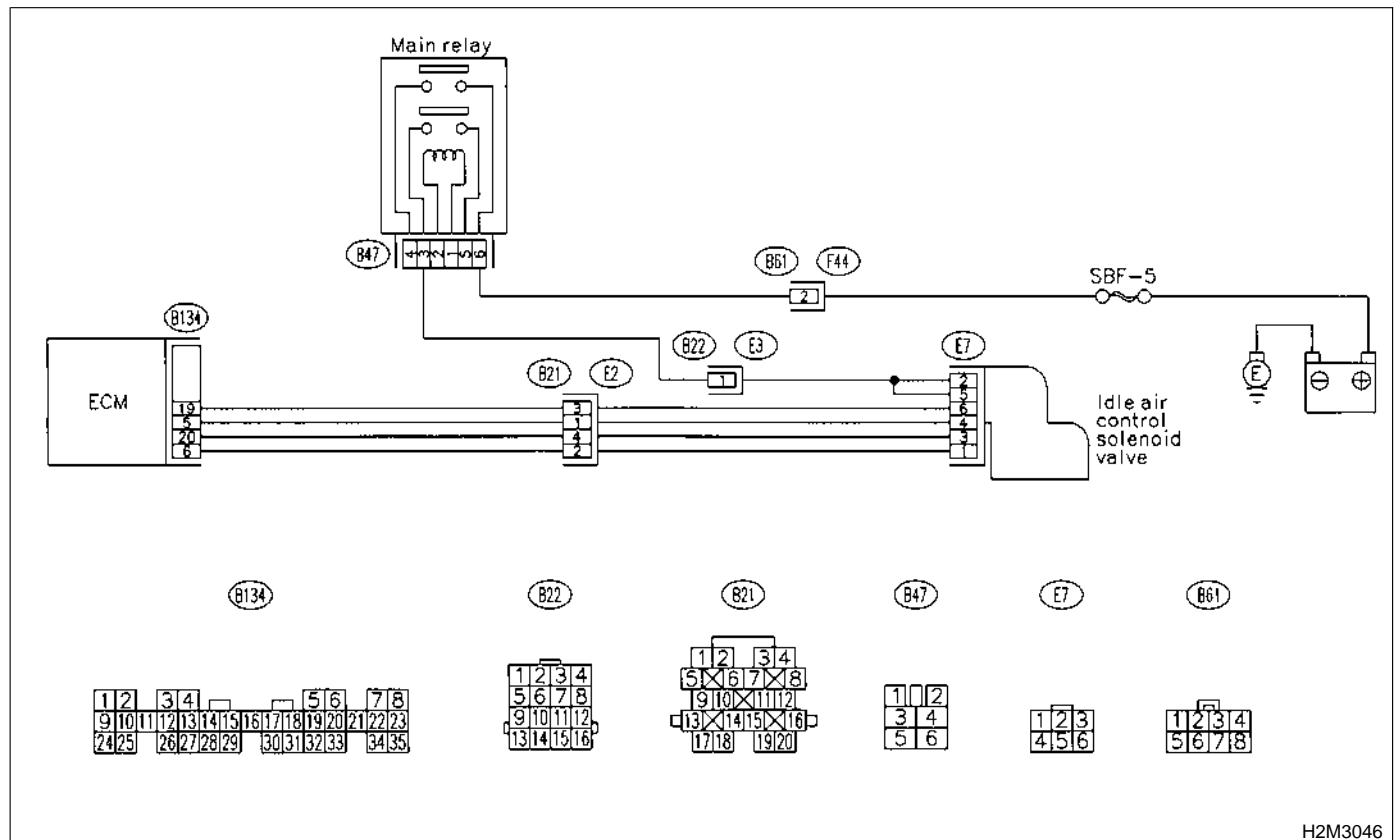
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Engine is difficult to start.
- Engine does not start.
- Erroneous idling
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

H2M3046

11AT1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1510, P1511, P1512, P1513, P1514, P1515, P1516 or P1517?***

YES : Inspect DTC P1510, P1511, P1512, P1513, P1514, P1515, P1516 or P1517 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0506.

NO : Go to step **11AT2**.

11AT2 : CHECK AIR BY-PASS LINE.

- 1) Turn ignition switch to OFF.
- 2) Remove idle air control solenoid valve from throttle body. <Ref. to 2-7 [W12A2].>
- 3) Remove throttle body from intake manifold. <Ref. to 2-7 [W3A2].>
- 4) Confirm that there is no foreign matter stuck in the air by-pass line.
- 5) Using an air gun, force air into idle air control solenoid valve installation area. Confirm that forced air subsequently escapes from throttle body interior.

CHECK : ***Does air flow out?***

YES : Replace idle air control solenoid valve. <Ref. to 2-7 [W12A2].>

NO : Replace throttle body. <Ref. to 2-7 [W3A2].>

AU: DTC P0507 — IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED**• DTC DETECTING CONDITION:**

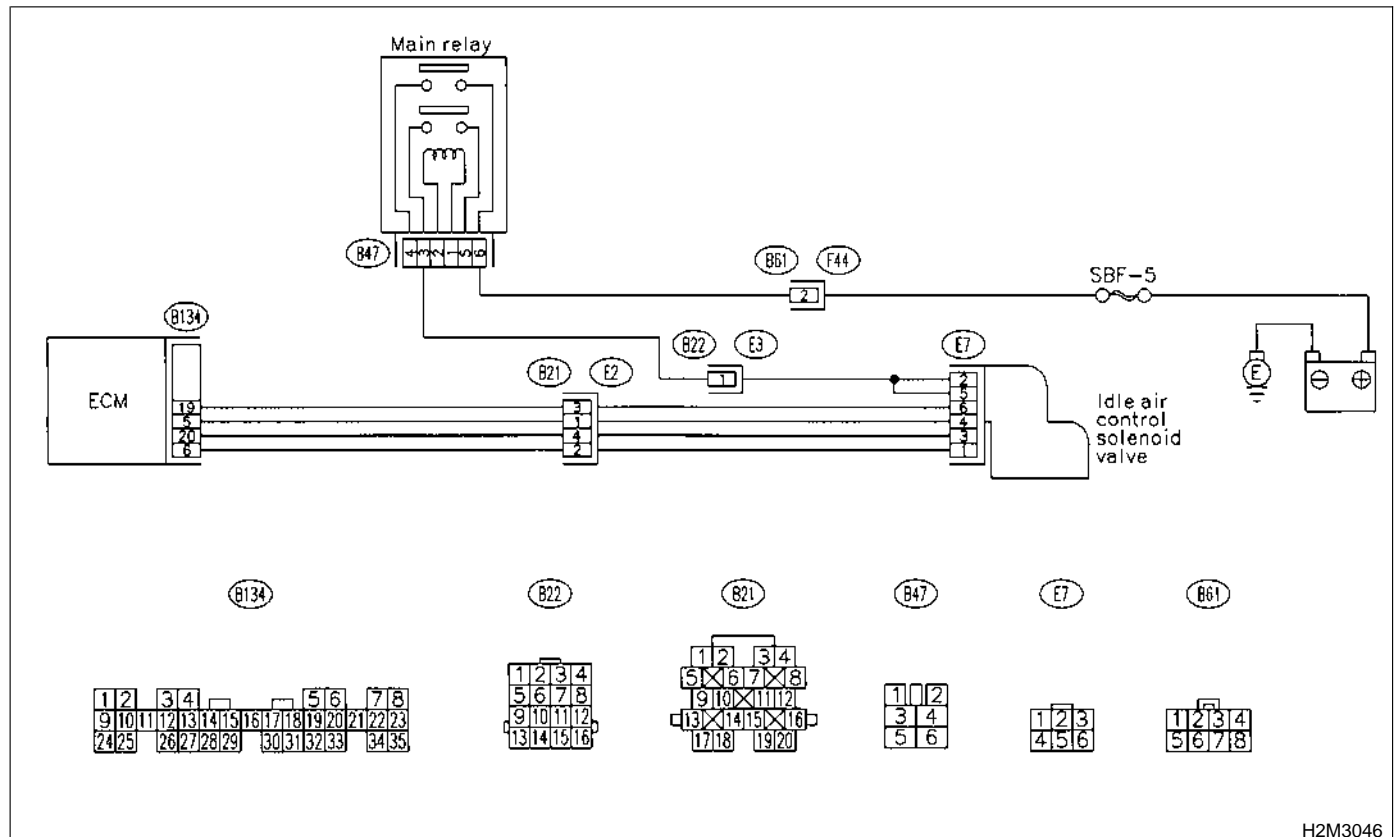
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Engine keeps running at higher revolution than specified idling revolution.

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

H2M3046

11AU1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1510, P1511, P1512, P1513, P1514, P1515, P1516 or P1517?***

YES : Inspect DTC P1510, P1511, P1512, P1513, P1514, P1515, P1516 or P1517 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NOTE:

In this case, it is not necessary to inspect DTC P0507.

NO : Go to step **11AU2**.

11AU2 : CHECK AIR INTAKE SYSTEM.

- 1) Turn ignition switch to ON.
- 2) Start engine, and idle it.
- 3) Check the following items.
 - Loose installation of intake manifold, idle air control solenoid valve and throttle body
 - Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket
 - Disconnections of vacuum hoses

CHECK : ***Is there a fault in air intake system?***

YES : Repair air suction and leaks.

NO : Go to step **11AU3**.

11AU3 : CHECK AIR BY-PASS LINE.

- 1) Turn ignition switch to OFF.
- 2) Remove idle air control solenoid valve from throttle body. <Ref. to 2-7 [W12A2].>
- 3) Confirm that there are no foreign particles in by-pass air line.

CHECK : ***Are foreign particles in by-pass air line?***

YES : Remove foreign particles from by-pass air line.

NO : Replace idle air control solenoid valve. <Ref. to 2-7 [W12A2].>

AV: DTC P0601 — INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

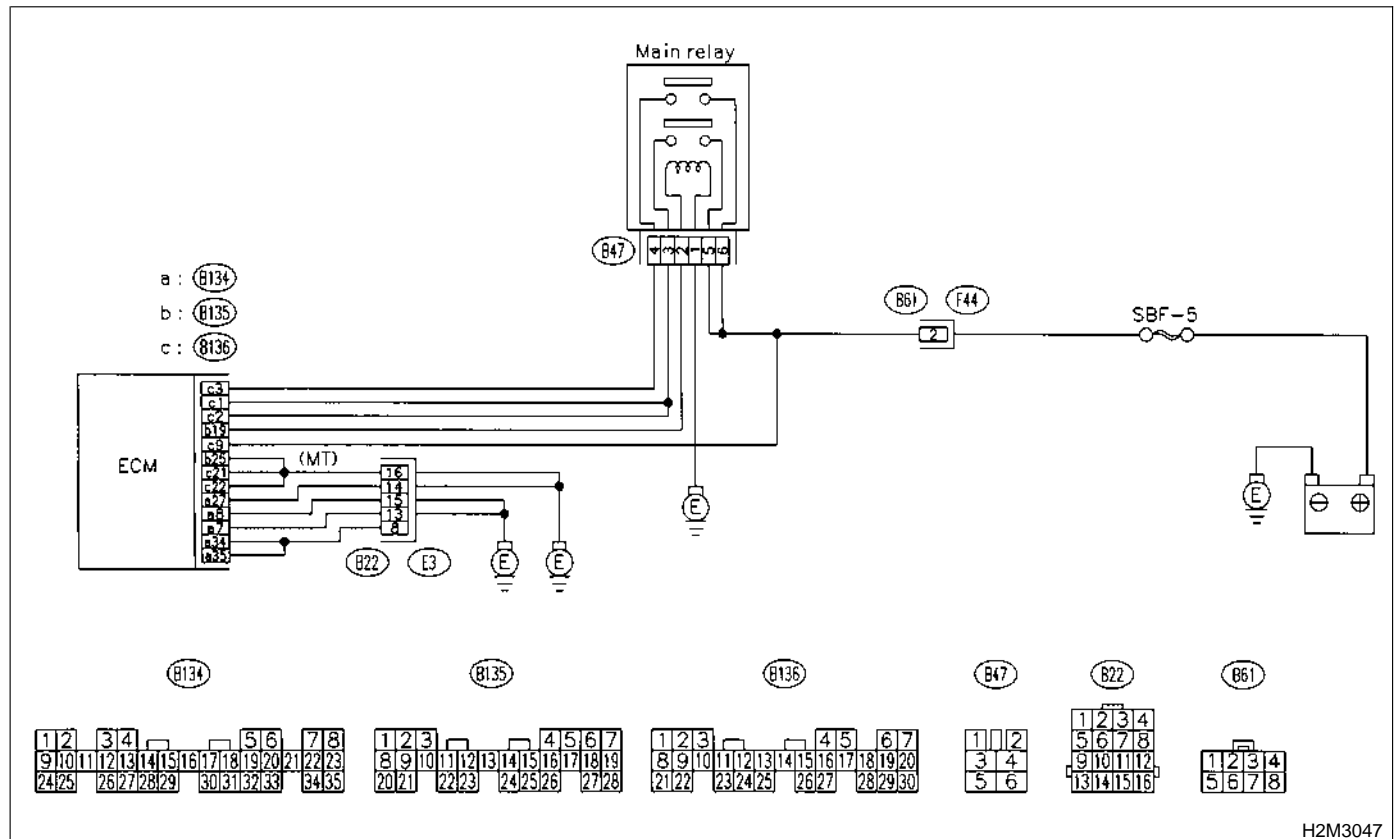
• TROUBLE SYMPTOM:

- Engine does not start.
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



11AV1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0601?

YES : Replace ECM. <Ref. to 2-7 [W15A0].>

NO : It is not necessary to inspect DTC P0601.

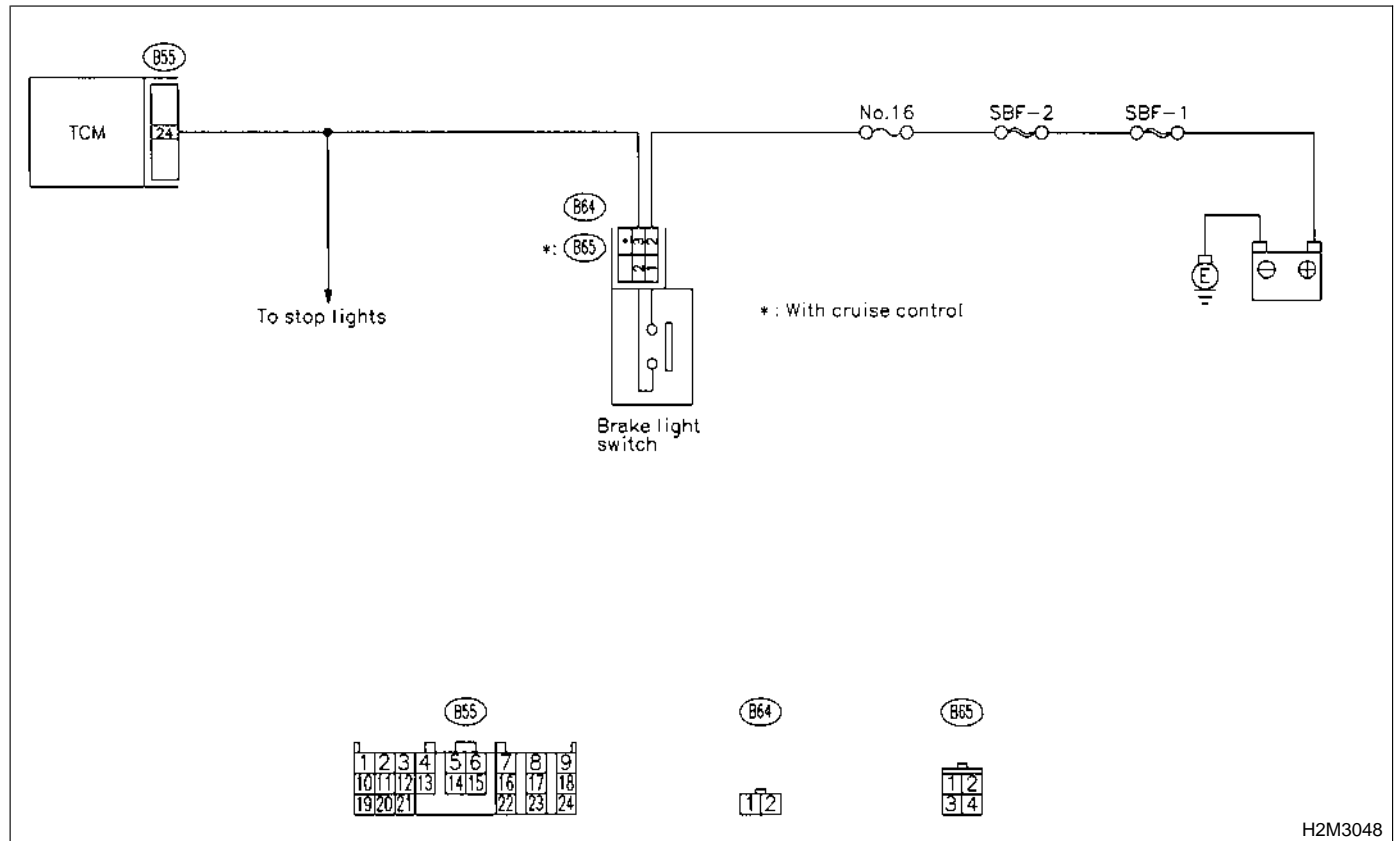
MEMO:

AW: DTC P0703 — BRAKE SWITCH INPUT MALFUNCTION —● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

● **WIRING DIAGRAM:**

H2M3048

11AW1 : CHECK OPERATION OF BRAKE LIGHT.

- CHECK** : Does brake light come on when depressing the brake pedal?
- YES** : Go to step 11AW2.
- NO** : Repair or replace brake light circuit.

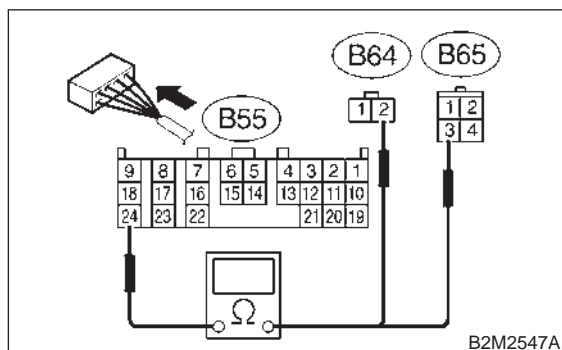
11AW2 : CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.

- 1) Disconnect connectors from TCM and brake light switch.
- 2) Measure resistance of harness between TCM and brake light switch connector.

Connector & terminal

(B55) No. 24 — (B64) No. 2:

(B55) No. 24 — (B65) No. 3 (With cruise control):



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 11AW3.

NO : Repair or replace harness and connector.

NOTE:

In this case, repair the following:

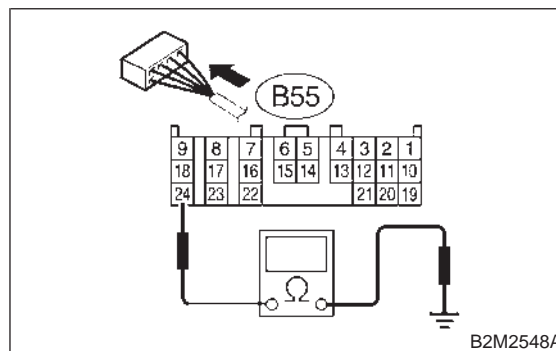
- Open circuit in harness between TCM and brake light switch connector
- Poor contact in TCM connector
- Poor contact in brake light switch connector

11AW3 : CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B55) No. 24 — Chassis ground:



CHECK : Is the resistance more than 1 $M\Omega$?

YES : Go to step 11AW4.

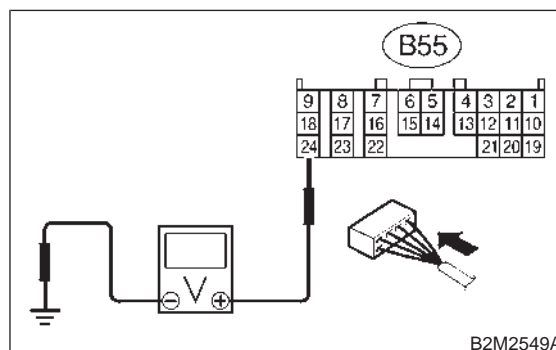
NO : Repair ground short circuit in harness between TCM and brake light switch connector.

11AW4 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect connectors to TCM and brake light switch.
- 2) Measure voltage between TCM and chassis ground.

Connector & terminal

(B55) No. 24 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V when releasing the brake pedal?

YES : Go to step 11AW5.

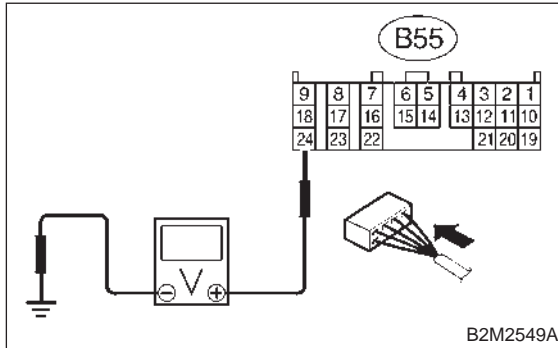
NO : Adjust or replace brake light switch.
<Ref. to 4-5 [W1A0].>

11AW5 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal

(B55) No. 24 (+) — Chassis ground (-):



- CHECK** : ***Is the voltage more than 10 V when depressing the brake pedal?***
- YES** : Go to step 11AW6.
- NO** : Adjust or replace brake light switch.
<Ref. to 4-5 [W1A0].>

11AW6 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : ***Is there poor contact in TCM connector?***
- YES** : Repair poor contact in TCM connector.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

MEMO:

AX: DTC P0705 — TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

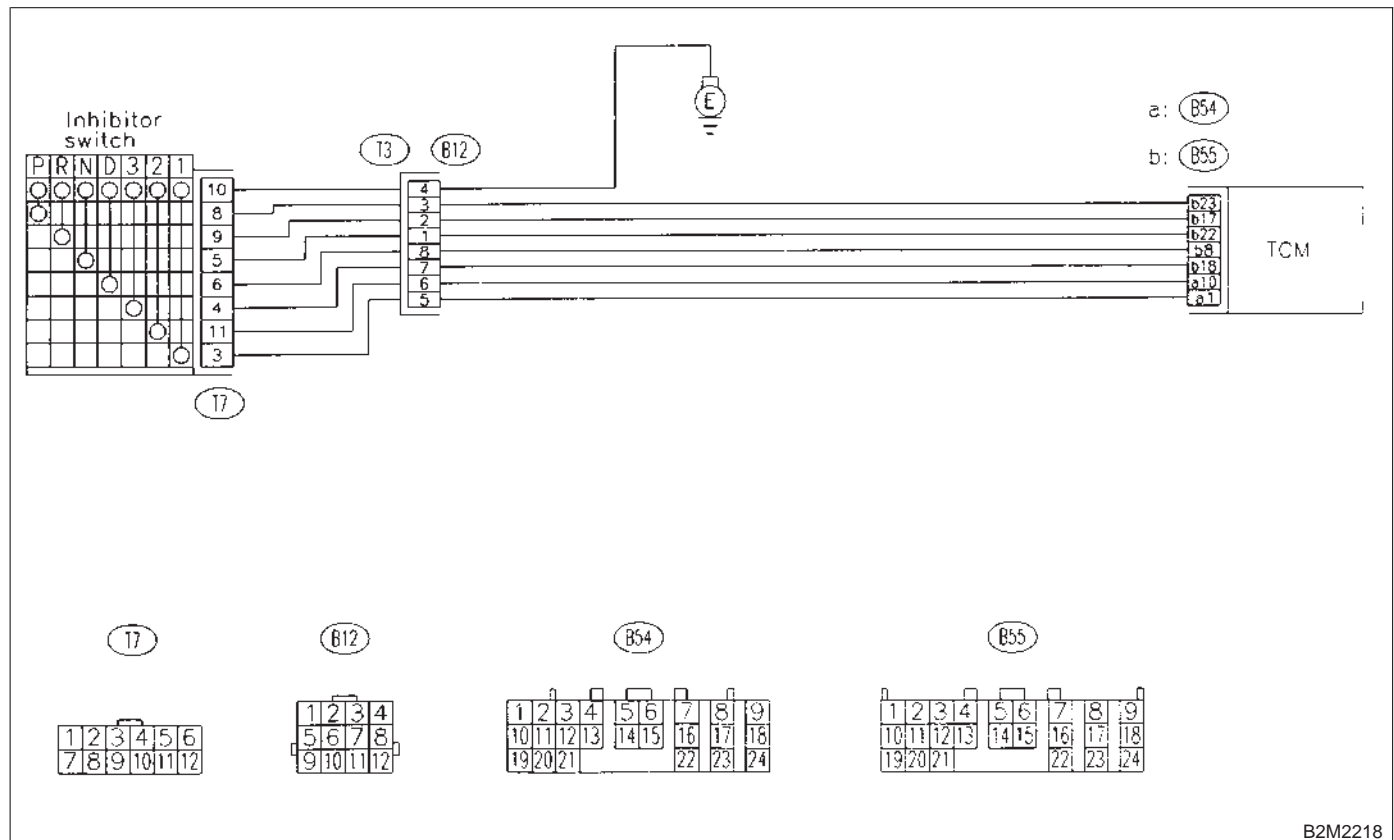
• TROUBLE SYMPTOM:

- Starter does not rotate when selector lever is in "P" or "N" range.
- Starter rotates when selector lever is in "R", "D", "3", "2" or "1" range.
- Engine brake is not effected when selector lever is in "3" range.
- Shift characteristics are erroneous.

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

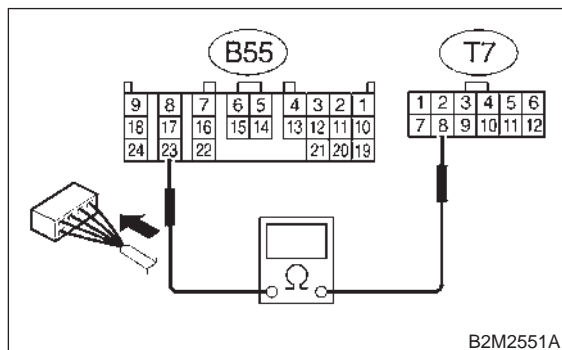
• WIRING DIAGRAM:



B2M2218

11AX1 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from TCM and transmission.
- 3) Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal
(B55) No. 23 — (T7) No. 8:

CHECK : **Is the resistance less than 1 Ω?**
YES : Go to step 11AX2.

NO : Repair harness and connector.

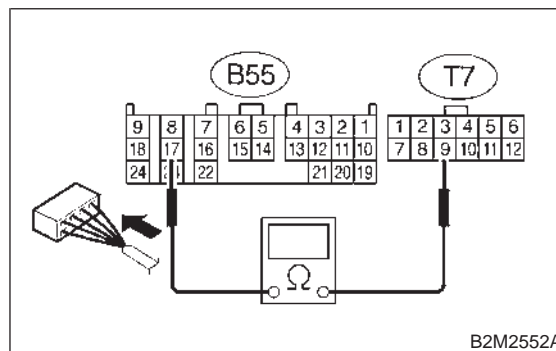
NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and inhibitor switch connector
- Poor contact in coupling connector (B12)

11AX2 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal
(B55) No. 17 — (T7) No. 9:

CHECK : **Is the resistance less than 1 Ω?**
YES : Go to step 11AX3.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

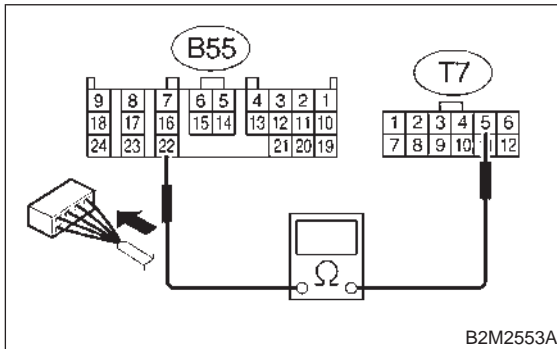
- Open circuit in harness between ECM and inhibitor switch connector
- Poor contact in coupling connector (B12)

11AX3 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal

(B55) No. 22 — (T7) No. 5:



- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 11AX4.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

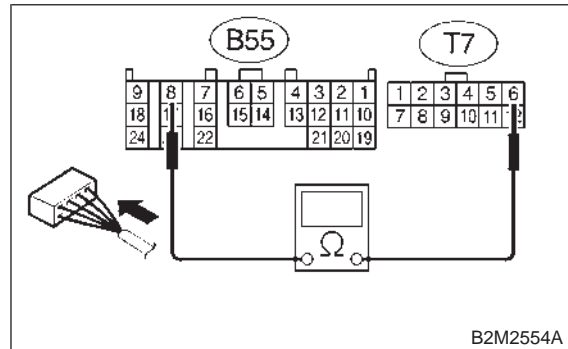
- Open circuit in harness between ECM and inhibitor switch connector.
- Poor contact in coupling connector (B12)

11AX4 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal

(B55) No. 8 — (T7) No. 6:



- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 11AX5.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

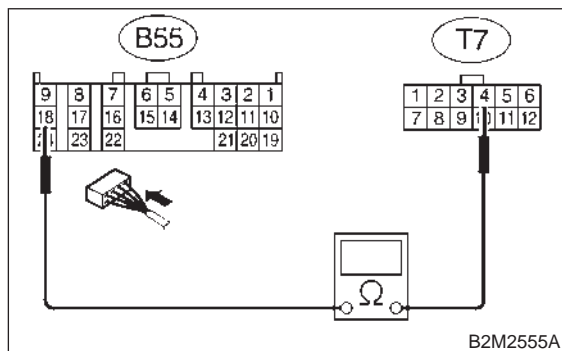
- Open circuit in harness between ECM and inhibitor switch connector.
- Poor contact in coupling connector (B12)

11AX5 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal

(B55) No. 18 — (T7) No. 4:



CHECK : **Is the resistance less than 1 Ω?**

YES : Go to step 11AX6.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

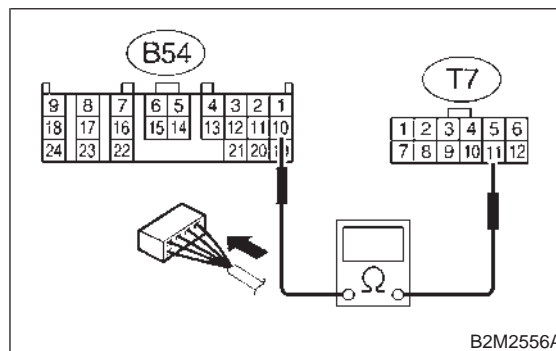
- Open circuit in harness between ECM and inhibitor switch connector.
- Poor contact in coupling connector (B12)

11AX6 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal

(B54) No. 10 — (T7) No. 11:



CHECK : **Is the resistance less than 1 Ω?**

YES : Go to step 11AX7.

NO : Repair harness and connector.

NOTE:

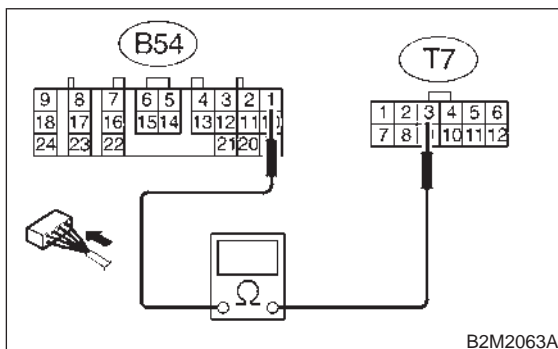
In this case, repair the following:

- Open circuit in harness between ECM and inhibitor switch connector.
- Poor contact in coupling connector (B12)

11AX7 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal
(B54) No. 1 — (T7) No. 3:



- CHECK** : Is the resistance less than 1 Ω ?
YES : Go to step 11AX8.
NO : Repair harness and connector.

NOTE:

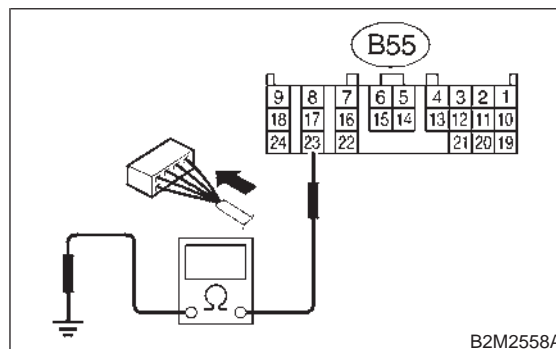
In this case, repair the following:

- Open circuit in harness between ECM and inhibitor switch connector.
- Poor contact in coupling connector (B12)

11AX8 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 23 — Chassis ground:

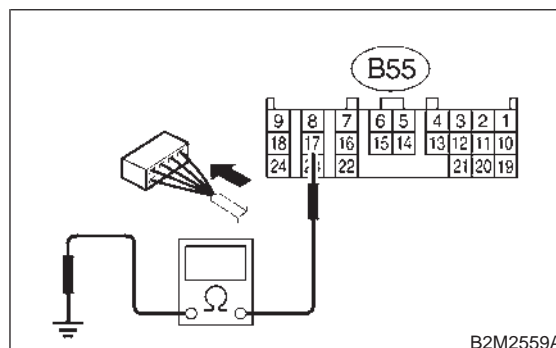


- CHECK** : Is the resistance more than 1 $M\Omega$?
YES : Go to step 11AX9.
NO : Repair ground short circuit in harness between TCM and transmission harness connector.

11AX9 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 17 — Chassis ground:

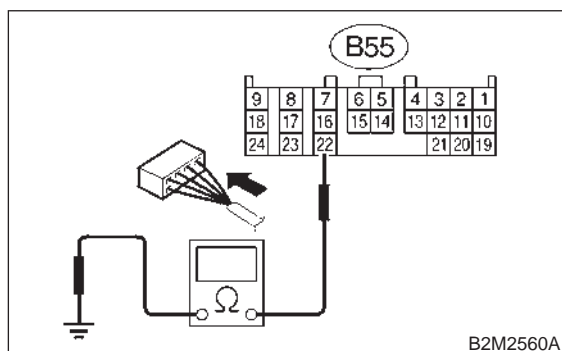


- CHECK** : Is the resistance more than 1 $M\Omega$?
YES : Go to step 11AX10.
NO : Repair ground short circuit in harness between TCM and transmission harness connector.

11AX10 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 22 — Chassis ground:

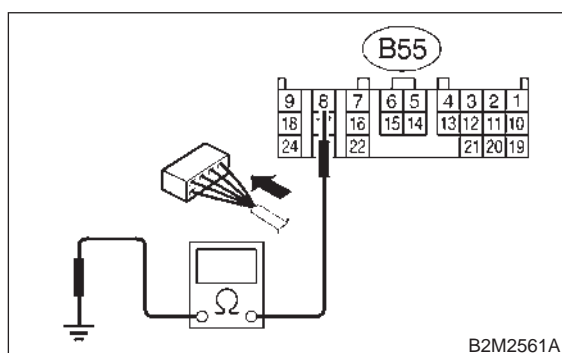


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 11AX11.
- NO** : Repair ground short circuit in harness between TCM and transmission harness connector.

11AX11 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 8 — Chassis ground:

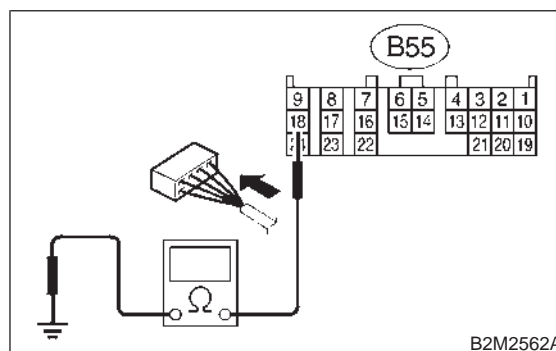


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 11AX12.
- NO** : Repair ground short circuit in harness between TCM and transmission harness connector.

11AX12 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 18 — Chassis ground:

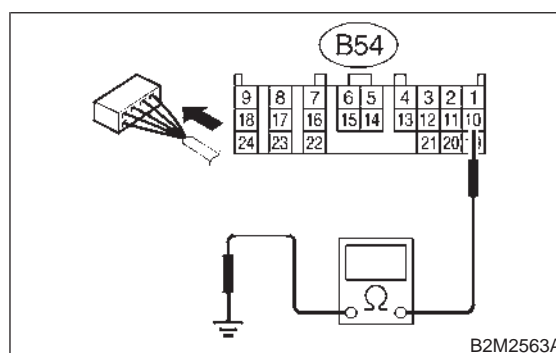


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 11AX13.
- NO** : Repair ground short circuit in harness between TCM and transmission harness connector.

11AX13 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B54) No. 10 — Chassis ground:

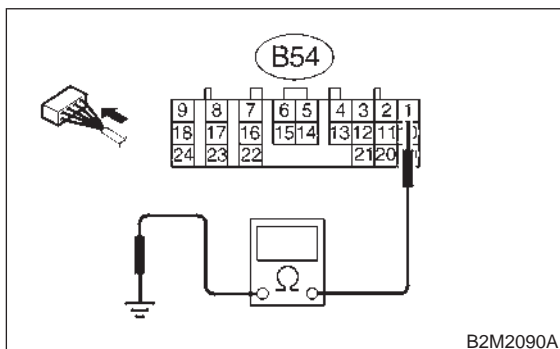


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 11AX14.
- NO** : Repair ground short circuit in harness between TCM and transmission harness connector.

11AX14 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B54) No. 1 — Chassis ground:

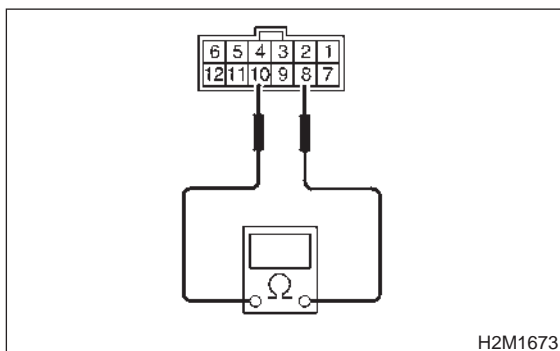


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 11AX15.
- NO** : Repair ground short circuit in harness between TCM and transmission harness connector.

11AX15 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever "P" position.

Terminals
No. 8 — No. 10:

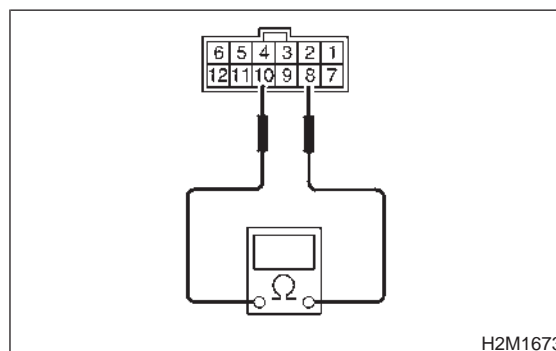


- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 11AX16.
- NO** : Go to step 11AX29.

11AX16 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "P" position.

Terminals
No. 8 — No. 10:

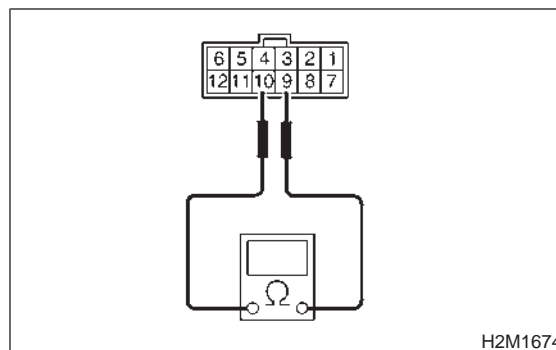


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 11AX17.
- NO** : Go to step 11AX29.

11AX17 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever for "R" position.

Terminals
No. 9 — No. 10:



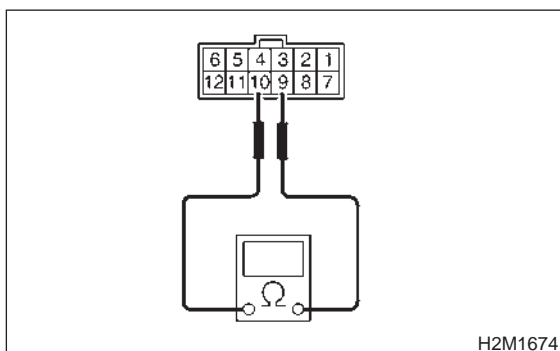
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 11AX18.
- NO** : Go to step 11AX29.

11AX18 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "R" position.

Terminals

No. 9 — No. 10:



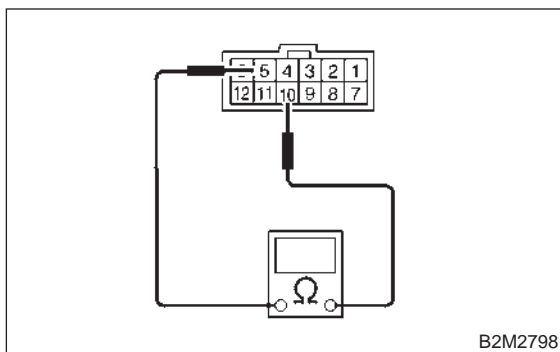
- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 11AX19.
- NO** : Go to step 11AX29.

11AX19 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever for "N" position.

Terminals

No. 5 — No. 10:



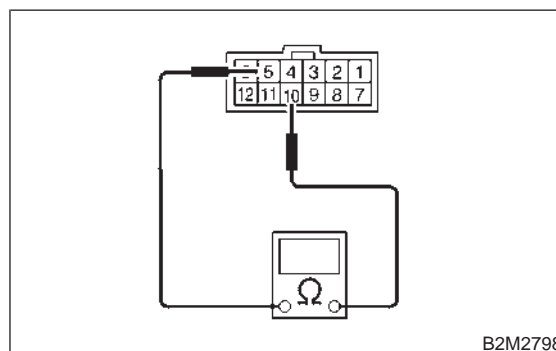
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 11AX20.
- NO** : Go to step 11AX29.

11AX20 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "N" position.

Terminals

No. 5 — No. 10:



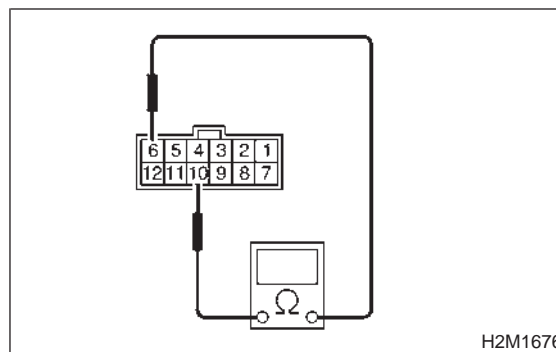
- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 11AX21.
- NO** : Go to step 11AX29.

11AX21 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "D" position.

Terminals

No. 6 — No. 10:



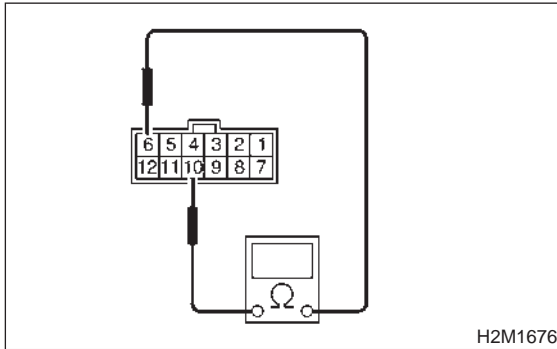
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 11AX22.
- NO** : Go to step 11AX29.

11AX22 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "D" position.

Terminals

No. 6 — No. 10:



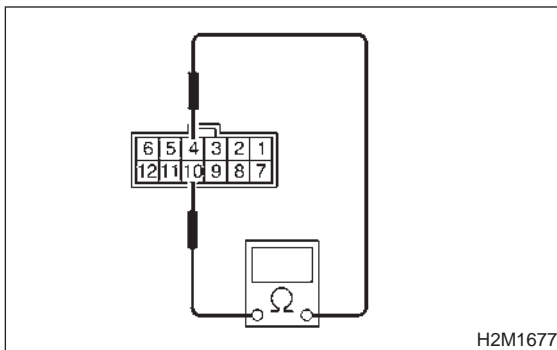
- CHECK** : Is the resistance more than 1 M Ω ?
- YES** : Go to step 11AX23.
- NO** : Go to step 11AX29.

11AX23 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever for "3" position.

Terminals

No. 4 — No. 10:



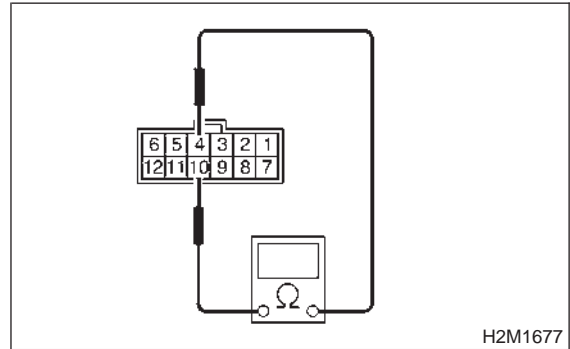
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 11AX24.
- NO** : Go to step 11AX29.

11AX24 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "3" position.

Terminals

No. 4 — No. 10:



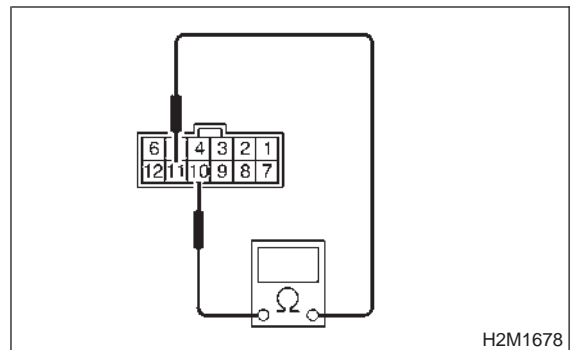
- CHECK** : Is the resistance more than 1 M Ω ?
- YES** : Go to step 11AX25.
- NO** : Go to step 11AX29.

11AX25 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "2" position.

Terminals

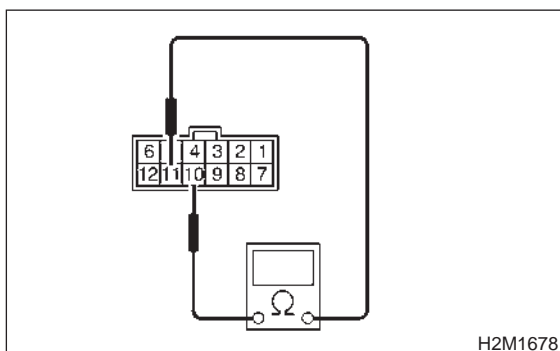
No. 11 — No. 10:



- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 11AX26.
- NO** : Go to step 11AX29.

11AX26 : CHECK INHIBITOR SWITCH.

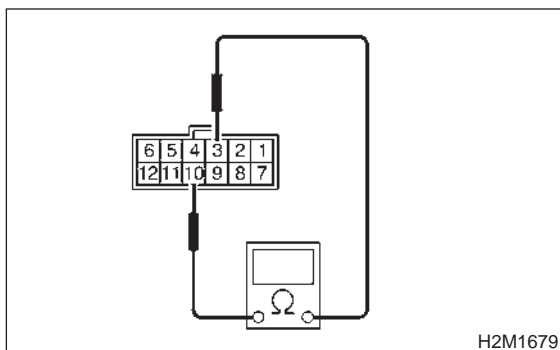
Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "R" position.

Terminals**No. 11 — No. 10:**

- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step 11AX27.
- NO** : Go to step 11AX29.

11AX27 : CHECK INHIBITOR SWITCH.

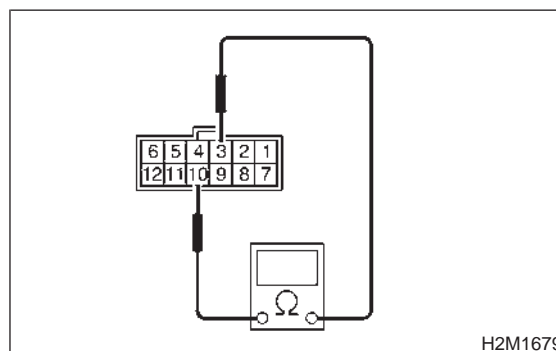
Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "1" position.

Terminals**No. 3 — No. 10:**

- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step 11AX28.
- NO** : Go to step 11AX29.

11AX28 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "1" position.

Terminals**No. 3 — No. 10:**

- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step 11AX30.
- NO** : Go to step 11AX29.

11AX29 : CHECK SELECTOR CABLE.

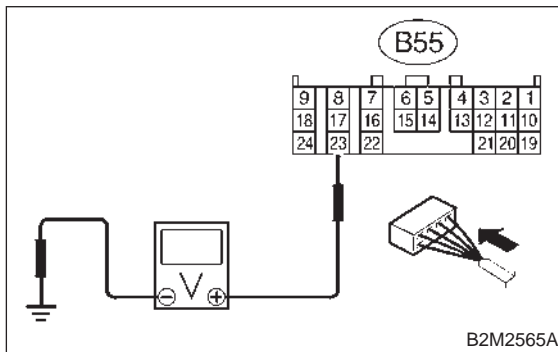
- CHECK** : *Is there faulty connection in the selector cable?*
- YES** : Repair connection of selector cable.
- NO** : Replace inhibitor switch. <Ref. to 3-2 [W2C0].>

11AX30 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to TCM and transmission.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal

(B55) No. 23 (+) — Chassis ground (-):



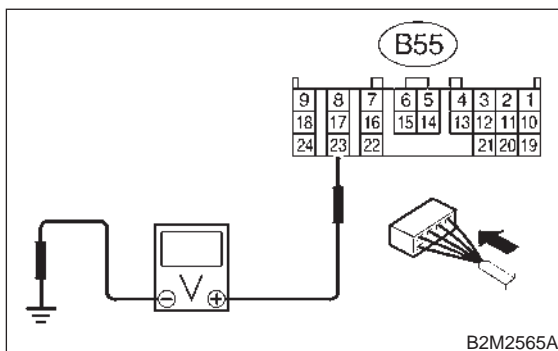
- CHECK** : Is the voltage less than 1 V?
- YES** : Go to step 11AX31.
- NO** : Go to step 11AX44.

11AX31 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever except for "P" and "N" positions.

Connector & terminal

(B55) No. 23 (+) — Chassis ground (-):



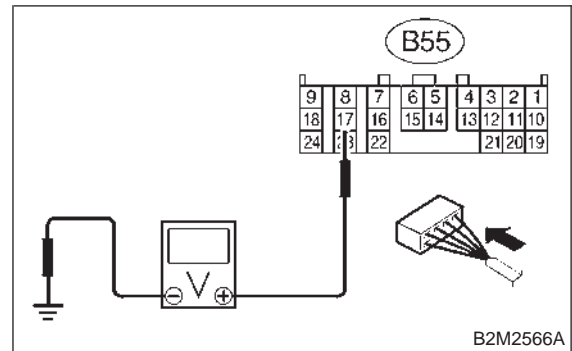
- CHECK** : Is the voltage more than 8 V?
- YES** : Go to step 11AX32.
- NO** : Go to step 11AX44.

11AX32 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever "R" position.

Connector & terminal

(B55) No. 17 (+) — Chassis ground (-):



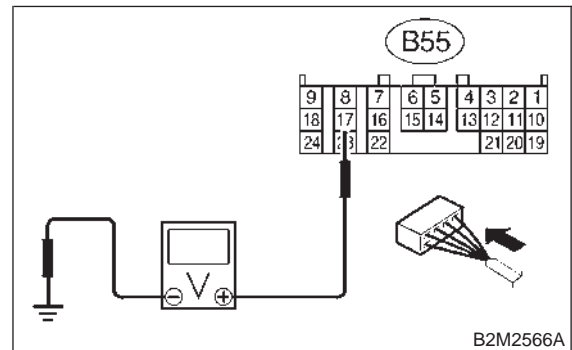
- CHECK** : Is the voltage less than 1 V?
- YES** : Go to step 11AX33.
- NO** : Go to step 11AX44.

11AX33 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever except for "R" position.

Connector & terminal

(B55) No. 17 (+) — Chassis ground (-):



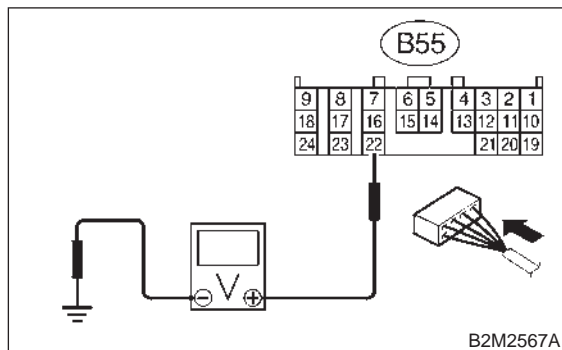
- CHECK** : Is the voltage more than 6 V?
- YES** : Go to step 11AX34.
- NO** : Go to step 11AX44.

11AX34 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever "P" and "N" positions.

Connector & terminal

(B55) No. 22 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step 11AX35.

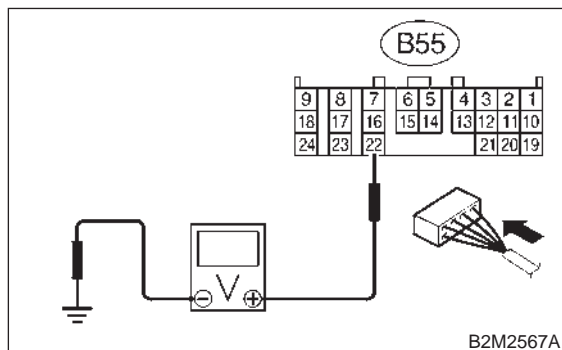
NO : Go to step 11AX44.

11AX35 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever except for "N" and "P" positions.

Connector & terminal

(B55) No. 22 (+) — Chassis ground (-):



CHECK : Is the voltage more than 8 V?

YES : Go to step 11AX36.

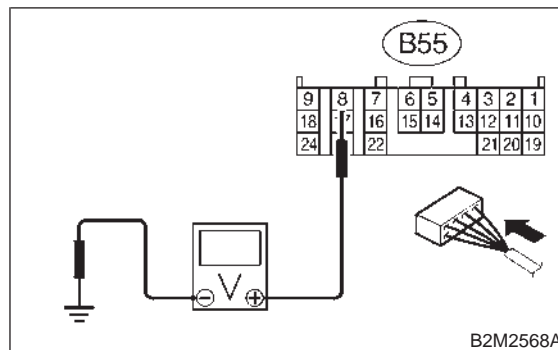
NO : Go to step 11AX44.

11AX36 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground in selector lever "D" position.

Connector & terminal

(B55) No. 8 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step 11AX37.

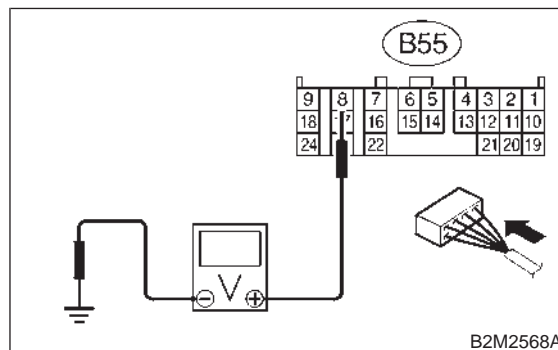
NO : Go to step 11AX44.

11AX37 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever except for "N" and "P" positions.

Connector & terminal

(B55) No. 8 (+) — Chassis ground (-):



CHECK : Is the voltage more than 6 V?

YES : Go to step 11AX38.

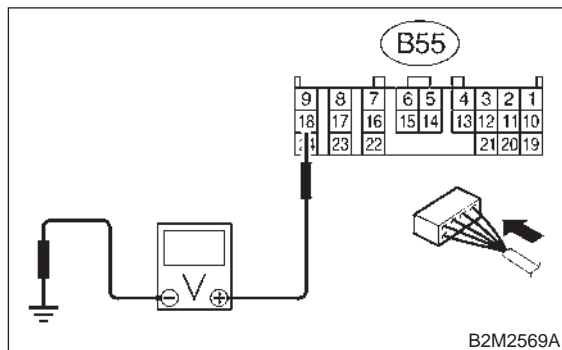
NO : Go to step 11AX44.

11AX38 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever "3" position.

Connector & terminal

(B55) No. 18 (+) — Chassis ground (-):



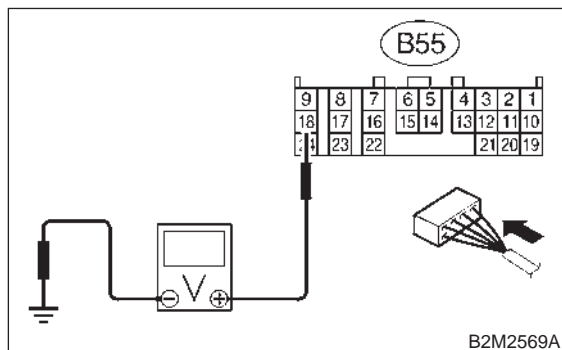
- CHECK** : Is the voltage less than 1 V?
- YES** : Go to step 11AX39.
- NO** : Go to step 11AX44.

11AX39 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground in selector lever except for "3" position.

Connector & terminal

(B55) No. 18 (+) — Chassis ground (-):



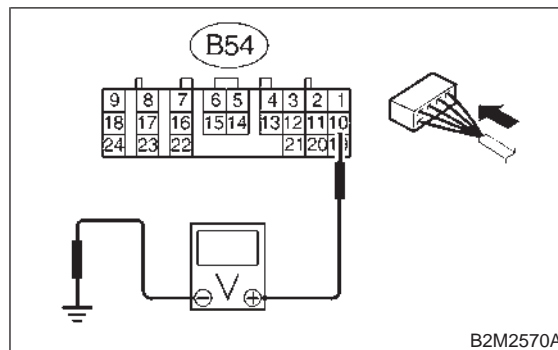
- CHECK** : Is the voltage more than 6 V?
- YES** : Go to step 11AX40.
- NO** : Go to step 11AX44.

11AX40 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever "2" position.

Connector & terminal

(B54) No. 10 (+) — Chassis ground (-):



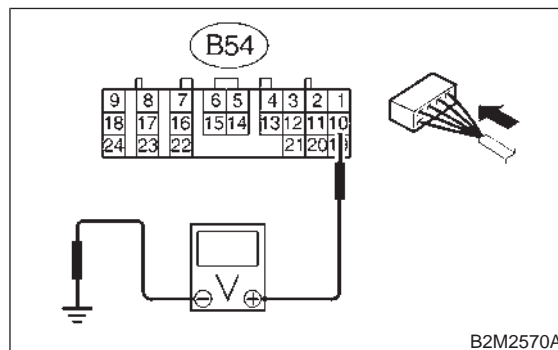
- CHECK** : Is the voltage less than 1 V?
- YES** : Go to step 11AX41.
- NO** : Go to step 11AX44.

11AX41 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground in selector lever except for "2" position.

Connector & terminal

(B54) No. 10 (+) — Chassis ground (-):



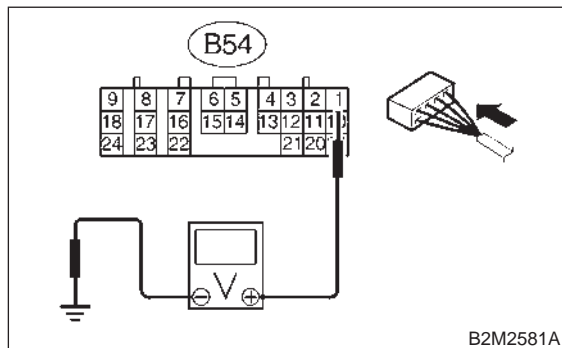
- CHECK** : Is the voltage more than 6 V?
- YES** : Go to step 11AX42.
- NO** : Go to step 11AX44.

11AX42 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever "1" position.

Connector & terminal

(B54) No. 1 (+) — Chassis ground (-):



CHECK : **Is the voltage less than 1 V?**

YES : Go to step 11AX43.

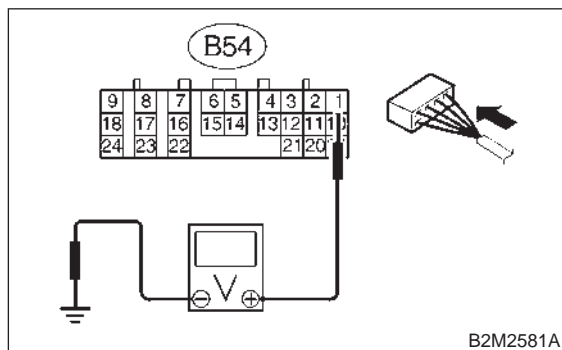
NO : Go to step 11AX44.

11AX43 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever except for "1" position.

Connector & terminal

(B54) No. 1 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 6 V?**

YES : Repair poor contact in TCM connector.

NO : Go to step 11AX44.

11AX44 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in TCM connector?**

YES : Repair poor contact in TCM connector.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

AY: DTC P0710 — TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT MALFUNCTION —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

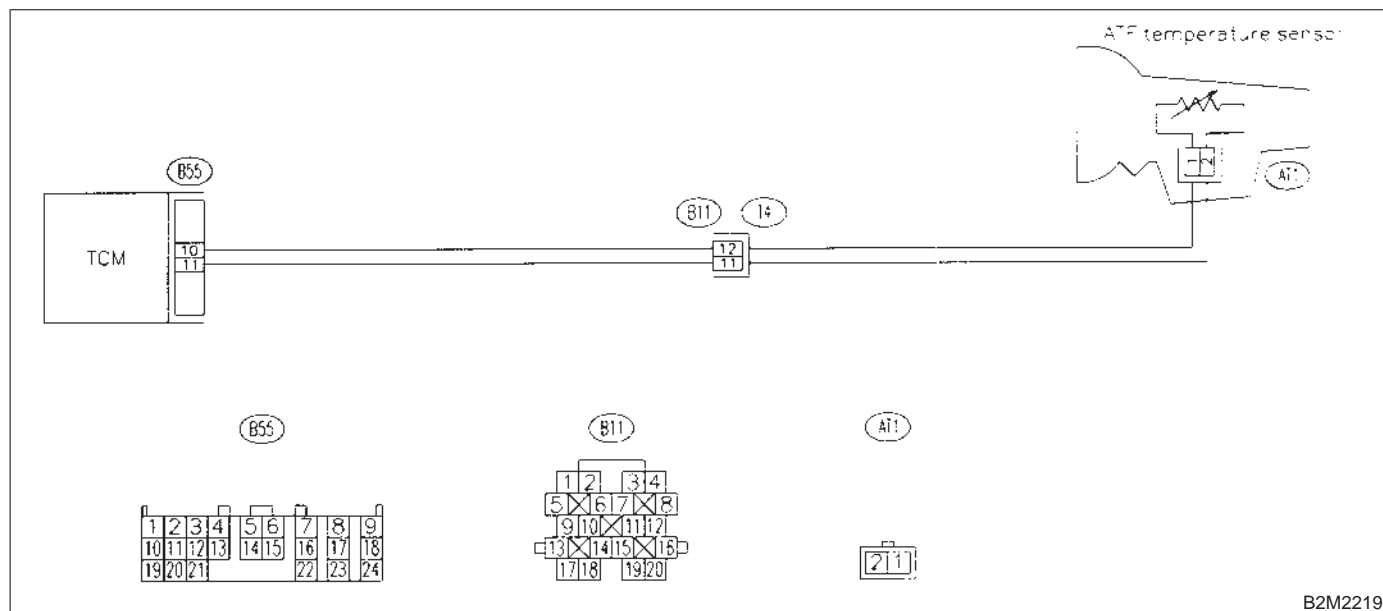
• TROUBLE SYMPTOM:

- No shift up to 4th speed (after engine warm-up)
- No lock-up (after engine warm-up)
- Excessive shift shock

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



B2M2219

11AY1 : CHECK DTC P0710 ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0710?

YES : Check ATF temperature sensor circuit.
<Ref. to 3-2 [T8E0].>

NO : It is not necessary to inspect DTC P0710.

AZ: DTC P0715 — TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT MALFUNCTION —

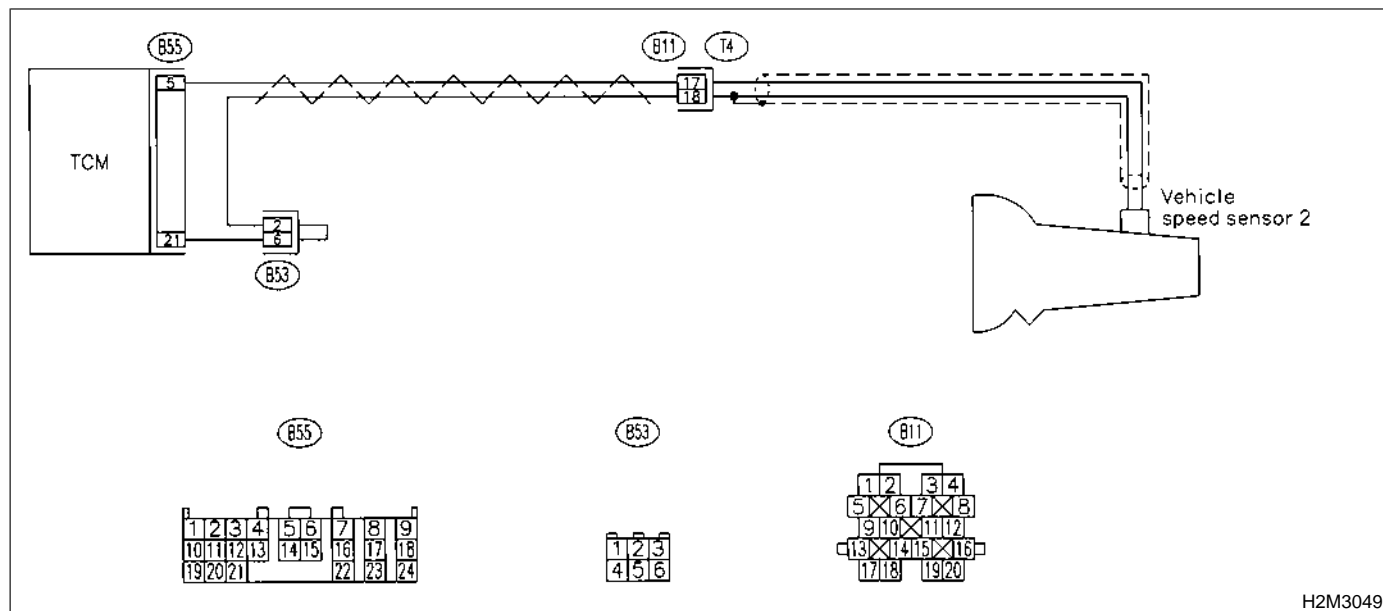
● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:



11AZ1 : CHECK DTC P0715 ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0715?

YES : Check torque converter turbine speed sensor circuit. <Ref. to 3-2 [T8H0].>

NO : It is not necessary to inspect DTC P0715.

BA: DTC P0720 — OUTPUT SPEED SENSOR (VEHICLE SPEED SENSOR 2) CIRCUIT MALFUNCTION —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

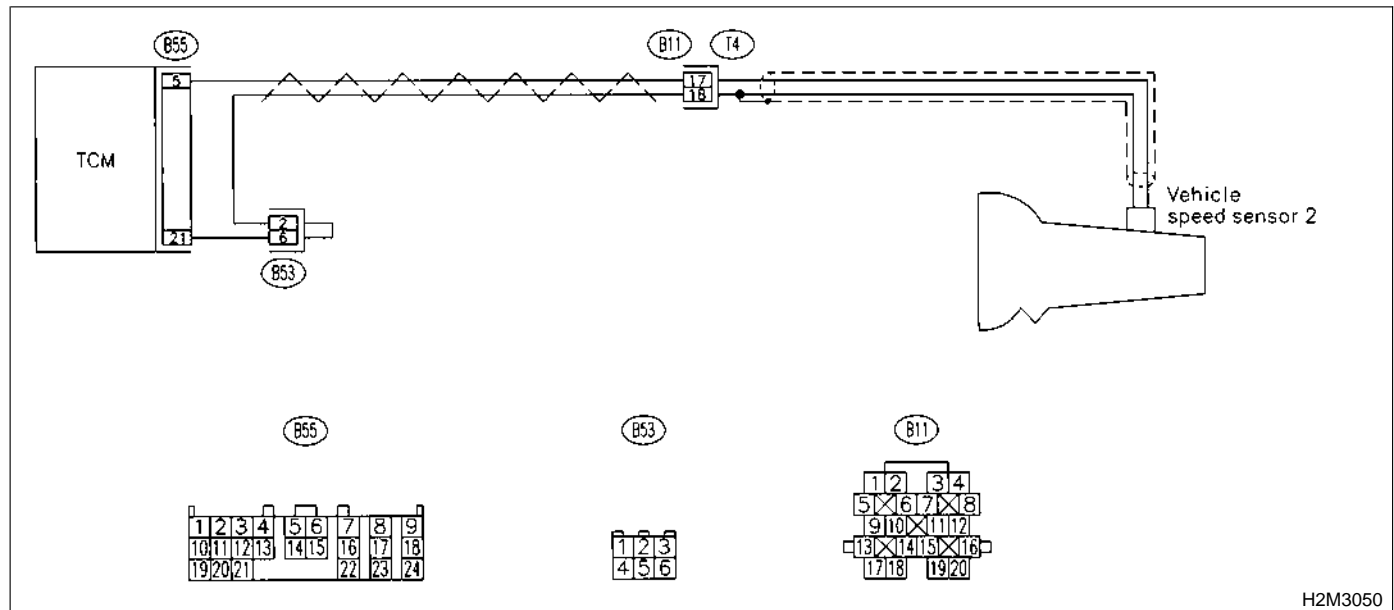
• TROUBLE SYMPTOM:

- No shift or excessive tight corner “braking”

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:



H2M3050

11BA1 : CHECK DTC P0720 ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0720?

YES : Check vehicle speed sensor 2 circuit.
<Ref. to 3-2 [T8G0].>

NO : It is not necessary to inspect DTC P0720.

BB: DTC P0725 — ENGINE SPEED INPUT CIRCUIT MALFUNCTION —**• DTC DETECTING CONDITION:**

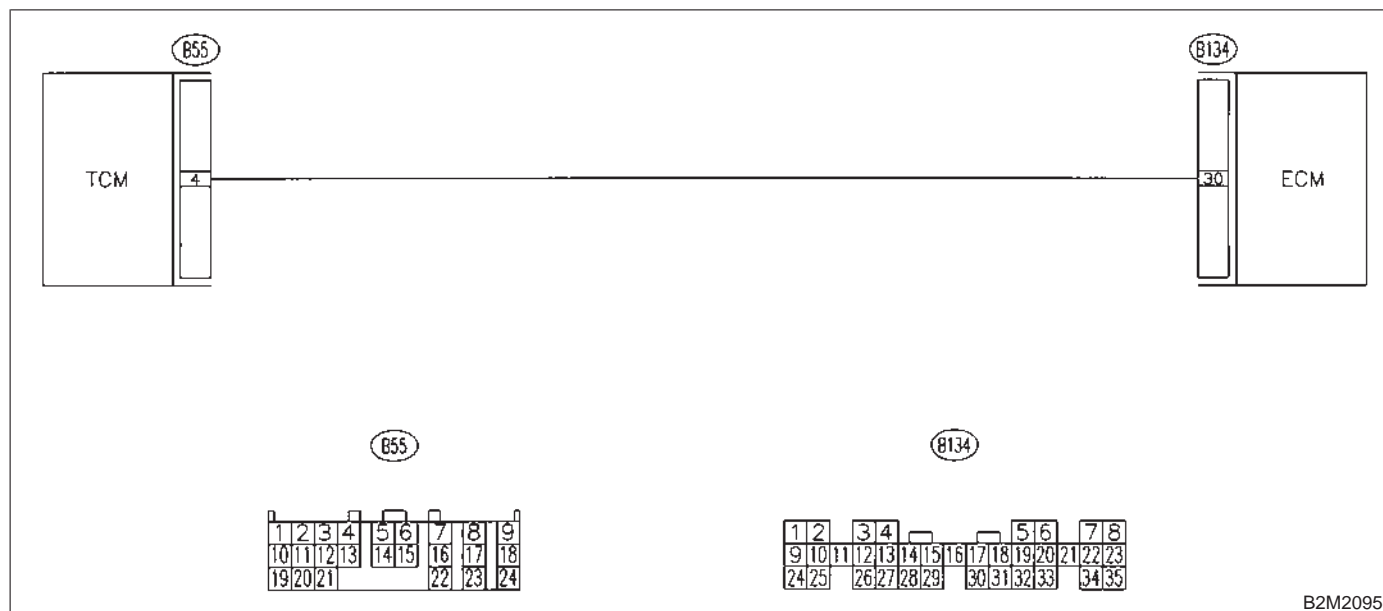
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- No lock-up (after engine warm-up)
- AT diagnostic indicator light (AT OIL TEMP indicator light) remains on when vehicle speed is "0".

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:**11BB1 : CHECK DTC P0725 ON DISPLAY.**

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0725?

YES : Check engine speed input signal circuit. <Ref. to 3-2 [T8C0].>

NO : It is not necessary to inspect DTC P0725.

BC: DTC P0731 — GEAR 1 INCORRECT RATIO —**NOTE:**

For the diagnostic procedure, refer to 2-7 [T11BF0]. <Ref. to 2-7 [T11BF0].>

BD: DTC P0732 — GEAR 2 INCORRECT RATIO —**NOTE:**

For the diagnostic procedure, refer to 2-7 [T11BF0]. <Ref. to 2-7 [T11BF0].>

BE: DTC P0733 — GEAR 3 INCORRECT RATIO —**NOTE:**

For the diagnostic procedure, refer to 2-7 [T11BF0]. <Ref. to 2-7 [T11BF0].>

BF: DTC P0734 — GEAR 4 INCORRECT RATIO —**● DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

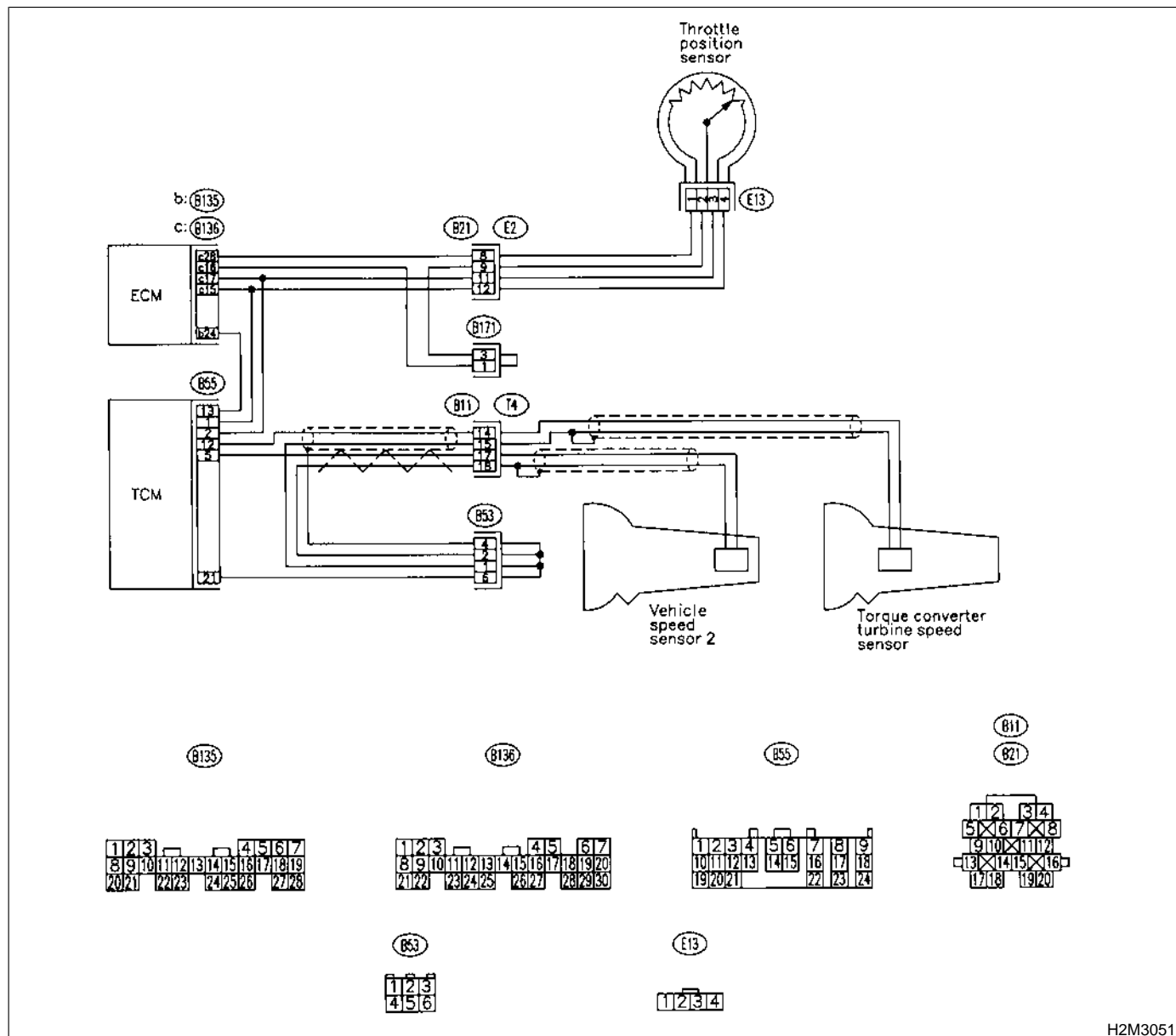
● TROUBLE SYMPTOM:

- Shift point too high or too low; engine brake not effected in “3” range; excessive shift shock; excessive tight corner “braking”

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

● WIRING DIAGRAM:



H2M3051

11BF1 : CHECK ANY OTHER DTC ON DISPLAY.

- CHECK** : *Is there any other DTC on display?*
- YES** : Inspect relevant DTC using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>
- NO** : Go to step **11BF2**.

11BF2 : CHECK THROTTLE POSITION SENSOR CIRCUIT.

Check throttle position sensor circuit. <Ref. to 3-2 [T8F0].>

- CHECK** : *Is there any trouble in throttle position sensor circuit?*
- YES** : Repair or replace throttle position sensor circuit.
- NO** : Go to step **11BF3**.

11BF3 : CHECK VEHICLE SPEED SENSOR 2 CIRCUIT.

Check vehicle speed sensor 2 circuit. <Ref. to 3-2 [T8G0].>

- CHECK** : *Is there any trouble in vehicle speed sensor 2 circuit?*
- YES** : Repair or replace vehicle speed sensor 2 circuit.
- NO** : Go to step **11BF4**.

11BF4 : CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT.

Check torque converter turbine speed sensor circuit. <Ref. to 3-2 [T8H0].>

- CHECK** : *Is there any trouble in torque converter turbine speed sensor circuit?*
- YES** : Repair or replace torque converter turbine speed sensor circuit.
- NO** : Go to step **11BF5**.

11BF5 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : *Is there poor contact in TCM connector?*
- YES** : Repair poor contact in TCM connector.
- NO** : Go to step **11BF6**.

11BF6 : CHECK MECHANICAL TROUBLE.

Check mechanical trouble in automatic transmission.

- CHECK** : *Is there any mechanical trouble in automatic transmission?*
- YES** : Repair or replace automatic transmission. <Ref. to 3-2 [T1000].>
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

MEMO:

BG: DTC P0740 — TORQUE CONVERTER CLUTCH SYSTEM MALFUNCTION

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

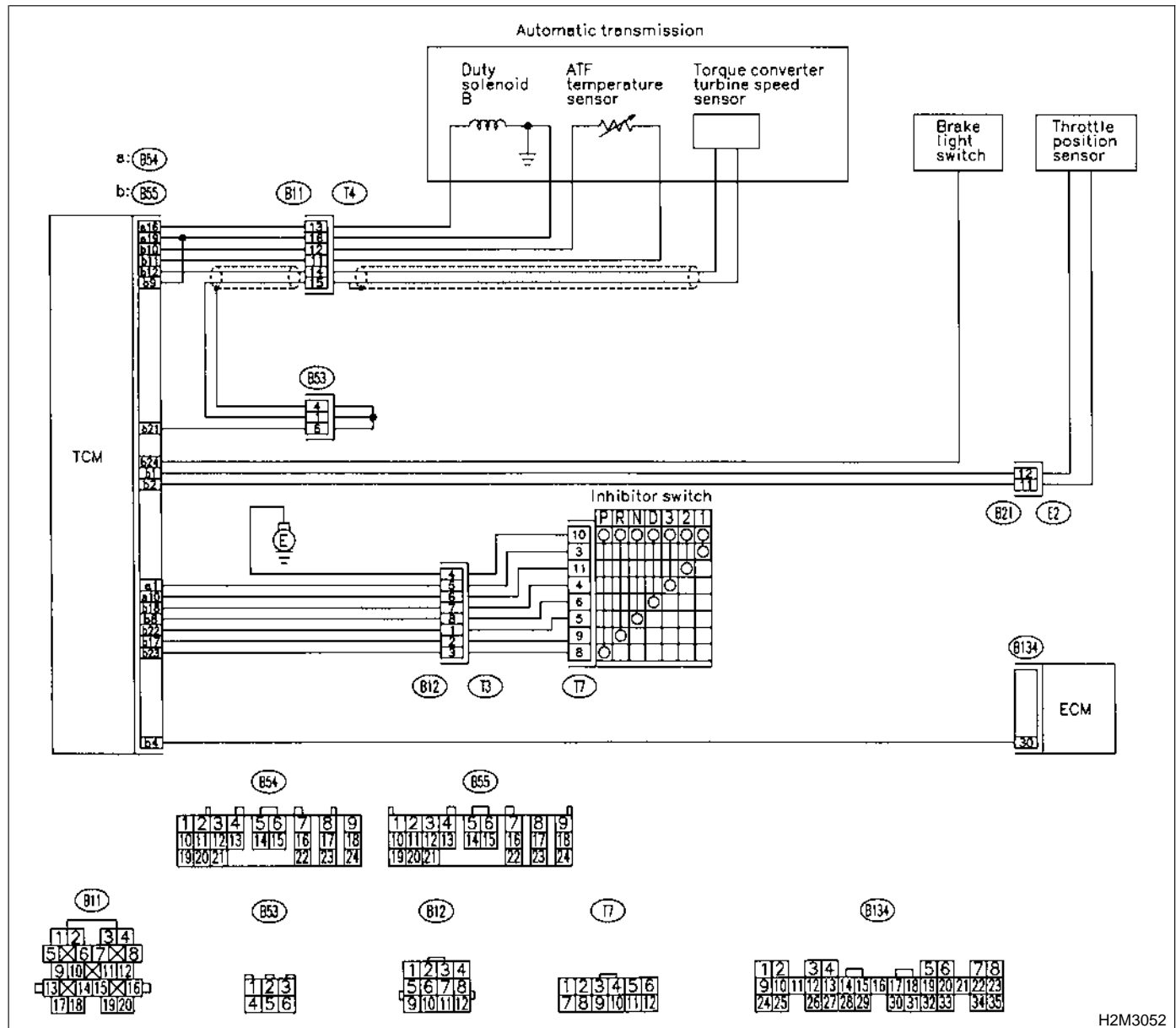
• TROUBLE SYMPTOM:

- No lock-up (after engine warm-up)
- No shift or excessive tight corner "braking"

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3052

11BG1 : CHECK ANY OTHER DTC ON DISPLAY.

- CHECK** : *Is there any other DTC on display?*
- YES** : Inspect the relevant DTC using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>
- NO** : Go to step 11BG2.

11BG2 : CHECK DUTY SOLENOID B CIRCUIT.

Check duty solenoid B circuit. <Ref. to 3-2 [T8Q0].>

- CHECK** : *Is there any trouble in duty solenoid B circuit?*
- YES** : Repair or replace duty solenoid B circuit.
- NO** : Go to step 11BG3.

11BG3 : CHECK THROTTLE POSITION SENSOR CIRCUIT.

Check throttle position sensor circuit. <Ref. to 3-2 [T8F0].>

- CHECK** : *Is there any trouble in throttle position sensor circuit?*
- YES** : Repair or replace throttle position sensor circuit.
- NO** : Go to step 11BG4.

11BG4 : CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT.

Check torque converter turbine speed sensor circuit. <Ref. to 3-2 [T8H0].>

- CHECK** : *Is there any trouble in torque converter turbine speed sensor circuit?*
- YES** : Repair or replace torque converter turbine speed sensor circuit.
- NO** : Go to step 11BG5.

11BG5 : CHECK INHIBITOR SWITCH CIRCUIT.

Check inhibitor switch circuit. <Ref. to 2-7 [T11AX0].>

- CHECK** : *Is there any trouble in inhibitor switch circuit?*
- YES** : Repair or replace inhibitor switch circuit.
- NO** : Go to step 11BG6.

11BG6 : CHECK BRAKE LIGHT SWITCH CIRCUIT.

Check brake light switch circuit. <Ref. to 2-7 [T11AW0].>

- CHECK** : *Is there any trouble in brake light switch circuit?*
- YES** : Repair or replace brake light switch circuit.
- NO** : Go to step 11BG7.

11BG7 : CHECK ATF TEMPERATURE SENSOR CIRCUIT.

Check ATF temperature sensor circuit. <Ref. to 3-2 [T8E0].>

- CHECK** : *Is there any trouble in ATF temperature sensor circuit?*
- YES** : Repair or replace ATF temperature sensor circuit.
- NO** : Go to step 11BG8.

11BG8 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : *Is there poor contact in TCM connector?*
- YES** : Repair poor contact in TCM connector.
- NO** : Go to step 11BG9.

11BG9 : CHECK MECHANICAL TROUBLE.

Check mechanical trouble in automatic transmission.

CHECK : *Is there any mechanical trouble in automatic transmission?*

YES : Repair or replace automatic transmission. <Ref. to 3-2 [T1000].>

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

BH: DTC P0743 — TORQUE CONVERTER CLUTCH SYSTEM (DUTY SOLENOID B) ELECTRICAL —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

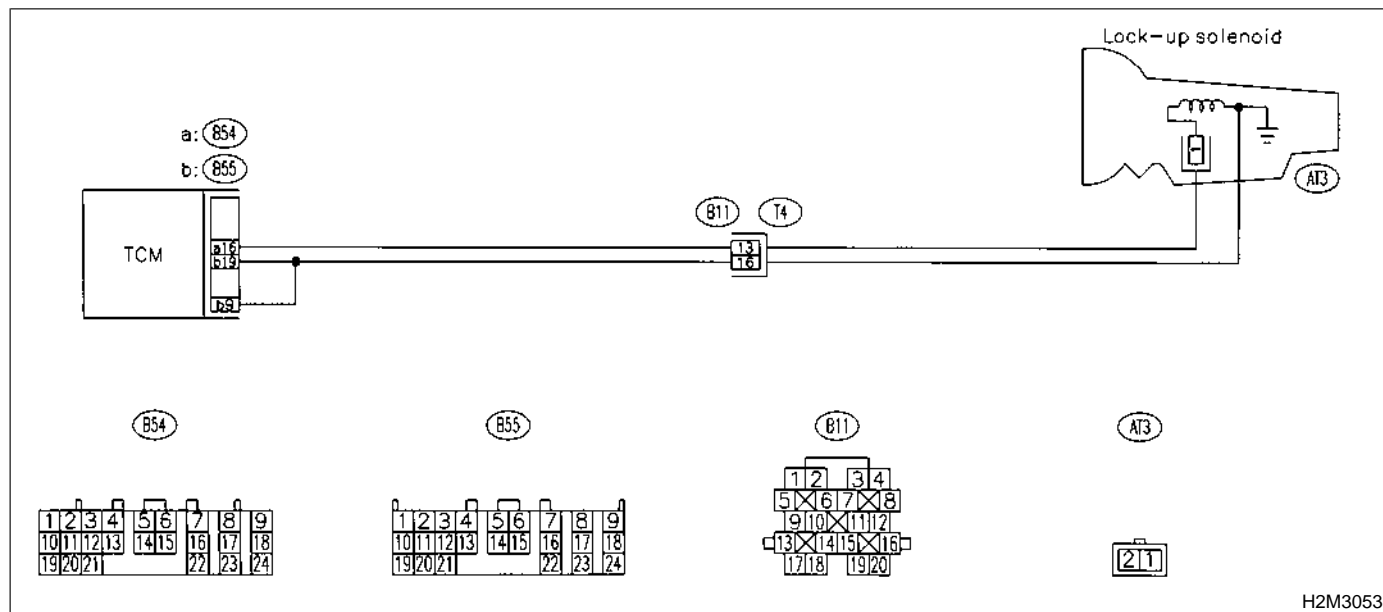
• TROUBLE SYMPTOM:

- No lock-up (after engine warm-up)

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:



11BH1 : CHECK DTC P0743 ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0743?

YES : Check duty solenoid B circuit. <Ref. to 3-2 [T8Q0].>

NO : It is not necessary to inspect DTC P0743.

BI: DTC P0748 — PRESSURE CONTROL SOLENOID (DUTY SOLENOID A) ELECTRICAL —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

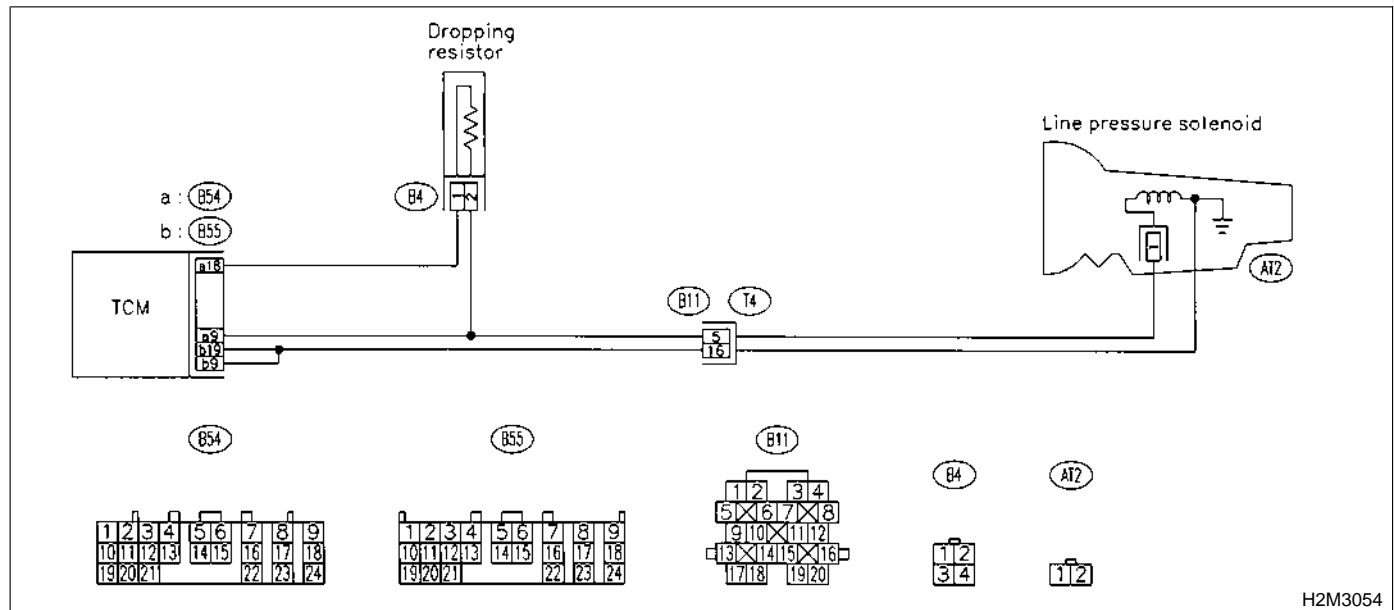
• TROUBLE SYMPTOM:

- Excessive shift shock

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



11B11 : CHECK DTC P0748 ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0748?

YES : Check duty solenoid A circuit. <Ref. to 3-2 [T8O0].>

NO : It is not necessary to inspect DTC P0748.

BJ: DTC P0753 — SHIFT SOLENOID A (SHIFT SOLENOID 1) ELECTRICAL —**• DTC DETECTING CONDITION:**

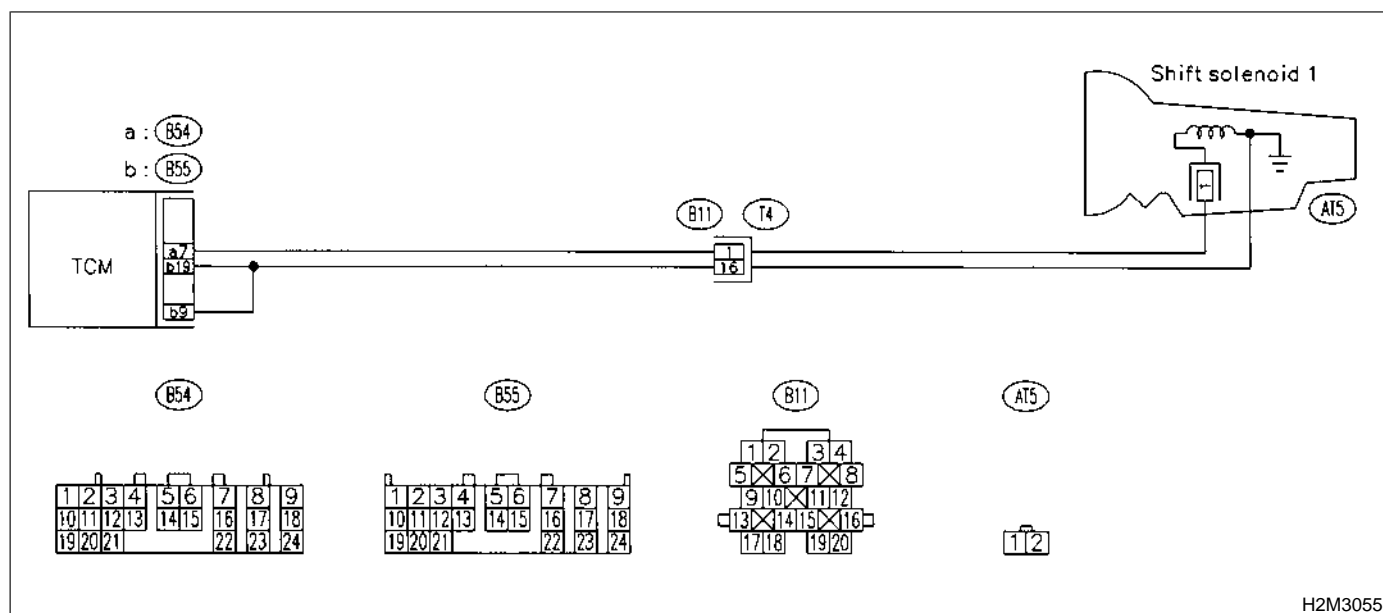
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- No shift

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3055

11BJ1 : CHECK DTC P0753 ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0753?

YES : Check shift solenoid 1 circuit. <Ref. to 3-2 [T8K0].>

NO : It is not necessary to inspect DTC P0753.

BK: DTC P0758 — SHIFT SOLENOID B (SHIFT SOLENOID 2) ELECTRICAL —**• DTC DETECTING CONDITION:**

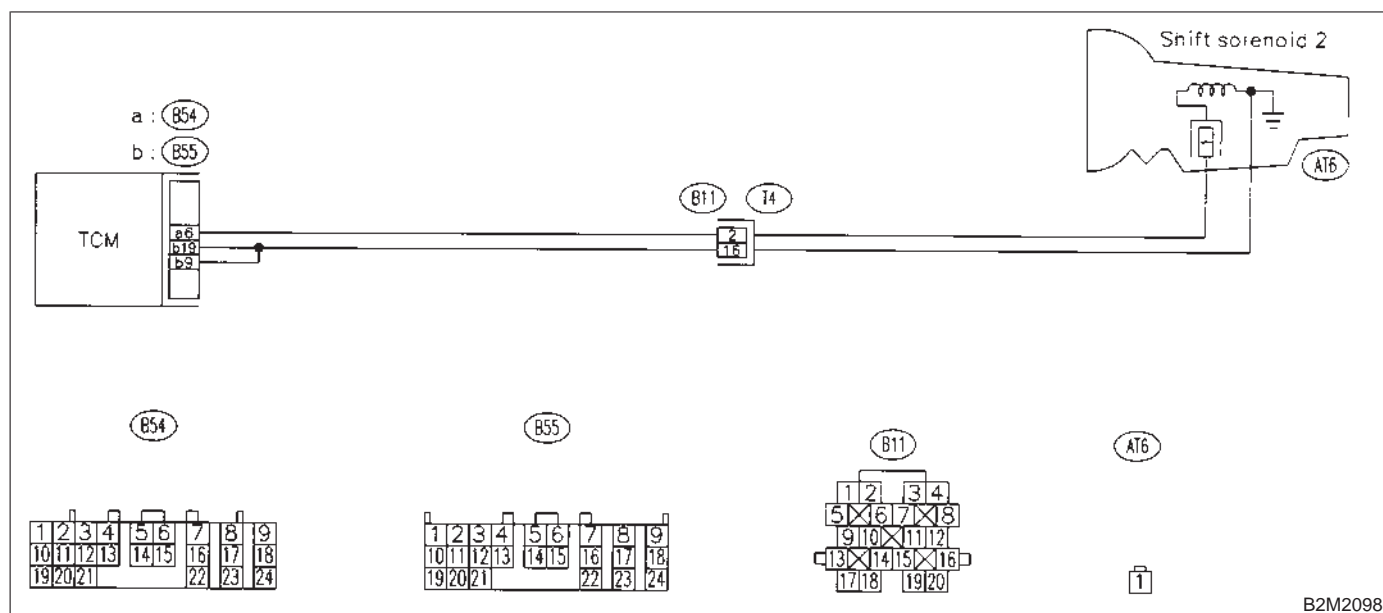
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- No shift

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

B2M2098

11BK1 : CHECK DTC P0758 ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0758?

YES : Check shift solenoid 2 circuit. <Ref. to 3-2 [T8L0].>

NO : It is not necessary to inspect DTC P0758.

BL: DTC P1100 — STARTER SWITCH CIRCUIT LOW INPUT —**• DTC DETECTING CONDITION:**

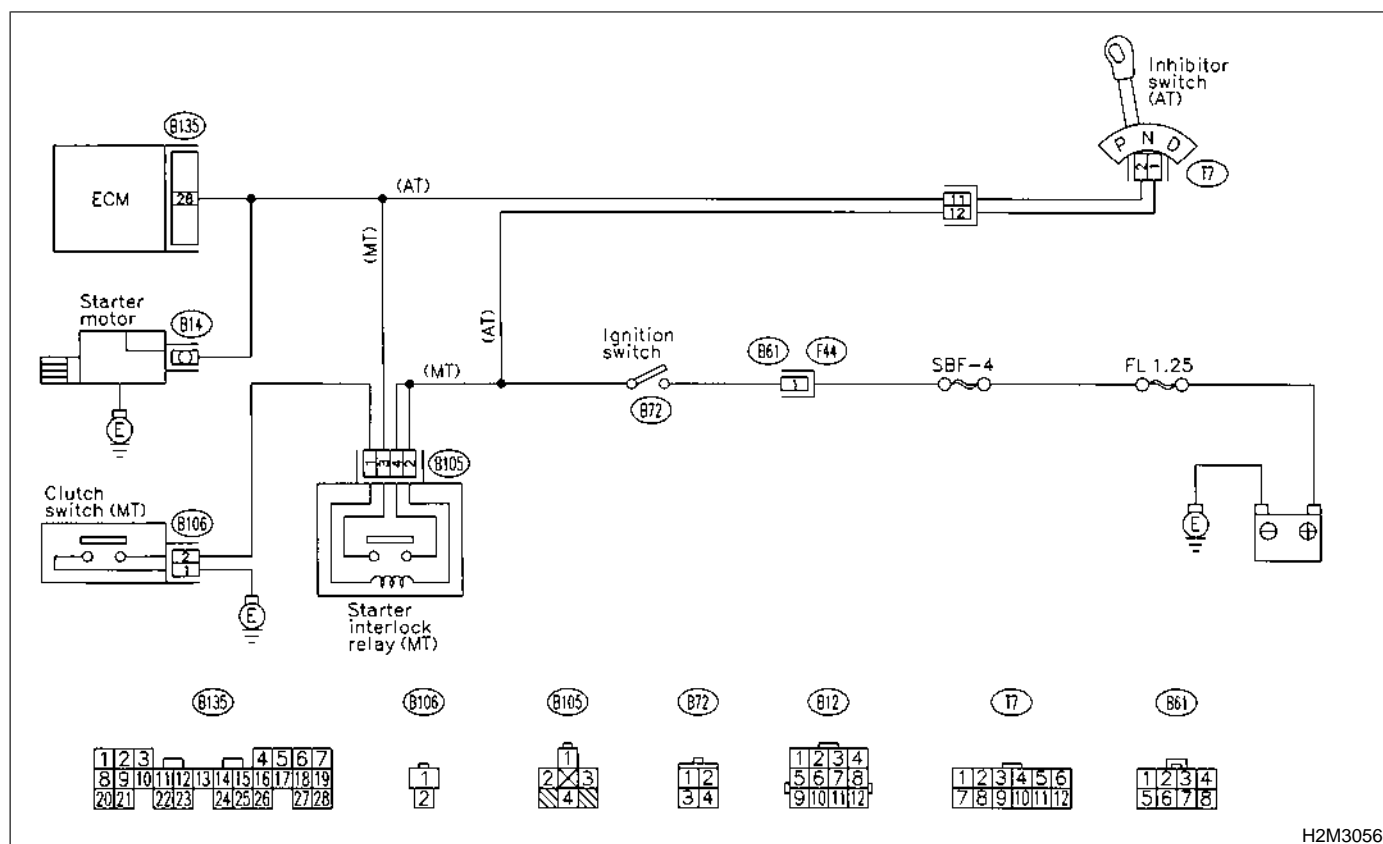
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3056

11BL1 : CHECK OPERATION OF STARTER MOTOR.**NOTE:**

- On AT vehicles, place the inhibitor switch in the "P" or "N" position.
- On MT vehicles, depress the clutch pedal.

CHECK : **Does starter motor operate when ignition switch to "ST"?**

YES : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open or ground short circuit in harness between ECM and starter motor connector.
- Poor contact in ECM connector.

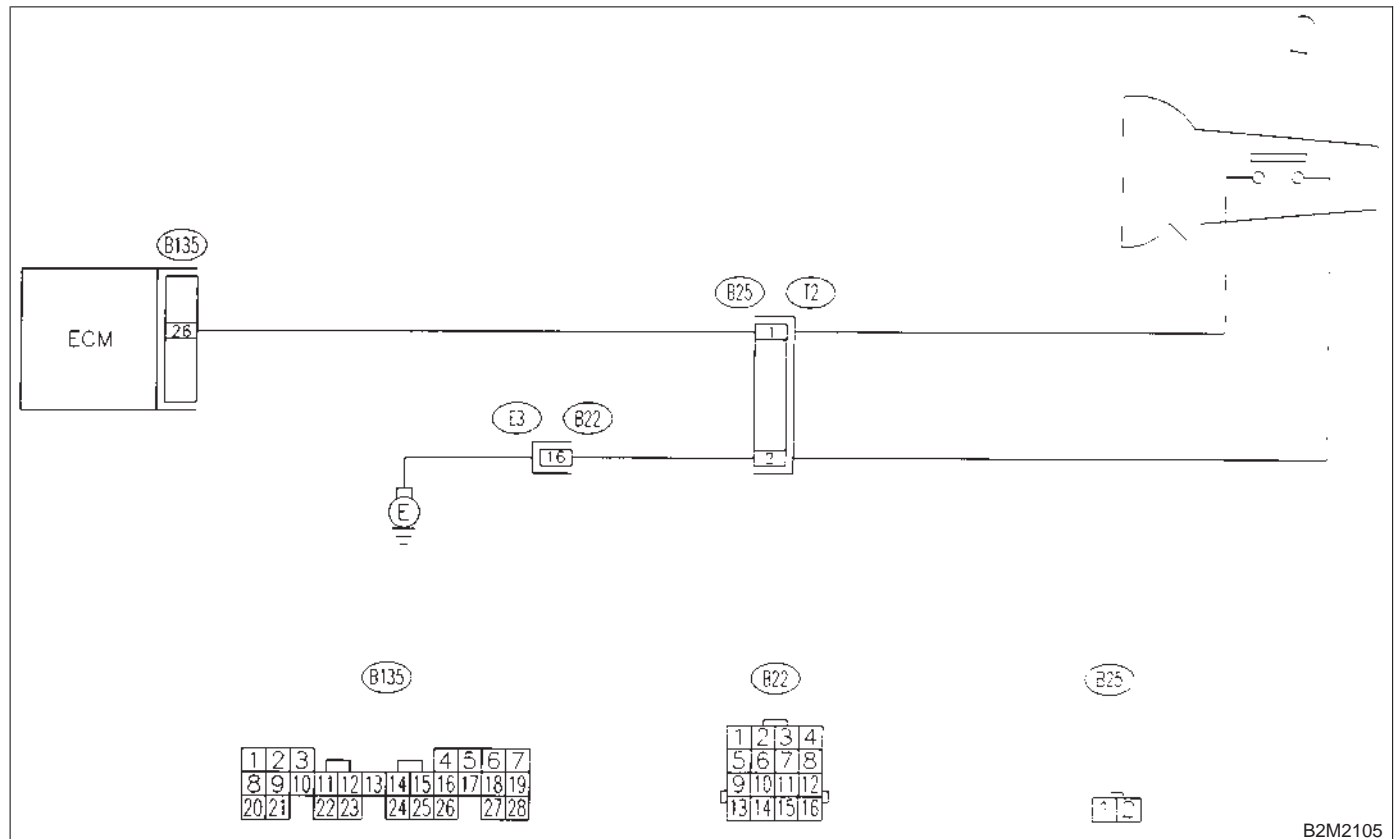
NO : Check starter motor circuit. <Ref. to 2-7 [T8B0].>

BM: DTC P1101 — NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT [MT VEHICLES] —

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - Erroneous idling

CAUTION:

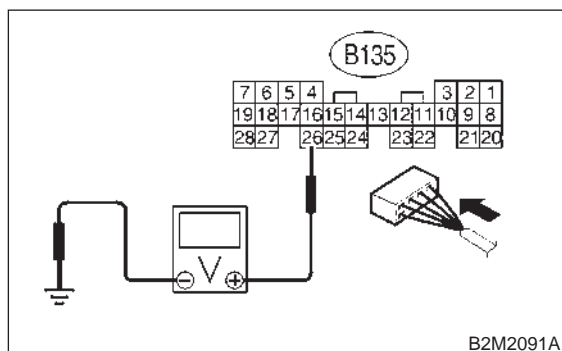
After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

● **WIRING DIAGRAM:**

B2M2105

11BM1 : CHECK INPUT SIGNAL FOR ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal**(B135) No. 26 (+) — Chassis ground (-):**

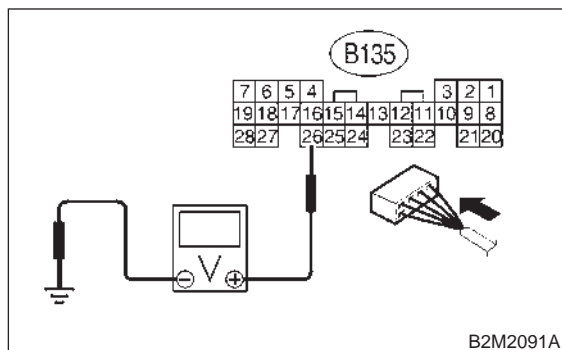
CHECK : **Is the voltage more than 10 V in neutral position?**

YES : Go to step 11BM2.

NO : Go to step 11BM4.

11BM2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal**(B135) No. 26 (+) — Chassis ground (-):**

CHECK : **Is the voltage less than 1 V in other positions?**

YES : Go to step 11BM3.

NO : Go to step 11BM4.

11BM3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in ECM connector?**

YES : Repair poor contact in ECM connector.

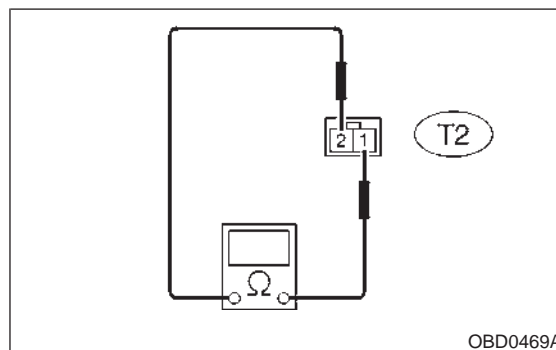
NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

11BM4 : CHECK NEUTRAL POSITION SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission harness.
- 3) Measure resistance between transmission harness and connector terminals.

Connector & terminal**(T2) No. 1 — No. 2:**

CHECK : **Is the resistance more than 1 MΩ in neutral position?**

YES : Go to step 11BM5.

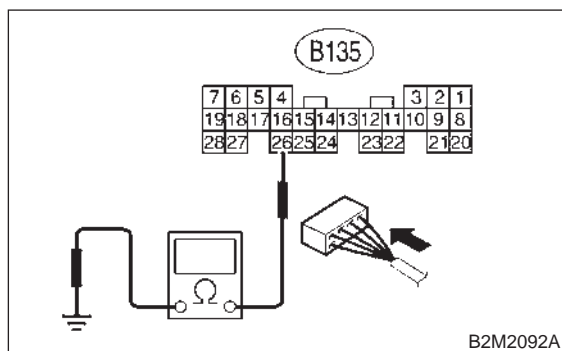
NO : Repair short circuit in transmission harness or replace neutral position switch.

11BM5 : CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.

Measure resistance between ECM and chassis ground.

Connector & terminal

(B135) No. 26 — Chassis ground:



- CHECK** : **Is the resistance less than 10 Ω ?**
- YES** : Repair ground short circuit in harness between ECM and transmission harness connector.
- NO** : Go to step **11BM6**.

11BM6 : CHECK POOR CONTACT.

Check poor contact in transmission harness connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : **Is there poor contact in transmission harness connector?**
- YES** : Repair poor contact in transmission harness connector.
- NO** : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

MEMO:

BN: DTC P1101 — NEUTRAL POSITION SWITCH CIRCUIT HIGH INPUT [AT VEHICLES] —**• DTC DETECTING CONDITION:**

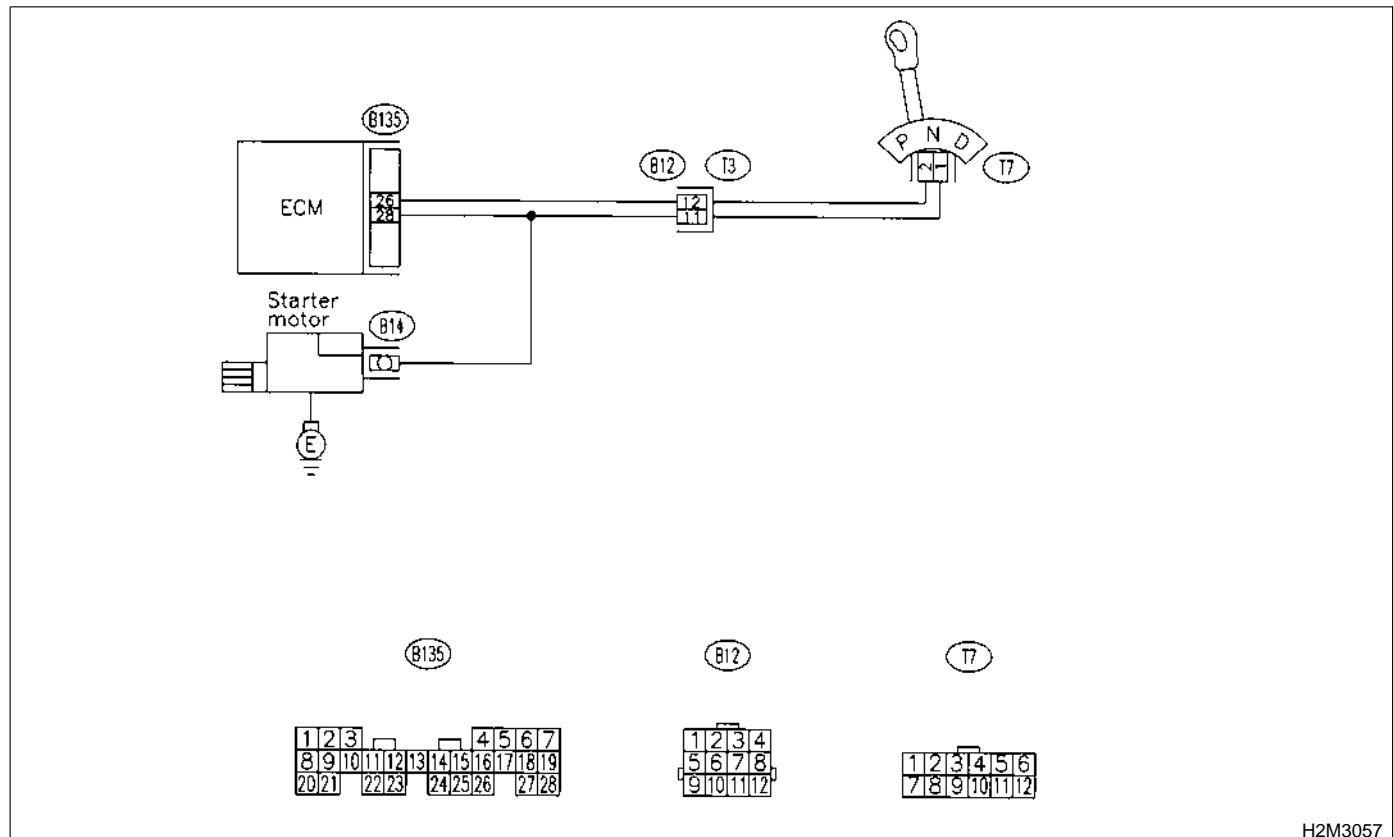
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

H2M3057

11BN1 : CHECK DTC P0705 ON DISPLAY.

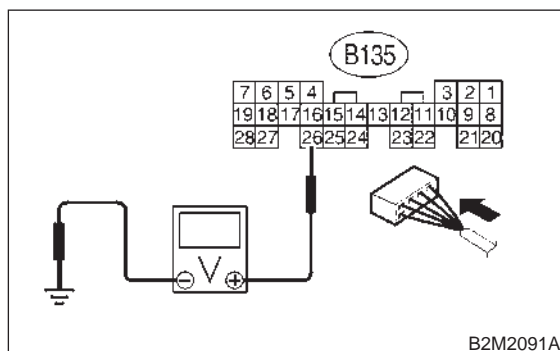
CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0705?

YES : Inspect DTC P0705 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NO : Go to step **11BN2**.

11BN2 : CHECK INPUT SIGNAL FOR ECM.

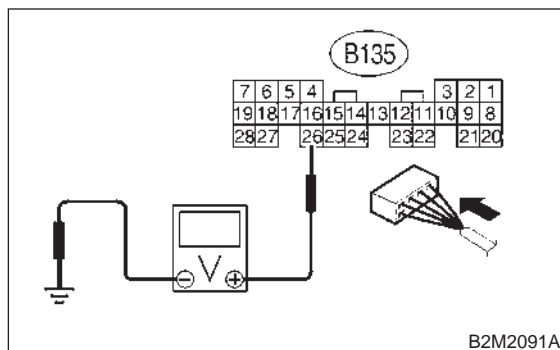
- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground in selector lever "N" and "P" positions.

Connector & terminal**(B135) No. 26 (+) — Chassis ground (-):**

- CHECK** : **Is the voltage less than 1 V?**
- YES** : Go to step 11BN3.
- NO** : Go to step 11BN5.

11BN3 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground in selector lever except for "N" and "P" positions.

Connector & terminal**(B135) No. 26 (+) — Chassis ground (-):**

- CHECK** : **Is the voltage between 4.5 and 5.5 V?**
- YES** : Go to step 11BN4.
- NO** : Go to step 11BN5.

11BN4 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

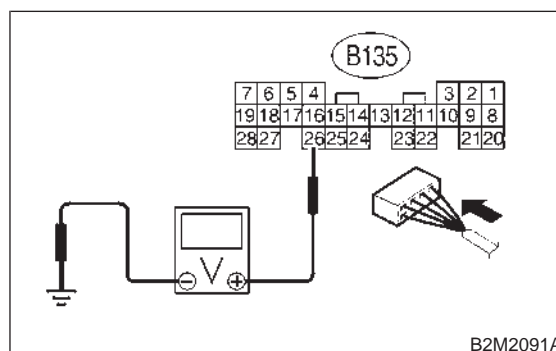
- CHECK** : **Is there poor contact in ECM connector?**
- YES** : Repair poor contact in ECM connector.
- NO** : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

11BN5 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal**(B135) No. 26 (+) — Chassis ground (-):**

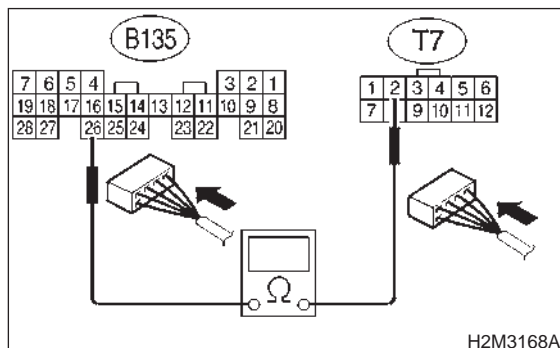
- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair battery short circuit in harness between ECM and inhibitor switch connector.
- NO** : Go to step 11BN6.

11BN6 : CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from ECM and inhibitor switch.
- 3) Measure resistance of harness between ECM and inhibitor switch connector.

Connector & terminal

(B135) No. 26 — (T7) No. 2:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 11BN7.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

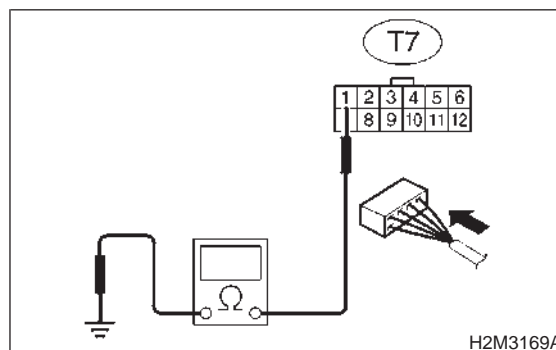
- Open circuit in harness between ECM and inhibitor switch connector
- Poor contact in coupling connector (B12)
- Poor contact in inhibitor switch connector
- Poor contact in ECM connector

11BN7 : CHECK INHIBITOR SWITCH GROUND LINE.

Measure resistance of harness between inhibitor switch connector and engine ground.

Connector & terminal

(T7) No. 1 — Engine ground:



CHECK : Is the resistance less than 5 Ω ?

YES : Go to step 11BN8.

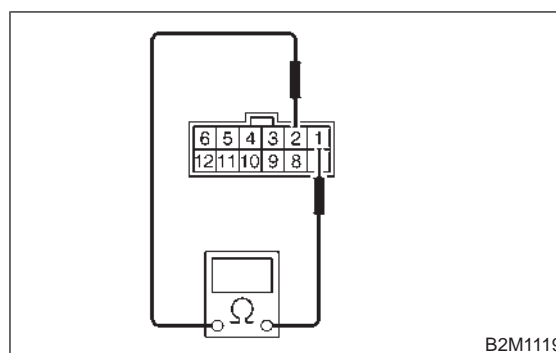
NO : Repair open circuit in inhibitor switch ground line.

11BN8 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever "N" and "P" positions.

Terminals

No. 2 — No. 1:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 11BN9.

NO : Replace inhibitor switch. <Ref. to 3-2 [W2C0].>

11BN9 : CHECK SELECTOR CABLE CONNECTION.

- CHECK** : *Is there any fault in selector cable connection to inhibitor switch?*
- YES** : Repair selector cable connection. <Ref. to 3-2 [W2A0].>
- NO** : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

BO: DTC P1102 — PRESSURE SOURCES SWITCHING SOLENOID VALVE CIRCUIT LOW INPUT —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

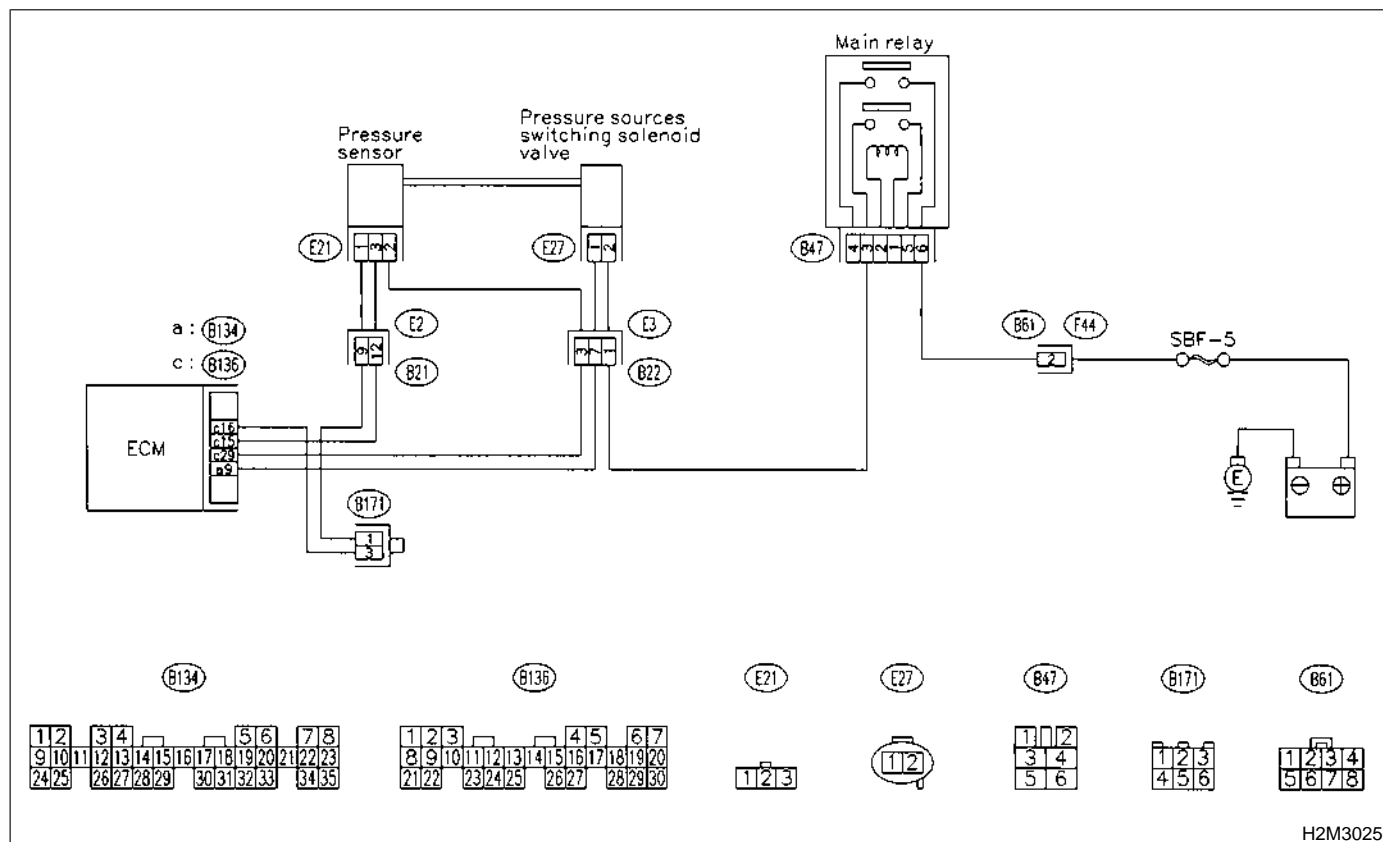
• TROUBLE SYMPTOM:

- Erroneous idling
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

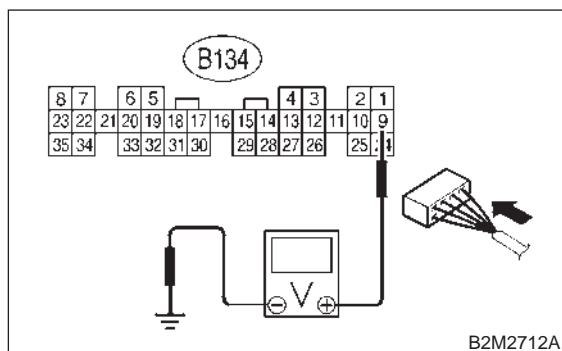
• WIRING DIAGRAM:



H2M3025

11B01 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal**(B134) No. 9 (+) — Chassis ground (-):****CHECK** : **Is the voltage more than 10 V?****YES** : Go to step 11B02.**NO** : Go to step 11B03.**11B02 : CHECK POOR CONTACT.**

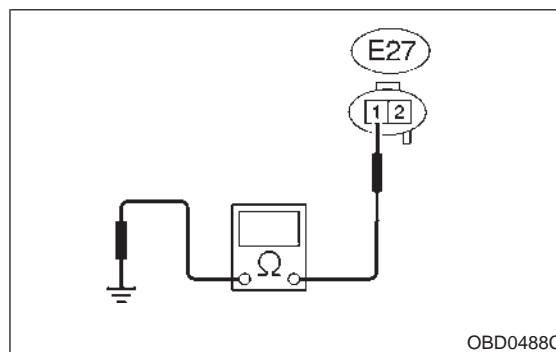
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in ECM connector?****YES** : Repair poor contact in ECM connector.**NO** : Contact with SOA service.**NOTE:**

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

11B03 : CHECK HARNESS BETWEEN ECM AND PRESSURE SOURCES SWITCHING SOLENOID VALVE CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from pressure sources switching solenoid valve and ECM.
- 3) Measure resistance of harness between pressure sources switching solenoid valve connector and engine ground.

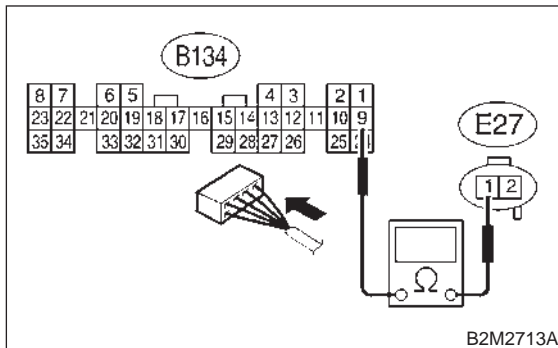
Connector & terminal**(E27) No. 1 — Engine ground:****CHECK** : **Is the resistance less than 10 Ω?****YES** : Repair ground short circuit in harness between ECM and pressure sources switching solenoid valve connector.**NO** : Go to step 11B04.

11B04 : CHECK HARNESS BETWEEN ECM AND PRESSURE SOURCES SWITCHING SOLENOID VALVE CONNECTOR.

Measure resistance of harness between ECM and pressure sources switching solenoid valve connector.

Connector & terminal

(B134) No. 9 — (E27) No. 1:



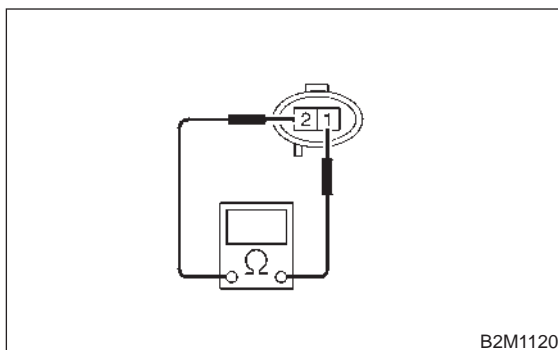
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 11B05.
- NO** : Repair open circuit in harness between ECM and pressure sources switching solenoid valve connector.

11B05 : CHECK PRESSURE SOURCES SWITCHING SOLENOID VALVE.

Measure resistance between pressure sources switching solenoid valve connector terminals.

Terminals

No. 1 — No. 2:



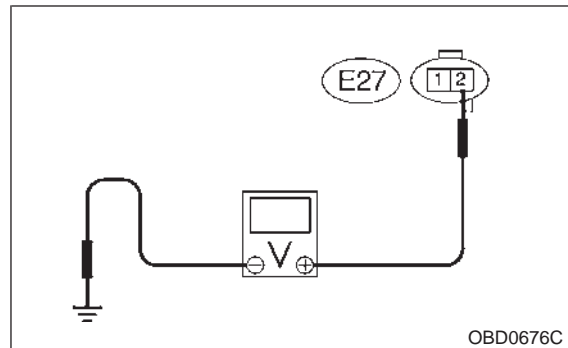
- CHECK** : Is the resistance between 10 and 100 Ω ?
- YES** : Go to step 11B06.
- NO** : Replace pressure sources switching solenoid valve. <Ref. to 2-7 [W13A0].>

11B06 : CHECK POWER SUPPLY TO PRESSURE SOURCES SWITCHING SOLENOID VALVE.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between pressure sources switching solenoid valve harness connector and engine ground.

Connector & terminal

(E27) No. 2 (+) — Engine ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 11B07.
- NO** : Repair open circuit in harness between main relay and pressure sources switching solenoid valve connector.

11B07 : CHECK POOR CONTACT.

Check poor contact in pressure sources switching solenoid valve connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : Is there poor contact in pressure sources switching solenoid valve connector?
- YES** : Repair poor contact in pressure sources switching solenoid valve connector.
- NO** : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

MEMO:

BP: DTC P1103 — ENGINE TORQUE CONTROL SIGNAL 1 CIRCUIT MALFUNCTION —

● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

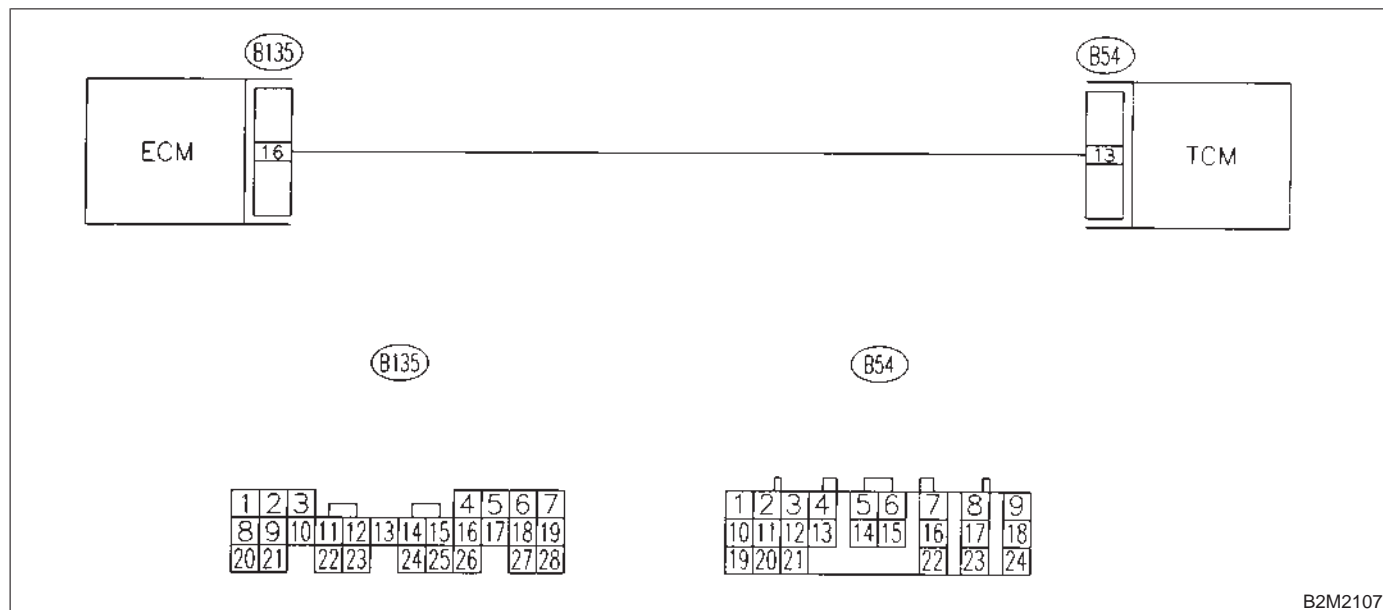
● TROUBLE SYMPTOM:

- Excessive shift shock

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:



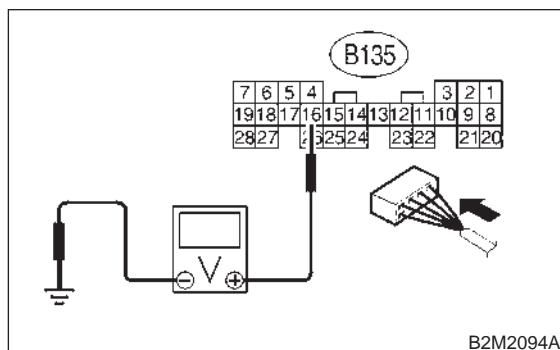
B2M2107

11BP1 : CHECK INPUT SIGNAL FOR ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 16 (+) — Chassis ground (-):



B2M2094A

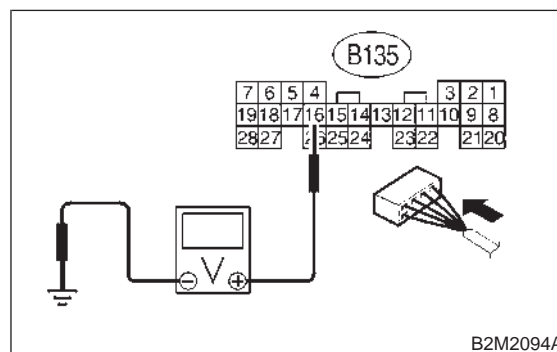
- CHECK** : Is the voltage more than 4.5 V?
- YES** : Go to step 11BP2.
- NO** : Go to step 11BP4.

11BP2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 16 (+) — Chassis ground (-):



B2M2094A

- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in harness between ECM and TCM connector.
- NO** : Go to step 11BP3.

11BP3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in ECM connector?*

YES : Repair poor contact in ECM connector.

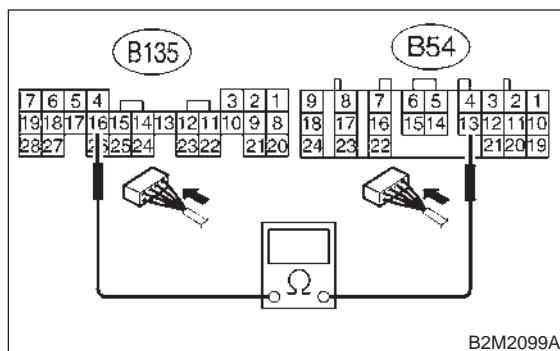
NO : Replace ECM. <Ref. to 2-7 [W15A0].>

11BP4 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from ECM and TCM.
- 3) Measure resistance of harness between ECM and TCM connector.

Connector & terminal

(B135) No. 16 — (B54) No. 13:



CHECK : *Is the resistance less than 1 Ω ?*

YES : Go to step 11BP5.

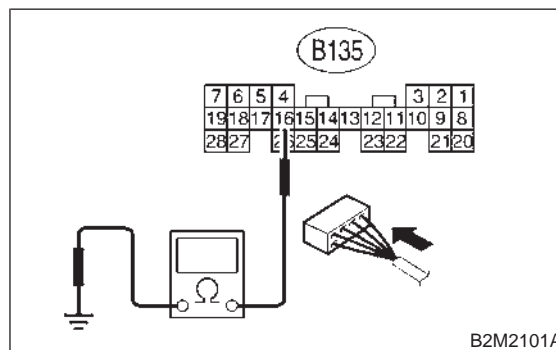
NO : Repair open circuit in harness between ECM and TCM connector.

11BP5 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B135) No. 16 — Chassis ground:



CHECK : *Is the resistance less than 10 Ω ?*

YES : Repair ground short circuit in harness between ECM and TCM connector.

NO : Go to step 11BP6.

11BP6 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in TCM connector?*

YES : Repair poor contact in TCM connector.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

BQ: DTC P1106 — ENGINE TORQUE CONTROL SIGNAL 2 CIRCUIT MALFUNCTION —

● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

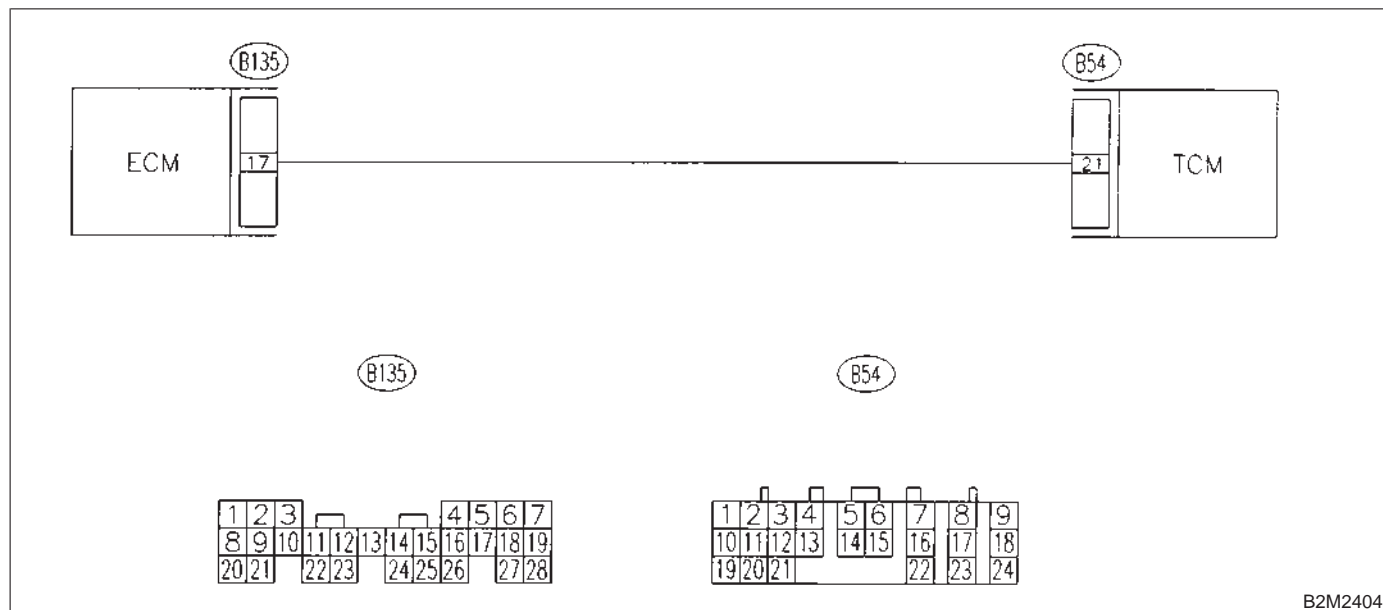
● TROUBLE SYMPTOM:

- Excessive shift shock

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:

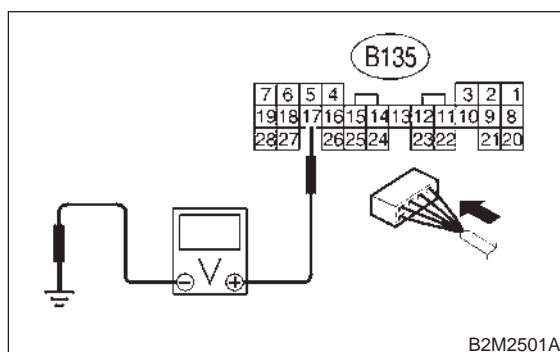


11BQ1 : CHECK INPUT SIGNAL FOR ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 17 (+) — Chassis ground (-):



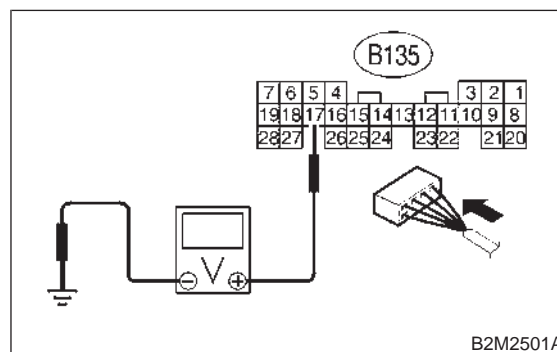
- CHECK** : Is the voltage more than 4.5 V?
- YES** : Go to step 11BQ2.
- NO** : Go to step 11BQ4.

11BQ2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 17 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in harness between ECM and TCM connector.
- NO** : Go to step 11BQ3.

11BQ3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in ECM connector?*

YES : Repair poor contact in ECM connector.

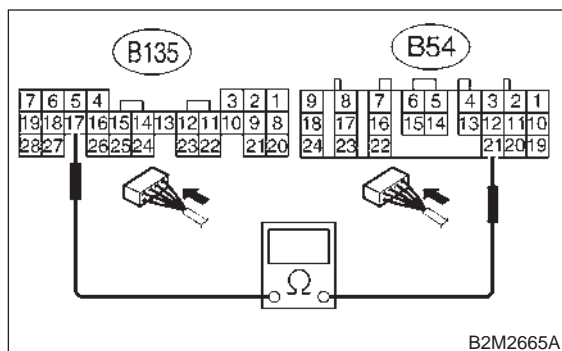
NO : Replace ECM. <Ref. to 2-7 [W15A0].>

11BQ4 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from ECM and TCM.
- 3) Measure resistance of harness between ECM and TCM connector.

Connector & terminal

(B135) No. 17 — (B54) No. 21:



CHECK : *Is the resistance less than 1 Ω ?*

YES : Go to step 11BQ5.

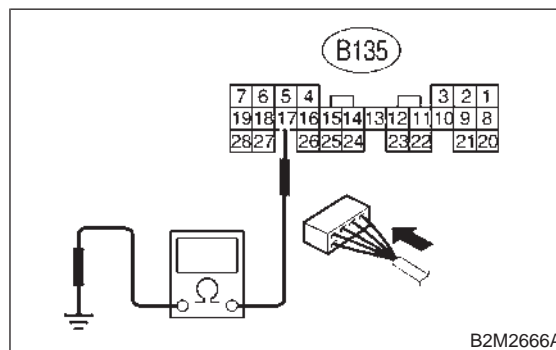
NO : Repair open circuit in harness between ECM and TCM connector.

11BQ5 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B135) No. 17 — Chassis ground:



CHECK : *Is the resistance less than 10 Ω ?*

YES : Repair ground short circuit in harness between ECM and TCM connector.

NO : Go to step 11BQ6.

11BQ6 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in TCM connector?*

YES : Repair poor contact in TCM connector.

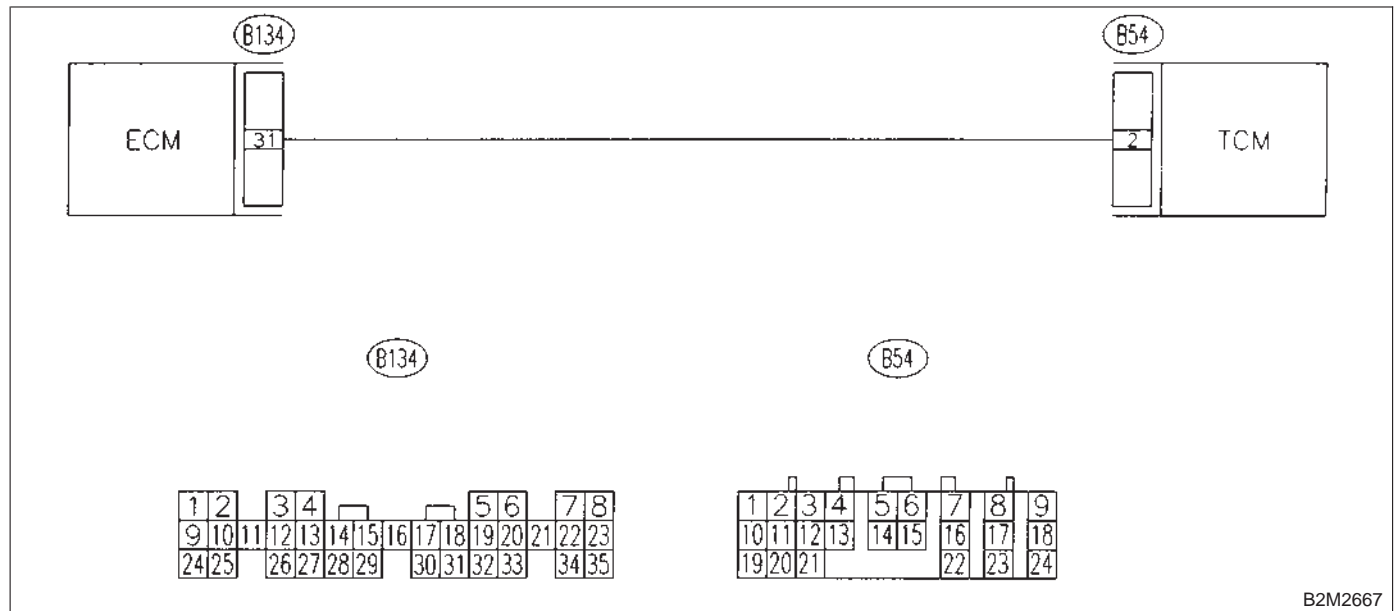
NO : Replace TCM. <Ref. to 3-2 [W22A0].>

BR: DTC P1115 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT HIGH INPUT —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

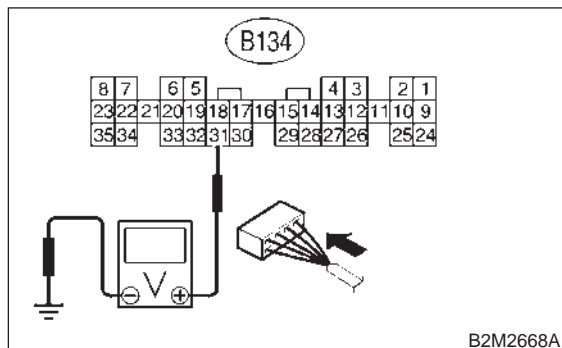
CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

11BR1 : CHECK OUTPUT SIGNAL FROM ECM.

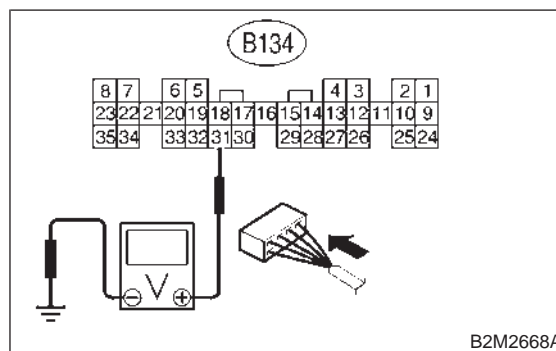
- 1) Start engine, and warm-up the engine.
- 2) Turn ignition switch to OFF.
- 3) Disconnect connector from TCM.
- 4) Turn ignition switch to ON.
- 5) Measure voltage between ECM and chassis ground.

Connector & terminal**(B134) No. 31 (+) — Chassis ground (-):**

- CHECK** : Is the voltage less than 3 V?
- YES** : Go to step 11BR2.
- NO** : Repair battery short circuit in harness between ECM and TCM connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>

11BR2 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal**(B134) No. 31 (+) — Chassis ground (-):**

- CHECK** : Does the voltage change more than 10 V by shaking harness and connector of ECM while monitoring the value with voltage meter?
- YES** : Repair battery short circuit in harness between ECM and TCM connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

BS: DTC P1116 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT LOW INPUT —

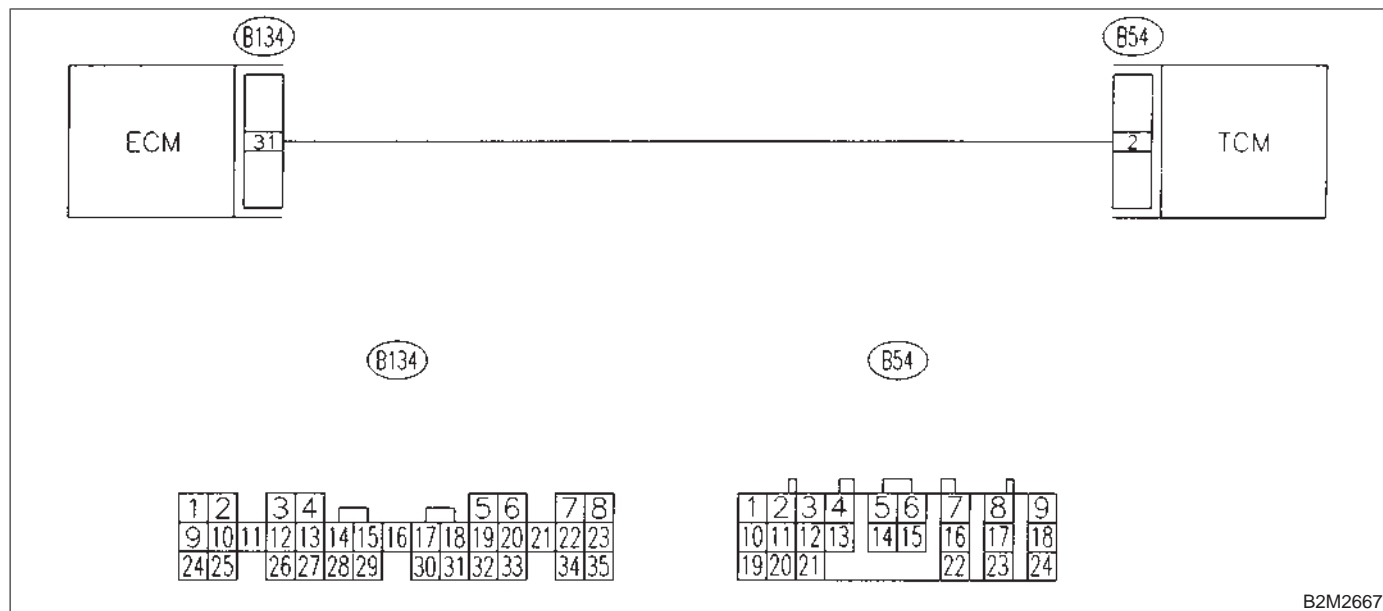
● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:

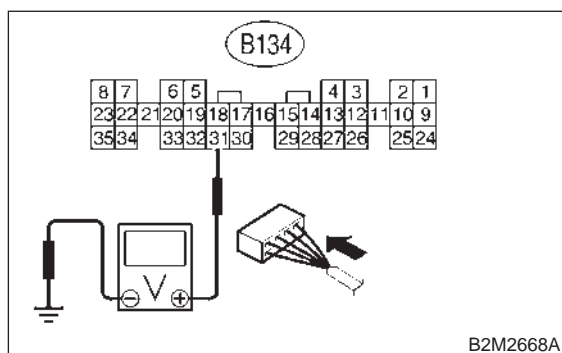


11BS1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Start engine, and warm-up the engine.
- 2) Turn ignition switch to OFF.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 31 (+) — Chassis ground (-):



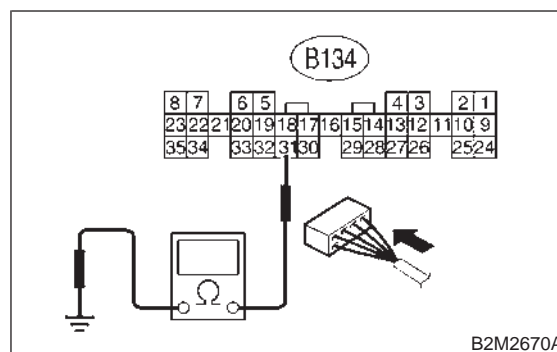
- CHECK** : Is the voltage more than 3 V?
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 11BS2.

11BS2 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from ECM and TCM.
- 3) Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B134) No. 31 — Chassis ground:



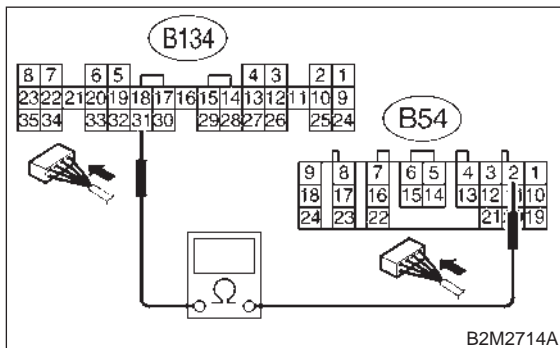
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in harness between ECM and TCM connector.
- NO** : Go to step 11BS3.

11BS3 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

Measure resistance of harness between ECM and TCM connector.

Connector & terminal

(B134) No. 31 — (B54) No. 2:



CHECK : **Is the resistance less than 1 Ω?**

YES : Repair poor contact in ECM or TCM connector.

NO : Repair open circuit in harness between ECM and TCM connector.

BT: DTC P1120 — STARTER SWITCH CIRCUIT HIGH INPUT —

● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

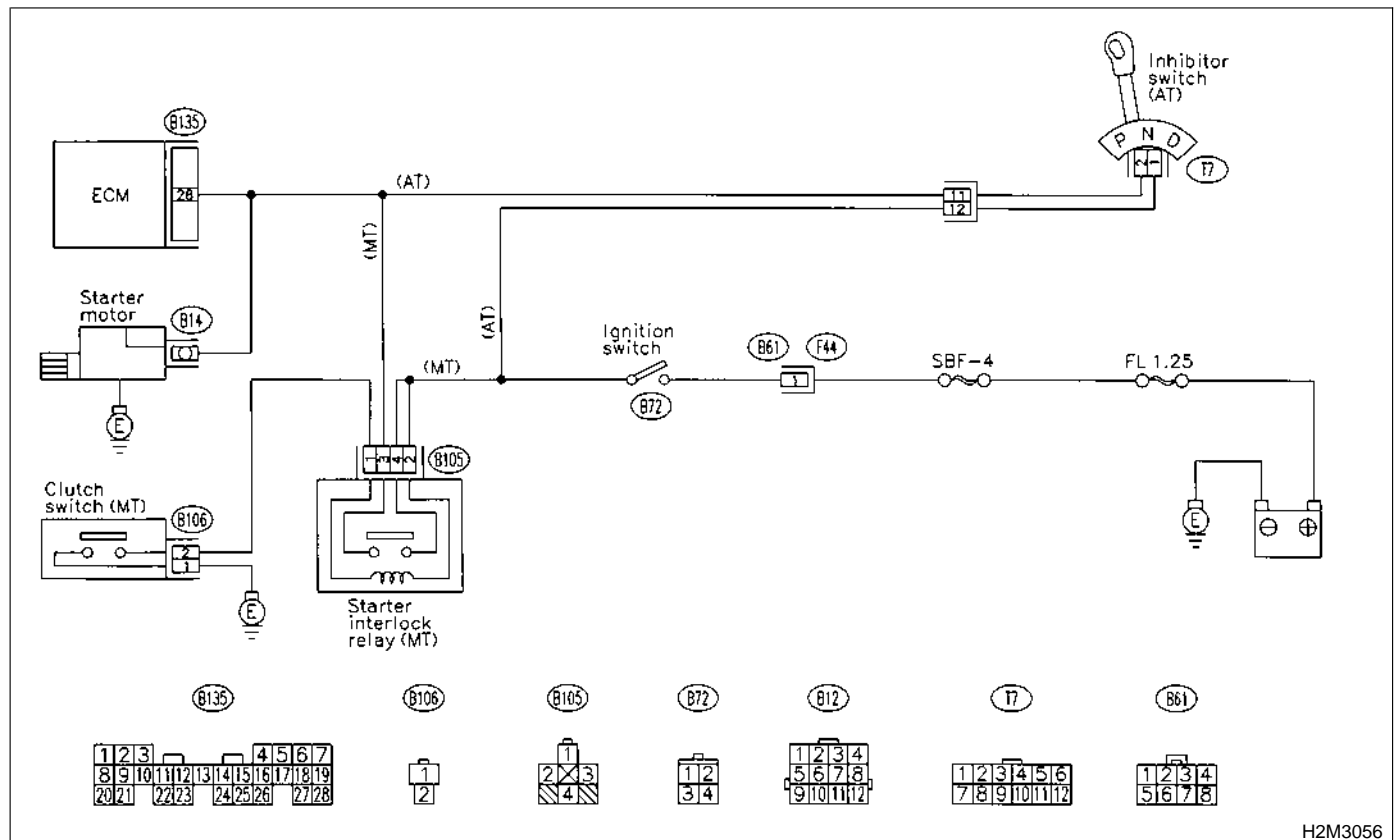
● TROUBLE SYMPTOM:

- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:



H2M3056

11BT1 : CHECK OPERATION OF STARTER MOTOR.

NOTE:

- On AT vehicles, place the inhibitor switch in each position.
- On MT vehicles, depress or release the clutch pedal.

CHECK : Does starter motor operate when ignition switch to "ON"?

YES : Repair battery short circuit in starter motor circuit. After repair, replace ECM. <Ref. to 2-7 [W15A0].>

NO : Check starter motor circuit. <Ref. to 2-7 [T8B0].>

MEMO:

BU: DTC P1121 — NEUTRAL POSITION SWITCH CIRCUIT HIGH INPUT [MT VEHICLES] —● **DTC DETECTING CONDITION:**

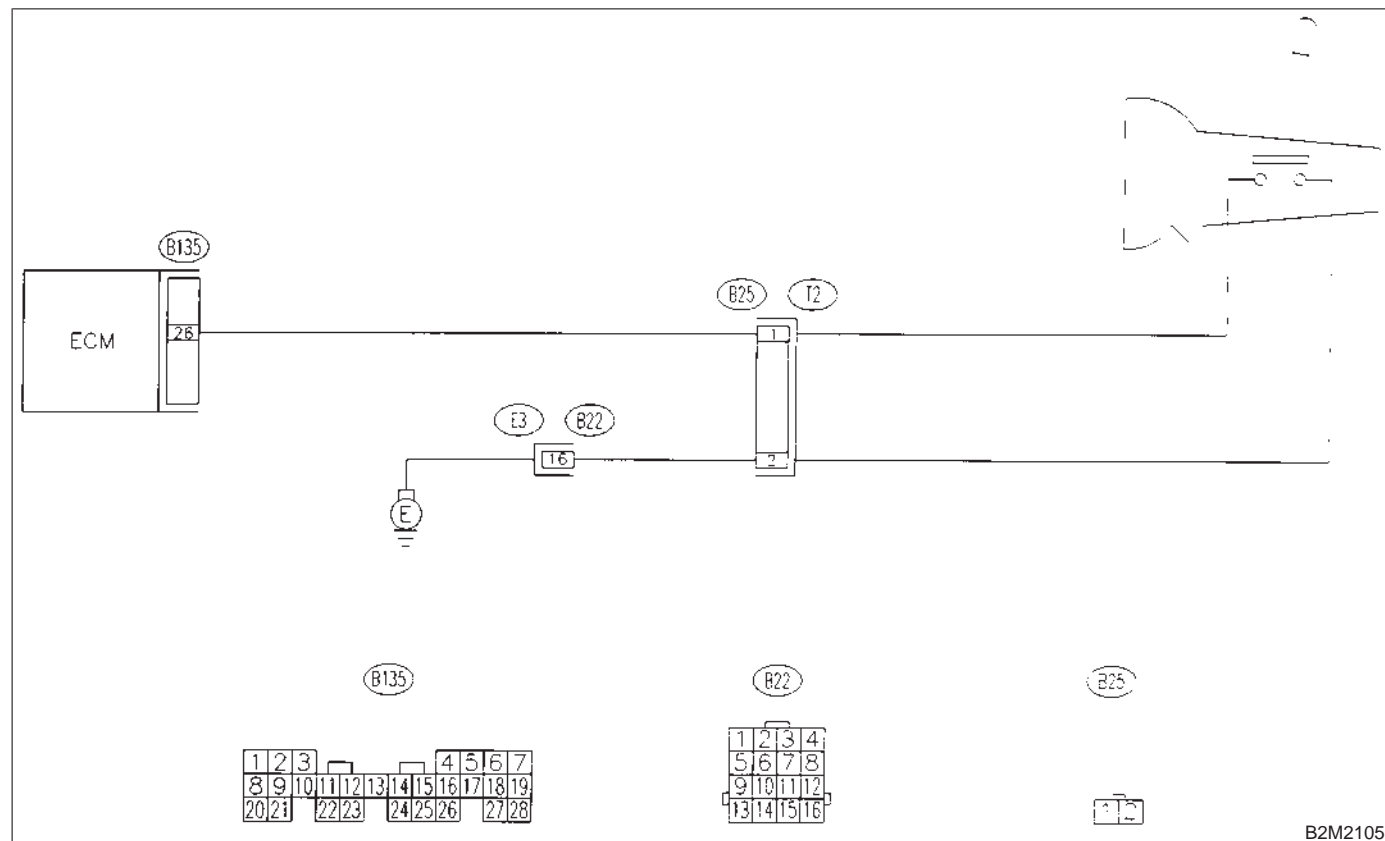
- Two consecutive driving cycles with fault

● **TROUBLE SYMPTOM:**

- Erroneous idling

CAUTION:

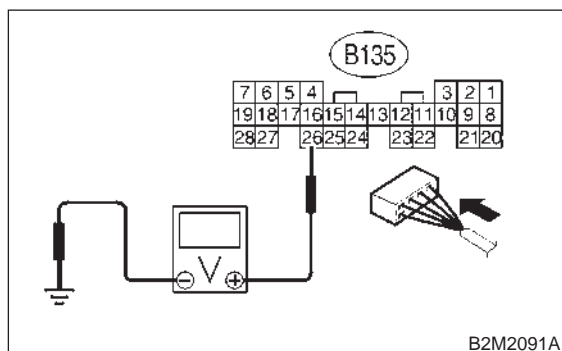
After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

● **WIRING DIAGRAM:**

B2M2105

11BU1 : CHECK INPUT SIGNAL FOR ECM.

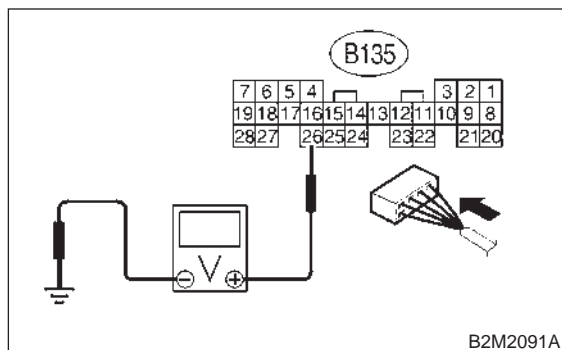
- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal**(B135) No. 26 (+) — Chassis ground (-):**

- CHECK** : **Is the voltage between 4.5 and 5.5 V in neutral position?**
- YES** : Go to step 11BU2.
- NO** : Go to step 11BU4.

11BU2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal**(B135) No. 26 (+) — Chassis ground (-):**

- CHECK** : **Is the voltage less than 1 V in other positions?**
- YES** : Go to step 11BU3.
- NO** : Go to step 11BU4.

11BU3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

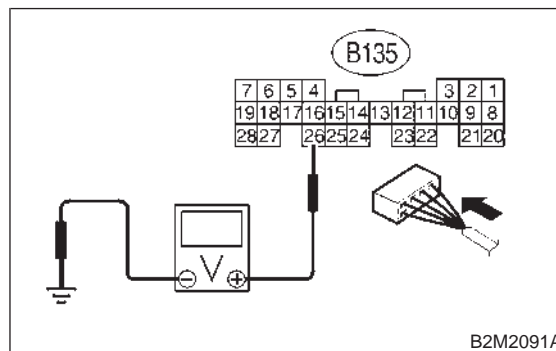
- CHECK** : **Is there poor contact in ECM connector?**
- YES** : Repair poor contact in ECM connector.
- NO** : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

11BU4 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal**(B135) No. 26 (+) — Chassis ground (-):**

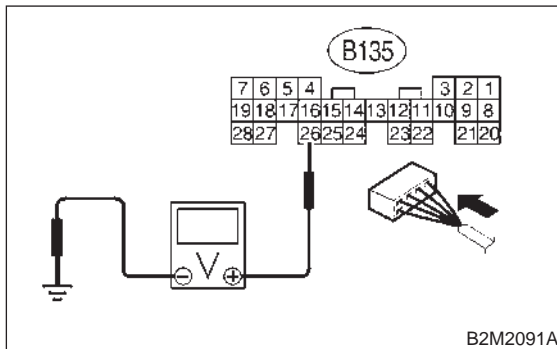
- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair battery short circuit in harness between ECM and transmission harness connector.
- NO** : Go to step 11BU5.

11BU5 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 26 (+) — Chassis ground (-):



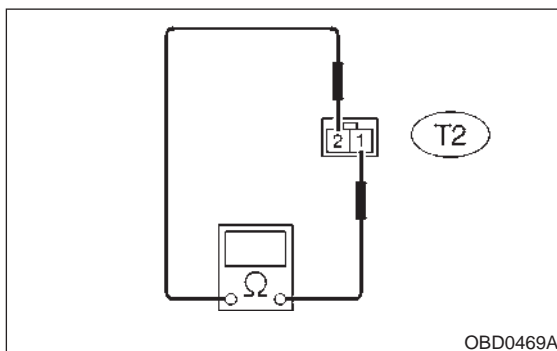
- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in harness between ECM and transmission harness connector.
- NO** : Go to step 11BU6.

11BU6 : CHECK NEUTRAL POSITION SWITCH.

Measure resistance between transmission harness connector terminals.

Connector & terminal

(T2) No. 1 — No. 2:



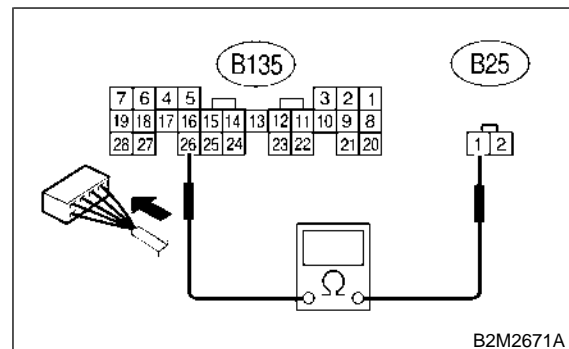
- CHECK** : Is the resistance less than 1 Ω in other positions?
- YES** : Go to step 11BU7.
- NO** : Repair open circuit in transmission harness or replace neutral position switch.

11BU7 : CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.

- 1) Disconnect connector from ECM.
- 2) Measure resistance of harness between ECM and transmission harness connector.

Connector & terminal

(B135) No. 26 — (B25) No. 1:



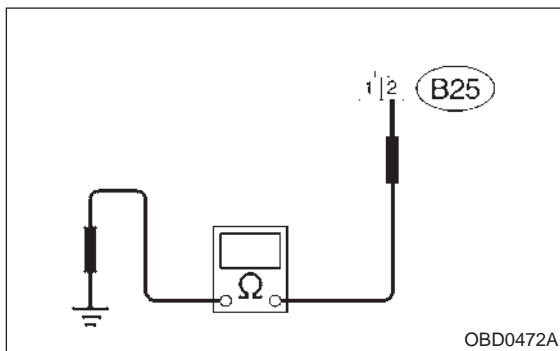
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 11BU8.
- NO** : Repair open circuit in harness between ECM and transmission harness connector.

11BU8 : CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.

Measure resistance of harness between transmission harness connector and engine ground.

Connector & terminal

(B25) No. 2 — Engine ground:



CHECK : **Is the resistance less than 5 Ω?**

YES : Go to step **11BU9**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between transmission harness connector and engine grounding terminal
- Poor contact in coupling connector (B22)

11BU9 : CHECK POOR CONTACT.

Check poor contact in transmission harness connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in transmission harness connector?**

YES : Repair poor contact in transmission harness connector.

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

BV: DTC P1121 — NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT [AT VEHICLES] —

- **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

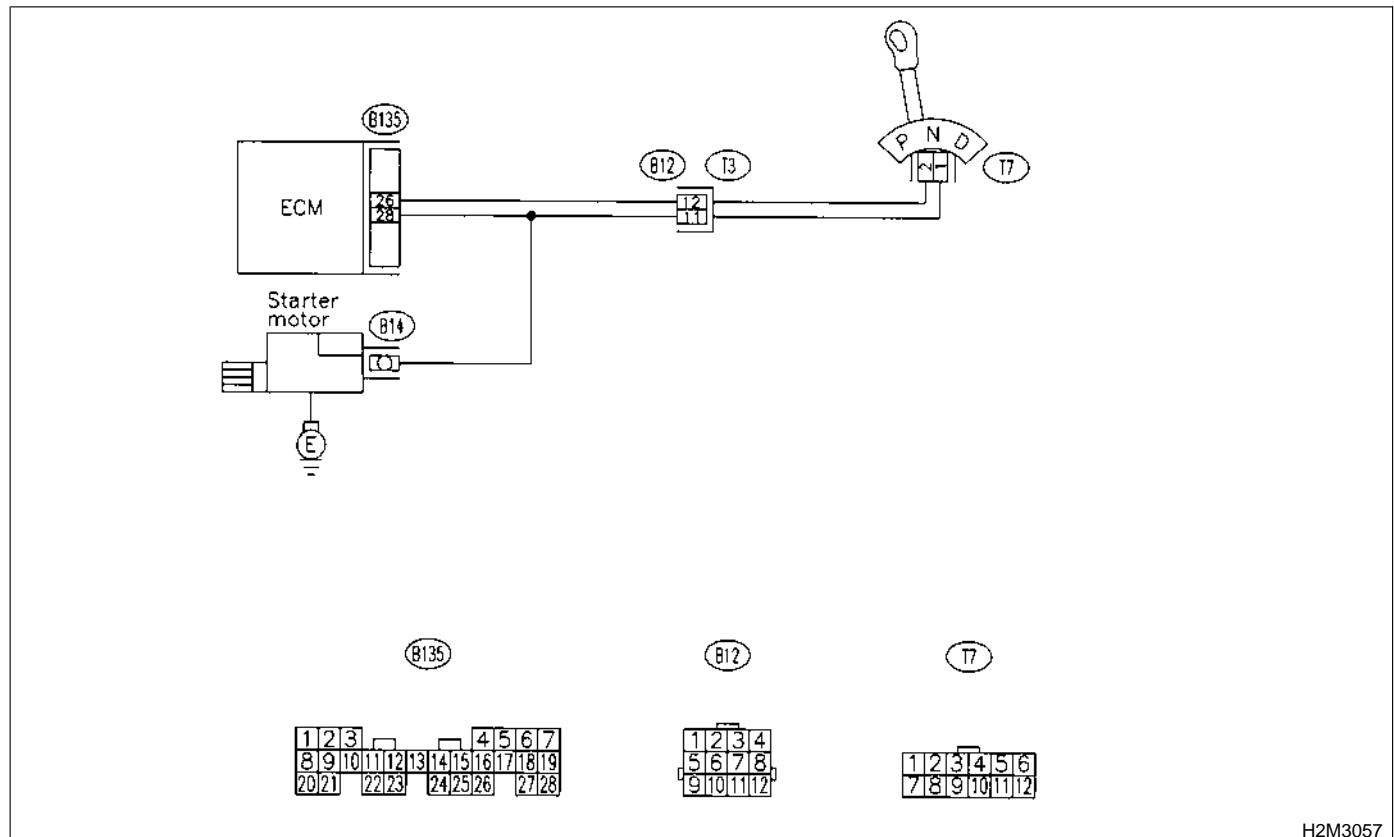
- **TROUBLE SYMPTOM:**

- Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

- **WIRING DIAGRAM:**



11BV1 : CHECK DTC P0705 ON DISPLAY.

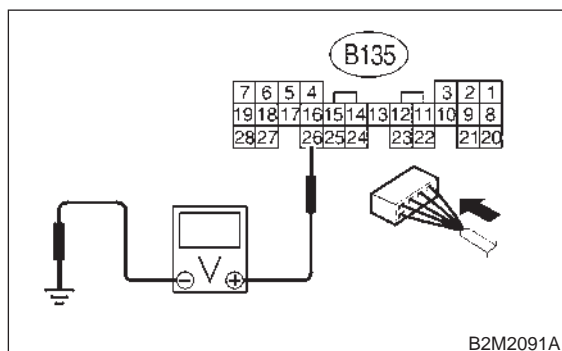
CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0705?

YES : Inspect DTC P0705 using “11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles”.
<Ref. to 2-7 [T11A0].>

NO : Go to step 11BV2.

11BV2 : CHECK INPUT SIGNAL FOR ECM.

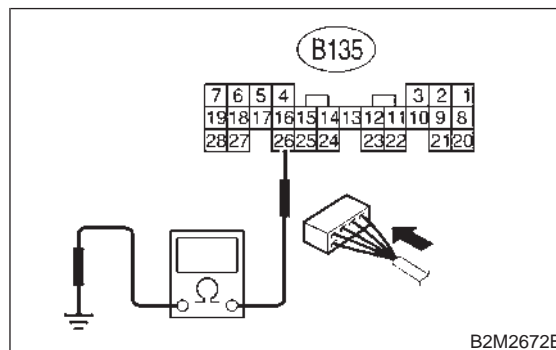
- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal**(B135) No. 26 (+) — Chassis ground (-):**

- CHECK** : **Is the voltage between 4.5 and 5.5 V in other positions?**
- YES** : Even if MIL lights up, the circuit has returned to a normal condition at this time.
- NO** : Go to step **11BV3**.

11BV3 : CHECK HARNESS BETWEEN ECM AND TRANSMISSION HARNESS CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from ECM and transmission harness connector.
- 3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal**(B135) No. 26 — Chassis ground:**

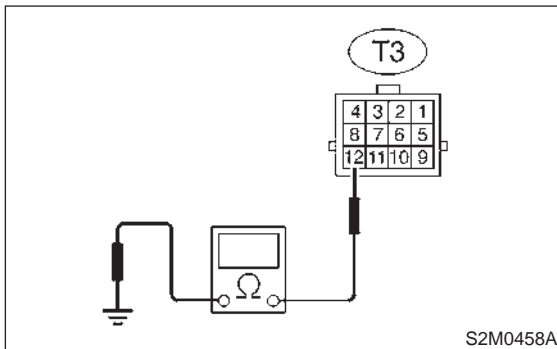
- CHECK** : **Is the resistance less than 10 Ω?**
- YES** : Repair ground short circuit in harness between ECM and transmission harness connector.
- NO** : Go to step **11BV4**.

11BV4 : CHECK TRANSMISSION HARNESS CONNECTOR.

- 1) Disconnect connector from inhibitor switch.
- 2) Measure resistance of harness between transmission harness connector and engine ground.

Connector & terminal

(T3) No. 12 — Engine ground:



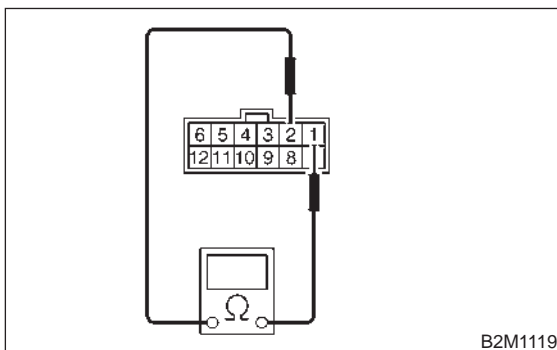
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair ground short circuit in harness between transmission harness and inhibitor switch connector.
- NO** : Go to step 11BV5.

11BV5 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "N" position.

Terminals

No. 2 — No. 1:



- CHECK** : Is the resistance more than 1 MΩ in other positions?
- YES** : Go to step 11BV6.
- NO** : Replace inhibitor switch. <Ref. to 3-2 [W2C0].>

11BV6 : CHECK SELECTOR CABLE CONNECTION.

- CHECK** : Is there any fault in selector cable connection to inhibitor switch?
- YES** : Repair selector cable connection. <Ref. to 3-2 [W2A0].>
- NO** : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

MEMO:

BW: DTC P1122 — PRESSURE SOURCES SWITCHING SOLENOID VALVE CIRCUIT HIGH INPUT —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

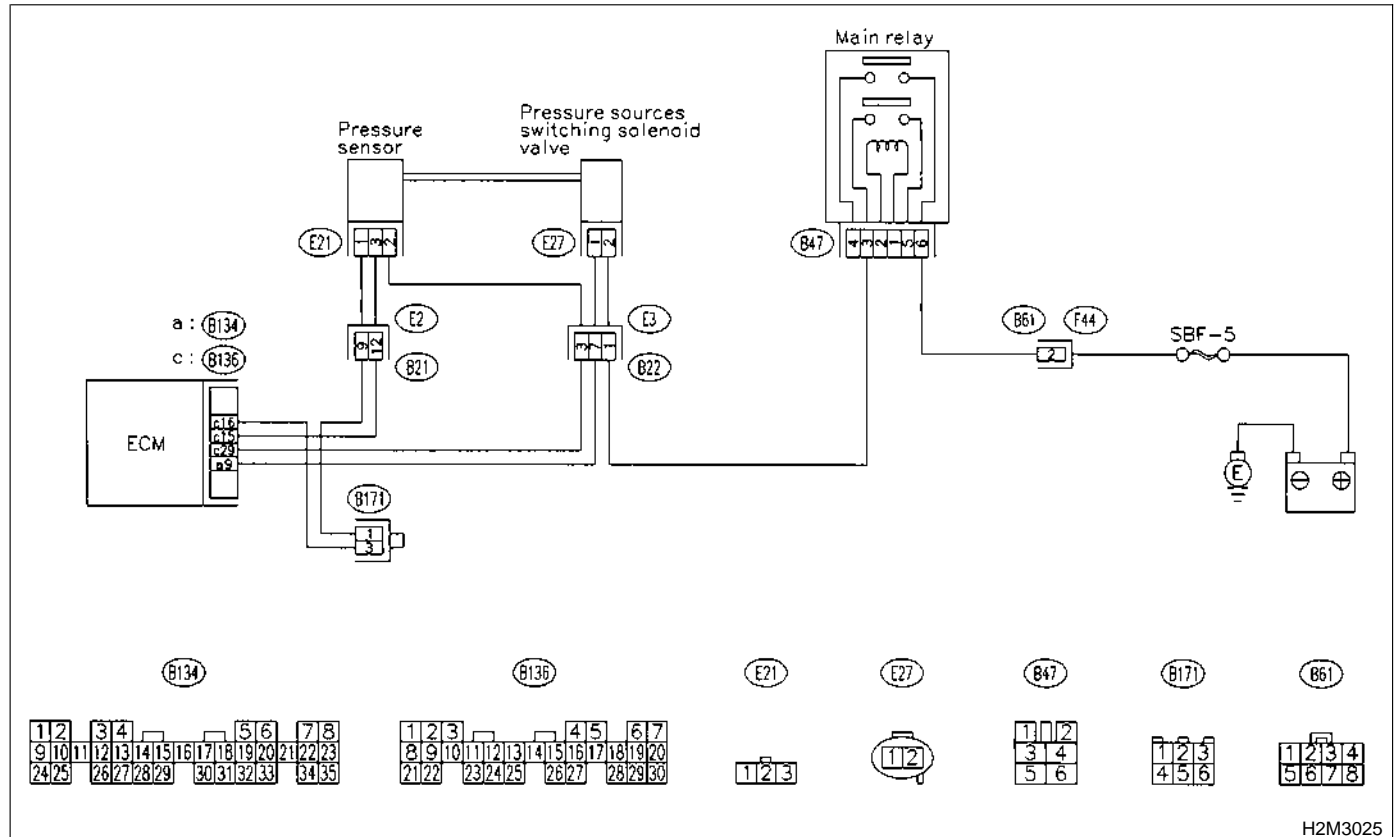
• TROUBLE SYMPTOM:

- Erroneous idling
- Failure of engine to start

CAUTION:

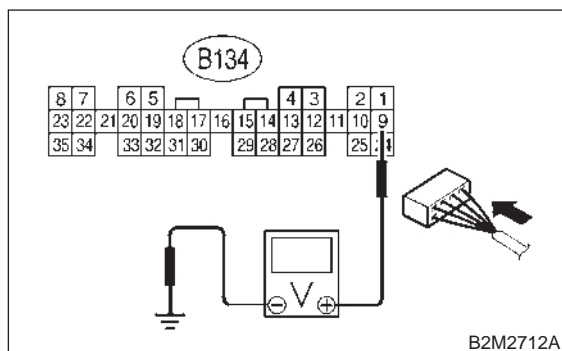
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



11BW1 : CHECK OUTPUT SIGNAL FROM ECM.

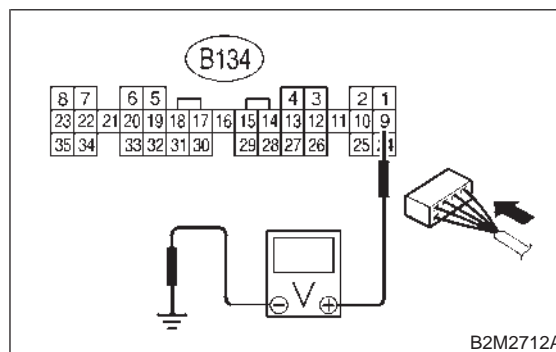
- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal**(B134) No. 9 (+) — Chassis ground (-):****CHECK** : **Is the voltage more than 10 V?****YES** : Go to step 11BW3.**NO** : Go to step 11BW2.**11BW2 : CHECK POOR CONTACT.**

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

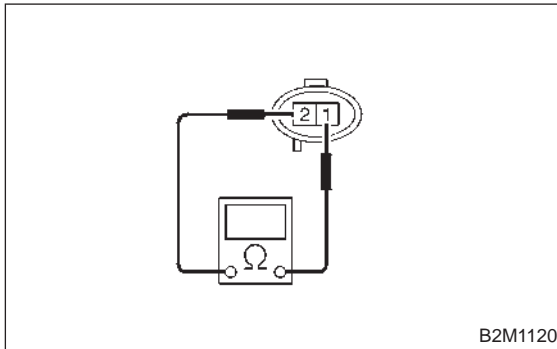
CHECK : **Is there poor contact in ECM connector?****YES** : Repair poor contact in ECM connector.**NO** : Replace ECM. <Ref. to 2-7 [W15A0].>**11BW3 : CHECK HARNESS BETWEEN ECM AND PRESSURE SOURCES SWITCHING SOLENOID VALVE CONNECTOR.**

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from pressure sources switching solenoid valve.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

Connector & terminal**(B134) No. 9 (+) — Chassis ground (-):****CHECK** : **Is the voltage more than 10 V?****YES** : Repair battery short circuit in harness between ECM and pressure sources switching solenoid valve connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>**NO** : Go to step 11BW4.

**11BW4 : CHECK PRESSURE SOURCES
SWICTHING SOLENOID VALVE.**

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between pressure sources switching solenoid valve connector terminals.

Terminals**No. 2 — No. 1:**

- CHECK** : ***Is the resistance less than 1 Ω ?***
- YES** : Replace pressure sources switching solenoid valve <Ref. to 2-7 [W13A0].> and ECM <Ref. to 2-7 [W15A0].>.
- NO** : Go to step **11BW5**.

11BW5 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : ***Is there poor contact in ECM connector?***
- YES** : Repair poor contact in ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

MEMO:

BX: DTC P1141 — MASS AIR FLOW SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

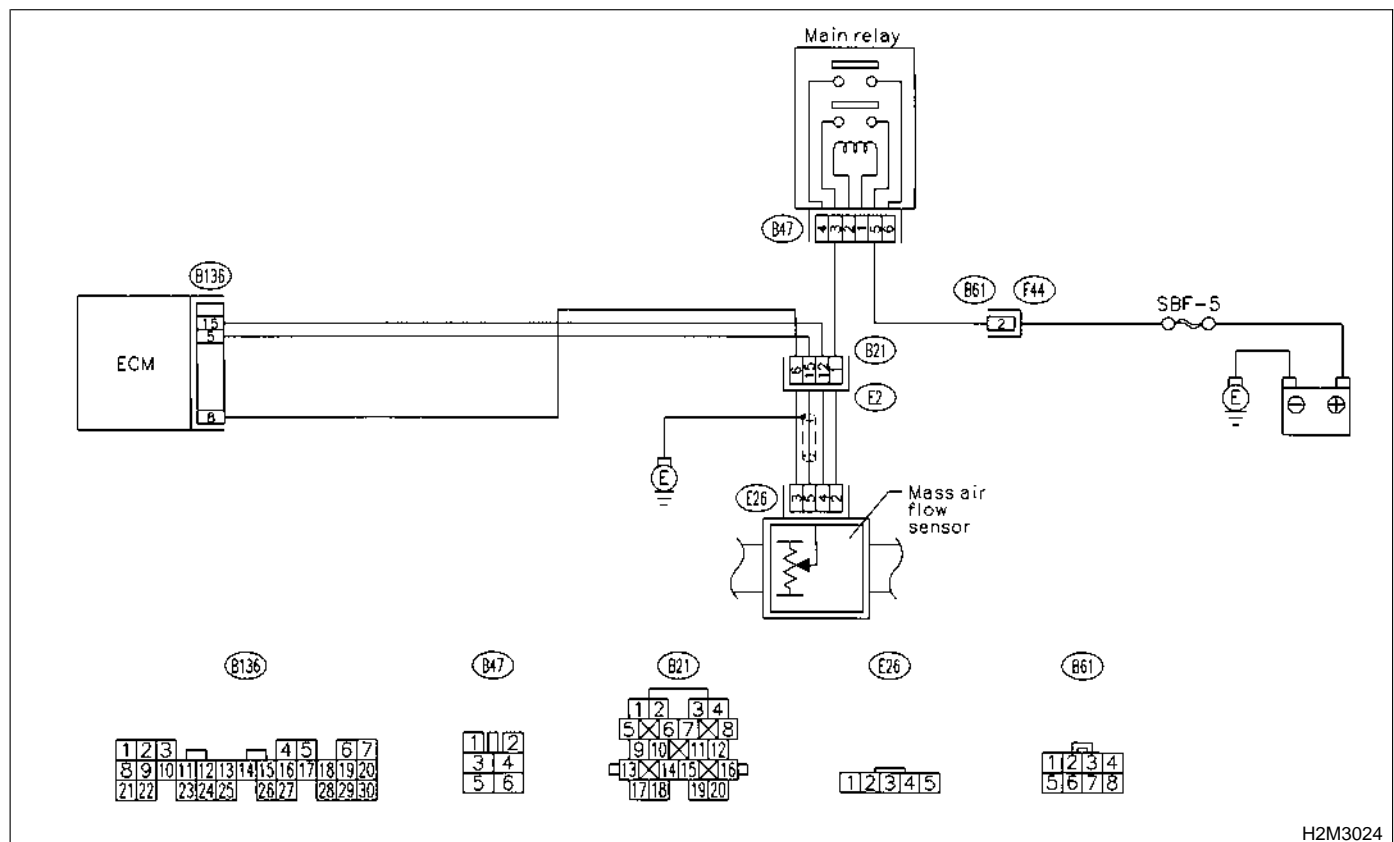
• TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3024

11BX1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0102, P0103 or P0122?*

YES : Inspect DTC P0102, P0103 or P0122 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NOTE:

In this case, it is not necessary to inspect DTC P1141.

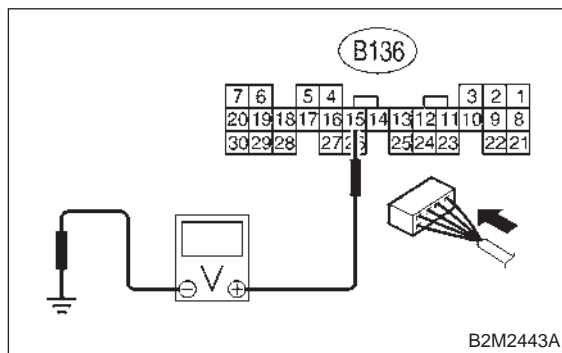
NO : Go to step **11BX2**.

11BX2 : CHECK THROTTLE POSITION SENSOR.

Measure voltage between ECM and chassis ground while throttle valve is fully closed.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : *Is the voltage less than 0.1 V?*

YES : Go to step **11BX3**.

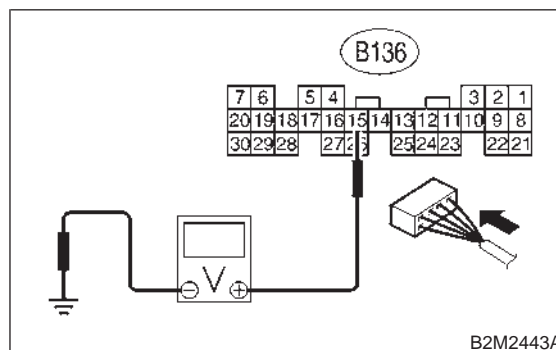
NO : Check throttle position sensor circuit. <Ref. to 2-7 [T11K0].>

11BX3 : CHECK THROTTLE POSITION SENSOR.

Measure voltage between ECM and chassis ground while throttle valve is fully opened.

Connector & terminal

(B136) No. 15 (+) — Chassis ground (-):



CHECK : *Is the voltage more than 4.5 V?*

YES : Replace mass air flow sensor. <Ref. to 2-7 [W2A1].>

NO : Check throttle position sensor circuit. <Ref. to 2-7 [T11K0].>

BY: DTC P1142 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

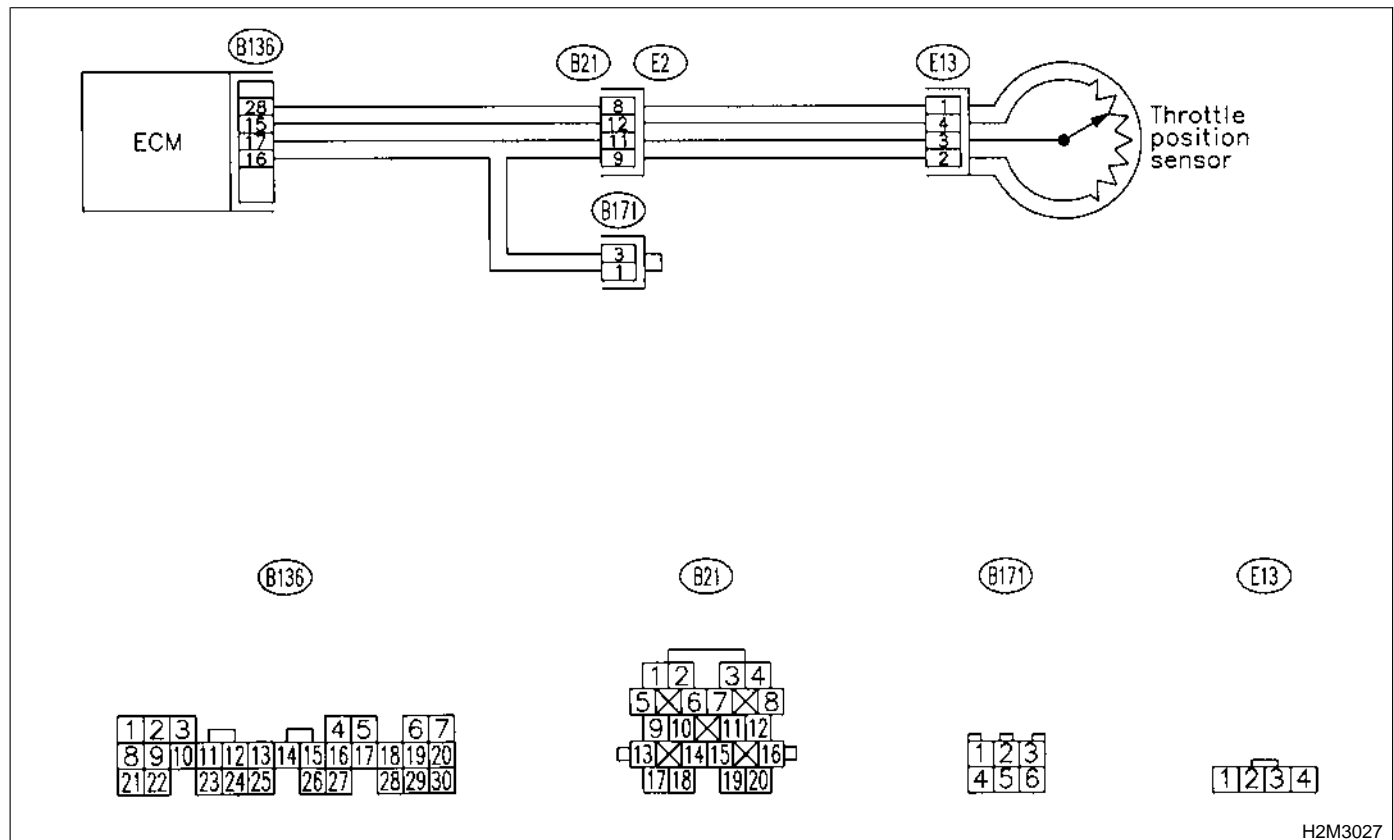
• TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:



H2M3027

11BY1 : CHECK ANY OTHER DTC ON DISPLAY.
--

CHECK : *Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0122 or P0123?*

YES : Inspect DTC P0122 or P0123 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NOTE:

In this case, it is not necessary to inspect DTC P1142.

NO : Replace throttle position sensor. <Ref. to 2-7 [W9A0].>

BZ: DTC P1143 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —

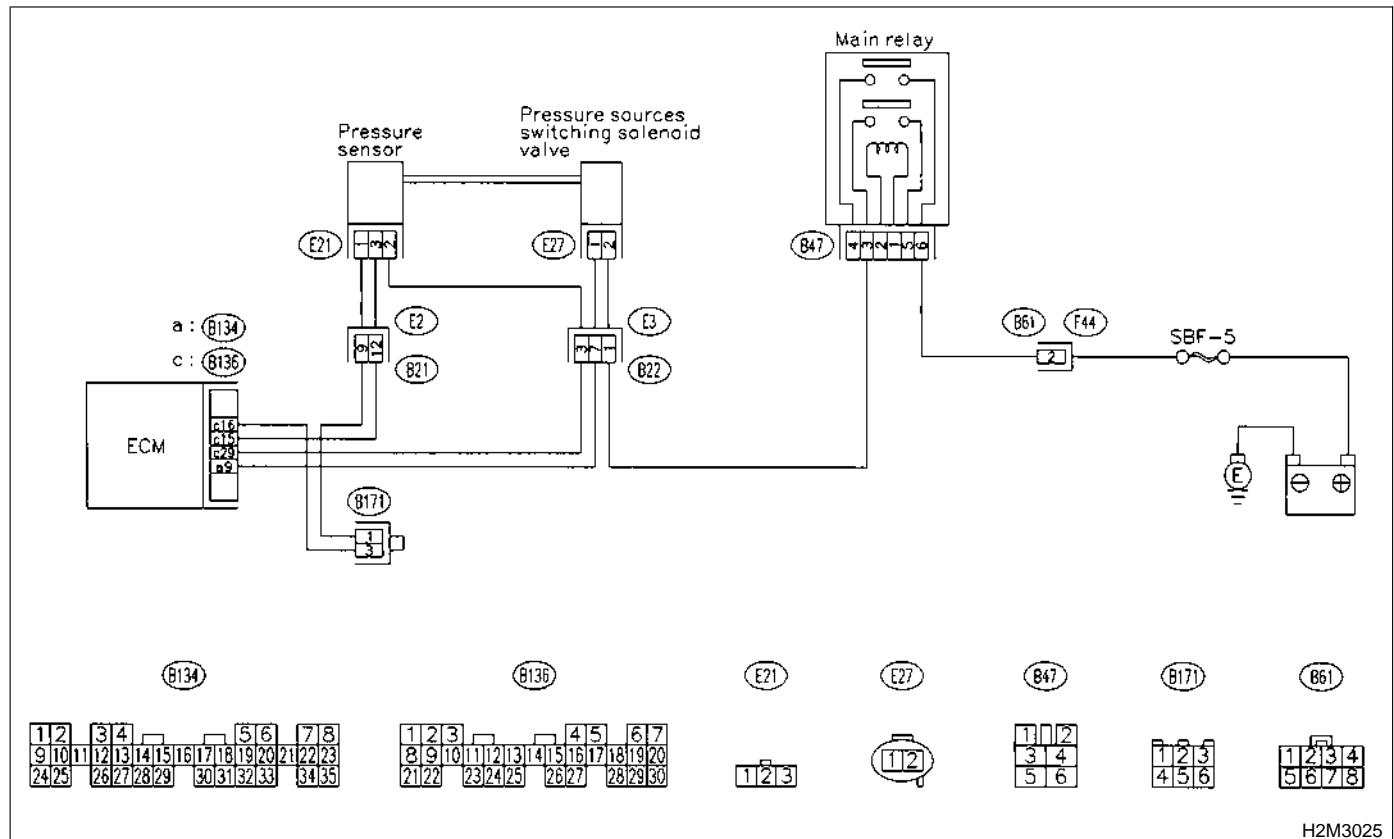
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

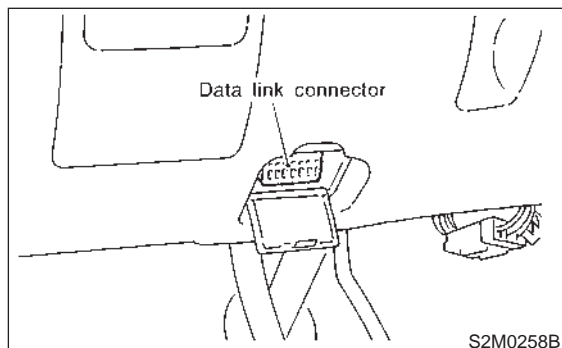
• WIRING DIAGRAM:



H2M3025

11BZ1 : CHECK IDLE SWITCH SIGNAL.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor switch to ON.
- 4) Operate the LED operation mode for engine using Subaru Select Monitor.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to 2-7 [T3C8].>

CHECK : **Does the LED of {Idle Switch Signal} come on?**

YES : Go to step **11BZ2**.

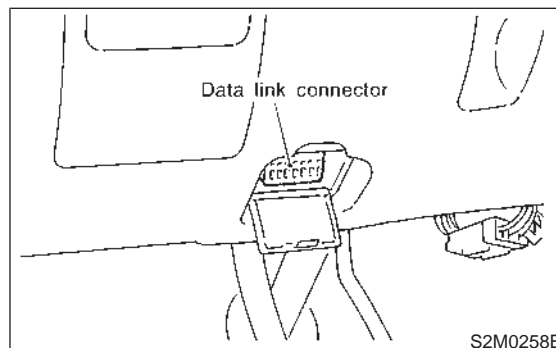
NO : Check throttle position sensor circuit.
<Ref. to 2-7 [T11K0].>

NOTE:

In this case, it is not necessary to inspect DTC P1143.

11BZ2 : CHECK DATA FOR CONTROL.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch ON and Subaru Select Monitor or the OBD-II general scan tool switch ON.
- 4) Start engine.
- 5) Read data of atmospheric absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Is the value less than 32 kPa (240 mmHg, 9.45 inHg)?**

YES : Go to step **11BZ4**.

NO : Go to step **11BZ3**.

11BZ3 : CHECK PRESSURE SENSOR.

- 1) Measure actual atmospheric pressure.
- 2) Read data of atmospheric absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

CHECK : *Is the difference between absolute value of Subaru Selector Monitor indication and actual atmospheric pressure greater than 10 kPa (75 mmHg, 2.95 inHg)?*

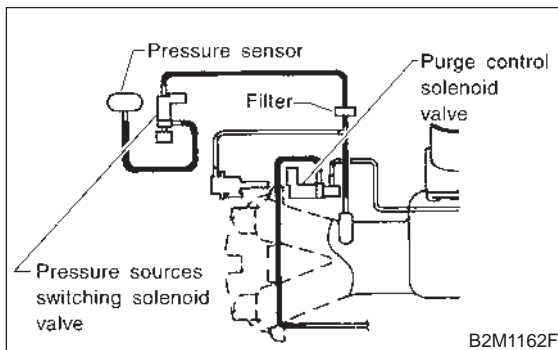
- YES** : Replace pressure sensor.
- NO** : Even if MIL lights up, the circuit has returned to a normal condition at this time. Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

11BZ4 : CHECK VACUUM HOSES.

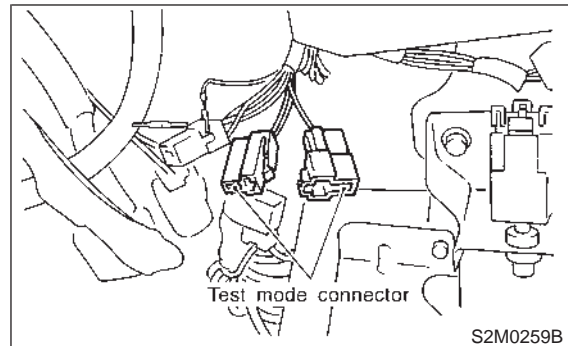
Check the following item. Incorrect hose connections in line between the pressure sources switching solenoid valve and pressure sensor, intake manifold and/or purge control solenoid valve.



- CHECK** : *Is there a fault in vacuum hose?*
- YES** : Repair or replace hoses or filter.
- NO** : Go to step 11BZ5.

11BZ5 : CHECK PRESSURE SOURCES SWITCHING SOLENOID VALVE.

- 1) Turn ignition switch to OFF.
- 2) Connect test mode connector.



- 3) Turn ignition switch to ON.

NOTE:

Pressure sources switching solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to the "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

- CHECK** : *Does pressure sources switching solenoid valve produce operating sound? (ON ↔ OFF each 1.5 sec.)*
- YES** : Replace pressure sensor. <Ref. to 2-7 [W11A0].>
- NO** : Replace pressure sources switching solenoid valve. <Ref. to 2-7 [W13A0].>

MEMO:

CA: DTC P1144 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —

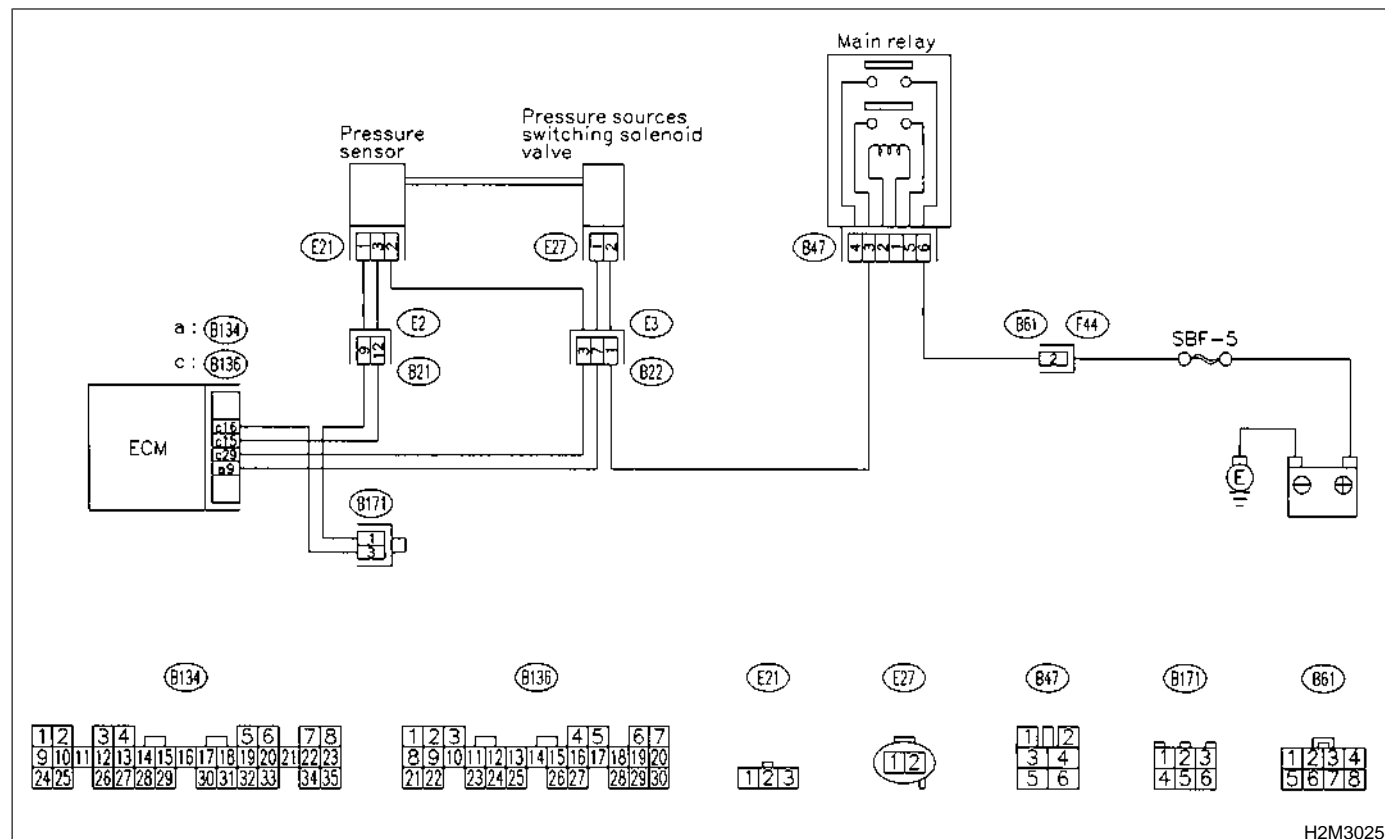
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

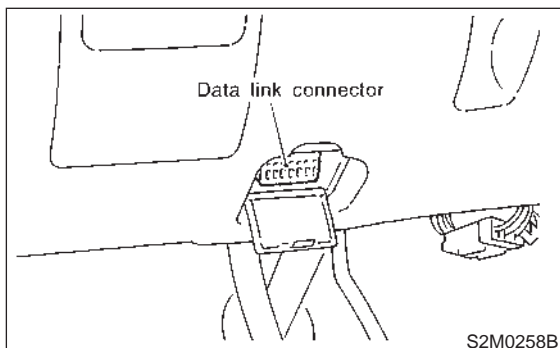
• WIRING DIAGRAM:



H2M3025

11CA1 : CHECK IDLE SWITCH SIGNAL.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Turn ignition switch to ON and Subaru Select Monitor switch to ON.
- 4) Operate the LED operation mode for engine using Subaru Select Monitor.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to 2-7 [T3C8].>

CHECK : **Does the LED of {Idle Switch Signal} come on?**

YES : Go to step **11CA2**.

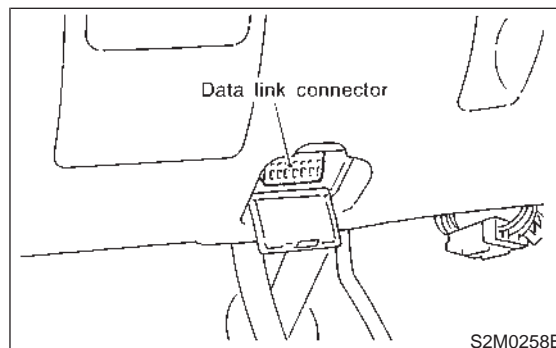
NO : Check throttle position sensor circuit. <Ref. to 2-7 [T11K0].>

NOTE:

In this case, it is not necessary to inspect DTC P1144.

11CA2 : CHECK DATA FOR CONTROL.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 3) Turn ignition switch ON and Subaru Select Monitor or the OBD-II general scan tool switch ON.
- 4) Start engine.
- 5) Read data of atmospheric absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Is the value more than 133 kPa (998 mmHg, 39.29 inHg)?**

YES : Replace pressure sensor. <Ref. to 2-7 [W11A0].>

NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

CB: DTC P1150 — FRONT OXYGEN SENSOR HEATER CIRCUIT HIGH INPUT

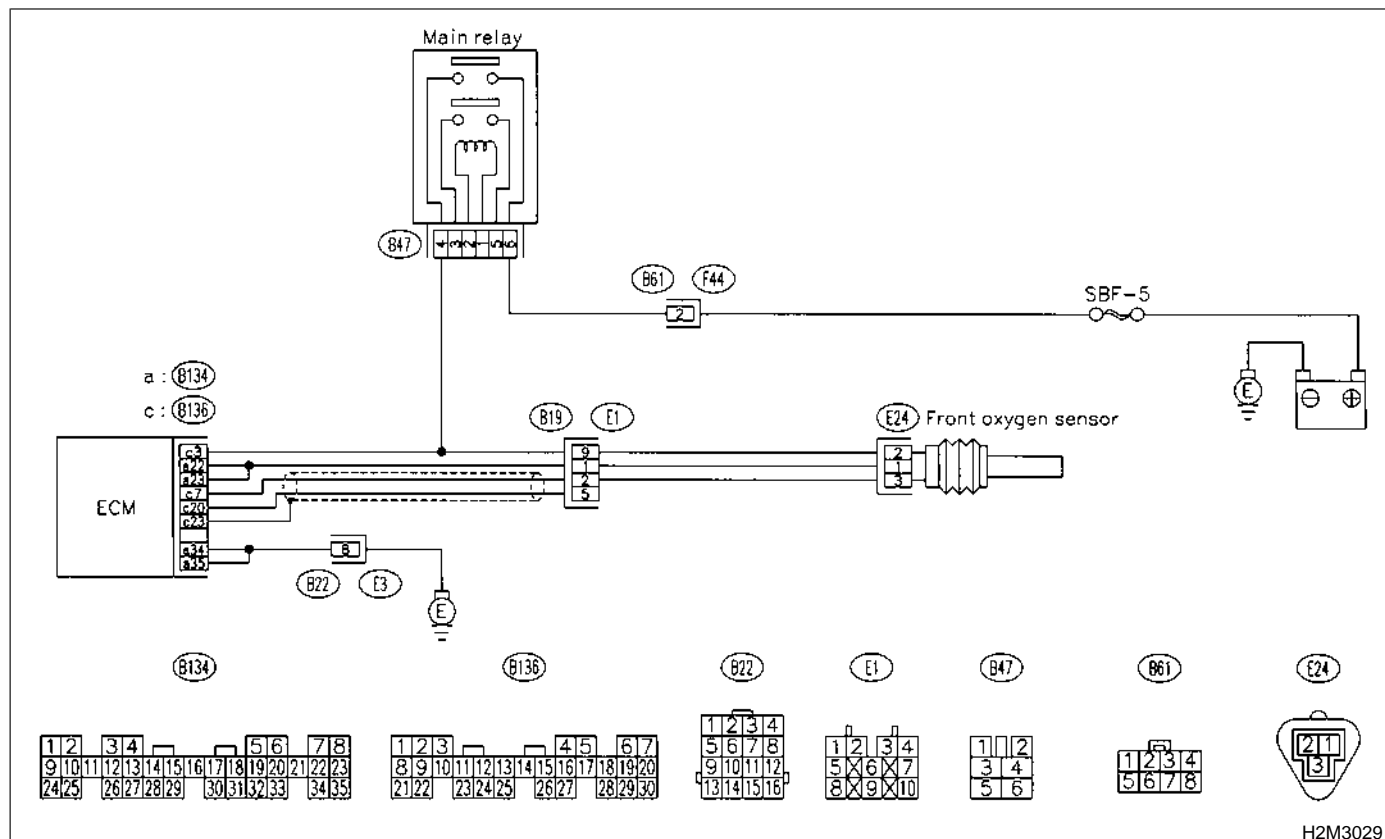
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

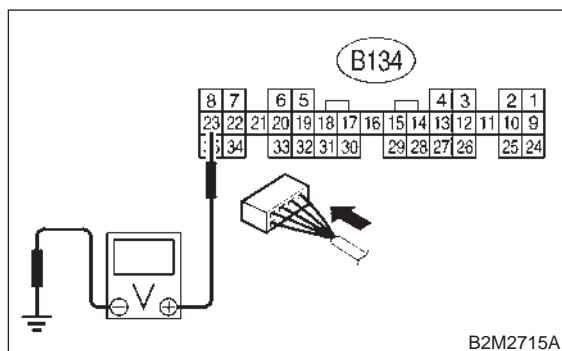
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

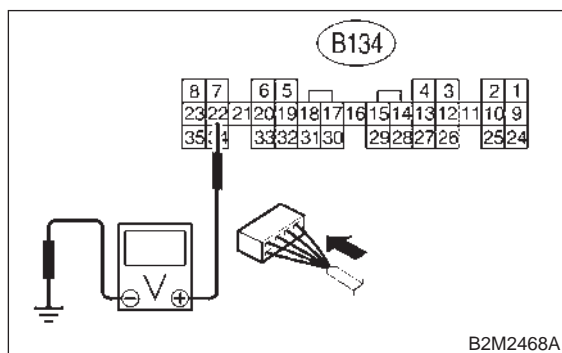


11CB1 : CHECK OUTPUT SIGNAL FROM ECM.

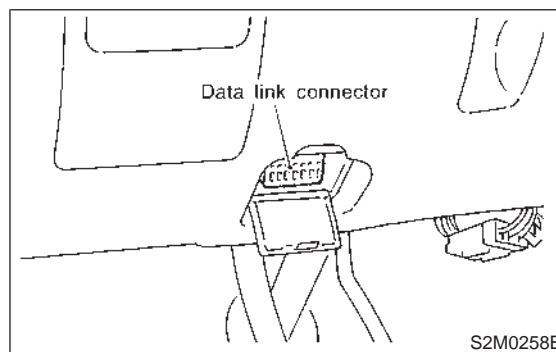
- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM connector and chassis ground.

Connector & terminal**(B134) No. 23 (+) — Chassis ground (-):****CHECK** : **Is the voltage more than 8 V?****YES** : Go to step 11CB3.**NO** : Go to step 11CB2.**11CB2 : CHECK OUTPUT SIGNAL FROM ECM.**

Measure voltage between ECM connector and chassis ground.

Connector & terminal**(B134) No. 22 (+) — Chassis ground (-):****CHECK** : **Is the voltage more than 8 V?****YES** : Go to step 11CB3.**NO** : Go to step 11CB4.**11CB3 : CHECK FRONT OXYGEN SENSOR HEATER CURRENT.**

- 1) Turn ignition switch to OFF.
- 2) Repair battery short circuit in harness between ECM and front oxygen sensor connector.
- 3) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 4) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 5) Read data of front oxygen sensor heater current using Subaru Select Monitor or the OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

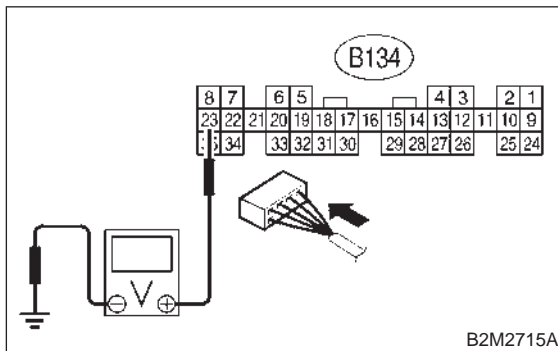
For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Is the value more than 7 A?****YES** : Replace ECM. <Ref. to 2-7 [W15A0].>**NO** : END

11CB4 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B134) No. 23 (+) — Chassis ground (-):

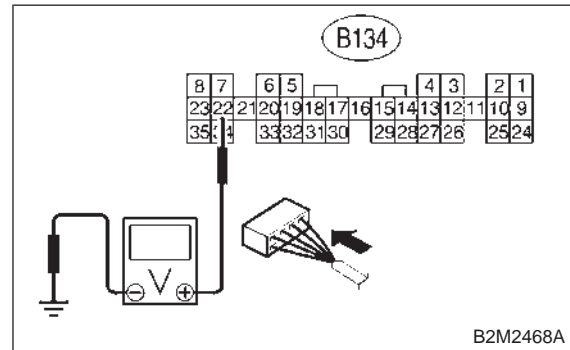


- CHECK** : Does the voltage change more than 8 V by shaking harness and connector of ECM while monitoring the value with voltage meter?
- YES** : Repair battery short circuit in harness between ECM and front oxygen sensor connector.
- NO** : Go to step 11CB5.

11CB5 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B134) No. 22 (+) — Chassis ground (-):



- CHECK** : Does the voltage change more than 8 V by shaking harness and connector of ECM while monitoring the value with voltage meter?
- YES** : Repair battery short circuit in harness between ECM and front oxygen sensor connector.
- NO** : END

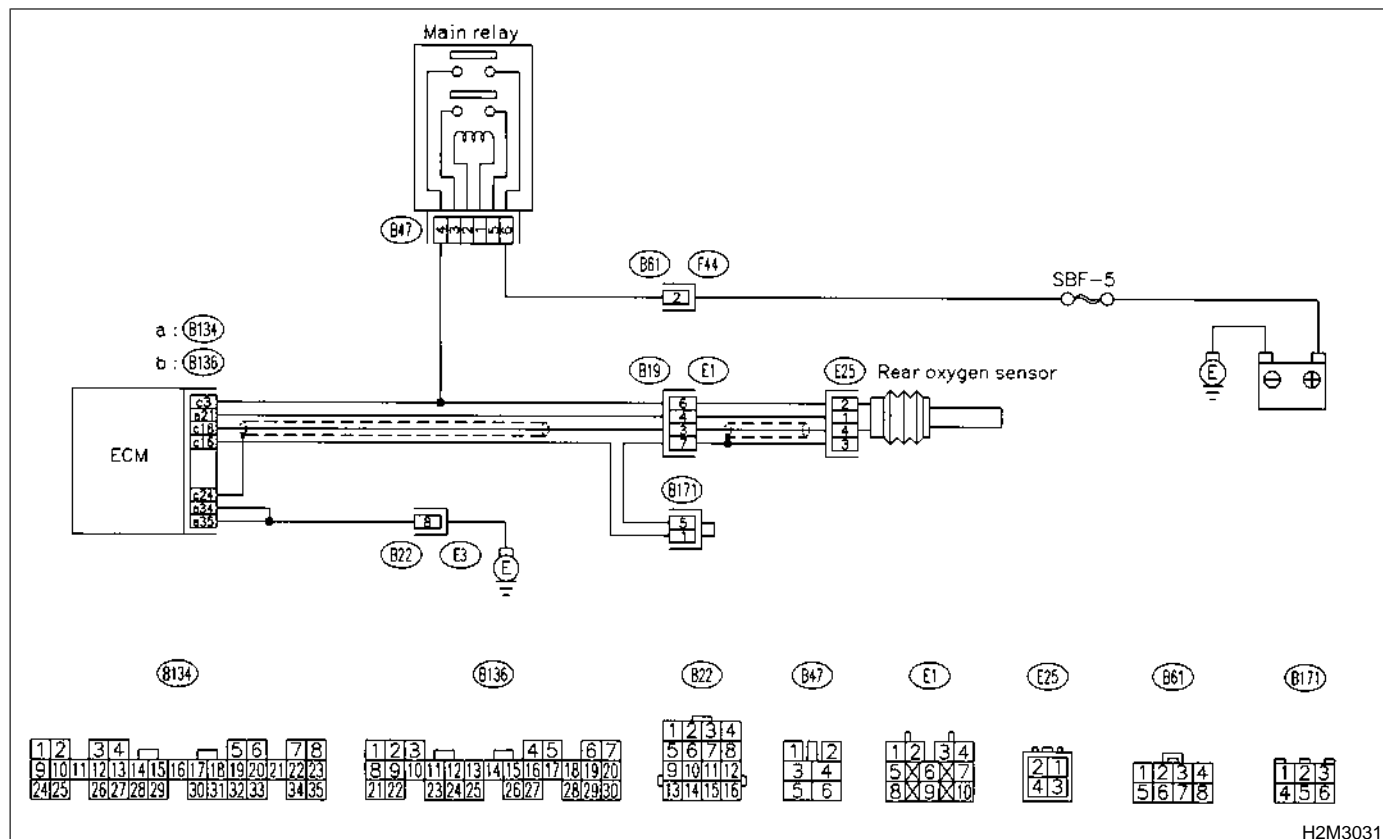
MEMO:

CC: DTC P1151 — REAR OXYGEN SENSOR HEATER CIRCUIT HIGH INPUT**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

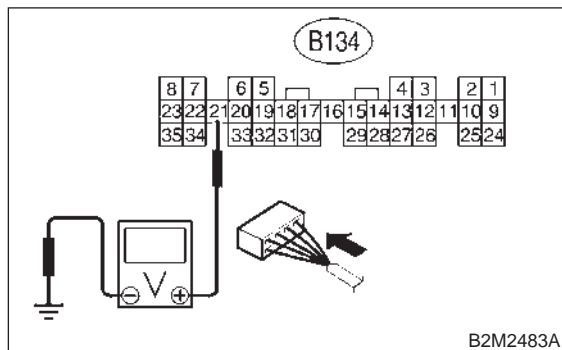
H2M3031

11CC1 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 21 (+) — Chassis ground (-):



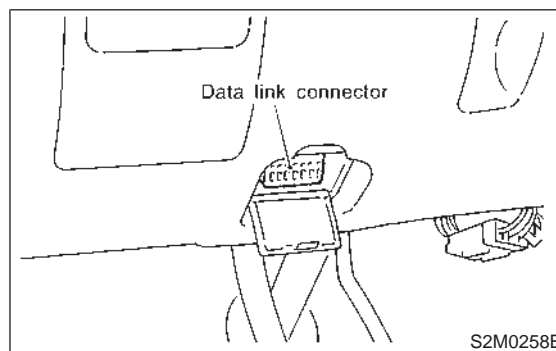
CHECK : **Is the voltage more than 8 V?**

YES : Go to step 11CC2.

NO : Go to step 11CC3.

11CC2 : CHECK FRONT OXYGEN SENSOR HEATER CURRENT.

- 1) Turn ignition switch to OFF.
- 2) Repair battery short circuit in harness between ECM and front oxygen sensor connector.
- 3) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



- 4) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
- 5) Read data of rear oxygen sensor heater current using Subaru Select Monitor or the OBD-II general scan tool.

NOTE:

- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

- OBD-II general scan tool

For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : **Is the value more than 7 A?**

YES : Replace ECM. <Ref. to 2-7 [W15A0].>

NO : END

11CC3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in ECM connector?**

YES : Repair poor contact in ECM connector.

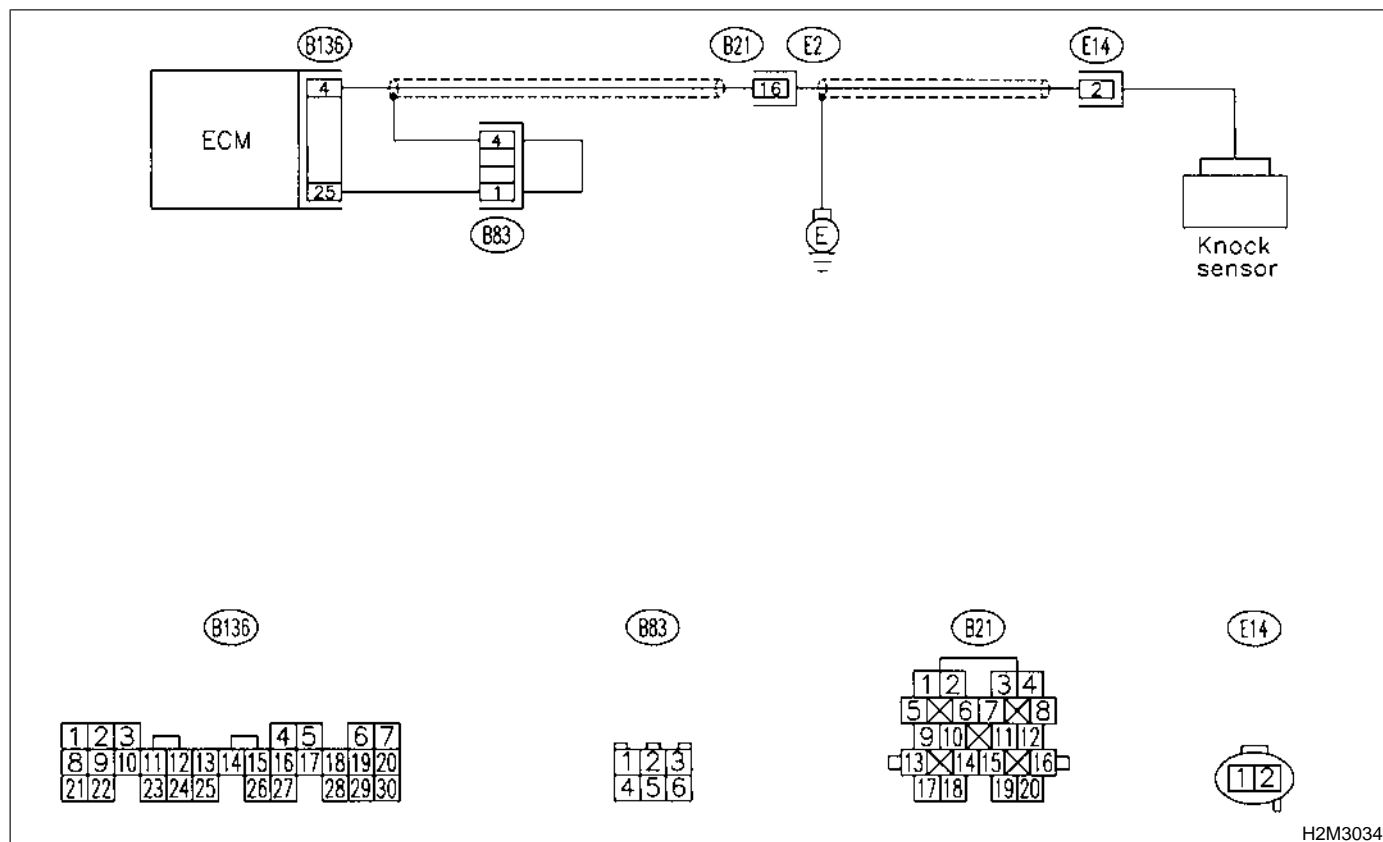
NO : END.

CD: DTC P1325 — KNOCK SENSOR CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Poor driving performance
 - Knocking occurs.

CAUTION:

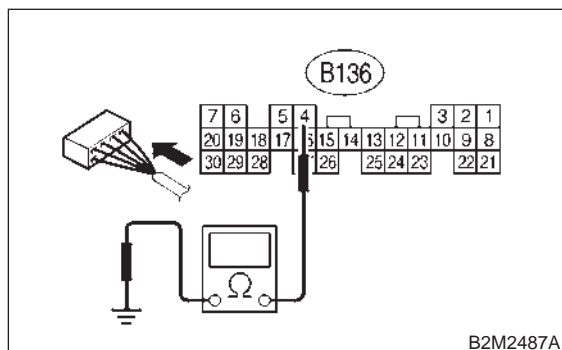
After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

• **WIRING DIAGRAM:**

H2M3034

11CD1 : CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.

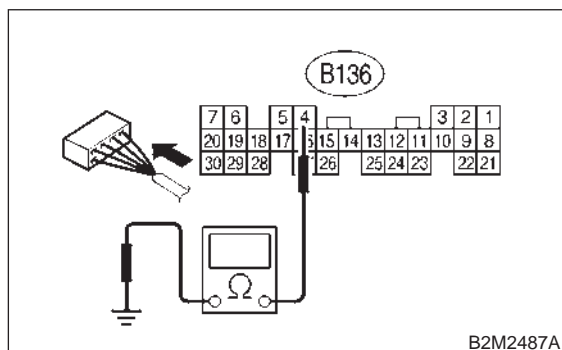
- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance between ECM harness connector and chassis ground.

Connector & terminal
(B136) No. 4 — Chassis ground:


- CHECK** : Is the resistance more than 700 k Ω ?
- YES** : Go to step 11CD3.
- NO** : Go to step 11CD2.

11CD2 : CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.

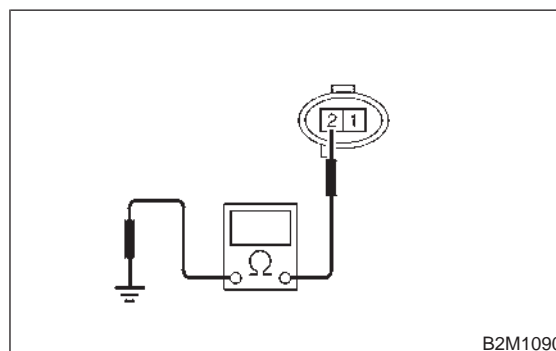
Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal
(B136) No. 4 — Chassis ground:


- CHECK** : Is the resistance less than 400 k Ω ?
- YES** : Go to step 11CD5.
- NO** : Go to step 11CD6.

11CD3 : CHECK KNOCK SENSOR.

- 1) Disconnect connector from knock sensor.
- 2) Measure resistance between knock sensor connector terminal and engine ground.

Terminal
No. 2 — Engine ground:


- CHECK** : Is the resistance more than 700 k Ω ?
- YES** : Go to step 11CD4.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between knock sensor and ECM connector
- Poor contact in knock sensor connector
- Poor contact in coupling connector (B21)

11CD4 : CHECK CONDITION OF KNOCK SENSOR INSTALLATION.

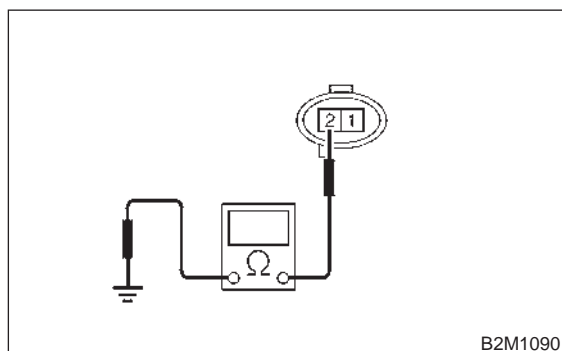
- CHECK** : Is the knock sensor installation bolt tightened securely?
- YES** : Replace knock sensor. <Ref. to 2-7 [W19A0].>
- NO** : Tighten knock sensor installation bolt securely.

11CD5 : CHECK KNOCK SENSOR.

- 1) Disconnect connector from knock sensor.
- 2) Measure resistance between knock sensor connector terminal and engine ground.

Terminal

No. 2 — Engine ground:



- CHECK** : **Is the resistance less than 400 kΩ?**
- YES** : Replace knock sensor. <Ref. to 2-7 [W19A0].>
- NO** : Repair ground short circuit in harness between knock sensor connector and ECM connector.

NOTE:

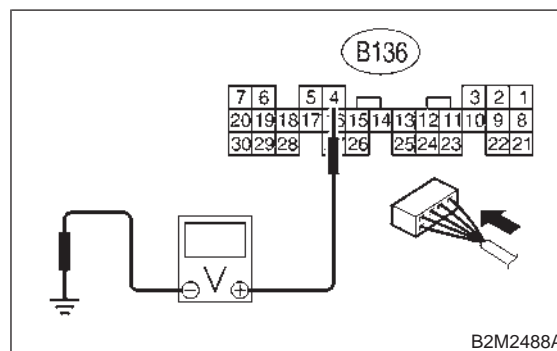
The harness between both connectors is shielded. Repair short circuit of harness together with shield.

11CD6 : CHECK INPUT SIGNAL FOR ECM.

- 1) Connect connectors to ECM and knock sensor.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between ECM and chassis ground.

Connector & terminal

(B136) No. 4 (+) — Chassis ground (-):



- CHECK** : **Is the voltage more than 2 V?**
- YES** : Even if MIL lights up, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.)

NOTE:

In this case, repair the following:

- Poor contact in knock sensor connector
 - Poor contact in ECM connector
 - Poor contact in coupling connector (B21)
- NO** : Repair poor contact in ECM connector.

MEMO:

CE: DTC P1400 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE CIRCUIT LOW INPUT —

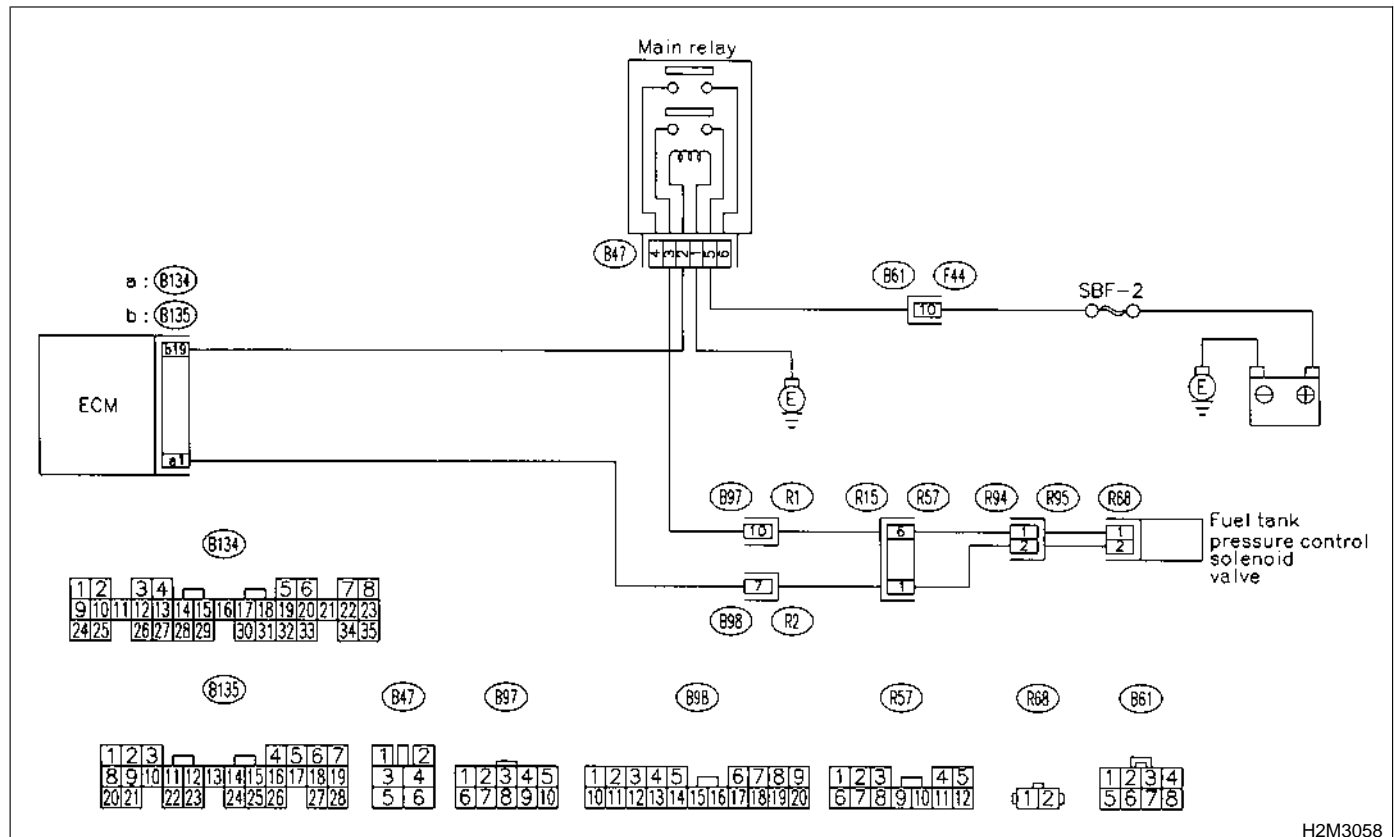
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

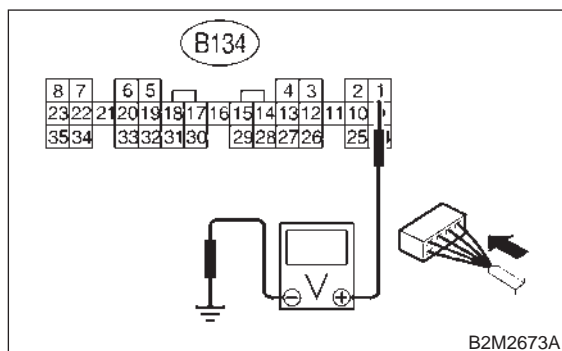
• WIRING DIAGRAM:



H2M3058

11CE1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal**(B134) No. 1 (+) — Chassis ground (-):****CHECK** : **Is the voltage more than 10 V?****YES** : Go to step 11CE2.**NO** : Go to step 11CE3.**11CE2 : CHECK POOR CONTACT.**

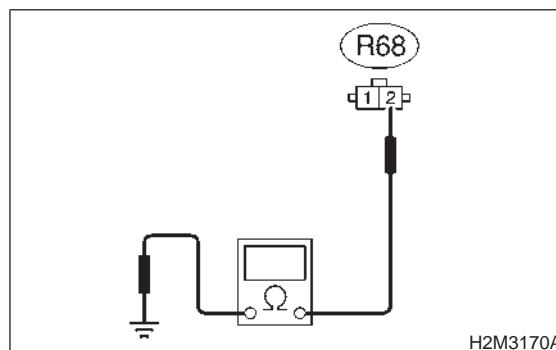
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in ECM connector?****YES** : Repair poor contact in ECM connector.**NO** : Contact with SOA service.**NOTE:**

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

11CE3 : CHECK HARNESS BETWEEN FUEL TANK PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

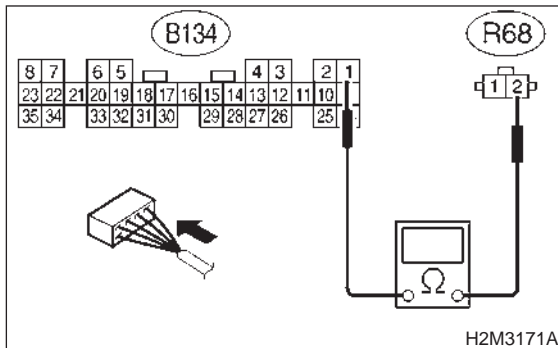
- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from fuel tank pressure control solenoid valve and ECM.
- 3) Measure resistance of harness between fuel tank pressure control solenoid valve connector and chassis ground.

Connector & terminal**(R68) No. 2 — Chassis ground:****CHECK** : **Is the resistance less than 10 Ω?****YES** : Repair ground short circuit in harness between ECM and fuel tank pressure control solenoid valve connector.**NO** : Go to step 11CE4.

11CE4 : CHECK HARNESS BETWEEN FUEL TANK PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

Measure resistance of harness between ECM and fuel tank pressure control solenoid valve connector.

Connector & terminal
(B134) No. 1 — (R68) No. 2:



- CHECK** : Is the resistance less than 1 Ω ?
YES : Go to step 11CE5.
NO : Repair harness and connector.

NOTE:

In this case, repair the following:

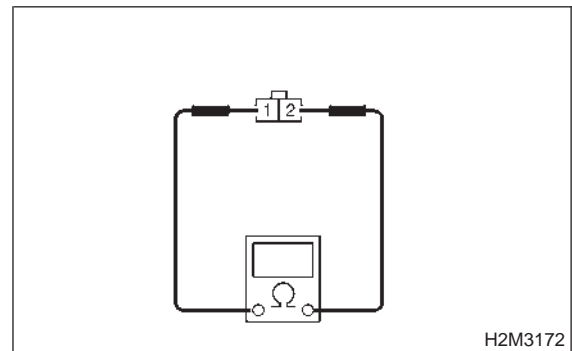
- Open circuit in harness between ECM and fuel tank pressure control solenoid valve connector
- Poor contact in coupling connectors (R94), (B98) and (R57)

11CE5 : CHECK FUEL TANK PRESSURE CONTROL SOLENOID VALVE.

Measure resistance between fuel tank pressure control solenoid valve terminals.

Terminals

No. 1 — No. 2:



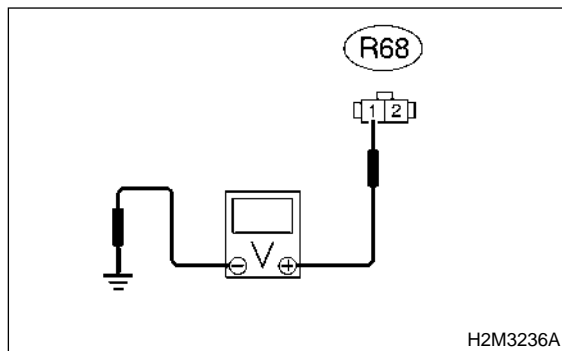
- CHECK** : Is the resistance between 10 and 100 Ω ?
YES : Go to step 11CE6.
NO : Replace fuel tank pressure control solenoid valve. <Ref. to 2-1 [W7A0].>

11CE6 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE CONTROL SOLENOID VALVE.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between fuel tank pressure control solenoid valve and chassis ground.

Connector & terminal

(R68) No. 1 (+) — Chassis ground (-):



CHECK : *Is the voltage more than 10 V?*

YES : Go to step 11CE7.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between main relay and fuel tank pressure control solenoid valve connector
- Poor contact in coupling connectors (R94), (B97) and (R57)
- Poor contact in main relay connector

11CE7 : CHECK POOR CONTACT.

Check poor contact in fuel tank pressure control solenoid valve connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in fuel tank pressure control solenoid valve connector?*

YES : Repair poor contact in fuel tank pressure control solenoid valve connector.

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

CF: DTC P1420 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE CIRCUIT HIGH INPUT —

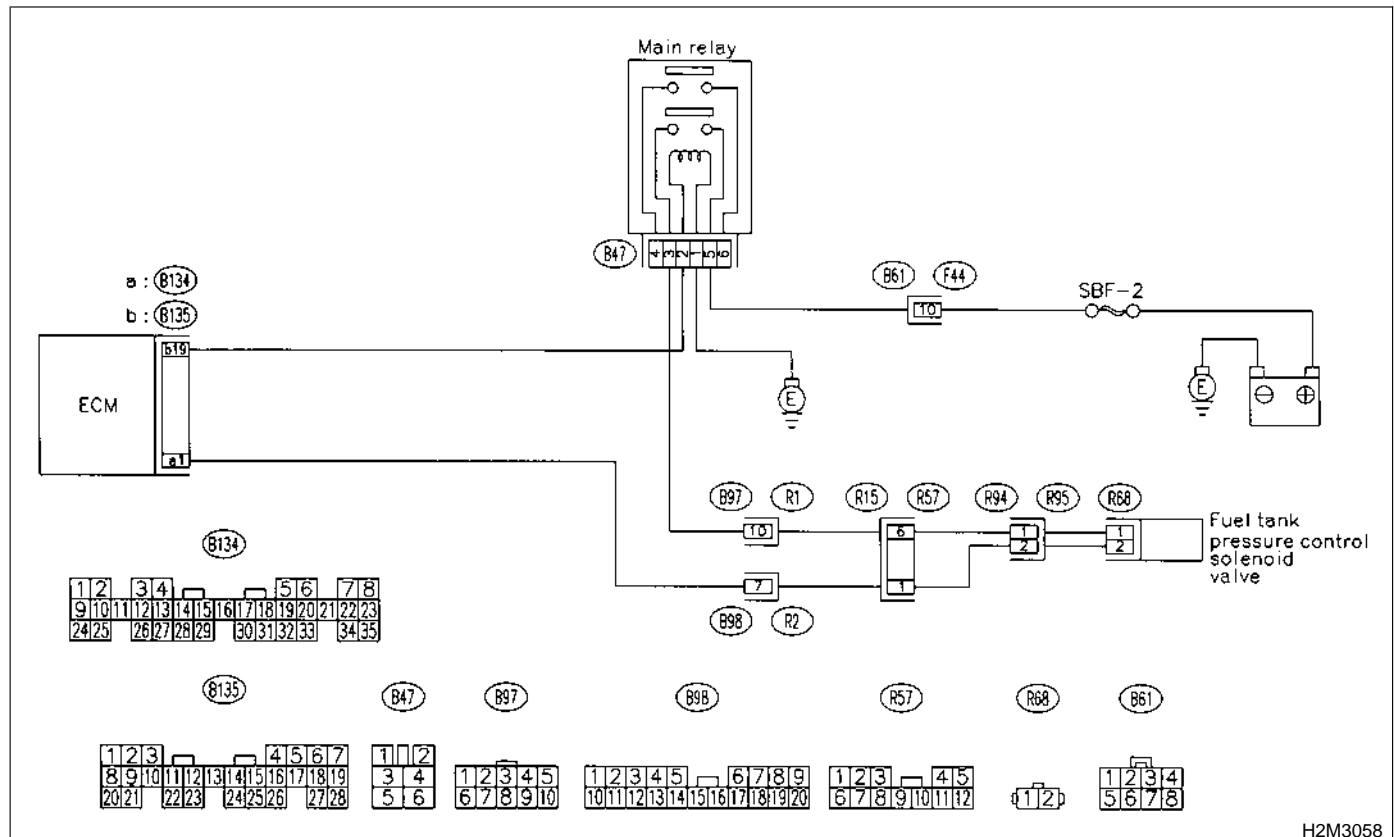
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

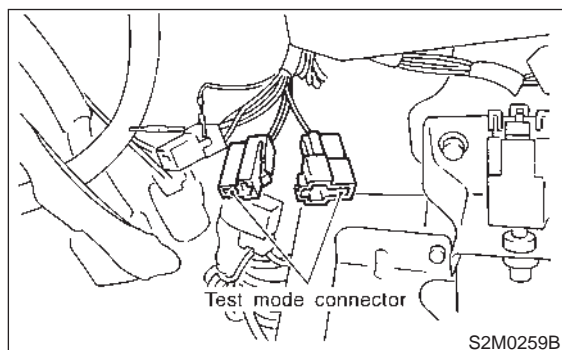
• WIRING DIAGRAM:



H2M3058

11CF1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to OFF.
- 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



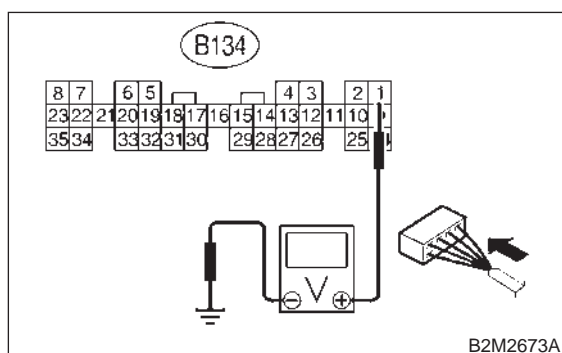
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

NOTE:

Fuel tank pressure control solenoid valve operation check can be executed using Subaru Select Monitor. For procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

Connector & terminal

(B134) No. 1 (+) — Chassis ground (-):



CHECK : Does voltage change between 0 and 10 volts?

YES : Go to step 11CF2.

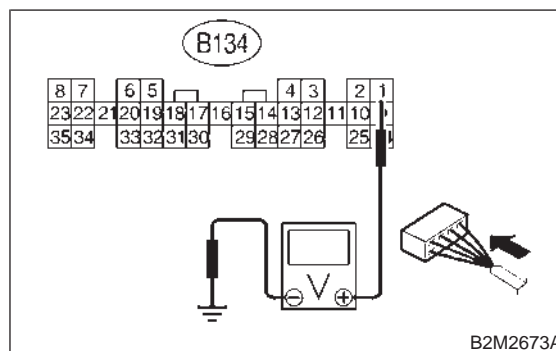
NO : Even if MIL light up, the circuit has returned to a normal condition at this time. In this case, repair poor contact in ECM connector.

11CF2 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 1 (+) — Chassis ground (-):



CHECK : Is the voltage more than 10 V?

YES : Go to step 11CF4.

NO : Go to step 11CF3.

11CF3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in ECM connector?

YES : Repair poor contact in ECM connector.

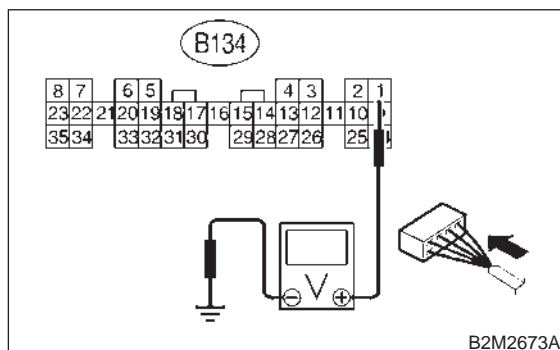
NO : Replace ECM. <Ref. to 2-7 [W15A0].>

11CF4 : CHECK HARNESS BETWEEN FUEL TANK PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from fuel tank pressure control solenoid valve.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 1 (+) — Chassis ground (-):



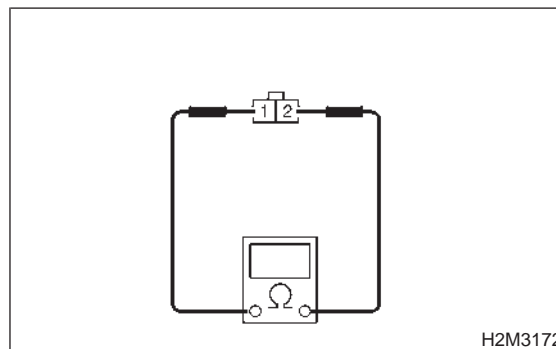
- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in harness between ECM and fuel tank pressure control solenoid valve connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Go to step 11CF5.

11CF5 : CHECK FUEL TANK PRESSURE CONTROL SOLENOID VALVE.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between fuel tank pressure control solenoid valve terminals.

Terminals

No. 1 — No. 2:



- CHECK** : Is the resistance less than 1 Ω?
- YES** : Replace fuel tank pressure control solenoid valve <Ref. to 2-1 [W7A0].> and ECM <Ref. to 2-7 [W15A0].>.
- NO** : Go to step 11CF6.

11CF6 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : Is there poor contact in ECM connector?
- YES** : Repair poor contact in ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

MEMO:

CG: DTC P1422 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH INPUT —

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

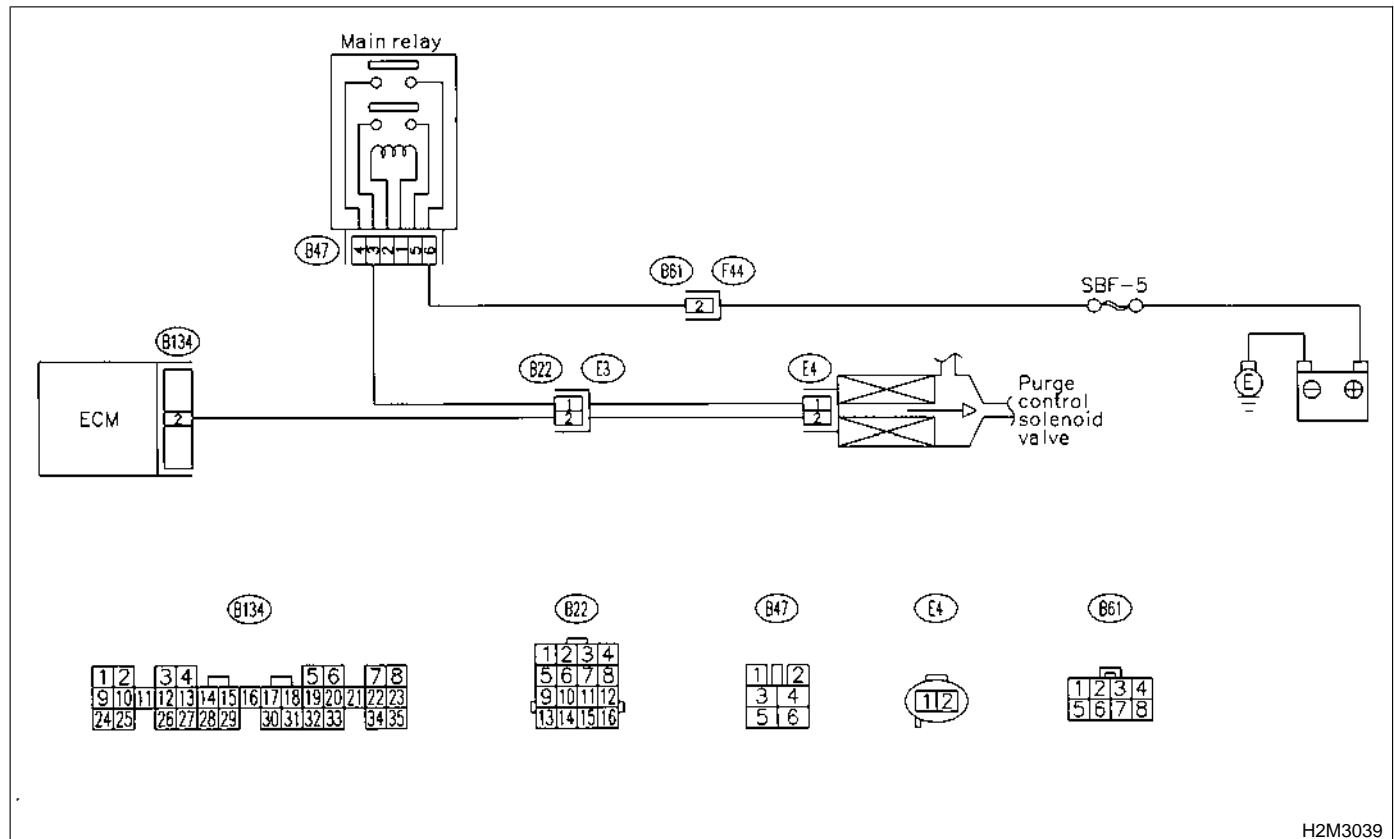
• TROUBLE SYMPTOM:

- Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

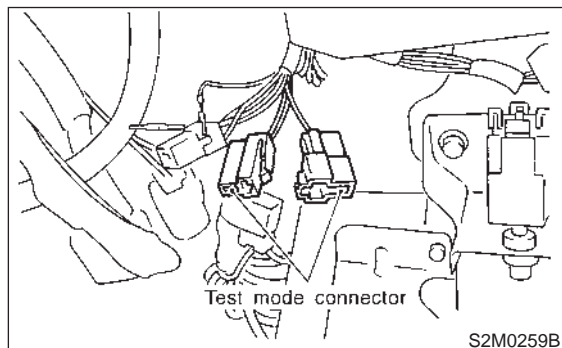
• WIRING DIAGRAM:



H2M3039

11CG1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to OFF.
- 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



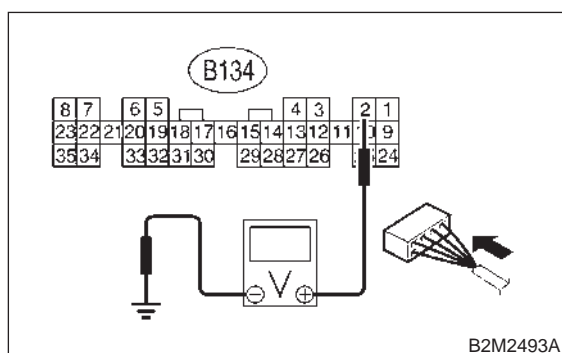
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

NOTE:

Purge control solenoid valve operation check can be executed using Subaru Select Monitor. For procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

Connector & terminal

(B134) No. 2 (+) — Chassis ground (-):



CHECK : **Does voltage change between 0 and 10 volts?**

YES : Go to step 11CG2.

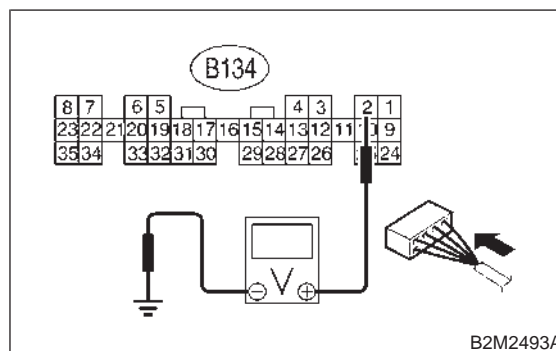
NO : Even if MIL light up, the circuit has returned to a normal condition at this time. In this case, repair poor contact in ECM connector.

11CG2 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 2 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 10 V?**

YES : Go to step 11CG4.

NO : Go to step 11CG3.

11CG3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in ECM connector?**

YES : Repair poor contact in ECM connector.

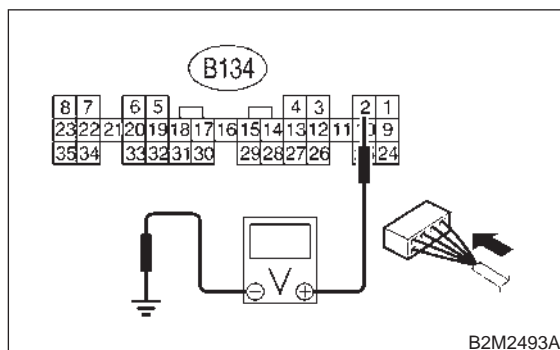
NO : Replace ECM. <Ref. to 2-7 [W15A0].>

11CG4 : CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from purge control solenoid valve.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 2 (+) — Chassis ground (-):



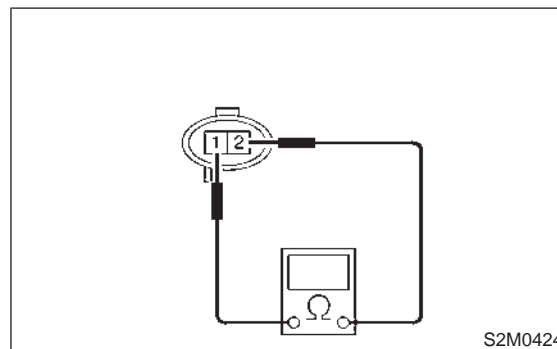
- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in harness between ECM and purge control solenoid valve connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Go to step 11CG5.

11CG5 : CHECK PURGE CONTROL SOLENOID VALVE.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between purge control solenoid valve terminals.

Terminals

No. 1 — No. 2:



- CHECK** : Is the resistance less than 1 Ω?
- YES** : Replace purge control solenoid valve <Ref. to 2-1 [W4A0].> and ECM <Ref. to 2-7 [W15A0].>.
- NO** : Go to step 11CG6.

11CG6 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : Is there poor contact in ECM connector?
- YES** : Repair poor contact in ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

MEMO:

CH: DTC P1423 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL HIGH INPUT —

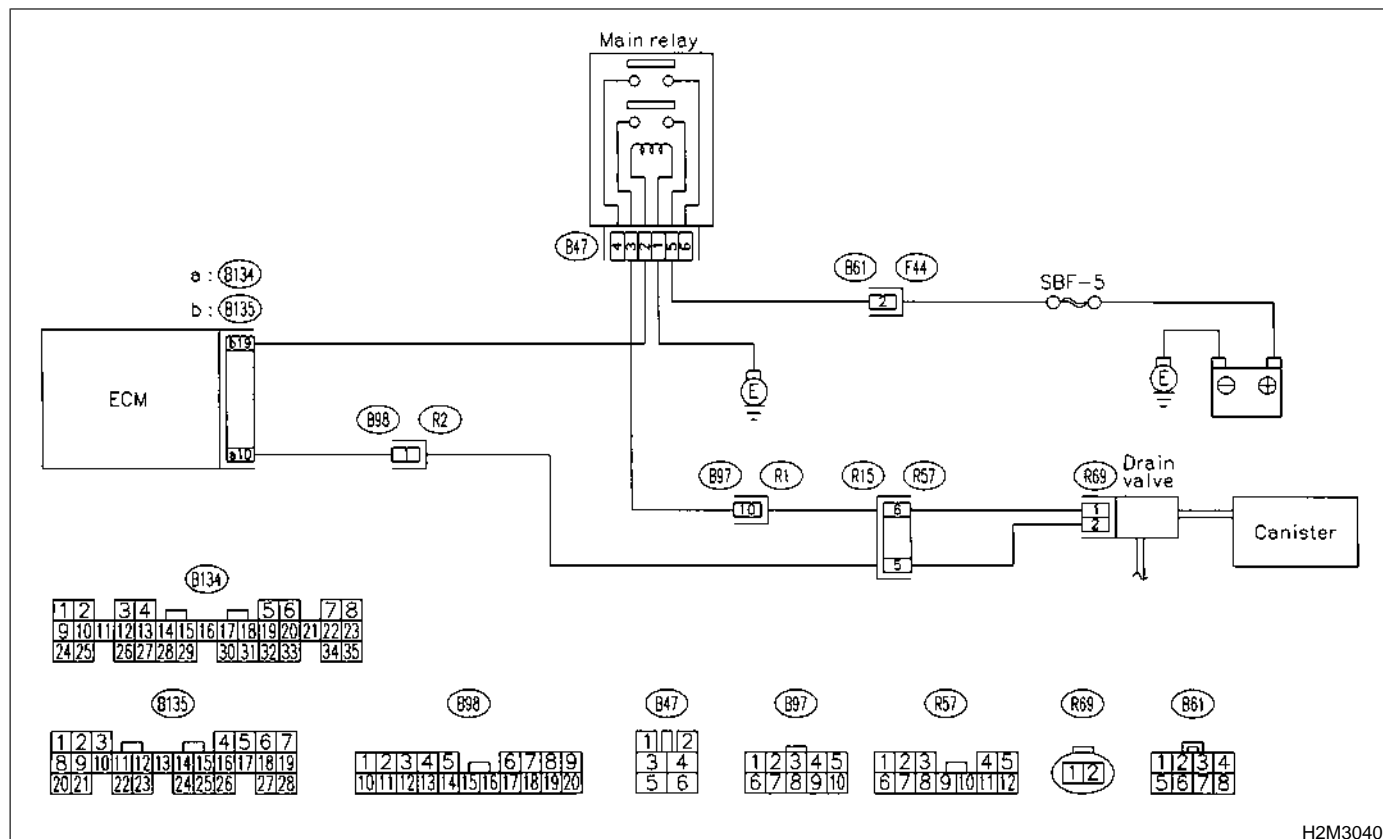
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

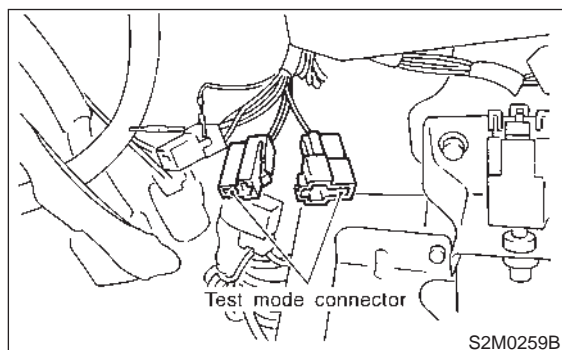
• WIRING DIAGRAM:



H2M3040

11CH1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to OFF.
- 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



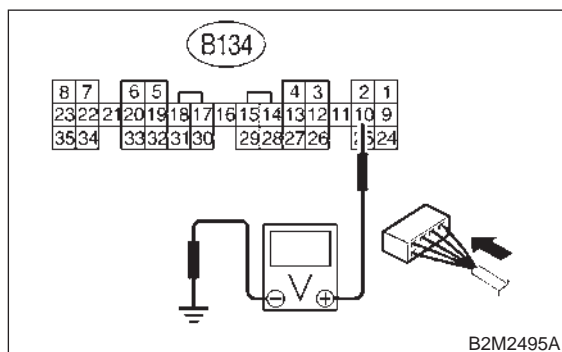
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

NOTE:

Drain valve operation check can be executed using Subaru Select Monitor. For procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

Connector & terminal

(B134) No. 10 (+) — Chassis ground (-):



CHECK : **Does voltage change between 0 and 10 volts?**

YES : Go to step 11CH2.

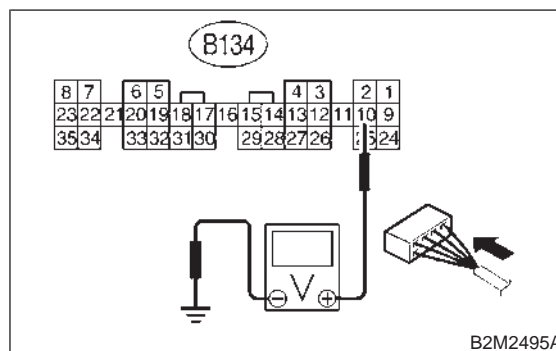
NO : Even if MIL light up, the circuit has returned to a normal condition at this time. In this case, repair poor contact in ECM connector.

11CH2 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 10 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 10 V?**

YES : Go to step 11CH4.

NO : Go to step 11CH3.

11CH3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in ECM connector?**

YES : Repair poor contact in ECM connector.

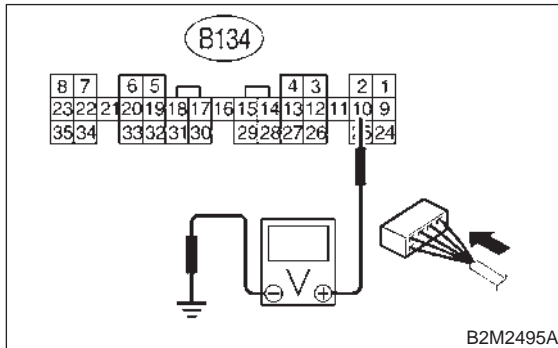
NO : Replace ECM. <Ref. to 2-7 [W15A0].>

11CH4 : CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from drain valve.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 10 (+) — Chassis ground (-):



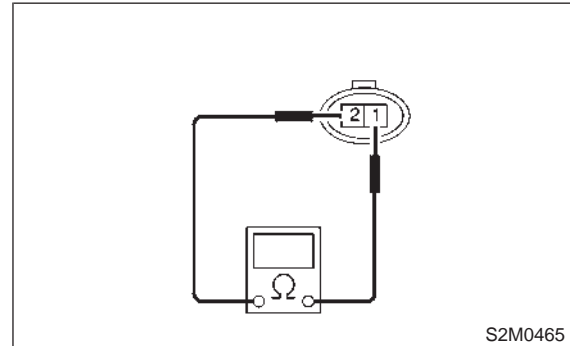
- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair battery short circuit in harness between ECM and drain valve connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Go to step **11CH5**.

11CH5 : CHECK DRAIN VALVE.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between drain valve terminals.

Terminals

No. 1 — No. 2:



- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Replace drain valve <Ref. to 2-1 [W13A0].> and ECM <Ref. to 2-7 [W15A0].>.
- NO** : Go to step **11CH6**.

11CH6 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : **Is there poor contact in ECM connector?**
- YES** : Repair poor contact in ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

CI: DTC P1442 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM 2 —

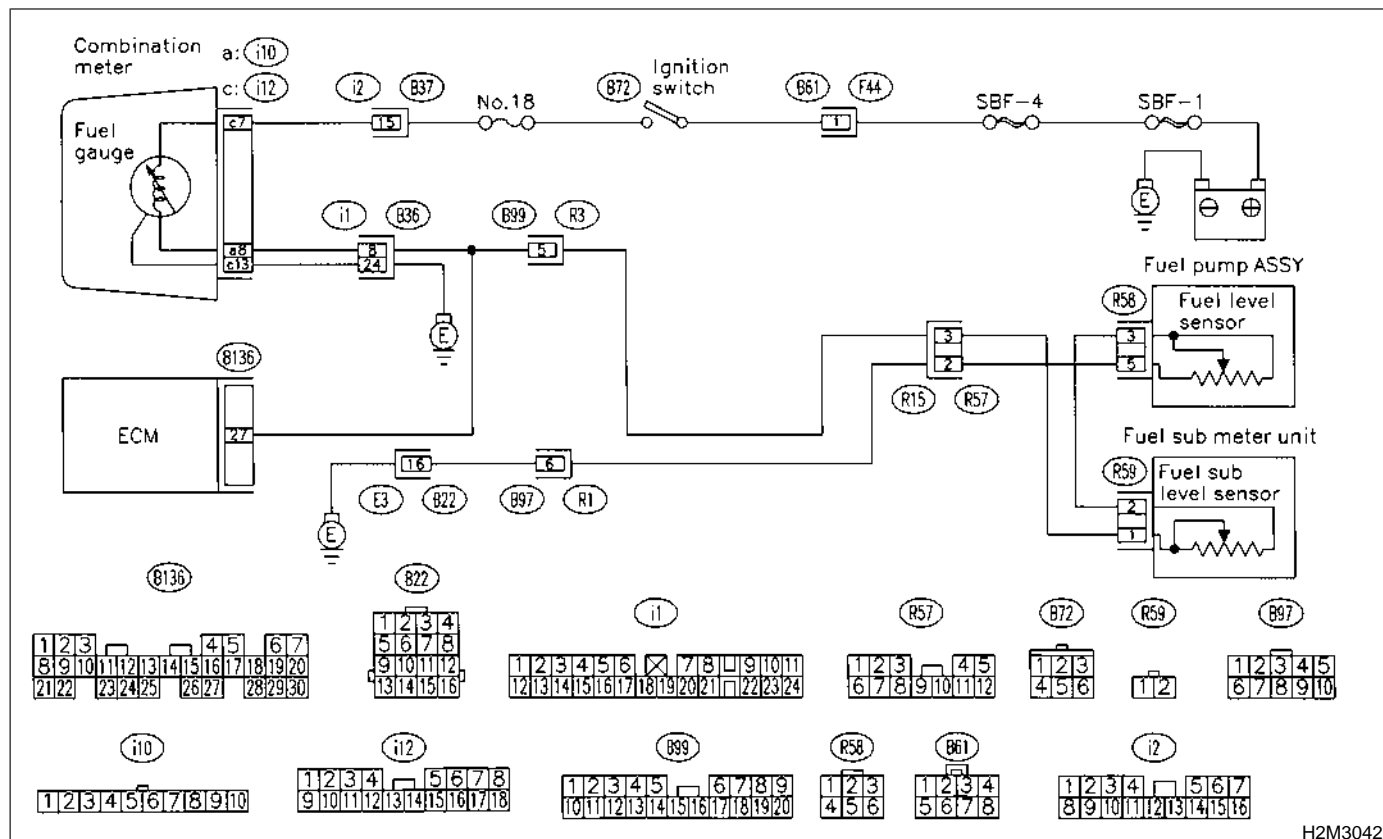
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3042

11C11 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0461, P0462 or P0463?

YES : Inspect DTC P0461, P0462 or P0463 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NOTE:

In this case, it is not necessary to inspect this trouble.

NO : Replace fuel sending unit <Ref. to 2-1 [W8A0].> and fuel sub meter unit.

CJ: DTC P1443 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL FUNCTION PROBLEM —

• DTC DETECTING CONDITION:

- Immediately after fault occurrence

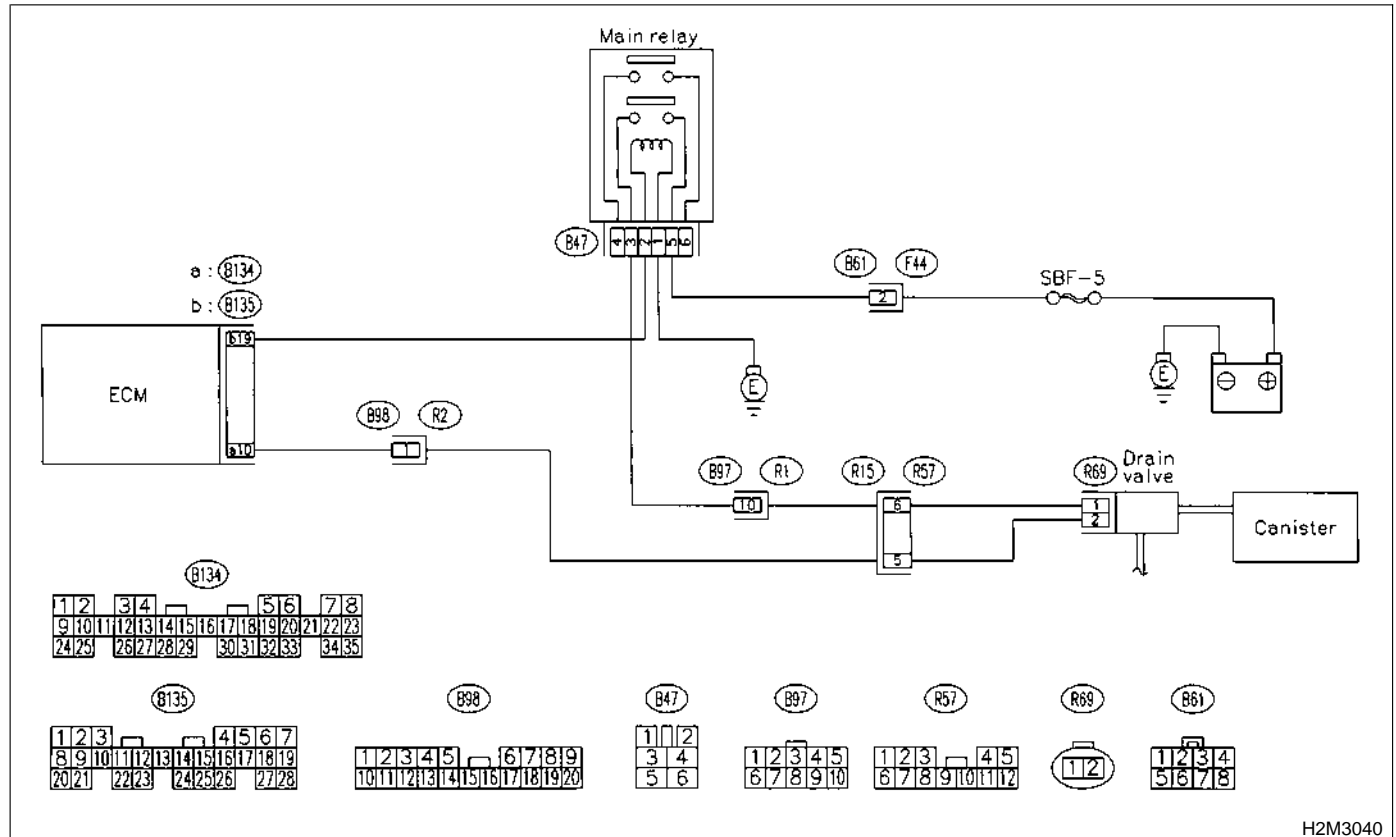
• TROUBLE SYMPTOM:

- Improper fuel supply

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3040

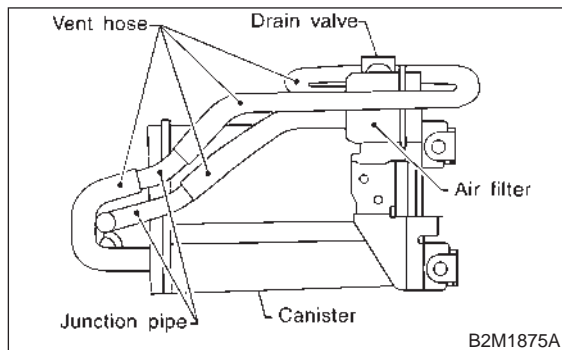
11CJ1 : CHECK ANY OTHER DTC ON DISPLAY.

- CHECK** : *Is there any other DTC on display?*
- YES** : Inspect the relevant DTC using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>
- NO** : Go to step **11CJ2**.

11CJ2 : CHECK VENT LINE HOSES.

Check the following items.

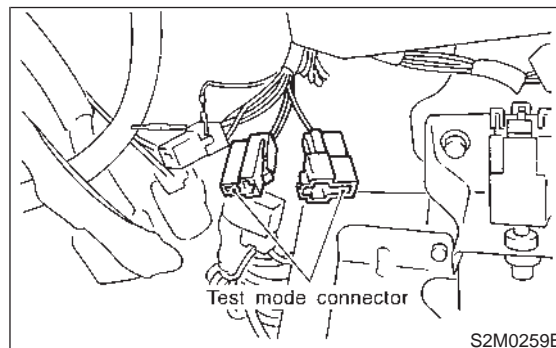
- Clogging of vent hoses between canister and drain valve
- Clogging of vent hose between drain valve and air filter
- Clogging of vent hose between air filter and junction pipe
- Clogging of junction pipe
- Clogging of air filter



- CHECK** : ***Is there a fault in vent line?***
- YES** : Repair or replace the faulty part.
- NO** : Go to step **11CJ3**.

11CJ3 : CHECK DRAIN VALVE OPERATION.

- 1) Turn ignition switch to OFF.
- 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



- 3) Turn ignition switch to ON.

NOTE:

Drain valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to the "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

- CHECK** : ***Does drain valve produce operating sound?***

- YES** : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

- NO** : Replace drain valve. <Ref. to 2-1 [W13A0].>

CK: DTC P1507 — IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE) —**• DTC DETECTING CONDITION:**

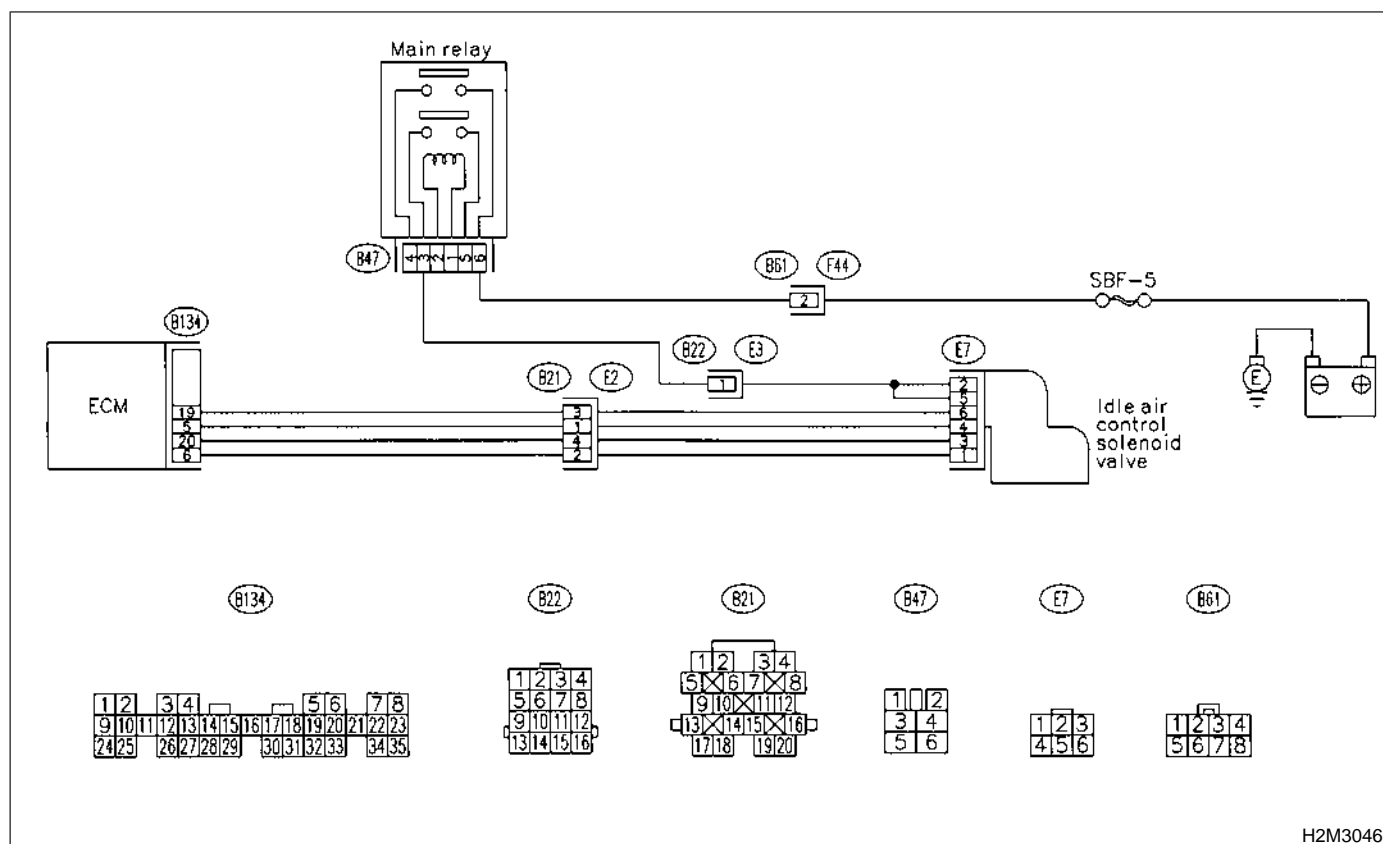
- Two consecutive driving cycles with fault

• TROUBLE SYMPTOM:

- Engine keeps running at higher revolution than specified idling revolution.

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3046

11CK1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0116 or P0117 or P0505 or P1505?

YES : Inspect DTC P0116 or P0117 or P0505 or P1505 using "11. Diagnostics Chart with Trouble Code for Except 2200 cc California Spec. Vehicles". <Ref. to 2-7 [T11A0].>

NOTE:

In this case, it is not necessary to inspect DTC P1507.

NO : Go to step **11CK2**.

11CK2 : CHECK AIR INTAKE SYSTEM.

- 1) Turn ignition switch to ON.
- 2) Start engine, and idle it.
- 3) Check the following items.
 - Loose installation of intake manifold, idle air control solenoid valve and throttle body
 - Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket
 - Disconnections of vacuum hoses

CHECK : Is there a fault in air intake system?

YES : Repair air suction and leaks.

NO : Replace idle air control solenoid valve. <Ref. to 2-7 [W12A2].>

MEMO:

**CL: DTC P1510 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 1
CIRCUIT LOW INPUT —****NOTE:**

For the diagnostic procedure, refer to 2-7 [T11CR0]. <Ref. to 2-7 [T11CR0].>

**CM: DTC P1511 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 1
CIRCUIT HIGH INPUT —****NOTE:**

For the diagnostic procedure, refer to 2-7 [T11CS0]. <Ref. to 2-7 [T11CS0].>

**CN: DTC P1512 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 2
CIRCUIT LOW INPUT —****NOTE:**

For the diagnostic procedure, refer to 2-7 [T11CR0]. <Ref. to 2-7 [T11CR0].>

**CO: DTC P1513 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 2
CIRCUIT HIGH INPUT —****NOTE:**

For the diagnostic procedure, refer to 2-7 [T11CR0]. <Ref. to 2-7 [T11CR0].>

**CP: DTC P1514 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 3
CIRCUIT LOW INPUT —****NOTE:**

For the diagnostic procedure, refer to 2-7 [T11CR0]. <Ref. to 2-7 [T11CR0].>

**CQ: DTC P1515 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 3
CIRCUIT HIGH INPUT —****NOTE:**

For the diagnostic procedure, refer to 2-7 [T11CR0]. <Ref. to 2-7 [T11CR0].>

CR: DTC P1516 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT LOW INPUT —

• DTC DETECTING CONDITION:

- Immediately at fault recognition

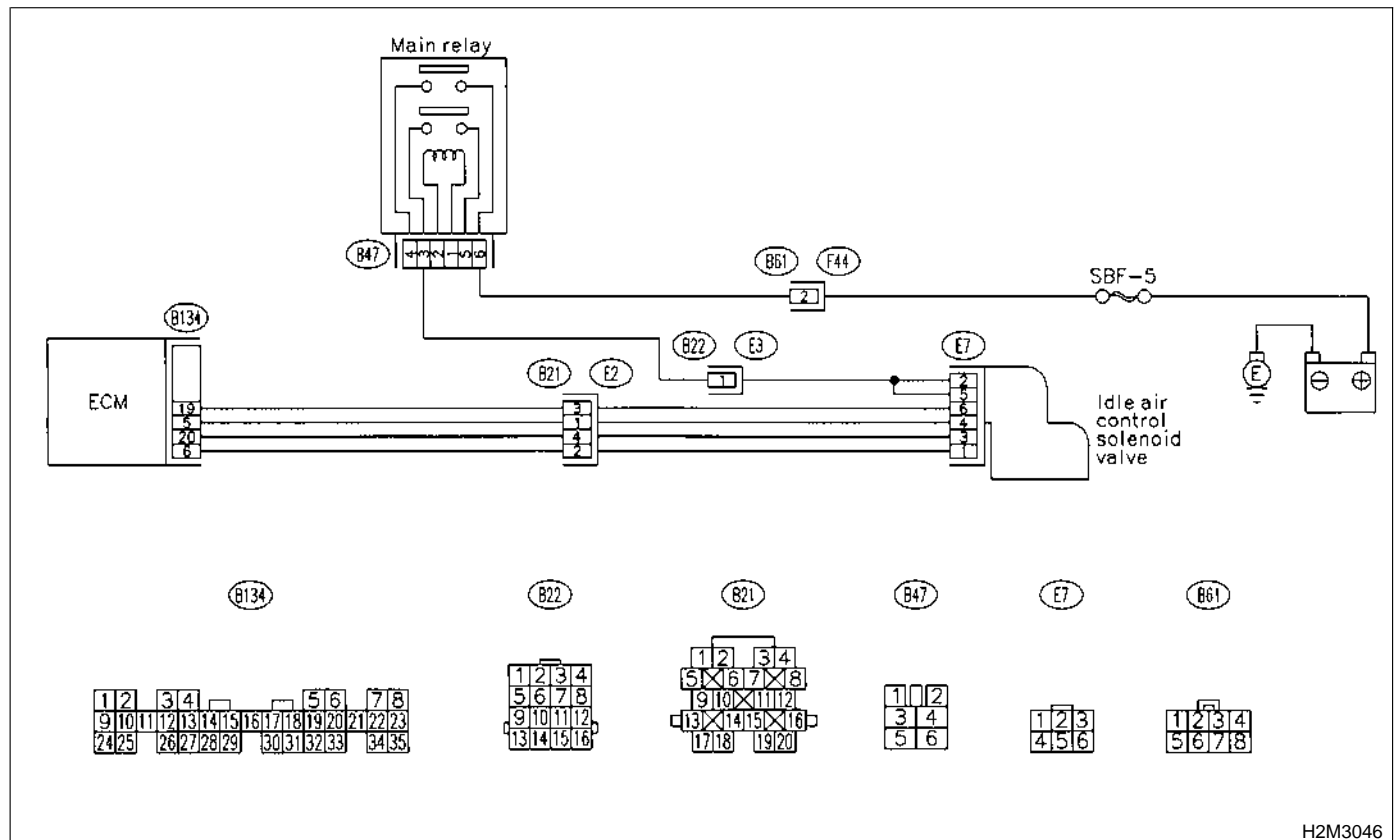
• TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



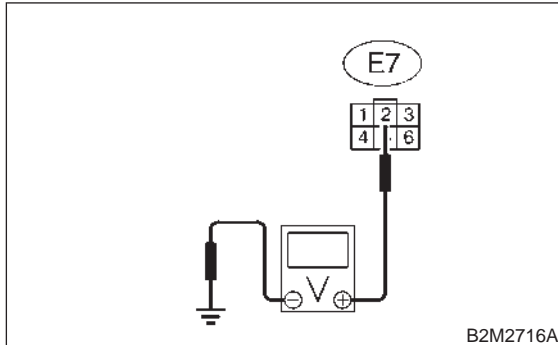
H2M3046

11CR1 : CHECK POWER SUPPLY TO IDLE AIR CONTROL SOLENOID VALVE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from idle air control solenoid valve.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between idle air control solenoid valve connector and engine ground.

Connector & terminal

(E7) No. 2 (+) — Engine ground (-):



CHECK : Is the voltage more than 10 V?

YES : Go to step 11CR2.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

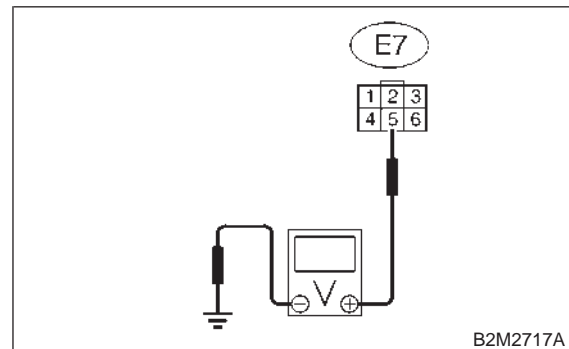
- Open circuit in harness between idle air control solenoid valve and main relay connector
- Poor contact in coupling connector (B22)

11CR2 : CHECK POWER SUPPLY TO IDLE AIR CONTROL SOLENOID VALVE.

Measure voltage between idle air control solenoid valve connector and engine ground.

Connector & terminal

(E7) No. 5 (+) — Engine ground (-):



CHECK : Is the voltage more than 10 V?

YES : Go to step 11CR3.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

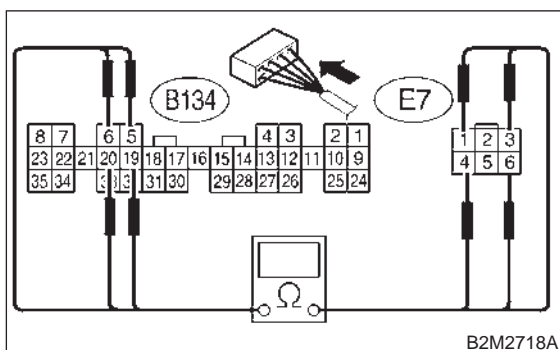
- Open circuit in harness between idle air control solenoid valve and main relay connector
- Poor contact in coupling connector (B22)

11CR3 : CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ECM and idle air control solenoid valve connector.

Connector & terminal

- #1; (B134) No. 5 — (E7) No. 4:
 #2; (B134) No. 6 — (E7) No. 1:
 #3; (B134) No. 19 — (E7) No. 6:
 #4; (B134) No. 20 — (E7) No. 3:



- CHECK** : Is the resistance less than 1 Ω ?
YES : Go to step 11CR4.
NO : Repair harness and connector.

NOTE:

In this case, repair the following:

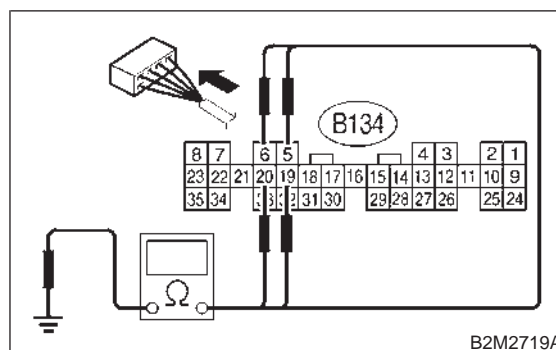
- Open circuit in harness between ECM and idle air control solenoid valve connector
- Poor contact in coupling connector (B21)

11CR4 : CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.

- 1) Disconnect connector from ECM.
- 2) Measure resistance between ECM connector and chassis ground.

Connector & terminal

- #1; (B134) No. 5 — Chassis ground:
 #2; (B134) No. 6 — Chassis ground:
 #3; (B134) No. 19 — Chassis ground:
 #4; (B134) No. 20 — Chassis ground:



- CHECK** : Is the resistance less than 10 Ω ?
YES : Repair ground short circuit in harness between ECM and idle air control solenoid valve connector.
NO : Go to step 11CR5.

11CR5 : CHECK POOR CONTACT.

Check poor contact in ECM connector and idle air control solenoid valve connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in ECM connector or idle air control solenoid valve connector?*

YES : Repair poor contact in ECM connector or idle air control solenoid valve connector.

NO : Replace idle air control solenoid valve. <Ref. to 2-7 [W12A0].>

MEMO:

CS: DTC P1517 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT HIGH INPUT —

● DTC DETECTING CONDITION:

- Immediately at fault recognition

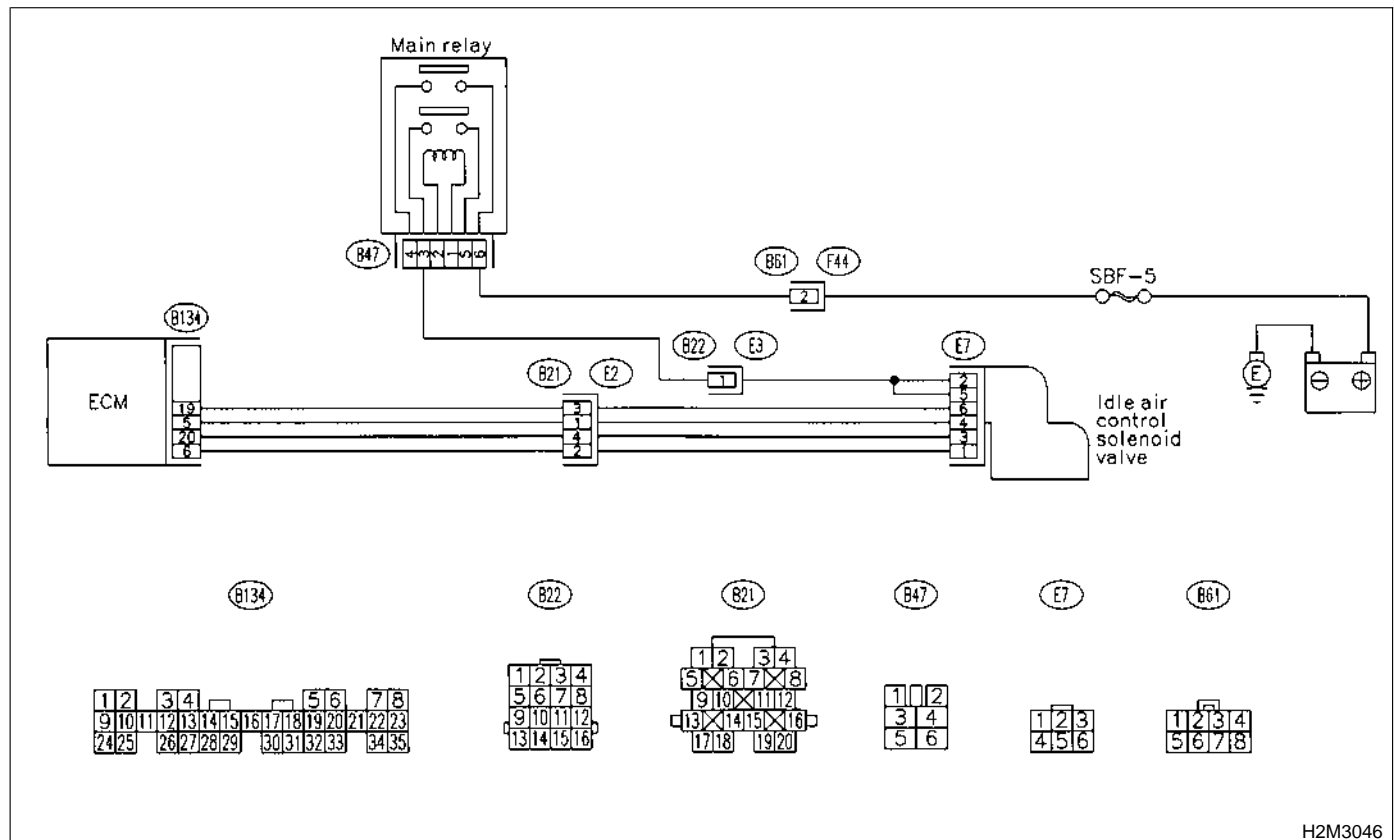
● TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:



H2M3046

11CS1 : CHECK ANY OTHER DTC ON DISPLAY.

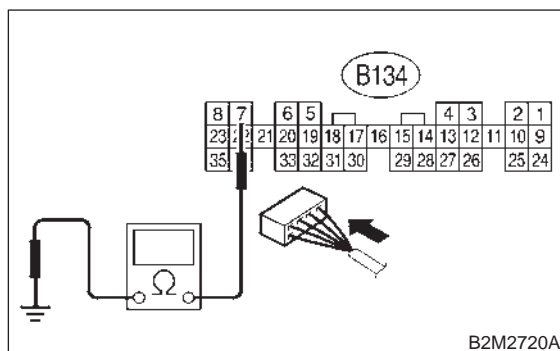
CHECK : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1511, P1513, P1515 and P1517 at same time?

YES : Go to step 11CS2.

NO : Go to step 11CS3.

11CS2 : CHECK GROUND CIRCUIT FOR ECM.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ECM connector and chassis ground.

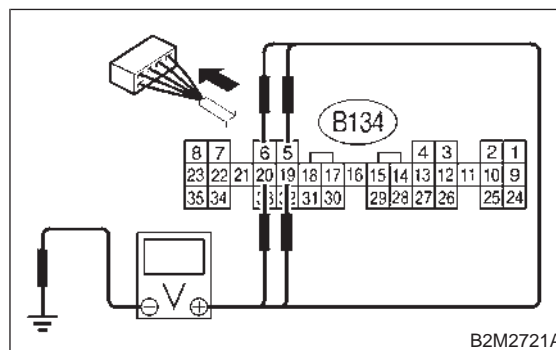
Connector & terminal**(B134) No. 7 — Chassis ground:****CHECK** : **Is the resistance less than 5 Ω?****YES** : Go to step 11CS3.**NO** : Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open circuit in harness between ECM connector and engine ground terminal
- Poor contact in ECM connector
- Poor contact in coupling connector (B22)

11CS3 : CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from idle air control solenoid valve.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM connector and chassis ground.

Connector & terminal**#1; (B134) No. 5 (+) — Chassis ground****(-):****#2; (B134) No. 6 (+) — Chassis ground****(-):****#3; (B134) No. 19 (+) — Chassis ground****(-):****#4; (B134) No. 20 (+) — Chassis ground****(-):****CHECK** : **Is the voltage more than 10 V?****YES** : Repair battery short circuit in harness between ECM and idle air control solenoid valve connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>**NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

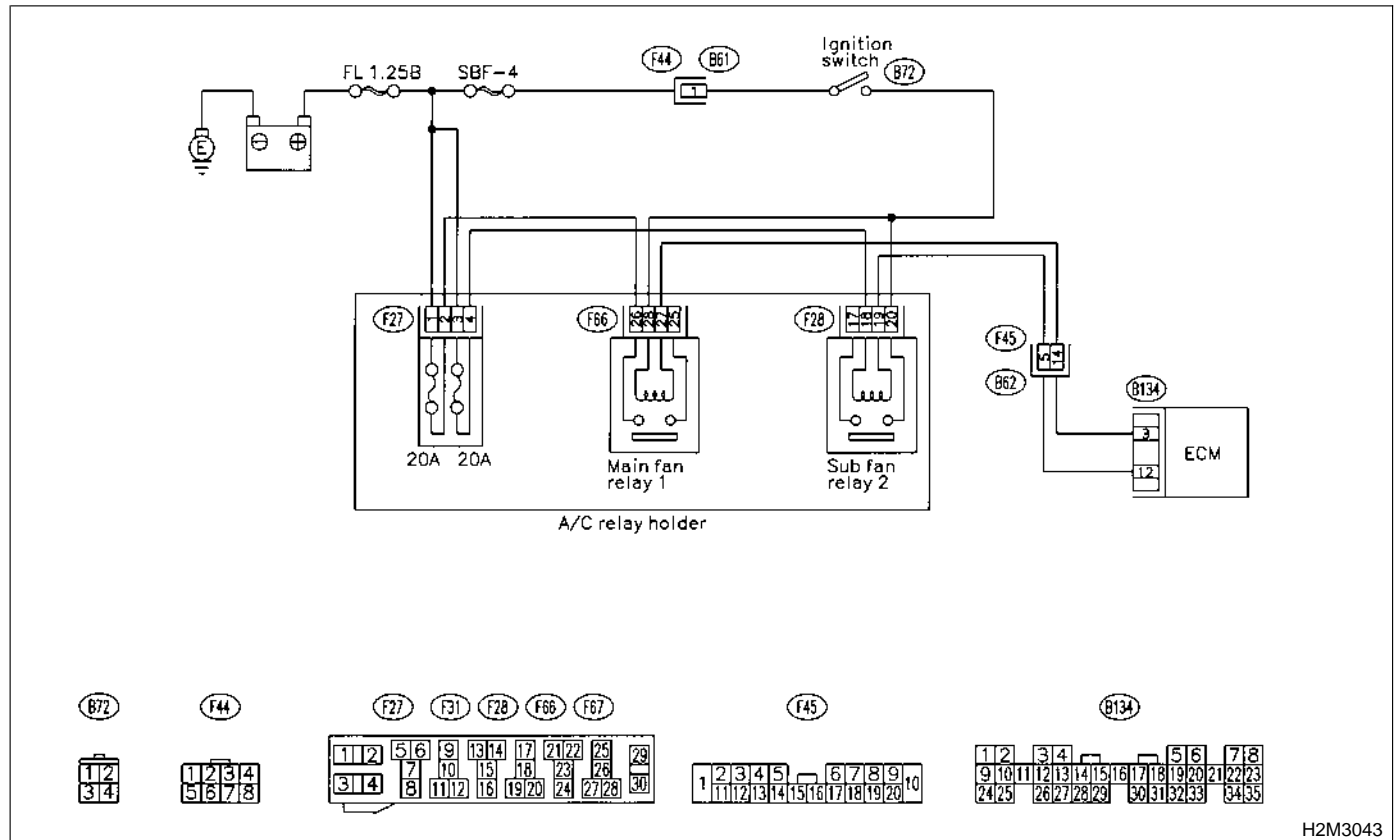
CT: DTC P1520 — COOLING FAN RELAY 1 CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - Radiator fan does not operate properly.
 - Overheating

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

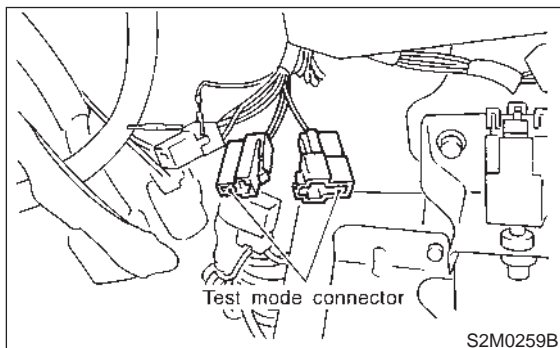
● WIRING DIAGRAM:



H2M3043

11CT1 : CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to OFF.
- 2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



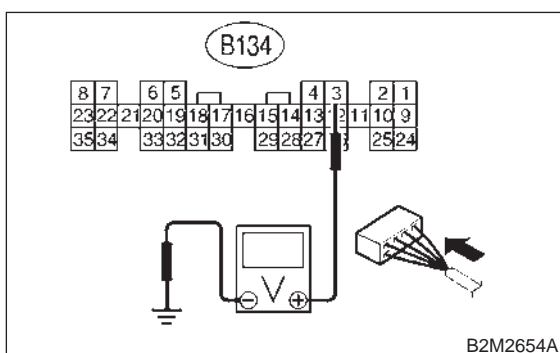
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

NOTE:

Radiator fan relay operation check can be executed using Subaru Select Monitor. For procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

Connector & terminal

(B134) No. 3 (+) — Chassis ground (-):



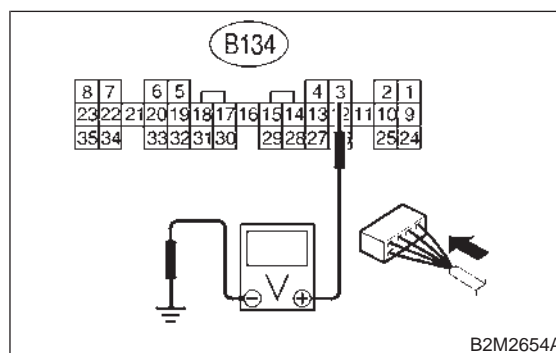
- CHECK** : Does voltage change between 0 and 10 volts?
- YES** : Even if MIL lights up, the circuit has returned to a normal condition at this time. In this case, repair poor contact in ECM connector.
- NO** : Go to step **11CT2**.

11CT2 : CHECK SHORT CIRCUIT IN RADIATOR FAN RELAY 1 CONTROL CIRCUIT.

- 1) Turn ignition switch to OFF.
- 2) Remove main fan relay 1 and sub fan relay 1. (with A/C models)
Remove main fan relay. (without A/C models)
- 3) Disconnect test mode connector.
- 4) Turn ignition switch to ON.
- 5) Measure voltage between ECM and chassis ground.

Connector & terminal

(B134) No. 3 (+) — Chassis ground (-):



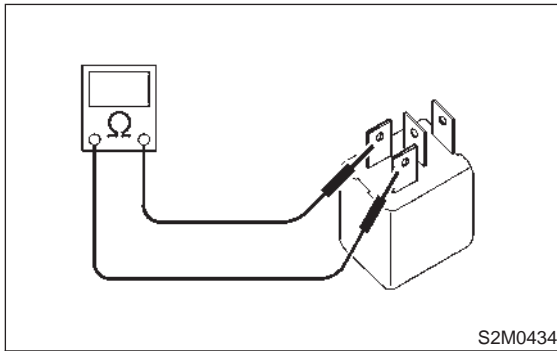
- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in radiator fan relay 1 control circuit. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Go to step **11CT3**.

11CT3 : CHECK VEHICLE MODEL.

- CHECK** : Is the vehicle equipped with A/C?
- YES** : Go to step **11CT4**.
- NO** : Go to step **11CT6**.

11CT4 : CHECK MAIN FAN RELAY 1.

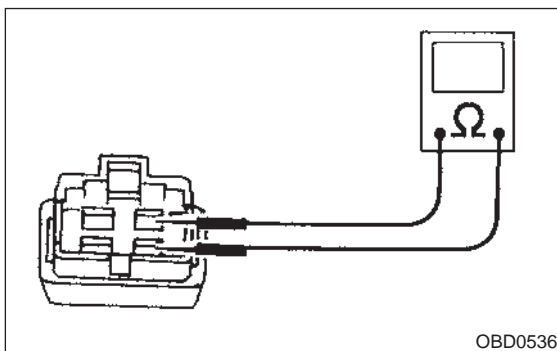
- 1) Turn ignition switch to OFF.
- 2) Remove main fan relay 1.
- 3) Measure resistance between main fan relay 1 terminals.

Terminal**No. 27 — No. 28:**

- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Replace main fan relay 1 and ECM <Ref. to 2-7 [W15A0].>
- NO** : Go to step **11CT5**.

11CT5 : CHECK SUB FAN RELAY 1.

- 1) Remove sub fan relay 1.
- 2) Measure resistance between sub fan relay 1 terminals.

Terminal**No. 20 — No. 19**

- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Replace sub fan relay 1 and ECM <Ref. to 2-7 [W15A0].>
- NO** : Go to step **11CT6**.

11CT6 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : **Is there poor contact in ECM connector?**
- YES** : Repair poor contact in ECM connector.
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

MEMO:

CU: DTC P1540 — VEHICLE SPEED SENSOR MALFUNCTION 2 —

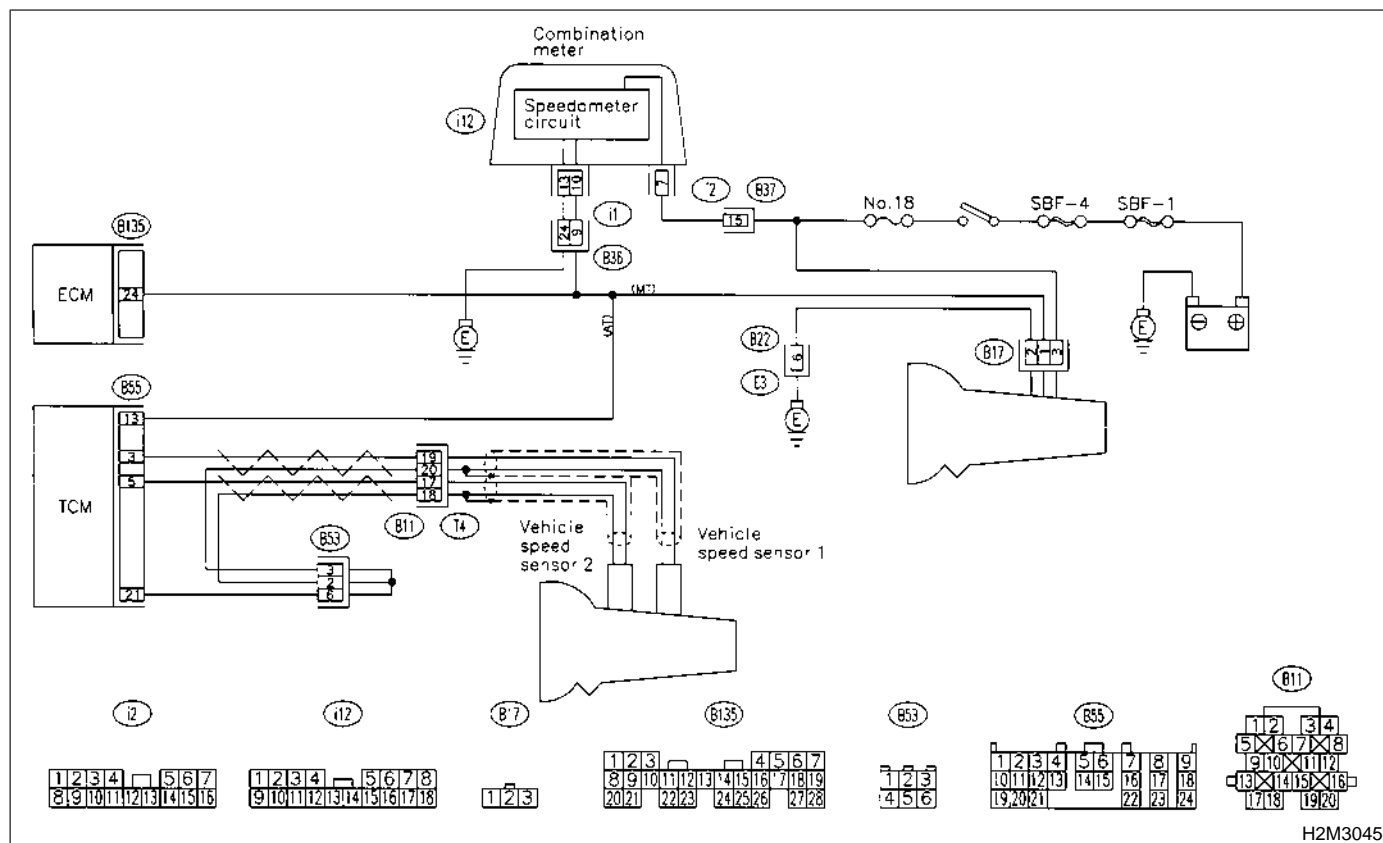
• DTC DETECTING CONDITION:

- Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



11CU1 : CHECK TRANSMISSION TYPE.

- CHECK** : Is transmission type AT?
- YES** : Go to step 11CU2.
- NO** : Go to step 11CU3.

11CU2 : CHECK DTC P0720 ON DISPLAY.

- CHECK** : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0720?
- YES** : Check vehicle speed sensor 2 signal circuit. <Ref. to 3-2 [T8G0].>
- NO** : Go to step 11CU3.

11CU3 : CHECK SPEEDOMETER OPERATION IN COMBINATION METER.

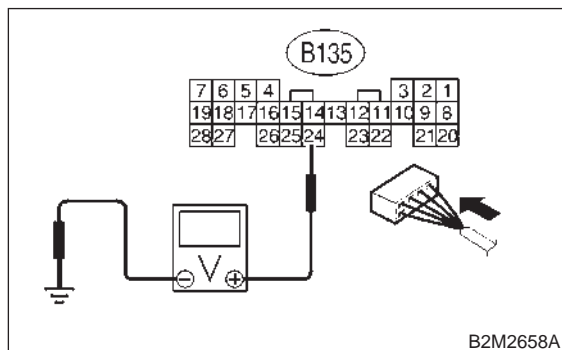
- CHECK** : Does speedometer operate normally?
- YES** : Go to step 11CU4.
- NO** : Check speedometer and vehicle speed sensor. <Ref. to 6-2 [K2A4].>

11CU4 : CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from TCM.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 24 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 2 V?**

YES : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and combination meter connector
- Poor contact in ECM connector
- Poor contact in combination meter connector

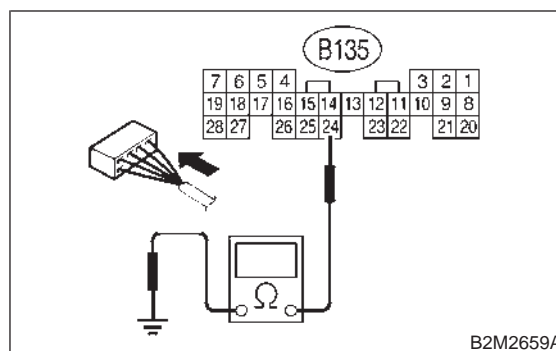
NO : Go to step **11CU5**.

11CU5 : CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B135) No. 24 — Chassis ground:



CHECK : **Is the resistance less than 10 Ω?**

YES : Repair ground short circuit in harness between ECM and combination meter connector.

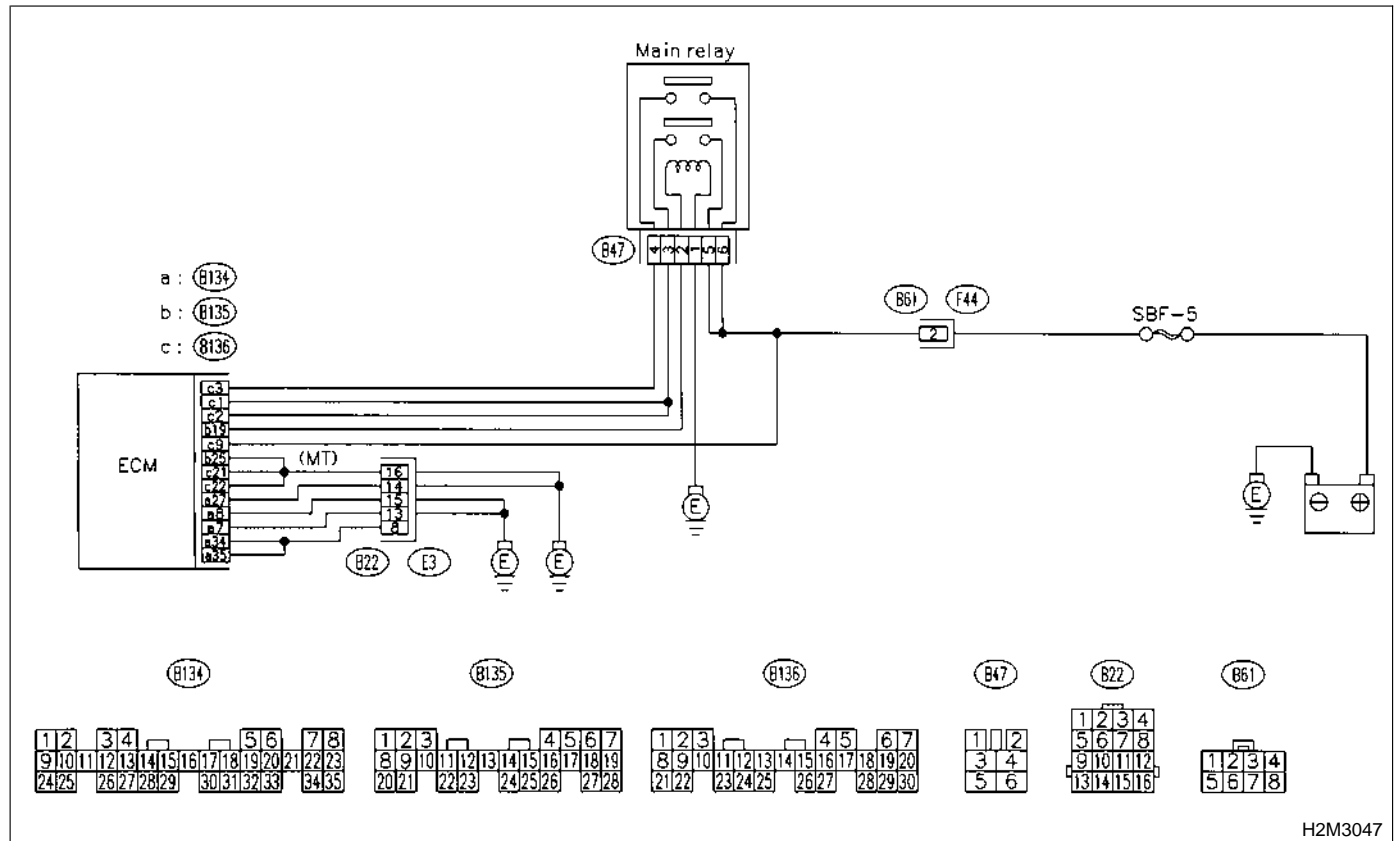
NO : Repair poor contact in ECM connector.

CV: DTC P1560 — BACK-UP VOLTAGE CIRCUIT MALFUNCTION —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

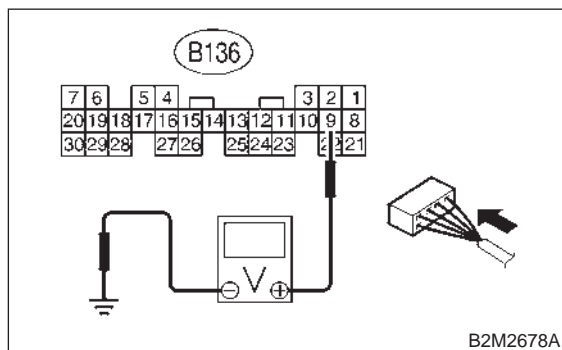
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

H2M3047

11CV1 : CHECK INPUT SIGNAL FOR ECM.

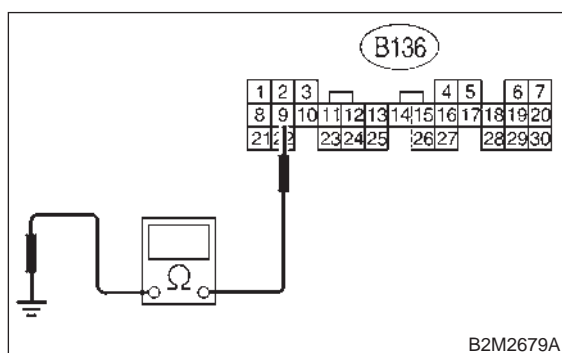
- 1) Turn ignition switch to OFF.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal**(B136) No. 9 (+) — Chassis ground (-):**

- CHECK** : **Is the voltage more than 10 V?**
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 11CV2.

11CV2 : CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.

- 1) Disconnect connector from ECM.
- 2) Measure resistance of harness between ECM and chassis ground.

Connector & terminal**(B136) No. 9 — Chassis ground:**

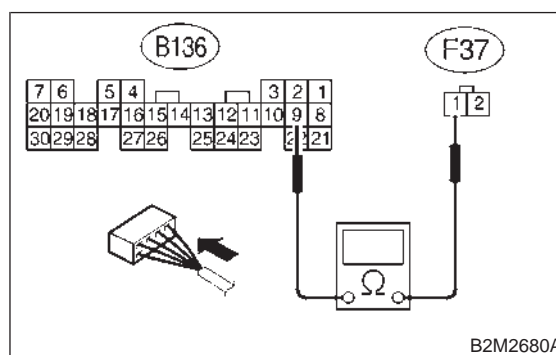
- CHECK** : **Is the resistance less than 10 Ω?**
- YES** : Repair ground short circuit in harness between ECM connector and battery terminal.
- NO** : Go to step 11CV3.

11CV3 : CHECK FUSE SBF-2.

- CHECK** : **Is fuse blown?**
- YES** : Replace fuse. <Ref. to 6-3 [D6B1].>
- NO** : Go to step 11CV4.

11CV4 : CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.

- 1) Disconnect connector from main fuse box.
- 2) Measure resistance of harness between ECM and main fuse box connector.

Connector & terminal**(B136) No. 9 — (F37) No. 1:**

- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Repair poor contact in ECM and main fuse box connector.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and main fuse box connector
- Poor contact in coupling connector (F44)
- Poor contact in ECM connector
- Poor contact in main fuse box connector

CW: DTC P1700 — THROTTLE POSITION SENSOR CIRCUIT MALFUNCTION FOR AUTOMATIC TRANSMISSION —

● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

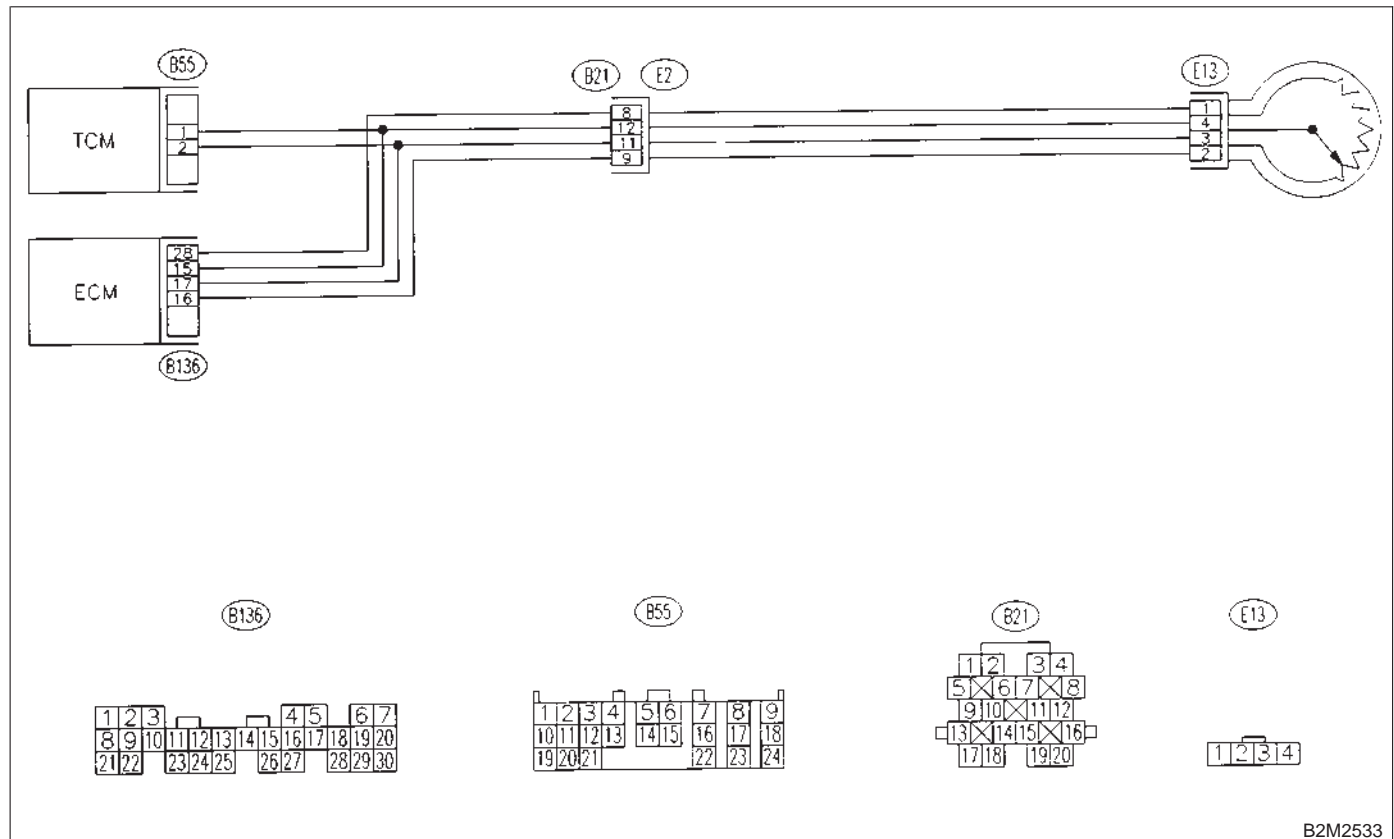
● TROUBLE SYMPTOM:

- Shift point too high or too low; engine brake not effected in "3" range; excessive shift shock; excessive tight corner "braking"

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

● WIRING DIAGRAM:



B2M2533

11CW1 : CHECK DTC P1700 ON DISPLAY.

- CHECK** : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1700?
- YES** : Check throttle position sensor circuit. <Ref. to 3-2 [T8F0].>
- NO** : It is not necessary to inspect DTC P1700.

MEMO:

CX: DTC P1701 — CRUISE CONTROL SET SIGNAL CIRCUIT MALFUNCTION FOR AUTOMATIC TRANSMISSION —

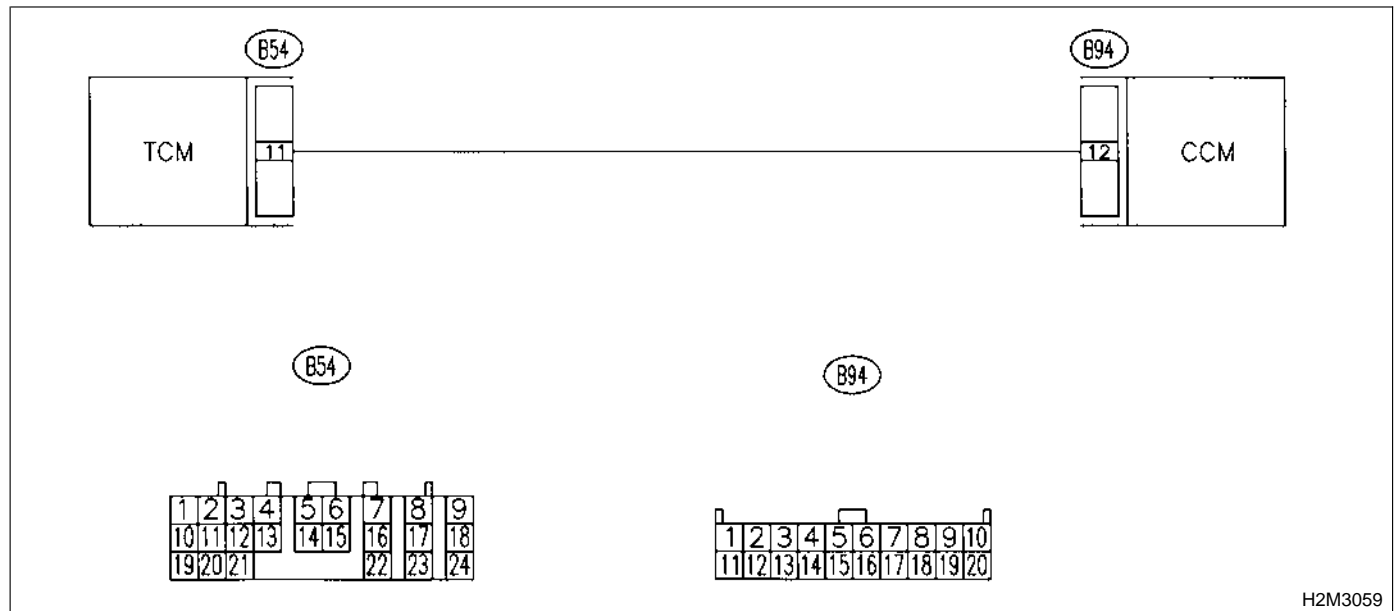
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:

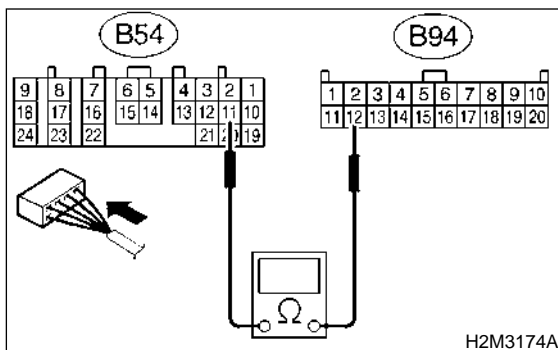


11CX1 : CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from TCM and CCM.
- 3) Measure resistance of harness between TCM and CCM connector.

Connector & terminal

(B54) No. 11 — (B94) No. 12:



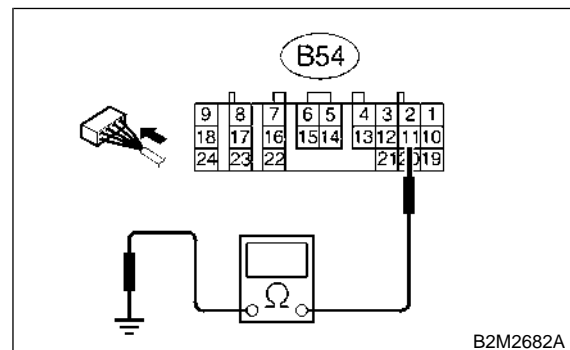
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 11CX2.
- NO** : Repair open circuit in harness between TCM and CCM connector.

11CX2 : CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B54) No. 11 — Chassis ground:



- CHECK** : Is the resistance less than 10 Ω?
- YES** : Repair short circuit in harness between TCM and CCM connector.
- NO** : Go to step 11CX3.

11CX3 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect connector to TCM and CCM.
- 2) Lift-up the vehicle or set the vehicle on free rollers.

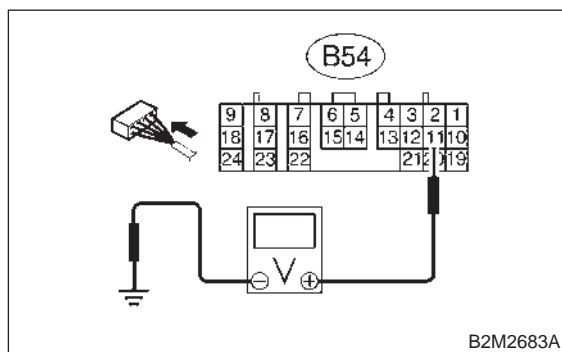
CAUTION:

On AWD models, raise all wheels off ground.

- 3) Start the engine.
- 4) Cruise control main switch to ON.
- 5) TCS OFF switch to ON. (with TCS models only)
- 6) Move selector lever to "D" and slowly increase vehicle speed to 50 km/h (31 MPH).
- 7) Cruise control set switch to ON.
- 8) Measure voltage between TCM and chassis ground.

Connector & terminal

(B54) No. 11 (+) — Chassis ground (-):



- CHECK** : **Is the voltage less than 1 V?**
- YES** : Go to step **11CX4**.
- NO** : Check cruise control set circuit.

11CX4 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : **Is there poor contact in TCM connector?**
- YES** : Repair poor contact in TCM connector.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

CY: DTC P1702 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT LOW INPUT —

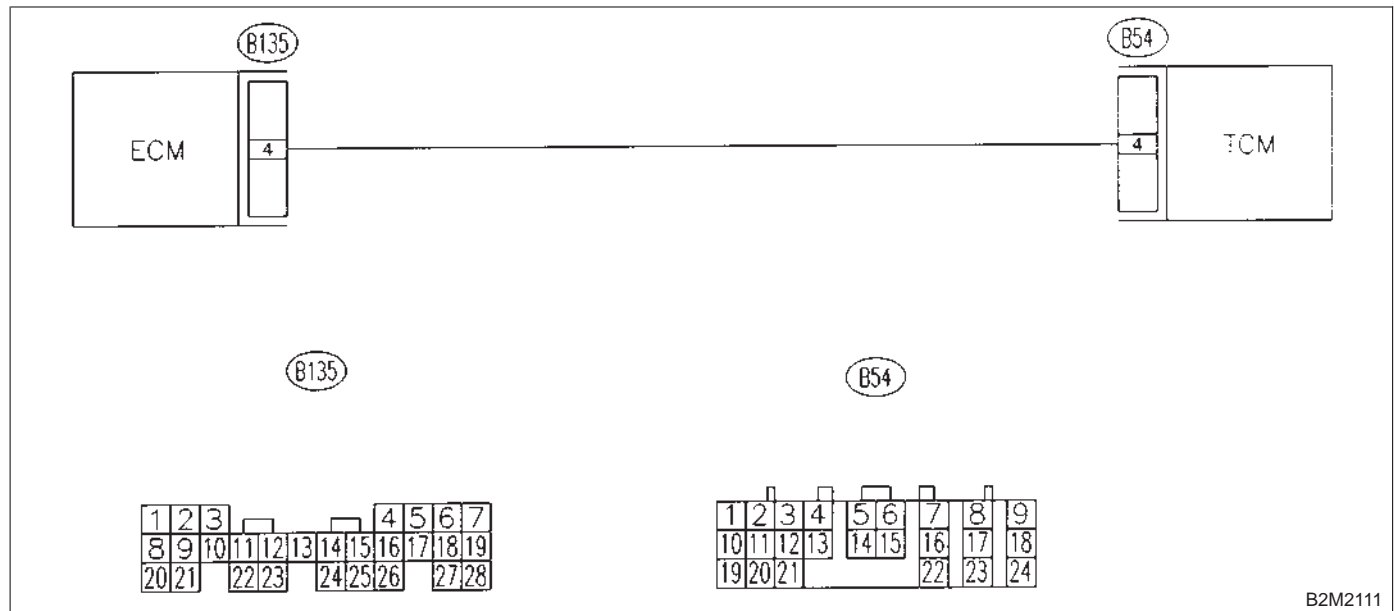
● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

● WIRING DIAGRAM:



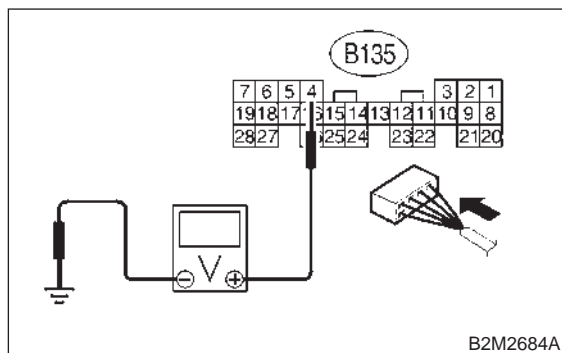
B2M2111

11CY1 : CHECK TRANSMISSION TYPE.

- CHECK** : *Is transmission type AT?*
- YES** : Go to step **11CY2**.
- NO** : Check AT/MT identification circuit. <Ref. to 2-7 [T11DE0].>

11CY2 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal**(B135) No. 4 (+) — Chassis ground (-):**

- CHECK** : **Is the voltage less than 1 V?**
- YES** : Go to step **11CY3**.
- NO** : Even if MIL lights up, the circuit has returned to a normal condition at this time.

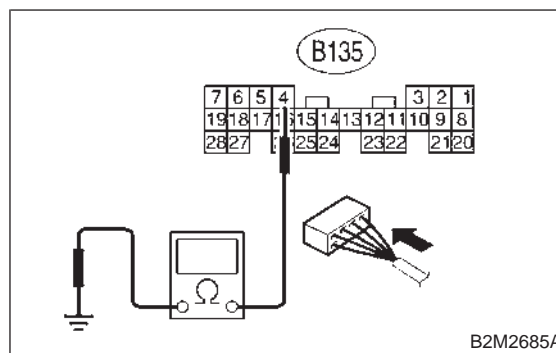
NOTE:

In this case, repair the following:

- Poor contact in ECM connector
- Poor contact in TCM connector

11CY3 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

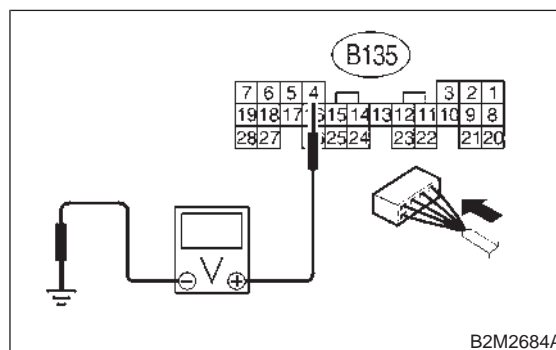
- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM and TCM.
- 3) Measure resistance of harness between ECM and chassis ground.

Connector & terminal**(B135) No. 4 — Chassis ground:**

- CHECK** : **Is the resistance less than 10 Ω?**
- YES** : Repair ground short circuit in harness between ECM and TCM connector.
- NO** : Go to step **11CY4**.

11CY4 : CHECK OUTPUT SIGNAL FOR ECM.

- 1) Connect connector to ECM.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between ECM and chassis ground.

Connector & terminal**(B135) No. 4 (+) — Chassis ground (-):**

- CHECK** : **Is the voltage more than 5 V?**
- YES** : Replace TCM. <Ref. to 3-2 [W22A0].>
- NO** : Repair poor contact in ECM connector.

CZ: DTC P1703 — LOW CLUTCH TIMING CONTROL SOLENOID VALVE CIRCUIT MALFUNCTION —

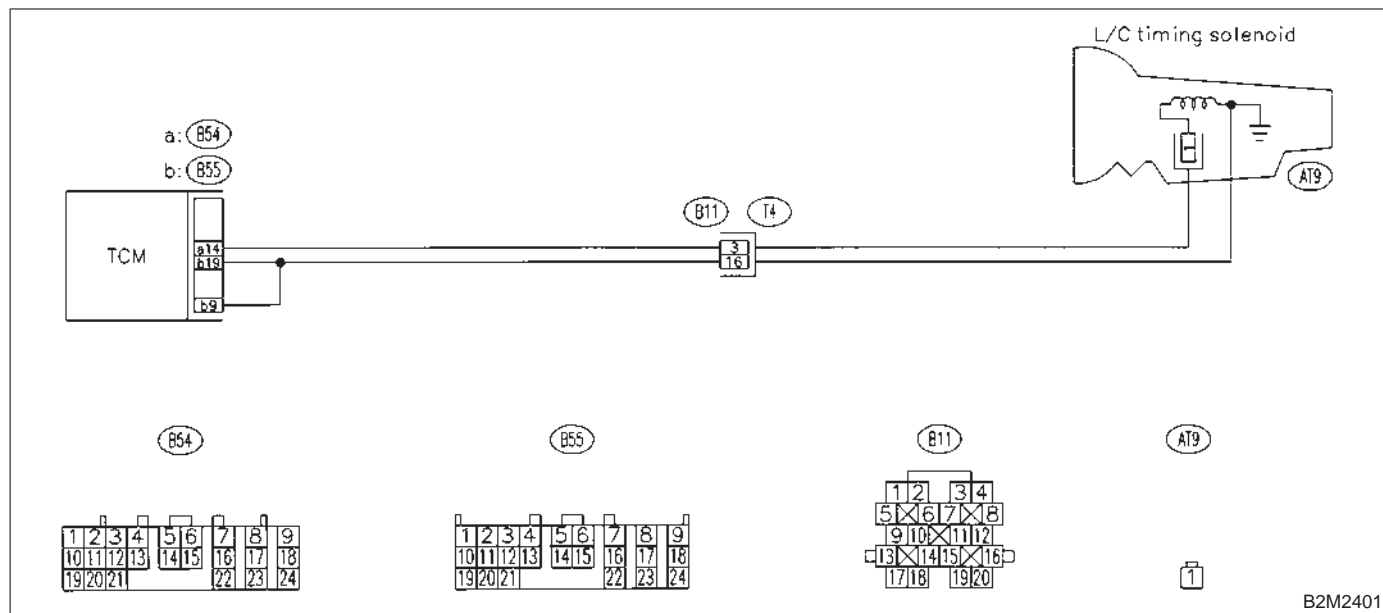
● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:



B2M2401

11CZ1 : CHECK DTC P1703 ON DISPLAY.

- CHECK** : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1703?
- YES** : Check low clutch timing control solenoid valve circuit. <Ref. to 3-2 [T8M0].>
- NO** : It is not necessary to inspect DTC P1703.

DA: DTC P1704 — 2-4 BRAKE TIMING CONTROL SOLENOID VALVE CIRCUIT MALFUNCTION —

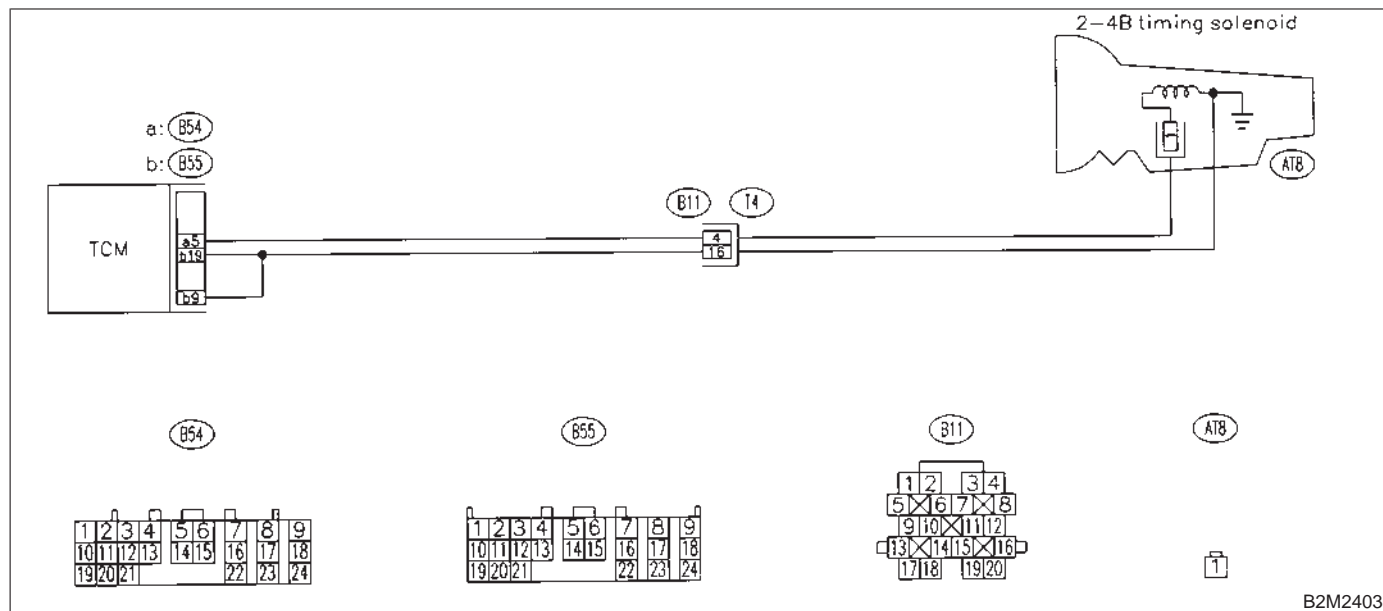
● DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>.

● WIRING DIAGRAM:



11DA1 : CHECK DTC P1704 ON DISPLAY.

- CHECK** : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1704?
- YES** : Check 2-4 brake timing control solenoid valve circuit. <Ref. to 3-2 [T8N0].>
- NO** : It is not necessary to inspect DTC P1704.

DB: DTC P1705 — 2-4 BRAKE PRESSURE CONTROL SOLENOID VALVE (DUTY SOLENOID D) CIRCUIT MALFUNCTION —

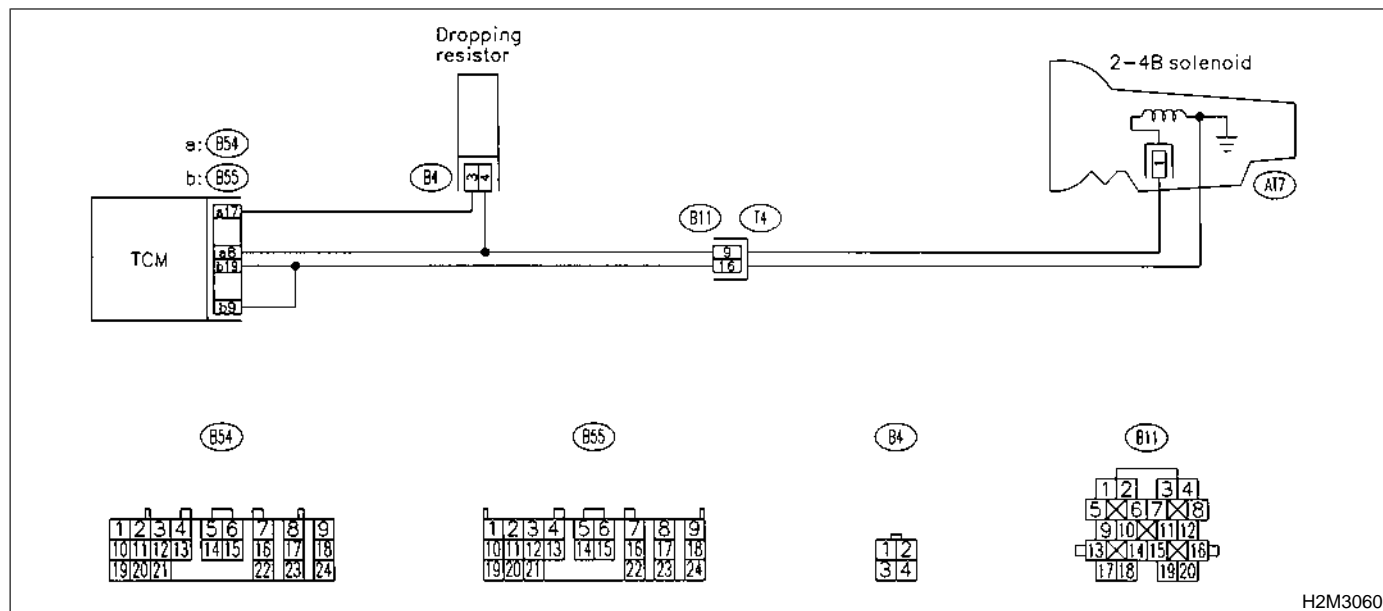
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

• WIRING DIAGRAM:



H2M3060

11DB1 : CHECK DTC P1705 ON DISPLAY.

- CHECK** : Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1705?
- YES** : Check 2-4 brake pressure control solenoid valve circuit. <Ref. to 3-2 [T8P0].>
- NO** : It is not necessary to inspect DTC P1705.

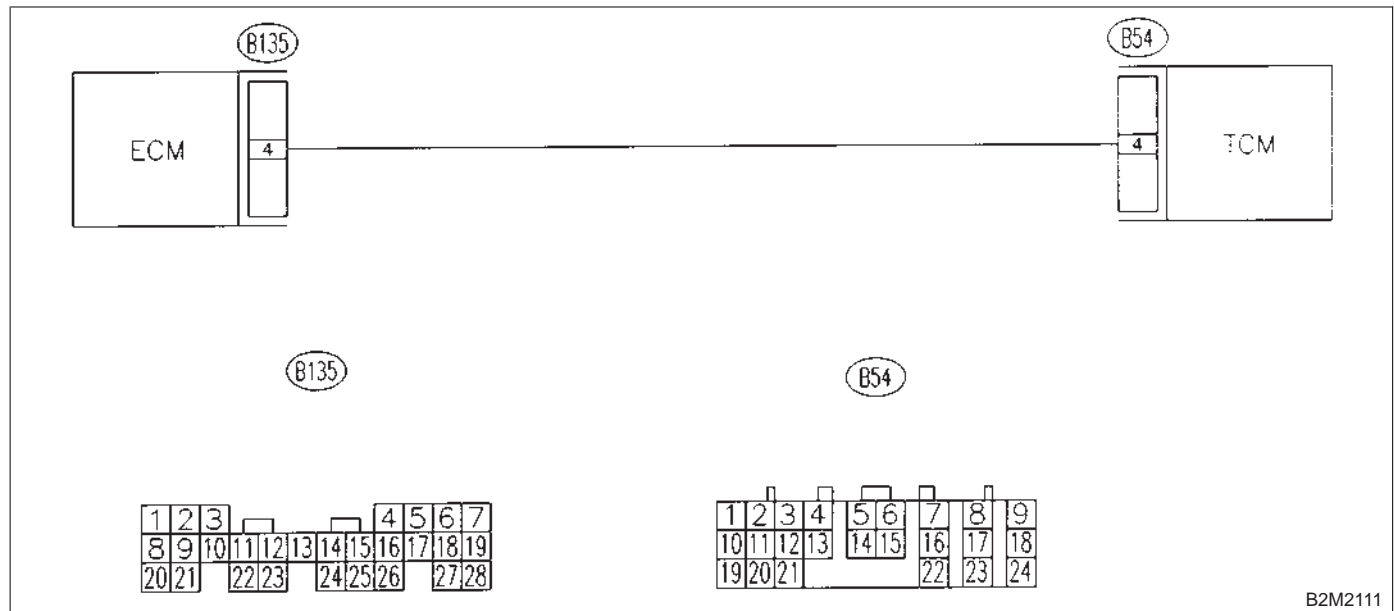
MEMO:

DC: DTC P1722 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT HIGH INPUT —**● DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

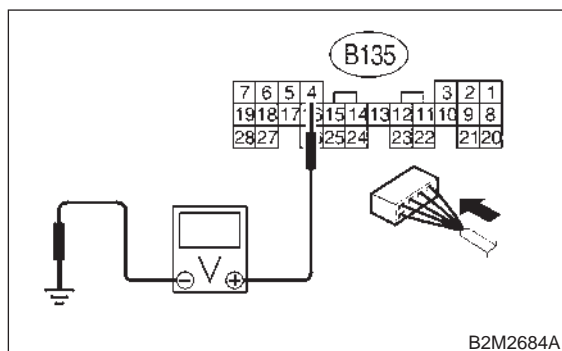
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:**11DC1 : CHECK TRANSMISSION TYPE.**

- CHECK** : *Is transmission type AT?*
- YES** : Go to step 11DC2.
- NO** : Check AT/MT identification circuit. <Ref. to 2-7 [T11DE0].>

11DC2 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

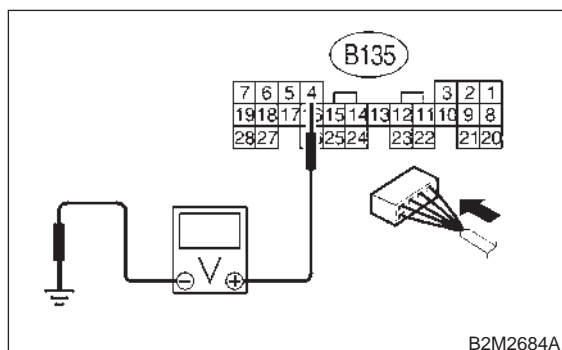
- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal**(B135) No. 4 (+) — Chassis ground (-):**

- CHECK** : Is the voltage more than 10 V?
- YES** : Repair battery short circuit in harness between ECM and TCM connector. After repair, replace ECM. <Ref. to 2-7 [W15A0].>
- NO** : Go to step 11DC3.

11DC3 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

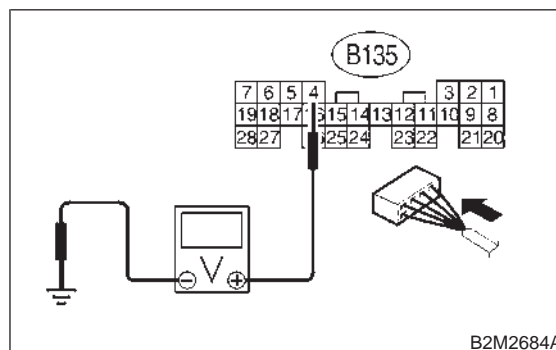
Measure voltage between ECM connector and chassis ground.

Connector & terminal**(B135) No. 4 (+) — Chassis ground (-):**

- CHECK** : Is the voltage more than 4 V?
- YES** : Go to step 11DC6.
- NO** : Go to step 11DC4.

11DC4 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal**(B135) No. 4 (+) — Chassis ground (-):**

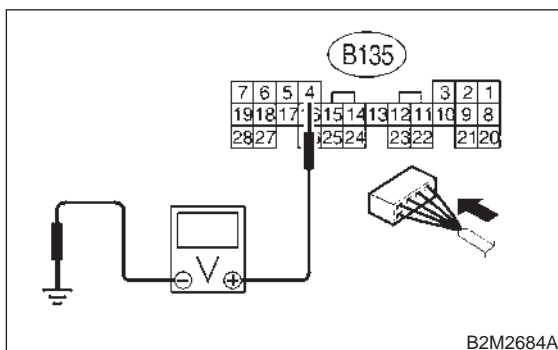
- CHECK** : Is the voltage less than 1 V?
- YES** : Repair poor contact in ECM connector.
- NO** : Go to step 11DC5.

11DC5 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 4 (+) — Chassis ground (-):



CHECK : Does the voltage change from 1 V to 4 V while monitoring the value with voltage meter?

YES : Even if MIL lights up, the circuit has returned to a normal condition at this time.

NOTE:

In this case, repair the following:

- Poor contact in ECM connector
- Poor contact in TCM connector

NO : Contact with SOA service.

NOTE:

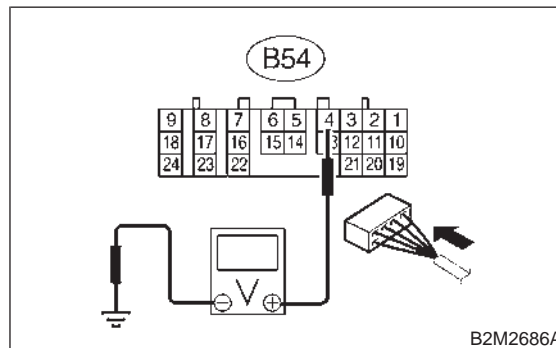
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

11DC6 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

Measure voltage between TCM and chassis ground.

Connector & terminal

(B54) No. 4 (+) — Chassis ground (-):



CHECK : Is the voltage more than 4 V?

YES : Go to step 11DC7.

NO : Repair open circuit in harness between ECM and TCM connector.

11DC7 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in TCM connector?

YES : Repair poor contact in TCM connector.

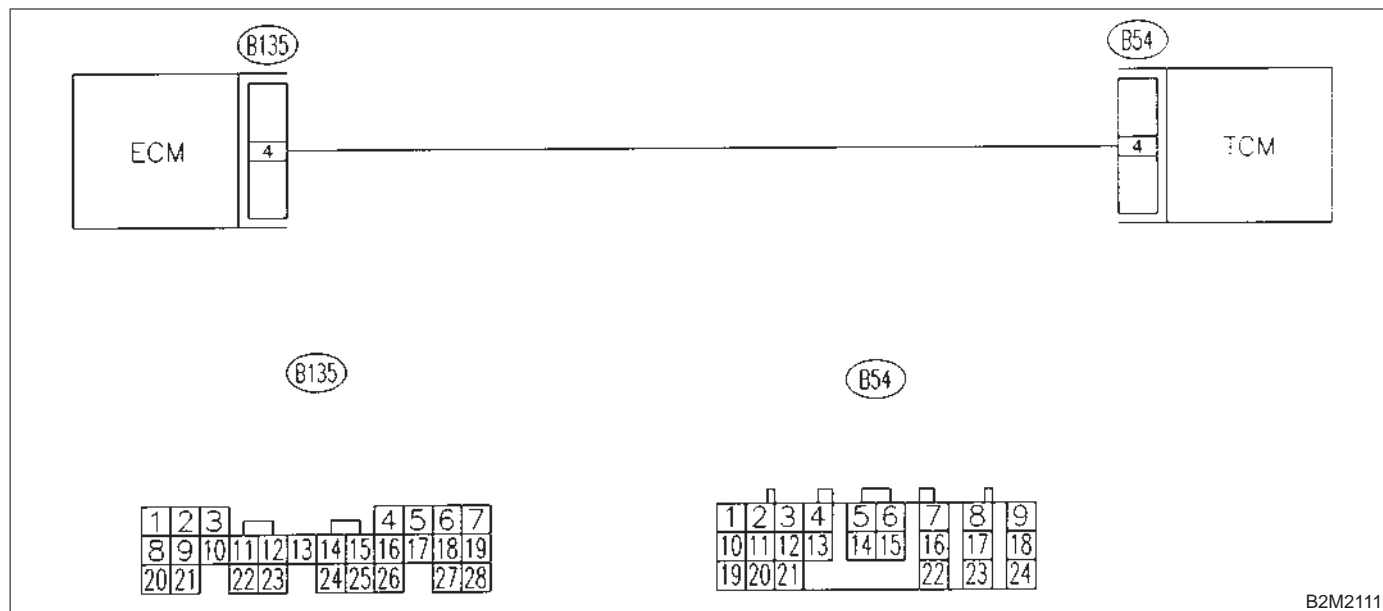
NO : Check TCM power supply line and grounding line.

DD: DTC P1742 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT MALFUNCTION —**• DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct **CLEAR MEMORY MODE** <Ref. to 2-7 [T3D0].> and **INSPECTION MODE** <Ref. to 2-7 [T3E0].>.

• WIRING DIAGRAM:

B2M2111

11DD1 : CHECK TRANSMISSION TYPE.

- CHECK** : *Is transmission type AT?*
- YES** : Go to step 11DD2.
- NO** : Check AT/MT identification circuit. <Ref. to 2-7 [T11DE0].>

11DD2 : CHECK DRIVING CONDITION.

- 1) Start and warm-up the engine until the radiator fan makes one complete rotation.
- 2) Drive the vehicle.

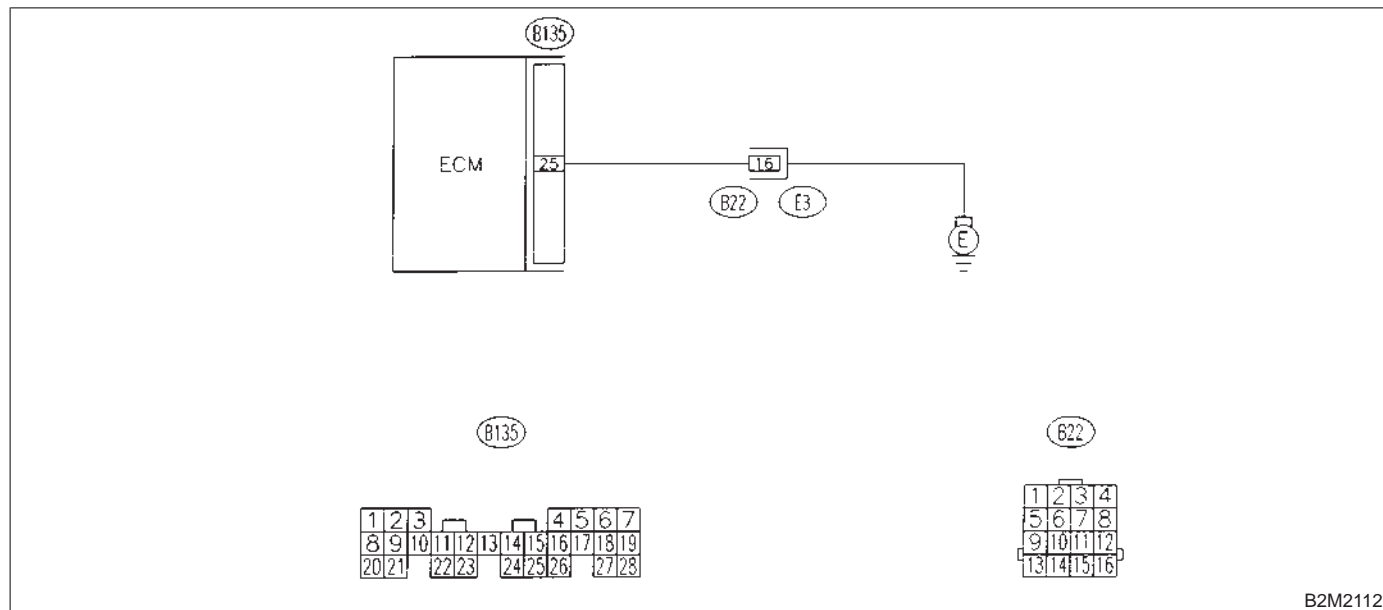
- CHECK** : *Is AT shift control functioning properly?*
- YES** : Go to step 11DD3.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

11DD3 : CHECK ACCESSORY.

- CHECK** : *Are car phone and/or CB installed on vehicle?*
- YES** : Repair grounding line of car phone or CB system.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

DE: — AT/MT IDENTIFICATION CIRCUIT MALFUNCTION [MT VEHICLES] —**CAUTION:**

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].>

● WIRING DIAGRAM:

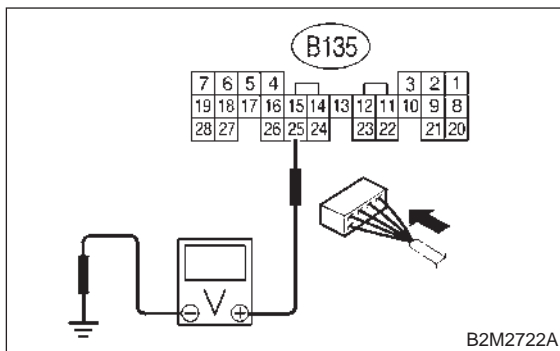
B2M2112

11DE1 : CHECK HARNESS BETWEEN ECM CONNECTOR AND ENGINE GROUNDING TERMINAL.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM and chassis ground.

Connector & terminal

(B135) No. 25 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 2 V?**

YES : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ECM connector and engine grounding terminal
- Poor contact in engine grounding terminal
- Poor contact in coupling connector (B22)

NO : Go to step **11DE2**.

11DE2 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : **Is there poor contact in ECM connector?**

YES : Repair poor contact in ECM connector.

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

FUEL SYSTEM 2-8

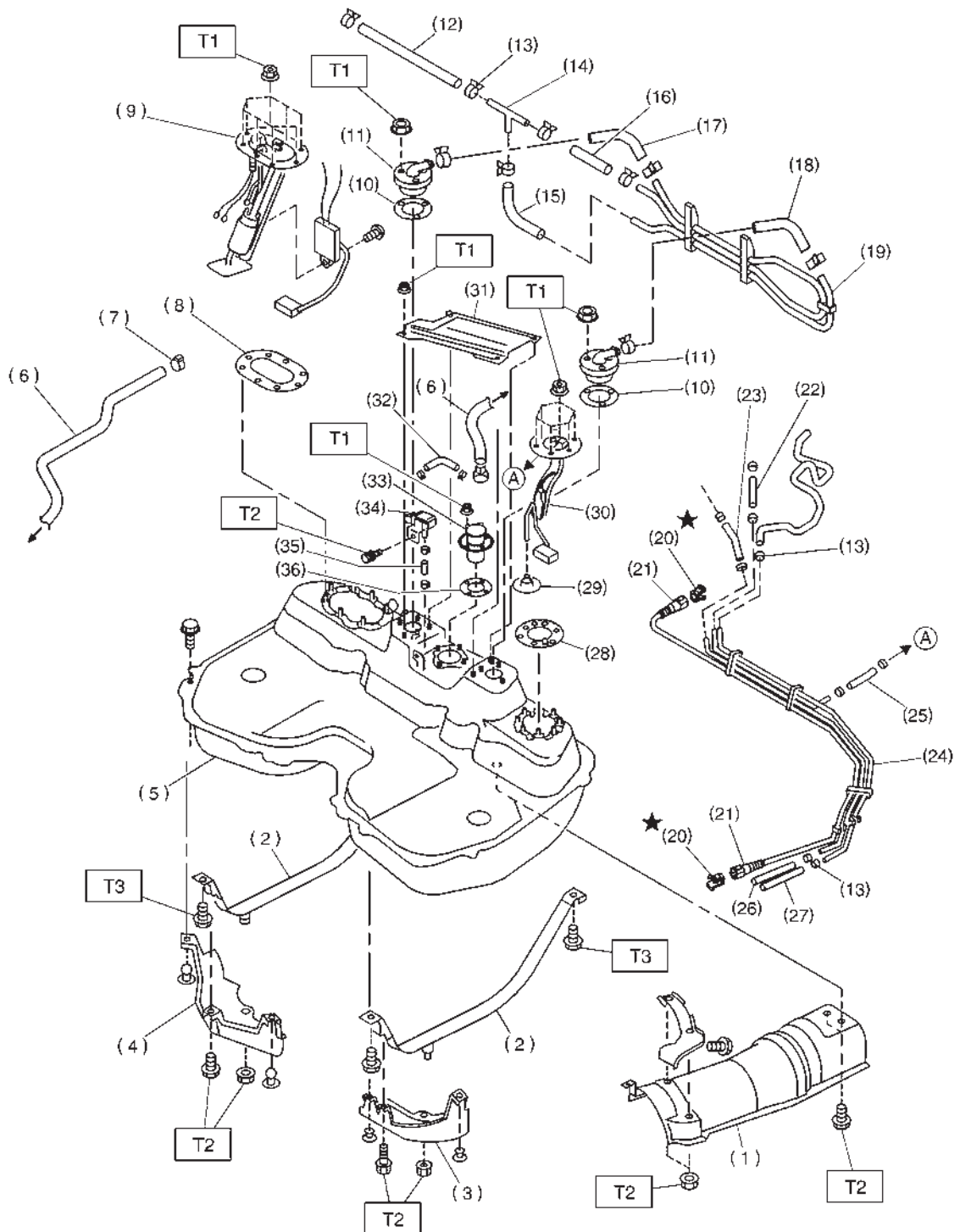
	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Fuel System	2
C COMPONENT PARTS	4
1. Fuel Tank.....	4
2. Fuel Line.....	6
W SERVICE PROCEDURE	8
1. On-car Services.....	8
2. Fuel Tank	11
3. Fuel Filler Pipe	16
4. Fuel Filter	21
5. Fuel Pump	22
6. Fuel Meter Unit.....	24
7. Fuel Delivery, Return and Evaporation Lines	26
8. Roll Over Valve	28
9. Fuel Cut Valve.....	29
10. Fuel Sub Meter Unit.....	29
K DIAGNOSTICS	31
1. Fuel System Trouble in General	31

1. Fuel System

Fuel tank	Capacity	60 ℓ (15.9 US gal, 13.2 Imp gal)
	Location	Under rear seat
Fuel pump	Type	Impeller
	Discharge pressure	299.1 kPa (3.05 kg/cm ² , 43.4 psi)
	Discharge flow	More than 65 ℓ (17.2 US gal, 14.3 Imp gal)/h [12 V at 300 kPa (3.06 kg/cm ² , 43.5 psi)]
Fuel filter		Cartridge type

MEMO:

1. Fuel Tank



S2M0877A

(1) Heat sealed cover	(15) Evaporation hose C	(29) Jet pump filter
(2) Fuel tank band	(16) Evaporation hose B	(30) Fuel sub meter unit
(3) Protector LH	(17) Evaporation hose D	(31) Protector cover
(4) Protector RH	(18) Evaporation hose E	(32) Vent valve hose
(5) Fuel tank	(19) Evaporation pipe ASSY	(33) Vent valve
(6) Canister hose A	(20) Retainer	(34) Fuel tank pressure sensor
(7) Clamp	(21) Quick connector	(35) Fuel tank pressure sensor hose
(8) Fuel pump gasket	(22) Jet pump hose A	(36) Vent valve gasket
(9) Fuel pump ASSY	(23) Fuel return hose A	
(10) Fuel cut valve gasket	(24) Fuel pipe ASSY	
(11) Fuel cut valve	(25) Jet pump hose B	
(12) Fuel delivery hose A	(26) Fuel return hose B	
(13) Clip	(27) Evaporation hose F	
(14) Joint pipe	(28) Fuel sub meter gasket	

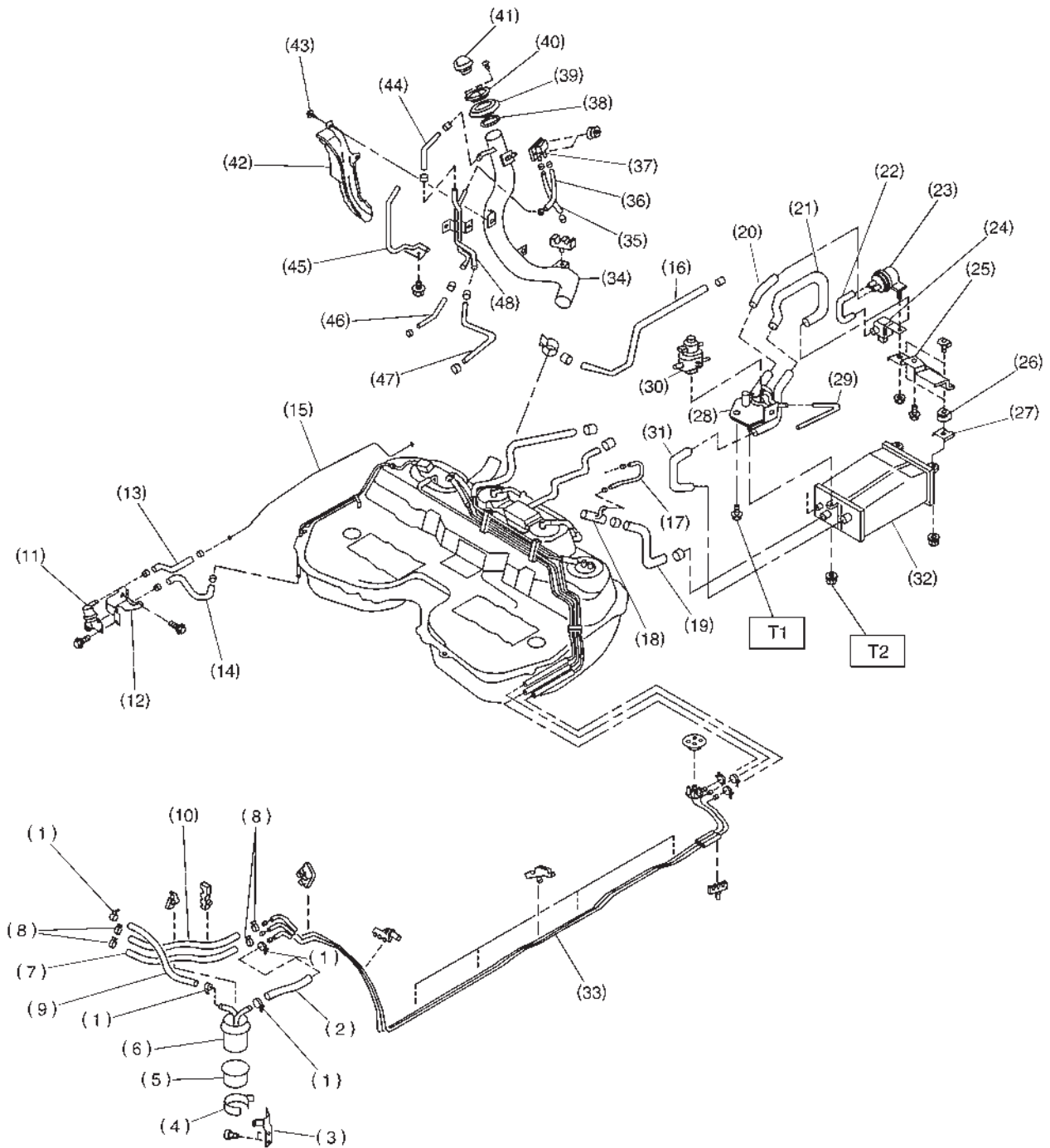
Tightening torque: N-m (kg-m, ft-lb)

T1: 4.4±1.5 (0.45±0.15, 3.3±1.1)

T2: 7.4±2.0 (0.75±0.2, 5.4±1.4)

T3: 33±10 (3.4±1.0, 25±7)

2. Fuel Line



S2M1114A

- | | | |
|------------------------------|--------------------------------------|---------------------------------|
| (1) Clamp | (19) Canister hose A | (37) Shut valve |
| (2) Fuel delivery hose A | (20) Air filter hose A | (38) Packing |
| (3) Fuel filter bracket | (21) Drain valve hose | (39) Ring A |
| (4) Fuel filter holder | (22) Air filter hose B | (40) Ring B |
| (5) Fuel filter cup | (23) Air filter | (41) Fuel filler cap |
| (6) Fuel filter | (24) Drain valve | (42) Fuel filler pipe protector |
| (7) Evaporation hose | (25) Canister upper bracket | (43) Tapping screw |
| (8) Clip | (26) Cushion rubber | (44) Evaporation hose O |
| (9) Fuel delivery hose B | (27) Canister lower bracket | (45) Joint pipe |
| (10) Fuel return hose | (28) Canister holder | (46) Evaporation hose P |
| (11) Roll over valve | (29) Evaporation hose L | (47) Evaporation hose Q |
| (12) Roll over valve bracket | (30) Pressure control solenoid valve | (48) Evaporation pipe |
| (13) Evaporation hose H | (31) Canister hose B | |
| (14) Evaporation hose I | (32) Canister | |
| (15) Evaporation pipe B | (33) Fuel pipe ASSY | |
| (16) Evaporation hose J | (34) Fuel filler pipe | |
| (17) Evaporation hose K | (35) Evaporation hose M | |
| (18) Joint pipe | (36) Evaporation hose N | |

Tightening torque: N·m (kg-m, ft-lb)

T1: 23±7 (2.3±0.7, 16.6±5.1)

T2: 25±7 (2.5±0.7, 18.1±5.1)

1. On-car Services

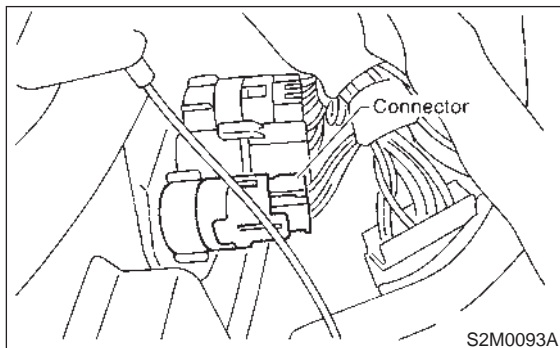
A: PRECAUTIONS

WARNING:

- Place "No fire" signs near the working area.
- Disconnect ground terminal from battery.
- Be careful not to spill fuel on the floor.

B: RELEASING OF FUEL PRESSURE

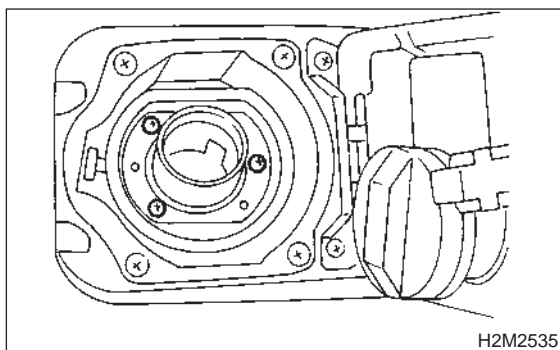
- 1) Disconnect connector from fuel pump relay.



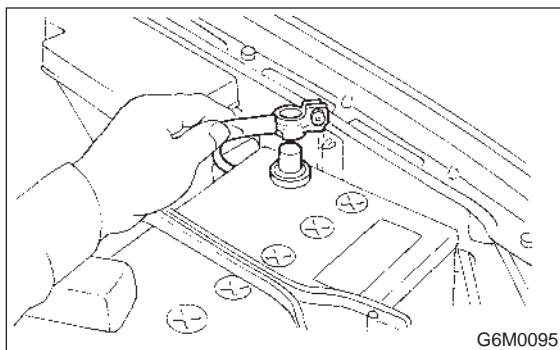
- 2) Start the engine, and run it until it stalls.
- 3) After the engine stalls, crank it for five more seconds.
- 4) Turn ignition switch OFF.

C: DRAINING OF FUEL

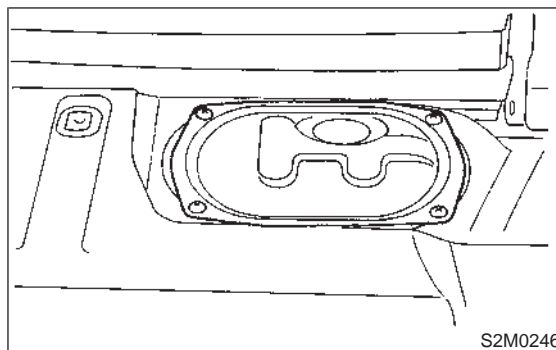
- 1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 2) Open fuel flap lid, and remove fuel filler cap.



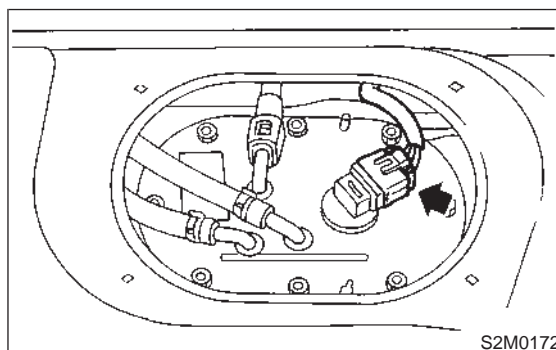
- 3) Disconnect battery ground cable.



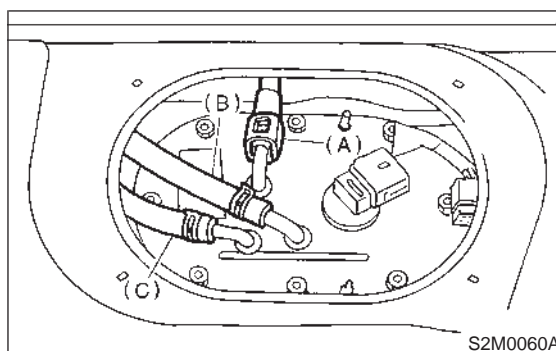
- 4) Remove access hole lid.



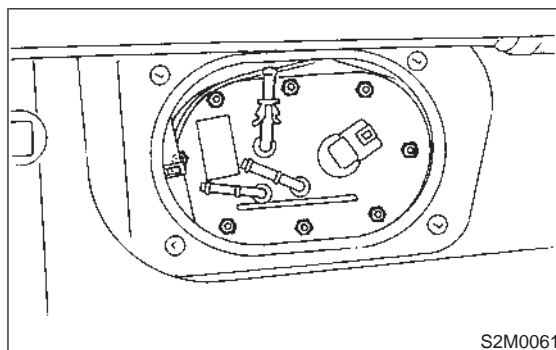
- 5) Disconnect connector from fuel pump.



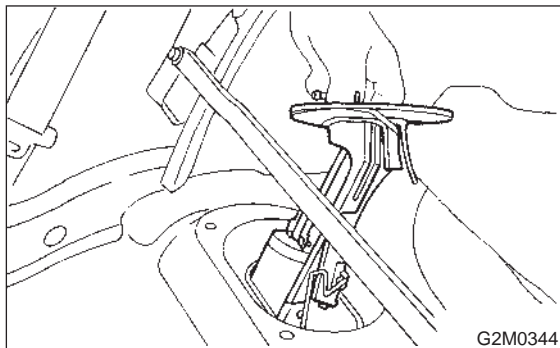
- 6) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to 2-8 [W7A0].>
- 7) Move clips, and then disconnect fuel return hose (B) and jet pump hose (C).



- 8) Remove nuts which install fuel pump assembly onto fuel tank.



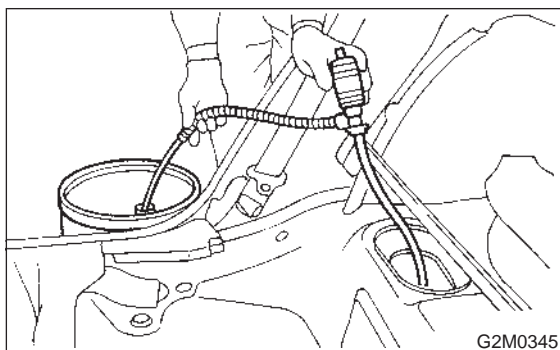
9) Take off fuel pump from fuel tank.



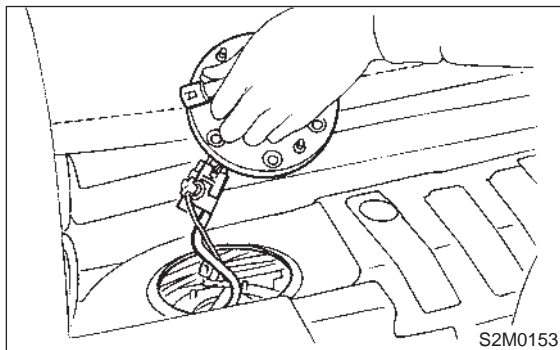
10) Drain fuel from fuel tank by using a hand pump.

WARNING:

Do not use a motor pump when draining fuel.



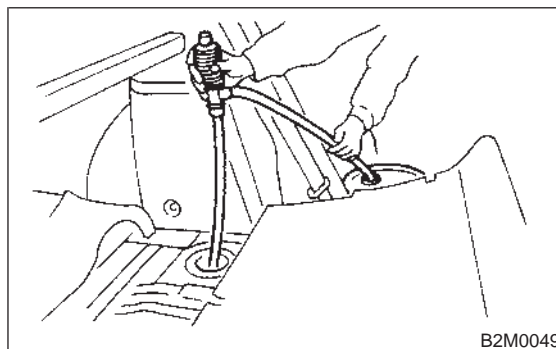
11) Remove fuel sub meter unit. <Ref. to 2-8 [W10A0].>



12) Drain fuel from there.

WARNING:

Do not use a motor pump when draining fuel.

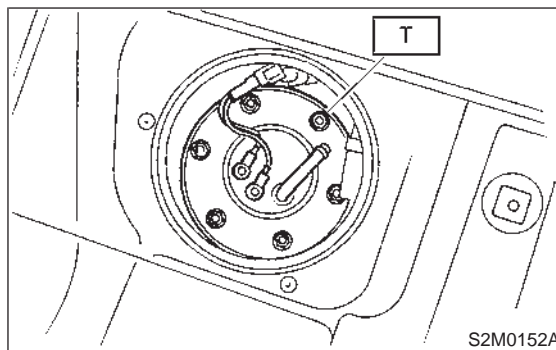
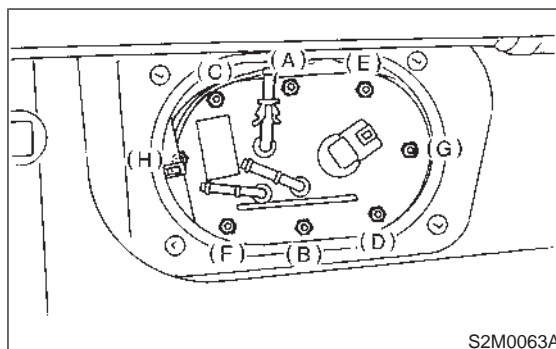


13) After draining fuel, reinstall fuel pump and fuel sub meter unit.

Tighten nuts of fuel pump in numerical sequence shown in figure to specified torque.

Tightening torque:

4.4 ± 1.5 N·m (0.45 ± 0.15 kg·m, 3.3 ± 1.1 ft·lb)



D: MEASUREMENT OF FUEL PRESSURE

WARNING:

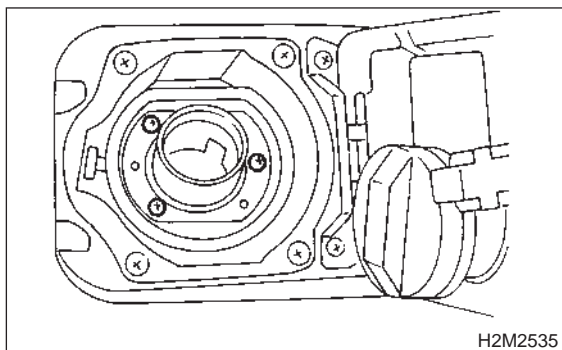
Before removing fuel pressure gauge, release fuel pressure.

NOTE:

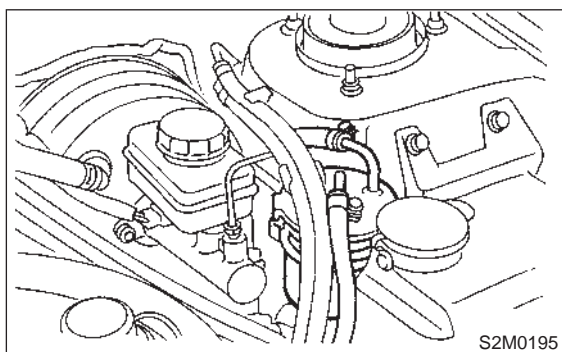
If out of specification, check or replace pressure regulator and pressure regulator vacuum hose.

1) Release fuel pressure. <Ref. to 2-8 [W1B0].>

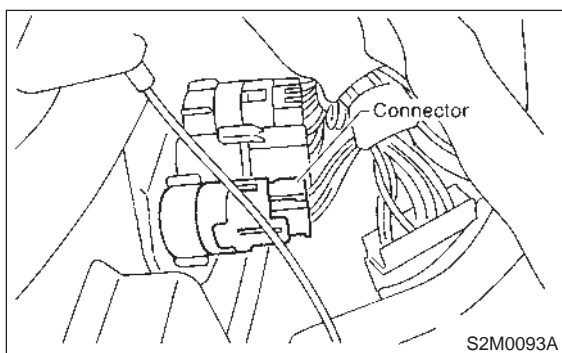
- 2) Open fuel flap lid, and remove fuel filler cap.



- 3) Disconnect fuel delivery hoses from fuel filter, and connect fuel pressure gauge.



- 4) Connect connector to fuel pump relay.

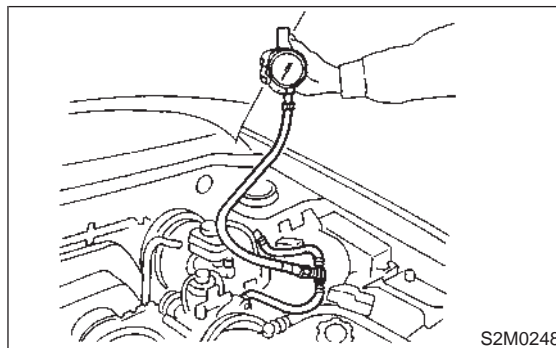


- 5) Start the engine.

- 6) Measure fuel pressure while disconnecting pressure regulator vacuum hose from collector chamber.

Fuel pressure:

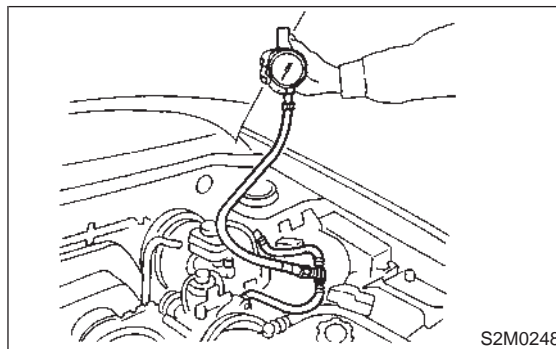
235 — 265 kPa (2.4 — 2.7 kg/cm², 34 — 38 psi)



- 7) After connecting pressure regulator vacuum hose, measure fuel pressure.

Fuel pressure:

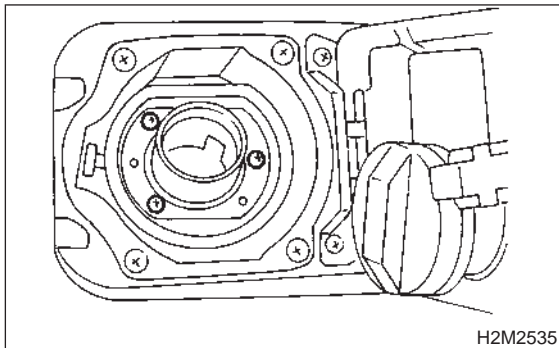
177 — 206 kPa (1.8 — 2.1 kg/cm², 26 — 30 psi)



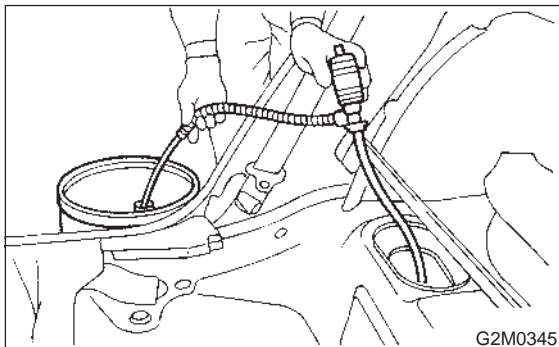
2. Fuel Tank

A: REMOVAL

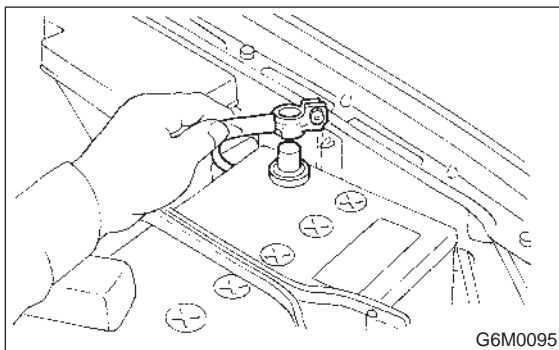
- 1) Set the vehicle on the lift.
- 2) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 3) Open fuel flap lid, and remove fuel filler cap.



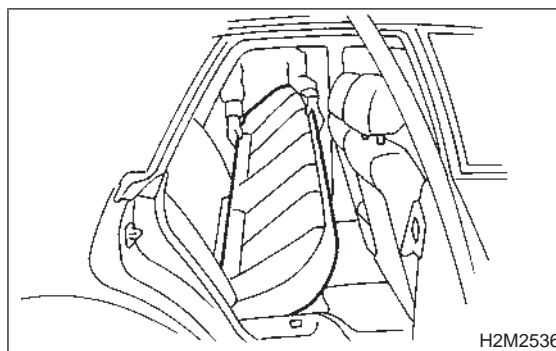
- 4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>



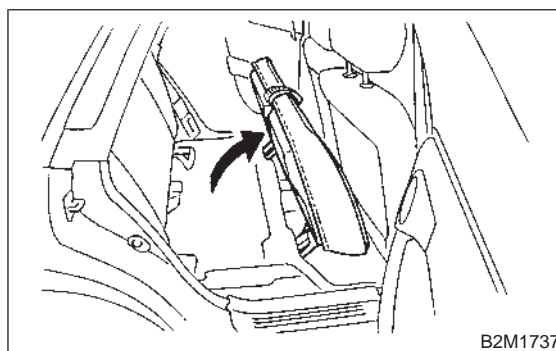
- 5) Disconnect battery ground cable.



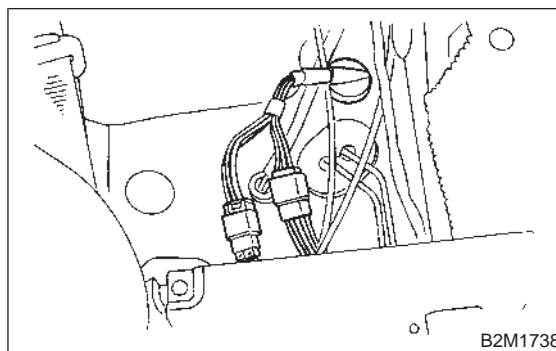
- 6) Remove rear seat cushion. (Sedan model)
<Ref. to 5-3 [W2A0].>



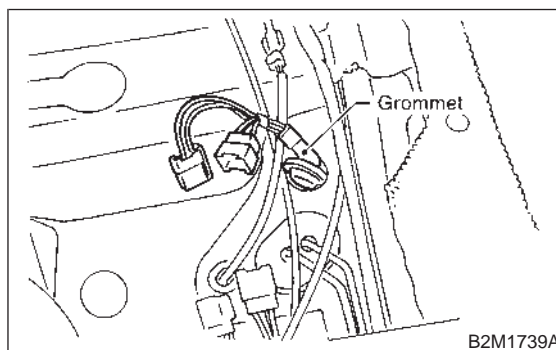
- 7) Move rear seat cushion forward. (Wagon model)



- 8) Disconnect connector of fuel tank cord from rear harness.



- 9) Push grommet which holds fuel tank cord on floor panel into the body side.

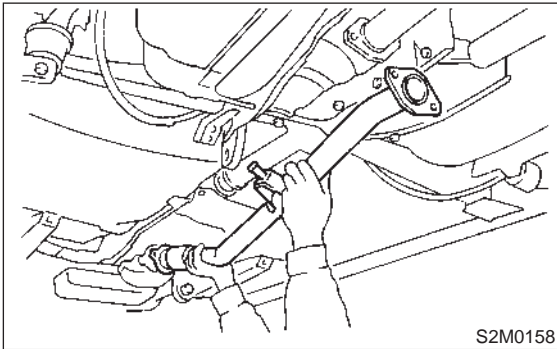


- 10) Lift-up the vehicle.
- 11) Remove rear exhaust pipe.

- (1) Separate rear exhaust pipe from center exhaust pipe.
- (2) Separate rear exhaust pipe from muffler.
- (3) Remove bracket from rubber cushion, and remove exhaust pipe.

NOTE:

To facilitate the removal of parts, apply a coat of SUBARU CRC5-56 (Part No. 004301003).

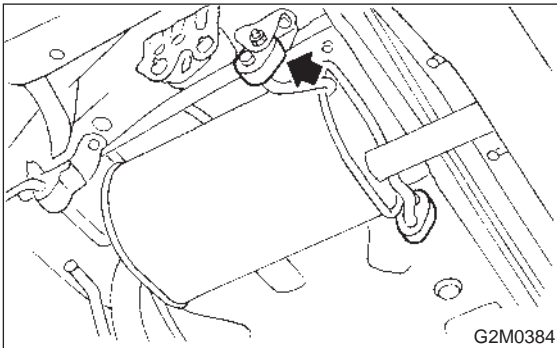


S2M0158

- 12) Remove muffler assembly.
<Ref. to 2-9 [W3A0].>

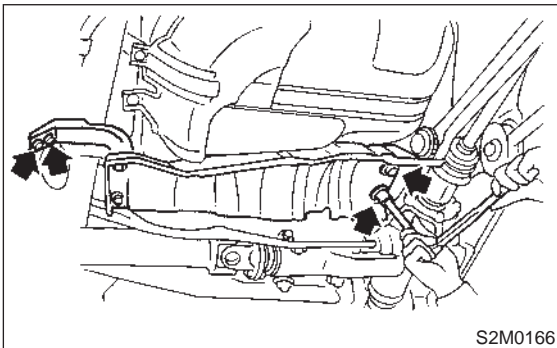
NOTE:

To facilitate the removal of parts, apply a coat of SUBARU CRC5-56 (Part No. 004301003).



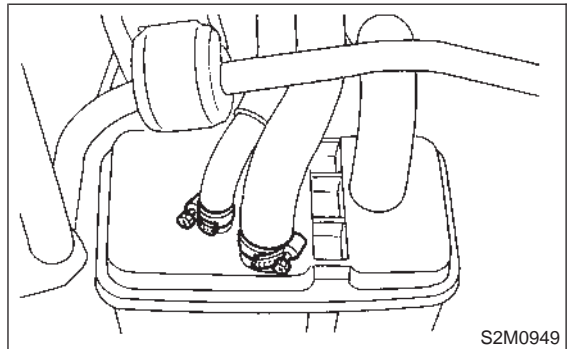
G2M0384

- 13) Remove heat sealed cover.



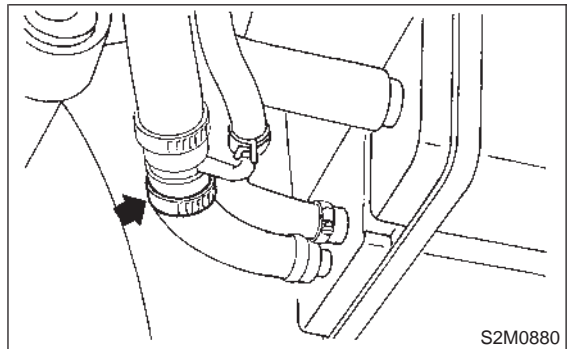
S2M0166

- 14) Move clamp, and disconnect evaporation hose from canister.



S2M0949

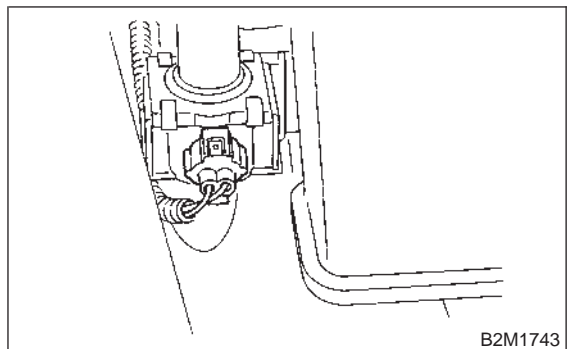
- 15) Disconnect hose from joint pipe.



S2M0880

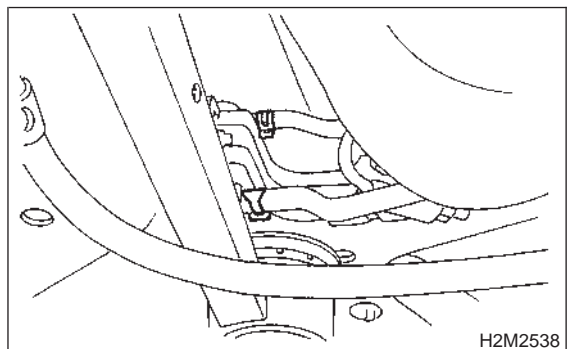
- 16) Disconnect connector from pressure control solenoid valve.

- 17) Disconnect connector from drain valve.



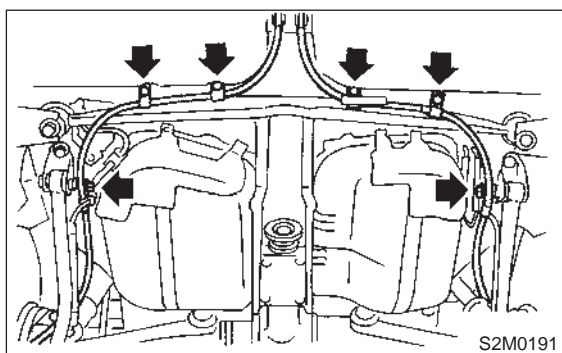
B2M1743

- 18) Disconnect hoses from roll over valve.



H2M2538

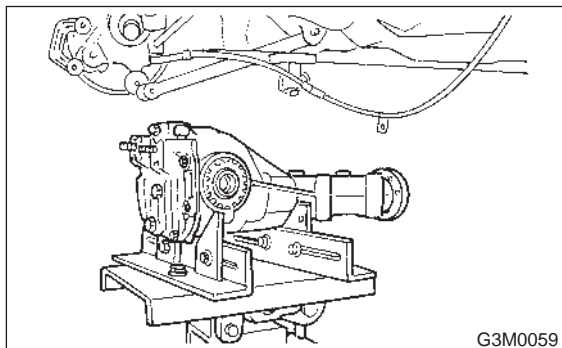
19) Remove bolts which hold parking brake cable holding bracket.



20) Remove rear differential assembly.

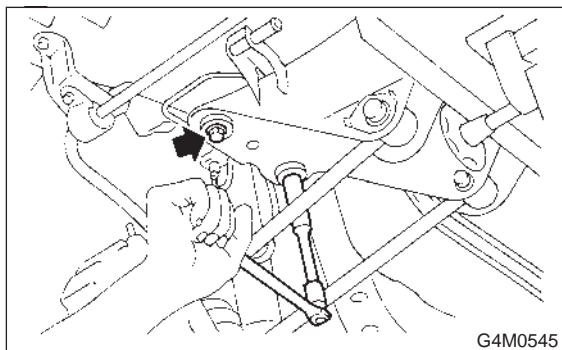
- (1) Remove rear axle shafts from rear differential assembly.
- (2) Remove rear differential front cover.
- (3) Remove propeller shaft.
- (4) Remove lower differential bracket.
- (5) Set transmission jack under rear differential.
- (6) Remove bolts which install rear differential onto rear crossmember.

<Ref. to 3-4 [W2B0].> and <Ref. to 3-4 [W3B0].>

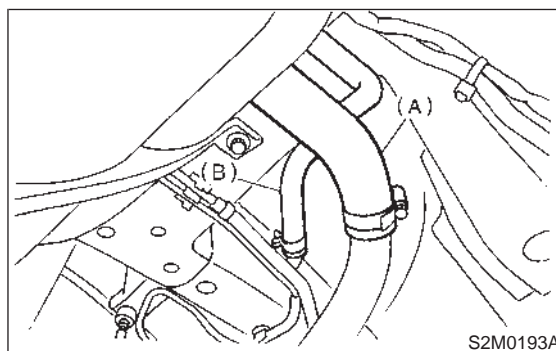


21) Remove rear crossmember.

<Ref. to 4-1 [W10A0].>

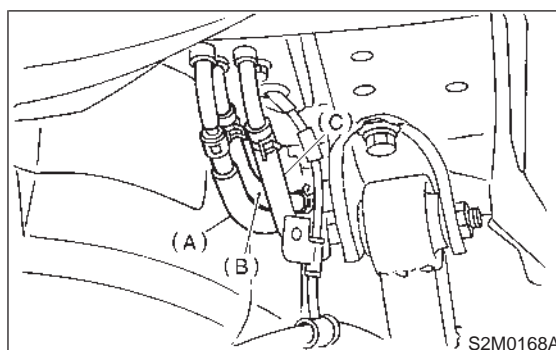


22) Loosen clamp, and disconnect fuel filler hose (A) and air vent hose (B) from fuel filler pipe and air vent pipe.



23) Move clips, and disconnect fuel return hose (B) and evaporation hose (C).

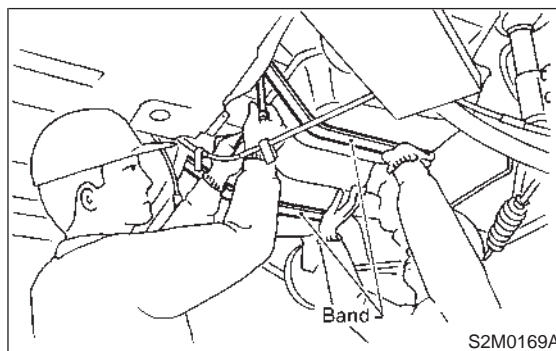
24) Disconnect quick connector, and then disconnect fuel delivery hose (A).



25) While holding fuel tank, remove bolts from bands and dismount fuel tank.

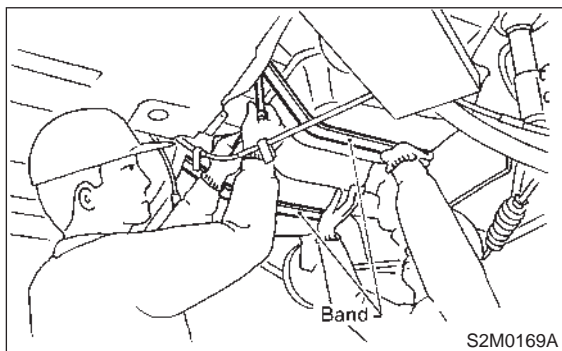
WARNING:

A helper is required to perform this work.



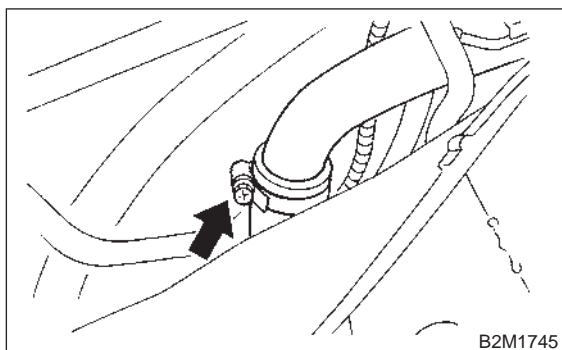
B: INSTALLATION

1) While a helper holds fuel tank, push fuel tank harness into access hole with grommet.



2) Set fuel tank, and temporary tighten bolts in order to install fuel tank bands.

3) Connect fuel filler hose, and tighten clamp.

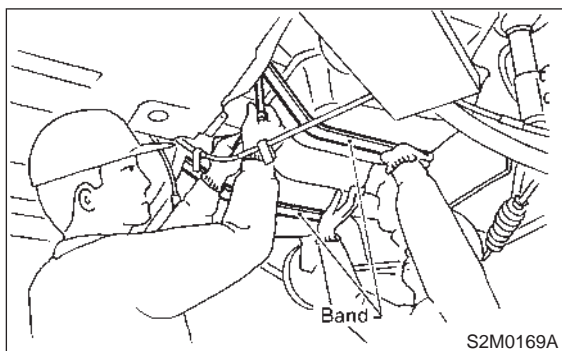


4) Connect fuel hoses, and hold then with clips and quick connector. <Ref. to 2-8 [W7A0].>

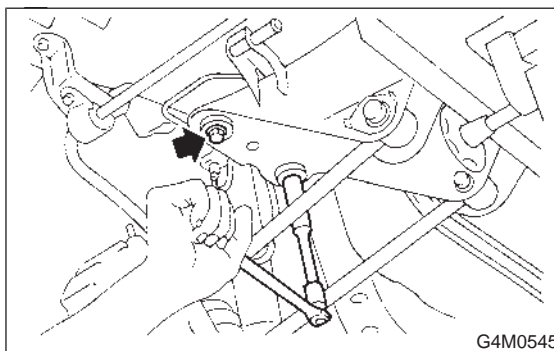
5) Tighten band mounting bolts.

Tightening torque:

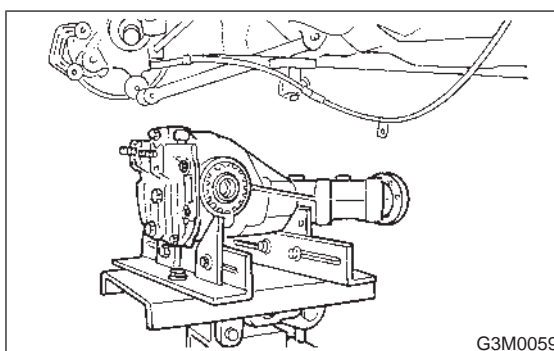
$33 \pm 10 \text{ N}\cdot\text{m}$ ($3.4 \pm 1.0 \text{ kg}\cdot\text{m}$, $25 \pm 7 \text{ ft}\cdot\text{lb}$)



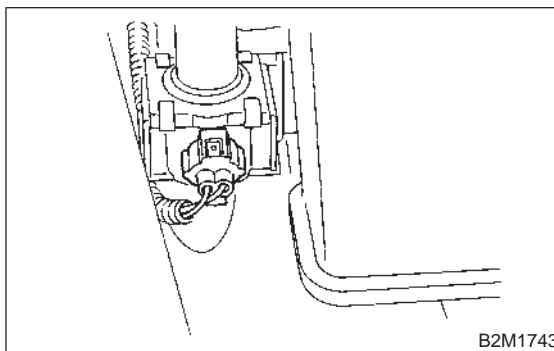
6) Install rear crossmember. <Ref. to 4-1 [W10C0].>



7) Install rear differential assembly. <Ref. to 3-4 [W2F0].> and <Ref. to 3-4 [W3F0].>

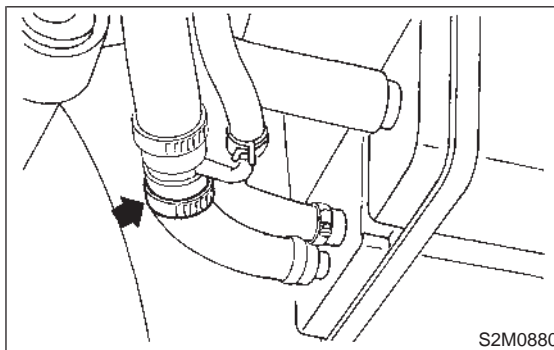


8) Connect connector to drain valve.

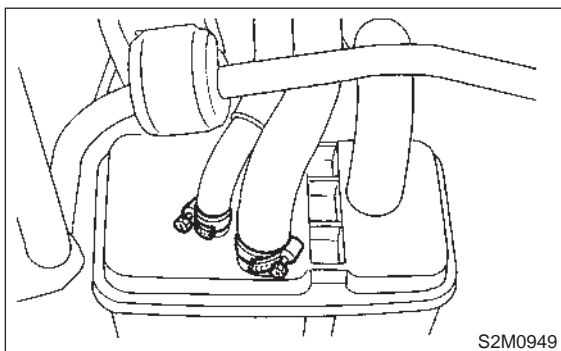


9) Connect connector to pressure control solenoid valve.

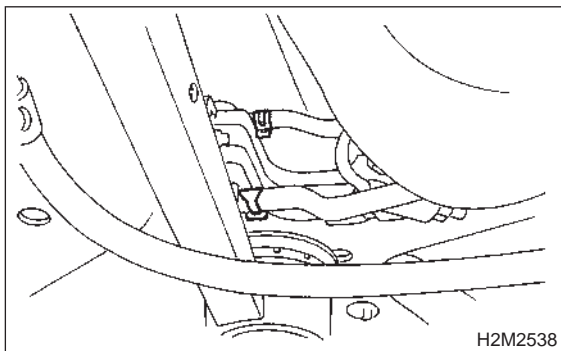
10) Connect hose to joint pipe.



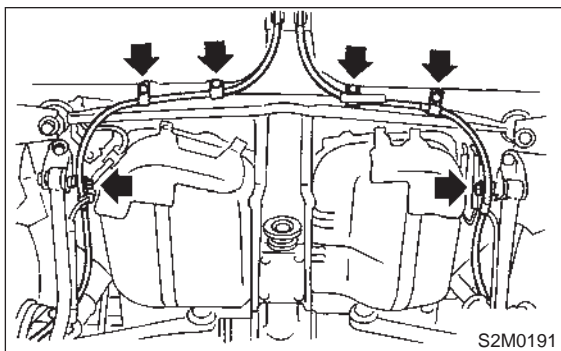
11) Connect evaporation hose to canister, and hold them with clamp.



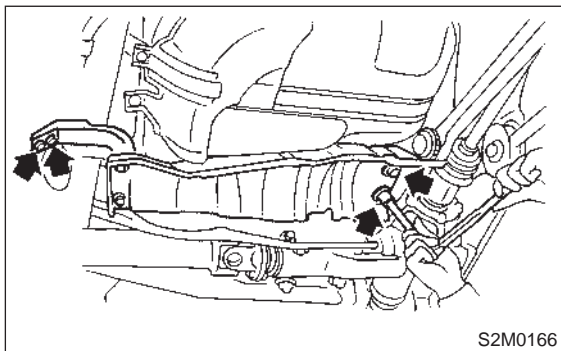
12) Connect hoses to roll over valve.



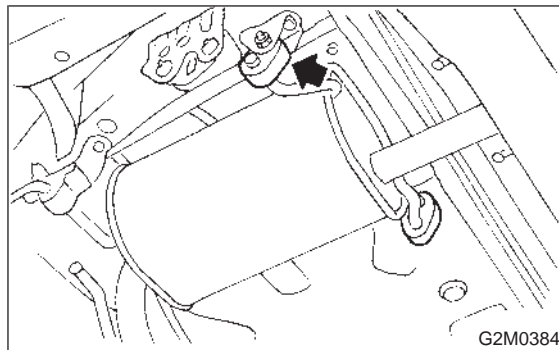
13) Install bolts which hold parking brake holding bracket.



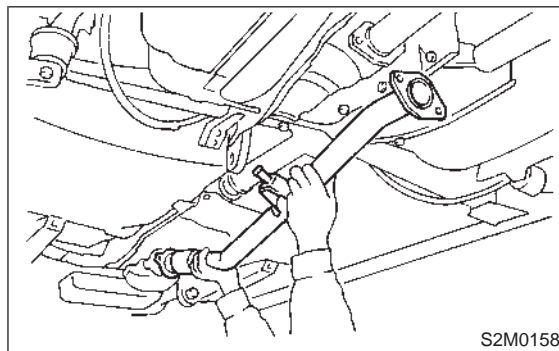
14) Install heat sealed cover.



15) Install muffler assembly. <Ref. to 2-9 [W3A0].>

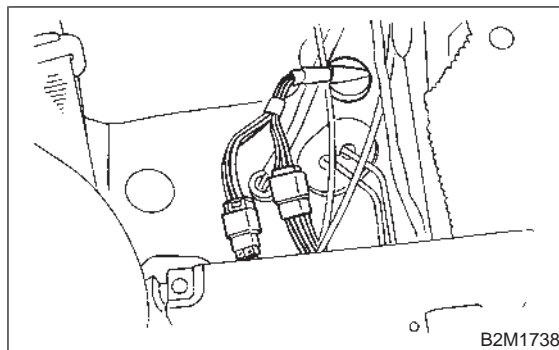


16) Install rear exhaust pipe. <Ref. to 2-9 [W2B0].>

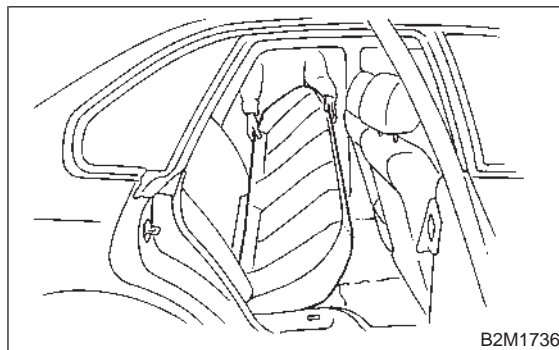


17) Lower the vehicle.

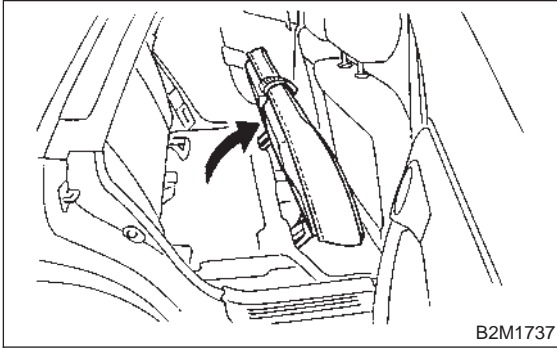
18) Connect connectors to fuel tank harness, and plug access hole with grommet.



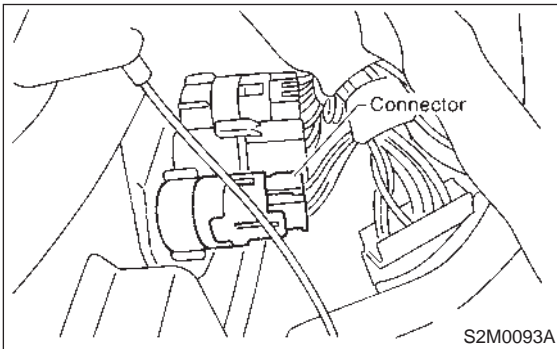
19) Install rear seat cushion. (Sedan model) <Ref. to 5-3 [W2B0].>



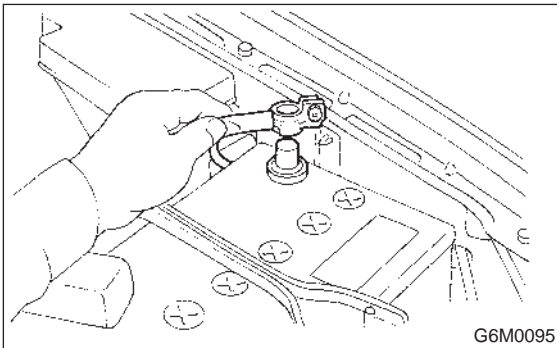
- 20) Set rear seat cushion. (Wagon model)



- 21) Install fuel filler cap.
22) Connect connector to fuel pump relay.



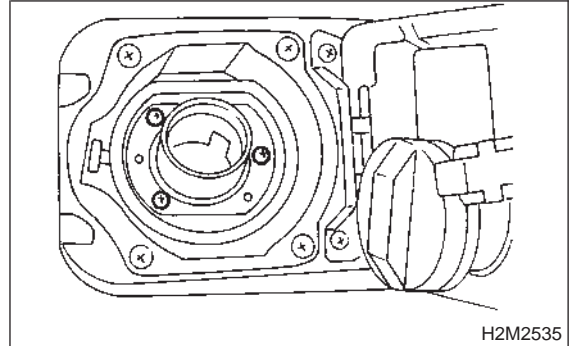
- 23) Connect battery ground cable.



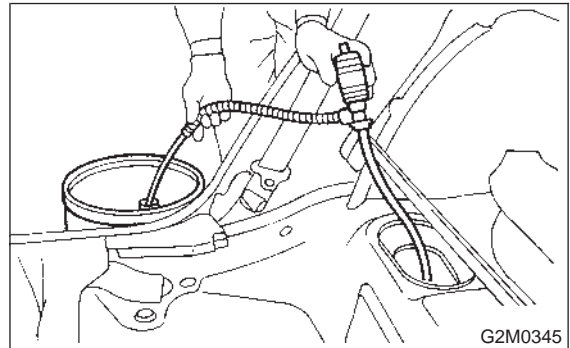
3. Fuel Filler Pipe

A: REMOVAL

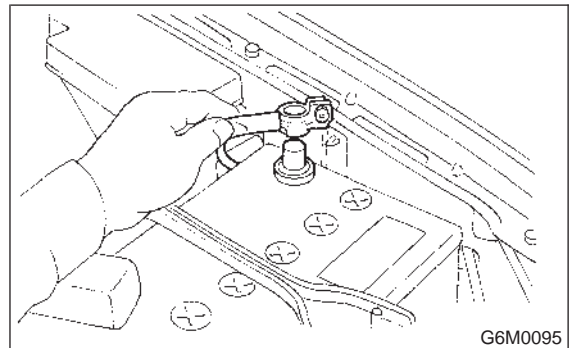
- 1) Set the vehicle on the lift.
- 2) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 3) Open fuel flap lid, and remove fuel filler cap.



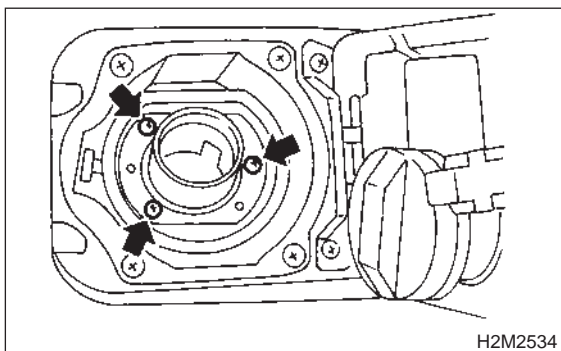
- 4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>



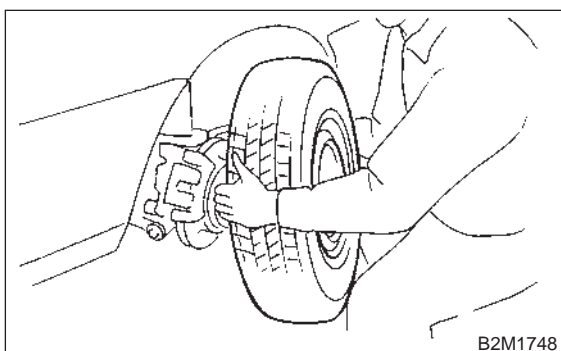
- 5) Disconnect battery ground cable.



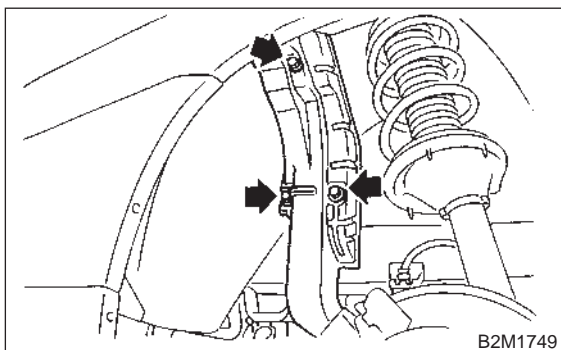
- 6) Remove screws which install fuel filler pipe on filler lid open.



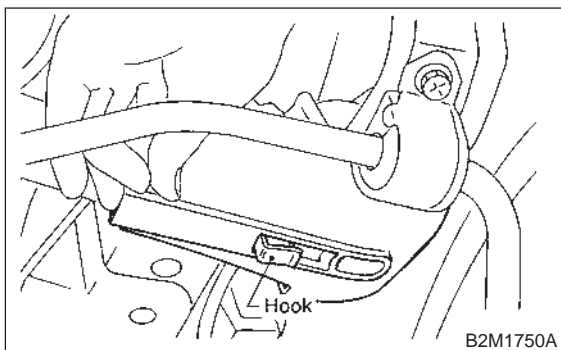
- 7) Remove wheel nuts of rear right side.
8) Lift-up the vehicle.
9) Remove rear right side wheel.



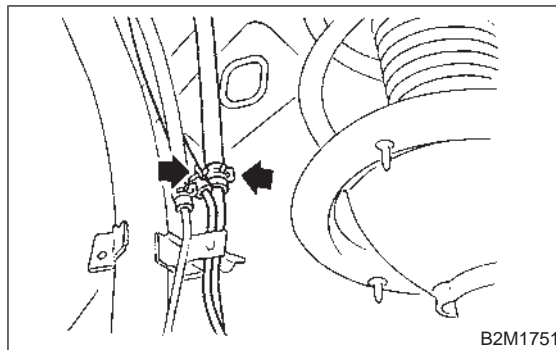
- 10) Remove bolts which install protector cover on body.



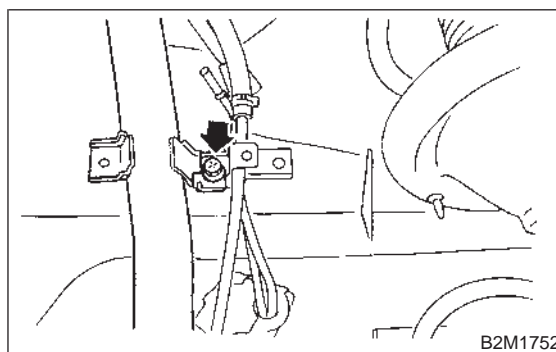
- 11) While releasing the under side of protector cover from hook, remove it.



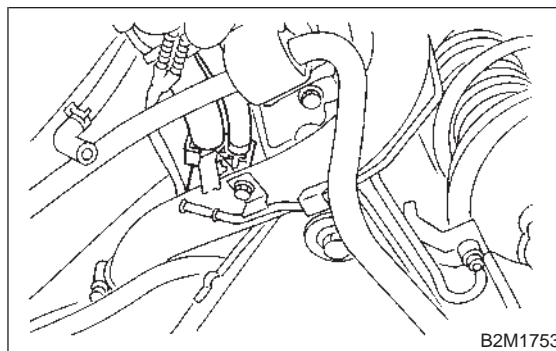
- 12) Disconnect evaporation hoses from pipes.



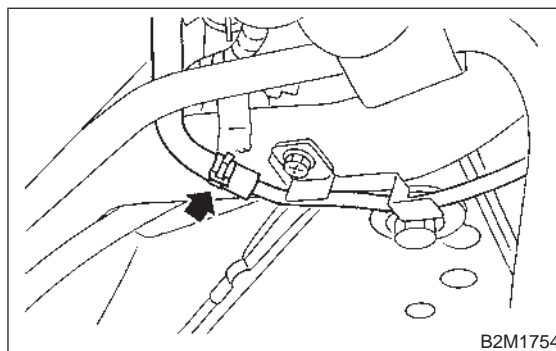
- 13) Remove bolts which hold fuel filler pipe bracket.



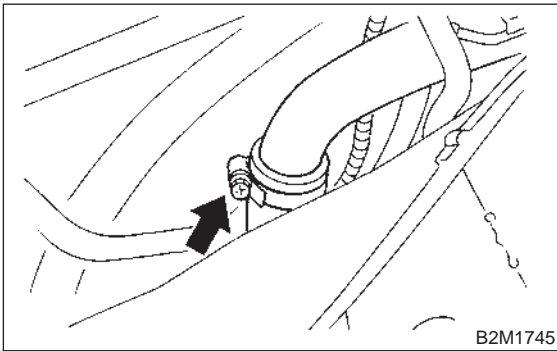
- 14) Lift-up the vehicle more.
15) Remove two evaporation hoses from clip.



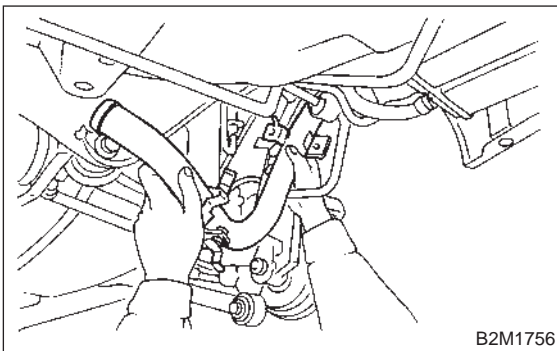
- 16) Disconnect evaporation hose from joint pipe.



- 17) Loosen clamp, and disconnect fuel filler hose from fuel filler pipe.

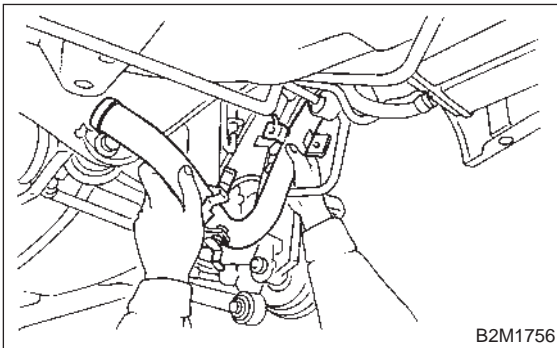


- 18) Remove fuel filler pipe to under side of vehicle.

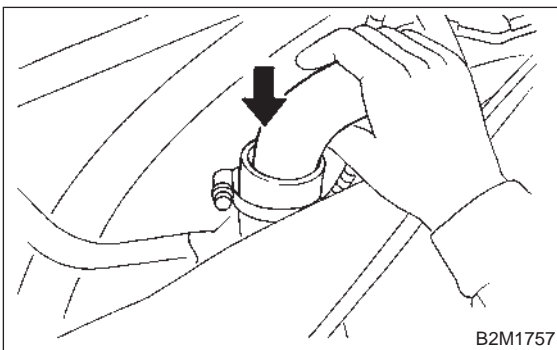


B: INSTALLATION

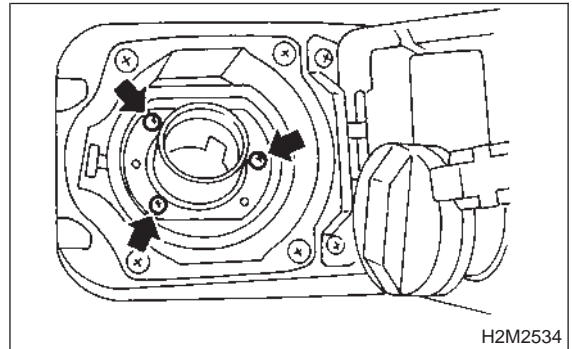
- 1) Set fuel filler pipe from under side of vehicle, and hold it on fuel filler flap open.



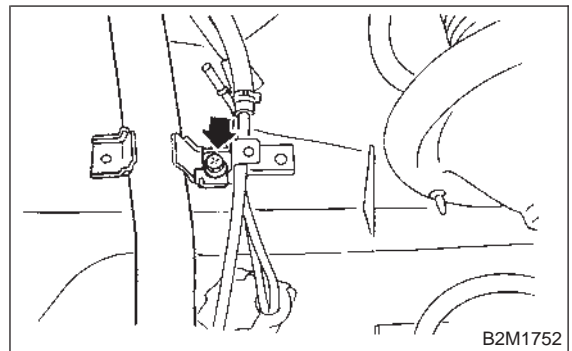
- 2) Connect fuel filler pipe into fuel filler hose.



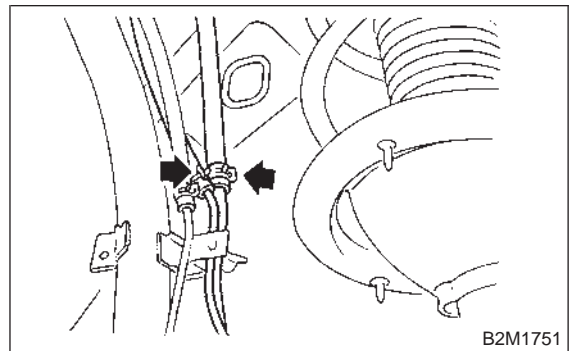
- 3) Lower the vehicle.
4) Temporarily tighten screws which install fuel filler pipe on filler lid open.



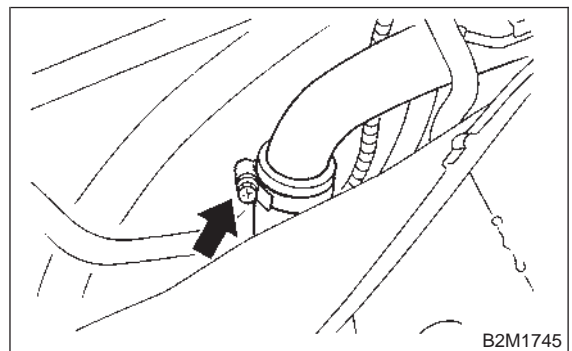
- 5) Tighten bolt which holds fuel filler pipe on body.



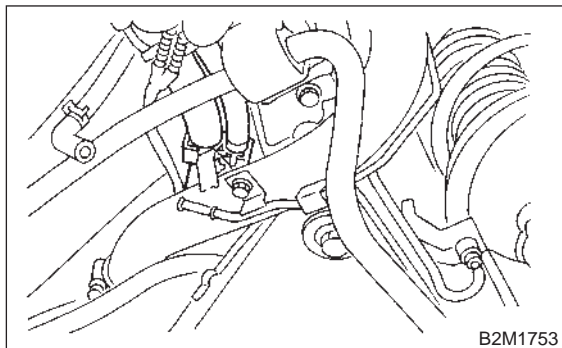
- 6) Connect evaporation hoses to pipes.



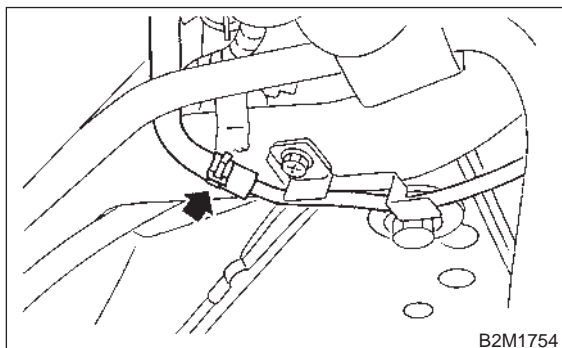
- 7) Lift-up the vehicle.
8) Tighten clamp bolt which holds fuel filler hose.



- 9) Install two evaporation hoses to clip.

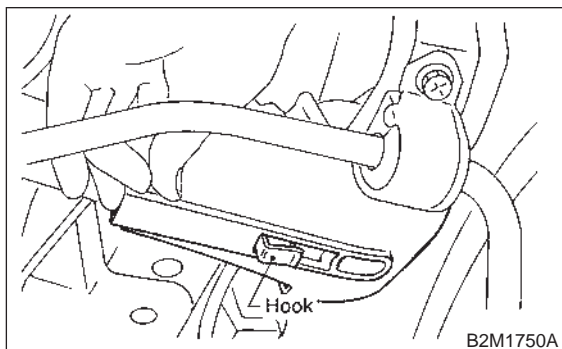


- 10) Connect evaporation hose to joint pipe.

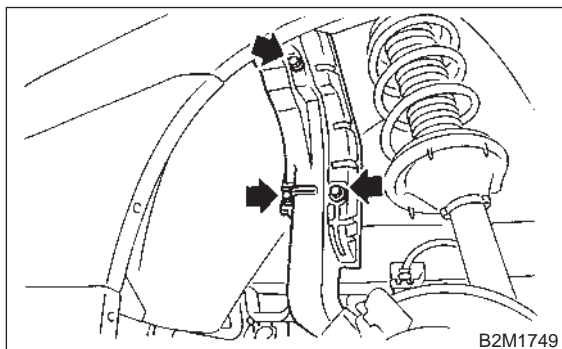


- 11) Lower the vehicle.

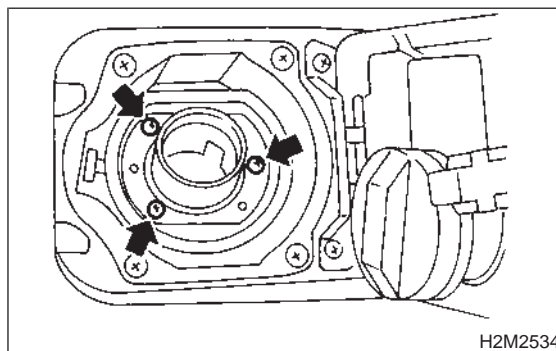
- 12) While holding the under side of protector cover on bracket, install it.



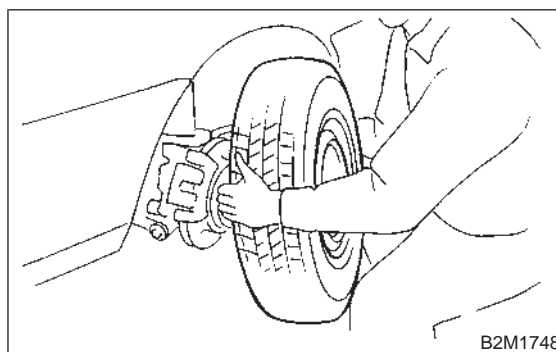
- 13) Tighten bolts which install protector cover on body.



- 14) Tighten screws which install fuel filler pipe on filler lid open.

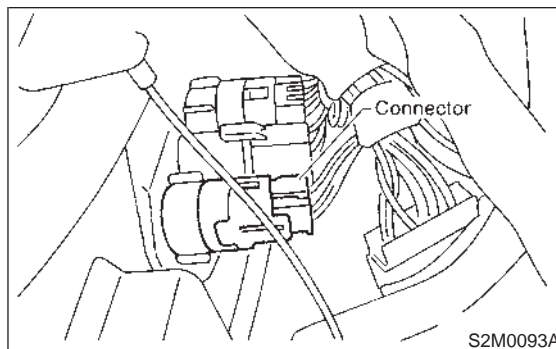


- 15) Install rear right wheel.

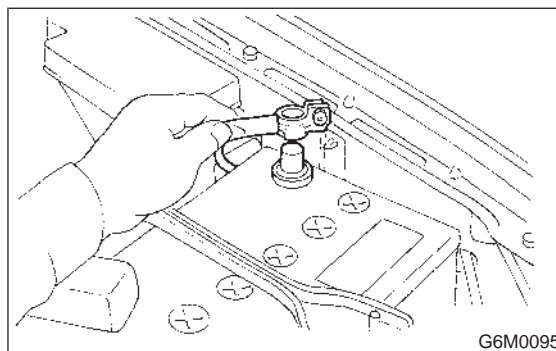


- 16) Install fuel filler cap.

- 17) Connect connector to fuel pump relay.

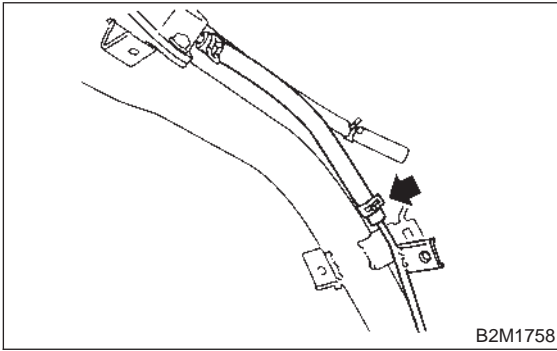


- 18) Connect battery ground terminal.

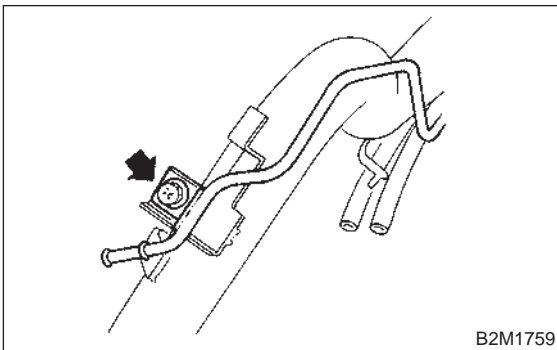


C: DISASSEMBLY

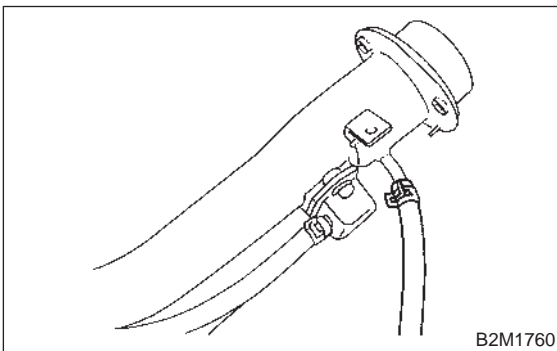
1) Move clip, and disconnect evaporation hose from joint pipe.



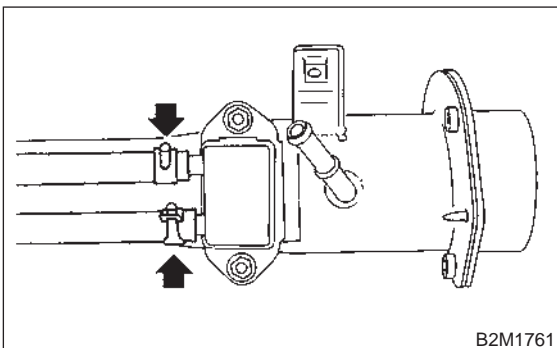
2) Remove bolt which installs joint pipe on fuel filler pipe.



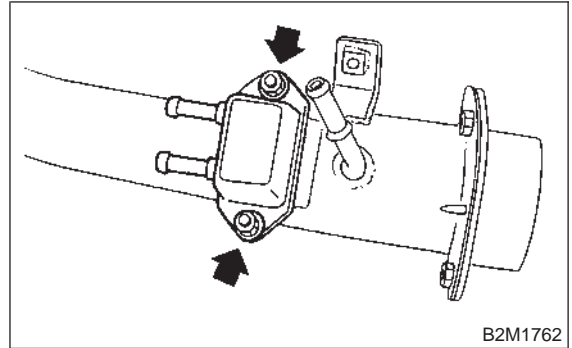
3) Disconnect evaporation hose from fuel filler pipe.



4) Disconnect evaporation hoses from shut valve.



5) Remove shut valve from fuel filler pipe.

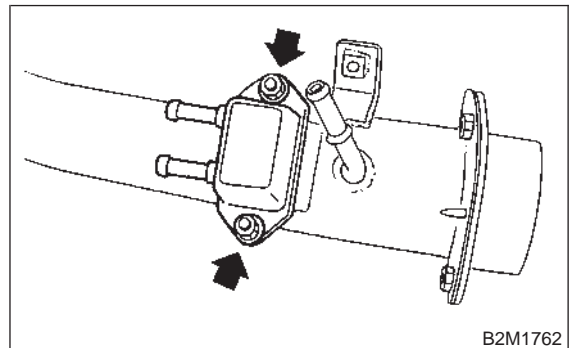


D: ASSEMBLY

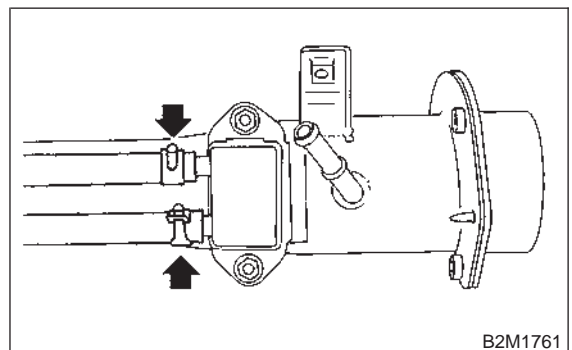
1) Install shut valve on fuel filler pipe.

Tightening torque:

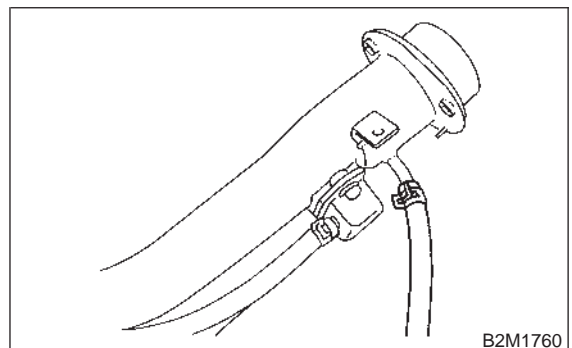
$4.4 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.45 \pm 0.15 \text{ kg}\cdot\text{m}$, $3.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)



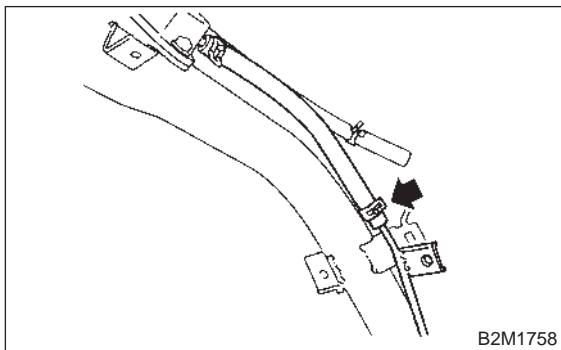
2) Connect evaporation hoses to shut valve.



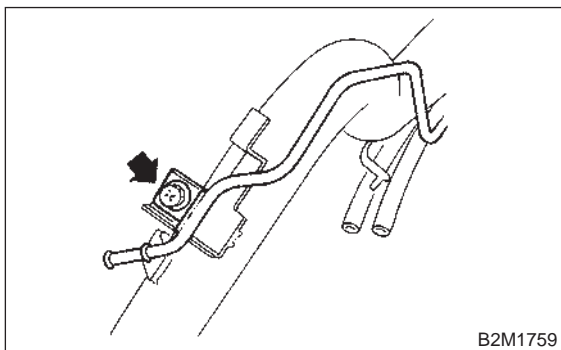
3) Connect evaporation hose to fuel filler pipe.



- 4) Connect evaporation hose to evaporation pipe.



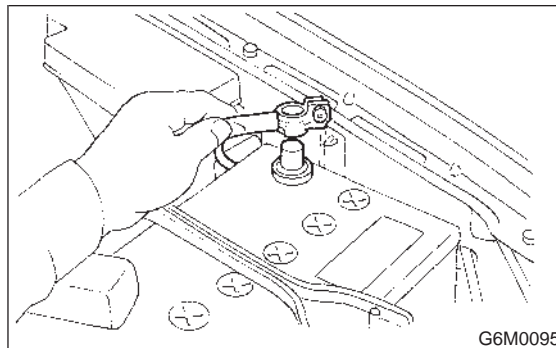
- 5) Install evaporation pipe to fuel filler pipe.



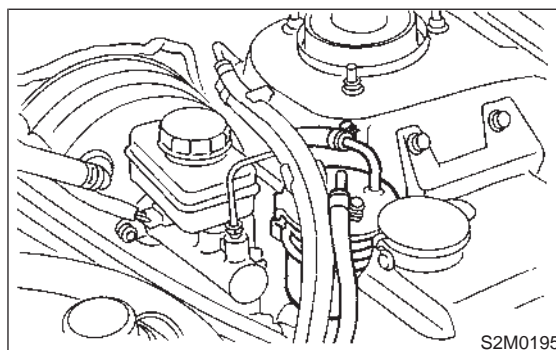
4. Fuel Filter

A: REMOVAL

- 1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 2) Disconnect battery ground cable.



- 3) Disconnect fuel delivery hoses from fuel filter.



- 4) Remove filter from holder.

B: INSPECTION

- 1) Check the inside of fuel filter for dirt and water sediment.
- 2) If it is clogged, or if replacement interval has been reached, replace it.
- 3) If water is found in it, shake and expel the water from inlet port.

C: INSTALLATION

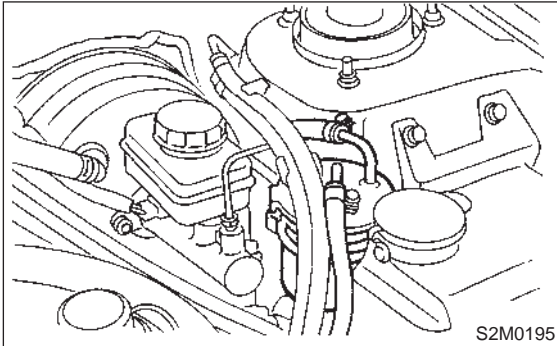
CAUTION:

- If fuel hoses are damaged at the connecting portion, replace it with a new one.
- If clamps are badly damaged, replace with new ones.

- 1) Installation is in the reverse order of removal.
- 2) Tighten hose clamp screws.

Tightening torque:

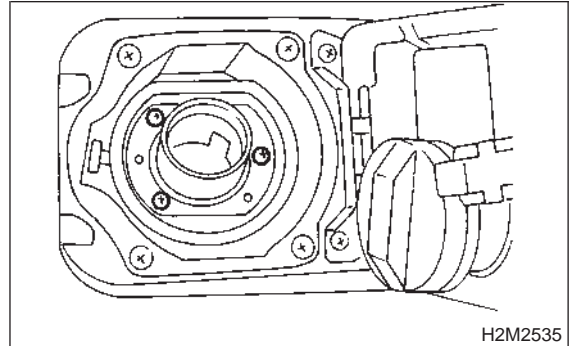
$1.0^{+0.5}_{-0}$ N·m ($0.1^{+0.05}_{-0}$ kg-m, $0.7^{+0.4}_{-0}$ ft-lb)



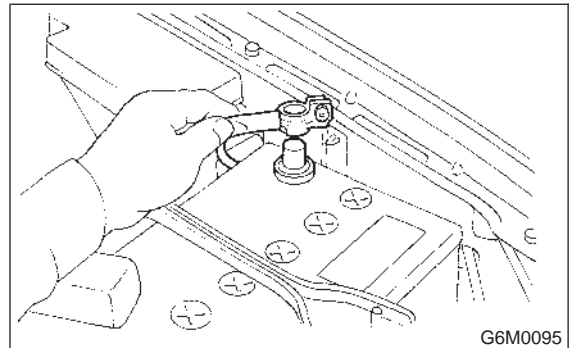
5. Fuel Pump

A: REMOVAL

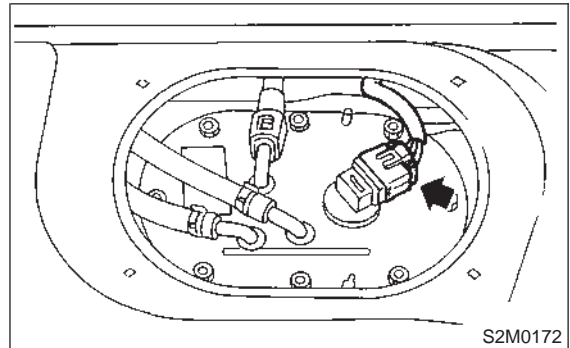
- 1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 2) Open fuel flap lid, and remove fuel filler cap.



- 3) Disconnect battery ground cable.

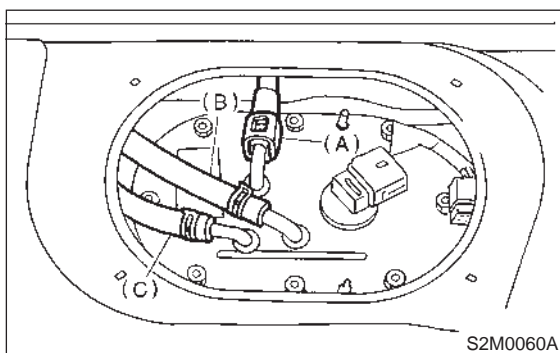


- 4) Disconnect connector from fuel pump.

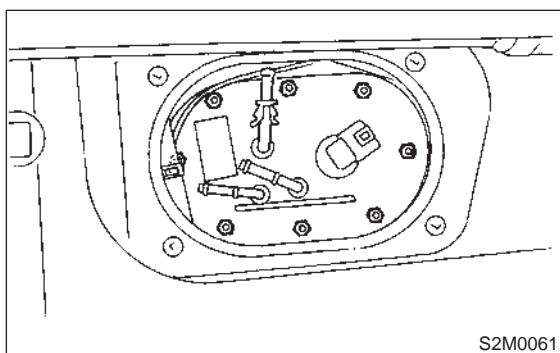


- 5) Move clips, and then disconnect fuel delivery hose (A), return hose (B) and jet pump hose (C).

- 6) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to 2-8 [W7A0].>



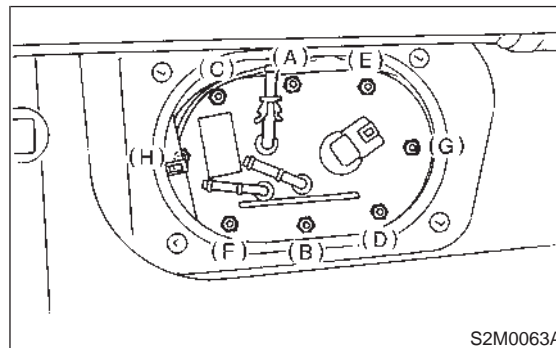
- 7) Remove nuts which install fuel pump assembly onto fuel tank.
8) Take off fuel pump from fuel tank.



- (1) Always use new gaskets.
(2) Ensure sealing portion is free from fuel or foreign particles before installation.
(3) Tighten nuts in numerical sequence shown in Figure to specified torque.

Tightening torque:

$4.4 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.45 \pm 0.15 \text{ kg}\cdot\text{m}$, $3.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)

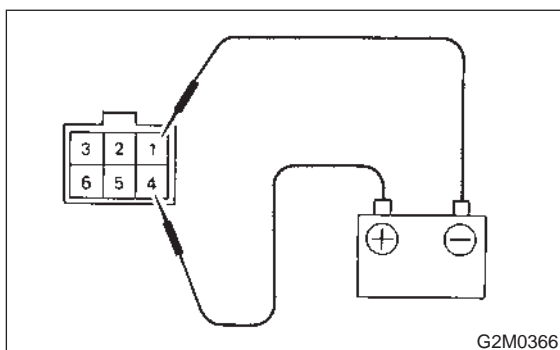


B: INSPECTION

Connect lead harness to connector terminal of fuel pump, and apply battery power supply to check whether the pump operate.

WARNING:

- Wipe off the fuel completely.
- Be sure to turn the battery supply ON and OFF on the battery side.
- Do not run fuel pump for a long time under non-load condition.



C: INSTALLATION

Installation is in the reverse order of removal. Do the following:

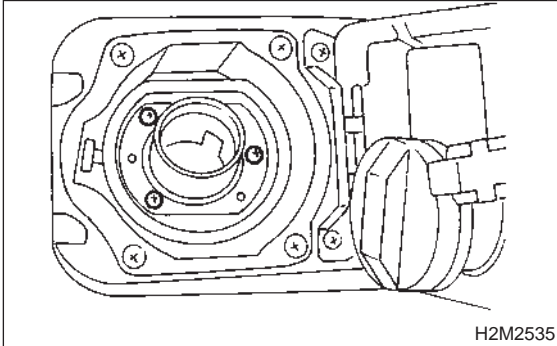
6. Fuel Meter Unit

A: REMOVAL

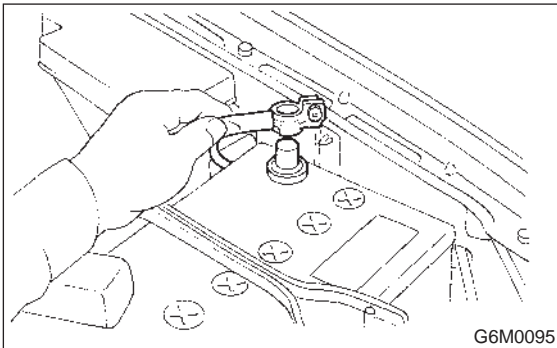
NOTE:

Fuel meter unit is built in fuel pump assembly.

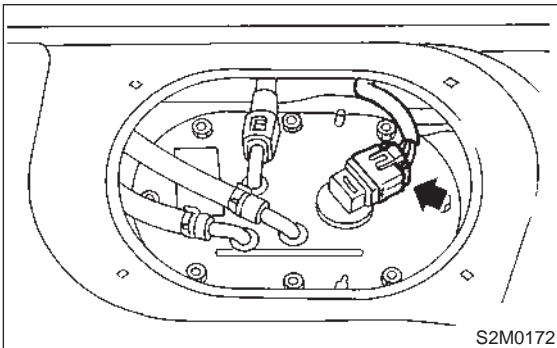
- 1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
- 2) Open fuel flap lid, and remove fuel filler cap.



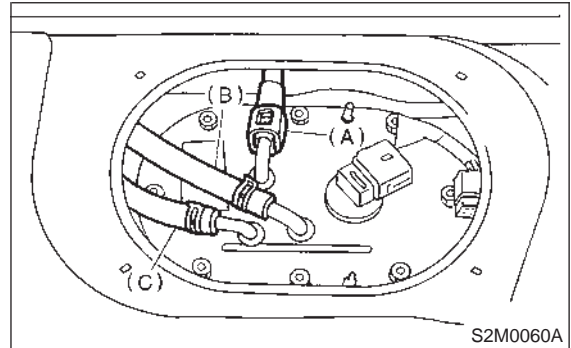
- 3) Disconnect battery ground cable.



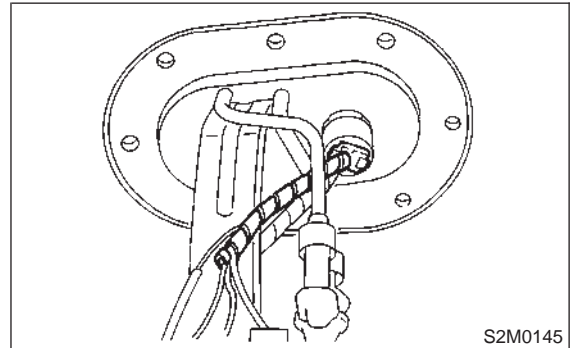
- 4) Disconnect connector from fuel pump.



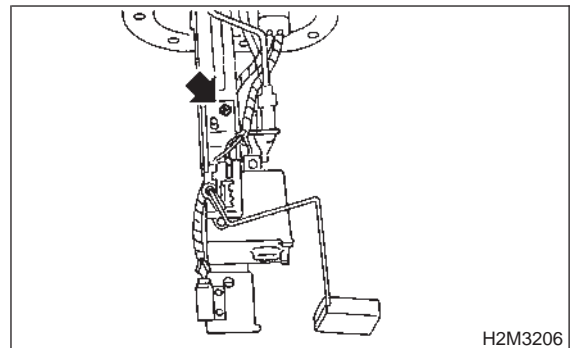
- 5) Move clips, and then disconnect fuel return hose (B) and jet pump hose (C).
- 6) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to 2-8 [W7A0].>



- 7) Remove nuts which install fuel pump assembly onto fuel tank.
- 8) Take off fuel pump assembly.
- 9) Disconnect connector from fuel pump bracket.



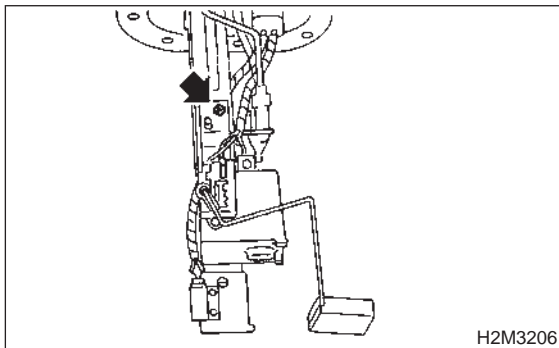
- 10) Remove bolt which installs fuel meter unit on mounting bracket.



B: INSTALLATION

Installation is in the reverse order of removal. Do the following:

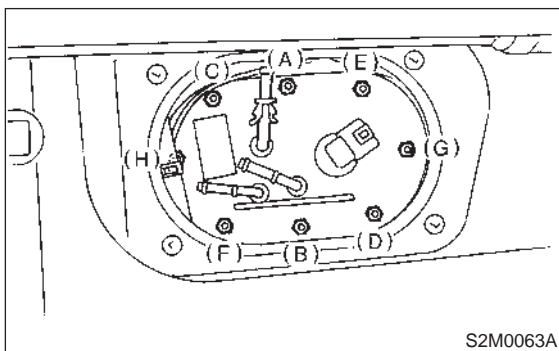
- (1) Install the fuel meter unit on mounting bracket.



- (2) Always use new gaskets.
- (3) Ensure sealing portion is free from fuel or foreign particles before installation.
- (4) Tighten nuts in alphabetical sequence shown in Figure to specified torque.

Tightening torque:

$4.4 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.45 \pm 0.15 \text{ kg}\cdot\text{m}$, $3.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)

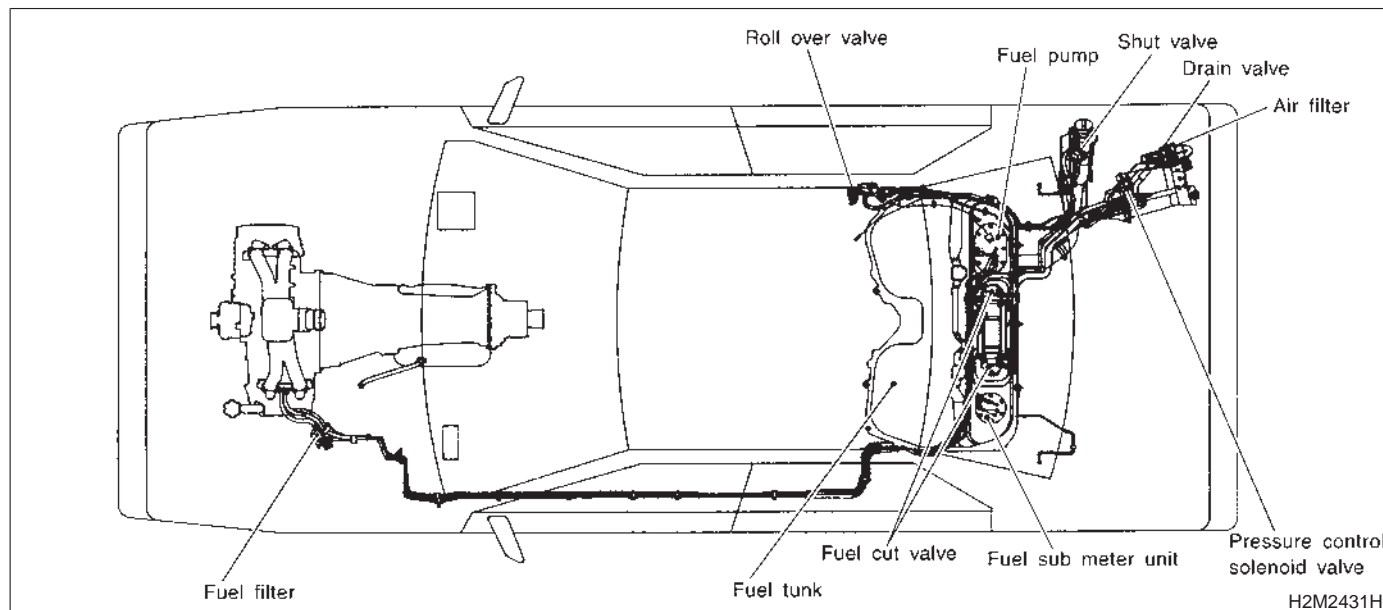


7. Fuel Delivery, Return and Evaporation Lines

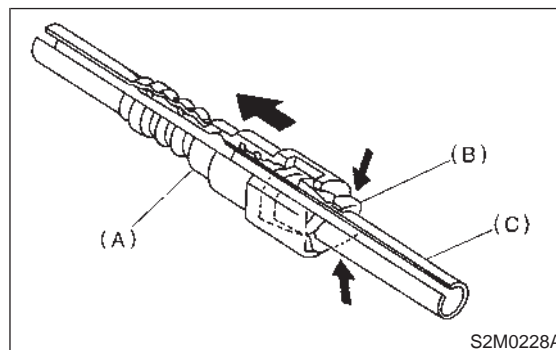
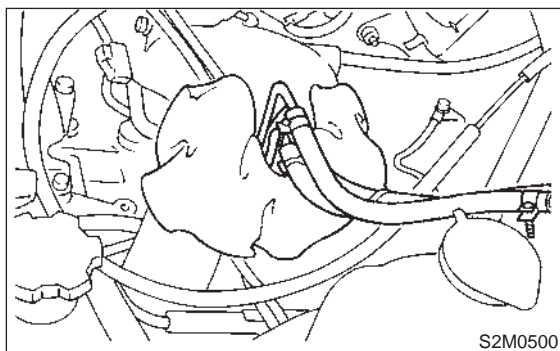
A: REMOVAL

1) Release fuel pressure. <Ref. to 2-8 [W1B0].>

- 2) Open fuel flap lid, and remove fuel filler cap.
- 3) Remove inner trim, insulator and rear seat.
- 4) Remove fuel delivery pipes and hoses, fuel return pipes and hoses, and evaporation pipes and hoses.



5) In engine compartment, detach fuel delivery hose, return hose and evaporation hose.



- (A) Connector
- (B) Retainer
- (C) Pipe

- 6) Separate quick connector on fuel delivery line.
 - (1) Clean pipe and connector, if they are covered with dust.
 - (2) Hold connector (A) and push retainer (B) down.
 - (3) Pull out connector (A) from retainer (B).

CAUTION:

Replace retainer with new ones.

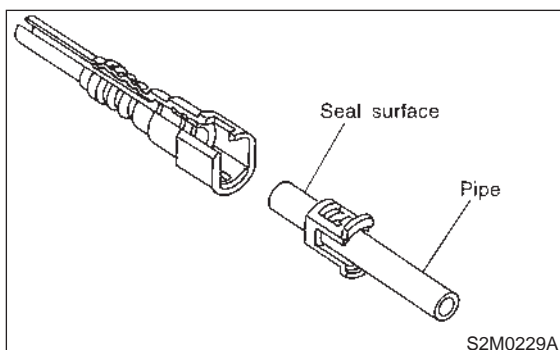
B: INSTALLATION

Installation is in the reverse order of removal.

- 1) Connect quick connector on fuel delivery line.

CAUTION:

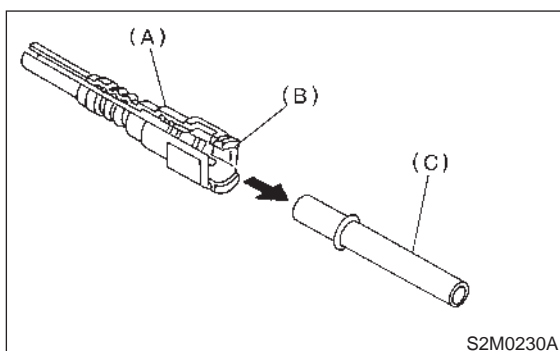
- Always use a new retainer.
- Make sure that the connected portion is not damaged or has dust. If necessary, clean sea



- (1) Set new retainer (B) to connector (A).
- (2) Push pipe into connector completely.

NOTE:

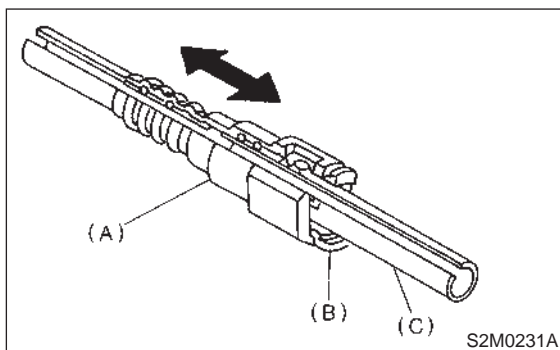
At this time, two clicking sounds are heard.



- (A) Connector
(B) Retainer
(C) Pipe

CAUTION:

- Pull the connector to ensure it is connected securely.
- Ensure the two retainer pawls are engaged in their mating positions in the connector.
- Be sure to inspect hoses and their connections for any leakage of fuel.



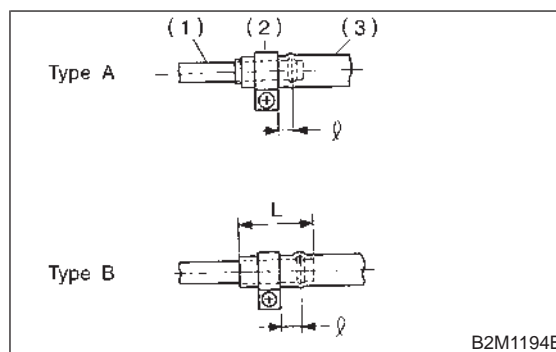
- (A) Connector
(B) Retainer
(C) Pipe

2) Connect fuel delivery hose to pipe in engine compartment with an overlap of 20 to 25 mm (0.79 to 0.98 in).

Type A: When fitting length is specified.
Type B: When fitting length is not specified.

ℓ : 1.0 — 4.0 mm (0.039 — 0.157 in)

L: 20 — 25 mm (0.79 — 0.98 in)



- (1) Fitting
(2) Clamp
(3) Hose

3) Connect return hose and evaporation hose to pipe by approx. 15 mm (0.59 in) from hose end.

Fuel return hose:

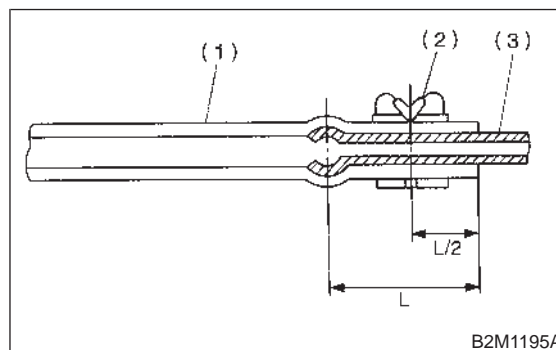
L = 20 — 25 mm (0.79 — 0.98 in)

Fuel evaporation hose:

L = 15 — 20 mm (0.59 — 0.79 in)

CAUTION:

Be sure to inspect hoses and their connections for any leakage of fuel.

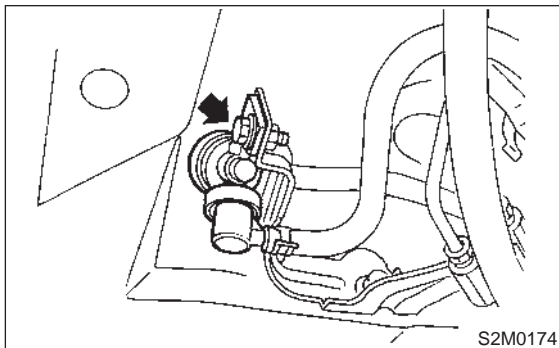


- (1) Hose
(2) Clip
(3) Pipe

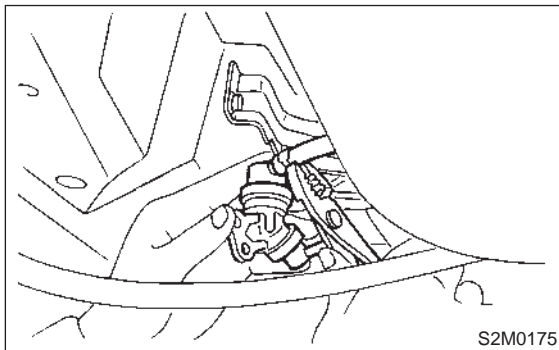
8. Roll Over Valve

A: REMOVAL AND INSTALLATION

- 1) Lift-up the vehicle.
- 2) Remove roll over valve from bracket.



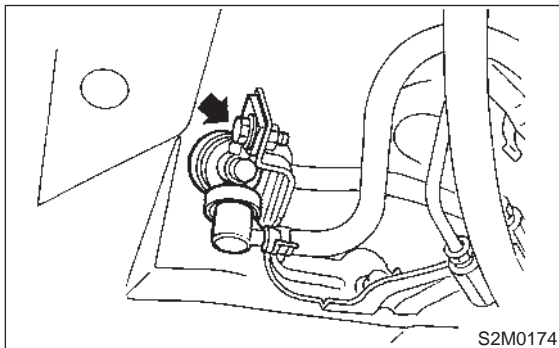
- 3) Disconnect hoses from roll over valve, and remove it from bracket.



- 4) Installation is in the reverse order of removal.

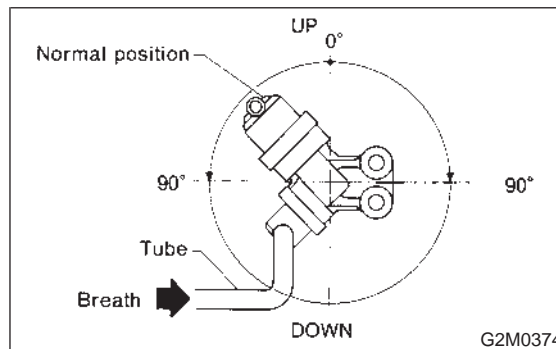
CAUTION:

- Do not install top side of valve down.
- Before installing bracket on body, securely fit concave part of bracket to hole in body.



B: INSPECTION

- 1) Connect hoses to roll over valve as shown in Figure.

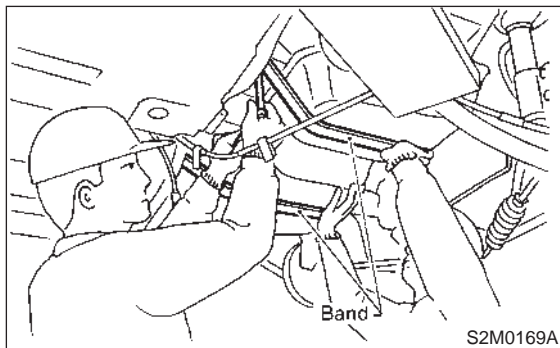


- 2) While blowing through open end of hose, tilt valve at least 90° left and right from normal position.
- 3) Ensure that there is no air flow when hose is tilted greater than 90°.

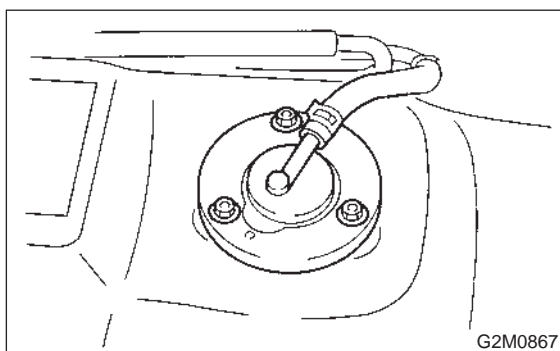
9. Fuel Cut Valve

A: REMOVAL AND INSTALLATION

- 1) Remove fuel tank. <Ref. to 2-8 [W2A0].>



- 2) Disconnect evaporation hose from fuel cut valve.
- 3) Remove fuel cut valve.



- 4) Installation is in the reverse order of removal procedure.

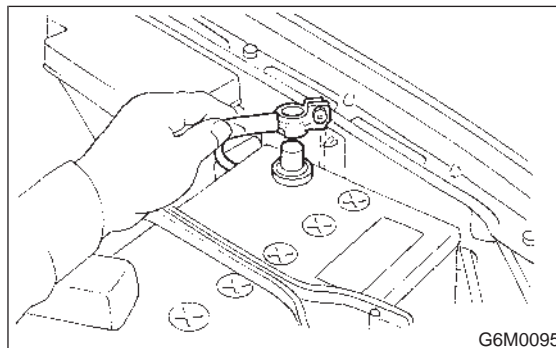
Tightening torque:

$4.4 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.45 \pm 0.15 \text{ kg}\cdot\text{m}$, $3.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)

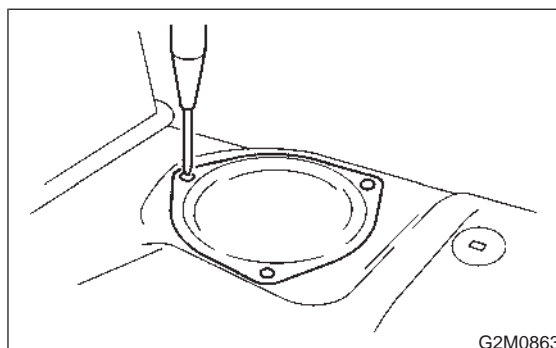
10. Fuel Sub Meter Unit

A: REMOVAL AND INSTALLATION

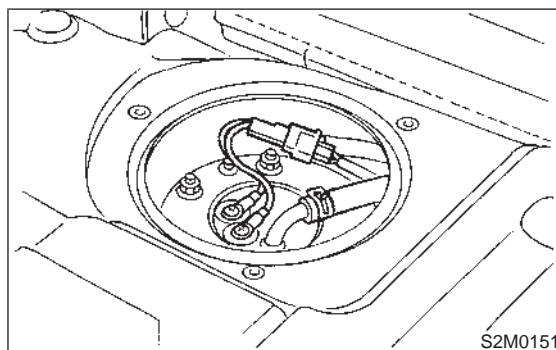
- 1) Disconnect battery ground cable.



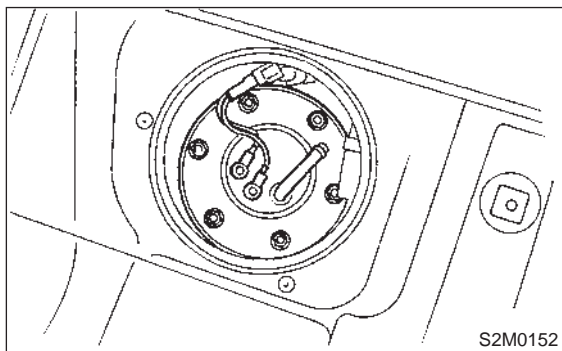
- 2) Remove fuel filler cap.
- 3) Remove service hole cover.



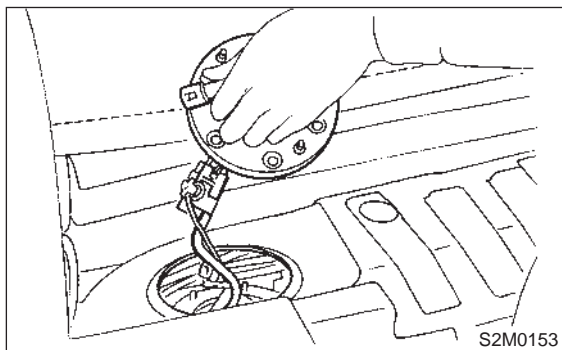
- 4) Disconnect connector from fuel sub meter, and disconnect jet pump hose.



- 5) Remove bolts which install fuel sub meter unit on fuel tank.



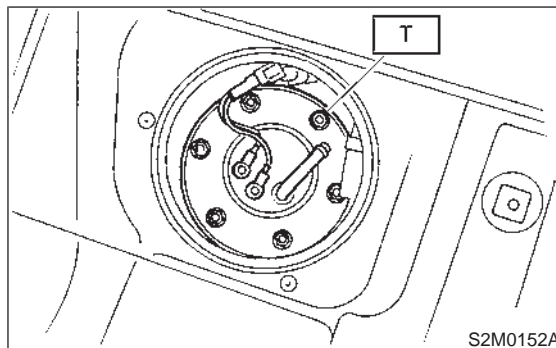
- 6) Remove fuel sub meter unit.



- 7) Installation is in the reverse order of removal.

Tightening torque:

T: 4.4 ± 1.5 N·m (0.45 ± 0.15 kg·m, 3.3 ± 1.1 ft-lb)



1. Fuel System Trouble in General

Trouble and possible cause			Corrective action
1. Insufficient fuel supply to the injector			
1)	Fuel pump will not operate.		
	○	Defective terminal contact.	Inspect connections, especially ground, and tighten securely.
	○	Trouble in electromagnetic or electronic circuit parts.	Replace fuel pump.
2)		Lowering of fuel pump function.	Replace fuel pump.
3)		Clogged dust or water in the fuel filter.	Replace fuel filter, clean or replace fuel tank.
4)		Clogged or bent fuel pipe or hose.	Clean, correct or replace fuel pipe or hose.
5)		Air is mixed in the fuel system.	Inspect or retighten each connection part.
6)		Clogged or bent breather tube or pipe.	Clean, correct or replace air breather tube or pipe.
7)		Damaged diaphragm of pressure regulator.	Replace.
2. Leakage or blow out fuel			
1)		Loosened joints of the fuel pipe.	Retightening.
2)		Cracked fuel pipe, hose and fuel tank.	Replace.
3)		Defective welding part on the fuel tank.	Replace.
4)		Defective drain packing of the fuel tank.	Replace.
5)		Clogged or bent air breather tube or air vent tube.	Clean, correct or replace air breather tube or air vent tube.
3. Gasoline smell inside of compartment			
1)		Loose joints at air breather tube, air vent tube and fuel filler pipe.	Retightening.
2)		Defective packing air tightness on the fuel saucer.	Correct or replace packing.
3)		Cracked fuel separator.	Replace separator.
4)		Inoperable fuel pump modulator or circuit.	Replace.
4. Defective fuel meter indicator			
1)		Defective operation of fuel meter unit.	Replace.
2)		Defective operation of fuel meter.	Replace.
5. Noise			
1)		Large operation noise or vibration of fuel pump.	Replace.

NOTE:

When the vehicle is left unattended for an extended period of time, water may accumulate in the fuel tank.

(1) To prevent water condensation:

- Top off the fuel tank or drain the fuel completely.
- Drain water condensation from the fuel filter.

(2) Refilling the fuel tank:

Refill the fuel tank while there is still some fuel left in the tank.

(3) Protecting the fuel system against freezing and water condensation:

- Cold areas

In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop below 0°C (32°F) throughout the winter season, use an anti-freeze solution in the cooling system. Refueling will also complement the effect of anti-freeze solution each time the fuel level drops to about one-half. After the winter season, drain water which may have accumulated in the fuel filter and fuel tank in the manner same as that described under Affected areas below.

- Affected areas

When water condensation is notched in the fuel filter, drain water from both the fuel filter and fuel tank or use a water removing agent (or anti-freeze solution) in the fuel tank.

(4) Observe the instructions, notes, etc., indicated on the label affixed to the anti-freeze solution (water removing agent) container before use.

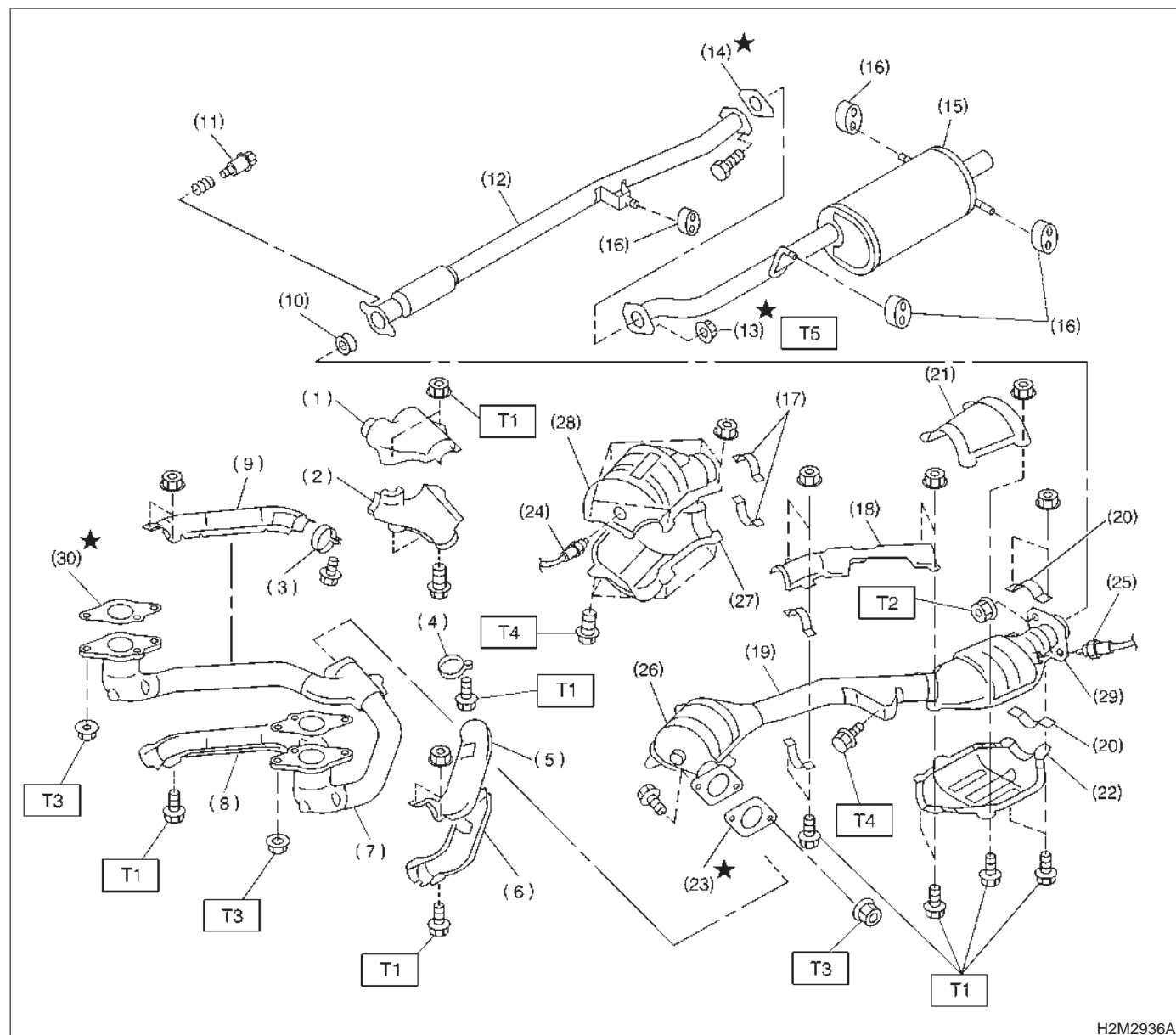
MEMO:

EXHAUST SYSTEM **2-9**

	Page
C COMPONENT PARTS	2
1. Exhaust System	2
W SERVICE PROCEDURE	5
1. Front Exhaust Pipe and Center Exhaust Pipe.....	5
2. Rear Exhaust Pipe	7
3. Muffler.....	8

1. Exhaust System

A: 2200 cc MODEL



(1) Upper front exhaust pipe cover CTR	(12) Rear exhaust pipe	(24) Front oxygen (A/F) sensor (California spec. vehicle)
(2) Lower front exhaust pipe cover CTR	(13) Self-locking nut	Front oxygen sensor (Except California spec. vehicle)
(3) Band RH	(14) Gasket	(25) Rear oxygen sensor
(4) Band LH	(15) Muffler	(26) Front catalytic converter
(5) Upper front exhaust pipe cover LH	(16) Cushion rubber	(27) Lower front catalytic converter cover
(6) Lower front exhaust pipe cover LH	(17) Clamp	(28) Upper front catalytic converter cover
(7) Front exhaust pipe	(18) Upper center exhaust pipe cover	(29) Rear catalytic converter
(8) Lower front exhaust pipe cover RH	(19) Center exhaust pipe	(39) Gasket
(9) Upper front exhaust pipe cover RH	(20) Clamp B	
(10) Gasket	(21) Upper rear catalytic converter cover	
(11) Spring	(22) Lower rear catalytic converter cover	
	(23) Rear oxygen sensor	

Tightening torque: N·m (kg-m, ft-lb)

T1: 13±3 (1.3±0.3, 9.4±2.2)

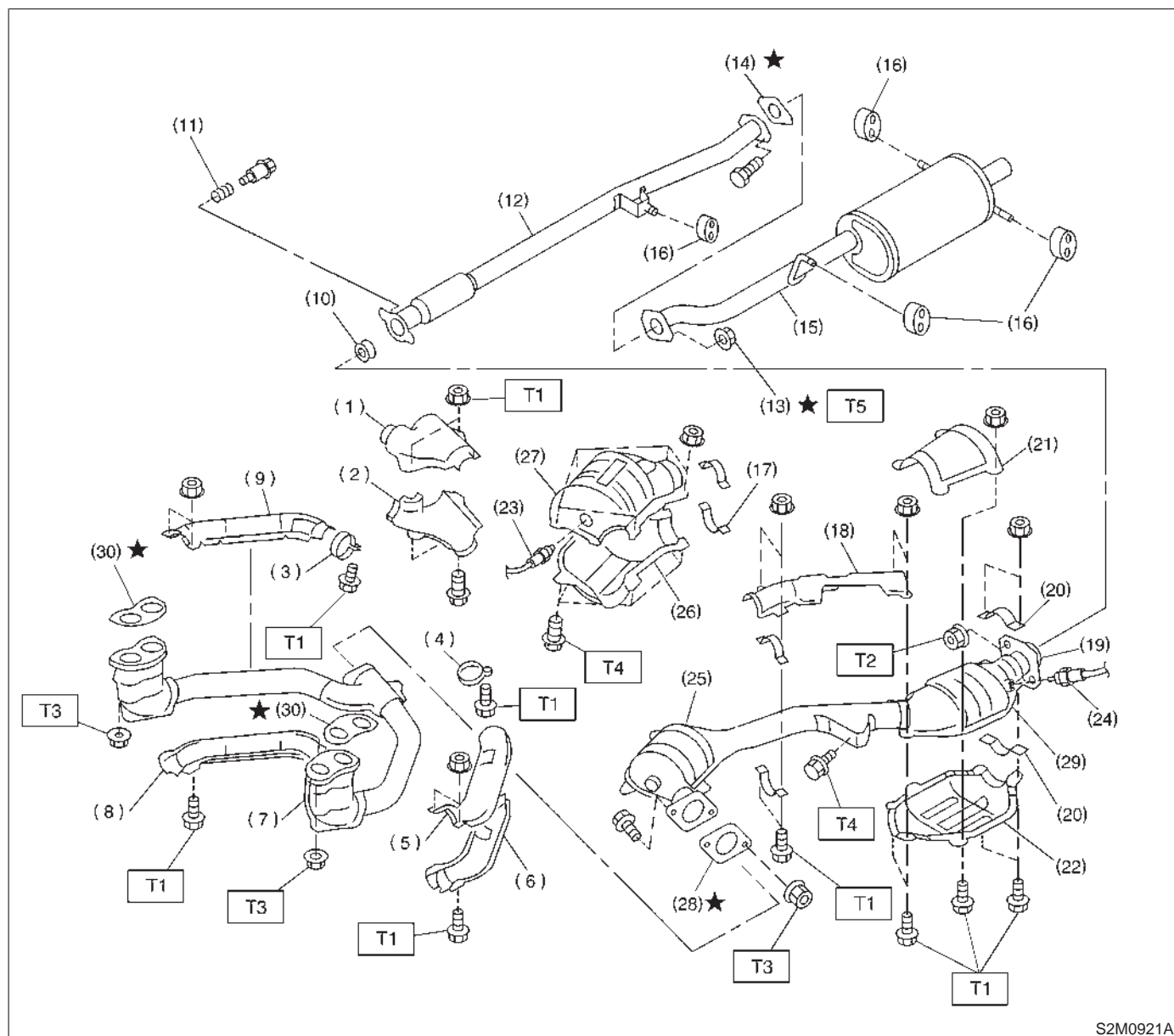
T2: 18±5 (1.8±0.5, 13.0±3.6)

T3: 30±5 (3.1±0.5, 22.4±3.6)

T4: 35±5 (3.6±0.5, 26.0±3.6)

T5: 48±5 (4.9±0.5, 35.4±3.6)

B: 2500 cc MODEL



S2M0921A

- | | | |
|--|---|--|
| (1) Upper front exhaust pipe cover CTR | (11) Spring | (25) Front catalytic converter |
| (2) Lower front exhaust pipe cover CTR | (12) Rear exhaust pipe | (26) Lower front catalytic converter cover |
| (3) Band RH | (13) Self-locking nut | (27) Upper front catalytic converter cover |
| (4) Band LH | (14) Gasket | (28) Gasket |
| (5) Upper front exhaust pipe cover LH | (15) Muffler | (29) Rear catalytic converter |
| (6) Lower front exhaust pipe cover LH | (16) Cushion rubber | (30) Gasket |
| (7) Front exhaust pipe | (17) Clamp | |
| (8) Lower front exhaust pipe cover RH | (18) Upper center exhaust pipe cover | |
| (9) Upper front exhaust pipe cover RH | (19) Center exhaust pipe | |
| (10) Gasket | (20) Clamp B | |
| | (21) Upper rear catalytic converter cover | |
| | (22) Lower rear catalytic converter cover | |
| | (23) Front oxygen sensor | |
| | (24) Rear oxygen sensor | |

Tightening torque: N-m (kg-m, ft-lb)

T1: 13±3 (1.3±0.3, 9.4±2.2)

T2: 18±5 (1.8±0.5, 13.0±3.6)

T3: 30±5 (3.1±0.5, 22.4±3.6)

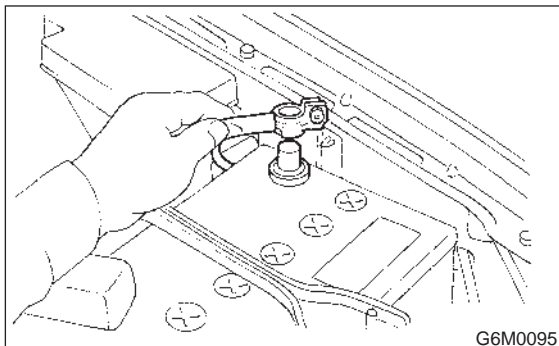
T4: 35±5 (3.6±0.5, 26.0±3.6)

T5: 48±5 (4.9±0.5, 35.4±3.6)

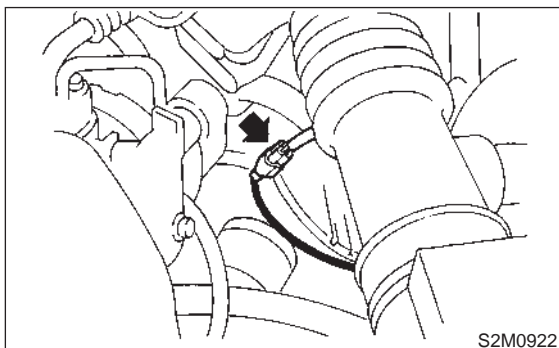
1. Front Exhaust Pipe and Center Exhaust Pipe

A: REMOVAL

- 1) Disconnect battery ground cable.

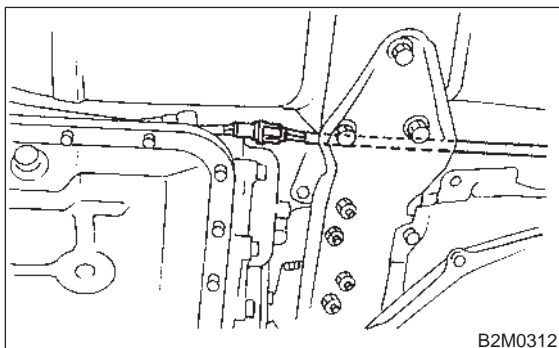


- 2) Disconnect front oxygen sensor connector.



- 3) Lift-up the vehicle.

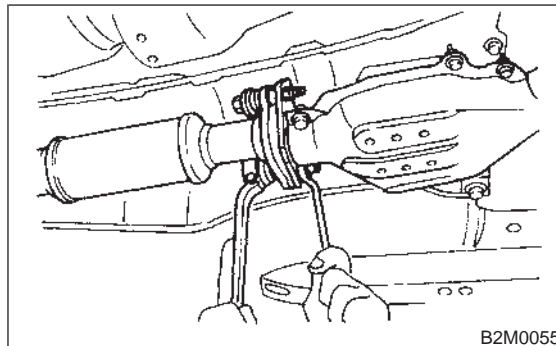
- 4) Disconnect rear oxygen sensor connector.



- 5) Separate front and center exhaust pipe assembly from rear exhaust pipe.

WARNING:

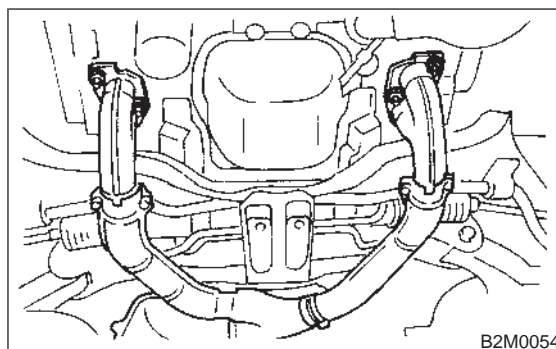
Be careful, exhaust pipe is hot.



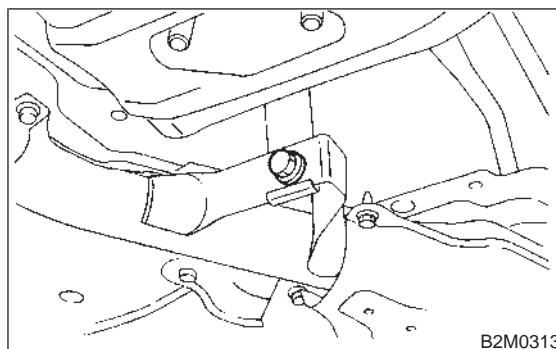
- 6) Remove bolts which hold front exhaust pipe onto cylinder heads.

CAUTION:

Be careful not to pull down front and center exhaust pipe assembly.



- 7) Remove bolt which installs front and center exhaust pipe assembly to hanger bracket.



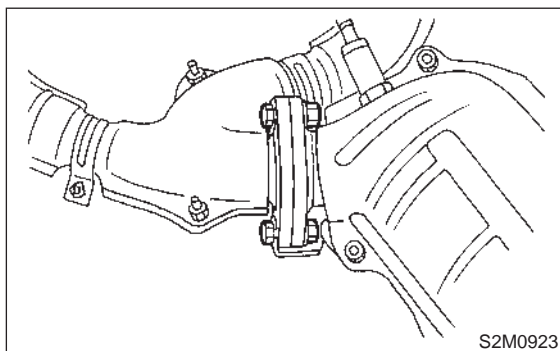
- 8) Remove front and center exhaust pipe assembly from the vehicle.

CAUTION:

- Be careful not to let front and center exhaust pipe assembly fall off when removing as it is quite heavy.
- After removing front and center exhaust assembly, do not apply excessive pulling force on rear exhaust pipe.

1. Front Exhaust Pipe and Center Exhaust Pipe

- 9) Separate front exhaust pipe from front catalytic converter and center exhaust pipe assembly.

**B: INSTALLATION**

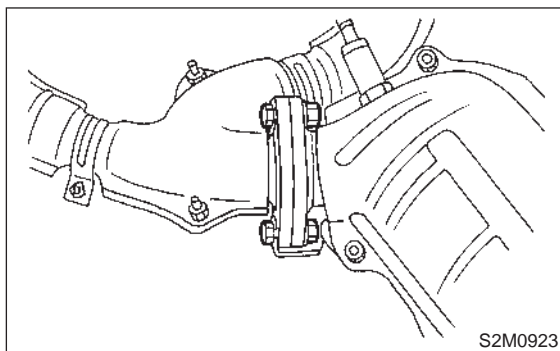
- 1) Install front exhaust pipe to front catalytic converter and center exhaust pipe assembly.

CAUTION:

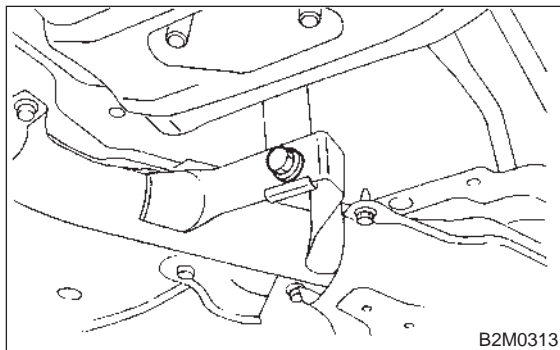
Replace gaskets with new ones.

Tightening torque:

$30 \pm 5 \text{ N-m}$ ($3.1 \pm 0.5 \text{ kg-m}$, $22.4 \pm 3.6 \text{ ft-lb}$)



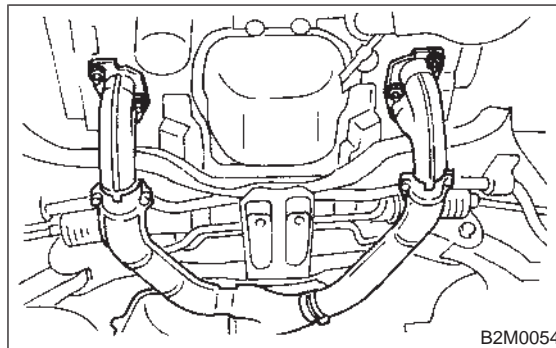
- 2) Install front and center exhaust pipe assembly to the vehicle.
 3) Temporarily tighten bolt which installs front and center exhaust pipe assembly to hanger bracket.



- 4) Tighten bolts which hold front exhaust pipe onto cylinder heads.

Tightening torque:

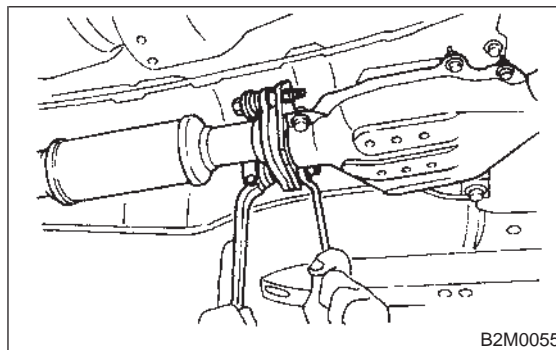
$30 \pm 5 \text{ N-m}$ ($3.1 \pm 0.5 \text{ kg-m}$, $22.4 \pm 3.6 \text{ ft-lb}$)



- 5) Tighten bolts which install front and center exhaust pipe assembly to rear exhaust pipe.

Tightening torque:

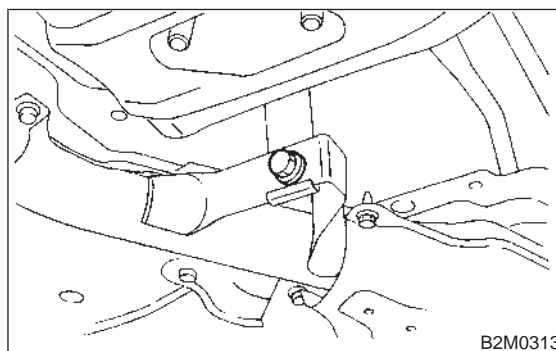
$18 \pm 5 \text{ N-m}$ ($1.8 \pm 0.5 \text{ kg-m}$, $13.0 \pm 3.6 \text{ ft-lb}$)



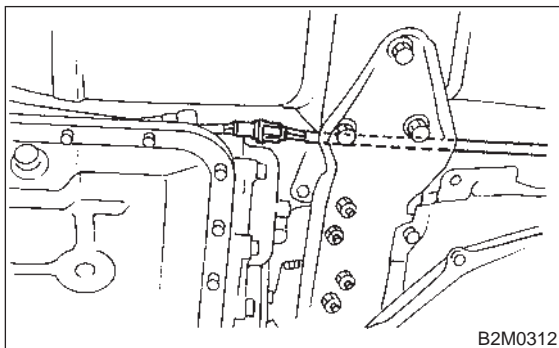
- 6) Tighten bolt which holds front and center exhaust pipe assembly to hanger bracket.

Tightening torque:

$35 \pm 5 \text{ N-m}$ ($3.6 \pm 0.5 \text{ kg-m}$, $26.0 \pm 3.6 \text{ ft-lb}$)

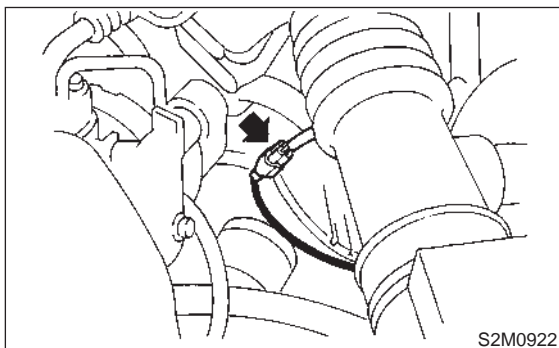


- 7) Connect rear oxygen sensor connector.

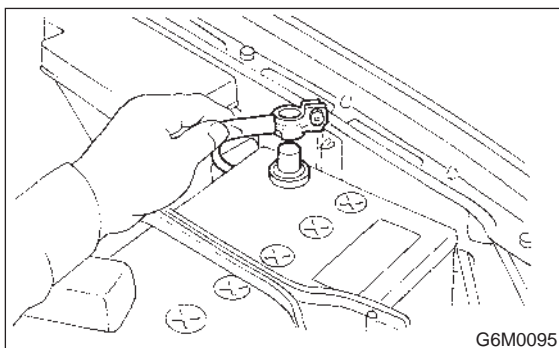


- 8) Lower the vehicle.

- 9) Connect front oxygen sensor connector.



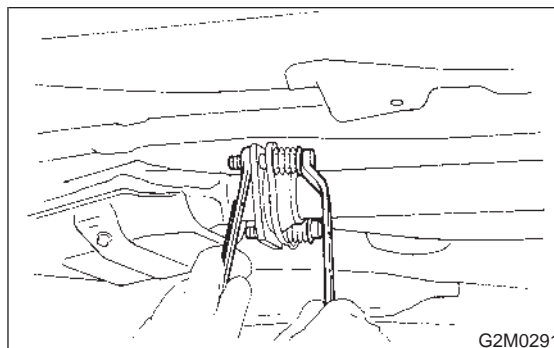
- 10) Connect battery ground cable.



2. Rear Exhaust Pipe

A: REMOVAL

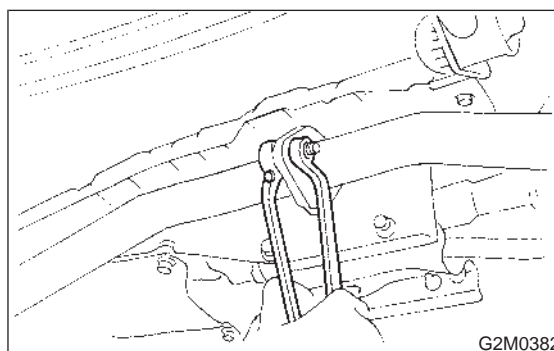
- 1) Separate rear exhaust pipe from front catalytic converter.



- 2) Separate rear exhaust pipe from muffler.

CAUTION:

Be careful not to pull down front exhaust pipe and front catalytic converter.

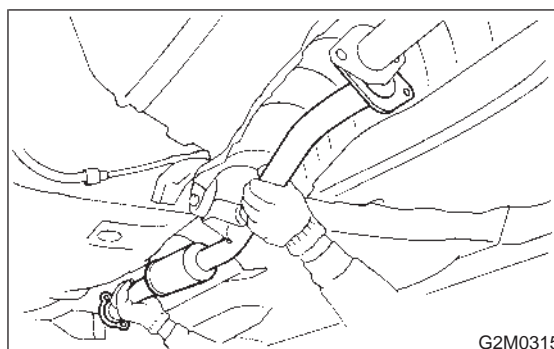


- 3) Remove rear exhaust pipe bracket from rubber cushion.

NOTE:

To facilitate removal, apply a coat of SUBARU CRC to pipe bracket in advance.

SUBARU CRC (Part No. 004301003)



B: INSTALLATION**CAUTION:**

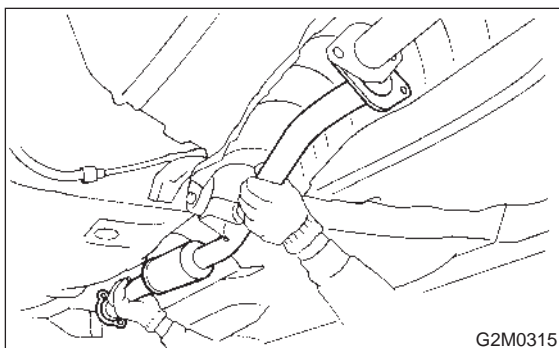
Replace gaskets with new ones.

- 1) Install rear exhaust pipe bracket to rubber cushion.

NOTE:

To facilitate installation, apply a coat of SUBARU CRC to mating area of rubber cushion in advance.

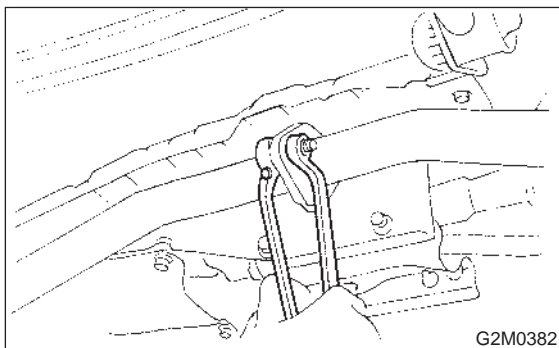
SUBARU CRC (Part No. 004301003)



- 2) Install rear exhaust pipe to muffler.

Tightening torque:

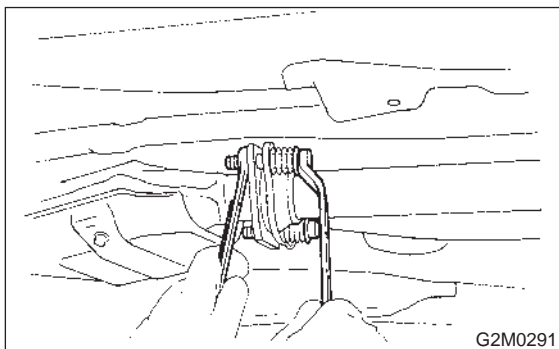
$48 \pm 5 \text{ N}\cdot\text{m}$ ($4.9 \pm 0.5 \text{ kg}\cdot\text{m}$, $35.4 \pm 3.6 \text{ ft}\cdot\text{lb}$)



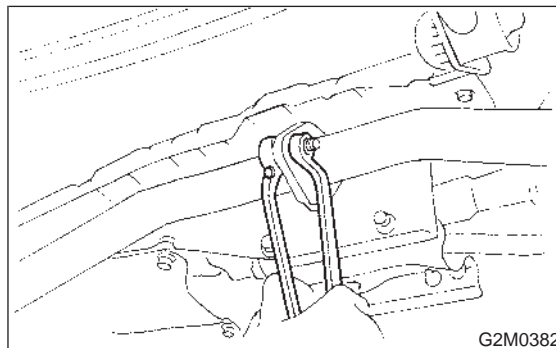
- 3) Install rear exhaust pipe to front catalytic converter.

Tightening torque:

$18 \pm 5 \text{ N}\cdot\text{m}$ ($1.8 \pm 0.5 \text{ kg}\cdot\text{m}$, $13.0 \pm 3.6 \text{ ft}\cdot\text{lb}$)

**3. Muffler****A: REMOVAL AND INSTALLATION**

- 1) Separate muffler from rear exhaust pipe.



- 2) Remove left and right rubber cushions.

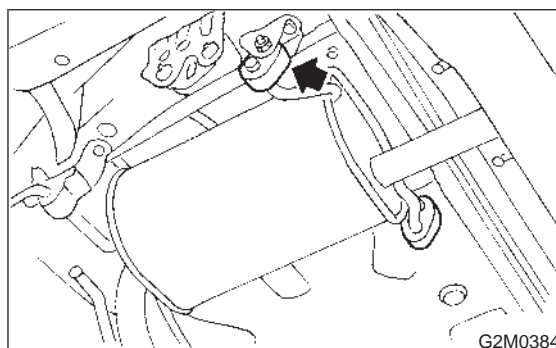
CAUTION:

Be careful not to pull down front exhaust pipe and front catalytic converter.

NOTE:

To facilitate removal, apply a coat of SUBARU CRC to mating area of rubber cushions in advance.

SUBARU CRC (Part No. 004301003)

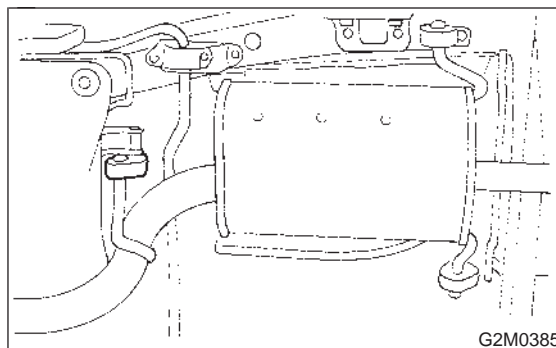


- 3) Remove front rubber cushion, and detach muffler assembly.

NOTE:

To facilitate removal, apply a coat of SUBARU CRC to mating area of rubber cushion in advance.

SUBARU CRC (Part No. 004301003)



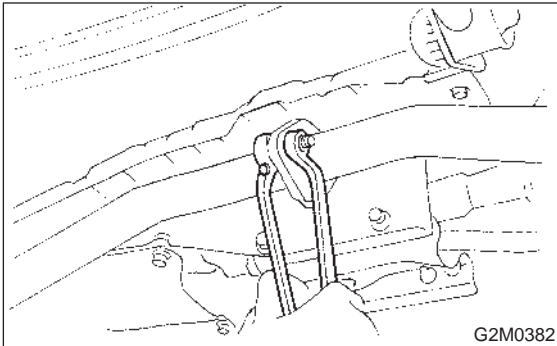
4) Installation is in the reverse order of removal.

CAUTION:

Replace gasket with a new one.

Tightening torque:

$48 \pm 5 \text{ N}\cdot\text{m}$ ($4.9 \pm 0.5 \text{ kg}\cdot\text{m}$, $35.4 \pm 3.6 \text{ ft}\cdot\text{lb}$)



MEMO:

CLUTCH **2-10**

	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Specifications	2
C COMPONENT PARTS	3
1. Clutch System	3
2. Master Cylinder and Reservoir Tank.....	5
W SERVICE PROCEDURE	6
1. General.....	6
2. On-car Service	7
3. Release Bearing and Lever	8
4. Clutch Disc and Cover	11
5. Operating Cylinder	14
6. Master Cylinder and Reservoir Tank.....	15
7. Brake Fluid	17
K DIAGNOSTICS	18
1. Clutch Trouble in General	18

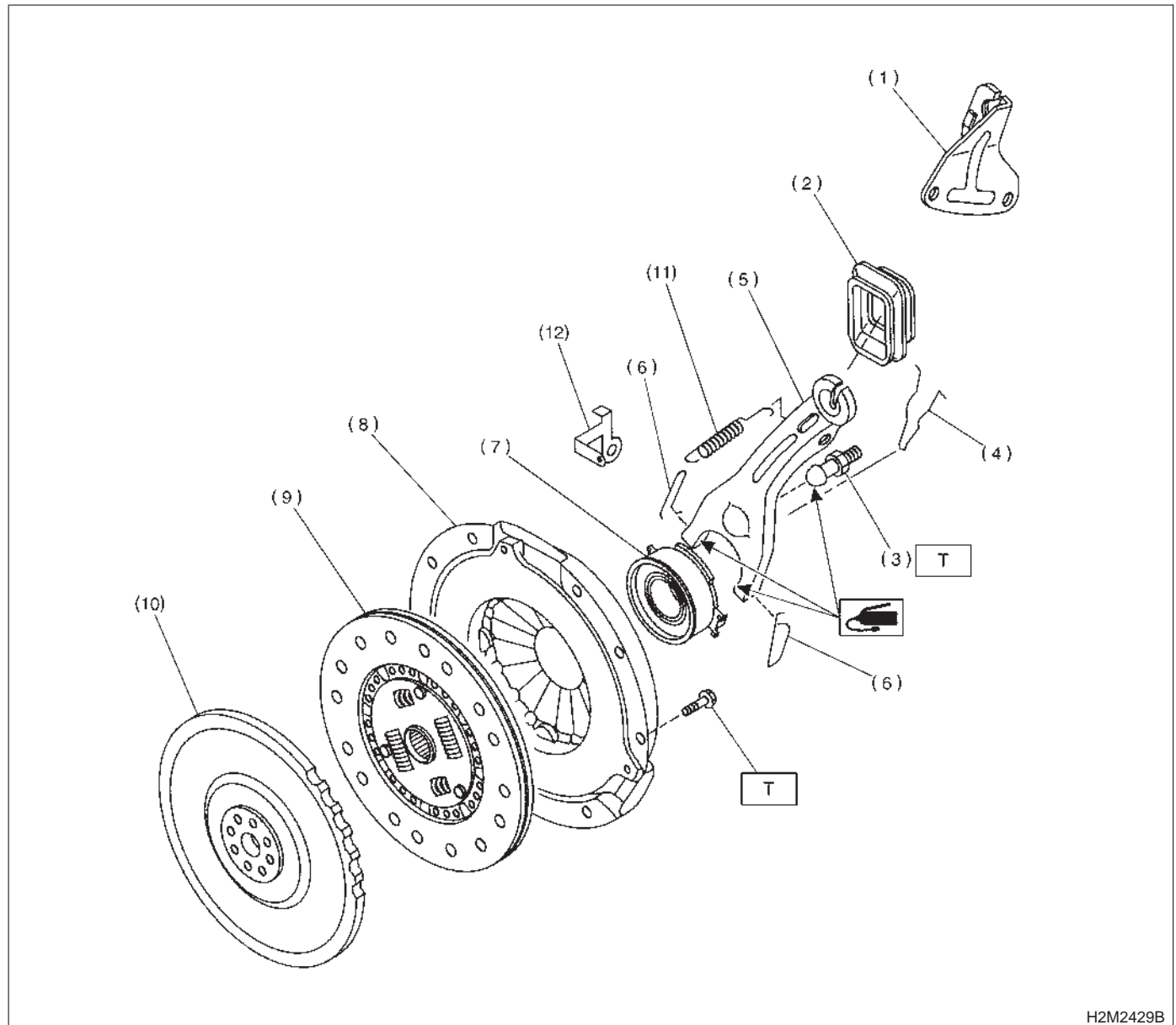
1. Specifications

			2200 cc	2500 cc
Clutch cover	Diaphragm set load	kg (lb)	450 (992)	580 (1,279)
Clutch disc	Facing material		Woven	
	O.D. × I.D. × thickness	mm (in)	225 × 150 × 3.5 (8.86 × 5.91 × 0.138)	
	Spline O.D. (No. of teeth)	mm (in)	25.2 (0.992) (24)	
	Depth of rivet head mm (in)	Standard	1.3 — 1.9 (0.051 — 0.075)	1.65 — 2.25 (0.0650 — 0.0886)
		Limit of sinking	0.3 (0.012)	
	Limit for runout	mm (in)	1.0 (0.039) at R = 107 (4.21)	
Clutch release lever ratio			3.0	1.6
Release lever	Stroke	mm (in)	24 — 26 (0.94 — 1.02)	12 — 13.6 (0.472 — 0.535)
	Play at release lever center	mm (in)	3 — 4 (0.12 — 0.16)	—
Release bearing			Grease-packed self-aligning	
Clutch pedal	Full stroke	mm (in)	140 — 145 (5.51 — 5.71)	130 — 135 (5.12 — 5.31)

O.D.; Outer Diameter **I.D.;** Inner Diameter

1. Clutch System

A: MECHANICAL APPLICATION TYPE



H2M2429B

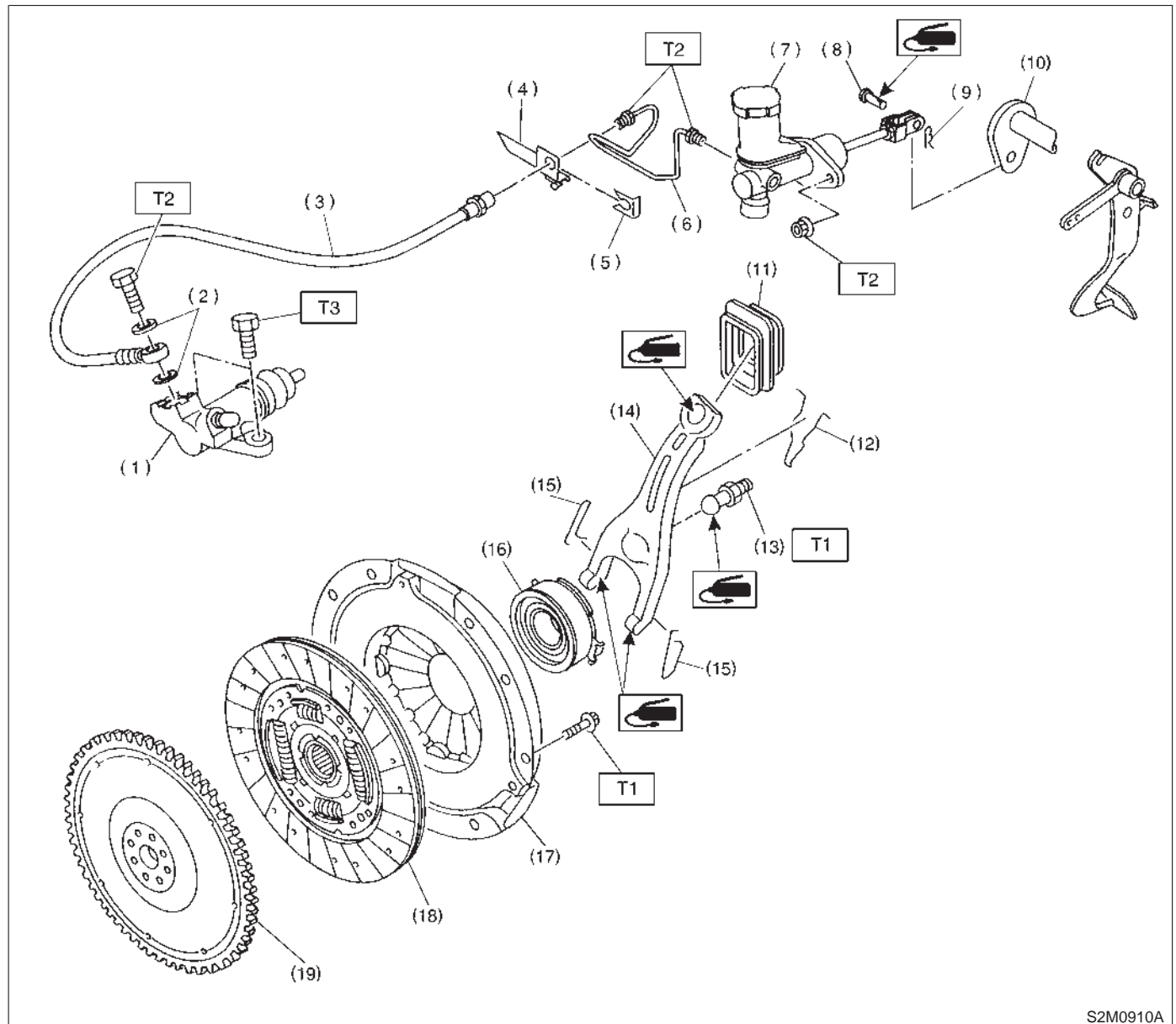
- (1) Clutch cable bracket
- (2) Clutch release lever sealing
- (3) Pivot
- (4) Retainer spring
- (5) Clutch release lever

- (6) Clip
- (7) Clutch release bearing
- (8) Clutch cover
- (9) Clutch disc
- (10) Flywheel

- (11) Return spring
- (12) Clutch return spring bracket

Tightening torque: N-m (kg-m, ft-lb)
T: 15.7±1.5 (1.6±0.15, 11.6±1.1)

B: HYDRAULIC APPLICATION TYPE



S2M0910A

- (1) Operating cylinder
- (2) Washer
- (3) Clutch hose
- (4) Bracket
- (5) Clip
- (6) Pipe
- (7) Master cylinder ASSY
- (8) Clevis pin
- (9) Snap pin

- (10) Lever
- (11) Clutch release lever sealing
- (12) Retainer spring
- (13) Pivot
- (14) Release lever
- (15) Clip
- (16) Release bearing
- (17) Clutch cover
- (18) Clutch disc

- (19) Flywheel

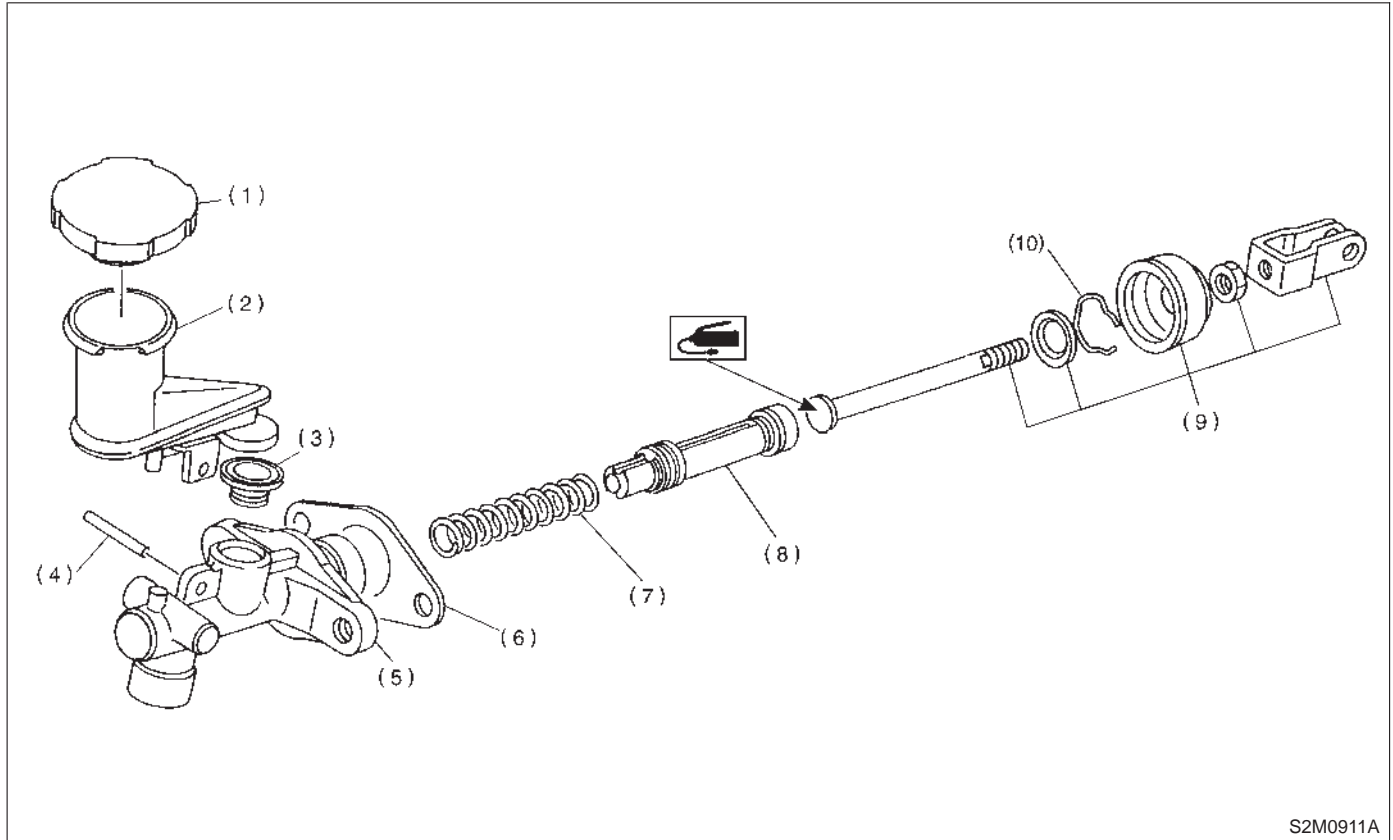
Tightening torque: N·m (kg·m, ft·lb)

T1: 15.7±1.5 (1.6±0.15, 11.6±1.1)

T2: 18±3 (1.8±0.3, 13.0±2.2)

T3: 37±3 (3.8±0.3, 27.5±2.2)

2. Master Cylinder and Reservoir Tank



S2M0911A

- | | | |
|--------------------|---------------------|-----------------------|
| (1) Reservoir cap | (5) Master cylinder | (9) Push rod |
| (2) Reservoir tank | (6) Seat | (10) Piston stop ring |
| (3) Oil seal | (7) Return spring | |
| (4) Straight pin | (8) Piston | |

1. General

A: PRECAUTION

- 4) Check for proper clutch disengagement and clutch pedal return ability.

1. MECHANICAL APPLICATION TYPE

When servicing clutch system, pay attention to the following items.

- 1) Check the routing of clutch cable for smoothness.
- 2) Excessive tightness or looseness of clutch cable have a bad influence upon the cable durability.
- 3) Apply grease sufficiently to the connecting portion of clutch pedal.
- 4) Apply grease sufficiently to the release lever portion.
- 5) Position clutch cable through the center of toe board hole and route it smoothly. Adjustment is done by moving the outer cable.
- 6) Make sure not to let the clutch chatter when starting forward or rearward. If clutch chattering occurs, readjust so that the bend of clutch outer cable becomes flatter.

2. HYDRAULIC APPLICATION TYPE

When servicing clutch system, pay attention to the following items.

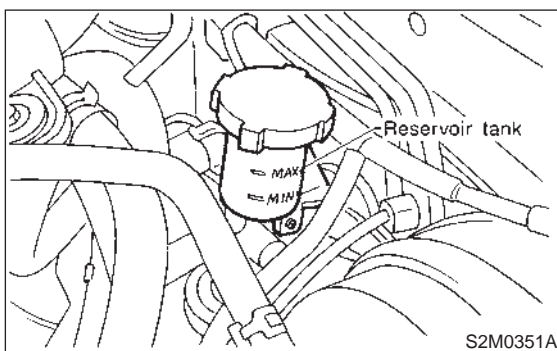
- 1) Check fluid level using a scale on outside of reservoir tank. If the level is below "MIN", add brake fluid to bring it up to "MAX".

Recommended brake fluid:

**FMVSS No. 116, fresh DOT3 or DOT4
brake fluid**

CAUTION:

- Avoid mixing different brands of brake fluid to prevent degradation of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.
- Use fresh DOT3 or DOT4 brake fluid when refilling fluid.



- 2) Make sure that brake fluid does not leak from master cylinder, operating cylinder and piping.
- 3) Apply grease sufficiently to the release lever pinion.

2. On-car Service

A: ADJUSTMENT

1. MECHANICAL APPLICATION TYPE

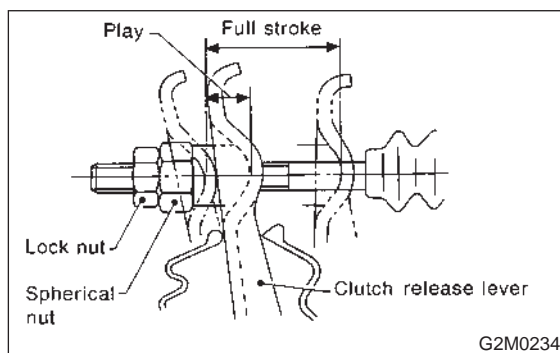
- 1) Remove release lever return spring from lever.
- 2) Adjust spherical nut so that the play is within the specified value at the lever end (center of spherical nut).

CAUTION:

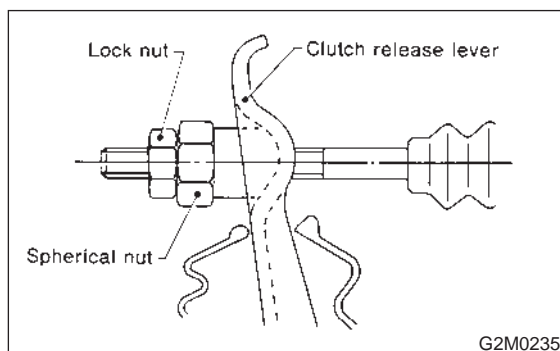
Take care not to twist the cable during adjustment.

Play: 3 — 4 mm (0.12 — 0.16 in)

Full stroke: 24 — 26 mm (0.94 — 1.02 in)



- 3) Upon completion of adjustment, securely lock spherical nut with lock nut.

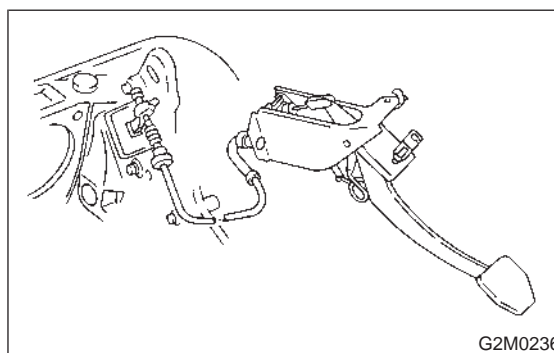


- 4) Install return spring on lever.

NOTE:

Hook the long hook side of the return spring with the lever.

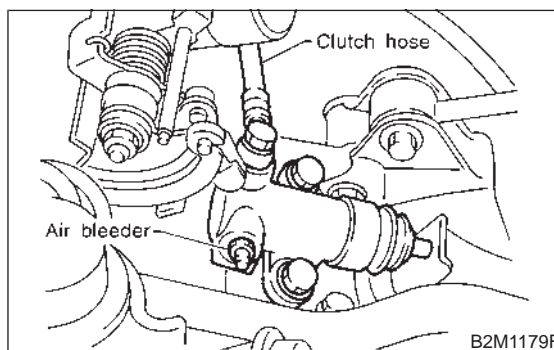
- 5) Depress clutch pedal to assure there is no abnormality in the clutch system.



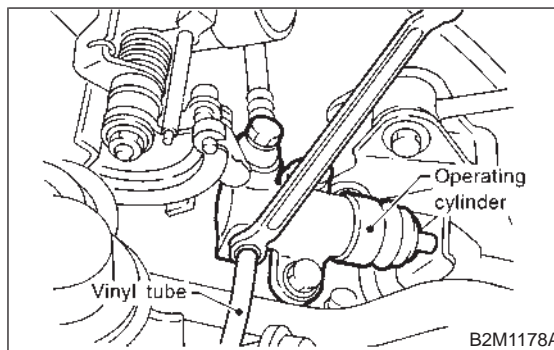
2. HYDRAULIC APPLICATION TYPE

Bleed air from oil line with the help of a co-worker.

- 1) Remove air chamber.
- 2) Fit one end of a vinyl tube into the air bleeder of operating cylinder and put the other end into a brake fluid container.



- 3) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid. Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal.



- 4) Repeat these steps until there are no more air bubbles in the vinyl tube.

CAUTION:

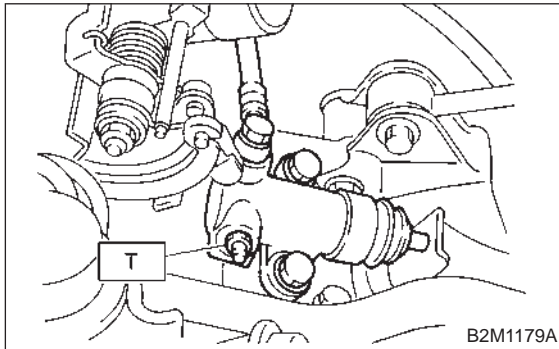
Cover bleeder with waste cloth when loosening it, to prevent brake fluid from being splashed over surrounding parts.

3. Release Bearing and Lever

5) Tighten air bleeder.

Tightening torque:

T: 18 ± 3 N·m (1.8 ± 0.3 kg·m, 13.0 ± 2.2 ft·lb)



- 6) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.
 7) After bleeding air from system, ensure that clutch operates properly.

3. Release Bearing and Lever

A: REMOVAL

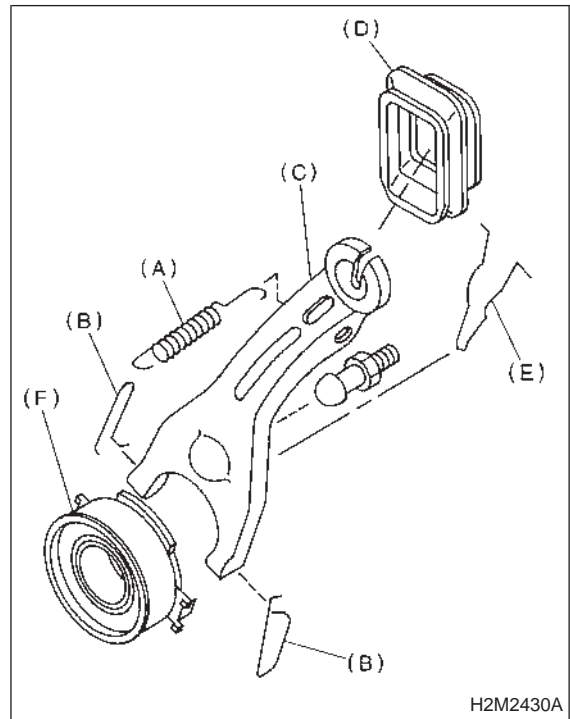
1. MECHANICAL APPLICATION TYPE

- 1) Remove release lever return spring.
- 2) Remove the two clips from clutch release lever and remove release bearing.

CAUTION:

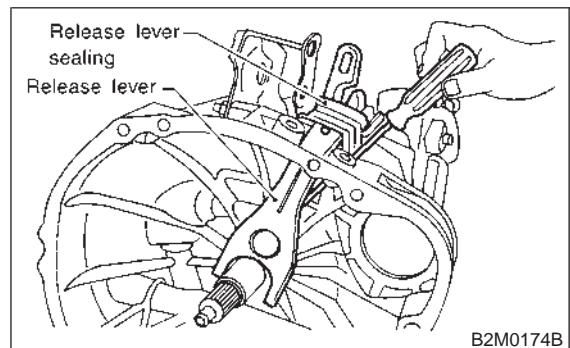
Be careful not to deform clips.

- 3) Remove release lever seal.



- (A) Release lever return spring
- (B) Clip
- (C) Release lever
- (D) Release lever seal
- (E) Retainer spring
- (F) Clutch release bearing

- 4) Remove release lever retainer spring from release lever pivot with a screwdriver by accessing it through clutch housing release lever hole. Then remove release lever.



2. HYDRAULIC APPLICATION TYPE

1) Remove transmission assembly from vehicle body.

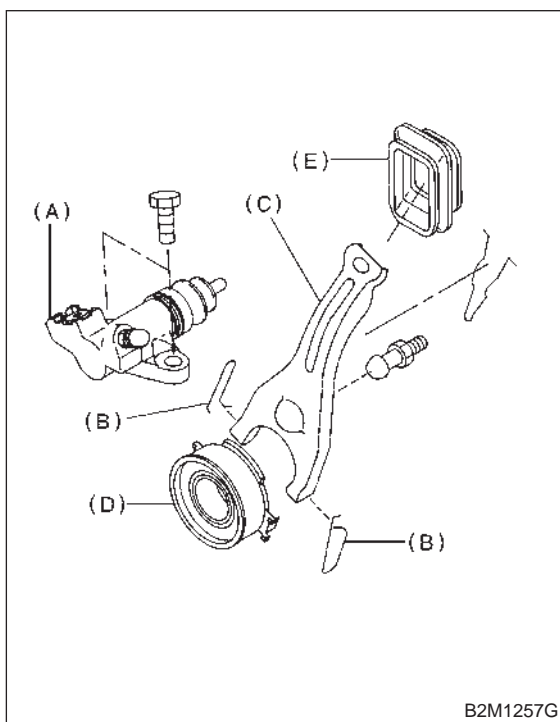
<Ref. to 2-11 [W2B0].>

2) Remove the two clips from clutch release lever and remove release bearing.

CAUTION:

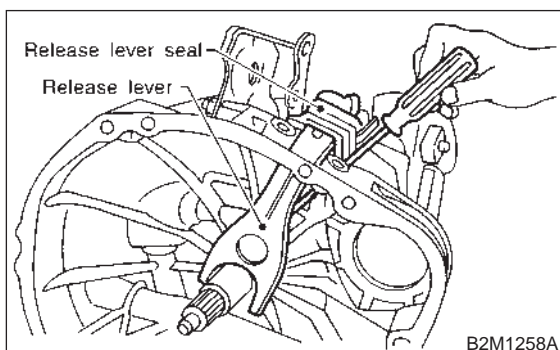
Be careful not to deform clips.

3) Remove release lever seal.



- (A) Operating cylinder
- (B) Clip
- (C) Clutch release lever
- (D) Release bearing
- (E) Release lever seal

4) Remove release lever retainer spring from release lever pivot with a screwdriver by accessing it through clutch housing release lever hole. Then remove release lever.



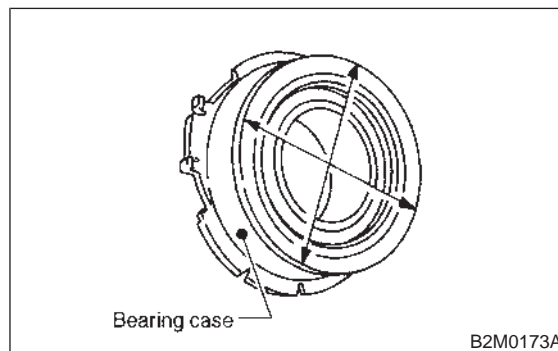
B: INSPECTION

1. RELEASE BEARING

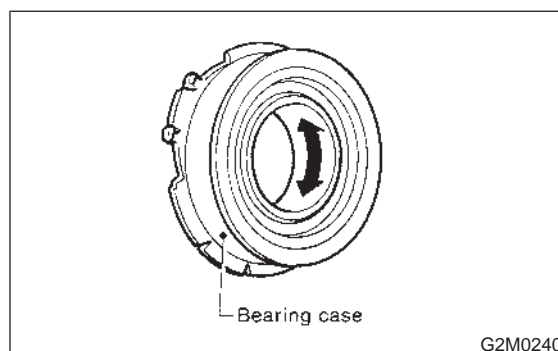
CAUTION:

Since this bearing is grease sealed and is of a nonlubrication type, do not wash with gasoline or any solvent when servicing the clutch.

1) Check the bearing for smooth movement by applying force in the radial direction.



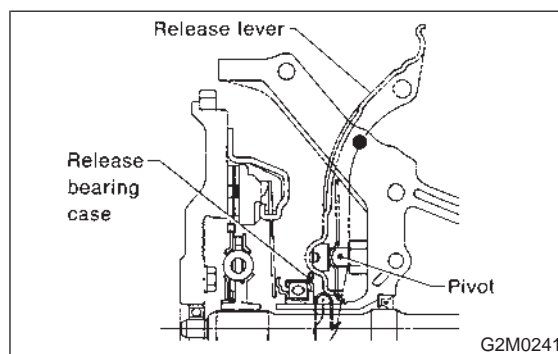
2) Check the bearing for smooth rotation by applying pressure in the thrust direction.



3) Check wear and damage of bearing case surface contacting with lever.

2. RELEASE LEVER

Check lever pivot portion and the point of contact with release bearing case for wear.



C: INSTALLATION

1. MECHANICAL APPLICATION TYPE

CAUTION:

Before or during assembling, lubricate the following points with a light coat of grease.

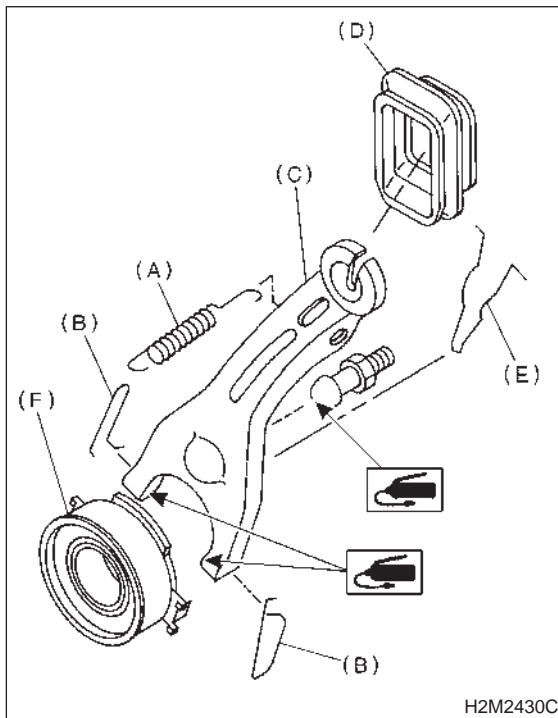
- Contact surface of lever and pivot
- Contact surface of lever and bearing
- Transmission main shaft spline (Use grease containing molybdenum disulphide.)

1) While pushing release lever to pivot and twisting it to both sides, fit retainer spring onto the constricted portion of pivot.

NOTE:

Confirm that retainer spring is securely fitted by observing it through the main case hole.

- 2) Install release bearing and fasten it with two clips.
- 3) Install release lever seal.

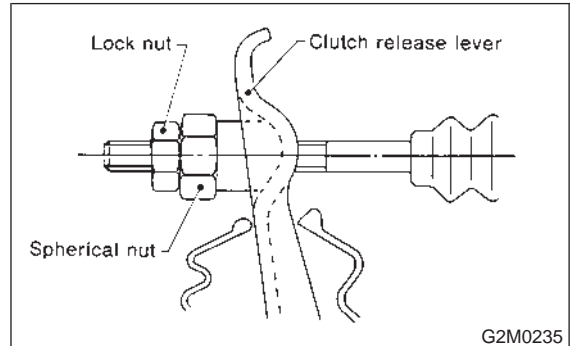


- (A) Release lever return spring
- (B) Clip
- (C) Release lever
- (D) Release lever seal
- (E) Retainer spring
- (F) Clutch release bearing

4) After remounting engine and transmission on body, make adjustment of the clutch release lever end play.

CAUTION:

Take care not to twist the cable during adjustment.



5) Install release lever return spring.

NOTE:

Hook up the return spring to right side hole of the release lever.

2. HYDRAULIC APPLICATION TYPE

CAUTION:

Before or during assembling, lubricate the following points with a light coat of grease.

- Inner groove of release bearing
- Contact surface of lever and pivot
- Contact surface of lever and bearing
- Transmission main shaft spline (Use grease containing molybdenum disulphide.)

1) While pushing release lever to pivot and twisting it to both sides, fit retainer spring onto the constricted portion of pivot.

NOTE:

- Apply grease (SUNLIGHT 2: P/N 003602010) to contact point of release lever and operating cylinder.
- Confirm that retainer spring is securely fitted by observing it through the main case hole.

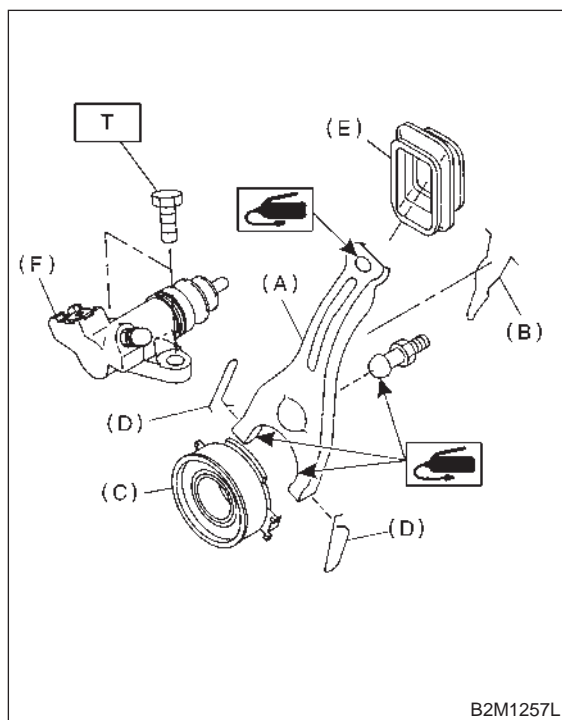
2) Install release bearing and fasten it with two clips.

3) Install release lever seal.

4) Install operating cylinder.

Tightening torque:

T: 37 ± 3 N·m (3.8 ± 0.3 kg·m, 27.5 ± 2.2 ft·lb)



B2M1257L

- (A) Release lever
- (B) Retainer spring
- (C) Release bearing
- (D) Clip
- (E) Release lever seal
- (F) Operating cylinder

5) After remounting engine and transmission on body.

<Ref. to 2-11 [W2C0].>

6) Bleed air from oil line with the help of a co-worker.

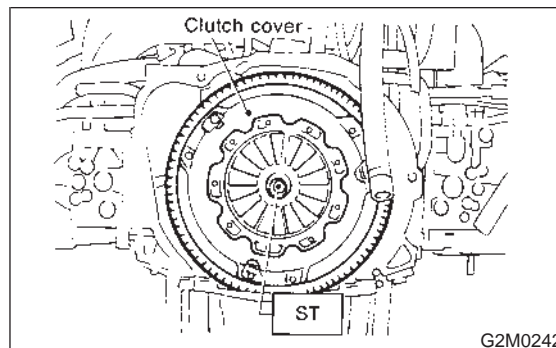
<Ref. to 2-10 [W2A2].>

4. Clutch Disc and Cover

A: REMOVAL

1) Install ST on flywheel.

ST 498497100 CRANKSHAFT STOPPER

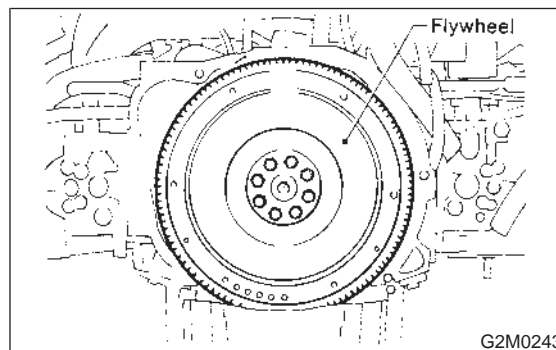


2) Remove clutch cover and clutch disc.

CAUTION:

- Take care not to allow oil on the clutch disc facing.
- Do not disassemble either clutch cover or clutch disc.

3) Remove flywheel.



B: INSPECTION**1. CLUTCH DISC****1) Facing wear**

Measure the depth of rivet head from the surface of facing. Replace if facings are worn locally or worn down to less than the specified value.

CAUTION:

Do not wash clutch disc with any cleaning fluid.

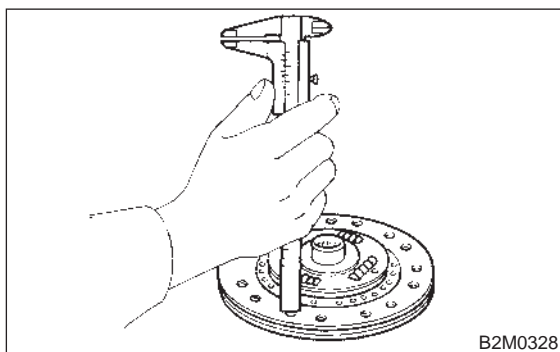
Depth of rivet head:**Standard value**

2200 cc model: 1.3 — 1.9 mm (0.051 — 0.075 in)

2500 cc model: 1.65 — 2.25 mm (0.0650 — 0.0886 in)

Limit of sinking

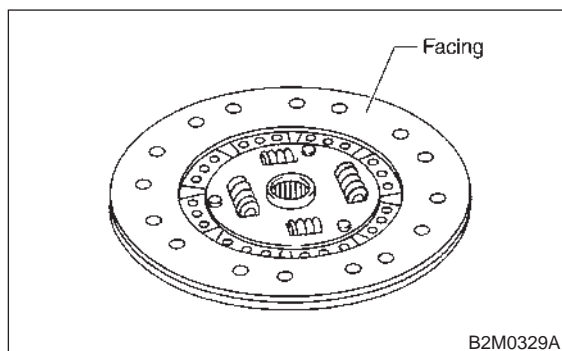
0.3 mm (0.012 in)

**2) Hardened facing**

Correct by using emery paper or replace.

3) Oil soakage on facing

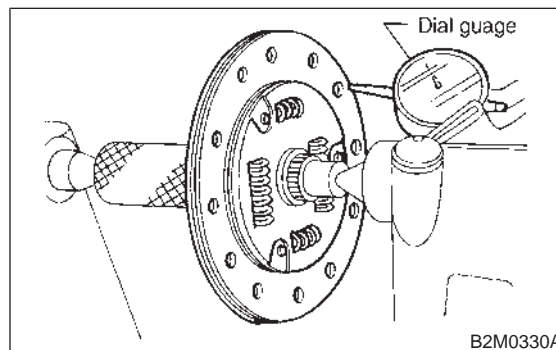
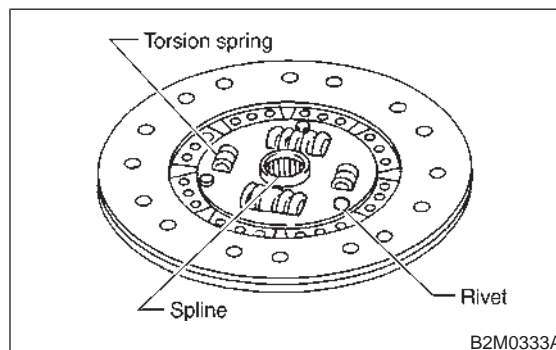
Replace clutch disc and inspect transmission front oil seal, transmission case mating surface, engine rear oil seal and other points for oil leakage.

**4) Deflection on facing**

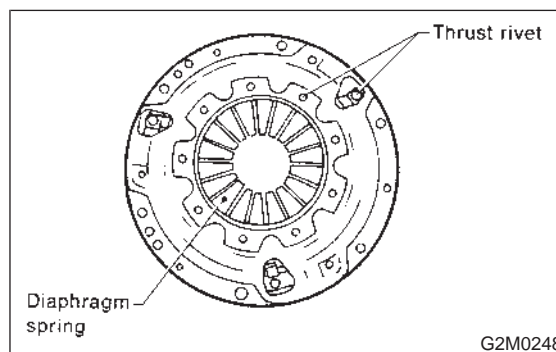
If deflection exceeds the specified value at the outer circumference of facing, repair or replace.

Limit for deflection:

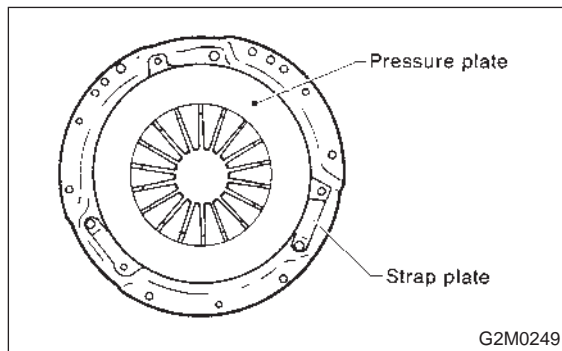
1.0 mm (0.039 in) at R = 107 mm (4.21 in)

**5) Worn spline, loose rivets and torsion spring failure**
Replace defective parts.**2. CLUTCH COVER**

Visually check for the following items without disassembling, and replace or repair if defective.

1) Loose thrust rivet.**2) Damaged or worn bearing contact area at center of diaphragm spring.**

- 3) Damaged or worn disc contact surface of pressure plate.
- 4) Loose strap plate setting bolt.
- 5) Worn diaphragm sliding surface.

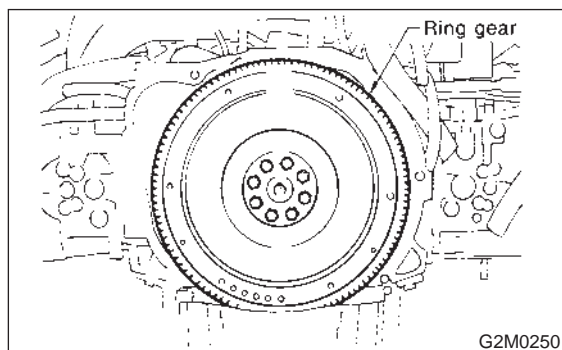


3. FLYWHEEL

CAUTION:

Since this bearing is grease sealed and is of a non-lubrication type, do not wash with gaso-line or any solvent.

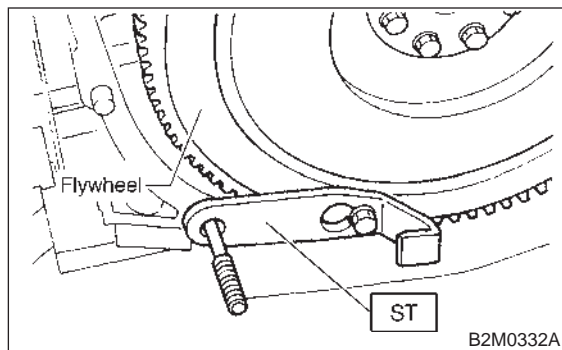
- 1) Damage of facing and ring gear
If defective, replace flywheel.



- 2) Smoothness of rotation
Rotate ball bearing applying pressure in thrust direction.
- 3) If noise or excessive play is noted, replace fly-wheel.

C: INSTALLATION

- 1) Install flywheel and ST.
ST 498497100 CRANKSHAFT STOPPER



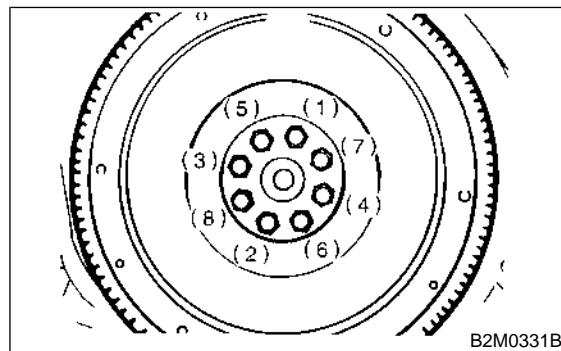
- 2) Tighten the flywheel attaching bolts to the specified torque.

NOTE:

Tighten flywheel installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross fashion.

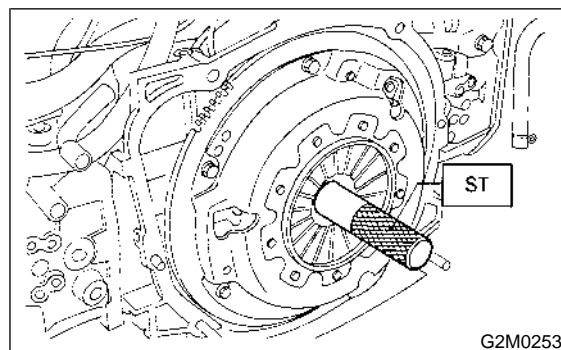
Tightening torque:

$72 \pm 3 \text{ N-m}$ ($7.3 \pm 0.3 \text{ kg-m}$, $52.8 \pm 2.2 \text{ ft-lb}$)



- 3) Insert ST into the clutch disc and install them on the flywheel by inserting the ST end into the pilot bearing.

ST 499747100 CLUTCH DISC GUIDE



4) Install clutch cover on flywheel and tighten bolts to the specified torque.

NOTE:

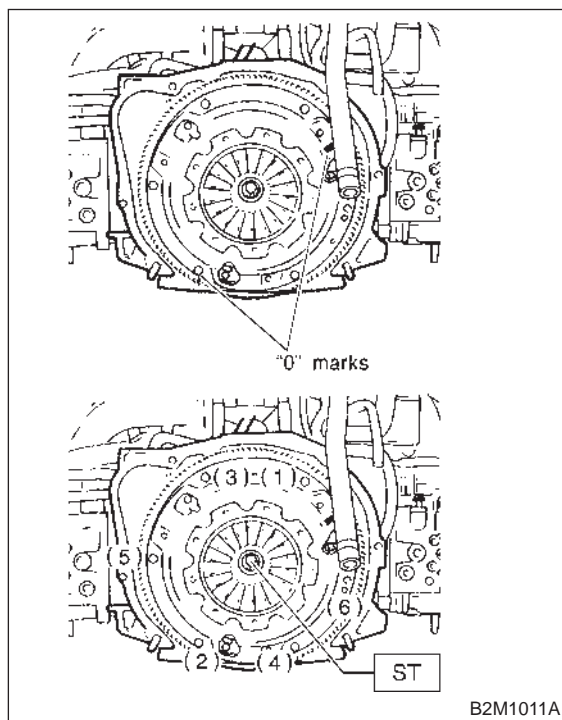
- When installing the clutch cover on the flywheel, position the clutch cover so that there is a gap of 120° or more between "0" marks on the flywheel and clutch cover. ("0" marks indicate the directions of residual unbalance.)
- Note the front and rear of the clutch disc when installing.
- Tighten clutch cover installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross fashion.

Tightening torque:

$15.7 \pm 1.5 \text{ N}\cdot\text{m}$ ($1.6 \pm 0.15 \text{ kg}\cdot\text{m}$, $11.6 \pm 1.1 \text{ ft}\cdot\text{lb}$)

5) Remove ST.

ST 499747100 CLUTCH DISC GUIDE

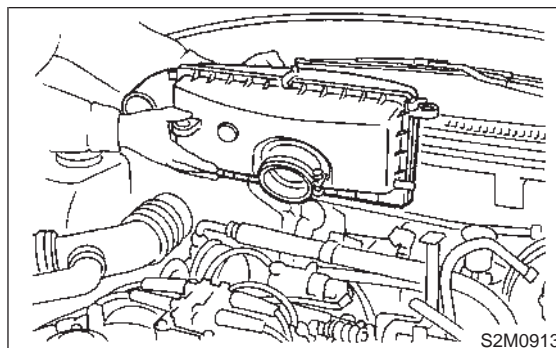


5. Operating Cylinder

A: REMOVAL AND INSTALLATION

1) Remove air chamber.

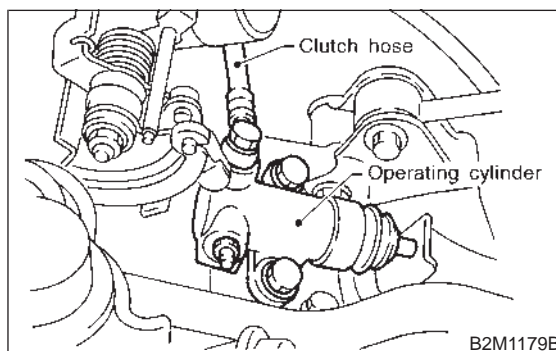
<Ref. to 2-7 [W18A0].>



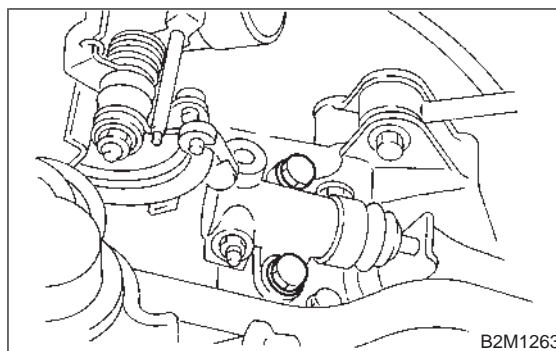
2) Remove clutch hose from operating cylinder.

CAUTION:

Cover hose joint to prevent brake fluid from flowing out.



3) Remove operating cylinder from transmission.



4) Installation is in the reverse order of removal.

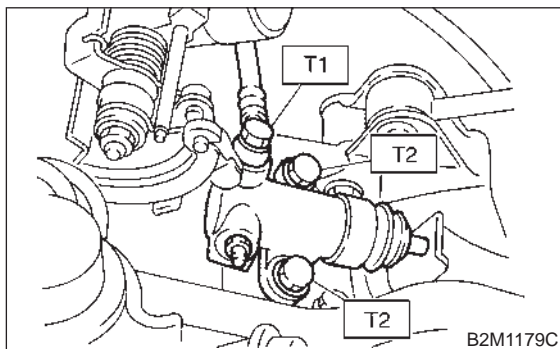
NOTE:

Before installing operating cylinder, apply grease (SUNLIGHT 2: P/N 003602010) to contact point of release lever and operating cylinder.

Tightening torque:

T1: 18 ± 3 N·m (1.8 ± 0.3 kg·m, 13.0 ± 2.2 ft·lb)

T2: 37 ± 3 N·m (3.8 ± 0.3 kg·m, 27.5 ± 2.2 ft·lb)

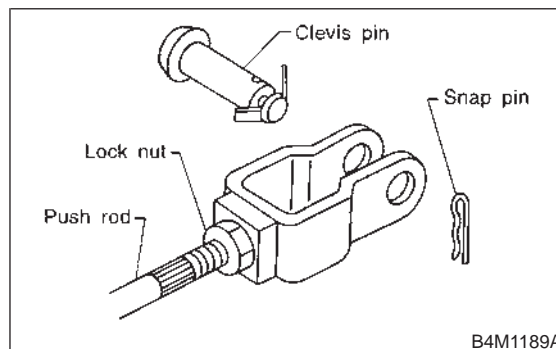


5) After bleeding air from operating cylinder, ensure that clutch operates properly.
<Ref. to 2-10 [W2A2].>

6. Master Cylinder and Reservoir Tank

A: REMOVAL

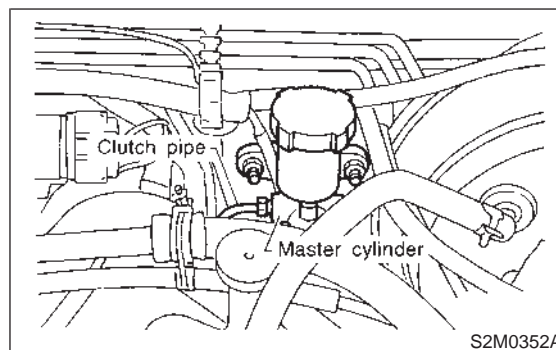
- 1) Thoroughly drain brake fluid from reservoir tank.
- 2) Remove snap pin, clevis pin and separate push rod of master cylinder from clutch pedal.



- 3) Remove clutch pipe from master cylinder.
- 4) Remove master cylinder with reservoir tank.

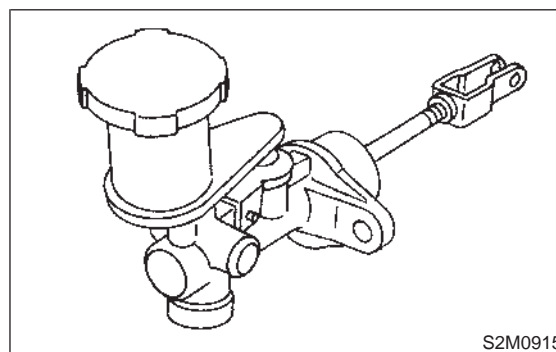
CAUTION:

Be extremely careful not to spill brake fluid. Brake fluid spilt on the vehicle body will harm the paint surface; wipe it off quickly if spilt.



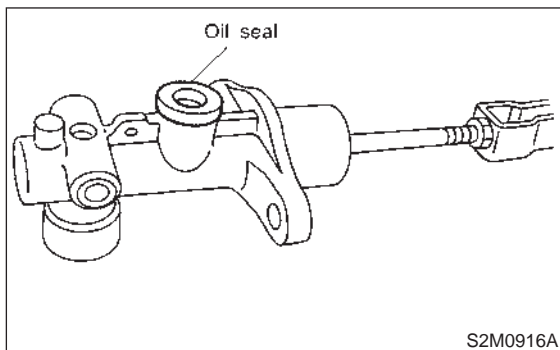
B: DISASSEMBLY

- 1) Remove straight pin and reservoir tank.

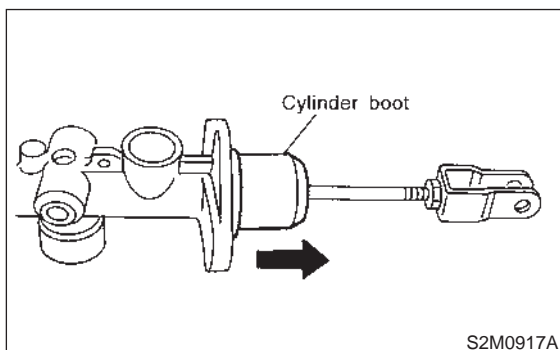


6. Master Cylinder and Reservoir Tank

- 2) Remove oil seal.



- 3) Move the cylinder boot backward.



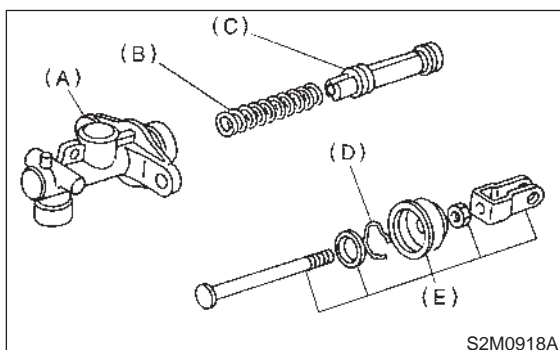
- 4) Remove snap ring.

CAUTION:

Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

C: INSPECTION

If any damage, deformation, wear, swelling, rust or other faults are found on the cylinder, piston, push rod, fluid reservoir, return spring and gasket, replace the faulty part.



- (A) Master cylinder body
- (B) Return spring
- (C) Piston
- (D) Snap ring
- (E) Rod ASSY

D: ASSEMBLY**CAUTION:**

Apply a coat of grease to the contacting surfaces of the push rod and piston before installation.

- 1) To assemble the master cylinder reverse the sequence of disassembly procedure.
- 2) Install damper cylinder washer. Install damper cylinder and tighten to the specified torque.

Tightening torque:

T: 46.6 ± 7.4 N·m (4.75 ± 0.75 kg·m, 34.4 ± 5.4 ft·lb)

E: INSTALLATION

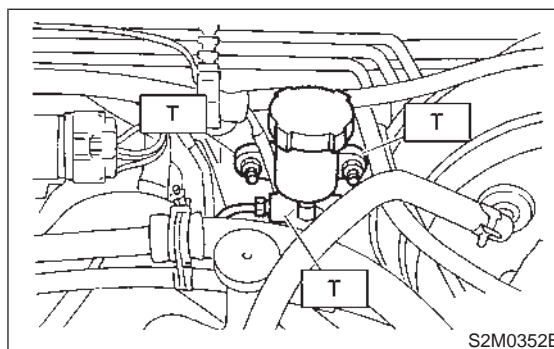
- 1) Install master cylinder to body, and install clutch pipe to master cylinder.

CAUTION:

Check that pipe is routed properly.

Tightening torque:

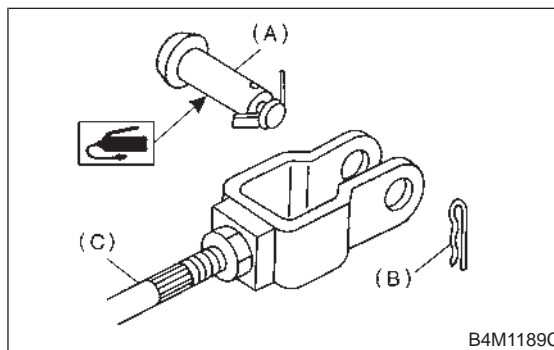
T: 18 ± 3 N·m (1.8 ± 0.3 kg·m, 13.0 ± 2.2 ft·lb)



- 2) Connect push rod of master cylinder to clutch pedal, and install clevis pin and snap pin.

NOTE:

Apply grease to clevis pin.



- (A) Clevis pin
- (B) Snap pin
- (C) Push rod

- 3) After bleeding air from system, ensure that clutch operates properly.
<Ref. to 2-10 [W2A2].>

7. Brake Fluid

A: REPLACEMENT

CAUTION:

- The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
- Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:

- During bleeding operation, keep the clutch reserve tank filled with brake fluid to eliminate entry of air.
- Clutch pedal operating must be very slow.
- For convenience and safety, it is advisable to have two men working.

- The amount of brake fluid required is approximately 70 ml (2.4 US fl oz, 2.5 Imp fl oz) for total clutch system.

- 1) Either jack-up vehicle and place a safety stand under it, or lift-up vehicle.
- 2) Remove both front and rear wheels.
- 3) Draw out the brake fluid from reserve tank with syringe.
- 4) Refill reservoir tank with recommended brake fluid.

Recommended brake fluid:

FMVSS No. 116, fresh DOT3 or 4 brake fluid

- 5) Bleed air from oil line with the help of a co-worker.

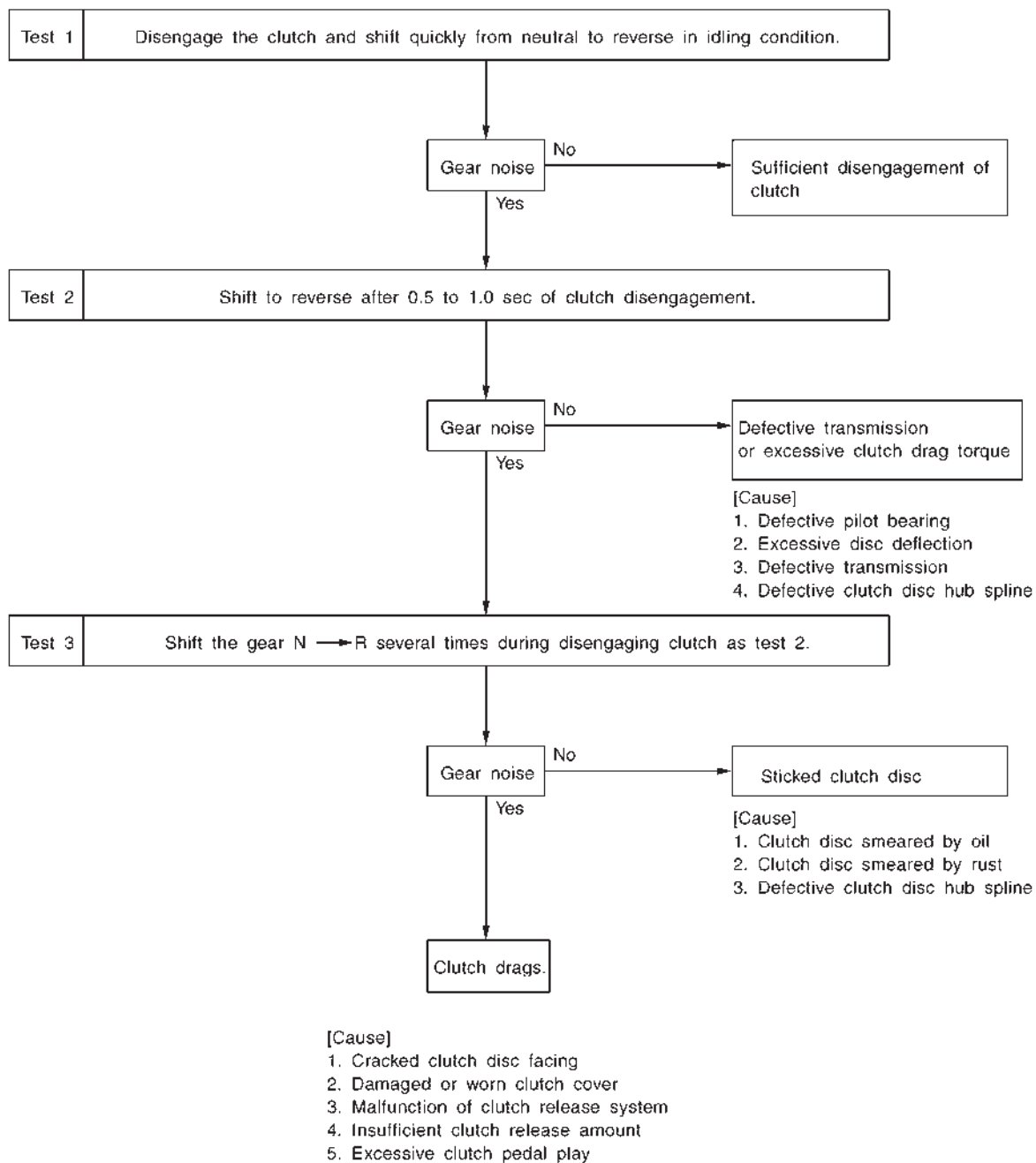
<Ref. to 2-10 [W2A2].>

1. Clutch Trouble in General

Symptom	Possible cause	Corrective action
1. Clutch slippage It is hard to perceive clutch slippage in the early stage, but pay attention to the following symptoms. <ul style="list-style-type: none"> ● Engine revs up when shifting. ● High speed driving is impossible; especially rapid acceleration impossible and vehicle speed does not increase in proportion to an increase in engine speed. ● Power falls, particularly when ascending a slope, and there is a smell of burning of the clutch facing. ● Method of testing: Put the vehicle in stationary condition with parking brake fully applied. Disengage the clutch and shift the transmission gear into the first. Gradually allow the clutch to engage while gradually increasing the engine speed. The clutch function is satisfactory if the engine stalls. However, the clutch is slipping if the vehicle does not start off and the engine does not stall. 	(a) No clutch pedal play	Readjust.
	(b) No release lever end play	Readjust.
	(c) Clutch facing smeared by oil	Replace.
	(d) Worn clutch facing	Replace.
	(e) Deteriorated diaphragm spring	Replace.
	(f) Distorted pressure plate or flywheel	Correct or replace.
	(g) Defective release bearing holder	Correct or replace.
	(h) Defective pedal and cable system	Correct or replace.
2. Clutch drags. As a symptom of this trouble, a harsh scratching noise develops and control becomes quite difficult when shifting gears. The symptom becomes more apparent when shifting into the first gear. However, because much trouble of this sort is due to defective synchronization mechanism, carry out the test as described after. <ul style="list-style-type: none"> ● Method of testing: <Ref. to 2-10 [K1A0].> It may be judged as insufficient disengagement of clutch if any noise occurs during this test.	(a) Excessive clutch pedal play	Readjust.
	(b) Excessive clutch release lever play	Readjust.
	(c) Worn or rusty clutch disc hub spline	Replace clutch disc.
	(d) Excessive deflection of clutch disc facing	Correct or replace.
	(e) Seized crankshaft pilot needle bearing	Replace.
	(f) Malfunction of pedal and cable system	Correct or replace.
	(g) Cracked clutch disc facing	Replace.
	(h) Sticked clutch disc (smeared by oil or water)	Replace.
3. Clutch chatters. Clutch chattering is an unpleasant vibration to the whole body when the vehicle is just started with clutch partially engaged.	(a) Improper clutch cable routing	Correct.
	(b) Adhesion of oil on the facing	Replace clutch disc.
	(c) Weak or broken torsion spring	Replace clutch disc.
	(d) Defective facing contact or excessive disc	Replace clutch disc defection.
	(e) Warped pressure plate or flywheel	Correct or replace.
	(f) Loose disc rivets	Replace clutch disc.
	(g) Loose engine mounting	Retighten or replace mounting.
	(h) Improper adjustment of pitching stopper	Adjustment.
4. Noisy clutch Examine whether the noise is generated when the clutch is disengaged, engaged, or partially engaged.	(a) Broken, worn or unlubricated release bearing	Replace release bearing.
	(b) Insufficient lubrication of pilot bearing	Apply grease.
	(c) Loose clutch disc hub	Replace clutch disc.
	(d) Loose torsion spring retainer	Replace clutch disc.
	(e) Deteriorated or broken torsion spring	Replace clutch disc.

Symptom	Possible cause	Corrective action
5. Clutch grabs. When starting the vehicle with the clutch partially engaged, the clutch engages suddenly and the vehicle jumps instead of making a smooth start.	(a) Grease or oil on facing	Replace clutch disc.
	(b) Deteriorated cushioning spring	Replace clutch disc.
	(c) Worn or rusted spline of clutch disc or main	Take off rust, apply grease or replace clutch shaft disc or mainshaft.
	(d) Deteriorated or broken torsion spring	Replace clutch disc.
	(e) Loose engine mounting	Retighten or replace mounting.
	(f) Deteriorated diaphragm spring	Replace.

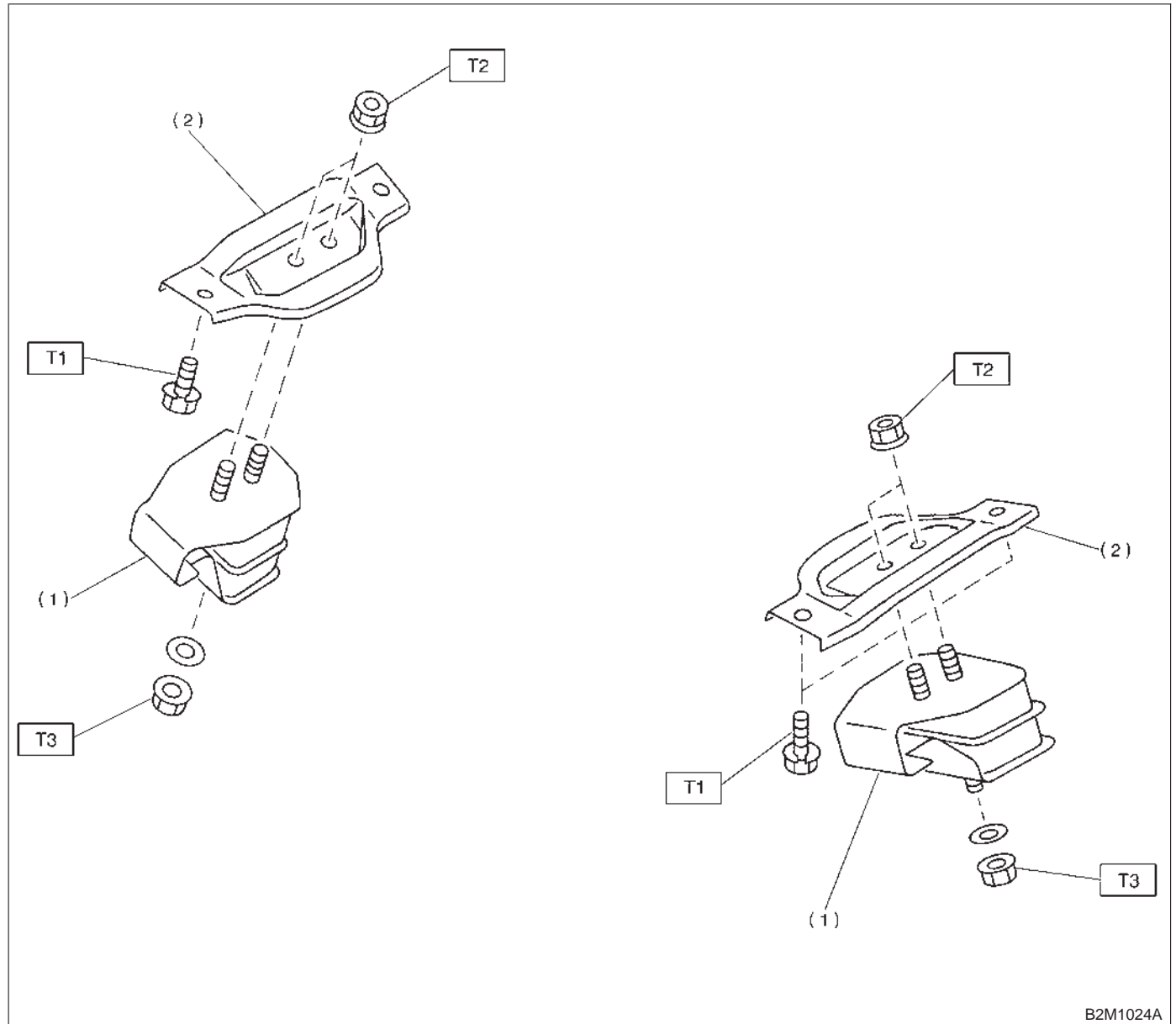
A: DIAGNOSTIC DIAGRAM OF CLUTCH DRAG



ENGINE AND TRANSMISSION MOUNTING SYSTEM *2-11*

	Page
C COMPONENT PARTS	2
1. Engine Mounting	2
2. Transmission Mounting	3
W SERVICE PROCEDURE	5
1. Engine	5
2. Transmission	18

1. Engine Mounting



- (1) Front cushion rubber
 (2) Front engine mounting bracket

Tightening torque: N·m (kg·m, ft·lb)

T1: 26±7 (2.7±0.7, 19.5±5.1)

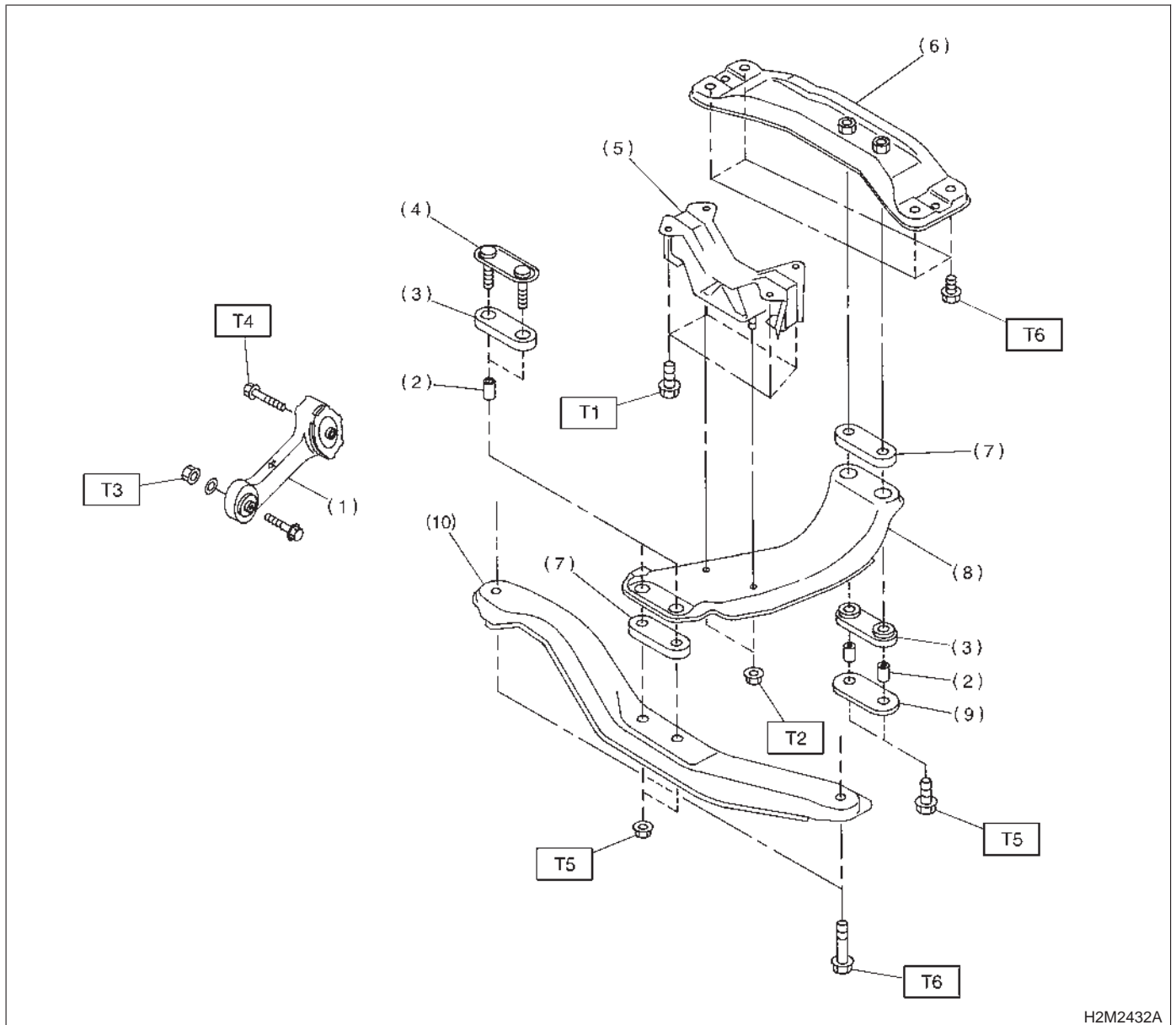
T2: 41±10 (4.2±1.0, 30±7)

T3: 83±15 (8.5±1.5, 61±11)

B2M1024A

2. Transmission Mounting

A: MT MODEL



H2M2432A

- | | |
|-------------------------|------------------------|
| (1) Pitching stopper | (8) Center crossmember |
| (2) Spacer | (9) Rear plate |
| (3) Cushion C | (10) Front crossmember |
| (4) Front plate | |
| (5) Rear cushion rubber | |
| (6) Rear crossmember | |
| (7) Cushion D | |

Tightening torque: N·m (kg-m, ft-lb)

T1: 33±5 (3.4±0.5, 24.6±3.6)

T2: 37±10 (3.8±1.0, 27±7)

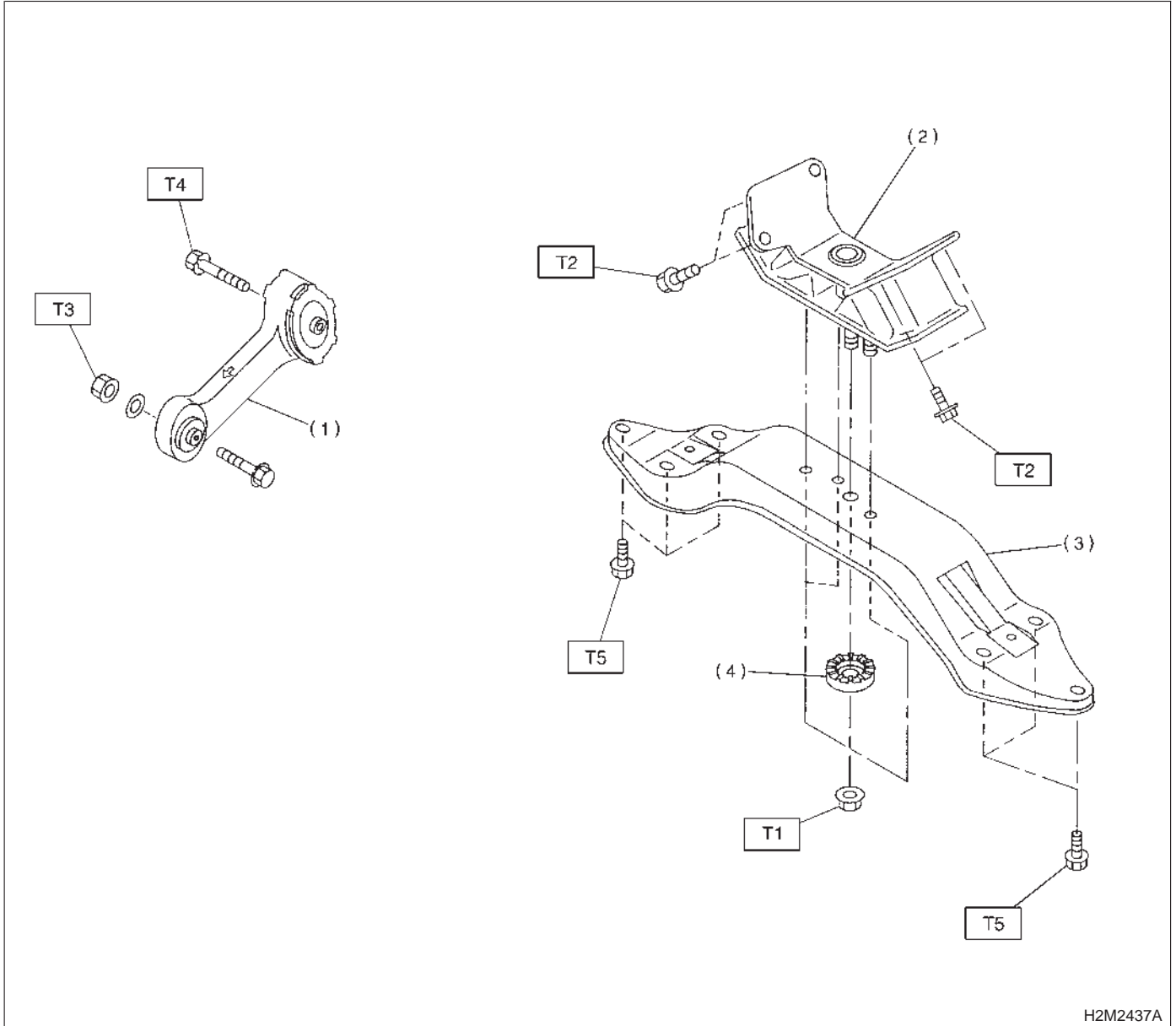
T3: 49±5 (5.0±0.5, 36.2±3.6)

T4: 57±10 (5.8±1.0, 42±7)

T5: 69±15 (7.0±1.5, 51±11)

T6: 137±20 (14±2, 101±14)

B: AT MODEL



H2M2437A

- (1) Pitching stopper
- (2) Rear cushion rubber
- (3) Crossmember
- (4) Stopper

Tightening torque: N·m (kg·m, ft·lb)

T1: 37±10 (3.8±1.0, 27±7)

T2: 38±15 (3.9±1.5, 28±11)

T3: 49±5 (5.0±0.5, 36.2±3.6)

T4: 57±10 (5.8±1.0, 42±7)

T5: 69±15 (7.0±1.5, 51±11)

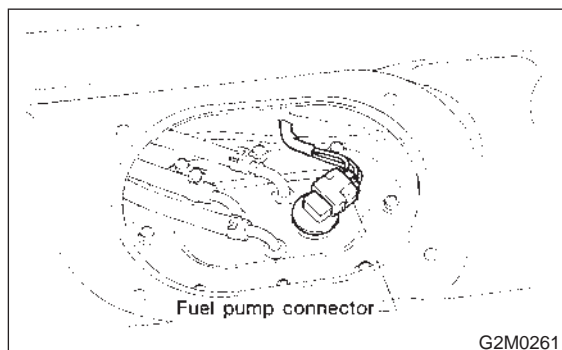
1. Engine

A: GENERAL PRECAUTION

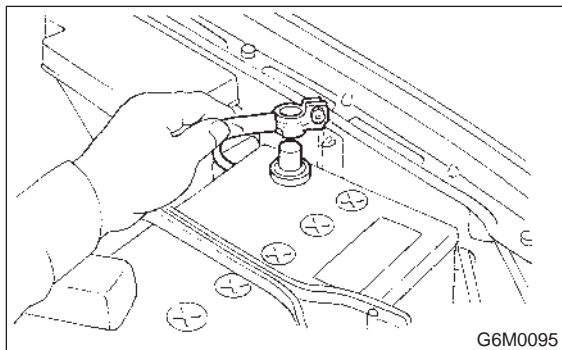
- 1) Remove or install engine in an area where chain hoists, lifting devices, etc. are available for ready use.
- 2) Be sure not to damage coated surfaces of body panels with tools or stain seats and windows with coolant or oil. Place a cover over fenders, as required, for protection.
- 3) Prior to starting work, prepare the following: Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
- 4) Lift-up or lower the vehicle when necessary. Make sure to support the correct positions. <Ref. to 1-3 [G7B0].>

B: REMOVAL

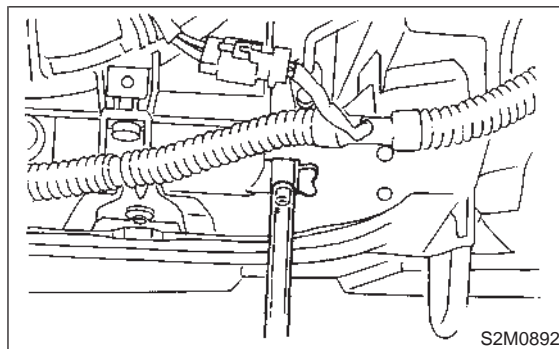
- 1) Set the vehicle on lift arms.
- 2) Open front hood fully and support with stay.
- 3) Release fuel pressure.
 - (1) Disconnect fuel pump connector.



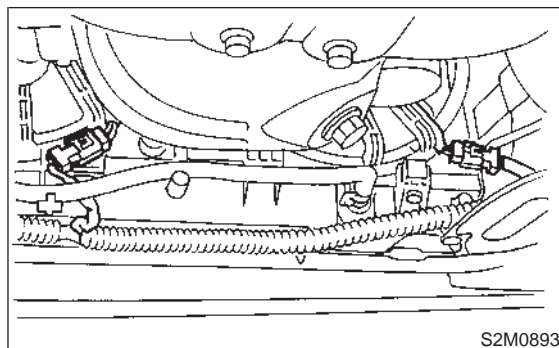
- (2) Start the engine, and run until it stalls.
 - (3) After the engine stalls, crank it for five seconds more.
 - (4) Turn ignition switch to "OFF".
 - (5) Remove filler cap.
- 4) Disconnect battery cables and remove battery from vehicle.



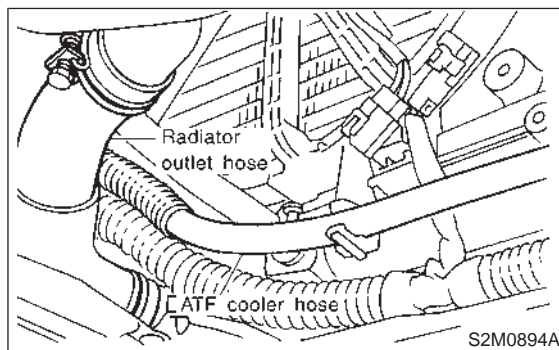
- 5) Drain coolant. Set container under the vehicle, and remove drain cock from radiator.



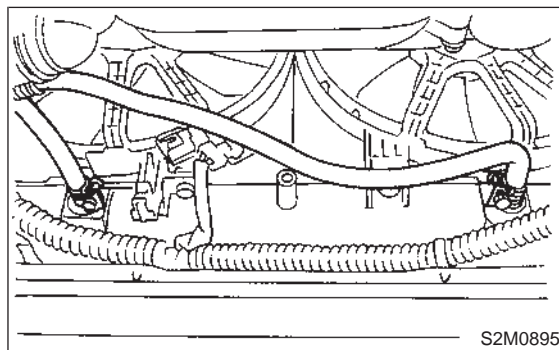
- 6) Remove cooling system.
 - (1) Disconnect connectors from radiator main fan and sub fan motors.



- (2) Disconnect radiator outlet hose from thermostat cover, and remove ATF cooler hose from clip of radiator.

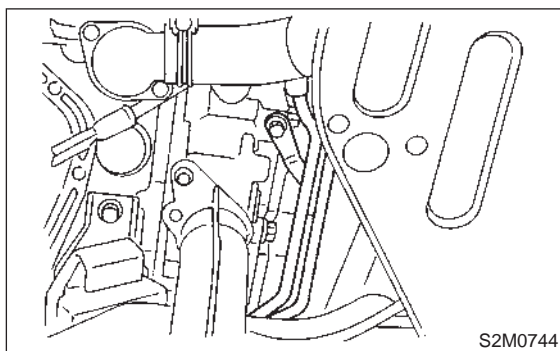


- (3) Disconnect ATF cooler hoses from radiator.

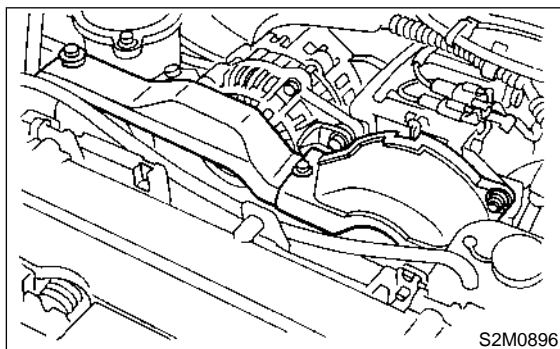


1. Engine

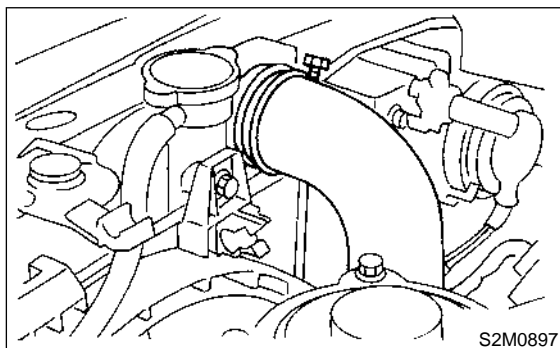
- (4) Remove ATF cooler pipe from cylinder head.



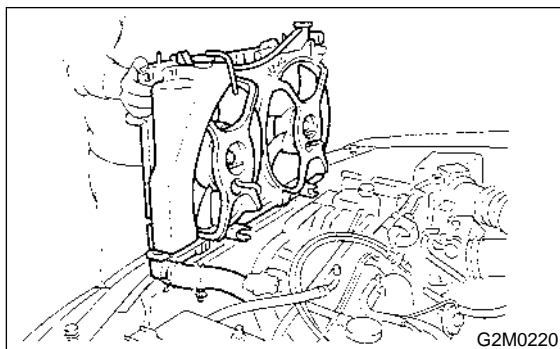
- (5) Remove V-belt cover.



- (6) Disconnect radiator inlet hose from radiator.



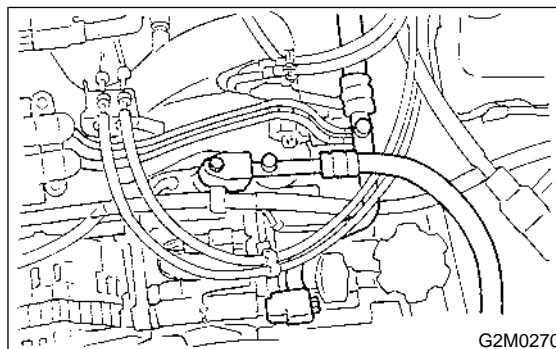
- (7) Remove radiator upper bracket, and remove radiator assembly from vehicle.



- 7) Collect refrigerant, and remove pressure hoses.
(With A/C)

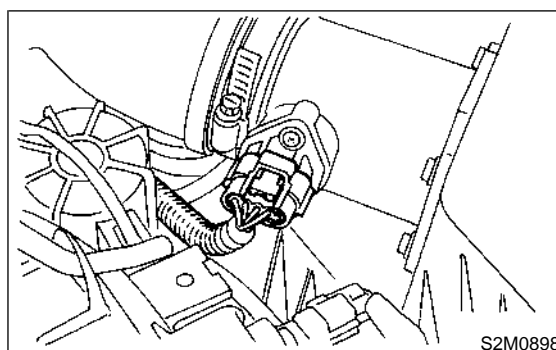
- (1) Place and connect the attachment hose to the refrigerant recycle system.

- (2) Collect refrigerant from A/C system.
(3) Disconnect A/C flexible hoses from A/C compressor.



- 8) Remove air intake system.

- (1) Disconnect connector from mass air flow sensor. (Except 2200 cc California spec. vehicles)

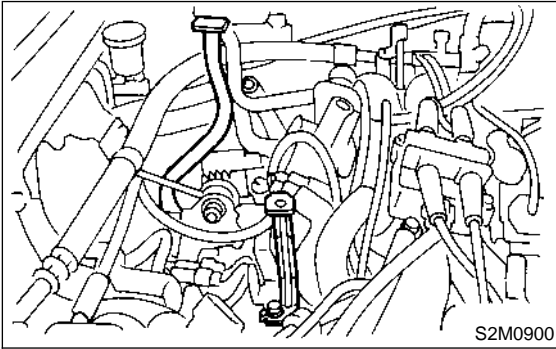


- (2) Remove air intake duct with air cleaner upper cover, and remove air cleaner element. (Except 2200 cc California spec. vehicles) <Ref. to 2-7 [W1A0].> and <Ref. to 2-7 [W18A0].>

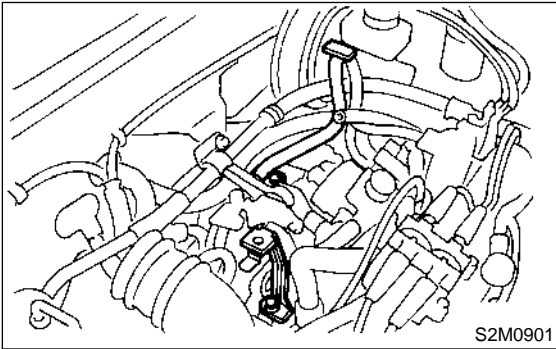
- (3) Remove air cleaner case and duct. (2200 cc California spec. vehicles) <Ref. to 2-7 [W1A0].>

9) Remove chamber stay.

- **MT vehicles**

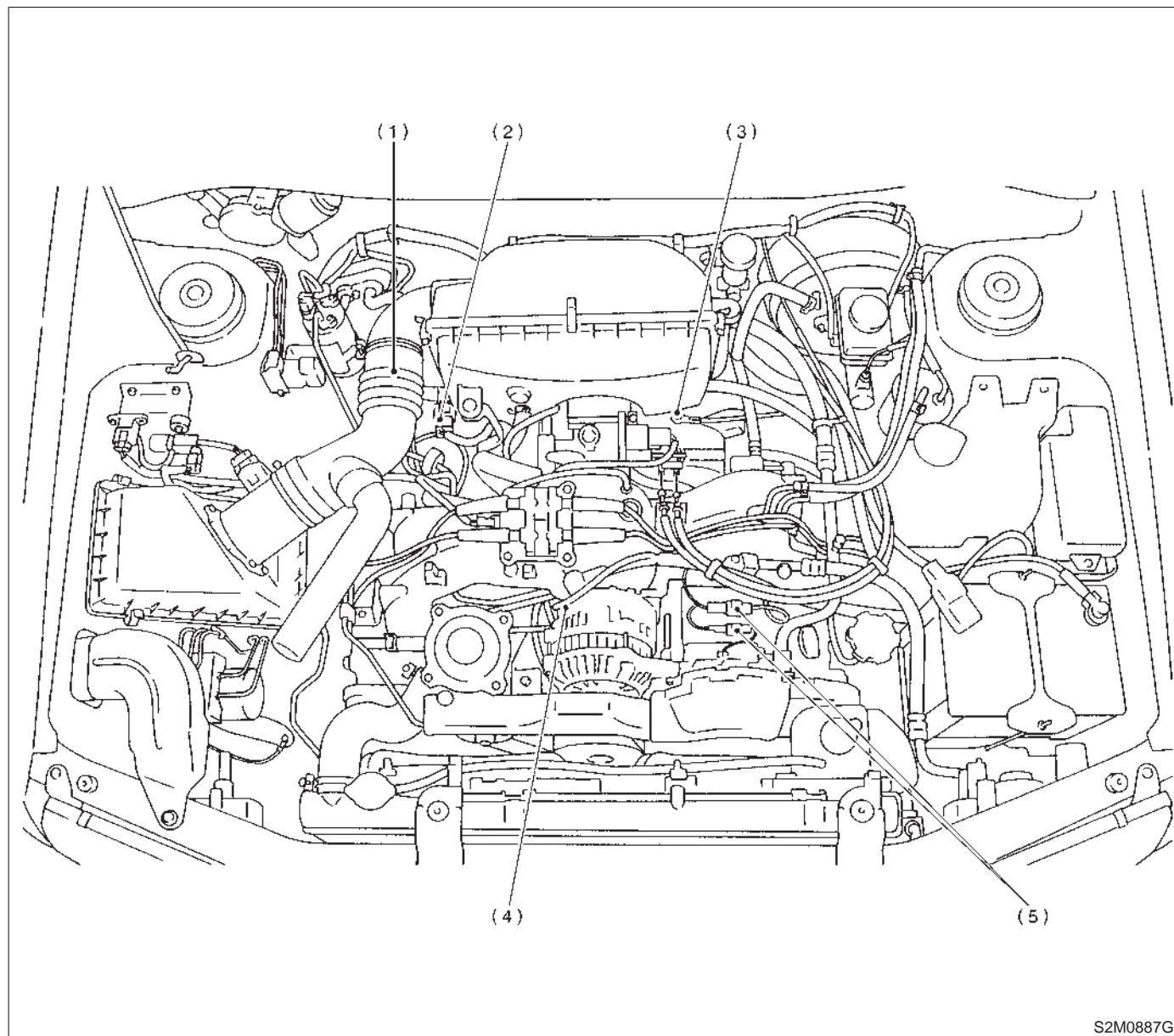


- **AT vehicles**



10) Disconnect connectors, cables and hoses.

(1) Disconnect the following connectors.

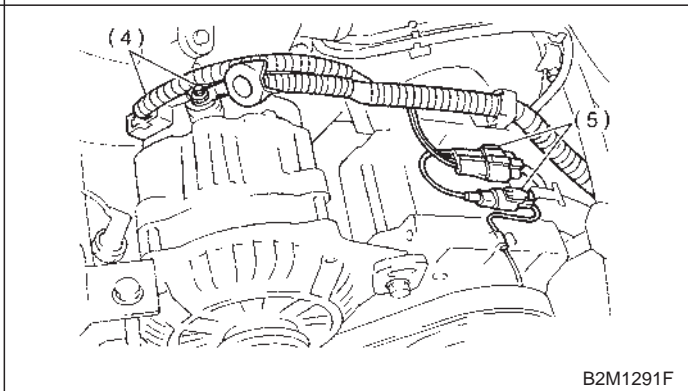
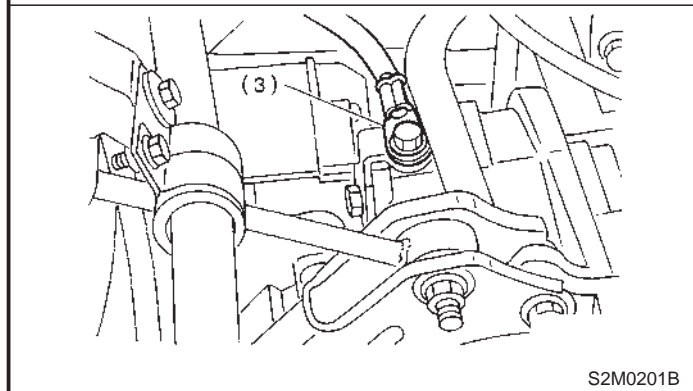
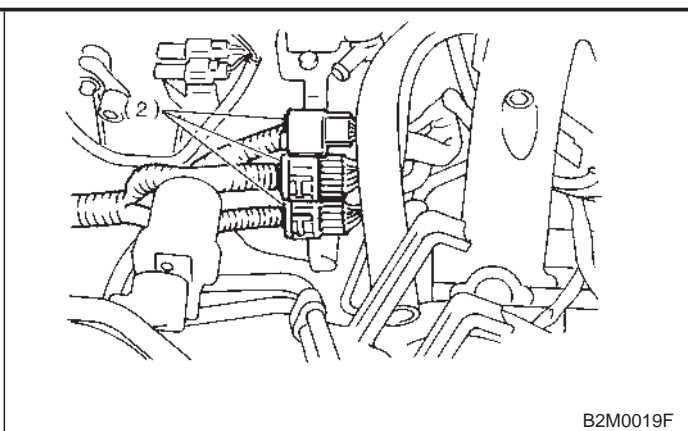
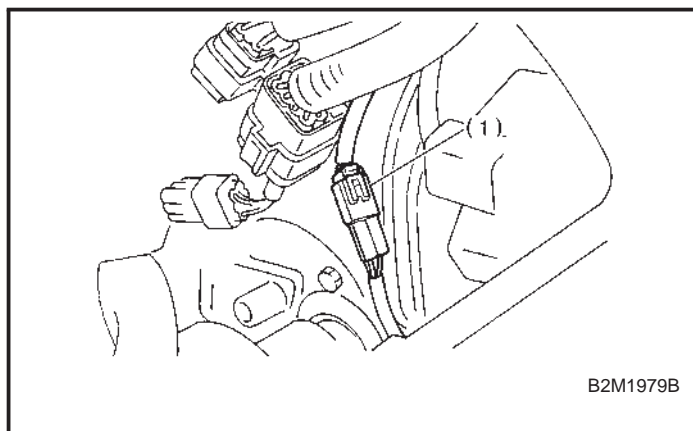


S2M0887G

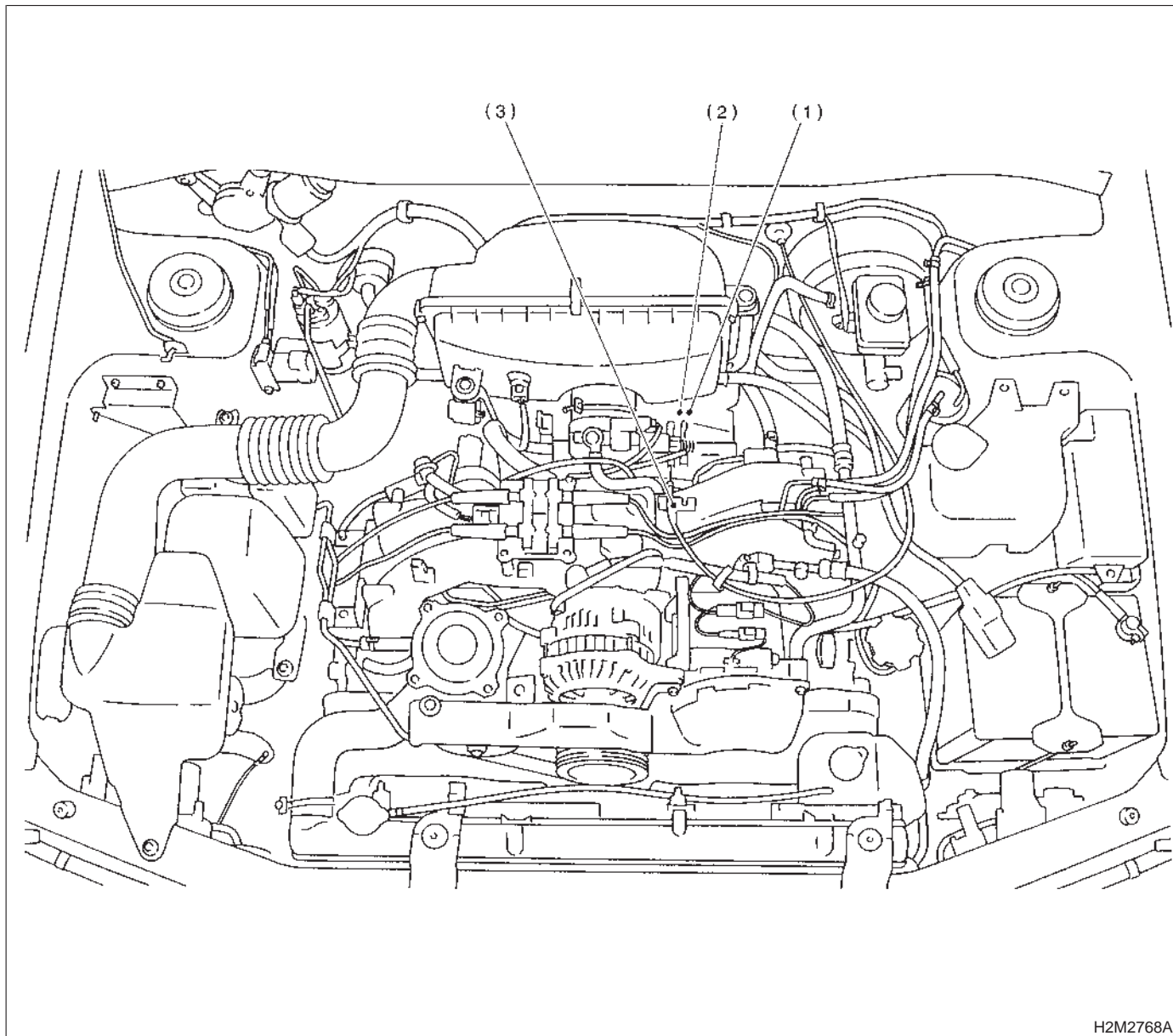
- (1) Front oxygen sensor connector
- (2) Engine harness connectors
- (3) Engine ground terminal stay

- (4) Alternator connector and terminal

- (5) A/C compressor connectors
(With A/C)



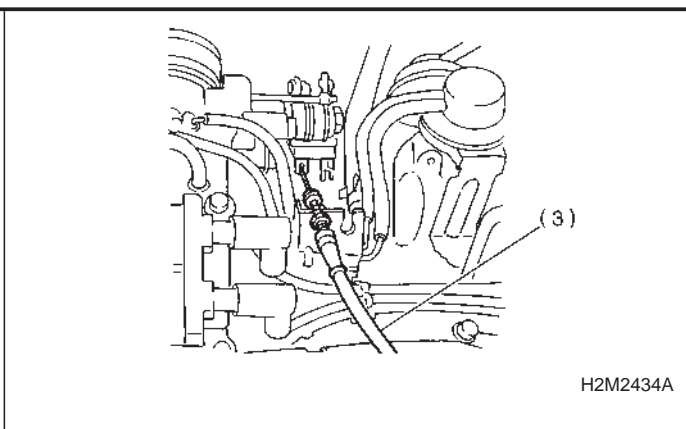
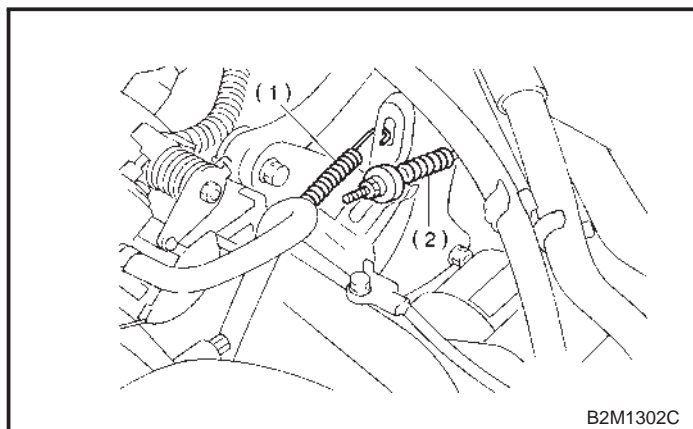
(2) Disconnect the following cables.



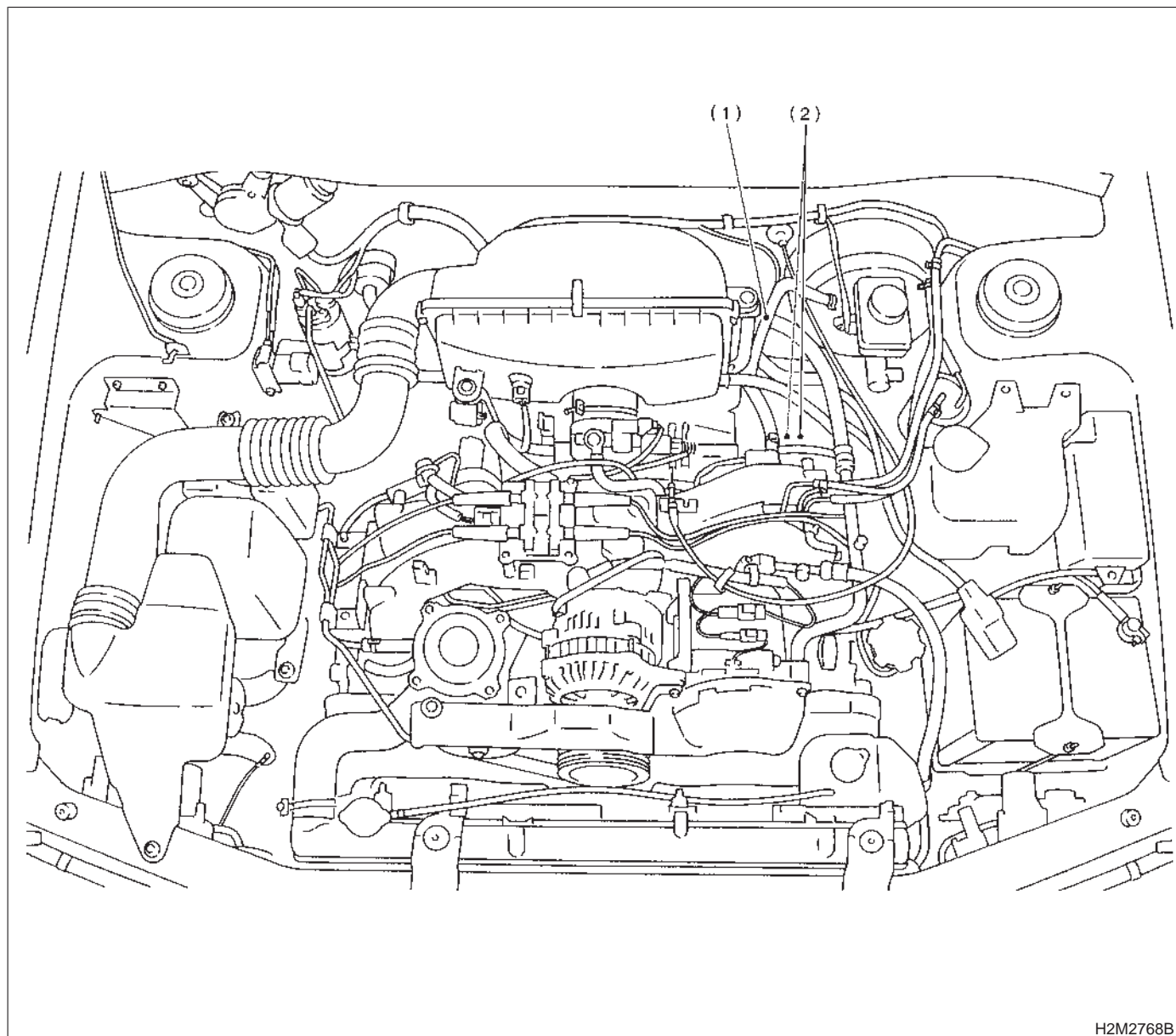
(1) Clutch release spring (2200 cc MT vehicle)

(2) Clutch cable (2200 cc MT vehicle)

(3) Accelerator cable



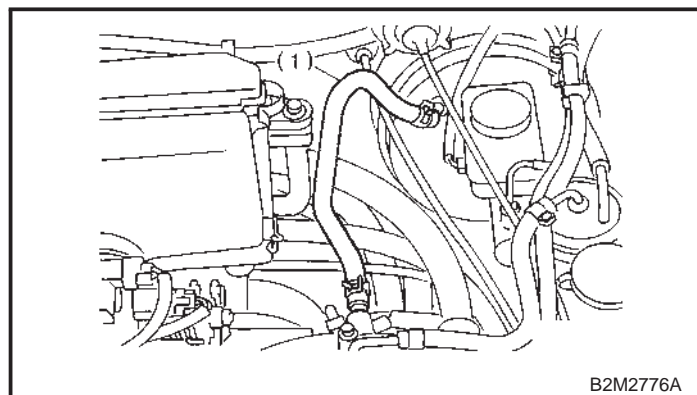
(3) Disconnect the following hoses.



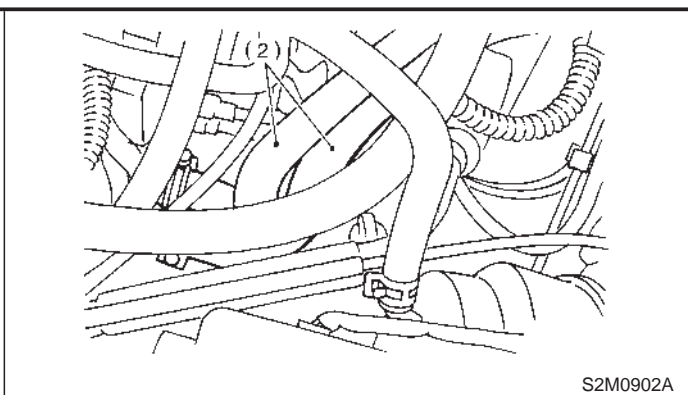
H2M2768B

(1) Brake booster vacuum hose

(2) Heater inlet and outlet hoses



B2M2776A

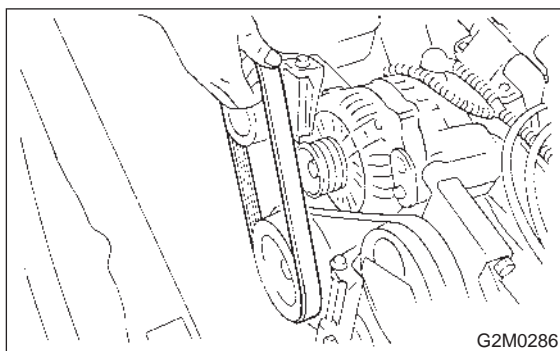


S2M0902A

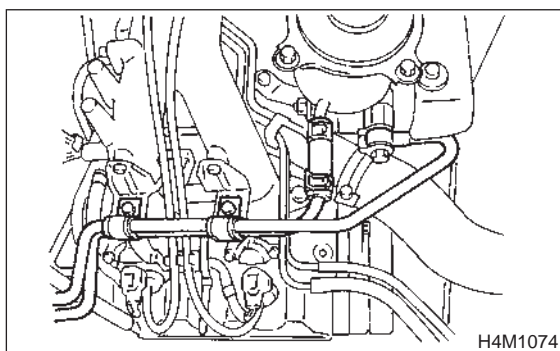
11) Remove power steering pump from bracket.

1. Engine

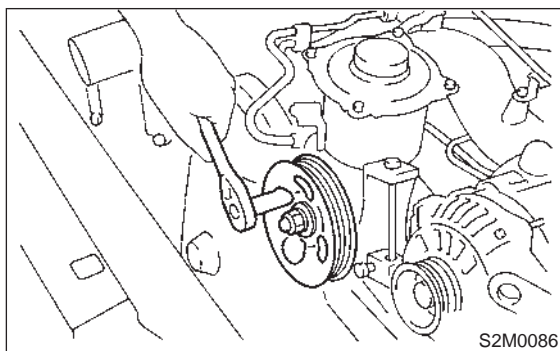
- (1) Loosen lock bolt and slider bolt, and remove front side V-belt.



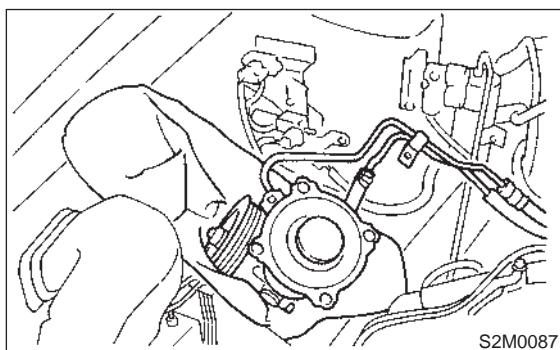
- (2) Remove pipe with bracket from intake manifold.



- (3) Remove bolts which install power steering pump from bracket.

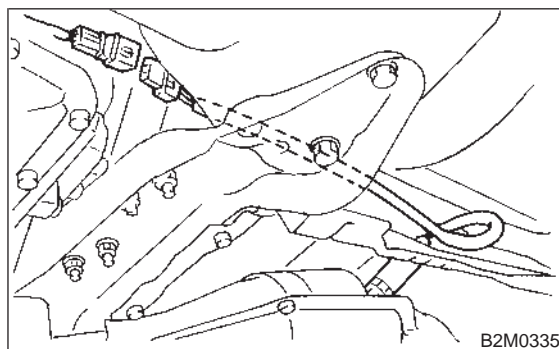


- (4) Place power steering pump on the right side wheel apron.

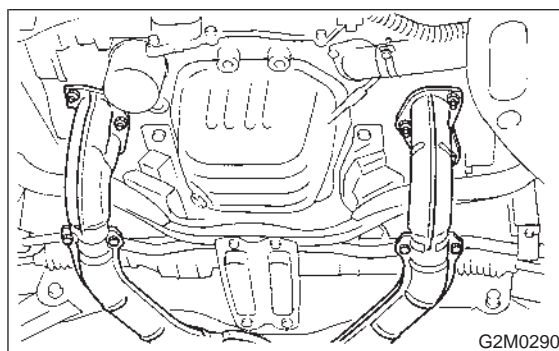


- 12) Remove front exhaust pipe and center exhaust pipe.

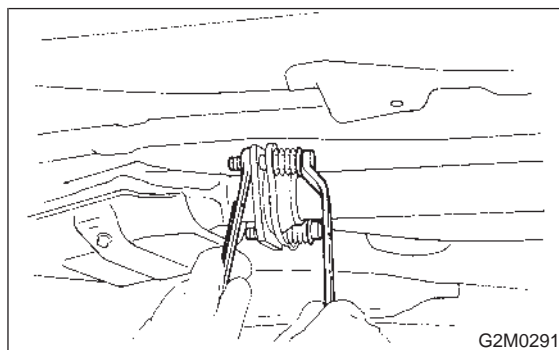
- (1) Lift-up the vehicle.
(2) Disconnect connector from rear oxygen sensor.



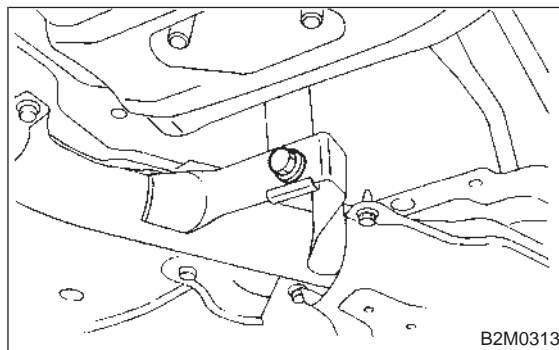
- (3) Remove nuts which install front exhaust pipe onto engine.



- (4) Separate center exhaust pipe from rear exhaust pipe.



- (5) Remove bolt which installs center exhaust pipe on hunger bracket.

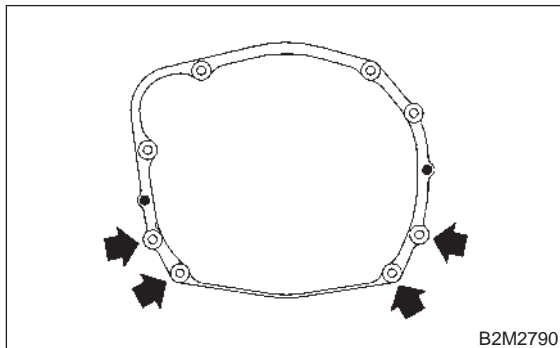


- (6) Take off front and center exhaust pipes.

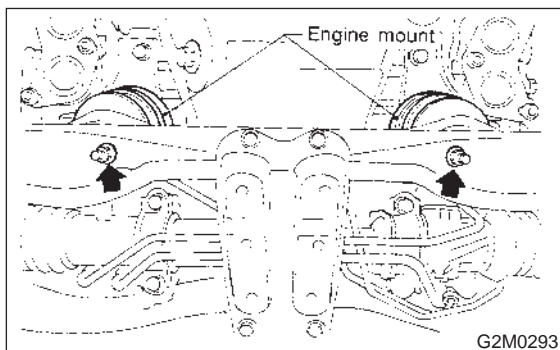
CAUTION:

Exhaust pipe will drop when all bolts are removed. So, hold it when removing the last bolt.

13) Remove nuts which hold lower side of transmission to engine.



14) Remove nuts which install front cushion rubber onto front crossmember.



15) Separate torque converter from drive plate.
(AT model)

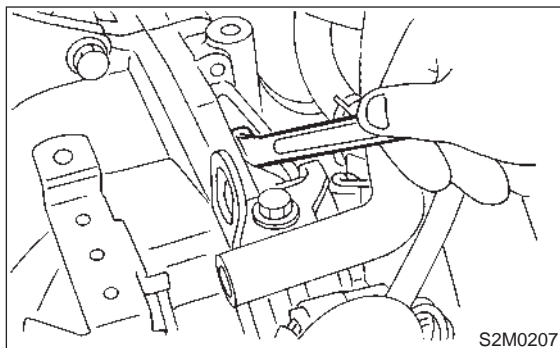
- (1) Lower the vehicle.
- (2) Remove service hole plug.
- (3) Remove bolts which hold torque converter to drive plate.
- (4) Remove other bolts while rotating the engine using ST.

2200 cc vehicles:

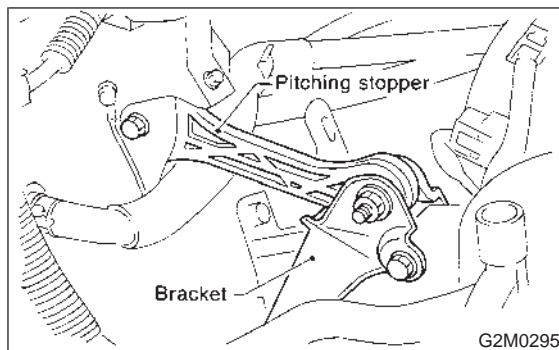
ST 499977300 CRANK PULLEY WRENCH

2500 cc vehicles:

ST 499977100 CRANK PULLEY WRENCH



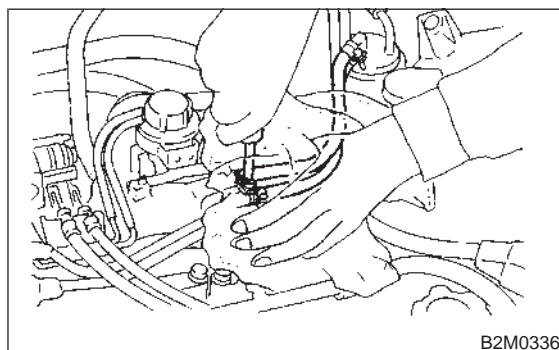
16) Remove pitching stopper.



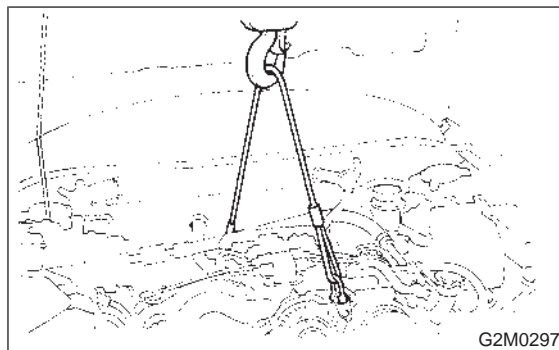
17) Disconnect fuel delivery hose, return hose and evaporation hose.

CAUTION:

- Disconnect hose with its end wrapped with cloth to prevent fuel from splashing.
- Catch fuel from hose into container.



18) Support engine with a lifting device and wire ropes.

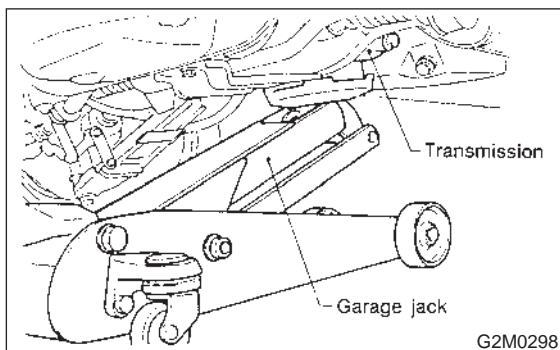


1. Engine

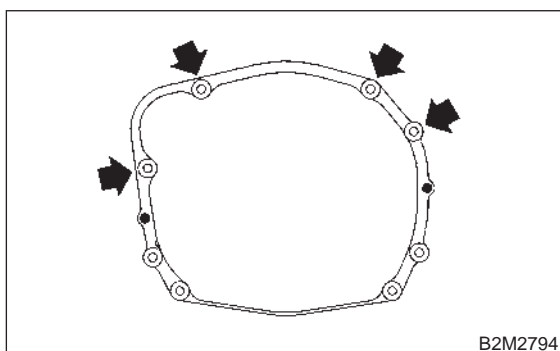
19) Support transmission with a garage jack.

CAUTION:

Before moving engine away from transmission, check to be sure no work has been overlooked. Doing this is very important in order to facilitate re-installation and because transmission lowers under its own weight.



20) Remove bolts which holds upper side of transmission to engine.

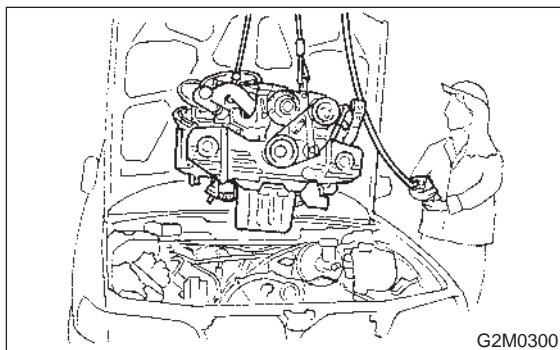


21) Remove engine from vehicle.

- (1) Slightly raise engine.
- (2) Raise transmission with garage jack.
- (3) Move engine horizontally until mainshaft is withdrawn from clutch cover.
- (4) Slowly move engine away from engine compartment.

CAUTION:

Be careful not to damage adjacent parts or body panels with crank pulley, oil pressure gauge, etc.

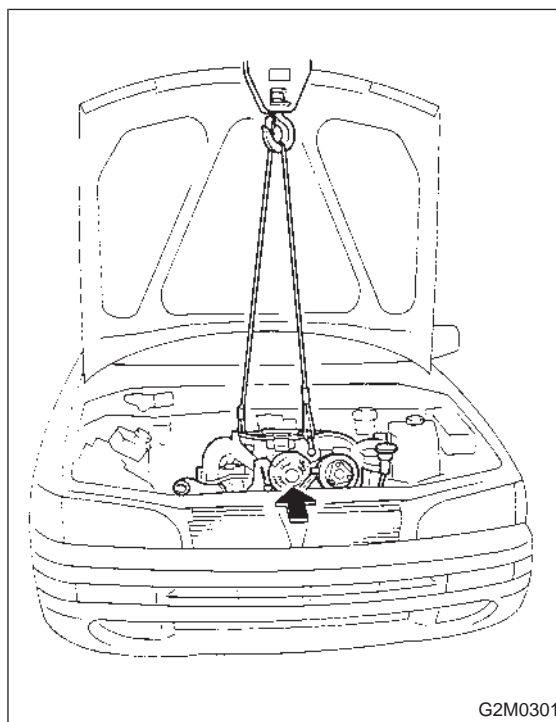
**C: INSTALLATION**

1) Install engine onto transmission.

- (1) Position engine in engine compartment and align it with transmission.

CAUTION:

Be careful not to damage adjacent parts or body panels with crank pulley, oil pressure gauge, etc.

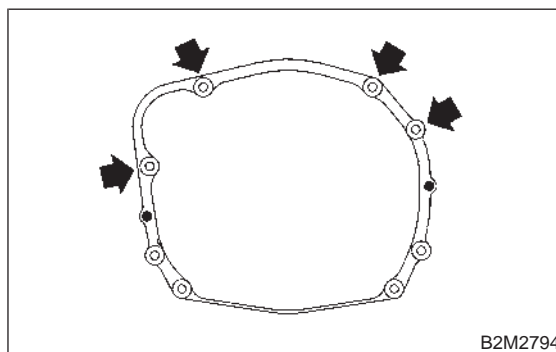


(2) Apply a small amount of grease to splines of mainshaft.

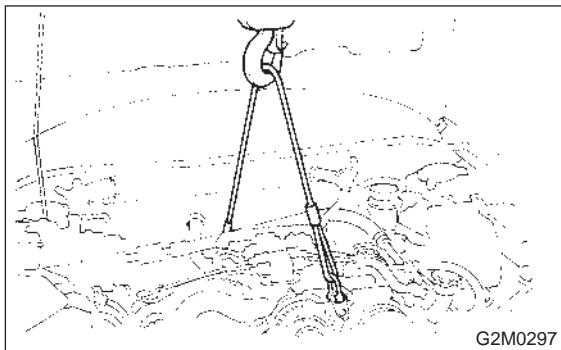
2) Tighten bolts which hold upper side of transmission to engine.

Tightening torque:

50 ± 4 N-m (5.1 ± 0.4 kg-m, 36.9 ± 2.9 ft-lb)



- 3) Remove lifting device and wire ropes.

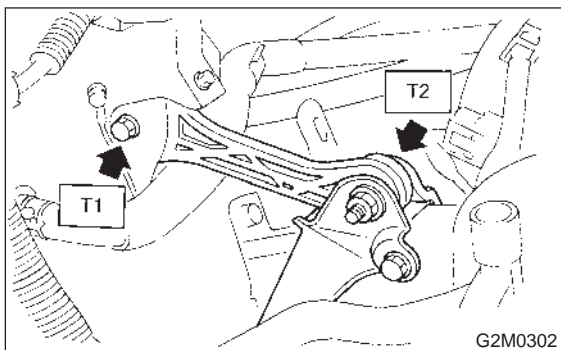


- 4) Remove garage jack.
5) Install pitching stopper.

Tightening torque:

T1: 57 ± 10 N·m (5.8 ± 1.0 kg·m, 42 ± 7 ft·lb)

T2: 49 ± 5 N·m (5.0 ± 0.5 kg·m, 36.2 ± 3.6 ft·lb)



- 6) Install torque converter onto drive plate. (AT model)

(1) Tighten bolts which hold torque converter to drive plate.

(2) Tighten other bolts while rotating the engine by using ST.

2200 cc vehicles:

ST 499977300 CRANK PULLEY WRENCH

2500 cc vehicles:

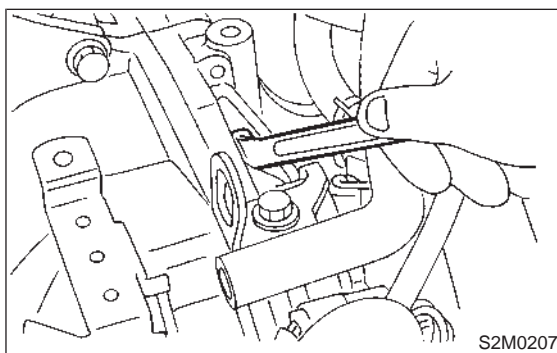
ST 499977100 CRANK PULLEY WRENCH

CAUTION:

Be careful not to drop bolts into torque converter housing.

Tightening torque:

25 ± 2 N·m (2.5 ± 0.2 kg·m, 18.1 ± 1.4 ft·lb)



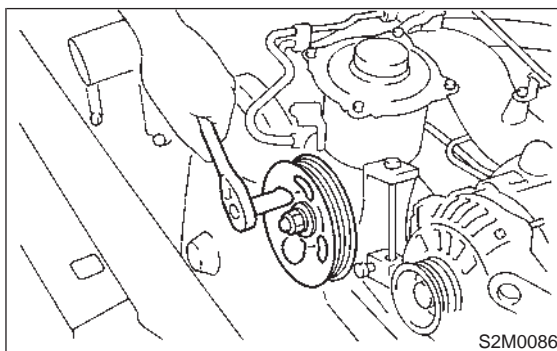
- (3) Clog plug onto service hole.

- 7) Install power steering pump on bracket.

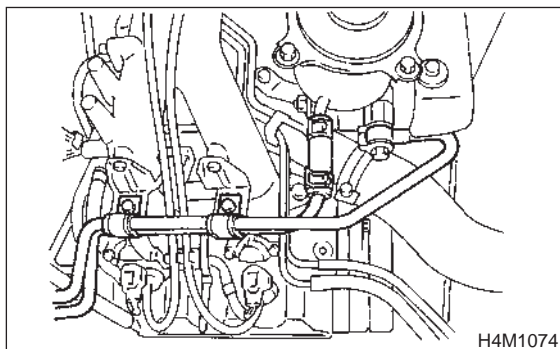
(1) Install power steering pump on bracket, and tighten bolts.

Tightening torque:

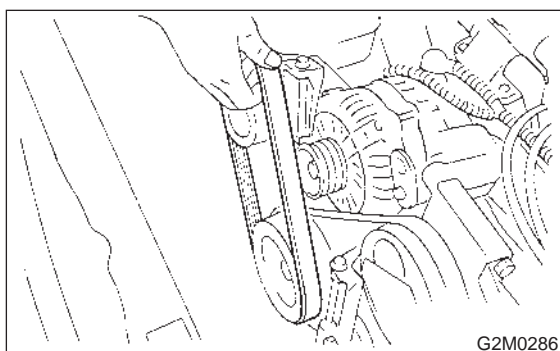
39 ± 10 N·m (4.0 ± 1.0 kg·m, 29 ± 7 ft·lb)



- (2) Install power steering pipe bracket on right side intake manifold, and install spark plug codes.



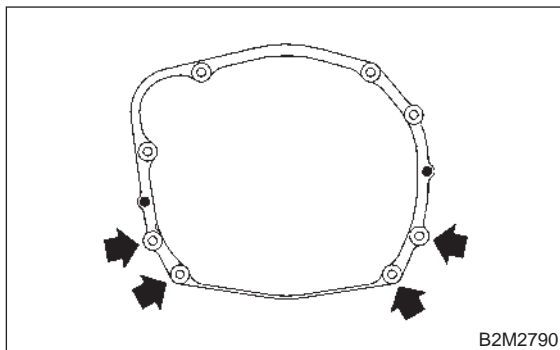
- (3) Install front side V-belt, and adjust it.
<Ref. to 1-5 [G2B0].>



- 8) Tighten nuts which hold lower side of transmission to engine.

Tightening torque:

$50 \pm 4 \text{ N-m}$ ($5.1 \pm 0.4 \text{ kg-m}$, $36.9 \pm 2.9 \text{ ft-lb}$)



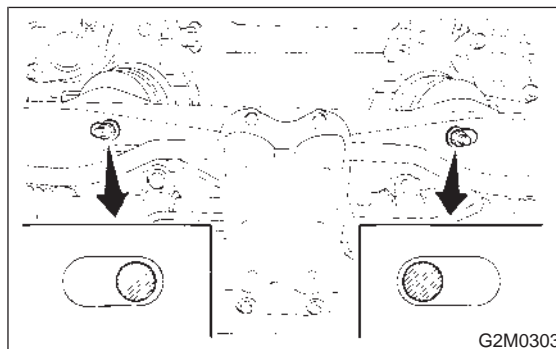
- 9) Tighten nuts which install front cushion rubber onto crossmember.

Tightening torque:

$69 \pm 15 \text{ N-m}$ ($7.0 \pm 1.5 \text{ kg-m}$, $51 \pm 11 \text{ ft-lb}$)

CAUTION:

Be sure to tighten front cushion rubber mounting bolts in the innermost elliptical hole in the front crossmember.



- 10) Install front exhaust pipe and center exhaust pipe. <Ref. to 2-9 [W1B0].>

- 11) Connect rear oxygen sensor connector.

- 12) Connect the following hoses.

- (1) Fuel delivery hose, return hose and evaporation hose
- (2) Heater inlet and outlet hoses
- (3) Brake booster vacuum hose

- 13) Connect the following connectors.

- (1) Engine ground terminal
- (2) Engine harness connectors
- (3) Front oxygen sensor connector
- (4) Alternator connector and terminal
- (5) A/C compressor connectors (With A/C)

- 14) Connect the following cables.

- (1) Accelerator cable
- (2) Clutch cable (2200 cc MT vehicle)
- (3) Clutch release spring (2200 cc MT vehicle)

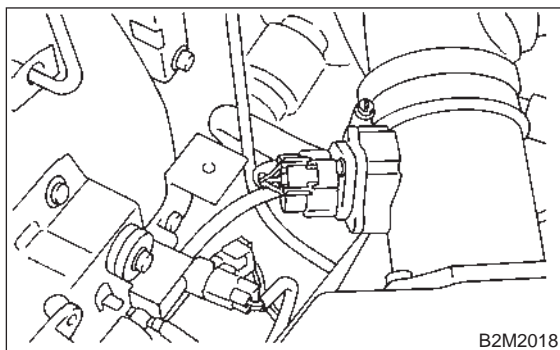
CAUTION:

After connecting each cable, adjust them.

- 15) Install air intake system.

- (1) Install air cleaner element.
- (2) Install air intake duct with air cleaner upper cover. (Except 2200 cc California spec. vehicles) <Ref. to 2-7 [W1A0].> and <Ref. to 2-7 [W18A0].>
- (3) Install air intake chamber.

- (4) Connect connector to mass air flow sensor.

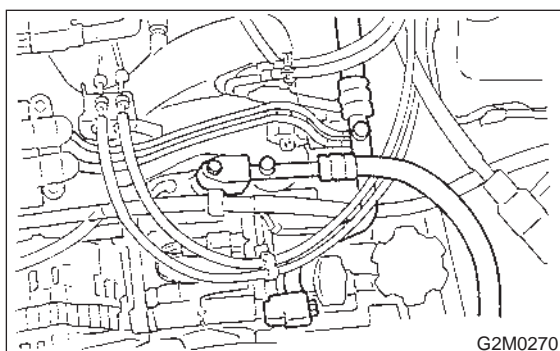


- (5) Install air intake duct with air cleaner case. (2200 cc California spec. vehicles) <Ref. to 2-7 [W1A0].>

- 16) Install A/C flexible hoses. (With A/C) <Ref. to 4-7 [W16A0].>

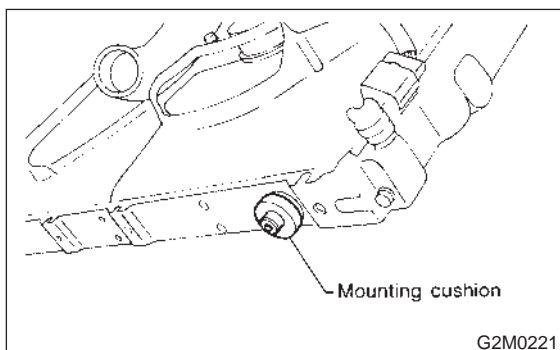
CAUTION:
Use new O-rings.

Tightening torque:
 $25 \pm 7 \text{ N-m}$ ($2.5 \pm 0.7 \text{ kg-m}$, $18.1 \pm 5.1 \text{ ft-lb}$)

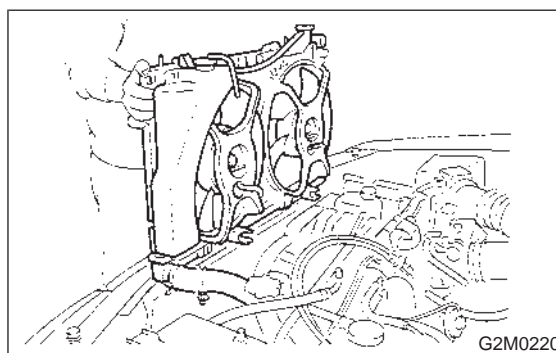


- 17) Install cooling system.

- (1) Attach radiator mounting cushions to pins on lower side of radiator.



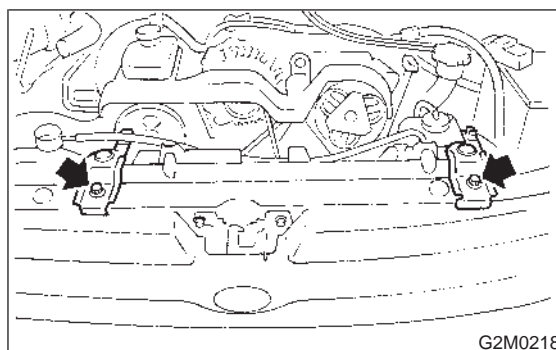
- (2) Fit cushions on lower side of radiator, into holes on body side and install radiator.



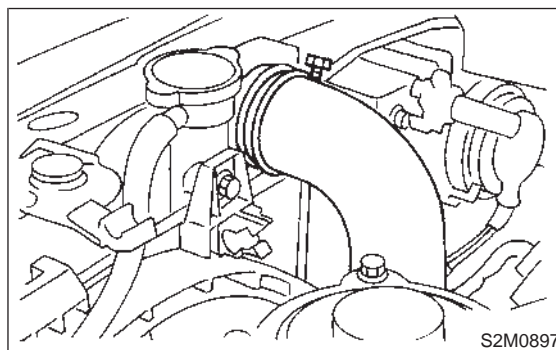
- (3) Install radiator brackets and tighten bolts.

Tightening torque:

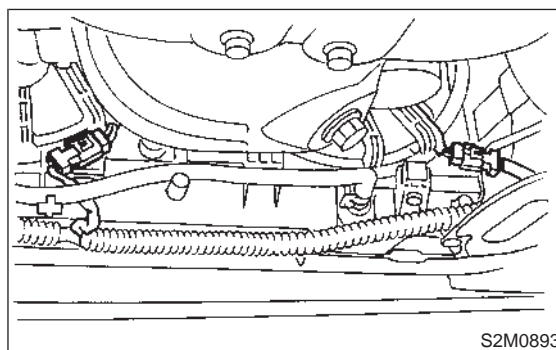
$13.7 \pm 1.5 \text{ N-m}$ ($1.4 \pm 0.15 \text{ kg-m}$, $10.1 \pm 1.1 \text{ ft-lb}$)



- (4) Connect radiator inlet hose.

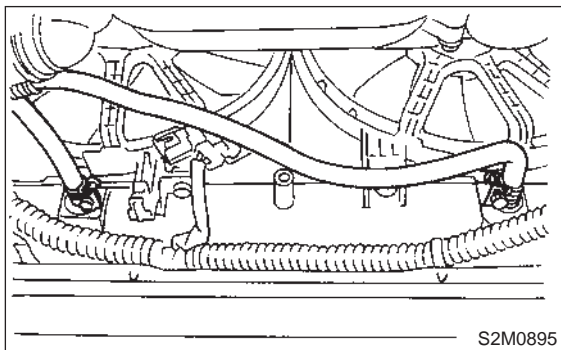


- (5) Connect radiator fan motor connector.

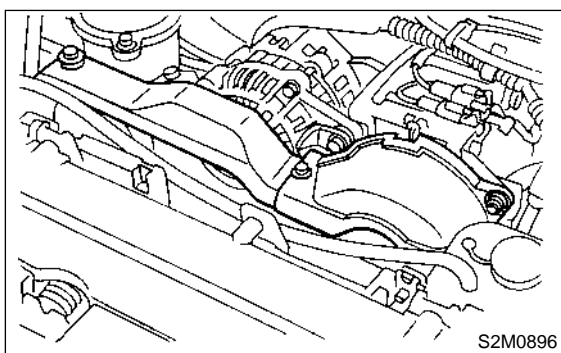


- (6) Connect radiator outlet hose.

- (7) Connect ATF cooler hoses. (AT vehicles)



- (8) Install ATF cooler pipe to cylinder head.
(2200 cc AT vehicle)
(9) Install V-belt cover.



- 18) Install battery in the vehicle, and connect cables.
19) Fill coolant.
<Ref. to 2-5 [W1B0].>

Engine coolant capacity:

5.8 l (6.1 US qt, 5.1 Imp qt)

- 20) Check ATF level and correct if necessary. (AT model)
<Ref. to 3-2 [W1B1].>
21) Charge A/C system with refrigerant.
<Ref. to 4-7 [W700].>
22) Remove front hood stay, and close front hood.
23) Remove the vehicle from lift arms.

2. Transmission

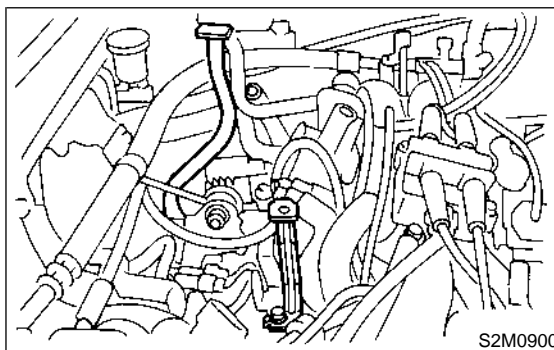
A: GENERAL PRECAUTION

- 1) Remove or install transmission in an area where chain hoists, lifting devices, etc. are available for ready use.
- 2) Be sure not to damage coated surfaces of body panels with tools or stain seats and windows with coolant or oil. Place a cover over fenders, as required, for protection.
- 3) Prior to starting work, prepare the following: Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
- 4) Lift-up or lower the vehicle when necessary. Make sure to support the correct positions. <Ref. to 1-3 [G7B0].>

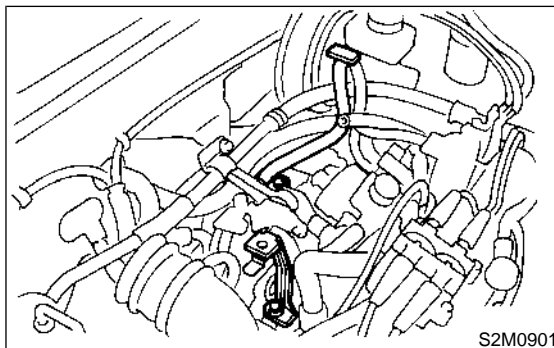
B: REMOVAL

- 1) Open front hood fully, and support with stay.
- 2) Disconnect battery ground terminal.
- 3) Remove air intake duct and chamber. (Except 2200 cc California spec. vehicles) <Ref. to 2-7 [W1A0].> and <Ref. to 2-7 [W18A0].>
- 4) Install air intake duct with air cleaner case. (2200 cc California spec. vehicles) <Ref. to 2-7 [W1A0].>
- 5) Remove chamber stay.

● MT vehicles

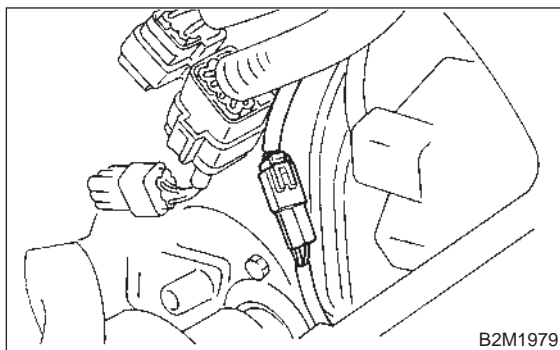


● AT vehicles

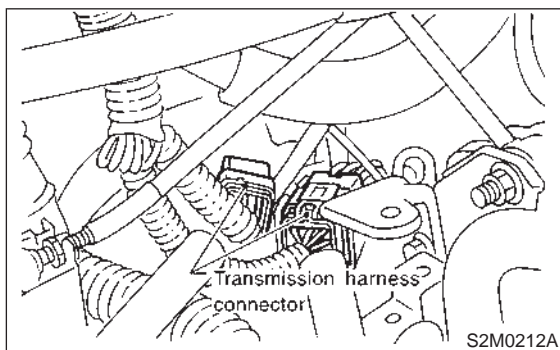


- 6) Disconnect the following connectors.

(1) Front oxygen sensor connector



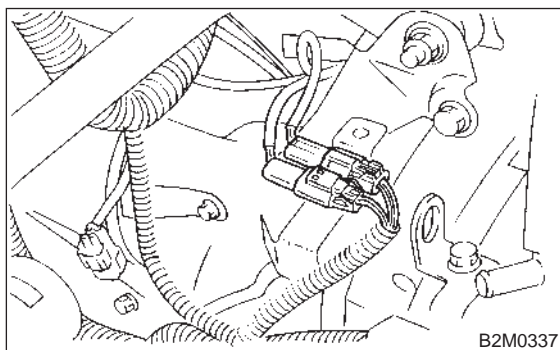
(2) Transmission harness connector (AT vehicles)



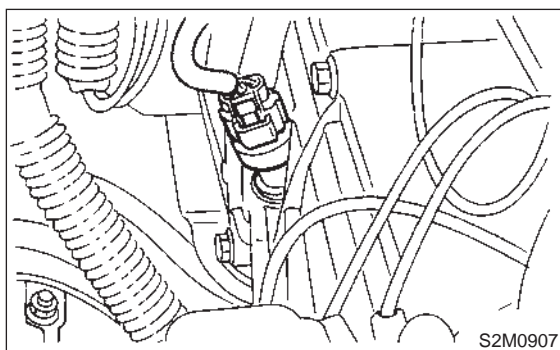
(3) Transmission ground terminal

(4) Neutral position switch connector (MT vehicles)

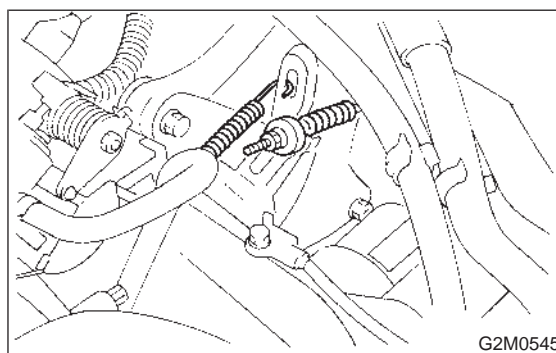
(5) Back-up light switch connector (MT vehicles)



(6) Vehicle speed sensor connector (MT vehicles)



7) Disconnect the following cable. (2200 cc MT vehicle)

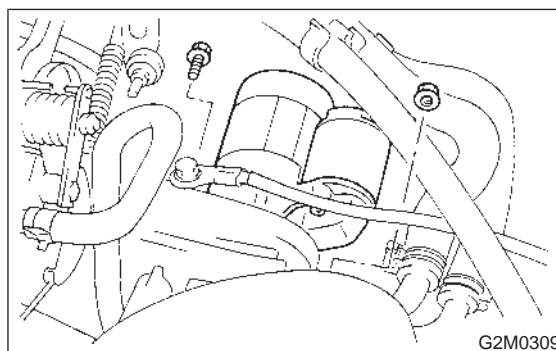


8) Remove starter.

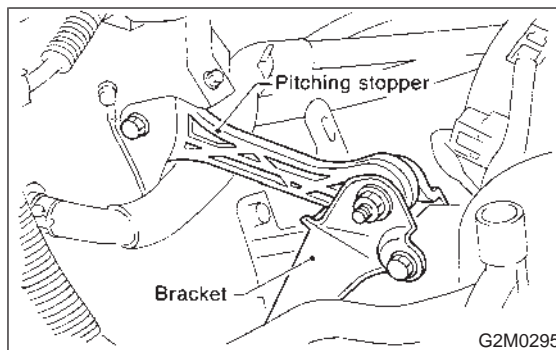
(1) Disconnect connectors and terminal from starter.

(2) Remove bolt which installs upper side of starter.

(3) Remove nut which installs lower side of starter, and remove starter from transmission.



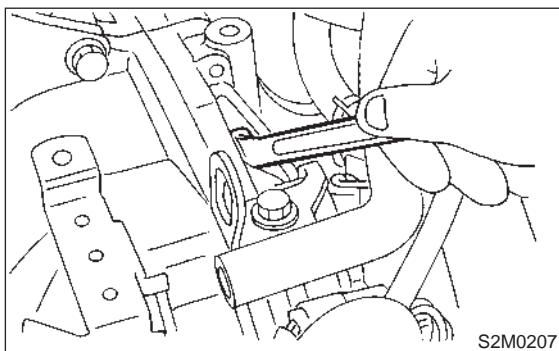
9) Remove pitching stopper.



10) Separate torque converter from drive plate. (AT vehicles)

(1) Remove service hole plug.

- (2) Remove bolts which hold torque converter to drive plate.



- (3) While rotating the engine, remove other bolts using ST.

2200 cc vehicles:

ST 499977300 CRANK PULLEY WRENCH

2500 cc vehicles:

ST 499977100 CRANK PULLEY WRENCH

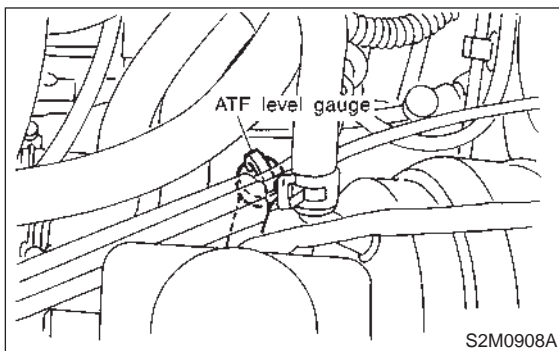
CAUTION:

Be careful not to drop bolts into torque converter housing.

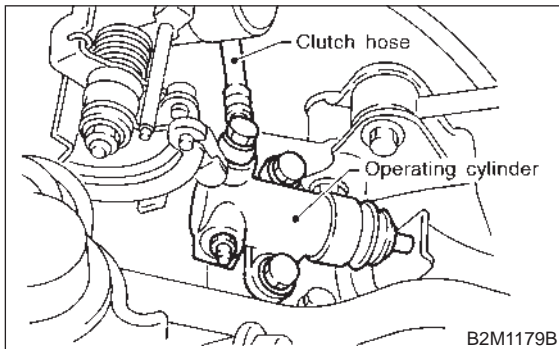
- 11) Remove ATF level gauge. (AT vehicles)

CAUTION:

Plug opening to prevent entry of foreign particles into transmission fluid.



- 12) Remove operating cylinder. (2500 cc MT vehicle)

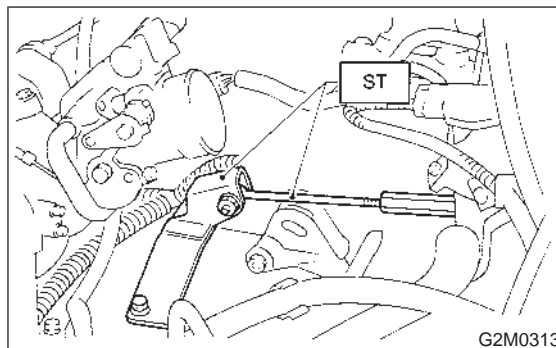


- 13) Set ST.

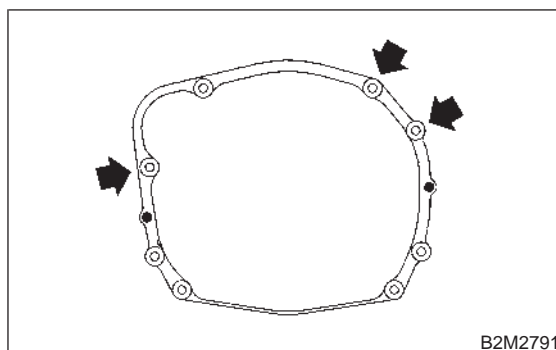
ST 41099AA020 ENGINE SUPPORT ASSY

NOTE:

Also is available Part No. 927670000.



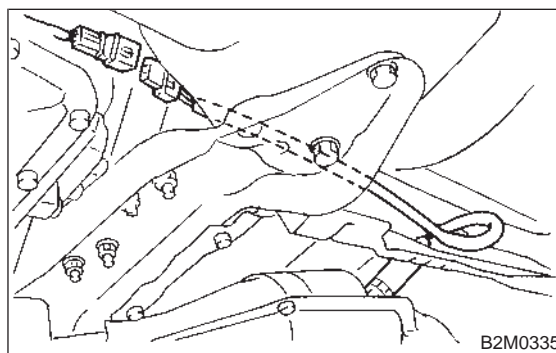
- 14) Remove bolt which holds right upper side of transmission to engine.



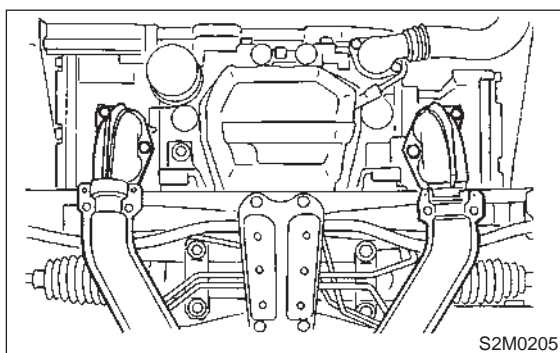
- 15) Remove exhaust system.

(1) Lift-up the vehicle.

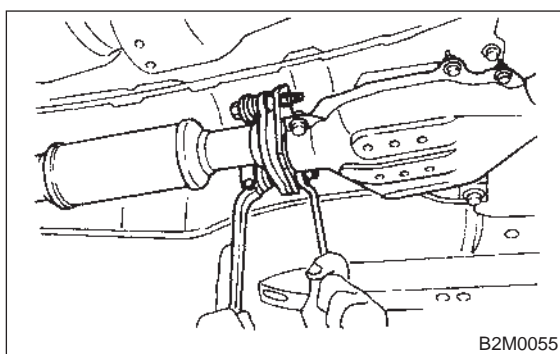
(2) Disconnect connector from rear oxygen sensor.



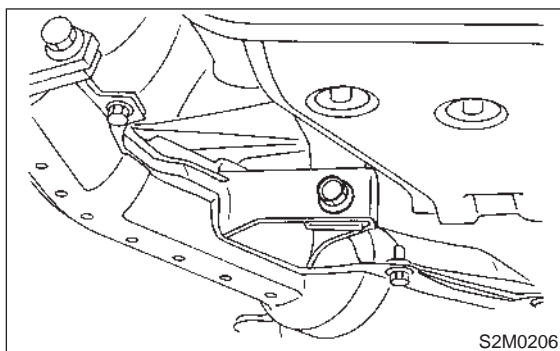
- (3) Remove nuts which install front exhaust pipe onto engine.



- (4) Separate center exhaust pipe from rear exhaust pipe.



- (5) Remove bolt which installs center exhaust pipe to hanger bracket.

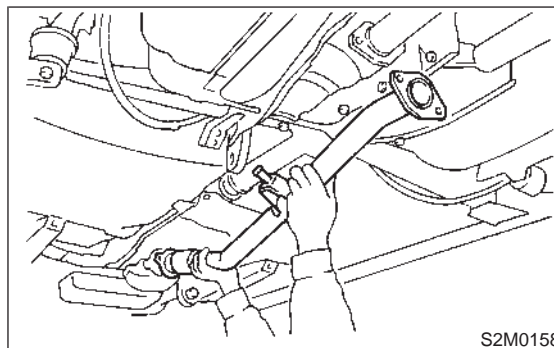


- (6) Take off front and center exhaust pipes.

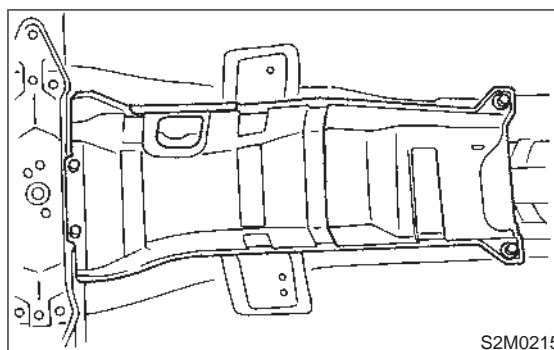
- (7) Remove rear exhaust pipe.

CAUTION:

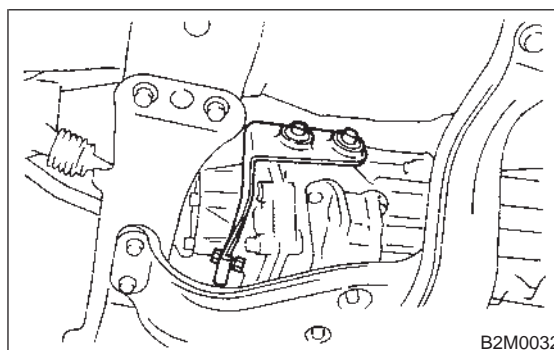
When removing exhaust pipes, be careful each exhaust pipe does not drop out.



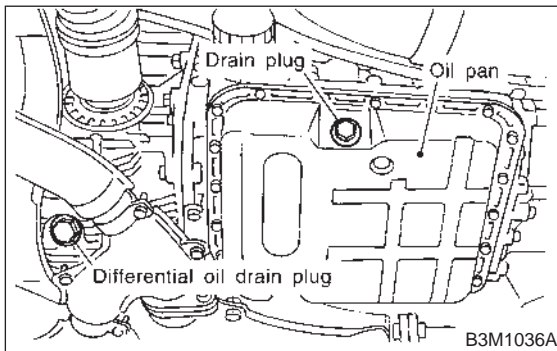
- (8) Remove heat shield cover of rear exhaust pipe.



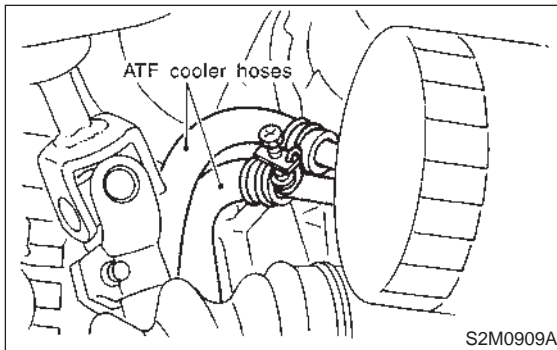
- (9) Remove hanger bracket from right side of transmission.



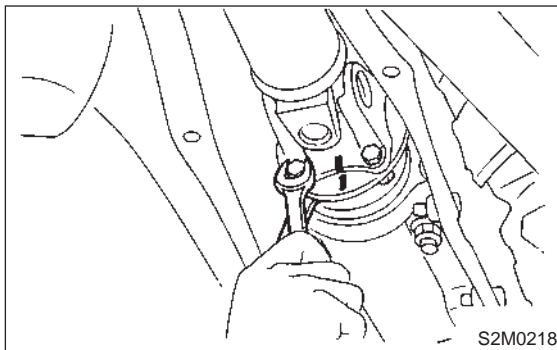
- 16) Drain ATF to remove ATF drain plug. (AT vehicles)



- 17) Disconnect ATF cooler hoses from pipes of transmission side, and remove ATF level gauge guide. (AT vehicles)

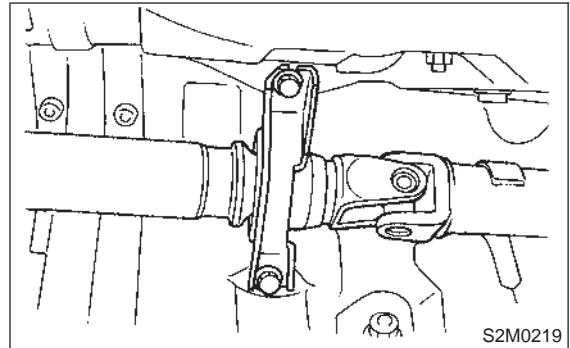


- 18) Remove propeller shaft.
(1) Remove front cover of rear differential mount.
(2) Separate propeller shaft from rear differential.



- (3) Remove bolts which hold center bearing onto body.

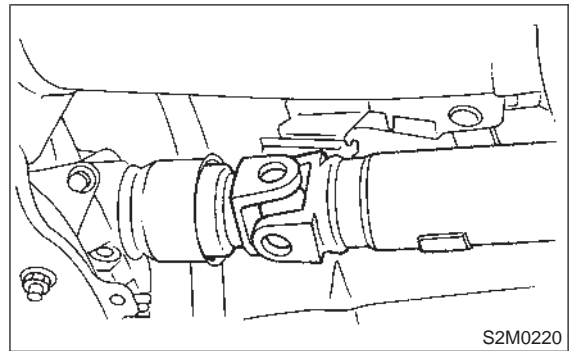
CAUTION:
Be careful not to drop propeller shaft.



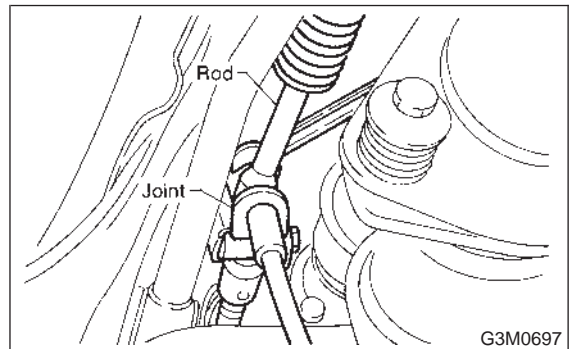
- (4) Remove propeller shaft from transmission.

CAUTION:

- Be sure to use an empty container to catch oil flowing out when removing propeller shaft.
- Be sure not to damage oil seals and the frictional surface of sleeve yoke.
- Be sure to plug the opening in transmission after removal of propeller shaft.

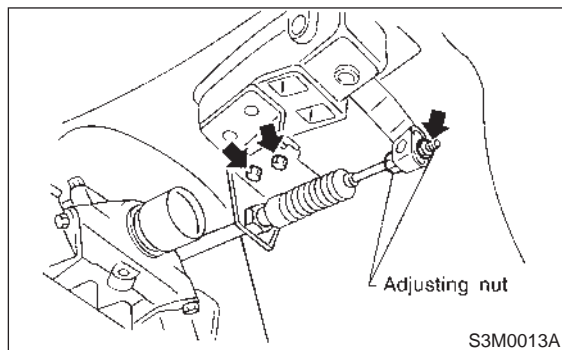


- 19) Remove gear shift rod and stay from transmission. (MT vehicles)
(1) Remove spring.
(2) Disconnect stay from transmission.
(3) Disconnect rod from transmission.

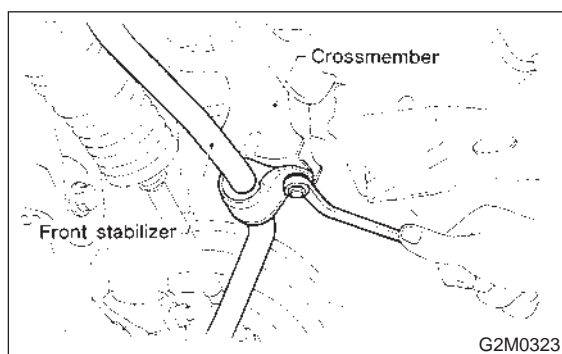


- 20) Remove shift selector cable. (AT vehicles)
(1) Disconnect shift selector cable from selector lever.

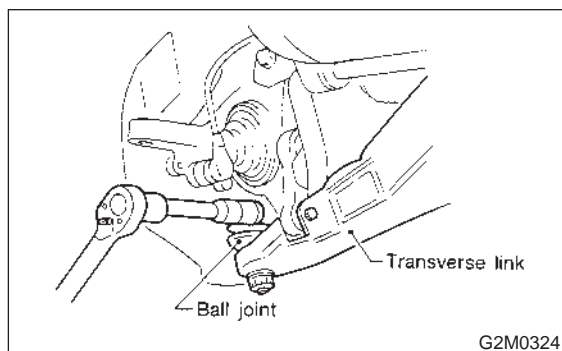
- (2) Remove cable bracket from body.



- 21) Remove bolts which install stabilizer clamps onto crossmember.



- 22) Remove front drive shafts from transmission.
(1) Remove transverse link from housing.

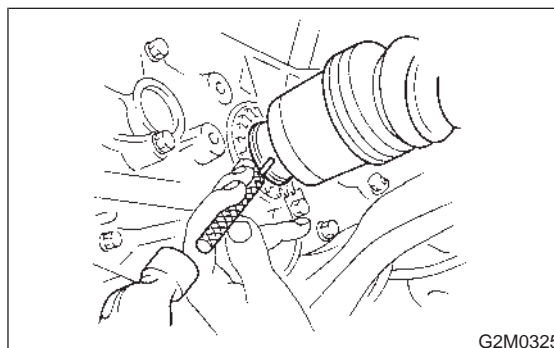


- (2) Lower transverse link.

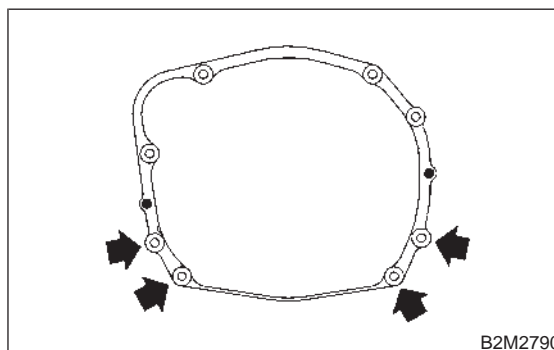
- (3) Remove spring pins and separate front drive shafts from each side of the transmission.

CAUTION:

Discard removing spring pin. Replace with a new one.



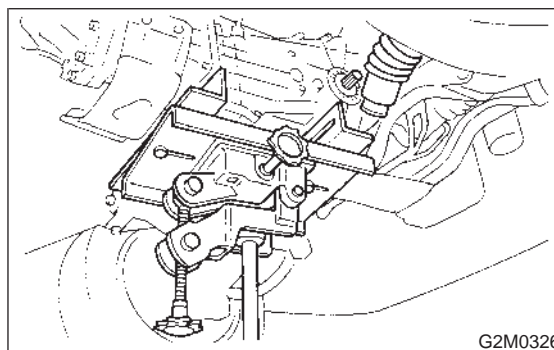
- 23) Remove nuts which hold lower side of transmission to engine.



- 24) Place transmission jack under transmission.

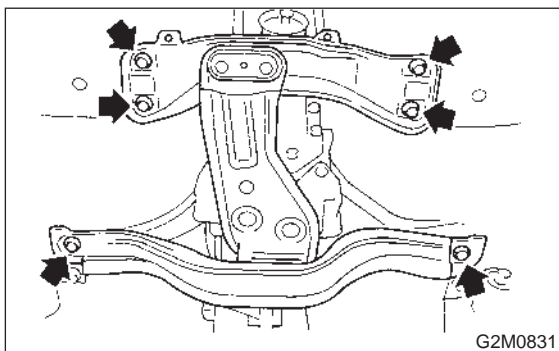
CAUTION:

- Always support transmission case with a transmission jack.
- On AT vehicles, make sure that the support plates of transmission jack don't touch the oil pan.

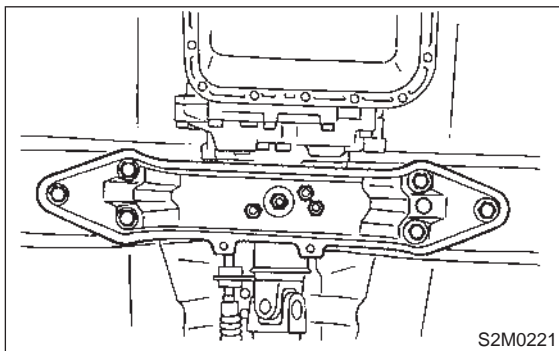


25) Remove transmission rear crossmember.

● MT vehicles



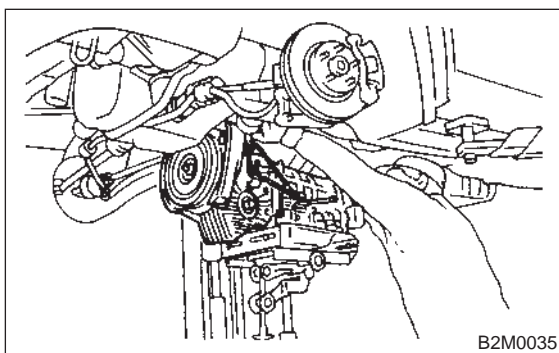
● AT vehicles



26) Remove transmission.

CAUTION:

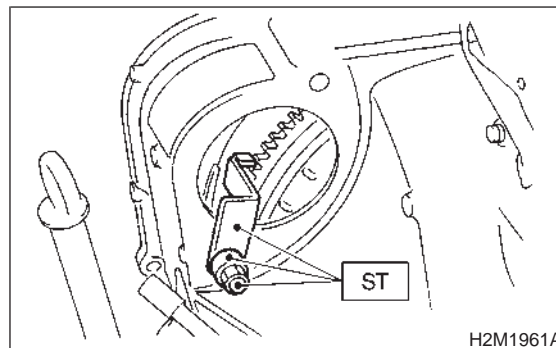
- Move transmission jack toward rear until mainshaft is withdrawn from clutch cover. (MT vehicles)
- Move transmission and torque converter as a unit away from engine. (AT vehicles)



C: INSTALLATION

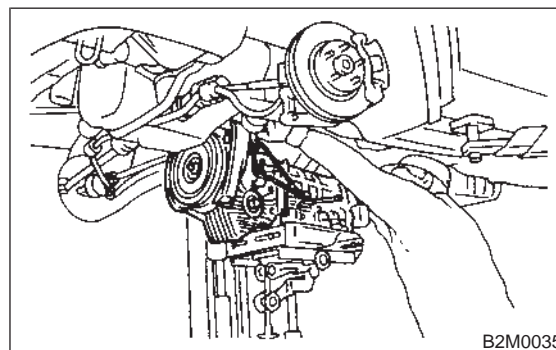
1) Install ST to torque converter clutch case. (AT vehicles)

ST 498277200 STOPPER SET



2) Install transmission to engine.

(1) Gradually raise transmission with transmission jack.



(2) Engage them at splines.

CAUTION:

Be careful not to strike main shaft against clutch cover. (MT vehicles)

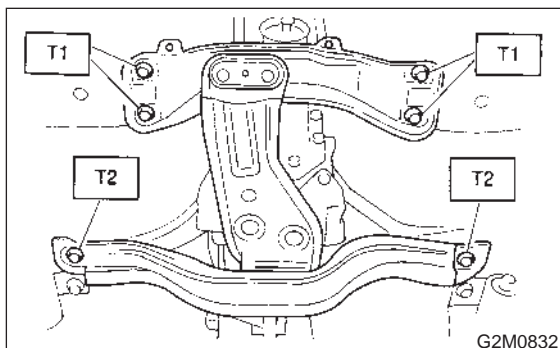
3) Install transmission rear crossmember.

● MT vehicles

Tightening torque:

T1: 69 ± 15 N·m (7.0 ± 1.5 kg-m, 51 ± 11 ft-lb)

T2: 137 ± 20 N·m (14 ± 2 kg-m, 101 ± 14 ft-lb)

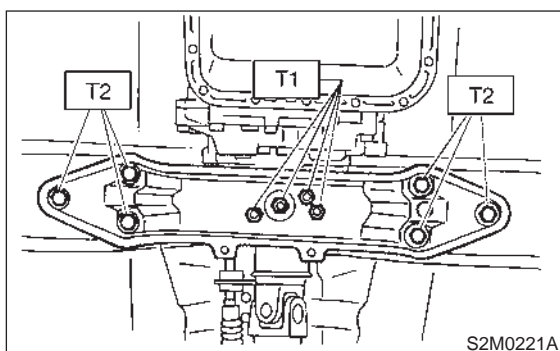


● AT vehicles

Tightening torque:

T1: 37 ± 10 N·m (3.8 ± 1.0 kg-m, 27 ± 7 ft-lb)

T2: 69 ± 15 N·m (7.0 ± 1.5 kg-m, 51 ± 11 ft-lb)

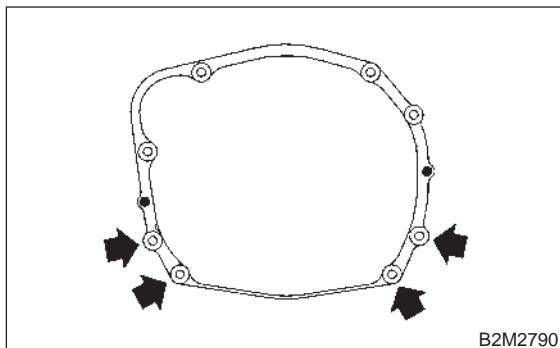


4) Take off transmission jack.

5) Tighten nuts which hold lower side of transmission to engine.

Tightening torque:

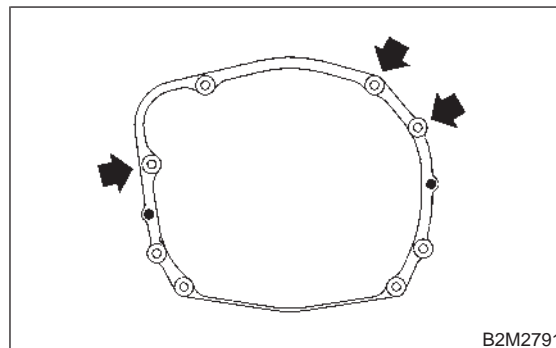
50 ± 4 N·m (5.1 ± 0.4 kg-m, 36.9 ± 2.9 ft-lb)



6) Tighten bolt which holds right upper side of transmission to engine.

Tightening torque:

50 ± 4 N·m (5.1 ± 0.4 kg-m, 36.9 ± 2.9 ft-lb)



7) Install torque converter to drive plate. (AT vehicles)

(1) Tighten bolts which hold torque converter to drive plate.

(2) Tighten other bolts while rotating the engine by using ST.

2200 cc vehicles:

ST 499977300 CRANK PULLEY WRENCH

2500 cc vehicles:

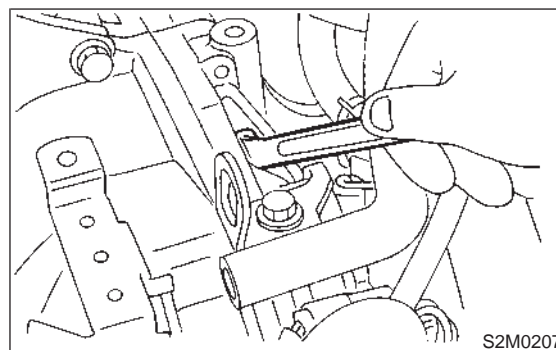
ST 499977100 CRANK PULLEY WRENCH

CAUTION:

Be careful not to drop bolts into torque converter housing.

Tightening torque:

25 ± 2 N·m (2.5 ± 0.2 kg-m, 18.1 ± 1.4 ft-lb)

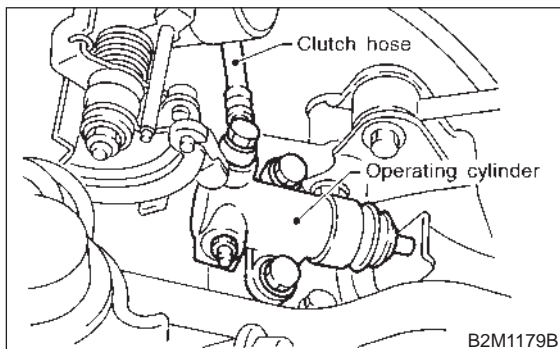


(3) Clog plug onto service hole.

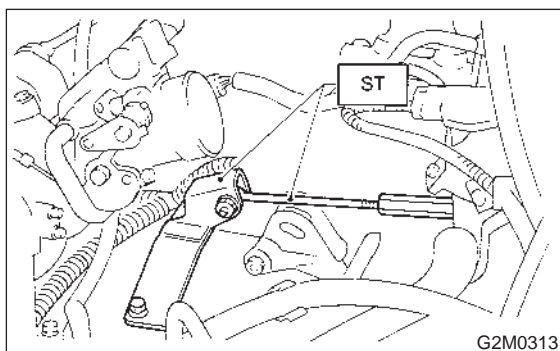
- 8) Install operating cylinder. (2500 cc MT vehicle)

Tightening torque:

37 ± 3 N-m (3.8 ± 0.3 kg-m, 27.5 ± 2.2 ft-lb)



- 9) Remove special tools.

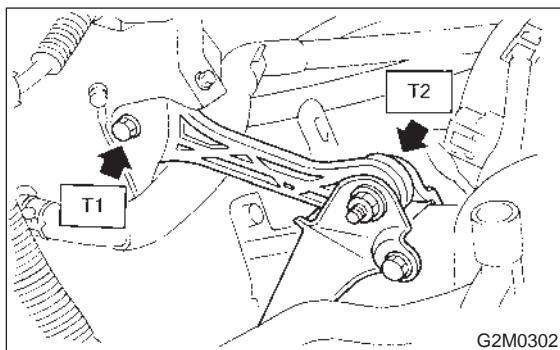


- 10) Install pitching stopper.

Tightening torque:

T1: 57 ± 10 N-m (5.8 ± 1.0 kg-m, 42 ± 7 ft-lb)

T2: 49 ± 5 N-m (5.0 ± 0.5 kg-m, 36.2 ± 3.6 ft-lb)

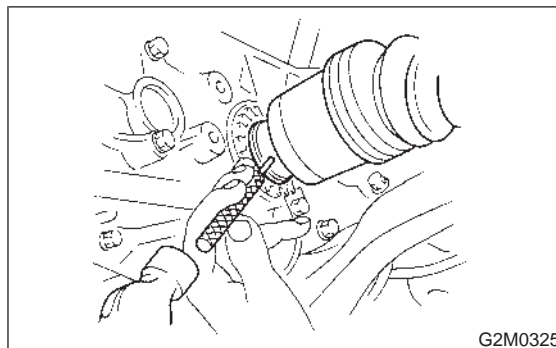


- 11) Install front drive shafts into transmission.

- (1) Lift-up the vehicle.
- (2) Install front drive shaft into transmission.
- (3) Drive spring pin into chamfered hole of drive shaft.

CAUTION:

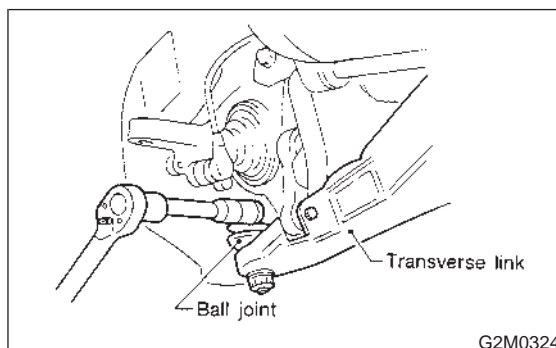
Always use a new spring pin.



- (4) Install ball joints of lower arm into knuckle arm of housing, and tighten installing bolts.

Tightening torque:

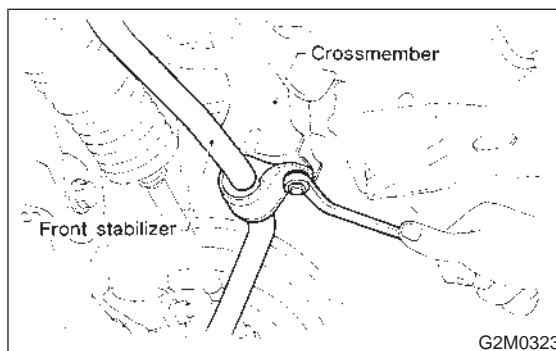
49 ± 10 N-m (5.0 ± 1.0 kg-m, 36 ± 7 ft-lb)



- 12) Install stabilizer clamps onto front crossmember.

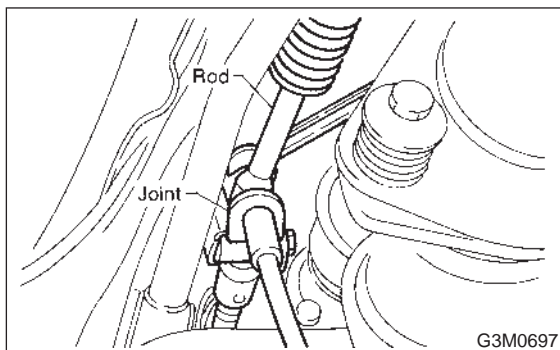
Tightening torque:

25 ± 4 N-m (2.5 ± 0.4 kg-m, 18.1 ± 2.9 ft-lb)



- 13) Install gear shift rod and stay. (MT vehicles)

- (1) Install gear shift rod onto transmission.



- (2) Install stay onto transmission.

- (3) Install spring.

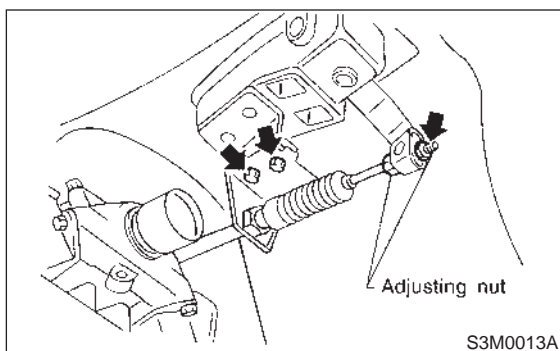
- 14) Install shift selector cable onto selector lever. (AT vehicles)

- (1) Install selector cable into selector lever.

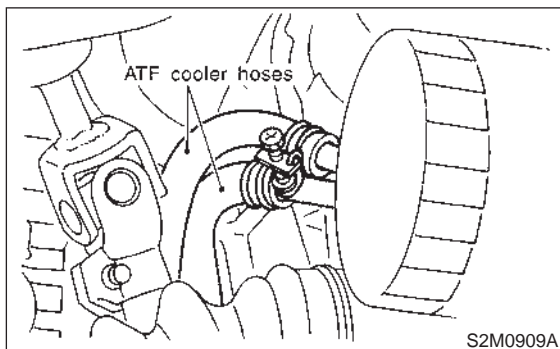
- (2) Install cable bracket onto body.

NOTE:

Tighten selector cable adjusting and lock nut after checking selector lever operation.



- 15) Install ATF level gauge guide, and ATF cooler hoses onto pipe. (AT vehicles)



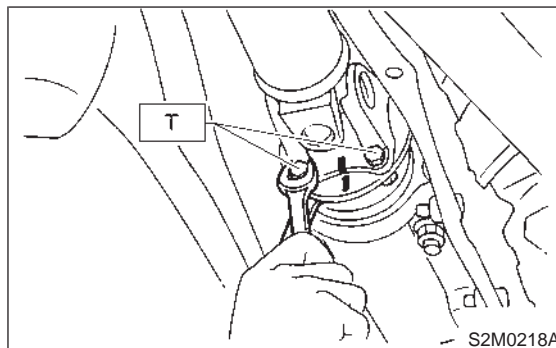
- 16) Install propeller shaft.

- (1) Install propeller shaft into transmission.

- (2) Tighten bolts which install propeller shaft onto companion flange of rear differential.

Tightening torque:

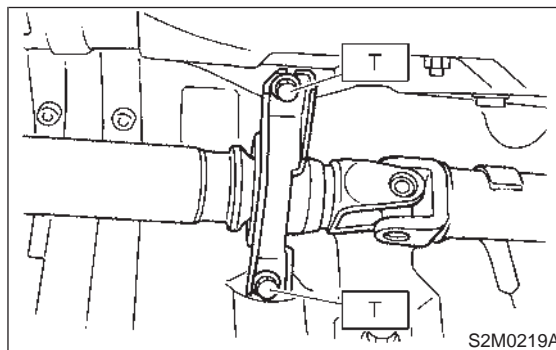
T: 31 ± 8 N·m (3.2 ± 0.8 kg·m, 23.1 ± 5.8 ft·lb)



- (3) Install center bearing bracket on body.

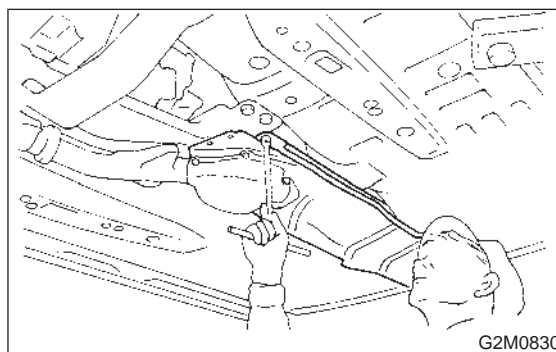
Tightening torque:

T: 52 ± 5 N·m (5.3 ± 0.5 kg·m, 38.3 ± 3.6 ft·lb)



- 17) Install exhaust system.

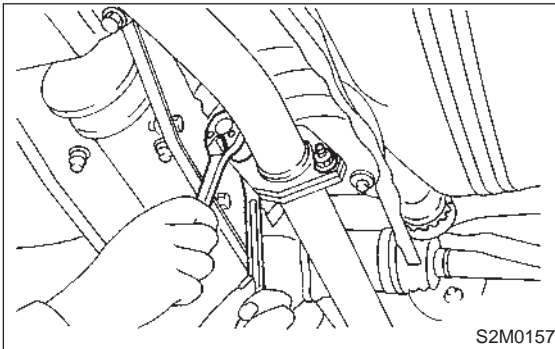
- (1) Install heat shield cover.



- (2) Install rear exhaust pipe to muffler.

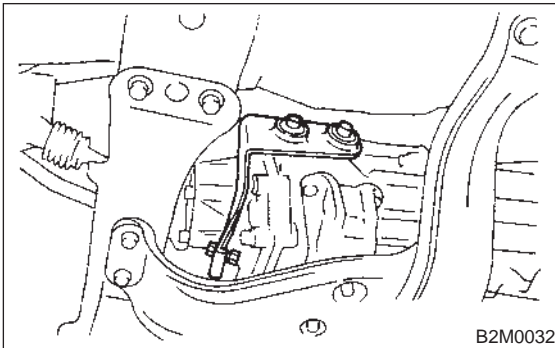
Tightening torque:

48 ± 9 N·m (4.9 ± 0.9 kg-m, 35.4 ± 6.5 ft-lb)



S2M0157

- (3) Install hanger bracket on right side of transmission.

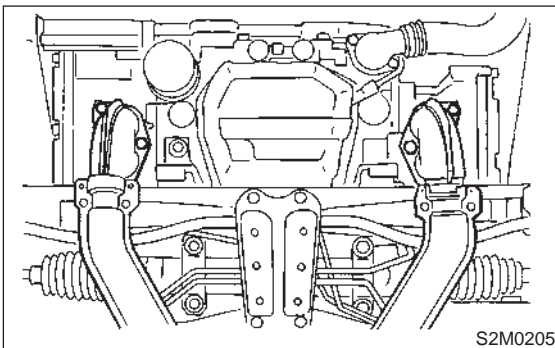


B2M0032

- (4) Install front exhaust pipe onto engine.

Tightening torque:

30 ± 5 N·m (3.1 ± 0.5 kg-m, 22.4 ± 3.6 ft-lb)

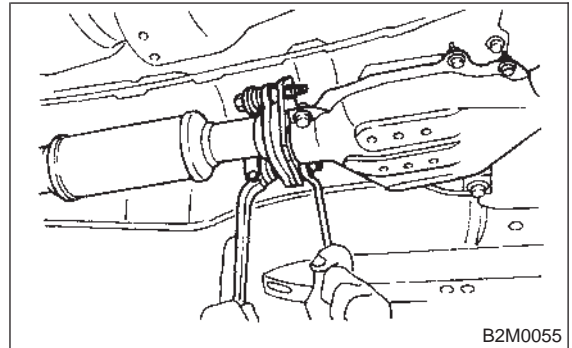


S2M0205

- (5) Install center exhaust pipe to rear exhaust pipe.

Tightening torque:

18 ± 5 N·m (1.8 ± 0.5 kg-m, 13.0 ± 3.6 ft-lb)

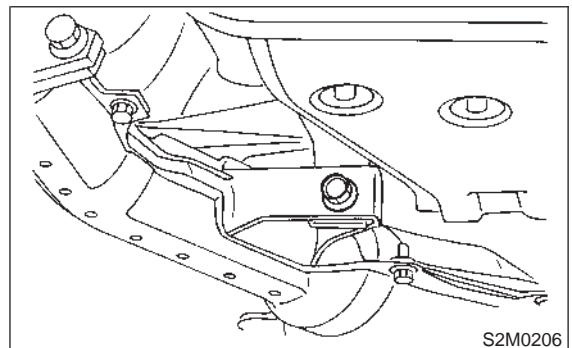


B2M0055

- (6) Tighten bolt which installs center exhaust pipe to hanger bracket.

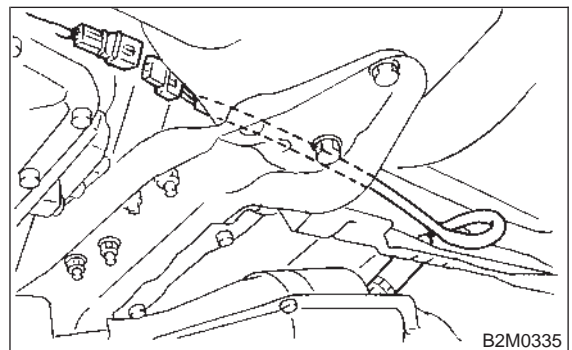
Tightening torque:

30 ± 5 N·m (3.1 ± 0.5 kg-m, 22.4 ± 3.6 ft-lb)



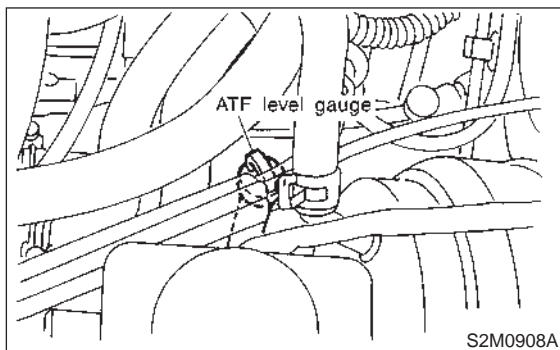
S2M0206

- (7) Connect connector to rear oxygen sensor.



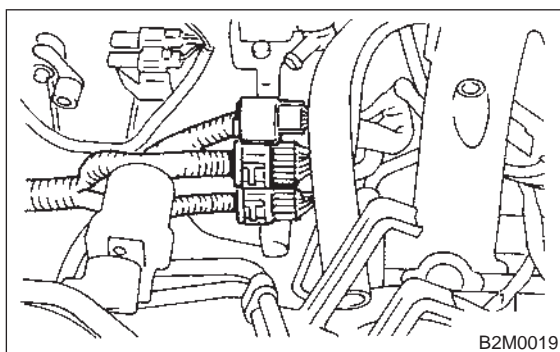
B2M0335

- 18) Install ATF level gauge. (AT vehicles)

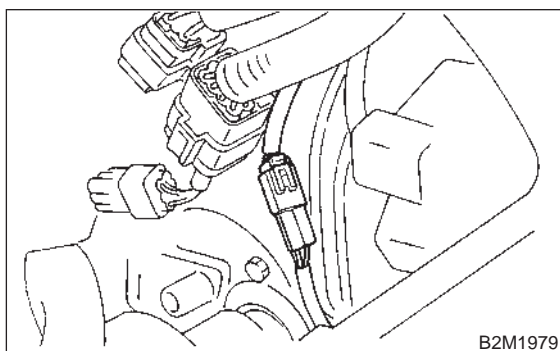


- 19) Connect the following connectors.

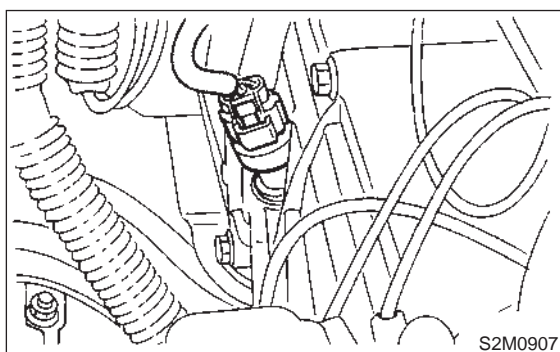
- (1) Transmission harness connectors



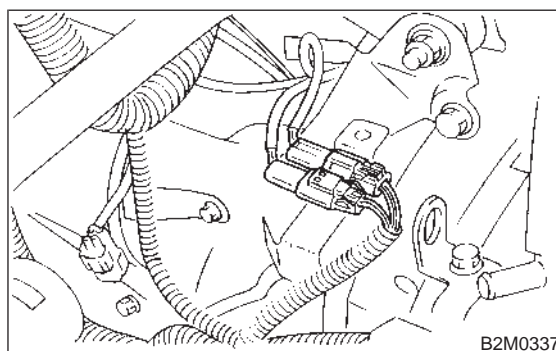
- (2) Transmission ground terminal
(3) Front oxygen sensor connector



- (4) Vehicle speed sensor connector (MT vehicles)



- (5) Neutral position and back-up light switch connector (MT vehicles)

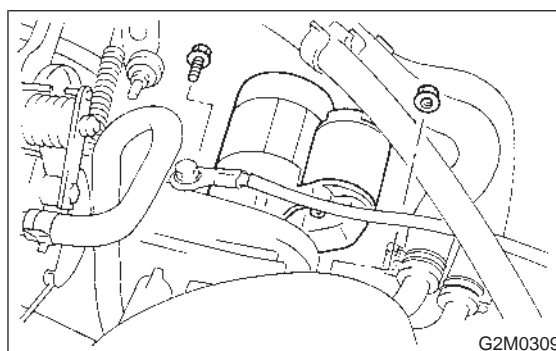


- 20) Install starter.

- (1) Install starter onto transmission case, and connect connectors and terminals.
(2) Tighten bolt and nut which install starter onto transmission.

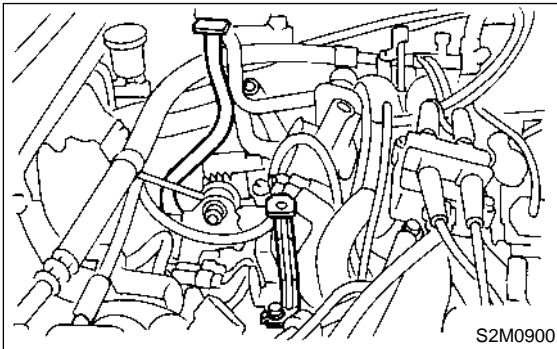
Tightening torque:

50 ± 4 N·m (5.1 ± 0.4 kg-m, 36.9 ± 2.9 ft-lb)

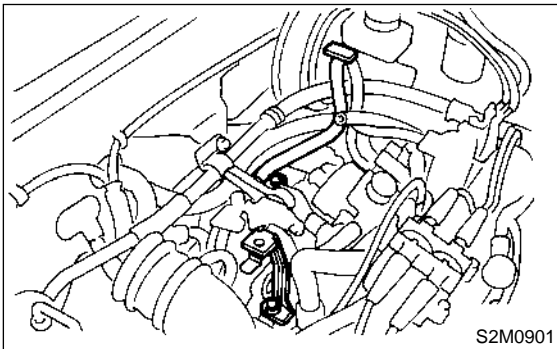


21) Install chamber stay.

● **MT vehicles**



● **AT vehicles**



22) Install air intake duct and chamber. (Except 2200 cc California spec. vehicles) <Ref. to 2-7 [W1A0].> and <Ref. to 2-7 [W18A0].>

23) Install air intake duct with air cleaner case. (2200 cc California spec. vehicles) <Ref. to 2-7 [W1A0].>

24) Connect battery ground cable.

25) Fill ATF and differential gear oil. (AT vehicles) <Ref. to 3-2 [S1A0].>

26) Check selector lever operation. (AT vehicles) <Ref. to 3-2 [T2C0].>

27) Take off vehicle from lift arms.

28) Check the vehicle on road tester. (AT vehicles) <Ref. to 3-2 [W6A0].>

MANUAL TRANSMISSION AND DIFFERENTIAL

3-1

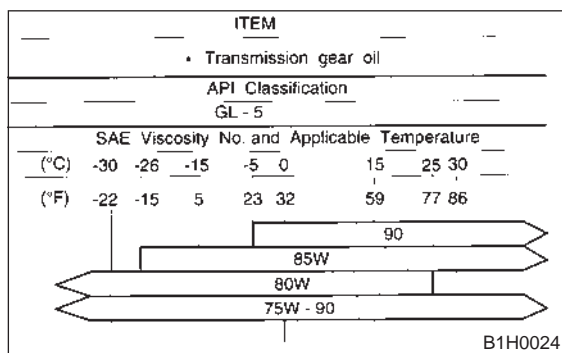
	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Manual Transmission and Differential	2
2. Transmission Gear Oil	2
3. Transmission Case Assembly	2
4. Drive Pinion Assembly	3
5. Reverse Idler Gear	3
6. Shifter Fork and Rod.....	4
7. Transfer Case.....	4
8. Extension Assembly	5
9. Front Differential	5
C COMPONENT PARTS	6
1. Transmission Case.....	6
2. Drive Pinion Assembly	7
3. Main Shaft Assembly.....	9
4. Shifter Fork and Shifter Rod	11
5. Transfer Case and Extension	12
6. Front Differential	13
W SERVICE PROCEDURE	14
1. General.....	14
2. Transmission Case.....	16
3. Drive Pinion Assembly	30
4. Main Shaft Assembly.....	38
5. Transfer Case and Extension	44
6. Front Differential	51
7. Center Differential	54
K DIAGNOSTICS	55
1. Manual Transmission	55
2. Differential	55

1. Manual Transmission and Differential

Item		Model	
		AWD	
		2200 cc	2500 cc
Type		5-forward speeds with synchromesh and 1-reverse	
Transmission gear ratio	1st	3.545	
	2nd	2.111	
	3rd	1.448	
	4th	1.088	
	5th	0.780	
	Reverse	3.333	
Front reduction gear	Final	Type of gear	Hypoid
		Gear ratio	3.900 4.111
Rear reduction gear	Transfer	Type of gear	Helical
		Gear ratio	1.000
	Final	Type of gear	Hypoid
		Gear ratio	3.900 4.111
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)
Center differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)
Transmission gear oil		GL-5	
Transmission oil capacity		3.5 ℓ (3.7 US qt, 3.1 Imp qt)	

2. Transmission Gear Oil

Recommended oil



3. Transmission Case Assembly

Drive pinion shim adjustment

Drive pinion shim			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)	32295AA071	0.250 (0.0098)
32295AA041	0.175 (0.0069)	32295AA081	0.275 (0.0108)
32295AA051	0.200 (0.0079)	32295AA091	0.300 (0.0118)
32295AA061	0.225 (0.0089)	32295AA101	0.500 (0.0197)

Hypoid gear backlash

0.13 — 0.18 mm (0.0051 — 0.0071 in)

Selection of main shaft rear plate

Main shaft rear plate		
Dimension "A" mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

4. Drive Pinion Assembly

Preload adjustment of thrust bearing

Starting torque

0.3 — 0.8 N·m

(0.03 — 0.08 kg-m, 0.2 — 0.6 ft-lb)

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

Adjusting washer No. 2	
Part No.	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

Assemble a driven shaft and 1st driven gear that are selected for the proper radial clearance adjustment.

Driven shaft		1st driven gear
Part No.	Diameter A mm (in)	Part No.
32229AA150	49.959 — 49.966 (1.9669 — 1.9672)	32231AA730
32229AA140	49.967 — 49.975 (1.9672 — 1.9675)	32231AA720

5. Reverse Idler Gear

Adjustment of reverse idler gear position

Reverse idler gear to transmission case (LH) wall clearance

6.0 — 7.5 mm (0.236 — 0.295 in)

Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to the case wall

After installing a suitable reverse shifter lever, adjust reverse idler gear to transmission case wall clearance to within 0 to 0.5 mm (0 to 0.020 in) using washers.

Washer (20.5 × 26 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803020151	0.4 (0.016)	803020154	1.9 (0.075)
803020152	1.1 (0.043)	803020155	2.3 (0.091)
803020153	1.5 (0.059)		

6. Shifter Fork and Rod

Select suitable shifter forks so that both coupling sleeve and reverse driven gear are positioned in the center of their synchromesh mechanisms.

1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in)
32804AA070	No mark	Standard
32804AA080	3	Approach to 2nd gear by 0.2 mm (0.008 in)

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA071	No mark	Standard
32810AA101	3	Approach to 3rd gear by 0.2 mm (0.008 in)

5th shifter fork		
Part No.	Mark	Remarks
32812AA200	1	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA210	No mark	Standard
32812AA220	3	Become distant from 5th gear by 0.2 mm (0.008 in)

Rod end clearance

A: 1st-2nd — 3rd-4th

0.5 — 1.5 mm (0.020 — 0.059 in)

B: 3rd-4th — 5th

0.6 — 1.4 mm (0.024 — 0.055 in)

7. Transfer Case

Neutral position adjustment

Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA090	X	Neutral position is closer to 1st.
32188AA100	Y	Standard
32188AA110	Z	Neutral position is closer to reverse gear.

Reverse check plate adjustment

Reverse check plate			
Part No.	Mark	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
33189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.

8. Extension Assembly

Thrust washer (52 × 61 × t) to ball bearing side clearance

0.05 — 0.30 mm (0.0020 — 0.0118 in)

Thrust washer (52 × 61 × t)	
Part No.	Thickness mm (in)
803052021	0.50 (0.0197)
803052022	0.75 (0.0295)
803052023	1.00 (0.0394)

Thrust washer to center differential side clearance

0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

9. Front Differential

Bevel gear to pinion backlash

0.13 — 0.18 mm (0.0051 — 0.0071 in)

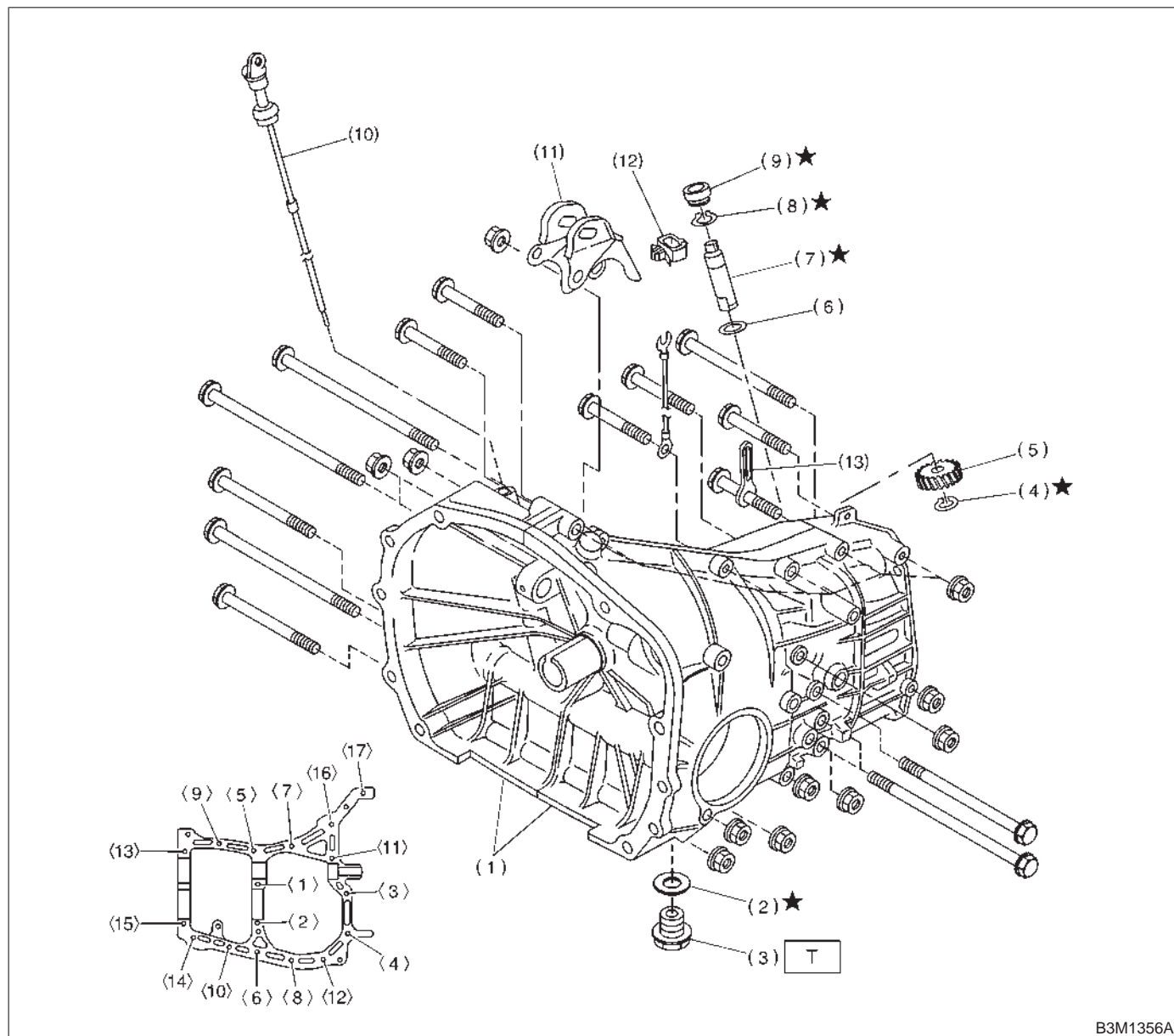
Washer (38.1 × 50 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)	803038023	1.025 — 1.050 (0.0404 — 0.0413)
803038022	0.975 — 1.000 (0.0384 — 0.0394)	—	—

Pinion shaft to axle drive shaft clearance

0 — 0.2 mm (0 — 0.008 in)

Snap ring (Outer-28)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
805028011	1.05 (0.0413)	805028012	1.20 (0.0472)

1. Transmission Case



B3M1356A

- | | |
|-----------------------------|-------------------------------|
| (1) Transmission case ASSY | (7) Speedometer shaft |
| (2) Gasket | (8) Snap ring (Outer) |
| (3) Drain plug | (9) Oil seal |
| (4) Snap ring (Outer) | (10) Oil level gauge |
| (5) Speedometer driven gear | (11) Pitching stopper bracket |
| (6) Washer | (12) Clamp |

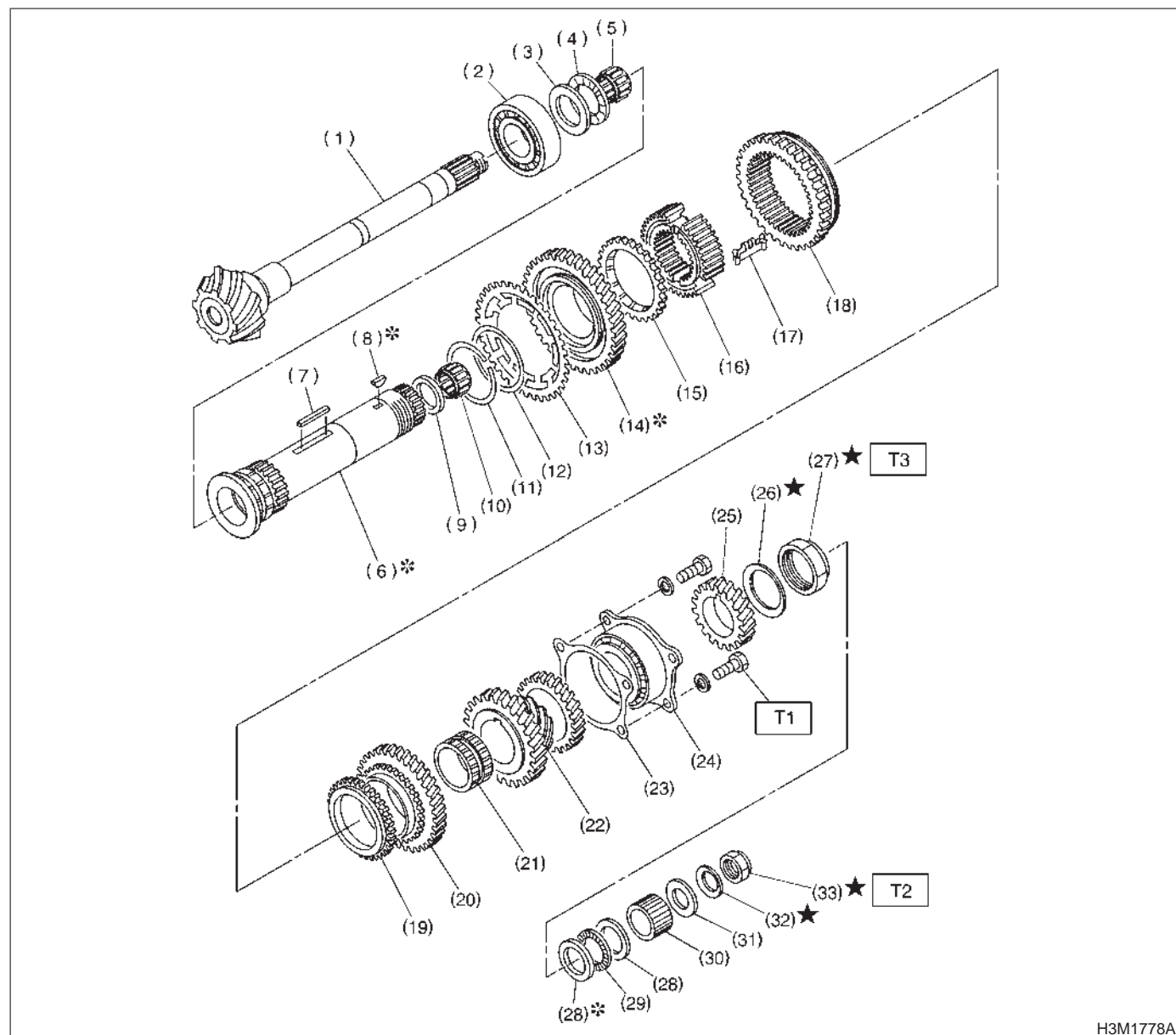
(13) Clip

Tightening torque: N·m (kg·m, ft·lb)
T: 44±3 (4.5±0.3, 32.5±2.2)

Size	All models	Torque
8 mm bolt	<5> — <15>	25±2 N·m (2.5±0.2 kg·m, 18.1±1.4 ft·lb)
10 mm bolt	<1> — <4> <16> — <17>	39±3 N·m (4.0±0.3 kg·m, 28.9±2.2 ft·lb)

2. Drive Pinion Assembly

A: 2200 cc MODEL



H3M1778A

- | | | |
|-------------------------|-------------------------------|-------------------------------------|
| (1) Drive pinion shaft | (14) 1st driven gear | (27) Lock nut |
| (2) Roller bearing | (15) Baulk ring | (28) Washer |
| (3) Washer | (16) 1st-2nd synchronizer hub | (29) Thrust bearing |
| (4) Thrust bearing | (17) Insert key | (30) Differential bevel gear sleeve |
| (5) Needle bearing | (18) Reverse driven gear | (31) Washer |
| (6) Driven shaft | (19) Baulk ring | (32) Lock washer |
| (7) Key | (20) 2nd driven gear | (33) Lock nut |
| (8) Woodruff key | (21) 2nd driven gear bush | |
| (9) Drive pinion collar | (22) 3rd-4th driven gear | |
| (10) Needle bearing | (23) Driven pinion shim | |
| (11) Snap ring (Outer) | (24) Roller bearing | |
| (12) Washer | (25) 5th driven gear | |
| (13) Sub gear | (26) Lock washer | |

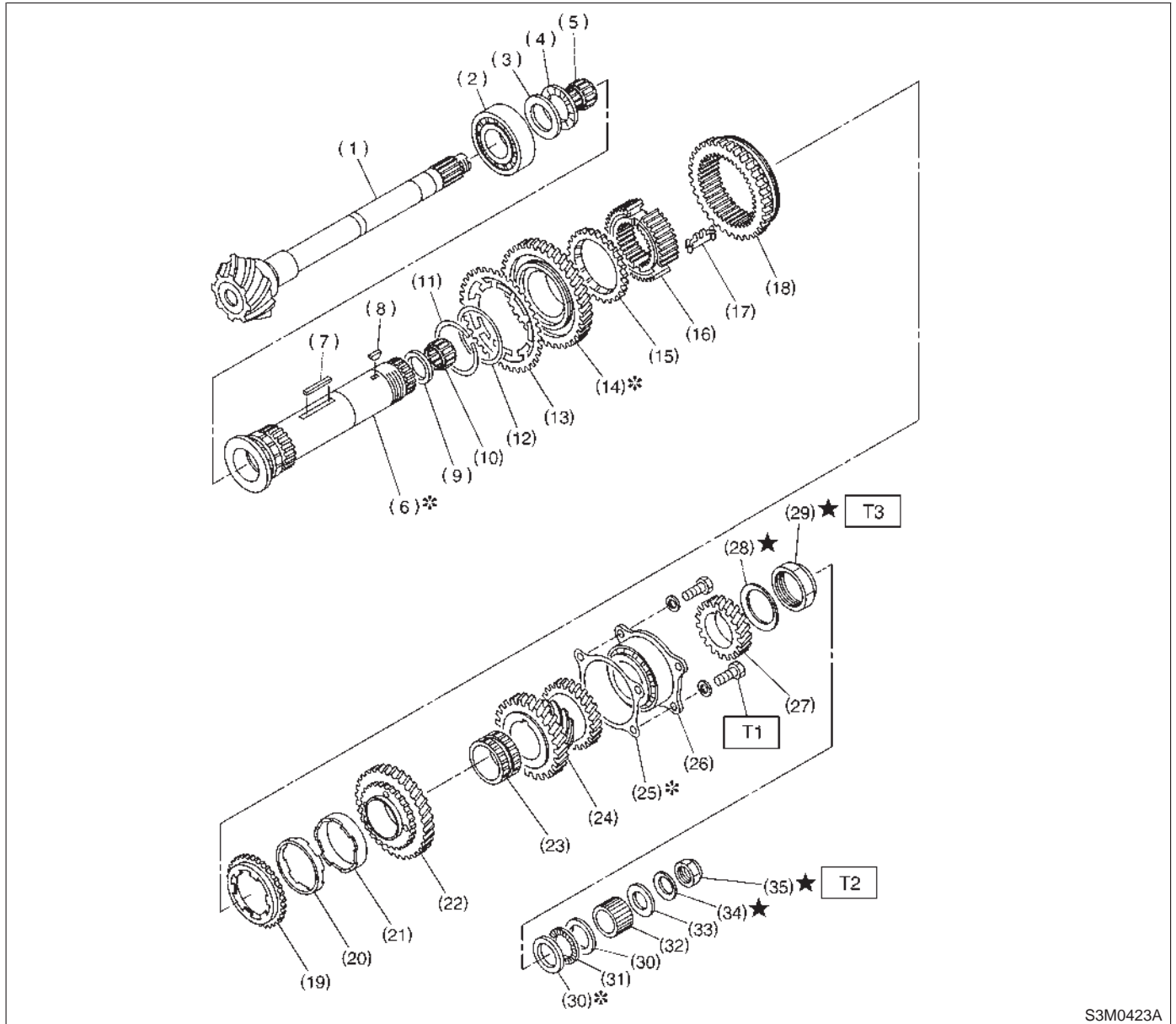
Tightening torque: N-m (kg-m, ft-lb)

T1: 29±3 (3.0±0.3, 21.7±2.2)

T2: 118±8 (12.0±0.8, 86.8±5.8)

T3: 265±10 (27±1, 195±7)

B: 2500 cc MODEL



S3M0423A

(1) Drive pinion shaft	(15) Baulk ring	(29) Lock nut
(2) Roller bearing	(16) 1st-2nd synchronizer hub	(30) Washer
(3) Washer	(17) Insert key	(31) Thrust bearing
(4) Thrust bearing	(18) Reverse driven gear	(32) Differential bevel gear sleeve
(5) Needle bearing	(19) Outer baulk ring	(33) Washer
(6) Driven shaft	(20) Synchro cone	(34) Lock washer
(7) Key	(21) Inner baulk ring	(35) Lock nut
(8) Woodruff key	(22) 2nd driven gear	
(9) Drive pinion collar	(23) 2nd driven gear bush	
(10) Needle bearing	(24) 3rd-4th driven gear	
(11) Snap ring (Outer)	(25) Driven pinion shim	
(12) Washer	(26) Roller bearing	
(13) Sub gear	(27) 5th driven gear	
(14) 1st driven gear	(28) Lock washer	

Tightening torque: N-m (kg-m, ft-lb)

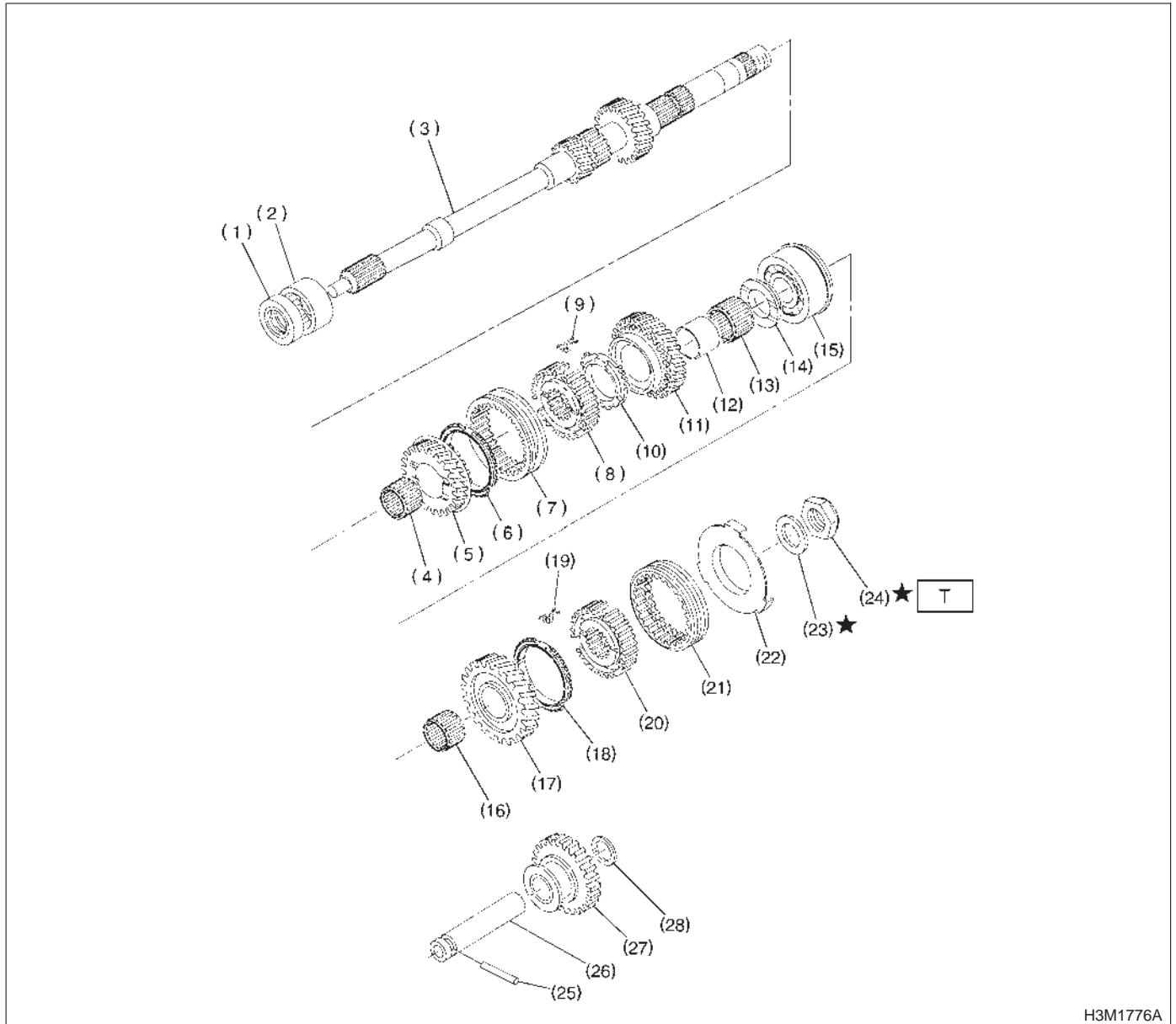
T1: 29±3 (3.0±0.3, 21.7±2.2)

T2: 118±8 (12.0±0.8, 86.8±5.8)

T3: 265±10 (27±1, 195±7)

3. Main Shaft Assembly

A: 2200 cc MODEL

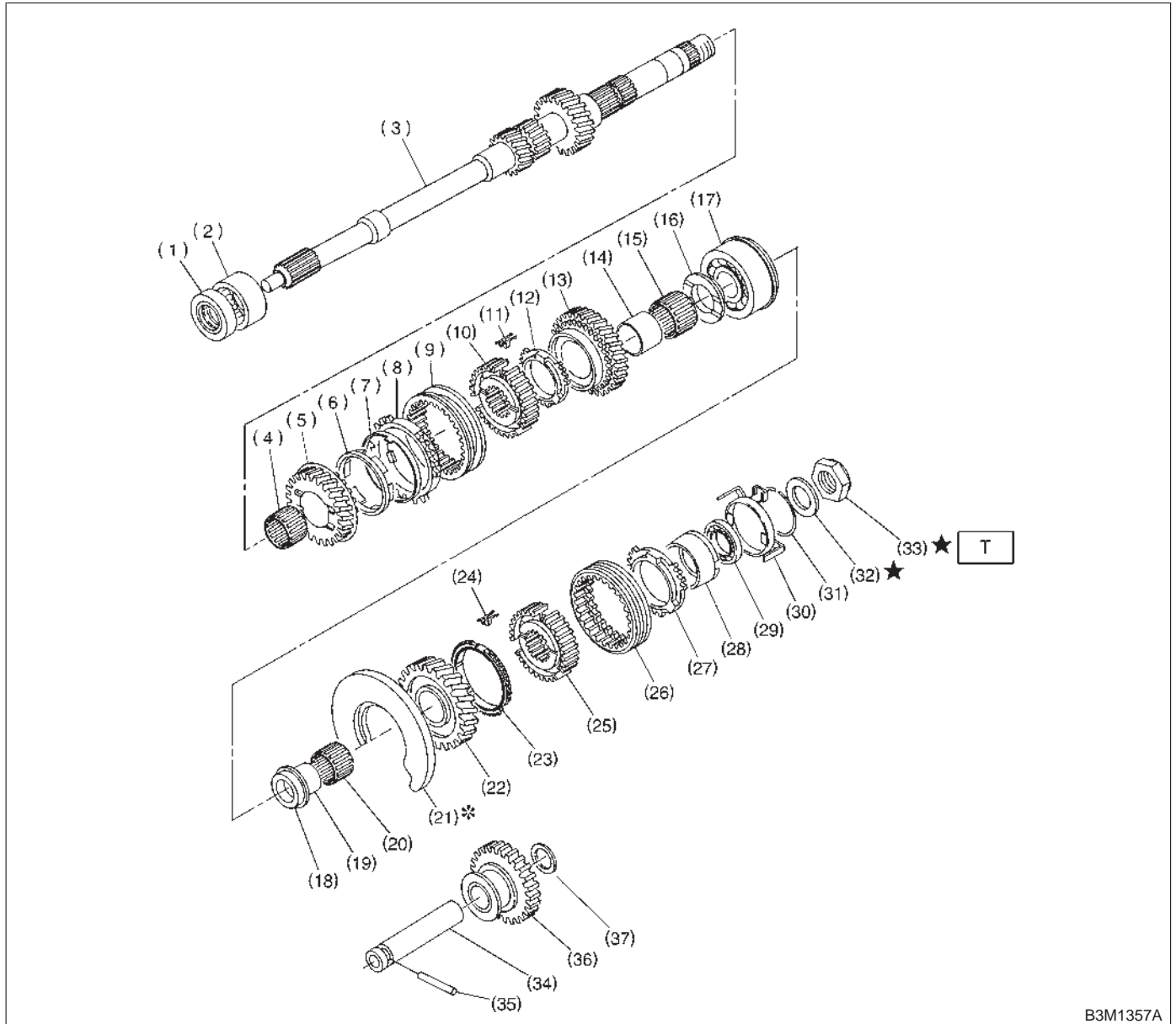


H3M1776A

- | | | |
|-----------------------------------|------------------------------------|-------------------------------|
| (1) Oil seal | (12) 4th needle bearing race | (23) Lock washer |
| (2) Needle bearing | (13) Needle bearing | (24) Lock nut |
| (3) Transmission main shaft | (14) 4th gear thrust washer | (25) Straight pin |
| (4) Needle bearing | (15) Ball bearing | (26) Reverse idler gear shaft |
| (5) 3rd drive gear | (16) Needle bearing | (27) Reverse idler gear |
| (6) Baulk ring | (17) 5th drive gear | (28) Washer |
| (7) Coupling sleeve (3rd-4th) | (18) Baulk ring (5th) | |
| (8) Synchronizer hub (3rd-4th) | (19) Shifting insert key (5th-Rev) | |
| (9) Shifting insert key (3rd-4th) | (20) Synchronizer hub (5th-Rev) | |
| (10) Baulk ring (4th) | (21) Coupling sleeve (5th-Rev) | |
| (11) 4th drive gear | (22) Insert stopper plate | |

Tightening torque: N·m (kg·m, ft·lb)
T: 118±6 (12.0±0.6, 86.8±4.3)

B: 2500 cc MODEL

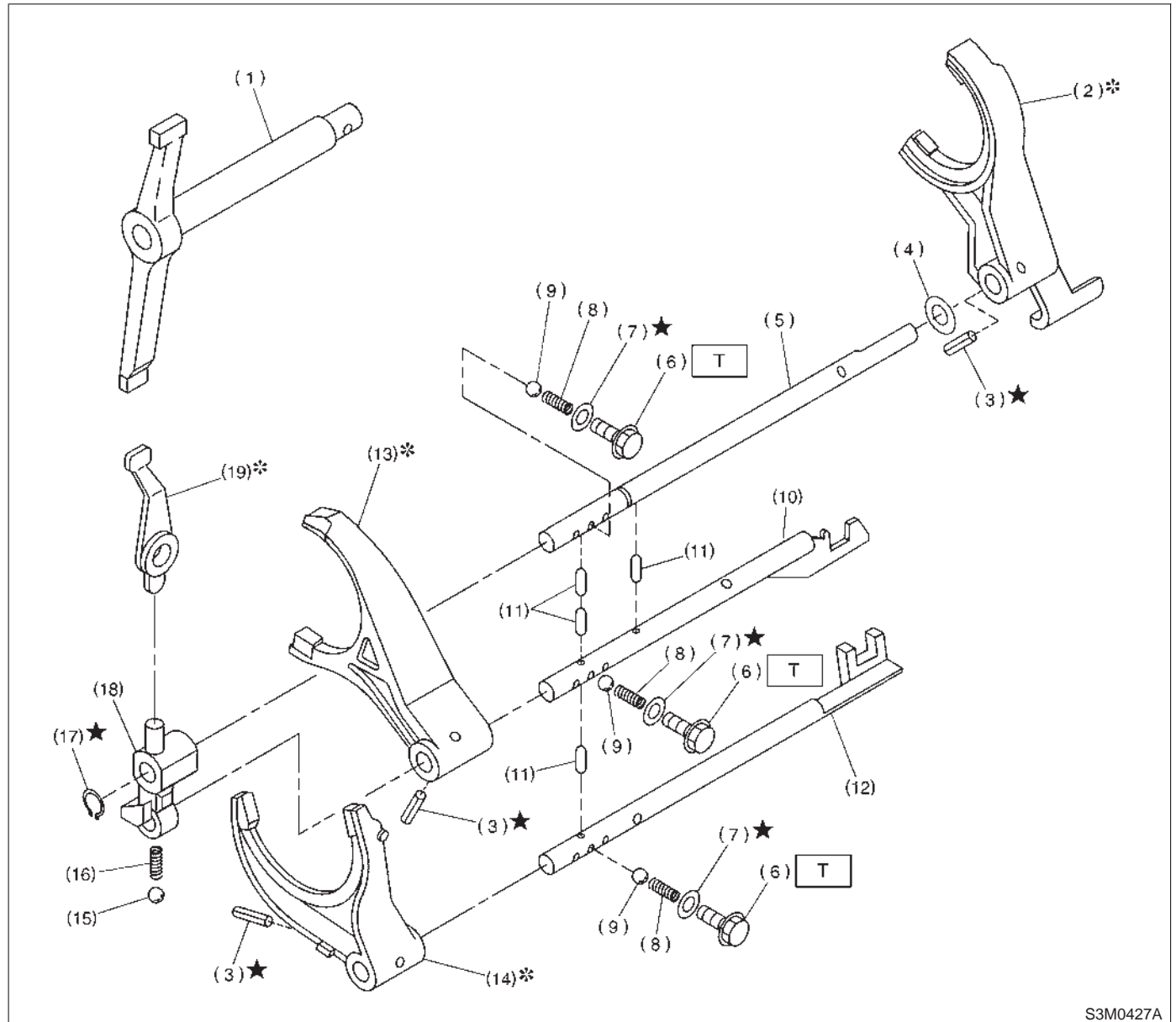


B3M1357A

- | | | |
|------------------------------------|------------------------------------|-------------------------------|
| (1) Oil seal | (15) Needle bearing | (29) Ball bearing |
| (2) Needle bearing | (16) 4th gear thrust washer | (30) Synchro cone stopper |
| (3) Transmission main shaft | (17) Ball bearing | (31) Snap ring |
| (4) Needle bearing | (18) 5th gear thrust washer | (32) Lock washer |
| (5) 3rd drive gear | (19) 5th needle bearing race | (33) Lock nut |
| (6) Inner baulk ring | (20) Needle bearing | (34) Straight pin |
| (7) Synchro cone (3rd) | (21) Main shaft rear plate | (35) Reverse idler gear shaft |
| (8) Outer baulk ring | (22) 5th drive gear | (36) Reverse idler gear |
| (9) Coupling sleeve (3rd-4th) | (23) 5th baulk ring | (37) Washer |
| (10) Synchronizer hub (3rd-4th) | (24) Shifting insert key (5th-Rev) | |
| (11) Shifting insert key (3rd-4th) | (25) Synchronizer hub (5th-Rev) | |
| (12) 4th baulk ring | (26) Coupling sleeve (5th-Rev) | |
| (13) 4th drive gear | (27) Rev baulk ring | |
| (14) 4th needle bearing race | (28) Synchro cone (Rev) | |

Tightening torque: N·m (kg·m, ft·lb)
T: 118±6 (12.0±0.6, 86.8±4.3)

4. Shifter Fork and Shifter Rod



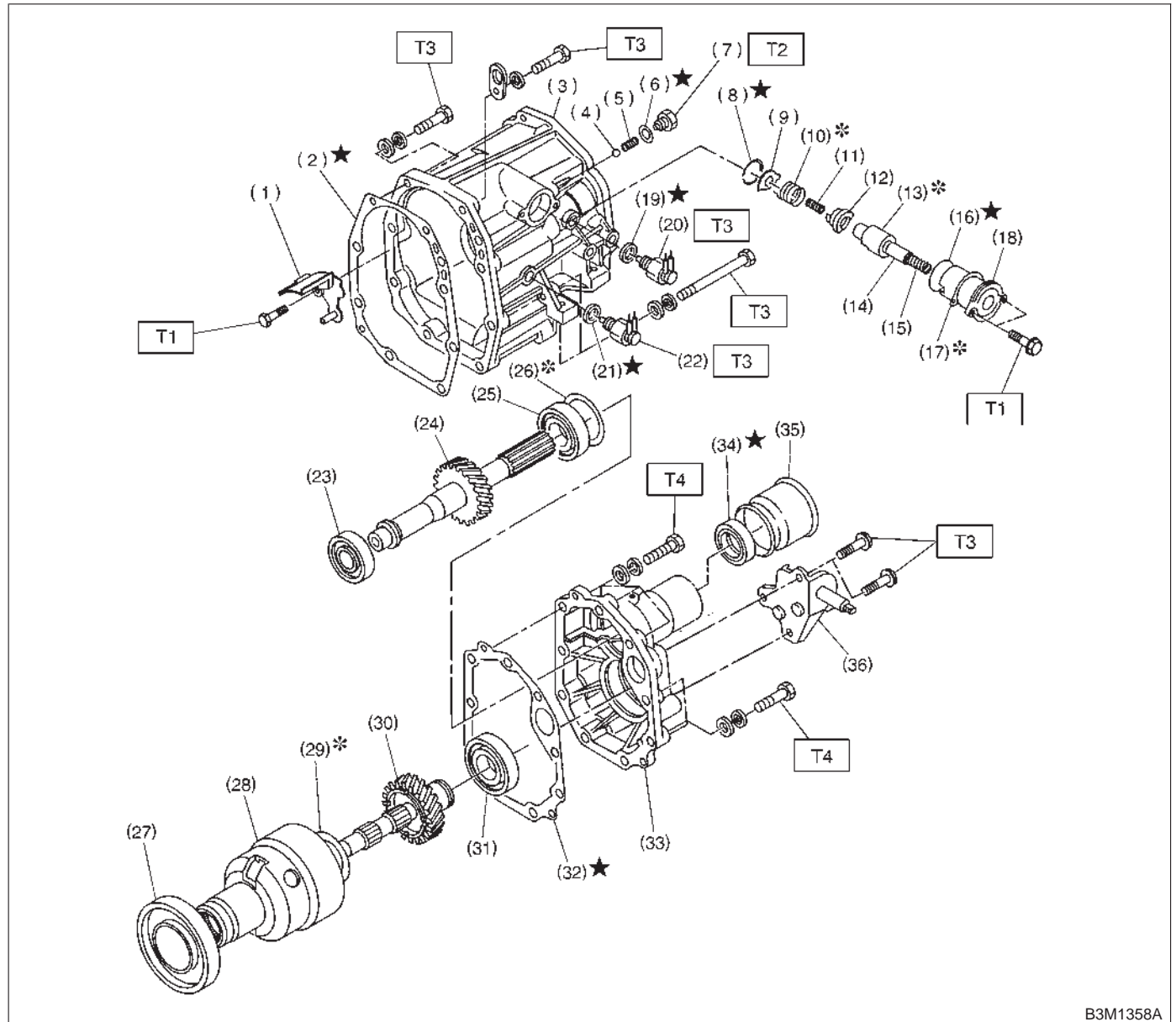
- (1) Shifter arm
- (2) 5th shifter fork
- (3) Straight pin
- (4) Washer
- (5) Reverse fork rod
- (6) Checking ball plug
- (7) Gasket
- (8) Checking ball spring

- (9) Ball
- (10) 3rd-4th fork rod
- (11) Interlock plunger
- (12) 1st-2nd fork rod
- (13) 3rd-4th shifter fork
- (14) 1st-2nd shifter fork
- (15) Ball
- (16) Spring

- (17) Snap ring (Outer)
- (18) Reverse fork rod arm
- (19) Reverse shifter lever

Tightening torque: N-m (kg-m, ft-lb)
T: 19.6±1.5 (2.00±0.15, 14.5±1.1)

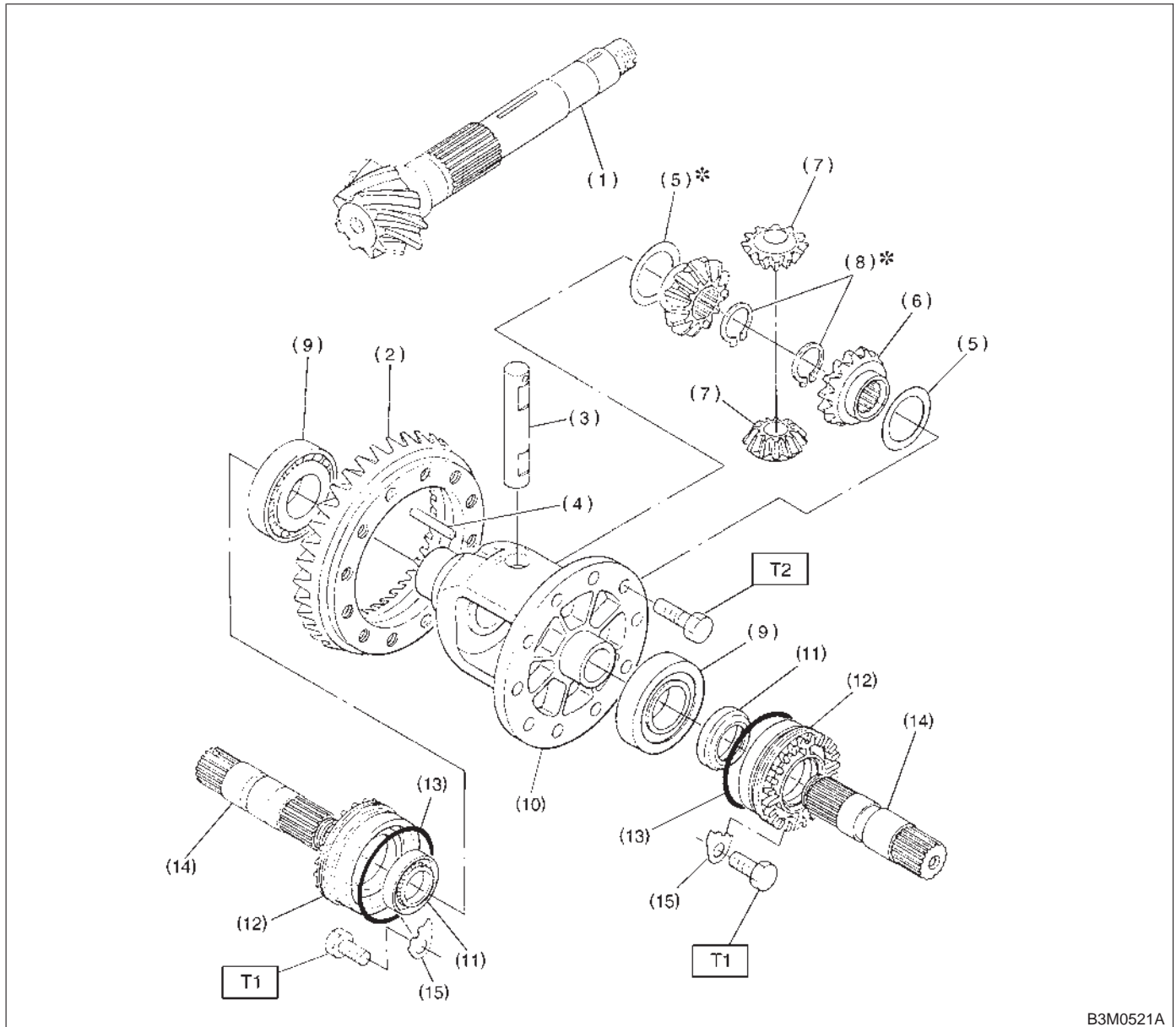
5. Transfer Case and Extension



- | | | |
|----------------------------|----------------------------|--------------------|
| (1) Oil guide | (16) O-ring | (31) Ball bearing |
| (2) Gasket | (17) Adjusting select shim | (32) Gasket |
| (3) Transfer case | (18) Reverse check sleeve | (33) Extension |
| (4) Ball | (19) Gasket | (34) Oil seal |
| (5) Reverse accent spring | (20) Neutral switch | (35) Dust cover |
| (6) Gasket | (21) Gasket | (36) Shift bracket |
| (7) Plug | (22) Back-up light switch | |
| (8) Snap ring (Inner) | (23) Ball bearing | |
| (9) Reverse check plate | (24) Transfer driven gear | |
| (10) Reverse check spring | (25) Ball bearing | |
| (11) Reverse return spring | (26) Adjusting washer | |
| (12) Reverse check cam | (27) Ball bearing | |
| (13) Reverse accent shaft | (28) Center differential | |
| (14) Return spring cap | (29) Adjusting washer | |
| (15) Return spring | (30) Transfer drive gear | |

Tightening torque: N-m (kg-m, ft-lb)**T1: 5 ± 1 (0.5 ± 0.1 , 3.6 ± 0.7)****T2: 10 ± 1 (1.0 ± 0.1 , 7.2 ± 0.7)****T3: 25 ± 2 (2.5 ± 0.2 , 18.1 ± 1.4)****T4: 37 ± 3 (3.8 ± 0.3 , 27.5 ± 2.2)**

6. Front Differential



B3M0521A

- | | |
|-------------------------------|---------------------------------|
| (1) Drive pinion shaft | (8) Snap ring (Outer) |
| (2) Hypoid driven gear | (9) Roller bearing |
| (3) Pinion shaft | (10) Differential case |
| (4) Straight pin | (11) Oil seal |
| (5) Washer | (12) Differential side retainer |
| (6) Differential bevel gear | (13) O-ring |
| (7) Differential bevel pinion | (14) Axle drive shaft |

- (15) Retainer lock plate

Tightening torque: N·m (kg·m, ft·lb)

T1: 25±5 (2.5±0.5, 18.1±3.6)

T2: 62±5 (6.3±0.5, 45.6±3.6)

1. General

A: PRECAUTIONS

1) The following job should be followed before disassembly:

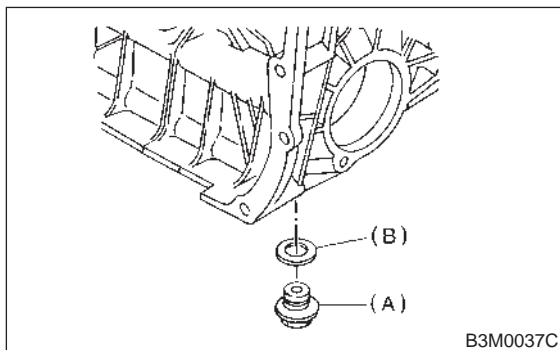
- (1) Clean oil, grease, dirt and dust from transmission.
- (2) Remove drain plug to drain oil. After draining, retighten it as before.

CAUTION:

Replace gasket with a new one.

Tightening torque:

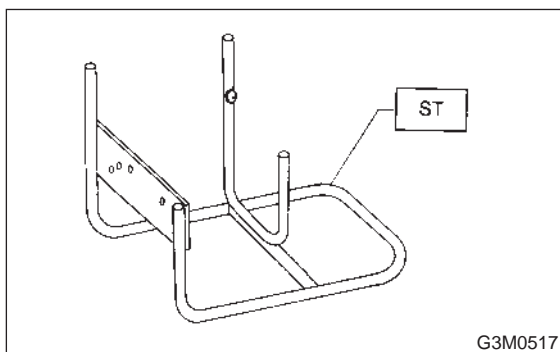
44±3 N·m (4.5±0.3 kg-m, 32.5±2.2 ft-lb)



- (A) Drain plug
(B) Washer

(3) Attach transmission to ST.

ST 499937100 TRANSMISSION STAND SET



2) Rotating parts should be coated with oil prior to assembly.

3) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.

4) Gaskets and lock washers must be replaced with new ones.

5) Liquid gasket should be used where specified to prevent leakage.

6) Fill transmission gear oil through the oil level gauge hole up to upper point level gauge. <Ref. to 1-5 [G10A1].>

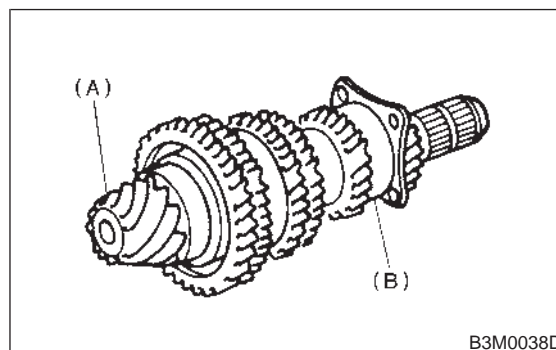
B: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.

1) Bearings

Replace bearings in the following cases:

- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- The ball bearing on the rear side of the drive pinion shaft should be checked for smooth rotation before the drive pinion assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike the other bearings.



- (A) Drive pinion shaft
(B) Ball bearing

- Bearings having other defects

2) Bushing (each gear)

Replace the bushing in the following cases:

- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

3) Gears

- Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- Correct or replace if the inner surface or end face is damaged.

4) Baulk ring

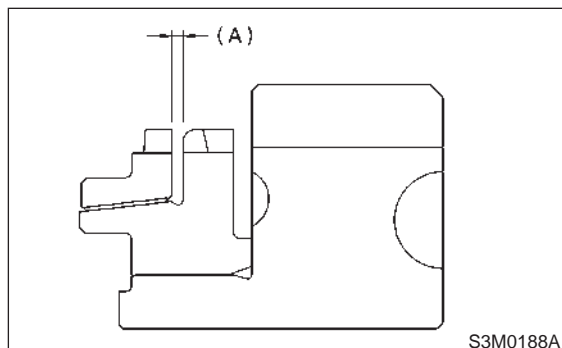
Replace the ring in the following cases:

- When the inner surface and end face are damaged.
- When the ring inner surface is abnormally or partially worn down.

- If the gap between the end faces of the ring and the gear splined part is excessively small when the ring is pressed against the cone.

Clearance (A):

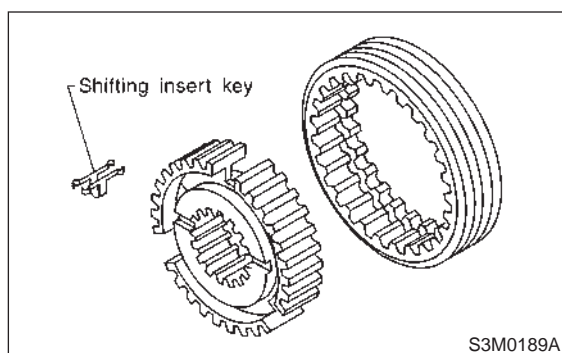
0.5 — 1.0 mm (0.020 — 0.040 in)



- When the contact surface of the synchronizer ring insert is scored or abnormally worn down.

5) Shifting insert

Replace the insert if deformed, excessively worn, or defective in any way.



6) Oil seal

Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.

7) O-ring

Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.

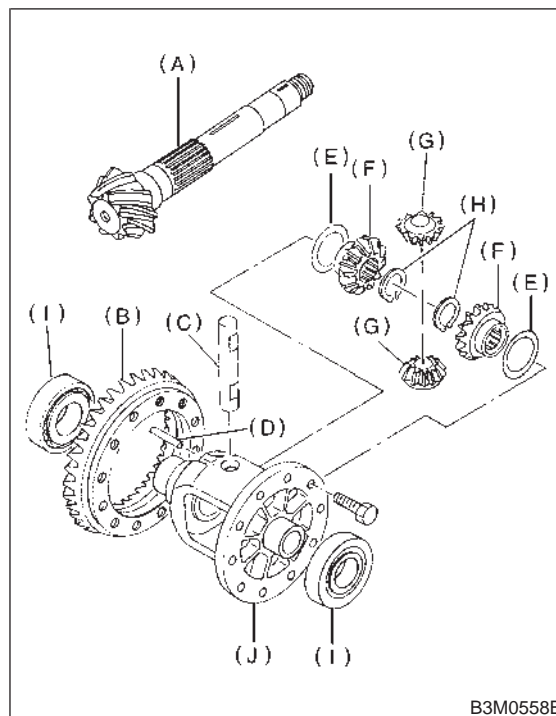
8) Gearshift mechanism

Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.

9) Differential gear

Repair or replace the differential gear in the following cases:

- The hypoid drive gear and drive pinion shaft tooth surface are damaged, excessively worn, or seized.
- The roller bearing on the drive pinion shaft has a worn or damaged roller path.
- There is damage, wear, or seizure of the differential bevel pinion, differential bevel gear, washer, pinion shaft, and straight pin.
- The differential case has worn or damaged sliding surfaces.

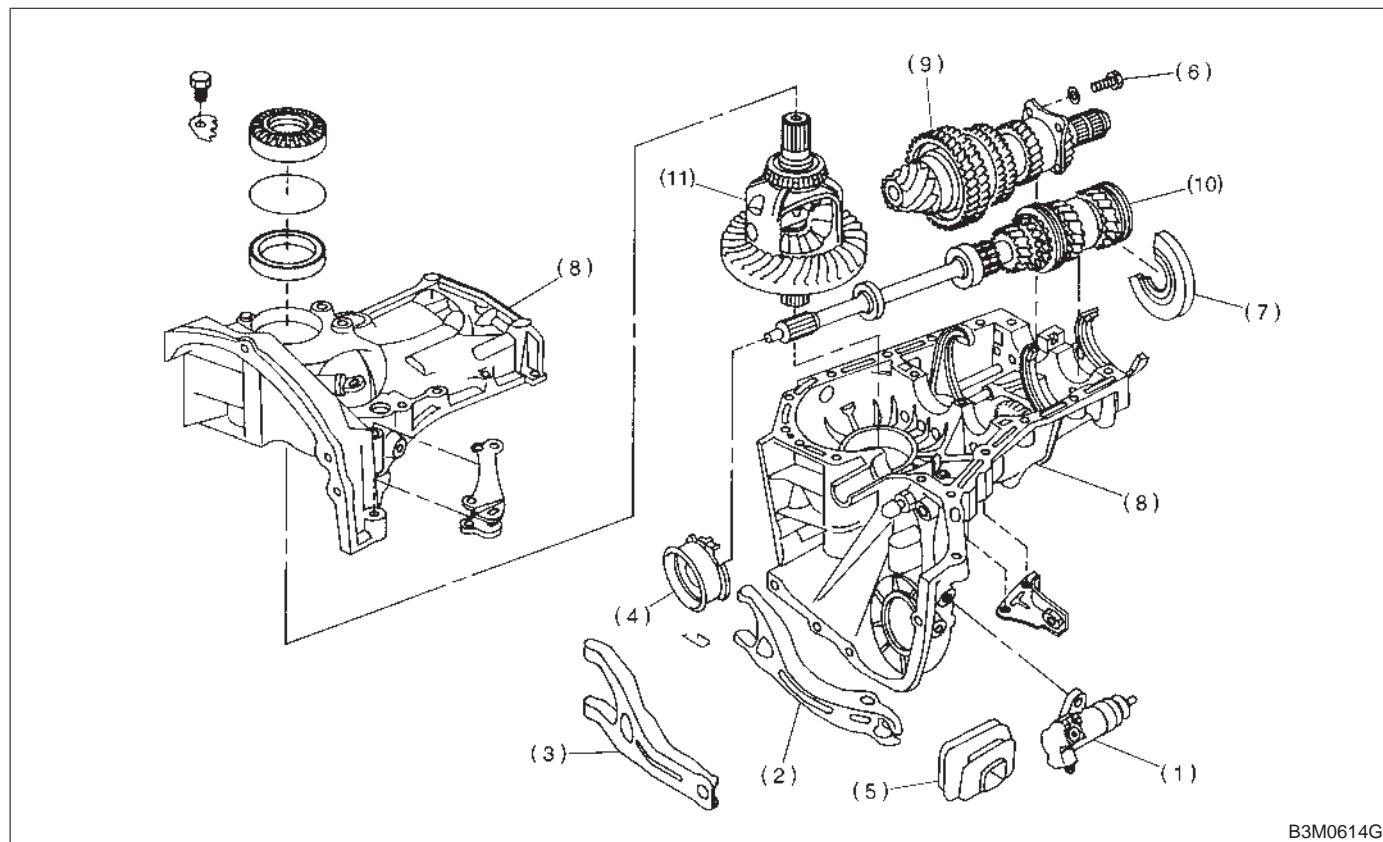


- (A) Drive pinion shaft
- (B) Hypoid driven gear
- (C) Pinion shaft
- (D) Straight pin
- (E) Washer
- (F) Differential bevel gear
- (G) Differential bevel pinion
- (H) Snap ring
- (I) Roller bearing
- (J) Differential case

2. Transmission Case

A: DISASSEMBLY

1. SEPARATION OF TRANSMISSION



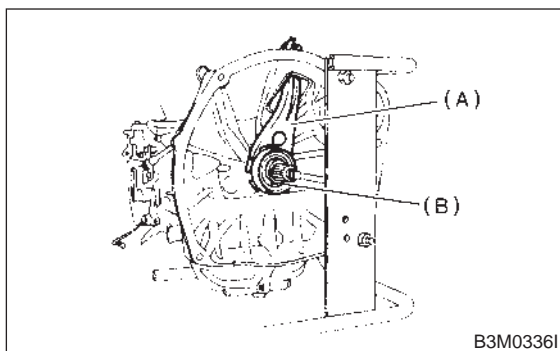
B3M0614G

- | | | |
|--|---------------------------|-------------------------|
| (1) Operating cylinder (2500 cc model) | (4) Release bearing | (8) Transmission case |
| (2) Release lever (2200 cc model) | (5) Release lever sealing | (9) Drive pinion ASSY |
| (3) Release lever (2500 cc model) | (6) Bolt | (10) Main shaft ASSY |
| | (7) Main shaft rear plate | (11) Front differential |

1) Remove clutch release lever. <Ref. to 2-10 [W3A0].>

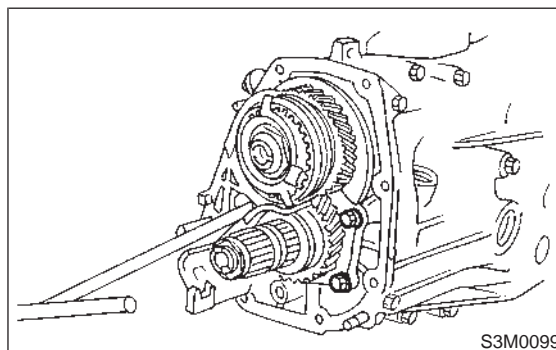
2) Remove transfer case assembly. <Ref. to 3-1 [W5A0].>

3) Remove bearing mounting bolts.



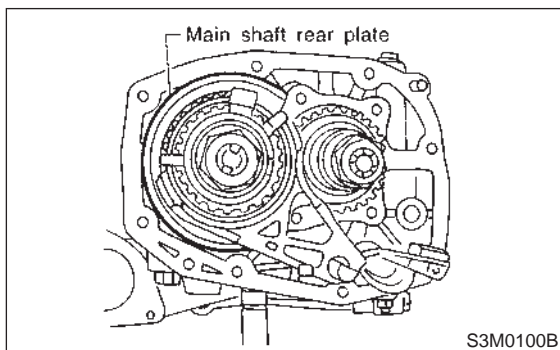
B3M0336I

- (A) Clutch release lever
(B) Release bearing

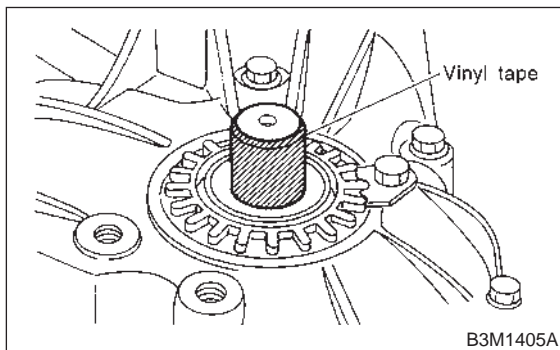


S3M0099

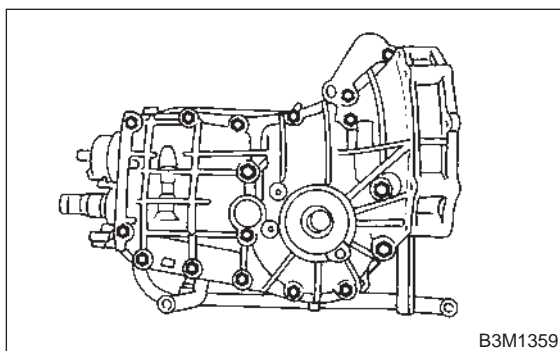
4) Remove main shaft rear plate.



5) Put vinyl tape around splines of right and left axle drive shafts to prevent damage to oil seals.



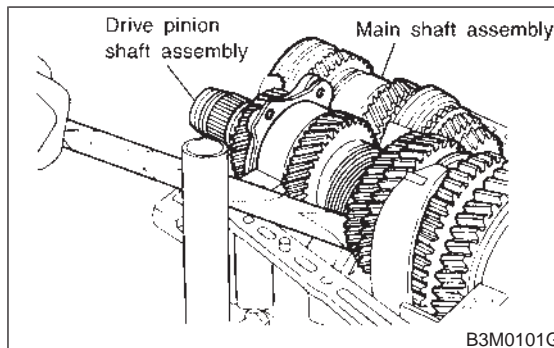
6) Separate transmission case into right and left cases by loosening seventeen coupling bolts and nuts.



7) Remove drive pinion shaft assembly from left side transmission case.

NOTE:

Use a hammer handle, etc. to remove if too tight.

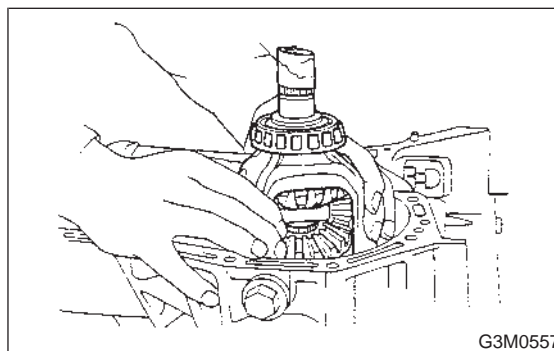


8) Remove main shaft assembly.

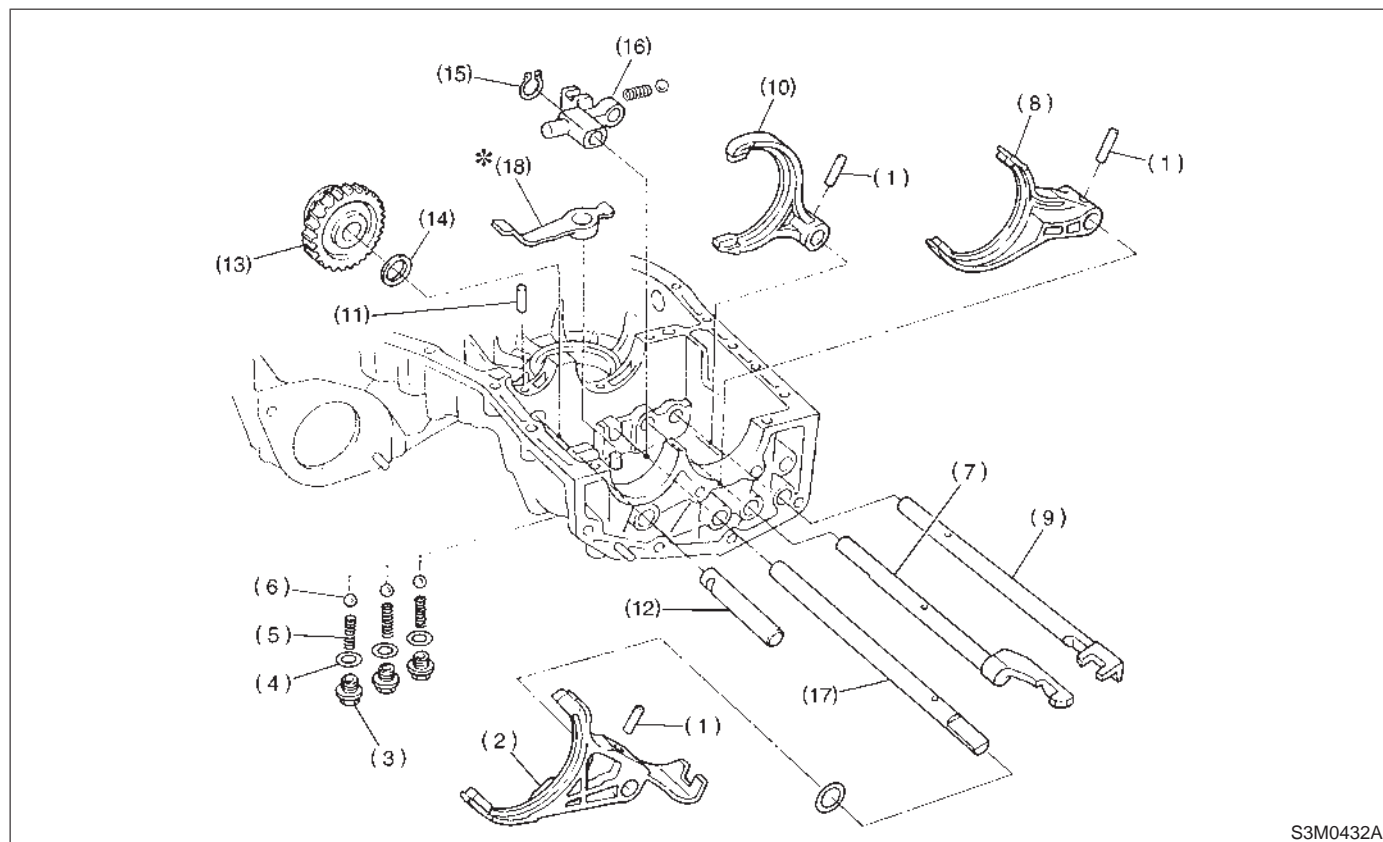
9) Remove differential assembly.

CAUTION:

- Be careful not to confuse right and left roller bearing outer races.
- Be careful not to damage retainer oil seal.



2. TRANSMISSION CASE

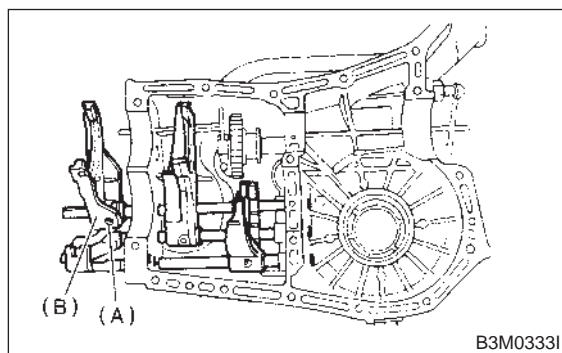


S3M0432A

- | | | |
|--------------------------|-------------------------------|----------------------------|
| (1) Straight pin | (7) 3rd-4th fork rod | (13) Reverse idler gear |
| (2) 5th shifter fork | (8) 3rd-4th shifter fork | (14) Washer |
| (3) Checking ball plug | (9) 1st-2nd fork rod | (15) Snap ring |
| (4) Gasket | (10) 1st-2nd shifter fork | (16) Reverse fork rod arm |
| (5) Checking ball spring | (11) Straight pin | (17) Reverse fork rod |
| (6) Ball | (12) Reverse idler gear shaft | (18) Reverse shifter lever |

1) Drive out straight pin with ST, and remove 5th shifter fork.

ST 398791700 STRAIGHT PIN REMOVER



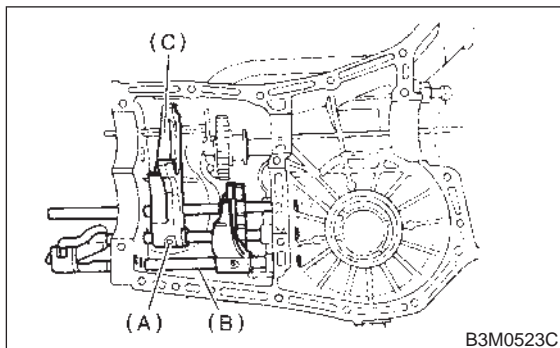
- (A) Straight pin
(B) 5th shifter fork

2) Remove plugs, springs and checking balls.

3) Drive out straight pin, and pull out 3-4 fork rod and shifter fork.

NOTE:

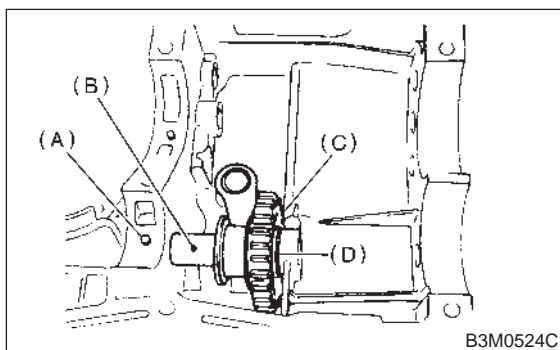
When removing rod, keep other rods in neutral. Also, when pulling out straight pin, remove it toward inside of case so that it may not hit against case.



- (A) Straight pin
- (B) 3-4 fork rod
- (C) Shifter fork

4) Drive out straight pin, and pull out 1-2 fork rod and shifter fork.

5) Pull out straight pin, and remove idler gear shaft, reverse idler gear and washer.



- (A) Straight pin
- (B) Idler gear shaft
- (C) Idler gear
- (D) Washer

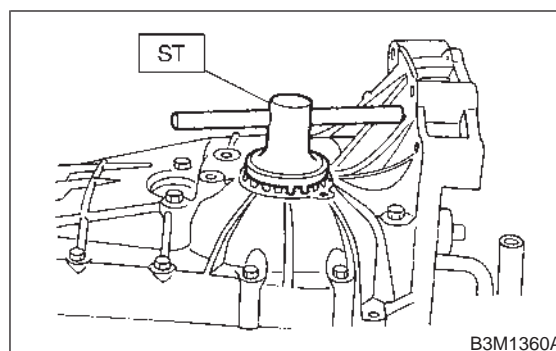
6) Remove outer snap ring, and pull out reverse shifter rod arm from reverse fork rod. Then take out ball, spring and interlock plunger from rod. And then remove rod.

NOTE:

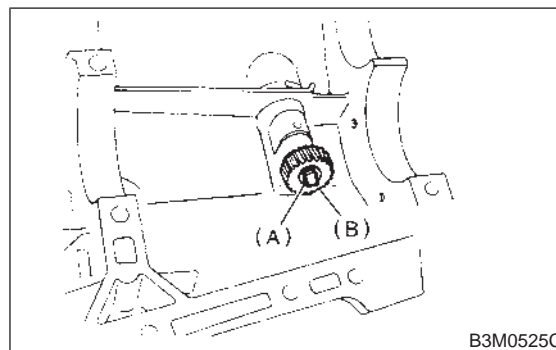
When pulling out reverse shifter rod arm, be careful not to let ball pop out of arm.

7) Remove reverse shifter lever.

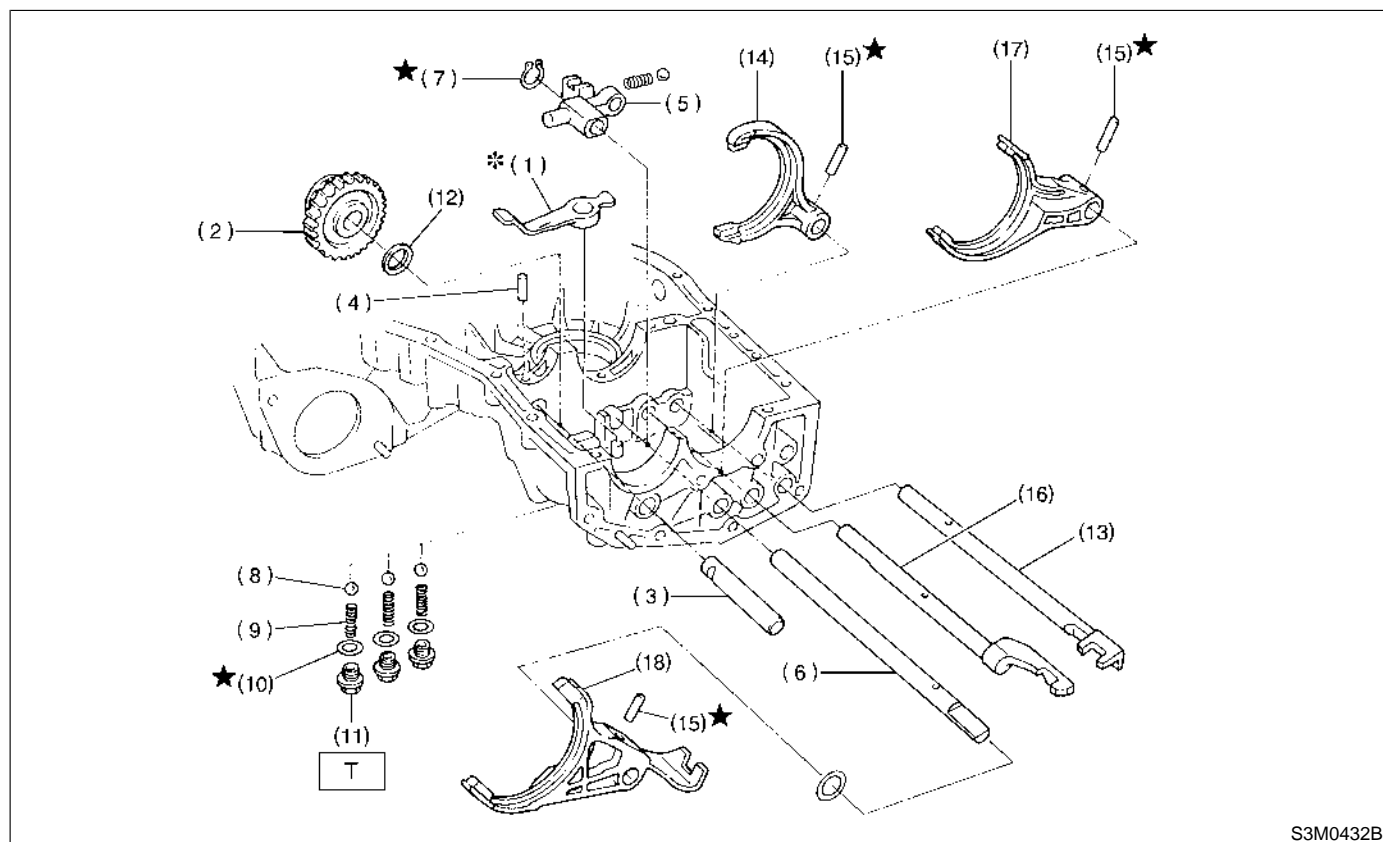
8) Remove differential side retainers using ST. ST 499787000 WRENCH ASSY



9) Remove outer snap ring and pull out speedometer driven gear. Next, remove vehicle speed sensor 2, oil seal, speedometer shaft and washer.



- (A) Outer snap ring
- (B) Speedometer driven gear

B: ASSEMBLY**1. TRANSMISSION CASE**

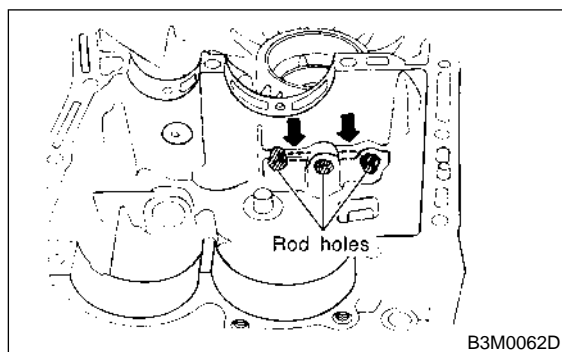
- | | |
|------------------------------|---------------------------|
| (1) Reverse shifter lever | (9) Checking ball spring |
| (2) Reverse idler gear | (10) Washer |
| (3) Reverse idler gear shaft | (11) Checking ball plug |
| (4) Straight pin | (12) Washer |
| (5) Reverse fork rod arm | (13) 1st-2nd fork rod |
| (6) Reverse fork rod | (14) 1st-2nd shifter fork |
| (7) Snap ring | (15) Straight pin |
| (8) Ball | (16) 3rd-4th fork rod |

- (17) 3rd-4th shifter fork
(18) 5th shifter fork

Tightening torque: N-m (kg-m, ft-lb)

**T: 19.6±0.1 (2.00±0.015,
14.5±0.1)**

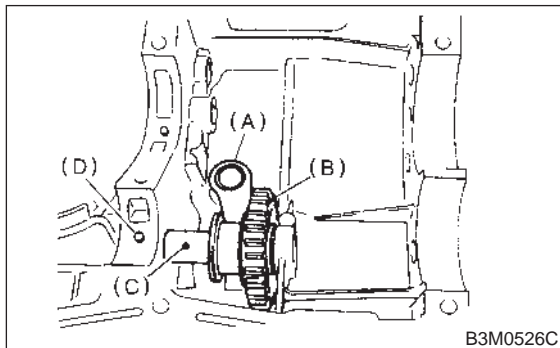
1) Position interlock plungers (5.56 × 19.6), one plunger in hole between 1-2 and 3-4 fork rod holes, and one plunger in hole between 3-4 and reverse fork rod holes.



2) Install reverse shifter lever, reverse idler gear and reverse idler gear shaft, and secure with straight pin.

NOTE:

Be sure to install reverse idler shaft from the rear side.



- (A) Reverse shifter lever
- (B) Reverse idler gear
- (C) Reverse idler gear shaft
- (D) Straight pin

3) Install reverse arm fork spring, ball and inter-lock plunger (5.56 × 19.6) to reverse fork rod arm. Insert reverse fork rod into hole in reverse fork rod arm, and hold it with outer snap ring using ST.

CAUTION:

Apply grease to plunger to prevent it from falling.

ST 399411700 ACCENT BALL INSTALLER

4) Position ball (7.1438), spring and gasket in reverse shifter rod hole, on left side transmission case, and tighten checking ball plug.

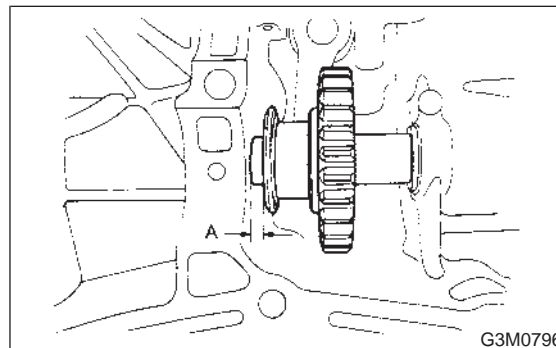
CAUTION:

Replace gasket with a new one.

5) Move reverse shifter rod toward REV side. Adjust clearance between reverse idler gear and transmission case wall, using reverse shifter lever.

Clearance A:

6.0 — 7.5 mm (0.236 — 0.295 in)

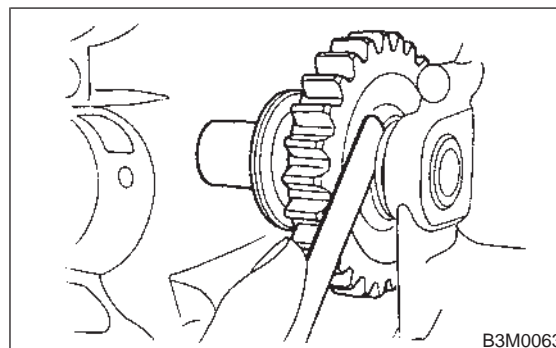


Reverse shifter lever		
Part No.	No.	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

6) After installing a suitable reverse shifter lever, shift into neutral. Using a thickness gauge, measure clearance between reverse idler gear and transmission case wall and adjust with washer(s).

Clearance:

0 — 0.5 mm (0 — 0.020 in)



Washer (20.5 × 26 × t)	
Part No.	Thickness mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)

7) Install 1-2 fork rod into 1-2 shifter fork via the hole on the rear of transmission case.

8) Align the holes in rod and fork, and drive straight pin (6 × 22) into these holes using ST.

ST 398791700 STRAIGHT PIN REMOVER

CAUTION:

Replace straight pin with a new one.

NOTE:

- Set other rods to neutral.
- Make sure interlock plunger (5.56 × 19.6) is on the 3-4 fork rod side.

9) Install interlock plunger (3 × 11.9) onto 3-4 fork rod.

CAUTION:

Apply a coat of grease to plunger to prevent it from falling.

10) Install 3-4 fork rod into 3-4 shifter fork via the hole on the rear of transmission case.

11) Align the holes in rod and fork, and drive straight pin (6 × 22) into these holes.

ST 398791700 STRAIGHT PIN REMOVER

CAUTION:

Replace straight pin with a new one.

NOTE:

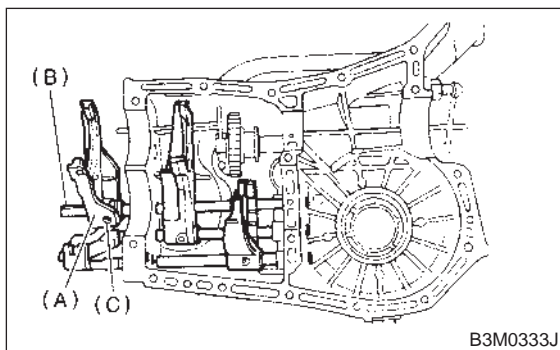
- Set reverse fork rod to neutral.
- Make sure interlock plunger (installed before) is on the reverse fork rod side.

12) Install 5th shifter fork onto the rear of reverse fork rod. Align holes in the two parts and drive straight pin into place.

CAUTION:

Replace straight pin with a new one.

ST 398791700 STRAIGHT PIN REMOVER

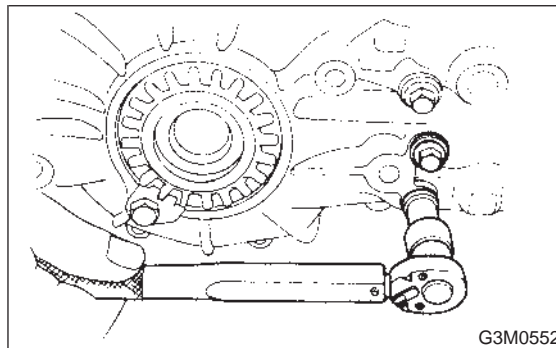


- (A) 5th shifter fork
- (B) Reverse fork rod
- (C) Straight pin

13) Position balls, checking ball springs and gas-kets into 3-4 and 1-2 rod holes, and install plugs.

CAUTION:

Replace gasket with a new one.



14) Install washer and speedometer shaft, and press fit oil seal with ST.

CAUTION:

Use new oil seal, if it has been removed.

ST 899824100 or 499827000 PRESS

15) Install vehicle speed sensor 2.

CAUTION:

Use new vehicle speed sensor 2, if it has been removed.

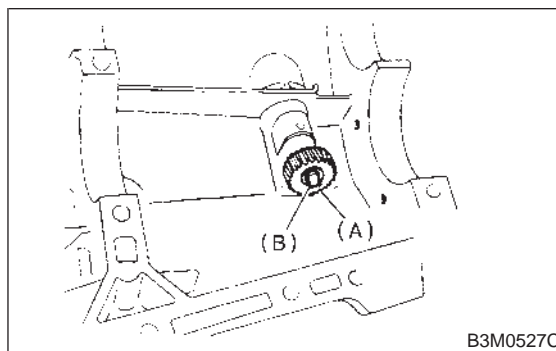
Tightening torque:

5.9±1.5 N·m (60±15 kg·cm, 52±13 in·lb)

16) Install speedometer driven gear and snap ring.

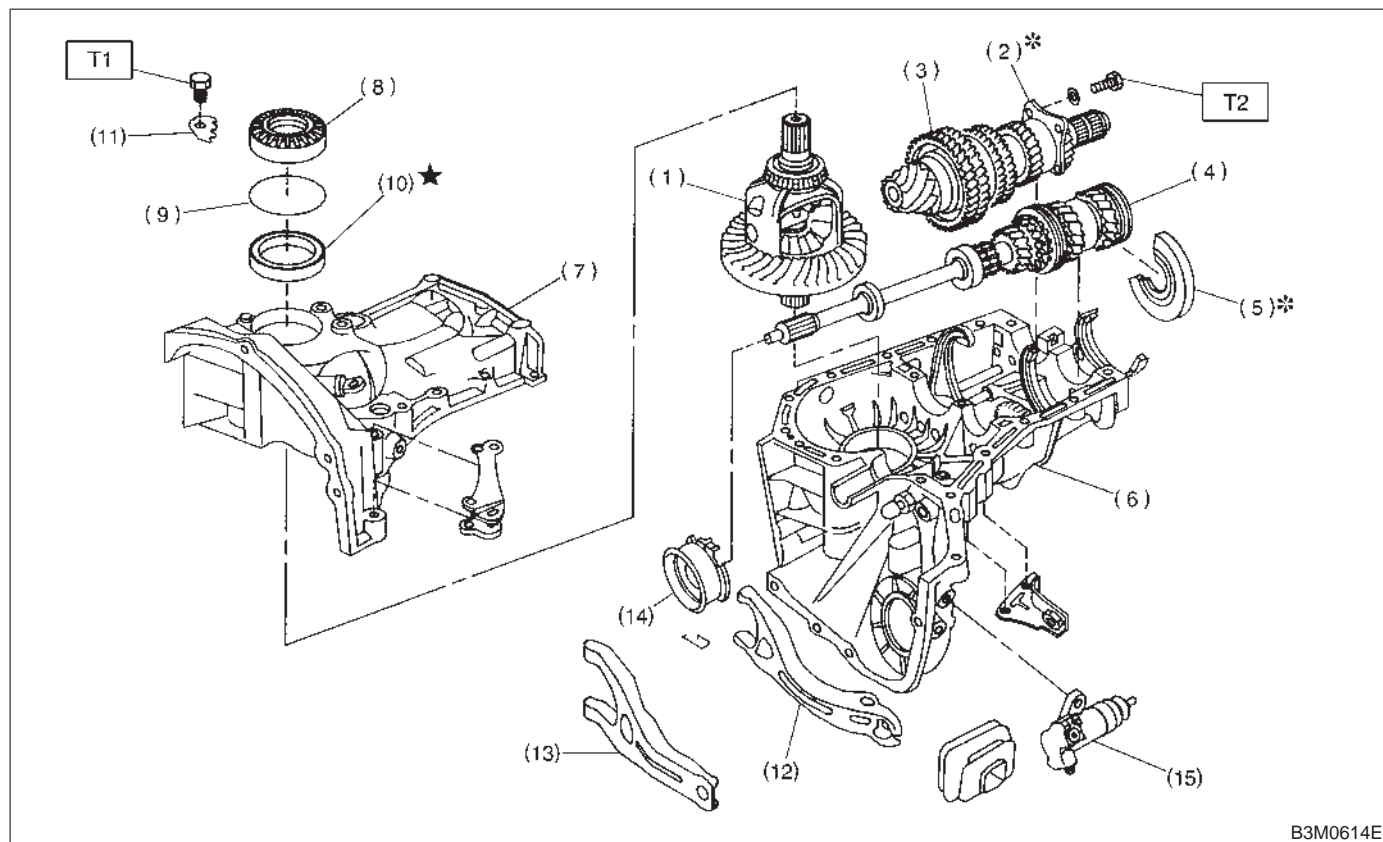
CAUTION:

Use a new snap ring, if it has been removed.



- (A) Speedometer driven gear
- (B) Snap ring

2. COMBINATION OF TRANSMISSION CASE



B3M0614E

- (1) Differential ASSY
- (2) Drive pinion shim
- (3) Drive pinion ASSY
- (4) Main shaft ASSY
- (5) Main shaft rear plate
- (6) Transmission case (LH)
- (7) Transmission case (RH)

- (8) Differential side retainer
- (9) O-ring
- (10) Oil seal
- (11) Retainer lock plate
- (12) Release lever (2200 cc model)
- (13) Release lever (2500 cc model)
- (14) Release bearing

- (15) Operating cylinder (2500 cc model)

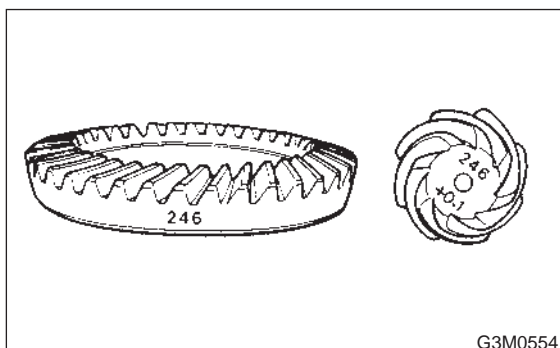
Tightening torque: N-m (kg-m, ft-lb)

T1: 25 (2.5, 18)

T2: 29±3 (3.0±0.3, 21.7±2.2)

1) Alignment marks/numbers on hypoid gear set
The upper number on driven pinion is the match number for combining it with hypoid driven gear. The lower number is for shim adjustment. If no lower number is shown, the value is zero. The number on hypoid driven gear indicates a number for combination with drive pinion.

2) Place drive pinion shaft assembly on right hand transmission main case without shim and tighten bearing mounting bolts.



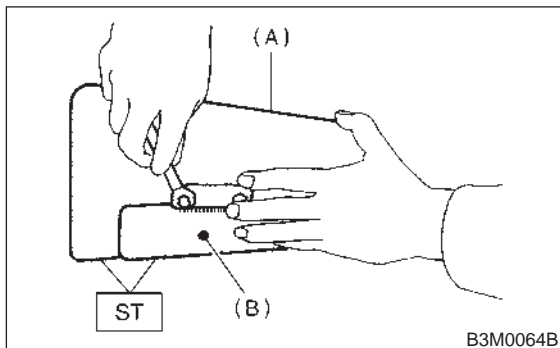
G3M0554

3) Inspection and adjustment of ST

NOTE:

- Loosen the two bolts and adjust so that the scale indicates 0.5 correctly when the plate end and the scale end are on the same level
- Tighten the two bolts.

ST 499917500 DRIVE PINION GAUGE ASSY



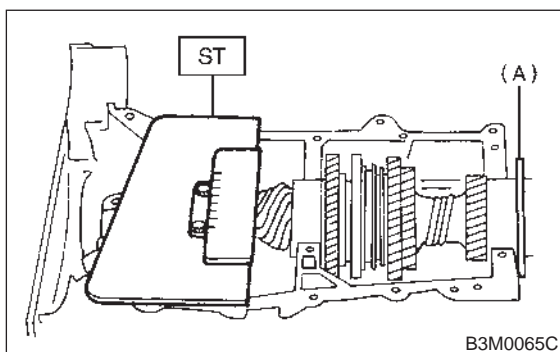
- (A) Plate
(B) Scale

4) Position the ST by inserting the knock pin of ST into the knock hole in the transmission case.

ST 499917500 DRIVE PINION GAUGE ASSY

5) Slide the drive pinion gauge scale with finger tip and read the value at the point where it matches with the end face of drive pinion.

ST 499917500 DRIVE PINION GAUGE ASSY



- (A) Adjust clearance to zero without shim.

6) The thickness of shim shall be determined by adding the value indicated on drive pinion to the value indicated on the ST. (Add if the number on drive pinion is prefixed by + and subtract if the number is prefixed by -.)

ST 499917500 DRIVE PINION GAUGE ASSY

7) Select one to three shims from the next table for the value determined as described above and take a shim thickness which is closest to the said value.

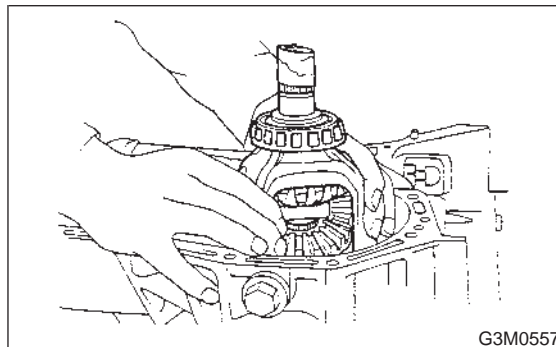
Drive pinion shim	
Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)
32295AA041	0.175 (0.0069)
32295AA051	0.200 (0.0079)
32295AA061	0.225 (0.0089)
32295AA071	0.250 (0.0098)
32295AA081	0.275 (0.0108)
32295AA091	0.300 (0.0118)
32295AA101	0.500 (0.0197)

8) Install differential assembly on left hand transmission case.

CAUTION:**Be careful not to fold the sealing lip of oil seal.**

NOTE:

Wrap the left and right splined sections of axle shaft with vinyl tape to prevent scratches.



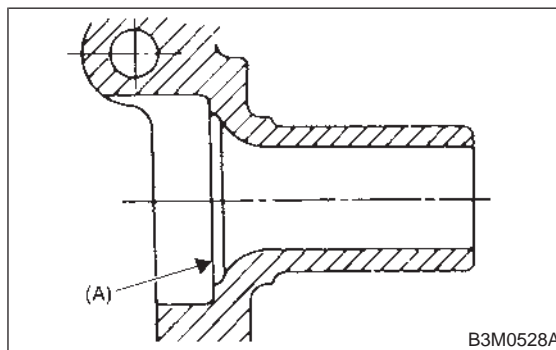
9) Install needle bearing and oil seal onto the front of transmission main shaft assembly, and position in left side transmission case.

CAUTION:

- Wrap clutch splined section with vinyl tape to prevent damage to oil seal.
- Apply grease (Unilube #2 or equivalent) to the sealing lip of oil seal.
- Use a new oil seal.

NOTE:

- Align the end face of seal with surface A of left side transmission main case when installing oil seal.

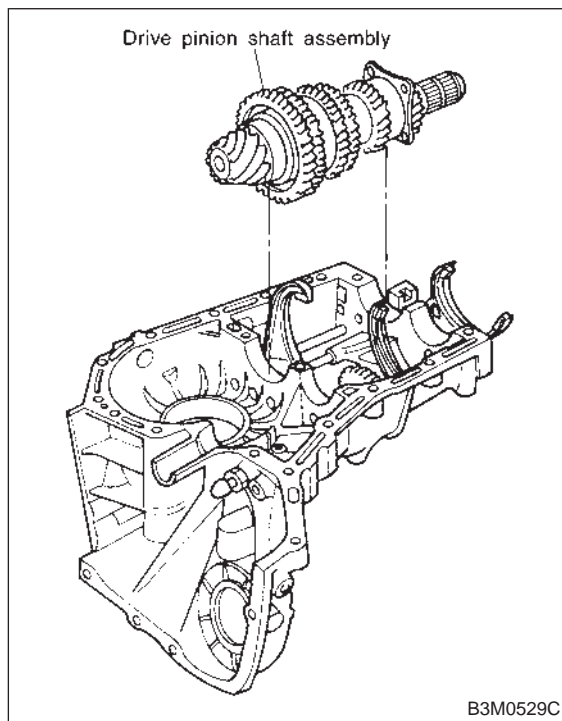


- Be careful not to drop oil seal when installing right side transmission main case.
- Make sure straight pin is positioned in hole in needle bearing's outer race.

10) Install drive pinion shaft assembly with shims selected before into transmission case.

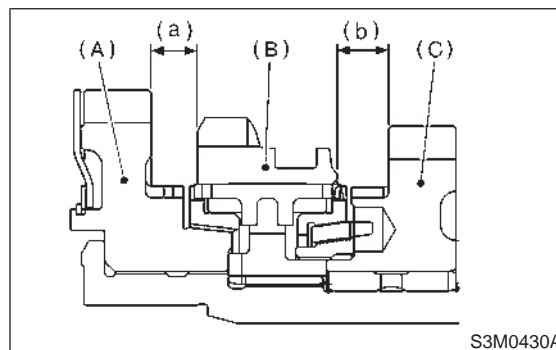
NOTE:

Ensure that the knock pin of the case is fitted into the hole in the bearing outer race.



11) Set transmission main shaft assembly and drive pinion shaft assembly in position (so there is no clearance between the two when moved all the way to the front). Select suitable 1st-2nd, 3rd-4th and 5th shifter fork so that coupling sleeve and reverse driven gear are positioned in the center of their synchronizing mechanisms.

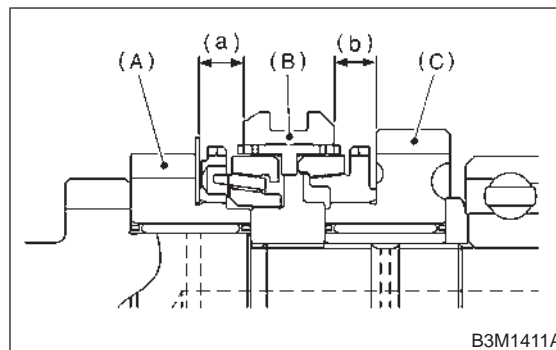
1st driven gear to reverse driven gear
Clearance (a): 9.5 mm (0.374 in)
Reverse driven gear to 2nd driven gear
Clearance (b): 9.5 mm (0.374 in)



- (A) 1st driven gear
- (B) Reverse driven gear
- (C) 2nd driven gear

1st-2nd shifter fork		
Part No.	No.	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in)
32804AA070	No mark	Standard
32804AA080	3	Approach to 2nd gear by 0.2 mm (0.008 in)

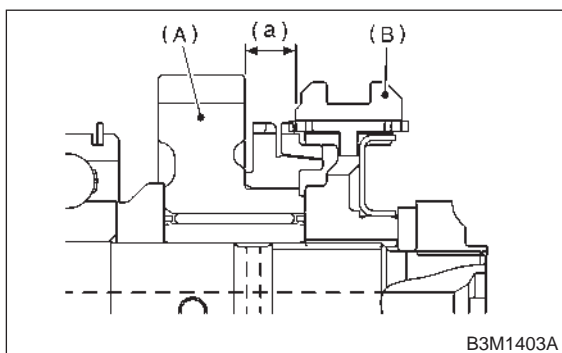
3rd-4th gear to coupling sleeve
Clearance (a): 9.3 mm (0.366 in)
Coupling sleeve to 4th driven gear
Clearance (b): 9.3 mm (0.366 in)



- (A) 3rd-4th
- (B) Coupling sleeve
- (C) 4th driven gear

3rd-4th shifter fork		
Part No.	No.	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA071	No mark	Standard
32810AA101	3	Approach to 3rd gear by 0.2 mm (0.008 in)

5th driven gear to coupling sleeve
Clearance (a): 9.3 mm (0.366 in)

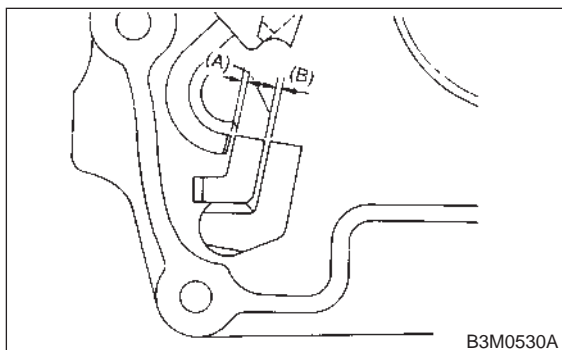


- (A) 5th driven gear
(B) Coupling sleeve

5th shifter fork		
Part No.	No.	Remarks
32812AA200	4	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA210	No mark	Standard
32812AA220	6	Become distant from 5th gear by 0.2 mm (0.008 in)

12) Measure rod end clearances (A) and (B). If any clearance is not within specifications, replace rod or fork as required.

(A): 1st-2nd to 3rd-4th	0.4 — 1.4 mm (0.016 — 0.055 in)
(B): 3rd-4th to 5th	0.5 — 1.3 mm (0.020 — 0.051 in)



13) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline, and apply liquid gasket, and then put case right side and left side together.

Liquid gasket:

THREE BOND 1215 or equivalent

14) Tighten 17 bolts with bracket, clip, etc. as shown in the figure.

NOTE:

- Insert bolts from the bottom and tighten nuts at the top.
- Put cases together so that drive pinion shim and input shaft holder shim are not caught up in between.
- Confirm that speedometer gear is meshed.

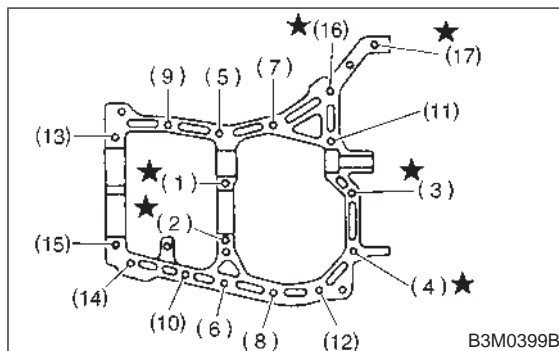
Tightening torque:

8 mm bolt

25±2 N·m (2.5±0.2 kg·m, 18.1±1.4 ft-lb)

★ 10 mm bolt

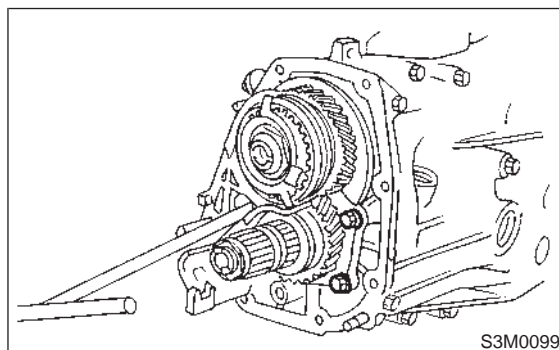
39±3 N·m (4.0±0.3 kg·m, 28.9±2.2 ft-lb)



15) Tighten ball bearing attachment bolts.

Tightening torque:

29±3 N·m (3.0±0.3 kg·m, 21.7±2.2 ft-lb)

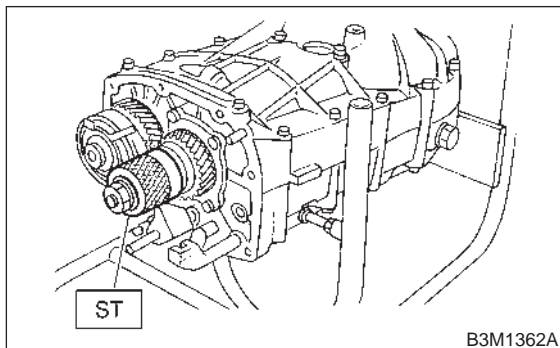


16) Backlash adjustment of hypoid gear and pre-load adjustment of roller bearing

NOTE:

Support drive pinion assembly with ST.

ST 498427100 STOPPER



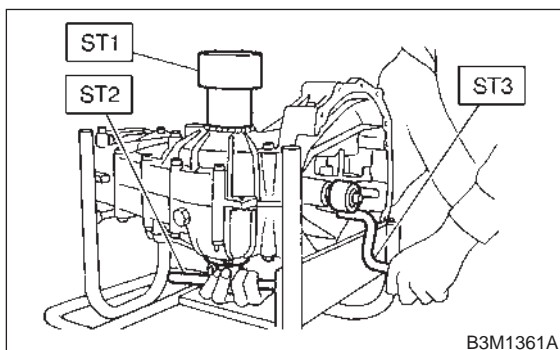
17) Place the transmission with case left side facing downward and put ST1 on bearing cup.

18) Screw retainer assembly into left case from the bottom with ST2. Fit ST3 on the transmission main shaft. Shift gear into 4th or 5th and turn the shaft several times. Screw in the retainer while turning ST3 until a slight resistance is felt on ST2. This is the contact point of hypoid gear and drive pinion shaft. Repeat the above sequence several times to ensure the contact point.

ST1 399780104 WEIGHT

ST2 499787000 WRENCH ASSY

ST3 499927100 HANDLE

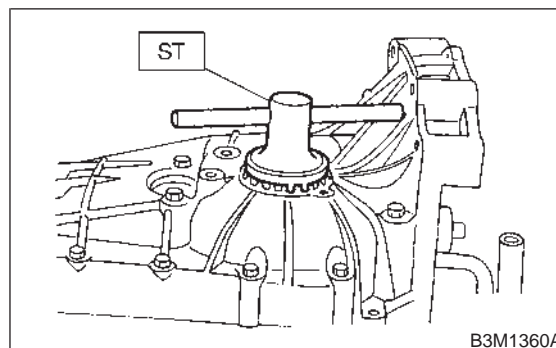


19) Remove weight and screw in retainer without O-ring on the upper side and stop at the point where slight resistance is felt.

NOTE:

At this point, the backlash between the hypoid gear and drive pinion shaft is zero.

ST 499787000 WRENCH ASSY



20) Fit lock plate. Loosen the retainer on the lower side by 1-1/2 notches of lock plate and turn in the retainer on the upper side by the same amount in order to obtain the backlash.

NOTE:

The notch on the lock plate moves by 1/2 notch if the plate is turned upside down.

21) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.

22) Tighten temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.

23) Turn transmission main shaft several times while tapping around retainer lightly with plastic hammer.

24) Set ST1 and ST2. Insert the needle through transmission oil drain plug hole so that the needle comes in contact with the tooth surface at a right angle and check the backlash.

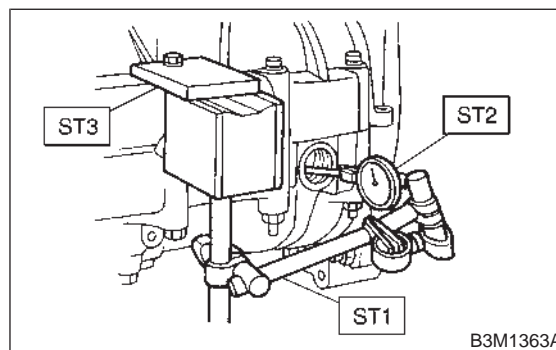
ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

ST3 498255400 PLATE

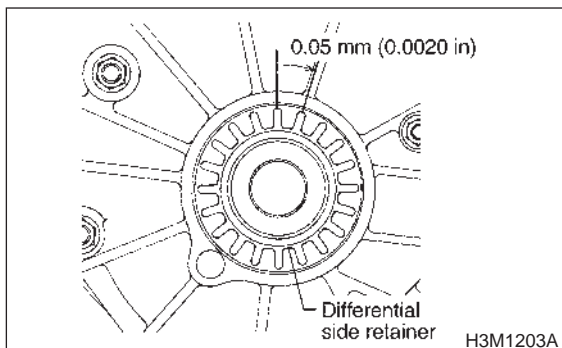
Backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



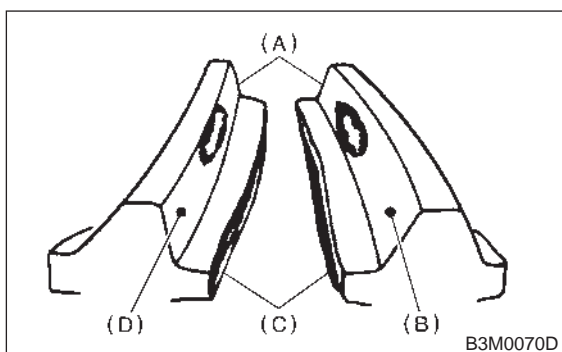
NOTE:

- If backlash is outside specified range, adjust it by turning holder in right side case.
- Each time holder rotates one tooth, backlash changes by 0.05 mm (0.0020 in).



25) Check tooth contact of hypoid gear as follows: Apply a uniform thin coat of red lead on both tooth surfaces of 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on hypoid gear, and judge whether face contact is correct. If it is incorrect, make the following correction.

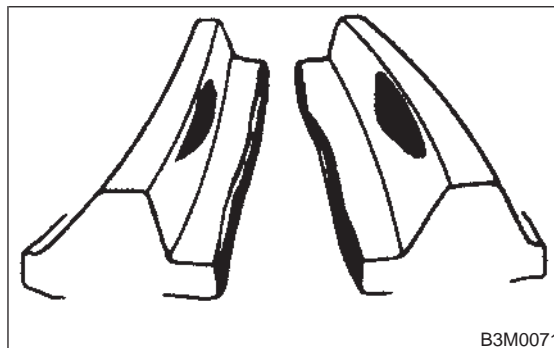
- Tooth contact is correct.



- (A) Toe
- (B) Coast side
- (C) Heel
- (D) Drive side

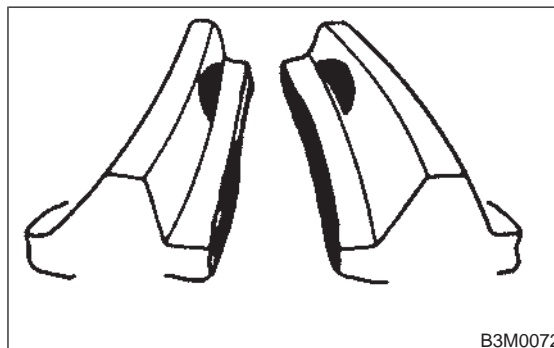
- Backlash is excessive.

To reduce backlash, loosen holder on the upper side (case right side) and turn in the holder on the lower side (case left side) by the same amount.

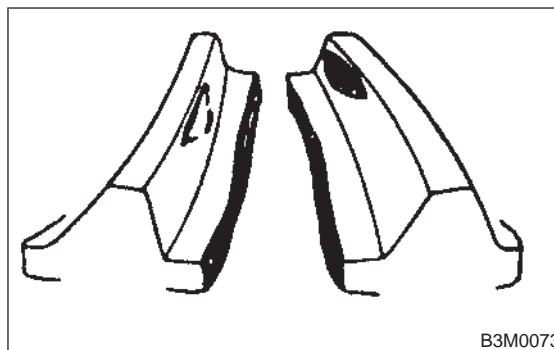


- Backlash is insufficient.

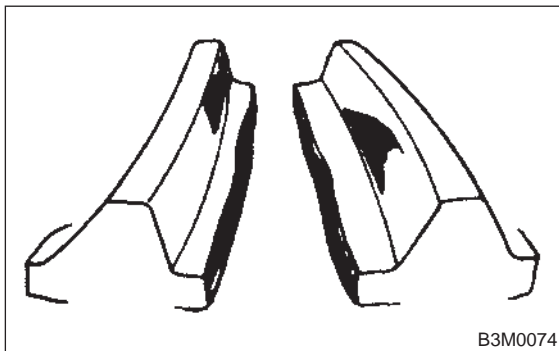
To increase backlash, loosen holder on the lower side (case left side) and turn in the holder on the upper side (case right side) by the same amount.



- The drive pinion shim selected before is too thick. Reduce its thickness.



- The drive pinion shim selected before is too thin. Increase its thickness.



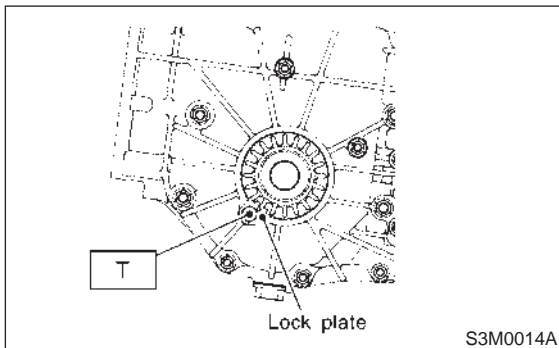
26) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen retainer until the O-ring groove appears. Fit O-ring into the groove and tighten retainer into the position where retainer has been tightened in. Tighten lock plate.

NOTE:

Carry out this job on both upper and lower retainers.

Tightening torque:

T: 25 ± 3 N·m (2.5 ± 0.3 kg·m, 18.1 ± 2.2 ft·lb)

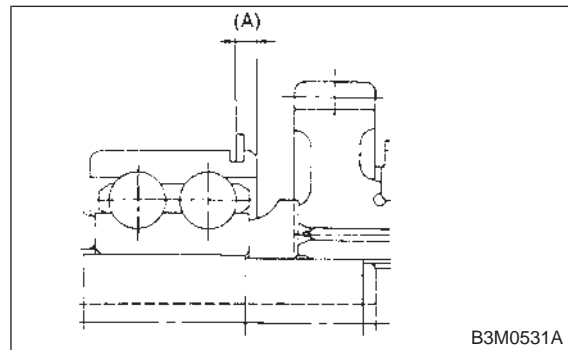


27) Selecting of main shaft rear plate
Using ST, measure the amount (A) of ball bearing protrusion from transmission main case surface and select the proper plate in the following table:
ST 498147000 DEPTH GAUGE

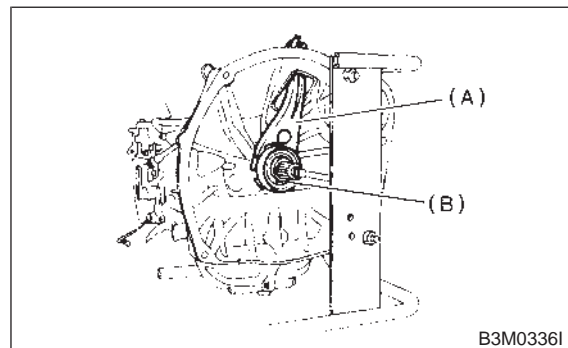
NOTE:

Before measuring, tap the end of main shaft with a plastic hammer lightly in order to make the clearance zero between the main case surface and the moving flange of bearing.

Dimension (A) mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2



28) Install clutch release lever and bearing. <Ref. to 2-10 [W3C0].>



- (A) Clutch release lever
(B) Release bearing

3. Drive Pinion Assembly

A: DISASSEMBLY

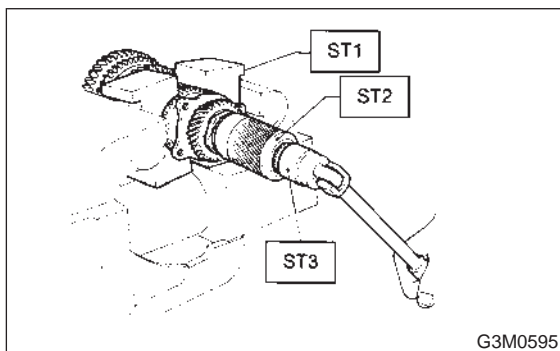
1. DRIVE PINION SHAFT

1) Straighten lock nut at staked portion. Remove the lock nut using ST1, ST2 and ST3.

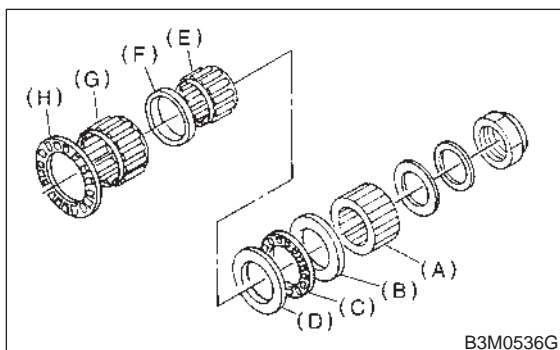
ST1 899884100 HOLDER

ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH



2) Withdraw drive pinion from driven shaft. Remove differential bevel gear sleeve, adjusting washer No. 1, adjusting washer No. 2, thrust bearing, needle bearing, drive pinion collar, needle bearing and thrust bearing.



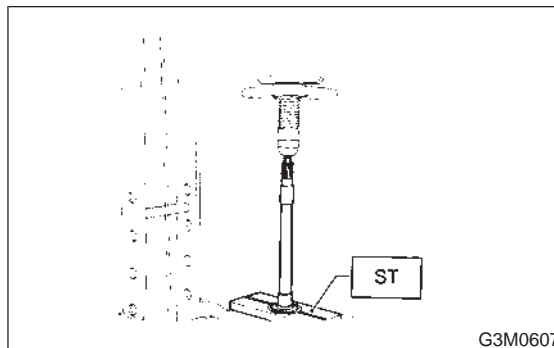
- (A) Differential bevel gear sleeve
- (B) Washer No. 1 (25 × 37.5 × t)
- (C) Thrust bearing (25 × 37.5 × 3)
- (D) Washer No. 2 (25 × 37.5 × 4)
- (E) Needle bearing (25 × 30 × 20)
- (F) Drive pinion collar
- (G) Needle bearing (30 × 37 × 23)
- (H) Thrust bearing (33 × 50 × 3)

3) Remove roller bearing and washer (33 × 50 × 5) using ST and press.

CAUTION:

Do not reuse roller bearing.

ST 498077000 REMOVER



2. DRIVEN GEAR ASSEMBLY (2200 cc MODEL)

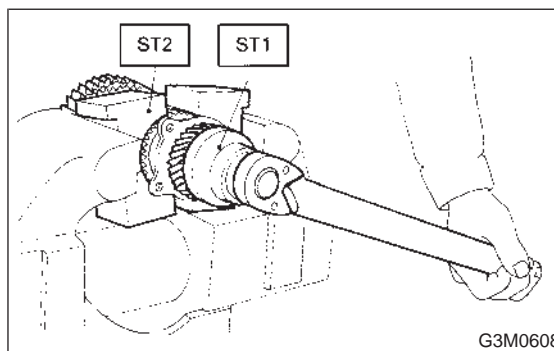
CAUTION:

Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) during disassembly or reassembly to prevent damage.

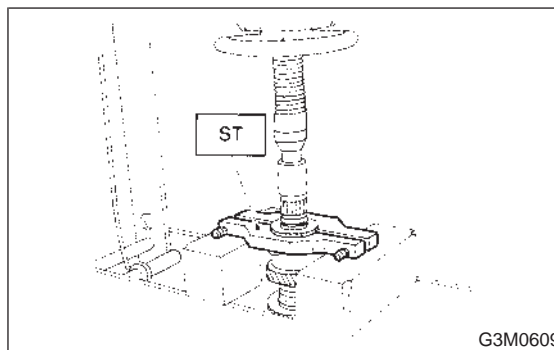
1) Straighten lock nut at staked portion. Remove the lock nut using ST1 and ST2.

ST1 499987300 SOCKET WRENCH (50)

ST2 899884100 HOLDER



2) Remove 5th driven gear using ST.
ST 499857000 5TH DRIVEN GEAR REMOVER

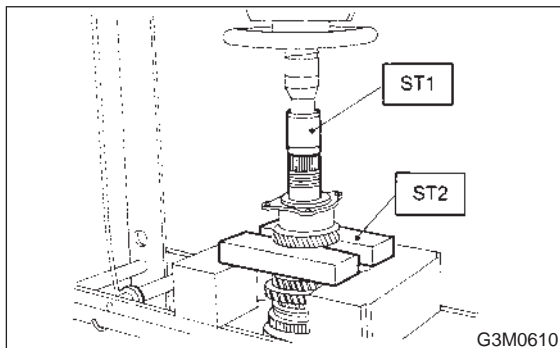


3) Remove woodruff key.

- 4) Remove roller bearing (42 × 74 × 40), 3rd and 4th driven gear using ST1 and ST2.

ST1 499757002 SNAP RING PRESS

ST2 899714110 REMOVER



- 5) Remove the key.

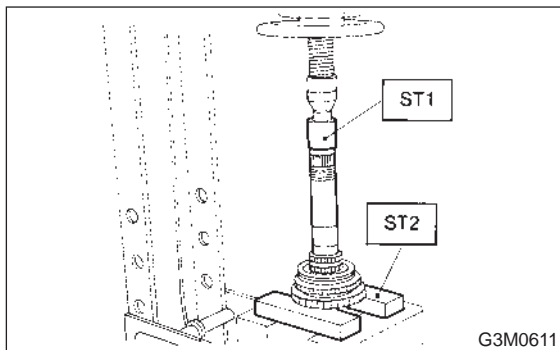
- 6) Remove 2nd driven gear assembly.

- 7) Remove 1st driven gear, 2nd gear bushing, gear and hub using ST1 and ST2.

Replace gear and hub if necessary. Do not attempt to disassemble if at all possible because they must engage at a specified point. If they have to be disassembled, mark the engaging point beforehand.

ST1 499757002 SNAP RING PRESS

ST2 899714110 REMOVER



- 8) Remove sub gears for 1st and 2nd driven gear.

3. DRIVEN GEAR ASSEMBLY (2500 cc MODEL)

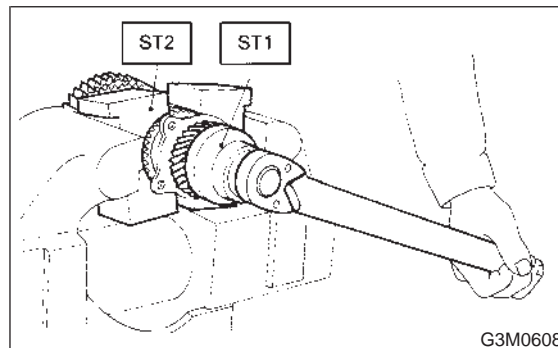
CAUTION:

Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) during disassembly or reassembly to prevent damage.

- 1) Straighten lock nut at staked portion. Remove the lock nut using ST1 and ST2.

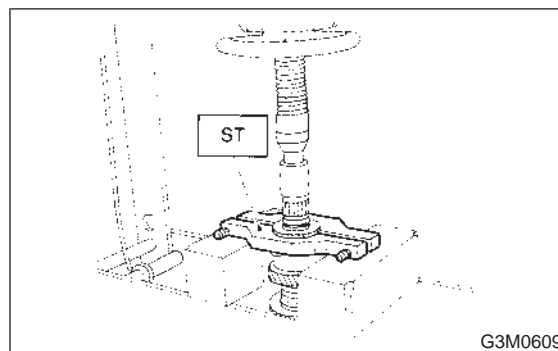
ST1 499987300 SOCKET WRENCH (50)

ST2 899884100 HOLDER



- 2) Remove 5th driven gear using ST.

ST 499857000 5TH DRIVEN GEAR REMOVER

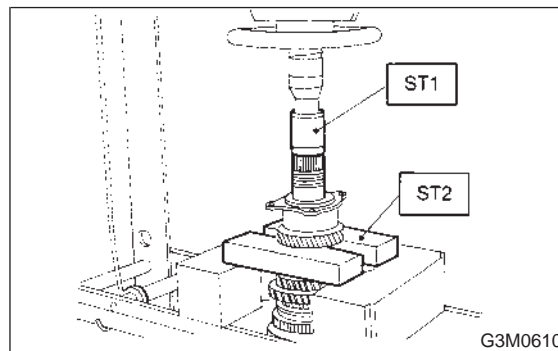


- 3) Remove woodruff key.

- 4) Remove roller bearing (42 × 74 × 40), 3rd-4th driven gear using ST1 and ST2.

ST1 499757002 SNAP RING PRESS

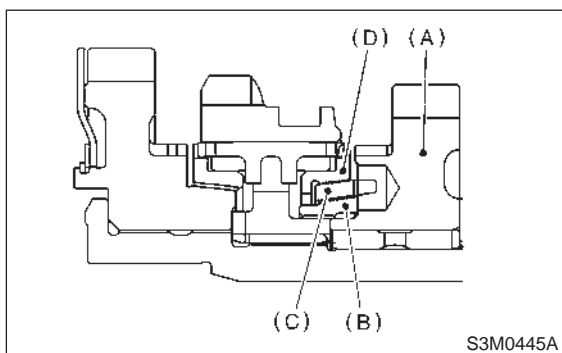
ST2 899714110 REMOVER



- 5) Remove the key.

3. Drive Pinion Assembly

- 6) Remove 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring.



- (A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

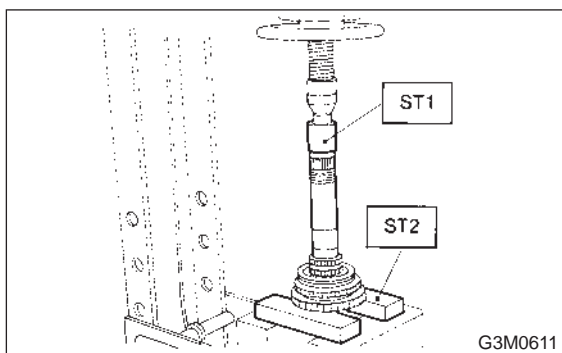
- 7) Remove 1st driven gear, 2nd gear bushing, gear and hub using ST1 and ST2.

NOTE:

Replace gear and hub if necessary. Do not attempt to disassemble if at all possible because they must engage at a specified point. If they have to be disassembled, mark the engaging point beforehand.

ST1 499757002 SNAP RING PRESS

ST2 899714110 REMOVER



- 8) Remove sub gear for 1st driven gear.

B: ASSEMBLY

CAUTION:

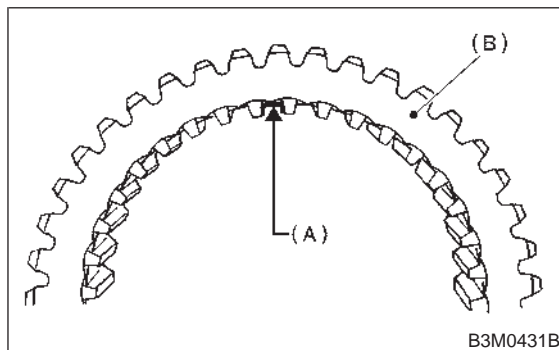
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton) during installation.

1. GEAR AND HUB ASSEMBLY

Assemble gear and hub assembly.

NOTE:

- Use new gear and hub assembly, if gear or hub have been replaced.
- Be sure the insert keys are correctly located in the insert key grooves inside the reverse driven gear.

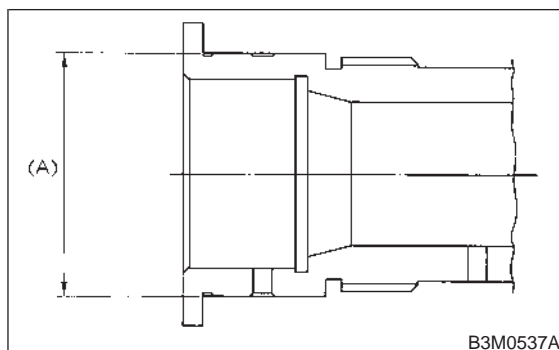


- (A) Key grooves
(B) Reverse driven gear

2. DRIVEN GEAR ASSEMBLY (2200 cc MODEL)

Assemble a driven shaft and 1st driven gear that select for adjustment the proper radial clearance.

Driven shaft		1st driven gear
Part No.	Diameter (A) mm (in)	Part No.
32229AA150	49.959 — 49.966 (1.9669 — 1.9672)	32231AA270
32229AA140	49.967 — 49.975 (1.9672 — 1.9675)	32231AA260



- 1) Install 1st driven gear, 1st-2nd baulk ring and gear and hub assembly onto driven shaft.

NOTE:

Take care to install gear hub in proper direction.

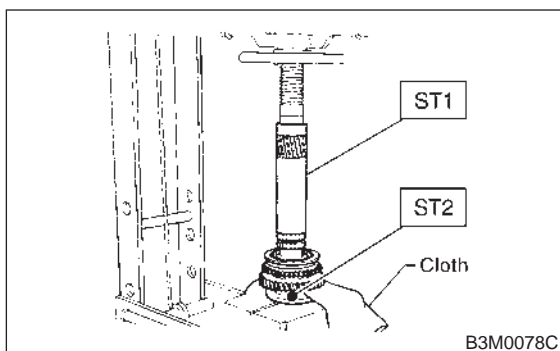
2) Install 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.

CAUTION:

Attach a cloth to the end of driven shaft to prevent damage.

ST1 499277200 INSTALLER

ST2 499587000 INSTALLER

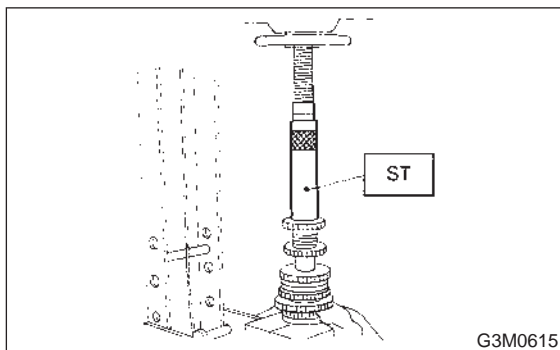


3) Install 2nd driven gear, 1st-2nd baulk ring and insert onto driven shaft. After installing key on driven shaft, install 3rd-4th driven gear using ST and press.

CAUTION:

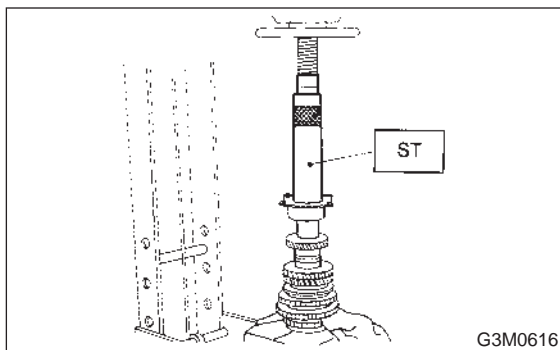
Align groove in baulk ring with insert.

ST 499277200 INSTALLER



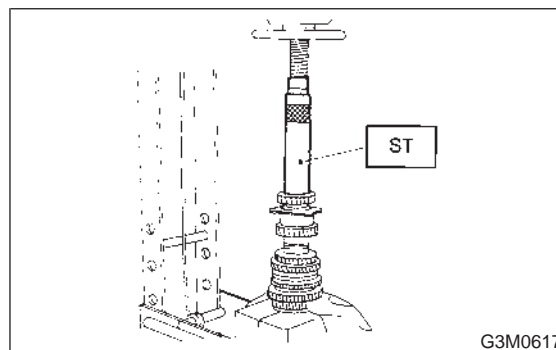
4) Install a set of roller bearings (42 × 74 × 40) onto the driven shaft using ST and press.

ST 499277200 INSTALLER



5) Position woodruff key in groove on the rear of driven shaft. Install 5th driven gear onto drive shaft using ST and press.

ST 499277200 INSTALLER

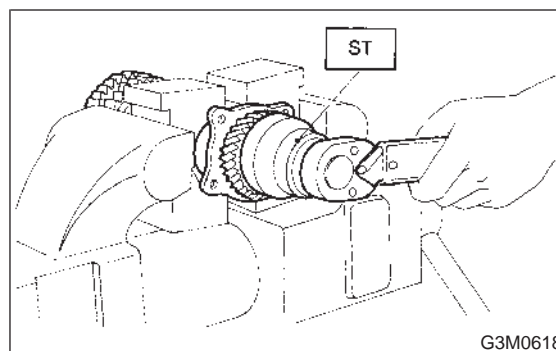


6) Install lock washer (42 × 53 × 2). Install lock nut (42 × 13) and tighten to the specified torque using ST.

ST 499987300 SOCKET WRENCH (50)

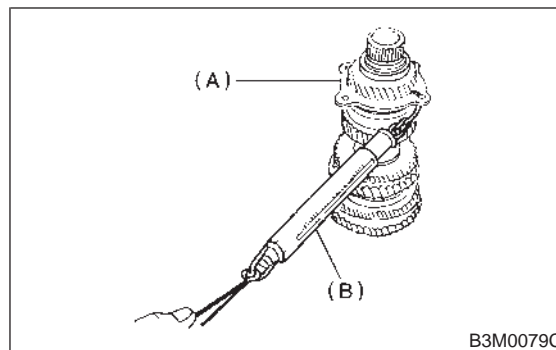
Tightening torque:

265±10 N·m (27±1 kg·m, 195±7 ft·lb)



NOTE:

- Stake lock nut at two points.
- Using spring balancer, check that starting load of roller bearing is 1.7 to 30.6 N (0.17 to 3.12 kg, 0.37 to 6.88 lb).

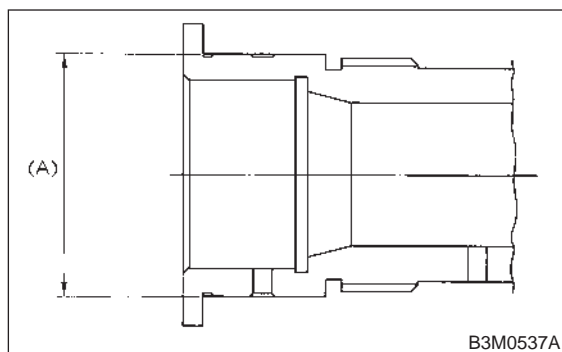


- (A) Roller bearing
- (B) Spring balancer

3. DRIVEN GEAR ASSEMBLY (2500 cc MODEL)

Assemble a driven shaft and 1st driven gear that select for adjustment the proper radial clearance.

Driven shaft		1st driven gear
Part No.	Diameter A mm (in)	Part No.
32229AA150	49.959 — 49.966 (1.9669 — 1.9672)	32231AA730
32229AA140	49.967 — 49.975 (1.9672 — 1.9675)	32231AA720



- 1) Install sub gear to 1st driven gear.
- 2) Install 1st driven gear, 1st baulk ring, gear and hub assembly onto driven shaft.

NOTE:

Take care to install gear hub in proper direction.

- 3) Install 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.

ST1 499277200 INSTALLER

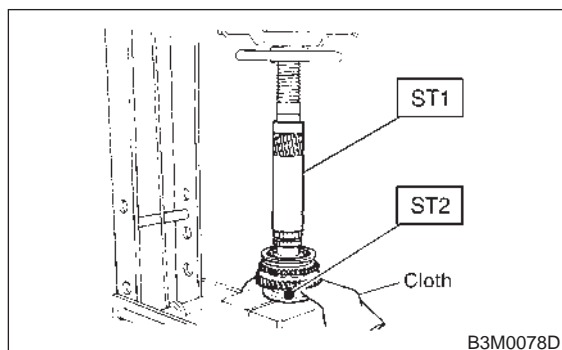
ST2 499587000 INSTALLER

CAUTION:

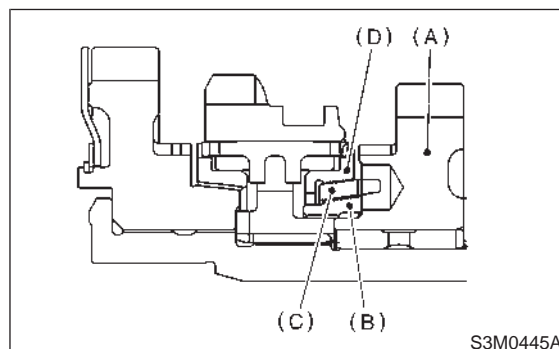
Attach a cloth to the end of driven shaft to prevent damage.

NOTE:

When press fitting, align oil holes of shaft and bush.



- 4) Install 2nd driven gear, inner baulk ring, synchro cone, outer baulk ring and insert onto driven shaft.



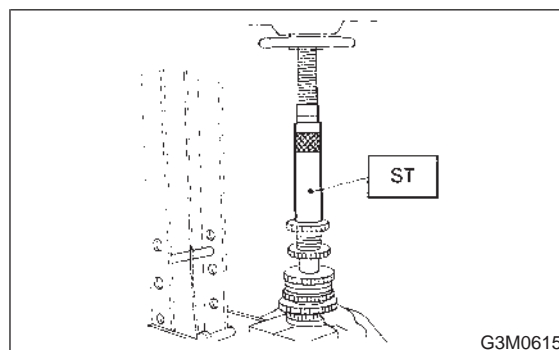
- (A) 2nd driven gear
- (B) Inner baulk ring
- (C) Synchro cone
- (D) Outer baulk ring

- 5) After installing key on driven shaft, install 3rd-4th driven gear using ST and press.

NOTE:

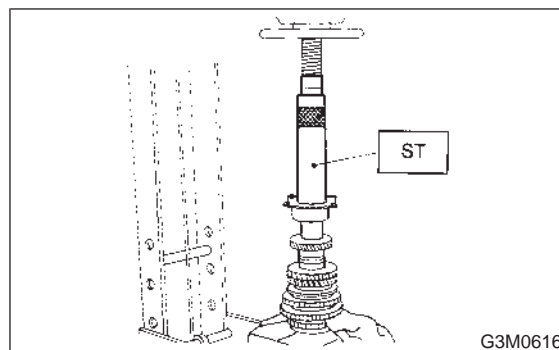
Align groove in baulk ring with insert.

ST 499277200 INSTALLER



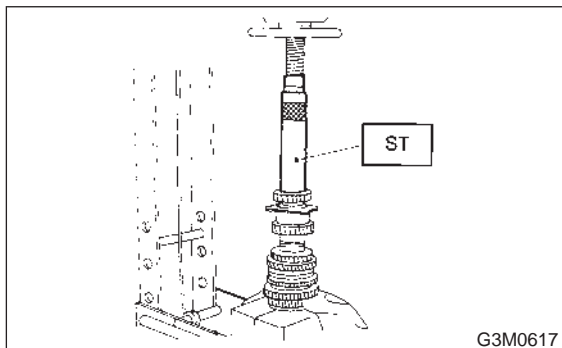
- 6) Install a set of roller bearings (42 × 74 × 40) onto the driven shaft using ST and press.

ST 499277200 INSTALLER



7) Position woodruff key in groove on the rear of driven shaft. Install 5th driven gear onto drive shaft using ST and press.

ST 499277200 INSTALLER

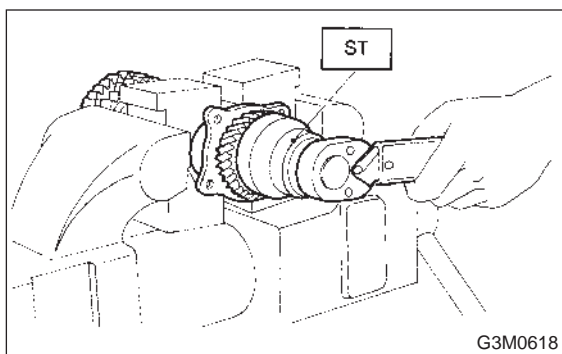


8) Install lock washer ($42 \times 53 \times 2$). Install lock nut (42×13) and tighten to the specified torque using ST.

ST 499987300 SOCKET WRENCH (50)

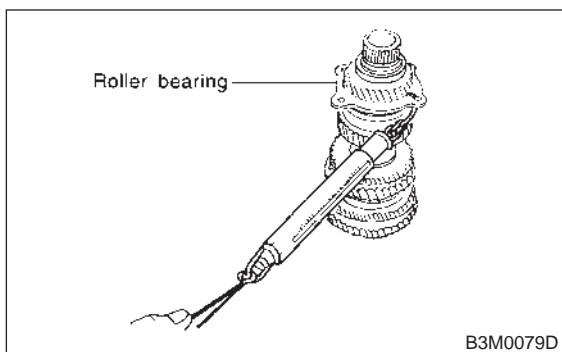
Tightening torque:

$265 \pm 10 \text{ N}\cdot\text{m}$ ($27 \pm 1 \text{ kg}\cdot\text{m}$, $195 \pm 7 \text{ ft}\cdot\text{lb}$)



NOTE:

- Stake lock nut at two points.
- Using spring balancer, check that starting load of roller bearing is 1.7 to 30.6 N (0.17 to 3.12 kg, 0.37 to 6.88 lb).

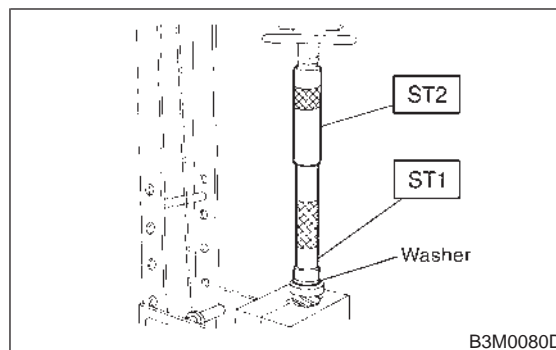


4. DRIVE PINION SHAFT

1) Install roller bearing onto drive pinion. Install washer ($33 \times 50 \times 5$) using ST1, ST2 and press.

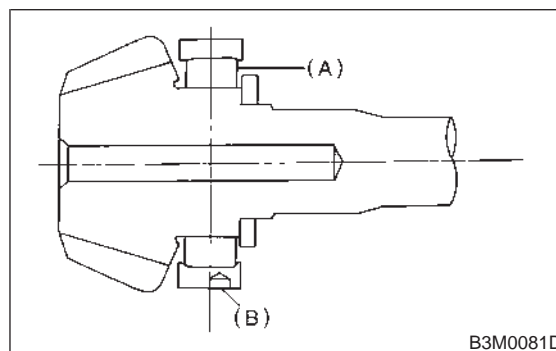
ST1 499277100 BUSH 1-2 INSTALLER

ST2 499277200 INSTALLER



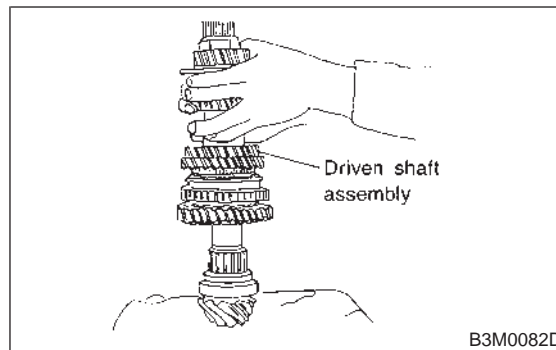
NOTE:

When installing roller bearing, note its directions (front and rear) because knock pin hole in outer race is offset.



- (A) Roller bearing
- (B) Knock pin hole

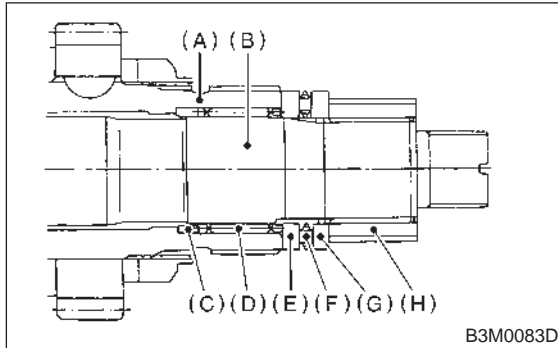
2) Install thrust bearing ($33 \times 50 \times 3$) and needle bearing ($30 \times 37 \times 23$). Install driven shaft assembly.



3) Install drive pinion collar, needle bearing, adjusting washer No. 2, thrust bearing, adjusting washer No. 1 and differential bevel gear sleeve in that order.

NOTE:

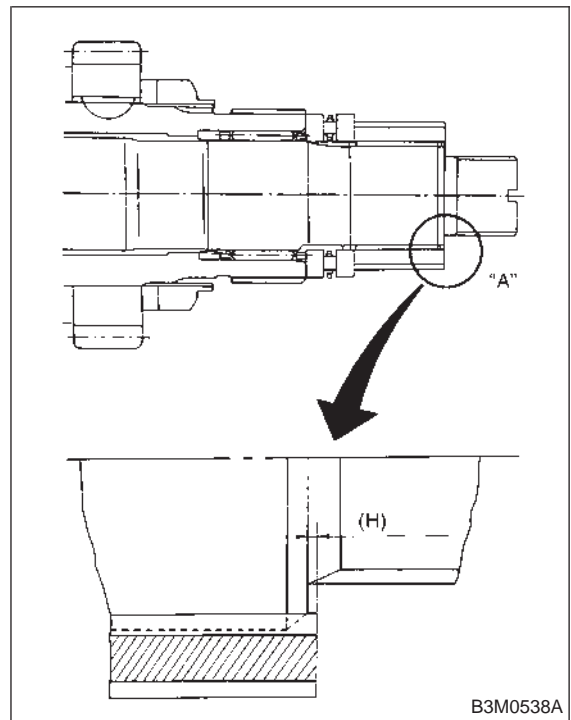
Be careful because spacer must be installed in proper direction.



- (A) Driven shaft
- (B) Drive shaft
- (C) Drive pinion collar
- (D) Needle bearing (25 × 30 × 20)
- (E) Washer No. 2 (25 × 36 × 4)
- (F) Thrust bearing (25 × 37.5 × 3)
- (G) Washer No. 1 (25 × 36 × t)
- (H) Differential bevel gear sleeve

C: ADJUSTMENT
1. THRUST BEARING PRELOAD

1) After completing the preceding steps 1) through 3), select adjusting washer No. 2 so that dimension (H) is zero through visual check. Position washer (18.3 × 30 × 4) and lock washer (18 × 30 × 2) and install lock nut (18 × 13.5).



2) Using ST1, ST2 and ST3, tighten lock nut to the specified torque.

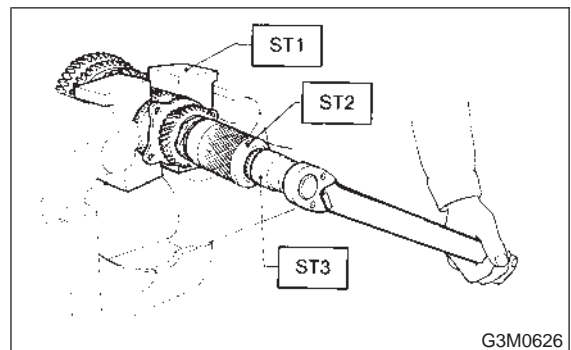
ST1 899884100 HOLDER

ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH (27)

Tightening torque:

118±8 N·m (12±0.8 kg-m, 86.8±5.8 ft-lb)



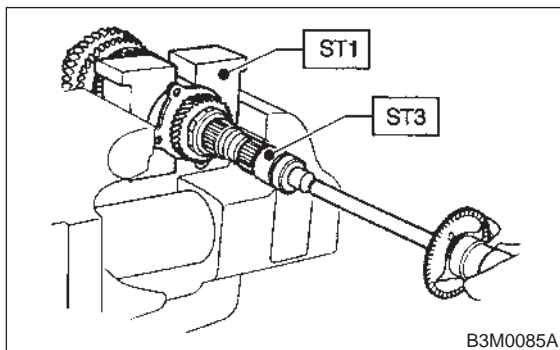
3) After removing ST2, measure starting torque using torque driver.

ST1 899884100 HOLDER

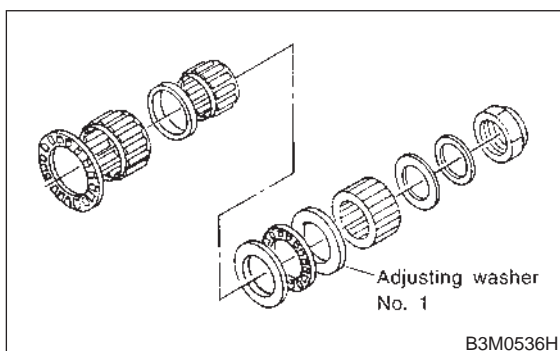
ST3 899988608 SOCKET WRENCH (27)

Starting torque:

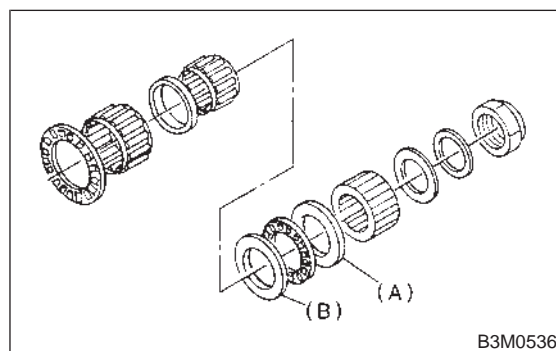
54 ± 25 N-m (5.5 ± 2.5 kg-m, 40 ± 18 ft-lb)



4) If starting torque is not within specified limit, select new adjusting washer No. 1 and recheck starting torque.



5) If specified starting torque range cannot be obtained when a No. 1 adjusting washer is used, then select a suitable No. 2 adjusting washer from those listed in the following table. Repeat steps 1) through 4) to adjust starting torque.



(A) Adjusting washer No. 1

(B) Adjusting washer No. 2

Starting torque	Dimension H	Washer No. 2
Low	Small	Select thicker one.
High	Large	Select thinner one.

Adjusting washer No. 2	
Part No.	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

6) Recheck that starting torque is within specified range, then clinch lock nut at four positions.

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

4. Main Shaft Assembly

A: DISASSEMBLY

1. 2200 cc MODEL

1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.

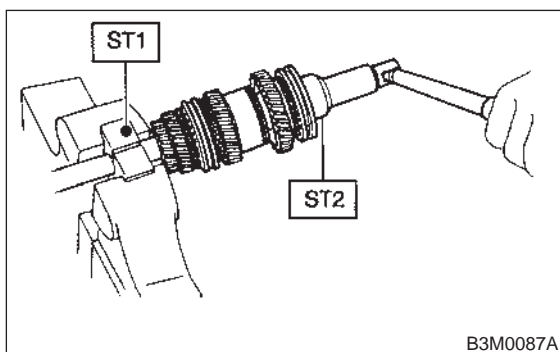
2) Remove lock nut from transmission main shaft assembly.

NOTE:

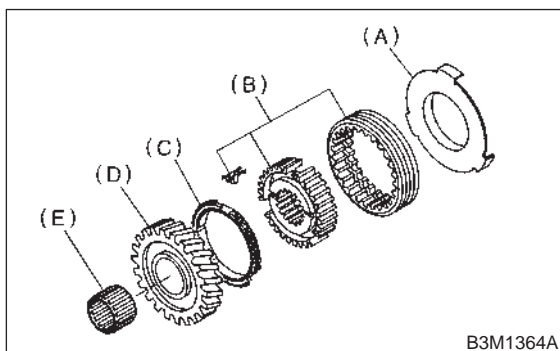
Remove caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER

ST2 499987003 SOCKET WRENCH (35)



3) Remove insert stopper plate, sleeve and hub assembly No. 2, baulk ring, 5th drive gear, and needle bearing.



- (A) Insert stopper plate
- (B) Sleeve and hub assembly No. 2
- (C) Baulk ring
- (D) 5th drive gear
- (E) Needle bearing (32 × 36 × 25.7)

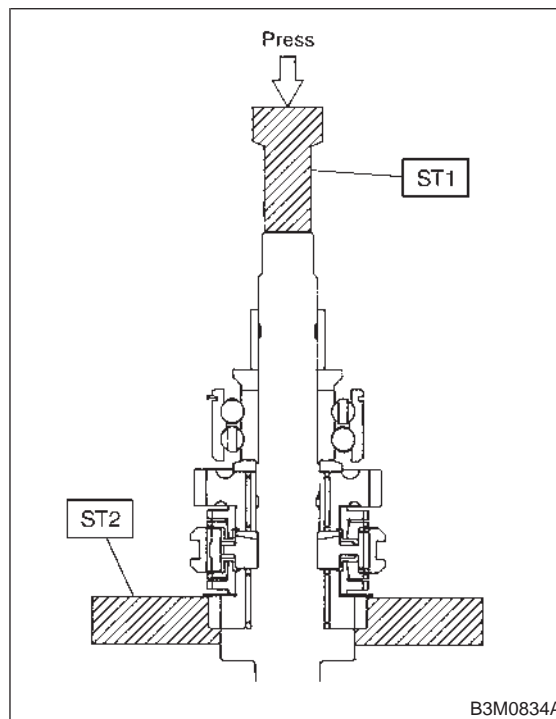
4) Using ST1 and ST2, remove the rest of parts.

NOTE:

Replace sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, marking engagement point on splines beforehand.

ST1 899864100 REMOVER

ST2 899714110 REMOVER



2. 2500 cc MODEL

1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.

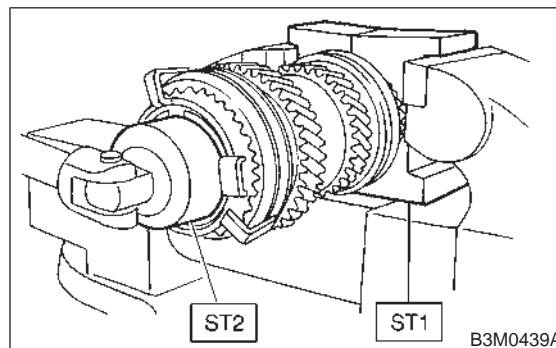
2) Remove lock nut from transmission main shaft assembly.

NOTE:

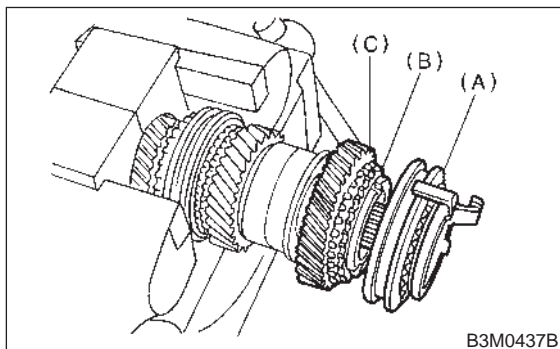
Remove caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER

ST2 499987003 SOCKET WRENCH (35)

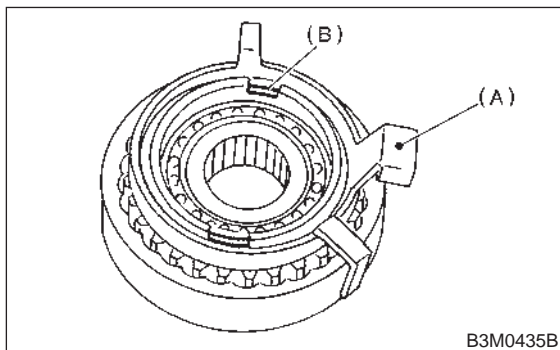


3) Remove 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing ($32 \times 36 \times 25.7$).



- (A) 5th-Rev sleeve and hub ASSY
- (B) Baulk ring
- (C) 5th drive gear

4) Remove snap ring and synchro cone stopper from 5th-Rev sleeve and hub assembly.



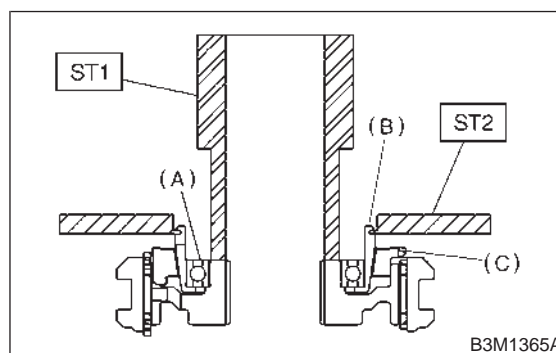
- (A) Synchro cone stopper
- (B) Snap ring

5) Using ST1, ST2 and a press, remove ball bearing, synchro cone and baulk ring (Rev).

NOTE:

- Replace sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, mark engagement point on splines beforehand.
- Do not reuse ball bearing.

ST1 499757002 SNAP RING PRESS
ST2 498077400 SYNCHRO CONE REMOVER



- (A) Ball bearing
- (B) Synchro cone
- (C) Baulk ring

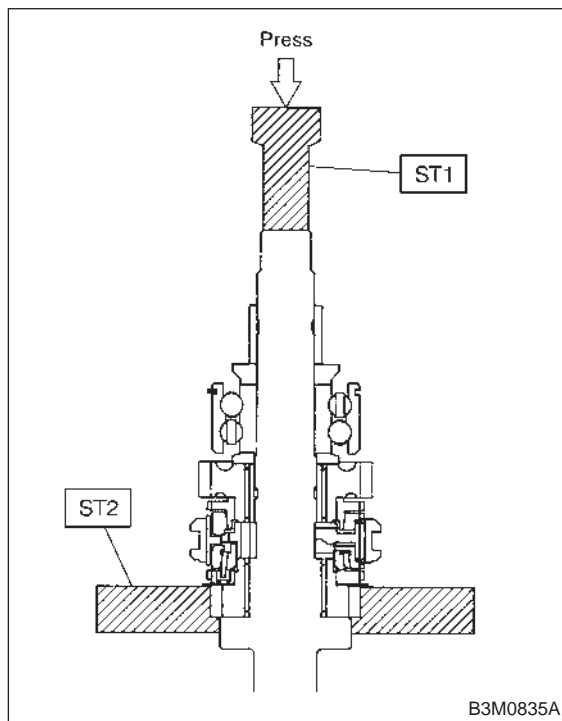
6) Using ST1 and ST2, remove the rest of parts.

NOTE:

Replace sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, marking engagement point on splines beforehand.

ST1 899864100 REMOVER

ST2 899714110 REMOVER



B: ASSEMBLY

CAUTION:

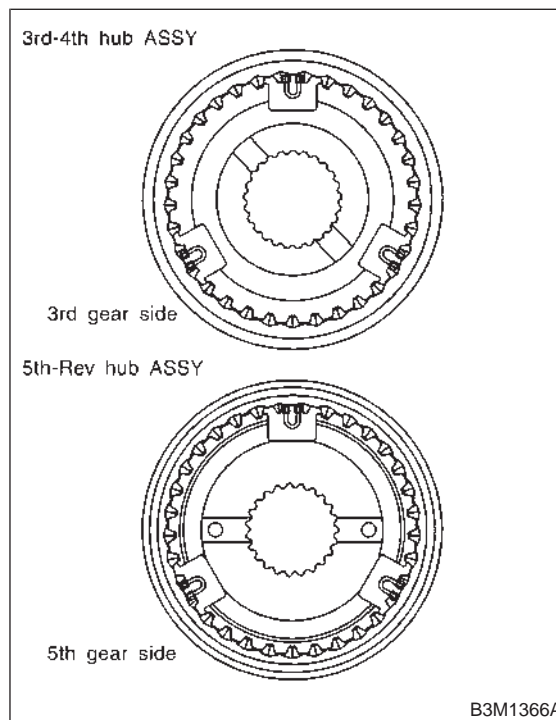
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton) during installation.

1. 2200 cc MODEL

1) Assemble sleeve and hub assembly for 3rd-4th and, 5th synchronizing.

NOTE:

Position open ends of spring 120° apart.



2) Install 3rd drive gear, baulk ring, and sleeve and hub assembly for 3rd-4th needle bearing (32 × 36 × 25.7) on transmission main shaft.

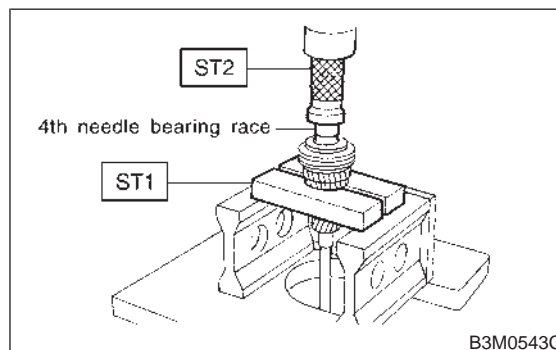
NOTE:

Align groove in baulk ring with shifting insert.

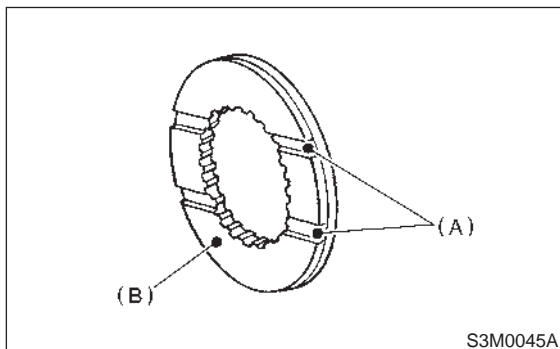
3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



4) Install baulk ring, needle bearing (32 × 30 × 25.7), 4th drive gear and 4th gear thrust washer to transmission main shaft.

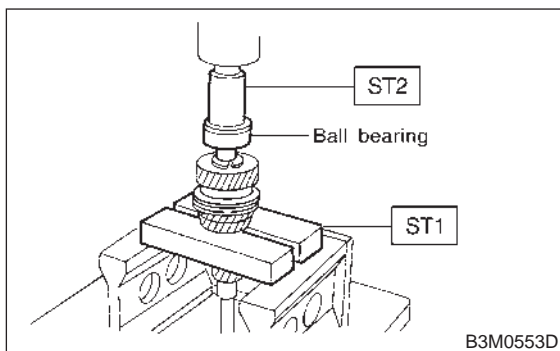


- (A) Groove
(B) 4th gear side

5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



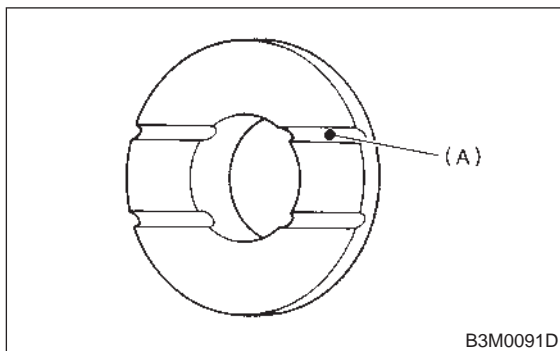
6) Using ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:

Face thrust washer in the correct direction.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER

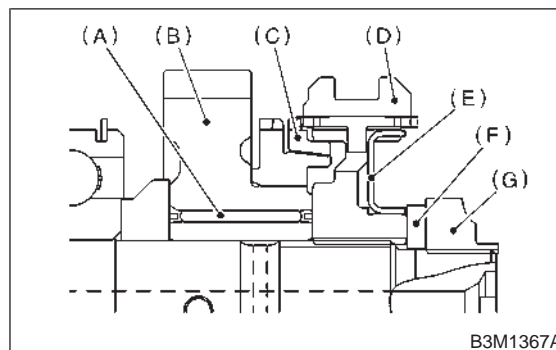


- (A) Face this surface to 5th gear side.

7) Install the following parts to the rear section of transmission main shaft.

NOTE:

- Align groove in baulk ring with shifting insert.
- Be sure to fit pawl of insert stopper plate into 4 mm (0.16 in) dia. hole in the boss section of synchronizer hub.



- (A) Needle bearing (32 × 36 × 25.7)
(B) 5th drive gear
(C) Baulk ring
(D) Sleeve and hub assembly
(E) Insert stopper plate
(F) Lock washer (22 × 38 × 2)
(G) Lock nut

8) Tighten lock nuts (22 × 13) to the specified torque using ST1 and ST2.

NOTE:

Secure lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH (35)

ST2 498937000 TRANSMISSION HOLDER

Tightening torque:

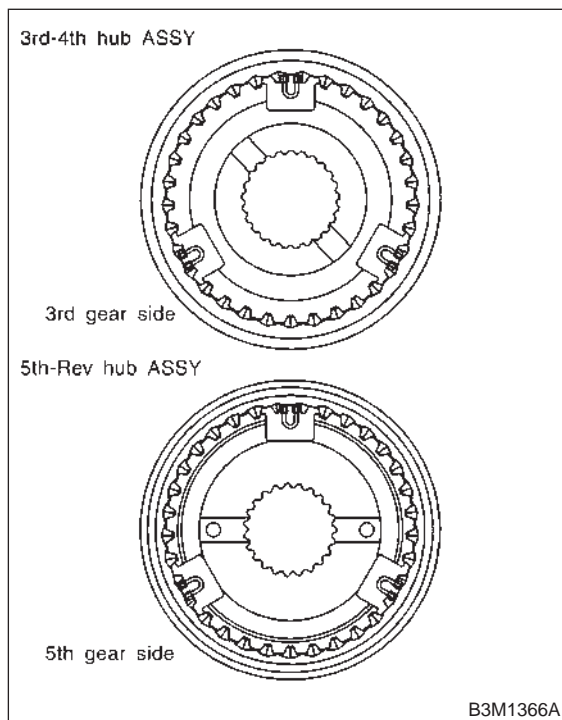
118±6 N·m (12.0±0.6 kg-m, 86.8±4.3 ft-lb)

2. 2500 cc MODEL

1) Assemble sleeve and hub assembly for 3rd-4th and, 5th synchronizing.

NOTE:

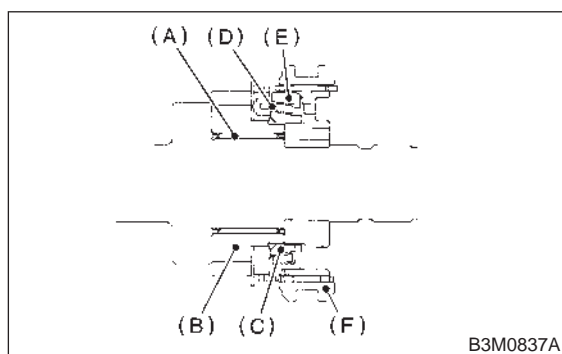
Position open ends of spring 120° apart.



2) Install 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve and hub assembly for 3rd needle bearing on transmission main shaft.

NOTE:

Align groove in baulk ring with insert key.

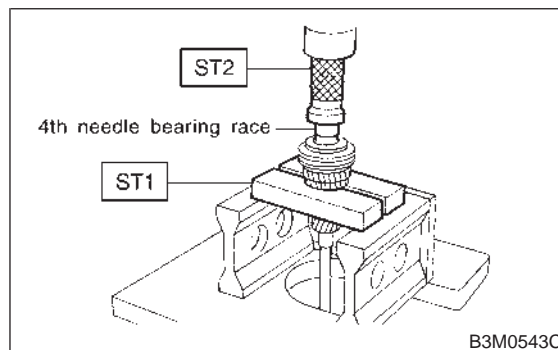


- (A) 3rd needle bearing (32 × 36 × 25.7)
- (B) 3rd drive gear
- (C) Inner baulk ring
- (D) Synchro cone
- (E) Outer baulk ring
- (F) Sleeve and hub ASSY

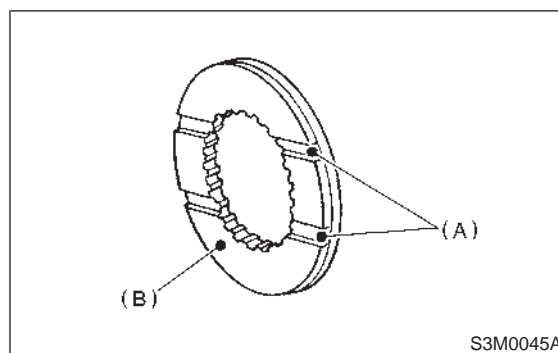
3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



4) Install baulk ring, needle bearing (32 × 30 × 25.7), 4th drive gear and 4th gear thrust washer to transmission main shaft.

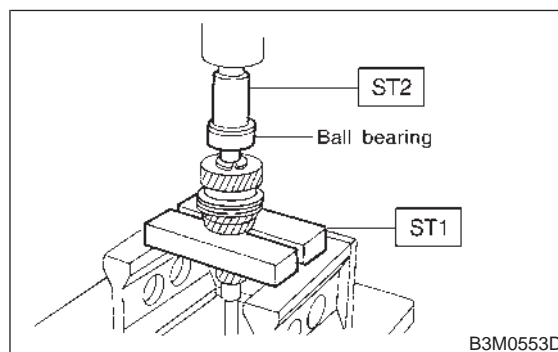


- (A) Groove
- (B) 4th gear side

5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



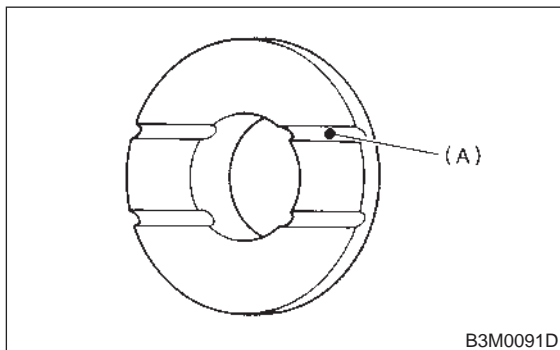
6) Using ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:

Face thrust washer in the correct direction.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



(A) Face this surface to 5th gear side.

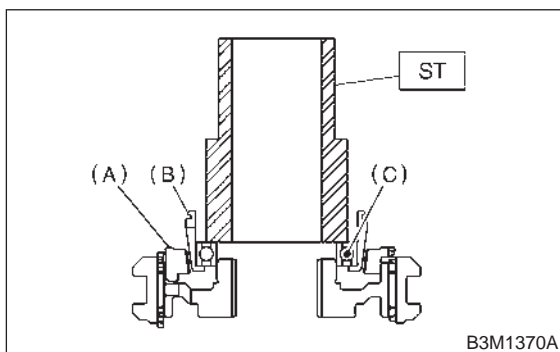
7) Install bearing onto synchro cone.

8) Install baulk ring and synchro cone onto 5th-Rev sleeve and hub assembly using ST and a press.

NOTE:

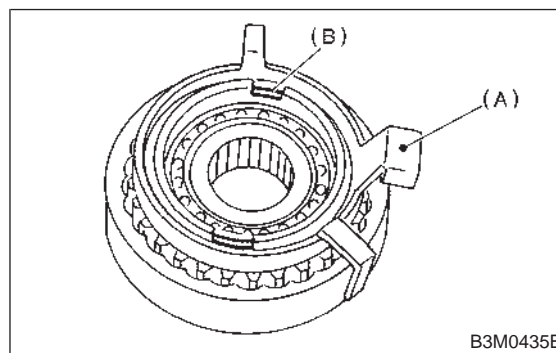
- Use new ball bearing.
- After press fitting, make sure synchro cone rotates freely.

ST 499757002 SNAP RING PRESS



(A) Baulk ring
(B) Synchro cone
(C) Ball bearing

9) Install synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.



(A) Synchro cone stopper
(B) Snap ring

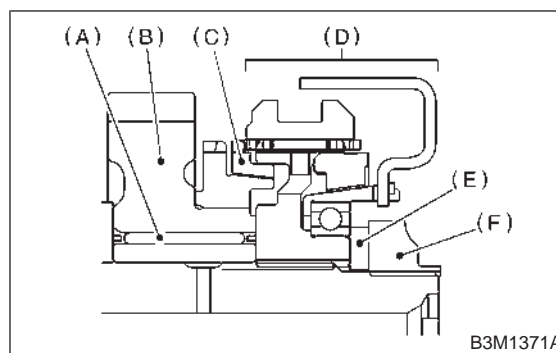
10) Install the rest parts to the rear section of transmission main shaft.

NOTE:

Align groove in baulk ring with shifting insert.

ST1 499987003 SOCKET WRENCH

ST2 498937000 TRANSMISSION HOLDER



(A) Needle bearing (32 × 36 × 25.7)
(B) 5th drive gear
(C) Baulk ring
(D) 5th-Rev sleeve and hub ASSY
(E) Lock washer (22 × 38 × 2)
(F) Lock nuts (22 × 13)

11) Tighten lock nuts to the specified torque using ST1 and ST2.

NOTE:

Secure lock nuts in two places after tightening.

ST1 499987000 SOCKET WRENCH

ST2 498937000 TRANSMISSION HOLDER

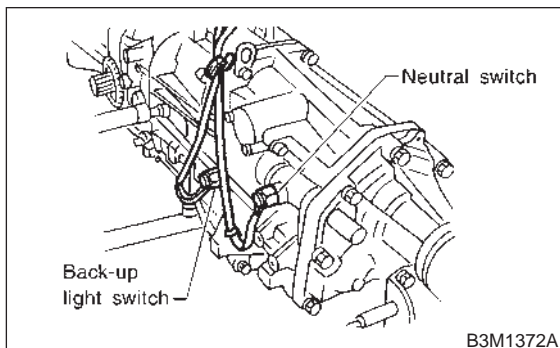
Tightening torque:

18±6 N·m (12.0±0.6 kg·m, 86.8±4.3 ft·lb)

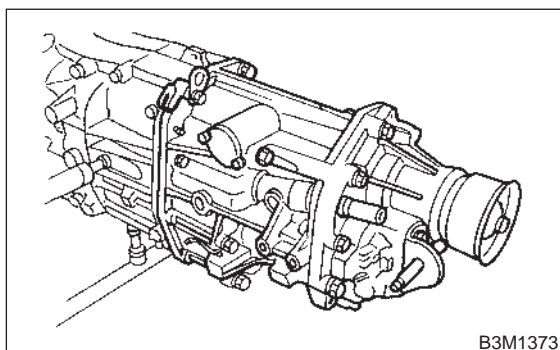
5. Transfer Case and Extension

A: REMOVAL

- 1) Remove back-up light switch and neutral switch.



- 2) Remove transfer case with extension assembly.

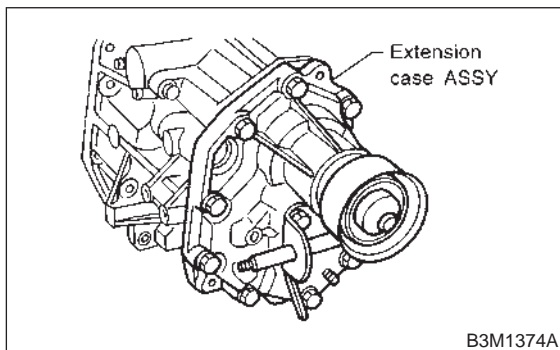


- 3) Remove shifter arm.

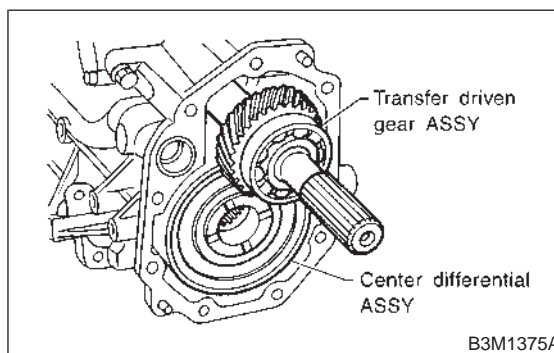
B: DISASSEMBLY

1. SEPARATION OF TRANSFER CASE AND EXTENSION ASSEMBLY

- 1) Separate transfer case and extension assembly.



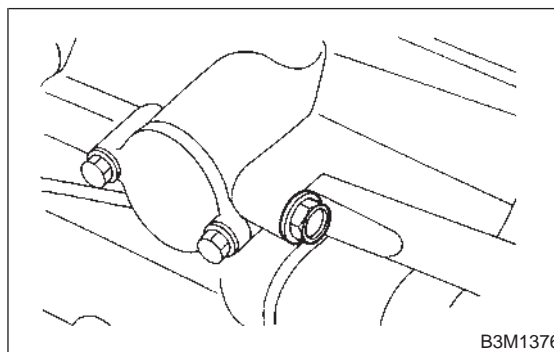
- 2) Remove transfer driven gear and center differential as a set.



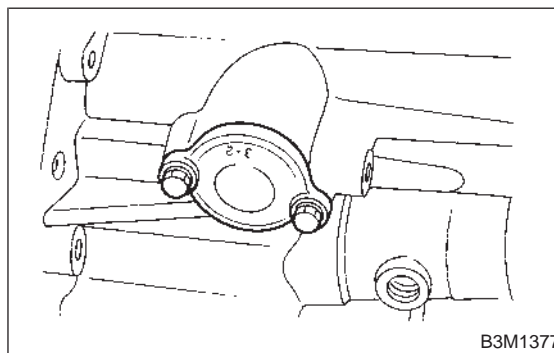
- 3) Remove thrust washer.

2. TRANSFER CASE

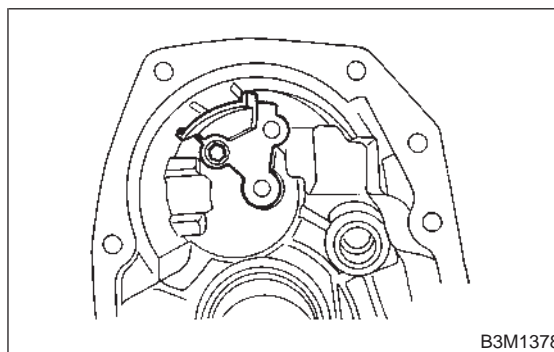
- 1) Remove plug, spring and reverse check ball.



- 2) Remove reverse check assembly.

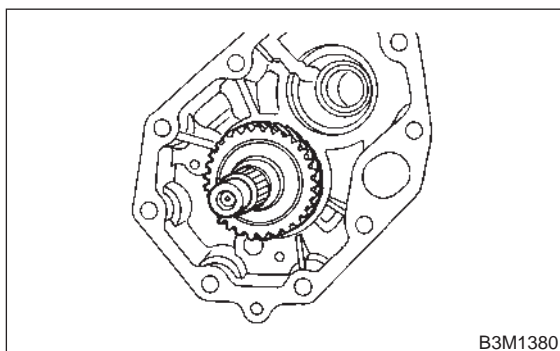


- 3) Remove oil guide.

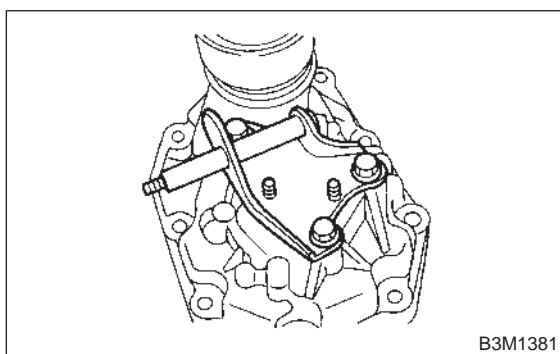


3. EXTENSION

- 1) Remove transfer drive gear assembly.

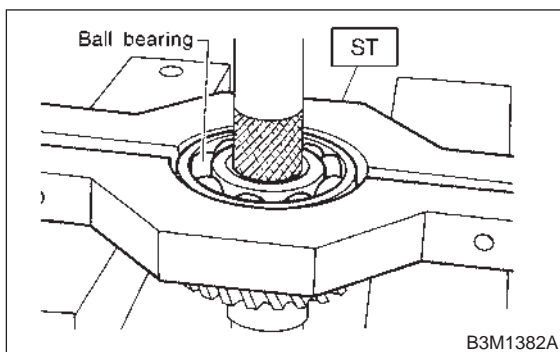


- 2) Remove shift bracket.



- 3) Using ST, remove ball bearing from transfer drive gear.

ST 498077100 REMOVER



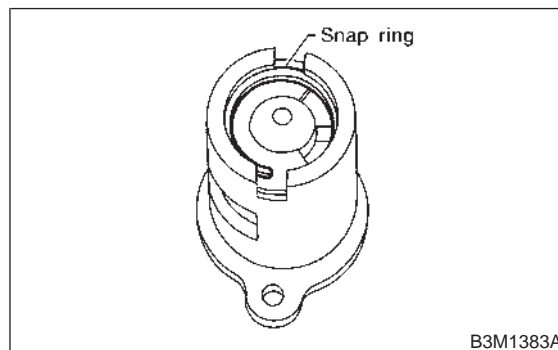
- 4) Remove oil seal from extension case.

4. REVERSE CHECK SLEEVE

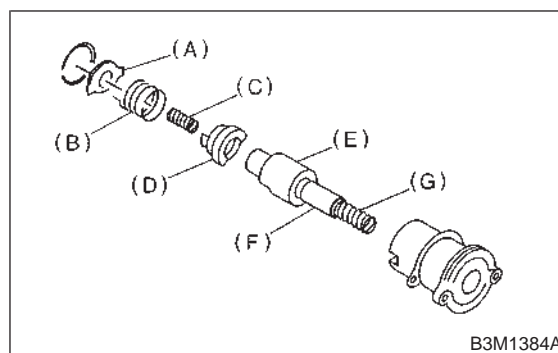
- 1) Using a standard screwdriver, remove snap ring.

NOTE:

Replace snap ring with a new one if deformed or weakened.



- 2) Remove reverse check plate, reverse check spring, reverse check cam, return spring (5th-Rev), reverse accent shaft, return spring cap and return spring (1st-2nd).



- (A) Reverse check plate
- (B) Reverse check spring
- (C) Return spring (5th-Rev)
- (D) Reverse check cam
- (E) Reverse accent shaft
- (F) Return spring cap
- (G) Return spring (1st-2nd)

- 3) Remove O-ring.

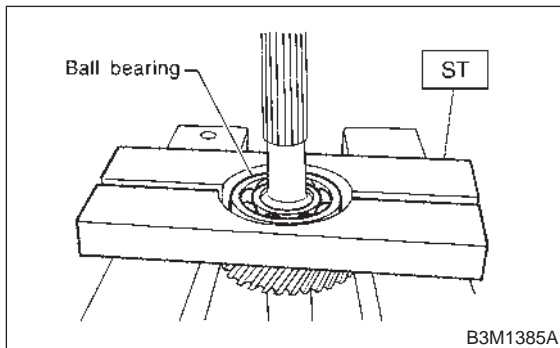
NOTE:

- Reverse check sleeve assembly uses an O-ring which should not be scratched.
- Be careful not to break adjustment shim placed between reverse check sleeve assembly and case.

5. TRANSFER DRIVEN GEAR

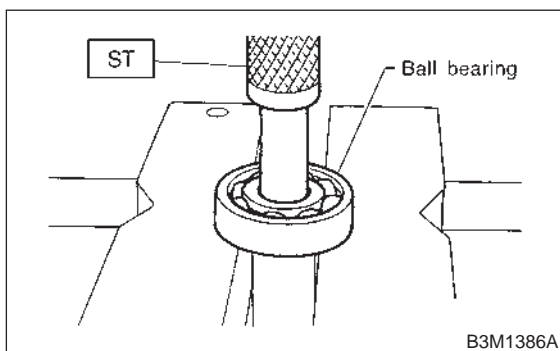
1) Using ST, remove ball bearing from transfer driven gear.

ST 498077000 REMOVER



2) Using ST, remove ball bearing from transfer driven gear.

ST 899864100 REMOVER



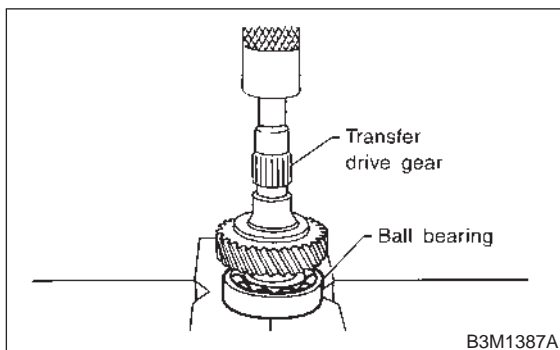
C: ASSEMBLY

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton) during installation.

1. EXTENSION

- 1) Install ball bearing to transfer drive gear.



- 2) Using ST, install oil seal to extension case.

CAUTION:

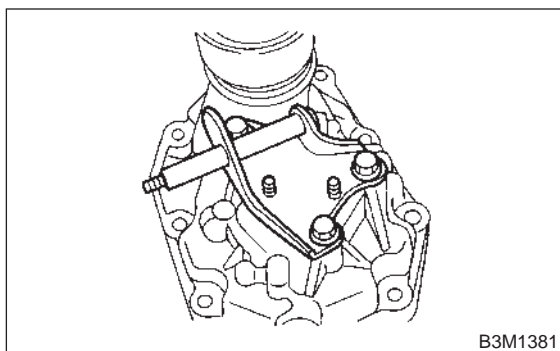
Use new oil seal.

ST 498057300 INSTALLER

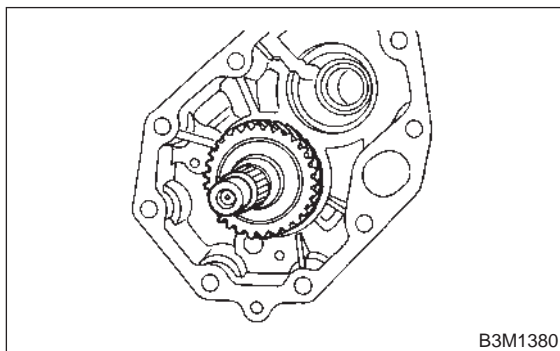
- 3) Install shift bracket to extension case.

Tightening torque:

25 ± 2 N·m (2.5 ± 0.2 kg·m, 18.1 ± 1.4 ft·lb)



- 4) Install transfer drive gear to extension case.

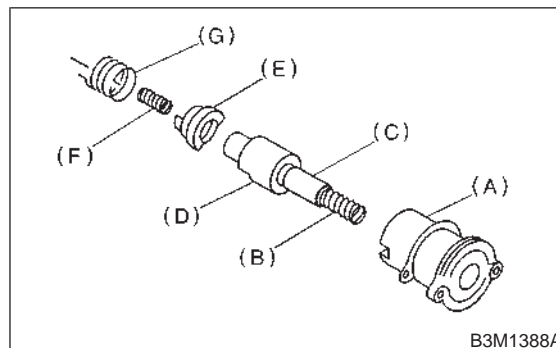


2. REVERSE CHECK SLEEVE

- 1) Install return spring (1st-2nd), return spring cap, reverse accent shaft, check cam, return spring and check spring onto reverse check sleeve.

NOTE:

Be sure the bent section of reverse check spring is positioned in the groove in check cam.



- (A) Reverse check sleeve
- (B) Return spring (1st-2nd)
- (C) Return spring cap
- (D) Reverse accent shaft
- (E) Return spring (5th-Rev)
- (F) Reverse check cam
- (G) Reverse check spring

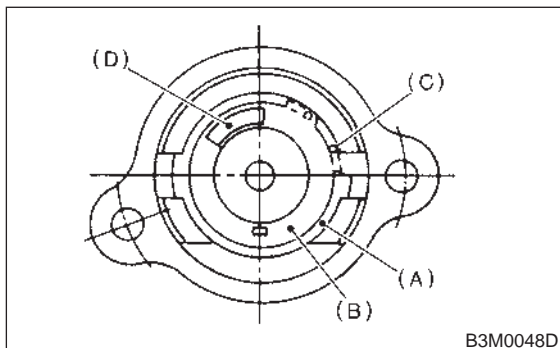
- 2) Hook the bent section of reverse check spring over reverse check plate.
- 3) Rotate cam so that the protrusion of reverse check cam is at the opening in plate.
- 4) With cam held in that position, install plate onto reverse check sleeve and hold with snap ring.
- 5) Position O-ring in groove in sleeve.

CAUTION:

- Make sure the cutout section of reverse accent shaft is aligned with the opening in reverse check sleeve.
- Spin cam by hand for smooth rotation.

- Move cam and shaft all the way toward plate and release.

If cam does not return properly, replace reverse check spring; if shaft does not, check for scratches on the inner surface of sleeve. If sleeve is in good order, replace spring.



- (A) Snap ring
- (B) Reverse check plate
- (C) Check spring
- (D) Check cam

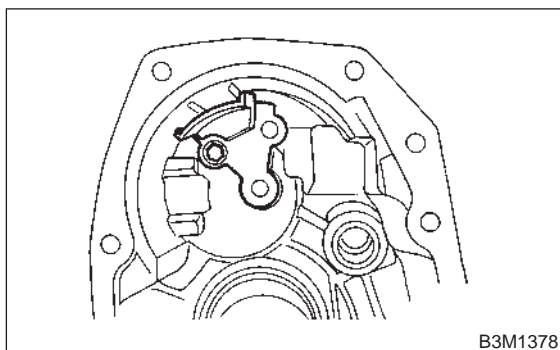
- Select a suitable reverse accent shaft and reverse check plate. <Ref. to 3-1 [W5E0].>

3. TRANSFER CASE

- 1) Install oil guide to transfer case.

Tightening torque:

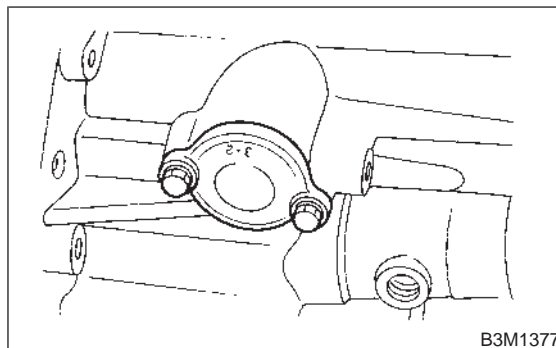
$6.4 \pm 0.5 \text{ N-m}$ ($0.65 \pm 0.05 \text{ kg-m}$, $4.7 \pm 0.4 \text{ ft-lb}$)



- 2) Install reverse check sleeve assembly to transfer case.

Tightening torque:

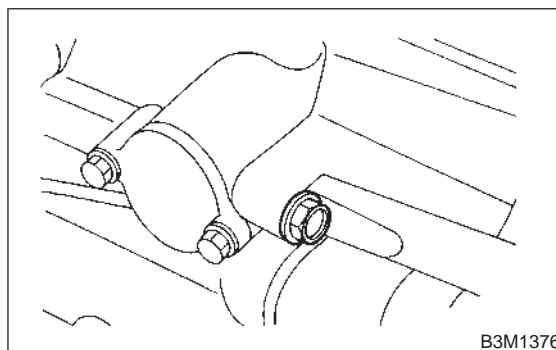
$6.4 \pm 0.5 \text{ N-m}$ ($0.65 \pm 0.05 \text{ kg-m}$, $4.7 \pm 0.4 \text{ ft-lb}$)



- 3) Install ball, reverse accent spring, washer and plug to transfer case.

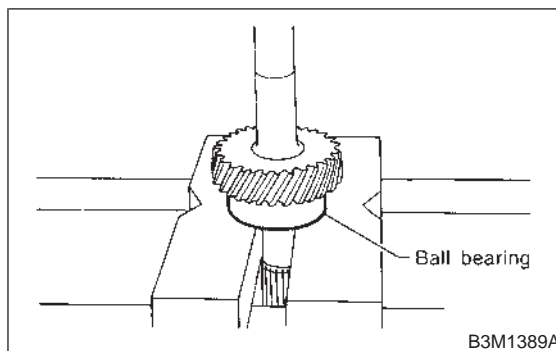
Tightening torque:

$10 \pm 1 \text{ N-m}$ ($1.0 \pm 0.1 \text{ kg-m}$, $7.2 \pm 0.7 \text{ ft-lb}$)

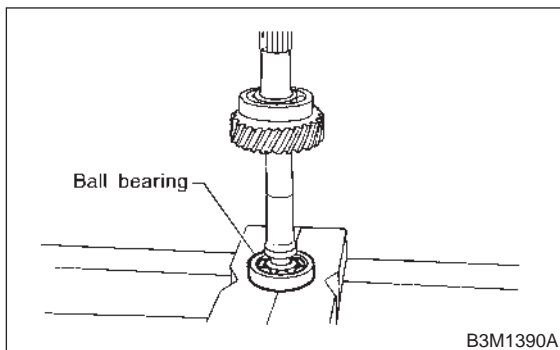


4. TRANSFER DRIVEN GEAR

- 1) Install ball bearing to transfer driven gear.

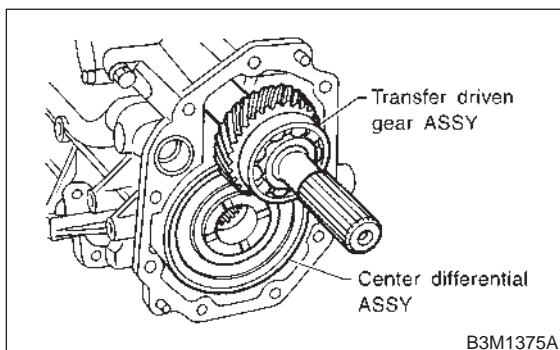


- 2) Install ball bearing to transfer driven gear.

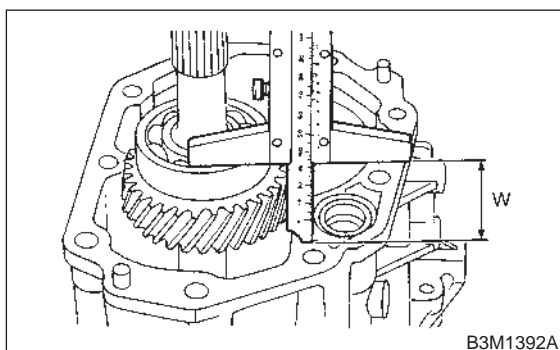


5. COMBINATION OF TRANSFER CASE AND EXTENSION ASSEMBLY

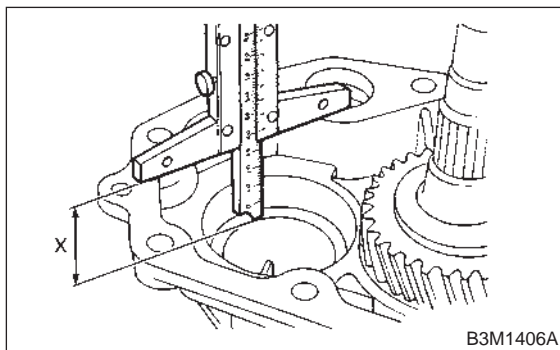
- 1) Install center differential and transfer driven gear into transfer case.



- 2) Measure height "W" between transfer case and ball bearing on the transfer driven gear.



- 3) Measure depth "X".



- 4) Calculate space "Y" using the following equation: $Y = X - W + 0.24 \text{ mm (0.0094 in)}$ [Thickness of gasket]

- 5) Select suitable washer in the following table:

Standard clearance between thrust washer and ball bearing:

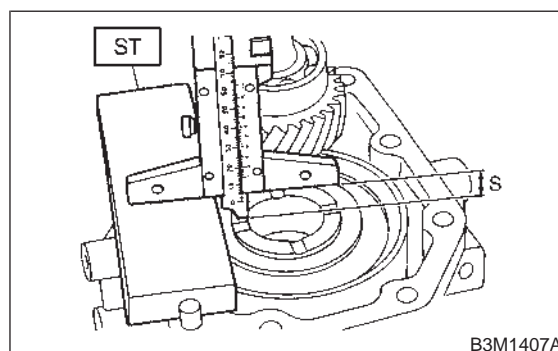
0.05 — 0.30 mm (0.0020 — 0.0118 in)

Space "Y" mm (in)	Thrust washer	
	Part No.	Thickness mm (in)
0.55 — 0.79 (0.0217 — 0.0311)	803052021	0.50 (0.0197)
0.80 — 1.04 (0.0315 — 0.0409)	803052022	0.75 (0.0295)
1.05 — 1.30 (0.0413 — 0.0512)	803052023	1.00 (0.0394)

- 6) Fit thrust washers on transfer drive shaft.

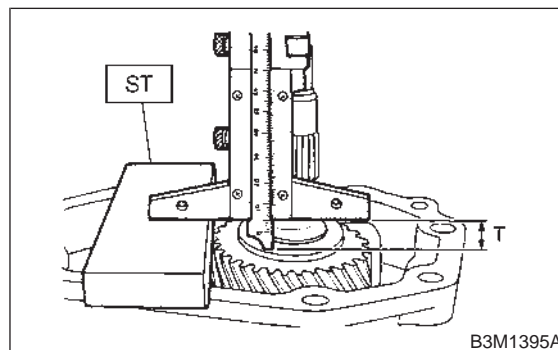
- 7) Measure depth "T" between extension case and transfer drive gear.

ST 398643600 GAUGE



- 8) Measure depth "T" between extension case and transfer drive gear.

ST 398643600 GAUGE



- 9) Calculate space "U" using the following equation: $U = S + T - 0.24 \text{ mm (0.0094 in)}$ [Thickness of gasket]

- 10) Select suitable washer in the following table:

Standard clearance:

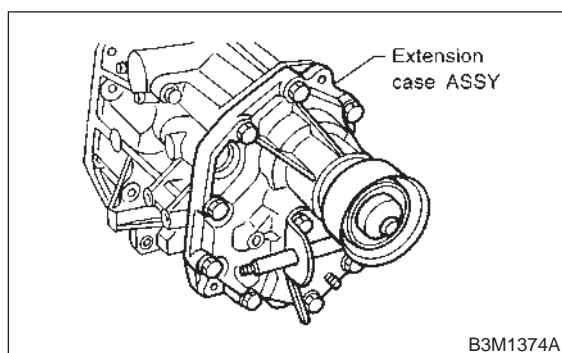
0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

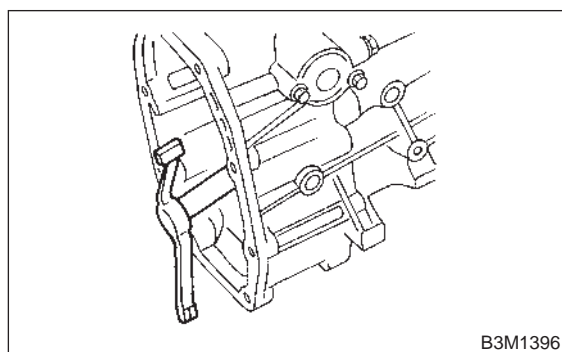
- 11) Fit thrust washer on center differential.
- 12) Install extension assembly into transfer case.

Tightening torque:

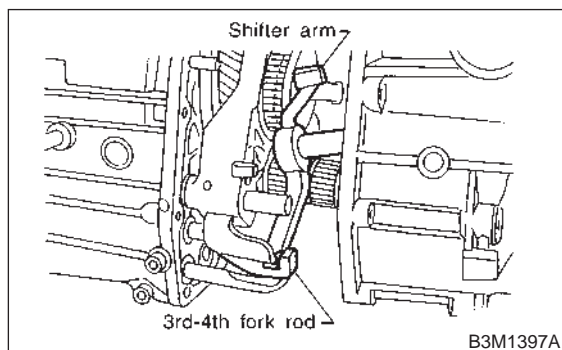
37 ± 3 N·m (3.8 ± 0.3 kg·m, 27.5 ± 2.2 ft·lb)

**D: INSTALLATION**

- 1) Install shifter arm to transfer case.



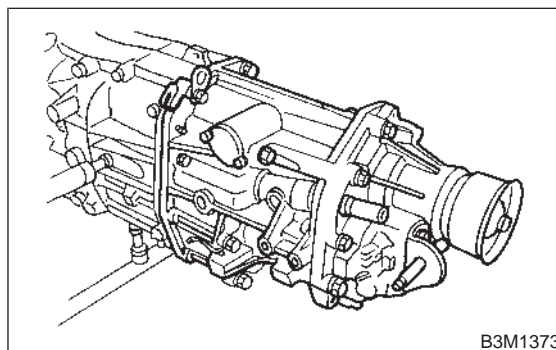
- 2) Hang the shifter arm on the 3rd-4th fork rod.



- 3) Install transfer case with extension assembly to transmission case.

Tightening torque:

24.5 ± 2.0 N·m (2.50 ± 0.20 kg·m, 18.1 ± 1.4 ft·lb)

**E: ADJUSTMENT****1. NEUTRAL POSITION ADJUSTMENT**

- 1) Shift gear into 3rd gear position.
- 2) Shifter arm turns lightly toward the 1st/2nd gear side but heavily toward the reverse gear side because of the function of the return spring, until arm contacts the stopper.
- 3) Make adjustment so that the heavy stroke (reverse side) is a little more than the light stroke (1st/2nd side).
- 4) To adjust, remove bolts holding reverse check sleeve assembly to the case, move sleeve assembly outward, and place adjustment shim (0 to 1 ea.) between sleeve assembly and case to adjust the clearance.

CAUTION:

Be careful not to break O-ring when placing shim(s).

NOTE:

- When shim is removed, the neutral position will move closer to reverse; when shim is added, the neutral position will move closer to 1st gear.
- If shims alone cannot adjust the clearance, replace reverse accent shaft and re-adjust.

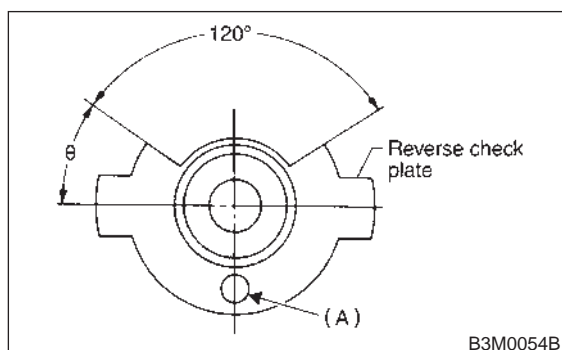
Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA090	X	Neutral position is closer to 1st gear.
32188AA100	Y	Standard
32188AA110	Z	Neutral position is closer to reverse gear.

2. REVERSE CHECK PLATE ADJUSTMENT

- 1) Shift shifter arm to "5th" and then to reverse to see if reverse check mechanism operates properly.
- 2) Also check to see if arm returns to neutral when released from the reverse position. If arm does not return properly, replace reverse check plate.

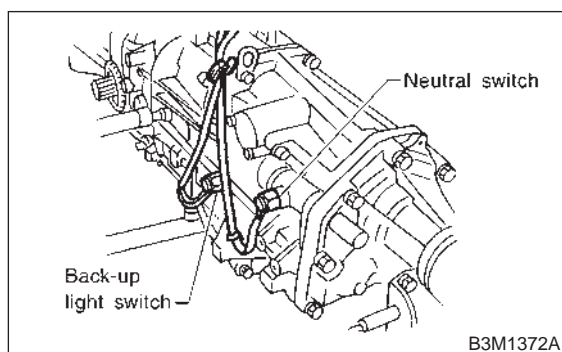
Reverse check plate			
Part No.	(A): No.	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
32189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.



- 3) Install neutral position switch and back-up light switch to transfer case.

Tightening torque:

24.5±2.0 N·m (2.50±0.20 kg-m, 18.1±1.4 ft-lb)



6. Front Differential

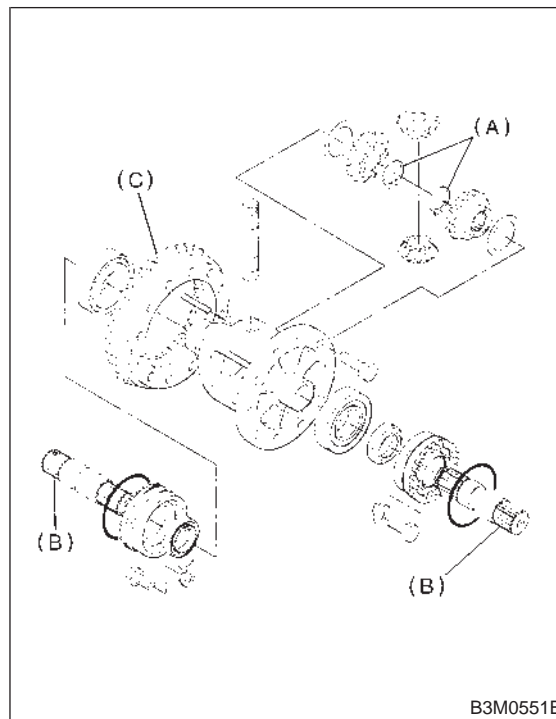
A: DISASSEMBLY

- 1) Remove right and left snap rings from differential, and then remove two axle drive shafts.

NOTE:

During reassembly, reinstall each axle drive shaft in the same place from which it was removed.

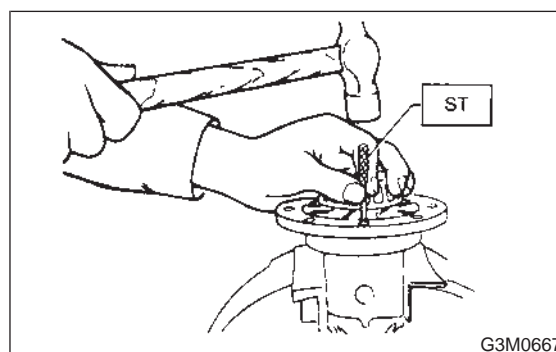
- 2) Loosen twelve bolts and remove hypoid drive gear.



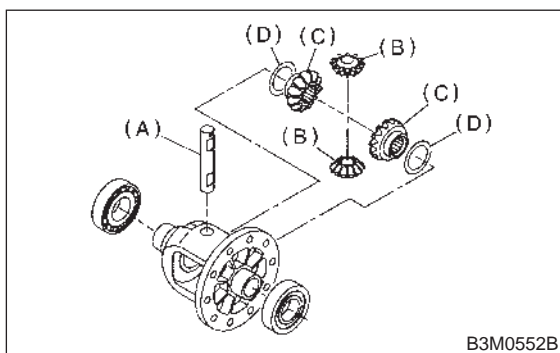
- (A) Snap ring
- (B) Axle drive shaft
- (C) Hypoid drive gear

- 3) Drive out straight pin from differential assembly toward hypoid driven gear.

ST 899904100 REMOVER

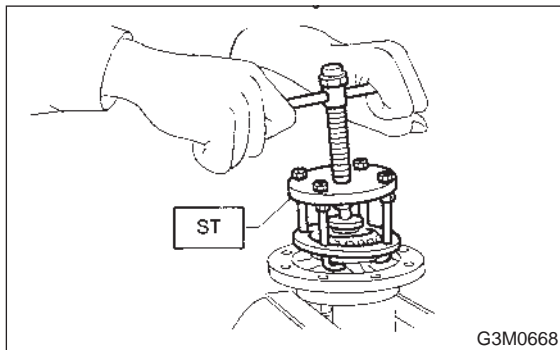


4) Pull out pinion shaft, and remove differential bevel pinion and gear and washer.



- (A) Pinion shaft
- (B) Differential bevel pinion
- (C) Differential bevel gear
- (D) Washer

5) Remove roller bearing using ST.
ST 399527700 PULLER SET

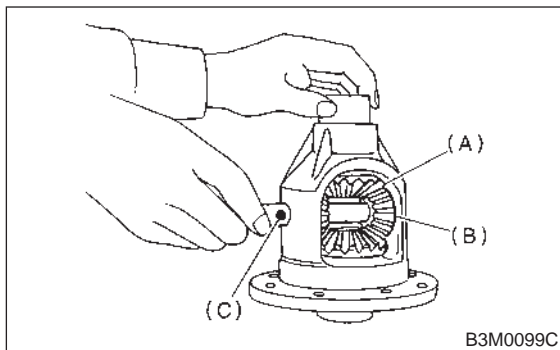


B: ASSEMBLY

1) Install bevel gear and bevel pinion together with washers, and insert pinion shaft.

NOTE:

Face the chamfered side of washer toward gear.



- (A) Differential bevel gear
- (B) Differential bevel pinion
- (C) Pinion shaft

2) Measure backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it.

NOTE:

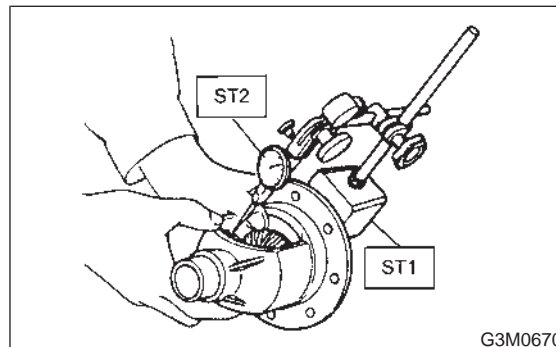
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



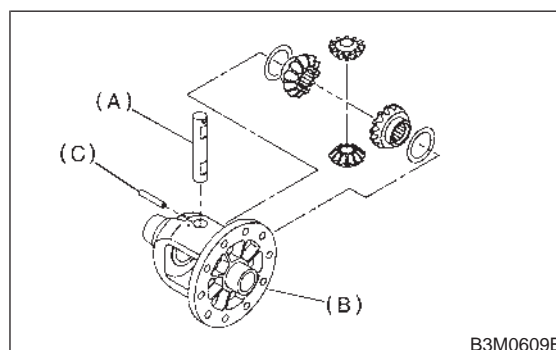
Washer (38.1 × 50 × t)	
Part No.	Thickness mm (in)
803038021	0.925 — 0.95 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

3) Align pinion shaft and differential case at their holes, and drive straight pin into holes from the hypoid driven gear side, using ST.

NOTE:

Lock straight pin after installing.

ST 899904100 REMOVER



- (A) Pinion shaft
- (B) Differential case
- (C) Straight pin

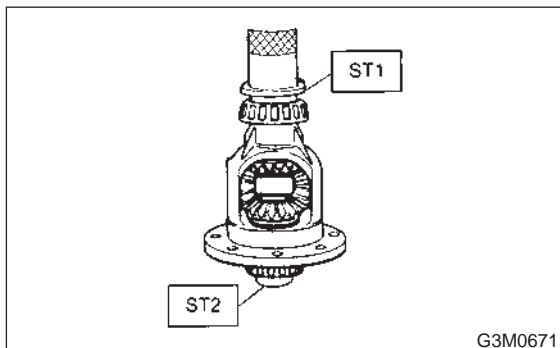
4) Install roller bearing (40 × 80 × 19.75) to differential case.

NOTE:

Be careful because roller bearing outer races are used as a set.

ST1 499277100 BUSH 1-2 INSTALLER

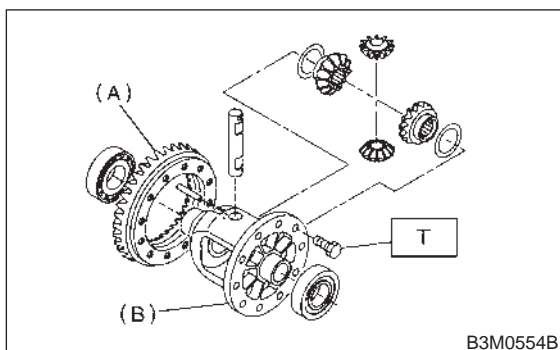
ST2 398497701 ADAPTER



5) Install hypoid driven gear to differential case using twelve bolts.

Tightening torque:

T: 62±5 N·m (6.3±0.5 kg-m, 45.6±3.6 ft-lb)



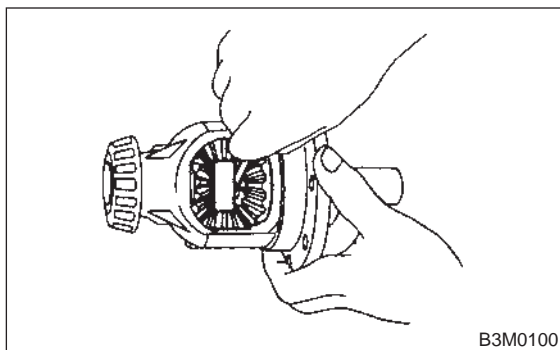
(A) Hypoid driven gear

(B) Differential case

6) Position drive axle shaft in differential case and hold it with outer snap ring (Outer-28). Using a thickness gauge, measure clearance between the shaft and case is within specifications.

Clearance:

0 — 0.2 mm (0 — 0.008 in)



7) If it is not within specifications, replace snap ring with a suitable one.

Snap ring (Outer-28)	
Part No.	Thickness mm (in)
805028011	1.05 (0.0413)
805028012	1.20 (0.0472)

7. Center Differential

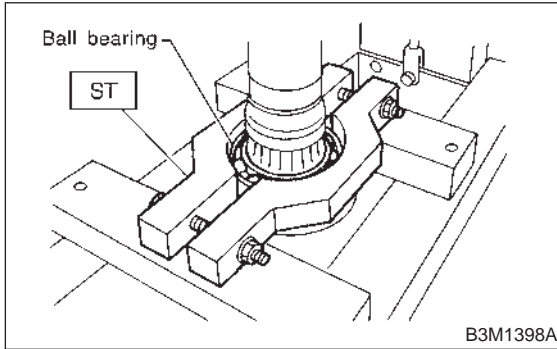
A: DISASSEMBLY AND ASSEMBLY

- 1) Remove ball bearing using ST.

CAUTION:

Do not reuse ball bearing.

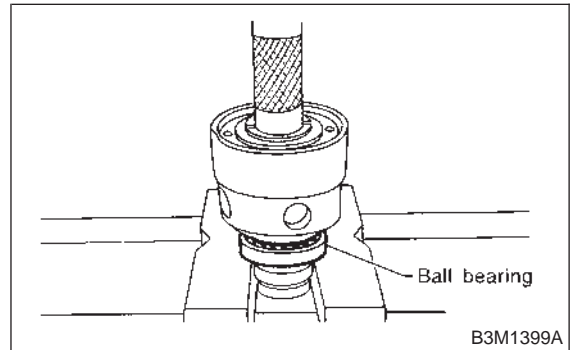
ST 498077300 CENTER DIFFERENTIAL
BEARING REMOVER



- 2) Install ball bearing to center differential assembly.

NOTE:

Do not disassemble center differential because it is a non-disassemble part.



1. Manual Transmission

Symptom and possible cause	Remedy
1. Gears are difficult to intermesh. The cause for difficulty in shifting gears can be classified into two kinds: one is malfunction of the gear shift system and the other is malfunction of the transmission. However, if the operation is heavy and engagement of the gears is difficult, defective clutch disengagement may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.	
(a) Worn, damaged or burred chamfer of internal spline of sleeve and reverse driven gear	Replace.
(b) Worn, damaged or burred chamfer of spline of gears	Replace.
(c) Worn or scratched bushings	Replace.
(d) Incorrect contact between synchronizer ring and gear cone or wear	Correct or replace.
2. Gear slips out.	
(1) Gear slips out when coasting on rough road.	
(2) Gear slips out during acceleration.	
(a) Defective pitching stopper adjustment	Adjust.
(b) Loose engine mounting bolts	Tighten or replace.
(c) Worn fork shifter, broken shifter fork rail spring	Replace.
(d) Worn or damaged ball bearing	Replace.
(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
(f) Worn tooth step of synchronizer hub (responsible for slip-out of 3rd gear)	Replace.
(g) Worn 1st driven gear, needle bearing and race	Replace.
(h) Worn 2nd driven gear, needle bearing and race	Replace.
(i) Worn 3rd drive gear and bushing	Replace.
(j) Worn 4th drive gear and bushing	Replace.
(k) Worn reverse idler gear and bushing	Replace.
3. Unusual noise comes from transmission. If an unusual noise is heard when the vehicle is parked with its engine idling and if the noise ceases when the clutch is disengaged, it may be considered that the noise comes from the transmission.	
(a) Insufficient or improper lubrication	Lubricate or replace with specified oil.
(b) Worn or damaged gears and bearings	Replace.
NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.	

2. Differential

Symptom and possible cause	Remedy
4. Broken differential (case, gear, bearing, etc.) Abnormal noise will develop and finally it will become impossible to continue to run due to broken pieces obstructing the gear revolution.	
(a) Insufficient or improper oil	Disassemble differential and replace broken components and at the same time check other components for any trouble, and replace if necessary.
(b) Use of vehicle under severe conditions such as excessive load and improper use of clutch	Readjust bearing preload and backlash and face contact of gears.
(c) Improper adjustment of taper roller bearing	Adjust.
(d) Improper adjustment of drive pinion and hypoid driven gear	Adjust.
(e) Excessive backlash due to worn differential side gear, washer or differential pinion	Add recommended oil to specified level. Do not use vehicle under severe operating conditions.

Symptom and possible cause	Remedy
(f) Loose hypoid driven gear clamping bolts	Tighten.
<p>5. Differential and hypoid gear noises</p> <p>Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of the trouble. However noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following four kinds of noises.</p>	
(1) Gear noise when driving: If noise increases as vehicle speed increases it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc.	
(2) Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment	
(3) Bearing noise when driving or when coasting: Cracked, broken or damaged bearings	
(4) Noise which mainly occurs when turning: Unusual noise from differential side gear, differential pinion, differential pinion shaft, etc.	
(a) Insufficient oil	Lubricate.
(b) Improper adjustment of hypoid driven gear and drive pinion	Check tooth contact.
(c) Worn teeth of hypoid driven gear and drive pinion	Replace as a set. Readjust bearing preload.
(d) Loose roller bearing	Readjust hypoid driven gear to drive pinion backlash and check tooth contact.
(e) Distorted hypoid driven gear or differential case	Replace.
(f) Worn washer and differential pinion shaft	Replace.

AUTOMATIC TRANSMISSION AND DIFFERENTIAL

3-2

	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Automatic Transmission and Differential	2
C COMPONENT PARTS	15
1. Torque Converter Clutch and Case	15
2. Oil Pump.....	16
3. Transmission Case and Control Device.....	18
4. Control Valve and Harness Routing.....	20
5. High Clutch and Reverse Clutch.....	21
6. Planetary Gear and 2-4 Brake	22
7. Low Clutch and Low & Reverse Brake	23
8. Reduction Gear	24
9. Differential Case	25
10. Transfer and Extension	26
W SERVICE PROCEDURE	27
1. General.....	27
2. Inhibitor Switch	30
3. Sensor (in transmission)	33
4. Shift Solenoid, Duty Solenoid and Valve	34
5. Duty Solenoid C and Transfer Valve Body	37
6. Road Test	42
7. Stall Test.....	43
8. Time Lag Test.....	45
9. Line Pressure Test	45
10. Transfer Clutch Pressure Test.....	47
11. Overall Transmission.....	48
12. Reduction Drive Gear Assembly	76
13. Reduction Driven Gear.....	77
14. Control Valve Body.....	78
15. Oil Pump Assembly	82
16. Drive Pinion Shaft	84
17. High Clutch and Reverse Clutch.....	87
18. Low Clutch Drum and Planetary Gear.....	93
19. Differential Case Assembly	100
20. Transfer Clutch.....	101
21. Transfer Valve Body	104
22. Transmission Control Module.....	105
23. Dropping Resistor.....	106

1. Automatic Transmission and Differential

A: SPECIFICATIONS

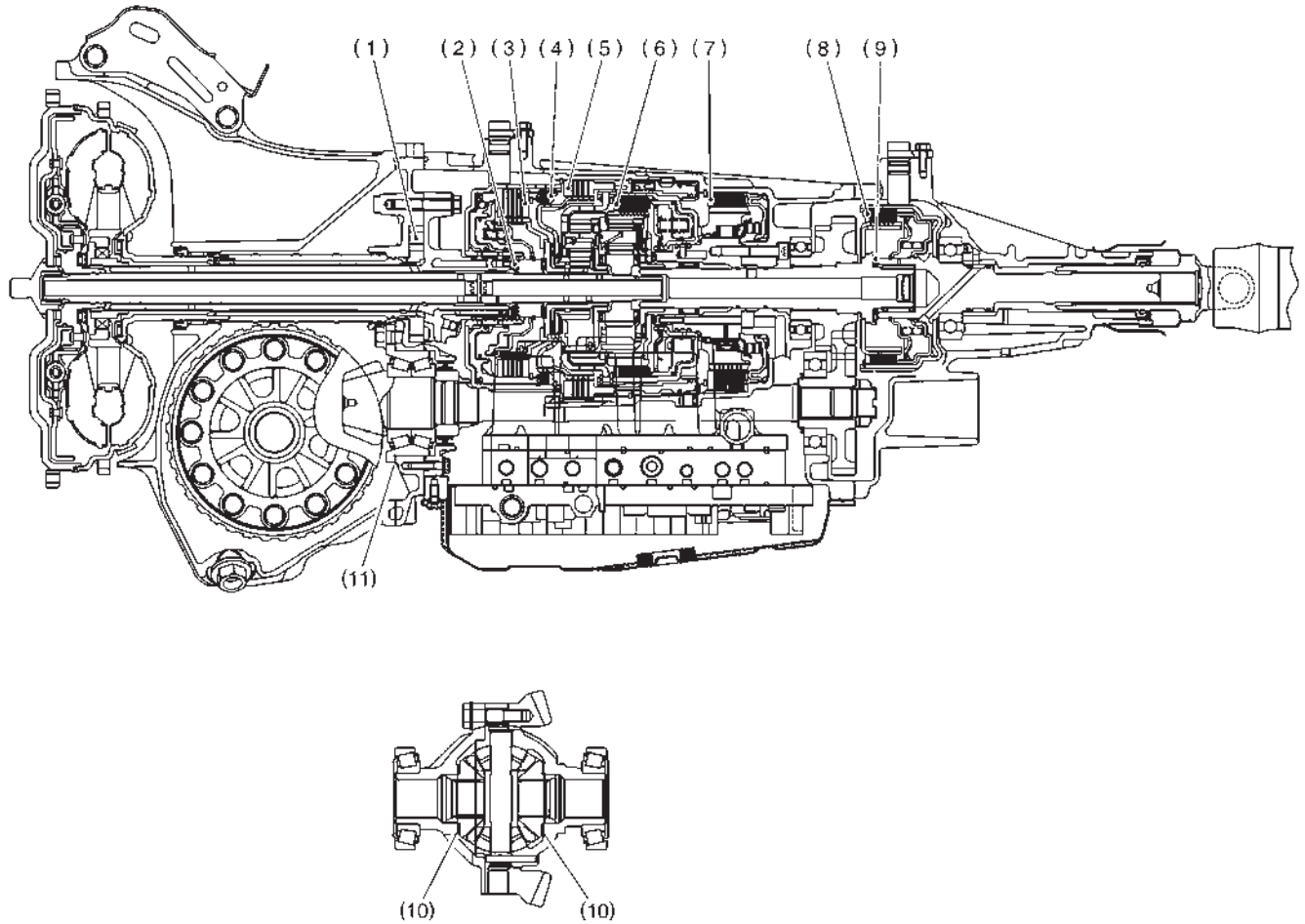
Torque converter clutch	Type		Symmetric, 3 element, single stage, 2 phase torque converter				
	Stall torque ratio	2200 cc	2.0 — 2.2				
		2500 cc	1.9 — 2.1				
	Nominal diameter	2200 cc	236 mm (9.29 in)				
		2500 cc	246 mm (9.69 in)				
	Stall speed (at sea level)	2200 cc	2,200 — 2,700 rpm				
		2500 cc	2,100 — 2,600 rpm				
One-way clutch			Sprague type one-way clutch				
Automatic transmission	Transmission	Type	4-forward, 1-reverse, double-row planetary gears				
		Control element	Multi-plate clutch		3 sets		
			Multi-plate brake		2 sets		
			One-way clutch (sprague type)		1 set		
		Gear ratio	1st	2200 cc	2.785		
				2500 cc	3.027		
			2nd	2200 cc	1.545		
				2500 cc	1.619		
			3rd		1.000		
			4th		0.694		
			Reverse		2.272		
		Tooth number of planetary gear	Front sun gear		33		
			Front pinion		21		
			Front internal gear		75		
			Rear sun gear	2200 cc	42		
				2500 cc	37		
			Rear pinion	2200 cc	17		
				2500 cc	19		
			Rear internal gear		75		
		Plate number of high clutch	Drive plate & driven plate	2200 cc	4		
				2500 cc	5		
		Plate number of reverse clutch		Drive plate & driven plate		2	
		Plate number of 2-4 brake		Drive plate & driven plate		3	
		Plate number of low clutch	Drive plate & driven plate	2200 cc	5		
				2500 cc	6		
		Plate number of low & reverse brake	Drive plate & driven plate	2200 cc	5		
				2500 cc	6		

Automatic transmission	Transmission	Selector position		P (Park)		Transmission in neutral, output member immovable, and engine start possible	
				R (Reverse)		Transmission in reverse for backing	
				N (Neutral)		Transmission in neutral, and engine start possible	
				D (Drive)		Automatic gear change 1st ↔ 2nd ↔ 3rd ↔ 4th	
				3 (3rd)		Automatic gear change 1st ↔ 2nd ↔ 3rd ↔ 4th	
				2 (2nd)		2nd gear locked (Deceleration possible 4th → 3rd → 2nd)	
				1 (1st)		1st gear locked (Deceleration possible 4th → 3rd → 2nd → 1st)	
				Control method		Hydraulic remote control	
	Oil pump	Type		Prachoid constant-displacement pump			
		Driving method		Driven by engine			
		Number of teeth		Inner rotor		9	
				Outer rotor		10	
	Hydraulic control	Type		Electronic/hydraulic control [Four forward speed changes by electrical signals of vehicle speed and accelerator (throttle) opening]			
		Fluid		Dexron IIE or Dexron III type Automatic transmission fluid			
		Fluid capacity	2200 cc	8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)			
			2500 cc	9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)			
	Lubrica-tion	Lubrication system		Forced feed lubrication with oil pump			
		Oil		Automatic transmission fluid (above mentioned.)			
	Cooling	Cooling system		Liquid-cooled cooler incorporated in radiator			
	Harness	Inhibitor switch		12 poles			
		Transmission harness		17 poles			
	Transfer	Transfer clutch		Hydraulic multi-plate clutch			
		Plate number of transfer clutch		Drive plate & driven plate		5	
		Control method		Electronic, hydraulic type			
		Lubricant		The same Automatic Transmission Fluid used in automatic transmission.			
		1st reduction gear ratio		1.000 (53/53)			

Final reduction	Final gear ratio	Front drive	2200 cc	4.111 (37/9)																		
			2500 cc	4.444 (40/9)																		
	Lubrication oil		<div>ITEM</div> <div>• Front differential gear oil</div> <div>API Classification</div> <div>GL - 5</div> <div>SAE Viscosity No. and Applicable Temperature</div> <table><tr><td>(°C)</td><td>-30</td><td>-26</td><td>-15</td><td>-5</td><td>0</td><td>15</td><td>25</td><td>30</td></tr><tr><td>(°F)</td><td>-22</td><td>-15</td><td>5</td><td>23</td><td>32</td><td>59</td><td>77</td><td>86</td></tr></table> <div><div>90</div><div>85W</div><div>80W</div><div>80W-90</div></div>		(°C)	-30	-26	-15	-5	0	15	25	30	(°F)	-22	-15	5	23	32	59	77	86
	(°C)	-30	-26	-15	-5	0	15	25	30													
	(°F)	-22	-15	5	23	32	59	77	86													
				H3M1235A																		
Oil capacity	Front drive	1.2 ℓ (1.3 US qt, 1.1 Imp qt)																				
ATF cooling system	Radiation capacity	4.630 kW (3,981 kcal/h, 15,797 BTU/h)																				

MEMO:

B: ADJUSTING PARTS



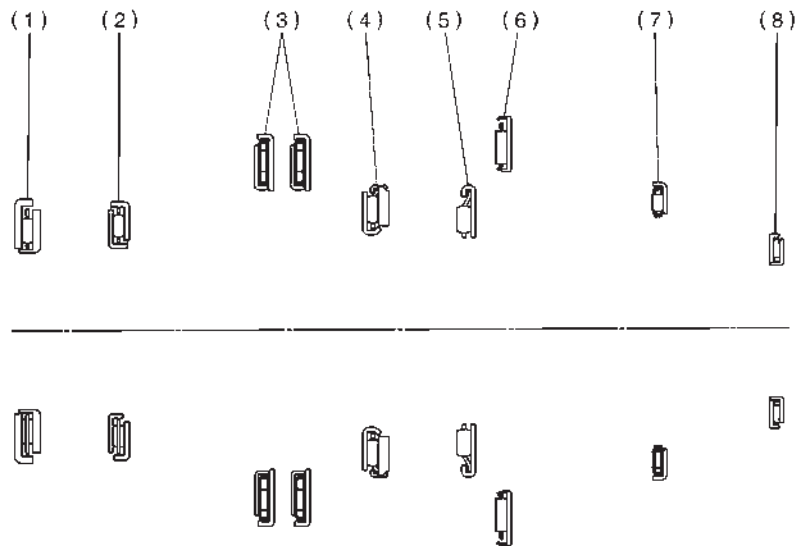
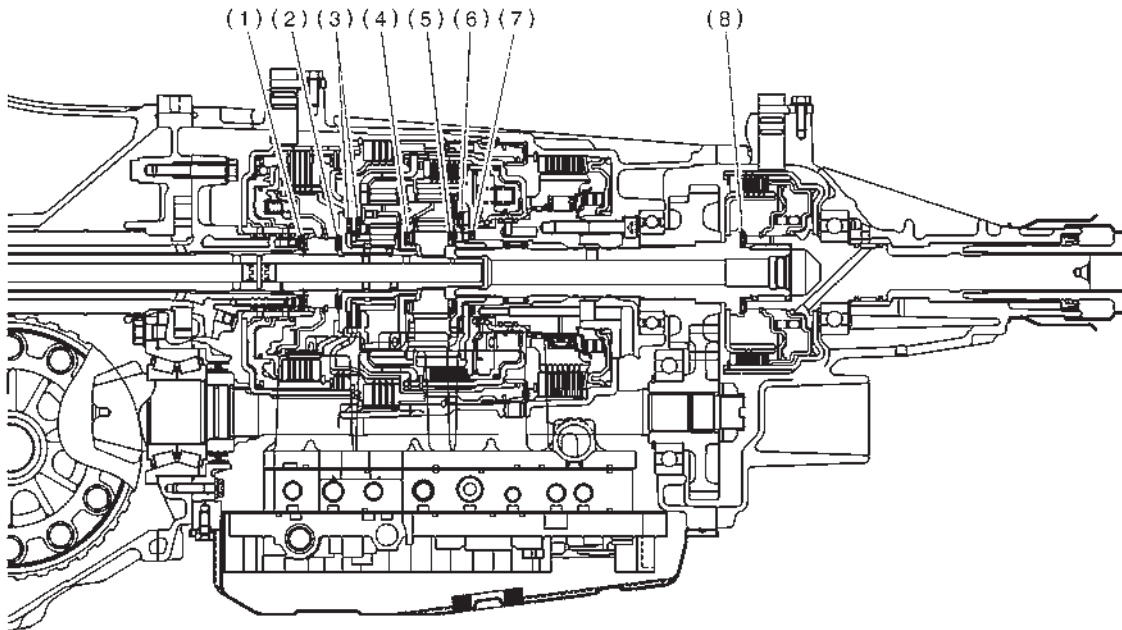
B3M1015A

No.	Part Name	Part Number	Dimension mm (in)	Application
1	Rotor (Oil pump)	15008AA060 15008AA070 15008AA080	11.37 — 11.38 (0.4476 — 0.4480) 11.38 — 11.39 (0.4480 — 0.4484) 11.39 — 11.40 (0.4484 — 0.4488)	Adjusting side clearance of oil pump
2	Thrust bearing	806528050 806528060 806528070 806528080 806528090 806528100	4.11 (0.1618) 4.3 (0.169) 4.5 (0.177) 4.7 (0.185) 4.9 (0.193) 5.1 (0.201)	Adjusting total end play
3	Retaining plate (High clutch)	31567AA710 31567AA720 31567AA730 31567AA740 31567AA670 31567AA680 31567AA690 31567AA700	4.7 (0.185) 4.8 (0.189) 4.9 (0.193) 5.0 (0.197) 5.1 (0.201) 5.2 (0.205) 5.3 (0.209) 5.4 (0.213)	Adjusting clearance of high clutch
4	Retaining plate (Reverse clutch)	31567AA750 31567AA760 31567AA770 31567AA780 31567AA790 31567AA800 31567AA810 31567AA820	3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197) 5.2 (0.205)	Adjusting clearance of reverse clutch
5	Retaining plate (2-4 brake)	31567AA612 31567AA622 31567AA632 31567AA642 31567AA652 31567AA662	5.6 (0.220) 5.8 (0.228) 6.0 (0.236) 6.2 (0.244) 6.4 (0.252) 6.6 (0.260)	Adjusting clearance of 2-4 brake
6	Retaining plate (Low clutch)	31567AA830 31567AA840 31567AA850 31567AA860 31567AA870	3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181)	Adjusting clearance of low clutch
7	Retaining plate (Low and reverse brake)	31667AA320 31667AA330 31667AA340 31667AA350 31667AA360 31667AA370 31667AA380	4.2 (0.165) 4.5 (0.177) 4.8 (0.189) 5.1 (0.201) 5.4 (0.213) 5.7 (0.224) 6.0 (0.236)	Adjusting clearance of low and reverse brake
8	Pressure plate (Transfer clutch)	31593AA151 31593AA161 31593AA171 31593AA181	3.3 (0.130) 3.7 (0.146) 4.1 (0.161) 4.5 (0.177)	Adjusting clearance of transfer clutch
9	Thrust bearing (Transfer clutch)	806536020 806535030 806535040 806535050 806535060 806535070 806535090	3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197)	Adjusting end play of transfer clutch
10	Washer (Front differential)	803038021 803038022 803038023	0.95 (0.0374) 1.00 (0.0394) 1.05 (0.0413)	Adjusting backlash of differential bevel gear

3-2 [S1B0]**SPECIFICATIONS AND SERVICE DATA**1. Automatic Transmission and Differential

No.	Part Name	Part Number	Dimension mm (in)	Application
11	Drive pinion shim	31451AA050	0.150 (0.0059)	Adjusting drive pinion shim
		31451AA060	0.175 (0.0069)	
		31451AA070	0.200 (0.0079)	
		31451AA080	0.225 (0.0089)	
		31451AA090	0.250 (0.0098)	
		31451AA100	0.275 (0.0108)	

MEMO:

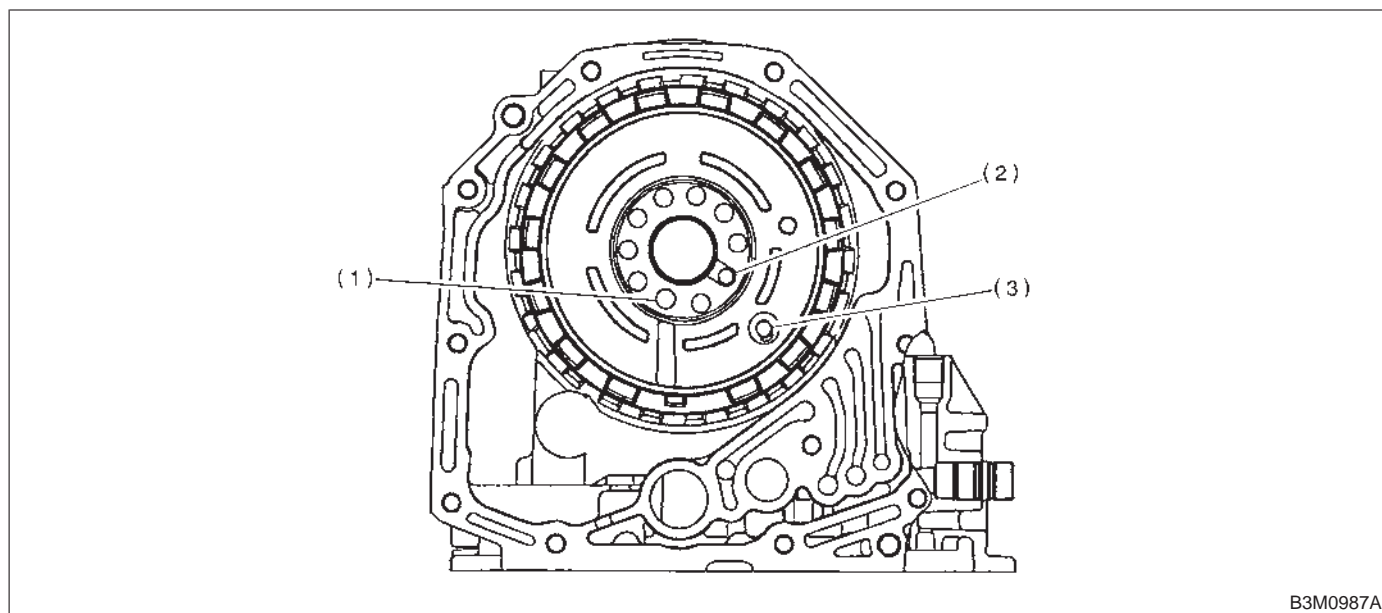
C: LOCATION AND INSTALLING DIRECTION OF THRUST NEEDLE BEARING

S3M0220A

No.	Part Name	Part Number	Inside diameter mm (in)	Outside diameter mm (in)	Dimension mm (in)	Application
(1)	Thrust needle bearing	806528050 806528060 806528070 806528080 806528090 806528100	28.5 (1.122)	48 (1.89)	4.11 (0.1618) 4.3 (0.169) 4.5 (0.177) 4.7 (0.185) 4.9 (0.193) 5.1 (0.201)	Adjusting total end play
(2)	Thrust needle bearing	806530040	30 (1.18)	47 (1.85)	3.8 (0.150)	Place of high clutch
(3)	Thrust needle bearing	806551020	51 (2.01)	71 (2.80)	3.3 (0.130)	Place of front sun gear
(4)	Thrust needle bearing	806535120	35 (1.38)	53 (2.09)	4.8 (0.189)	Place of rear sun gear
(5)	Thrust needle bearing	806534060	35 (1.38)	53 (2.09)	3.3 (0.130)	Place of rear sun gear
(6)	Thrust needle bearing	806558030	58 (2.28)	78 (3.07)	2.8 (0.110)	Place of rear internal gear
(7)	Thrust needle bearing	806541020	39.7 (1.563)	54 (2.13)	3.6 (0.142)	Place of one-way clutch
(8)	Thrust needle bearing	806536020 806535030 806535040 806535050 806535060 806535070 806535090	36 (1.42)	53 (2.09)	3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197)	Adjusting end play of transfer clutch

D: FLUID PASSAGES

1. TRANSMISSION CASE (FRONT SIDE)

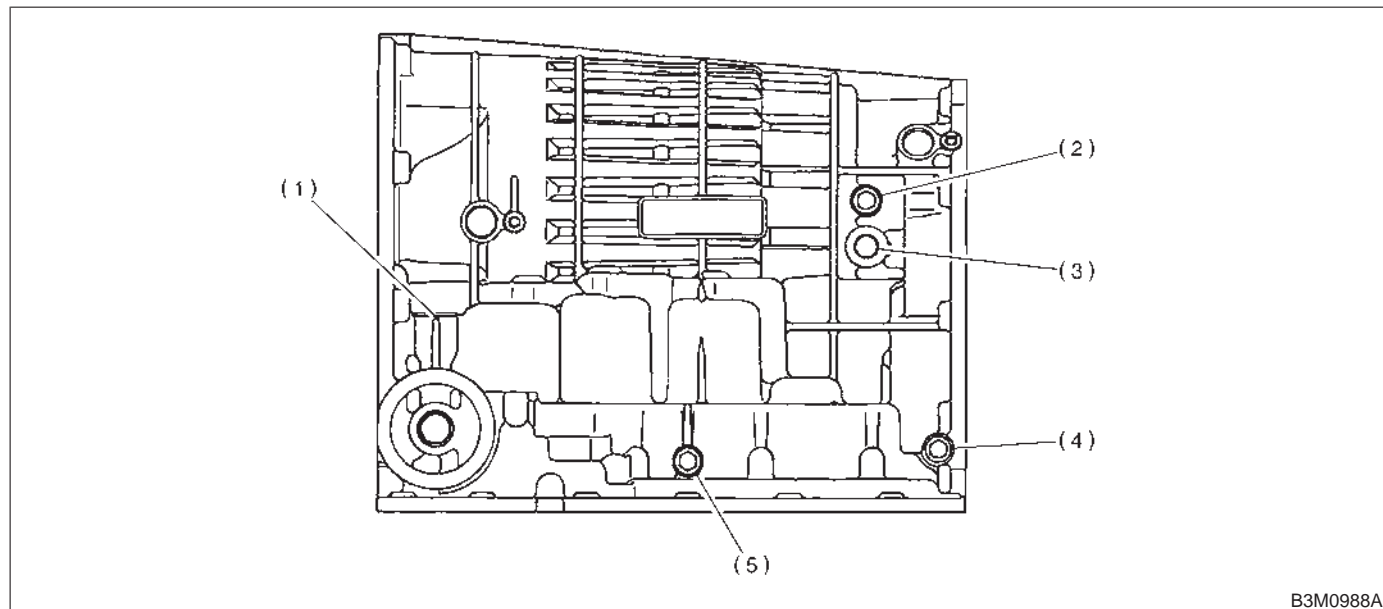


B3M0987A

(1) Low clutch pressure

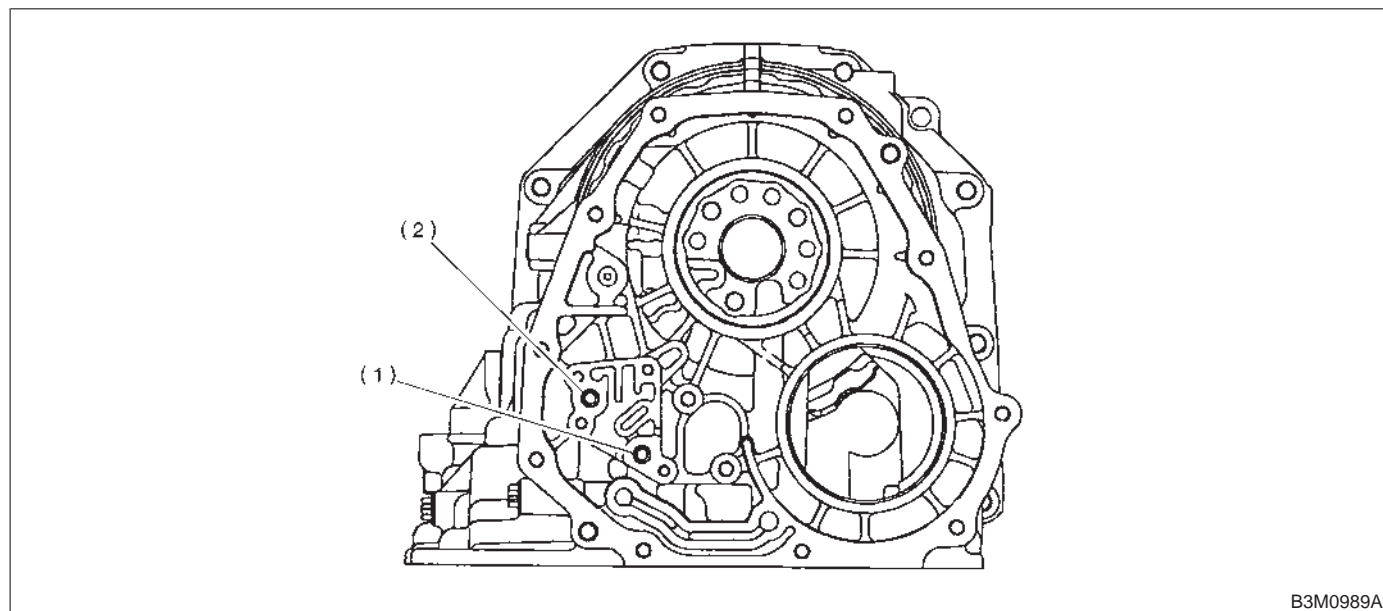
(2) Oil cooler inlet pressure

(3) Low & reverse brake pressure

2. TRANSMISSION CASE (LH SIDE)

B3M0988A

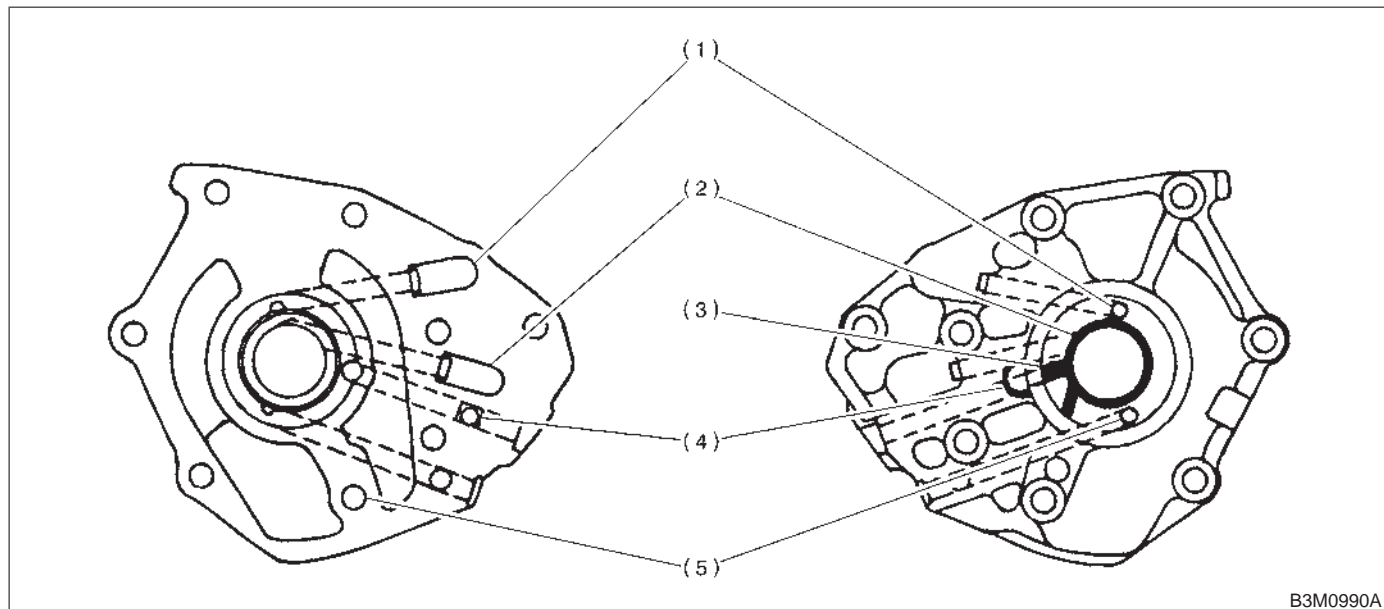
- | | | |
|----------------------------------|-------------------------------|------------------------|
| (1) Oil cooler outlet pressure | (3) Oil cooler inlet pressure | (5) 2-4 brake pressure |
| (2) Low & reverse brake pressure | (4) Low clutch pressure | |

3. TRANSMISSION CASE (REAR SIDE)

B3M0989A

- | | |
|--------------------|-------------------|
| (1) Pilot pressure | (2) Line pressure |
|--------------------|-------------------|

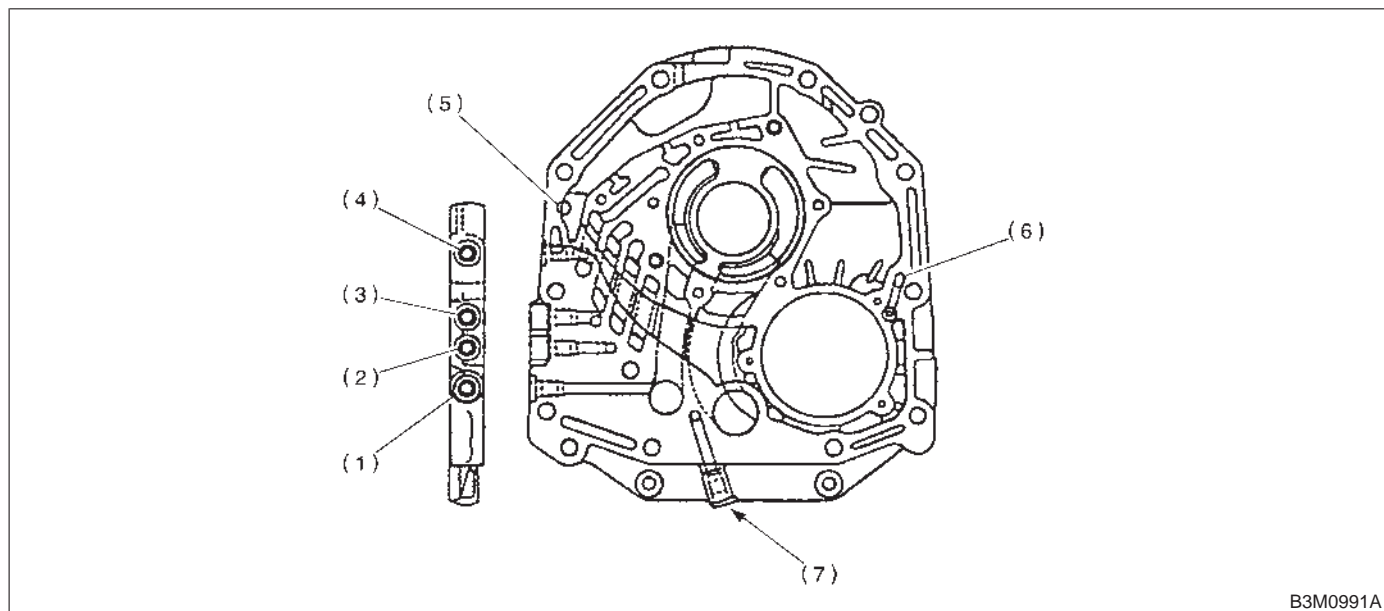
4. OIL PUMP COVER



B3M0990A

- | | | |
|------------------------------|----------------------------|-----------------------------|
| (1) High clutch pressure | (3) Front lubricating hole | (5) Reverse clutch pressure |
| (2) Lock-up release pressure | (4) Lock-up apply pressure | |

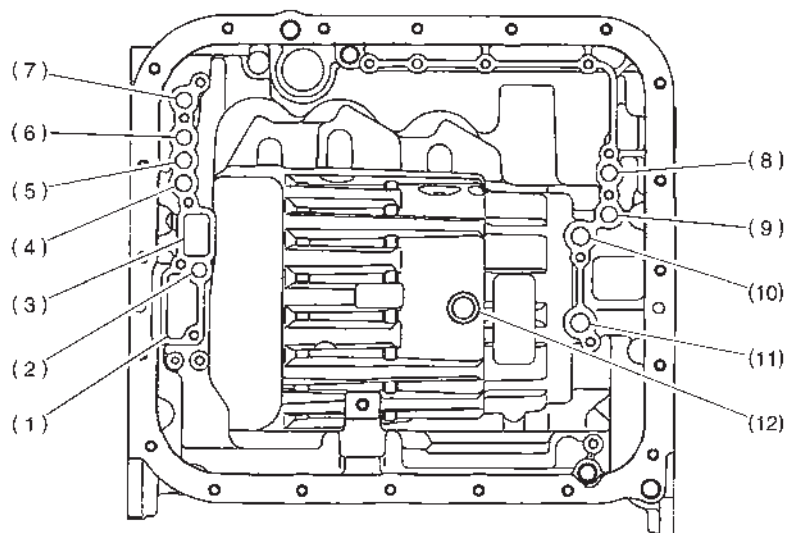
5. OIL PUMP HOUSING



B3M0991A

- | | | |
|------------------------------|--------------------------|-----------------------------|
| (1) Oil pump outlet pressure | (4) High clutch pressure | (7) Reverse clutch pressure |
| (2) Lock-up apply pressure | (5) Drain | |
| (3) Lock-up release pressure | (6) Air breather | |

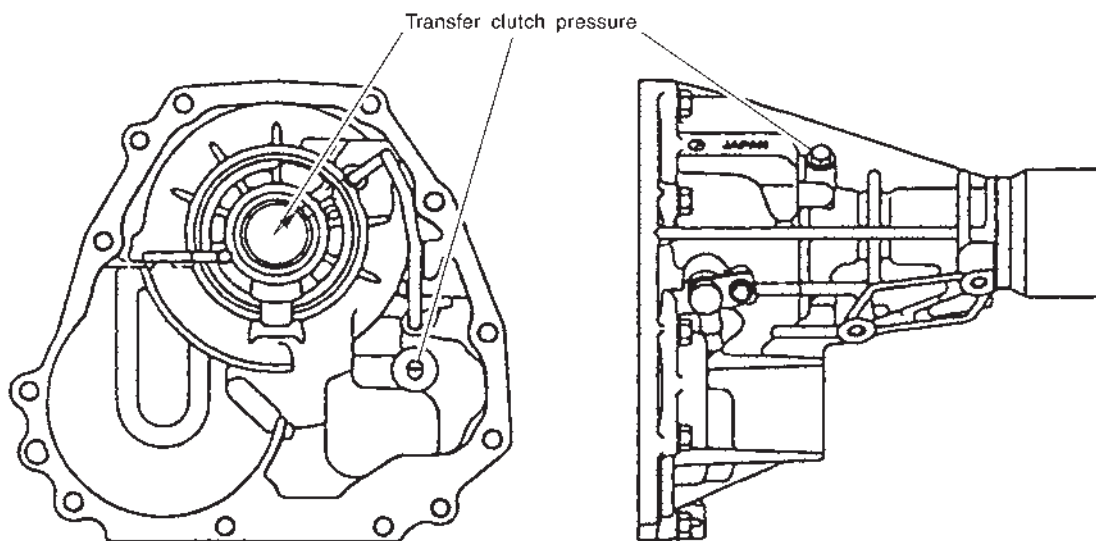
6. TRANSMISSION CASE



B3M0992A

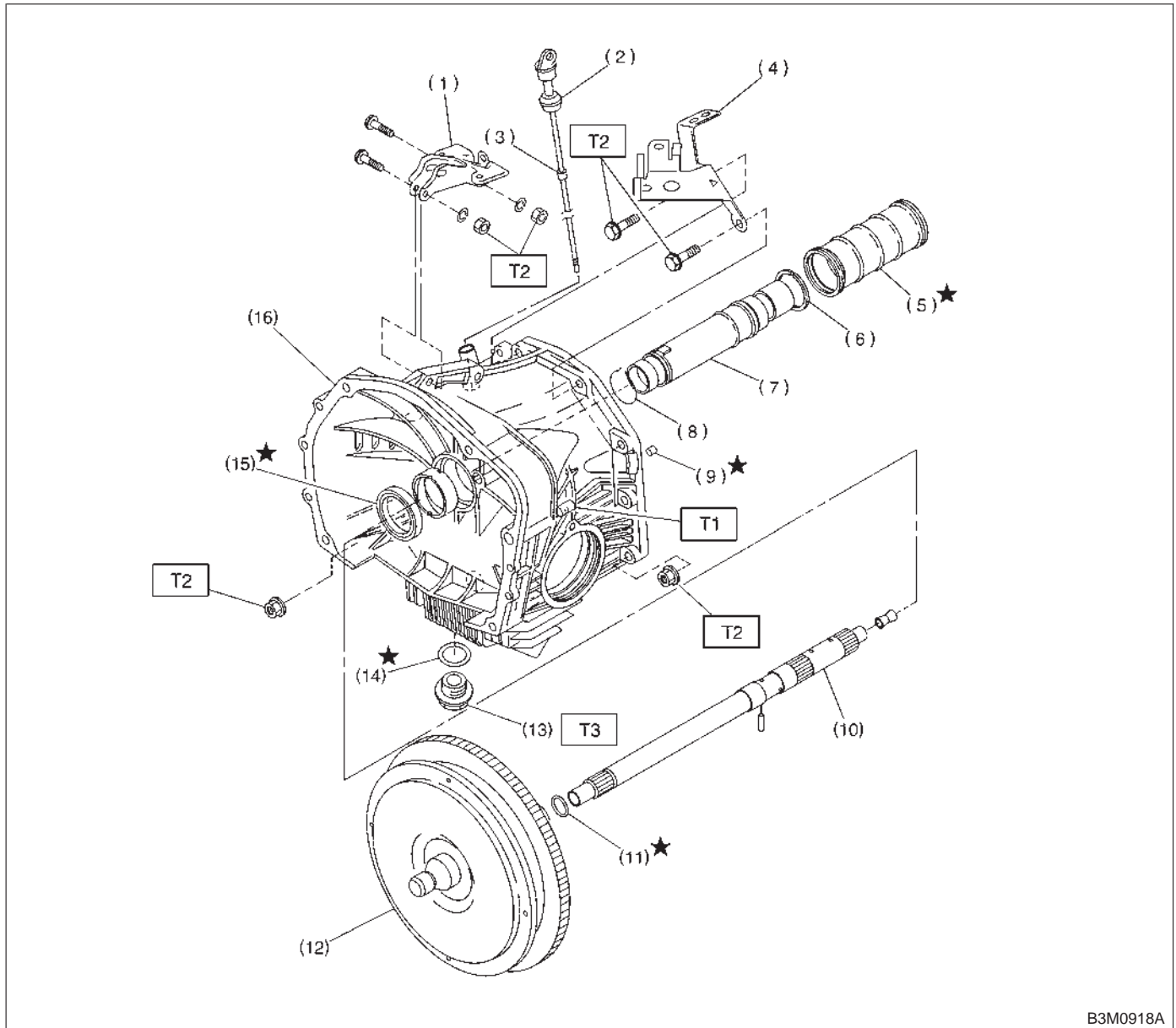
- | | | |
|-----------------------------|--------------------------------|-----------------------------------|
| (1) Oil pump inlet port | (5) Lock-up release pressure | (9) Pilot pressure |
| (2) Reverse clutch pressure | (6) High clutch pressure | (10) Low & reverse brake pressure |
| (3) Oil pump outlet port | (7) Oil cooler outlet pressure | (11) Low clutch pressure |
| (4) Lock-up apply pressure | (8) Line pressure | (12) 2-4 brake pressure |

7. EXTENSION CASE



B3M0993A

1. Torque Converter Clutch and Case



B3M0918A

- | | |
|----------------------------------|-----------------------------------|
| (1) Pitching stopper bracket | (9) Oil drain pipe |
| (2) O-ring | (10) Input shaft |
| (3) Differential oil level gauge | (11) O-ring |
| (4) Stay | (12) Torque converter clutch |
| (5) Seal pipe | (13) Drain plug |
| (6) Seal ring | (14) Gasket |
| (7) Oil pump shaft | (15) Oil seal |
| (8) Clip | (16) Torque converter clutch case |

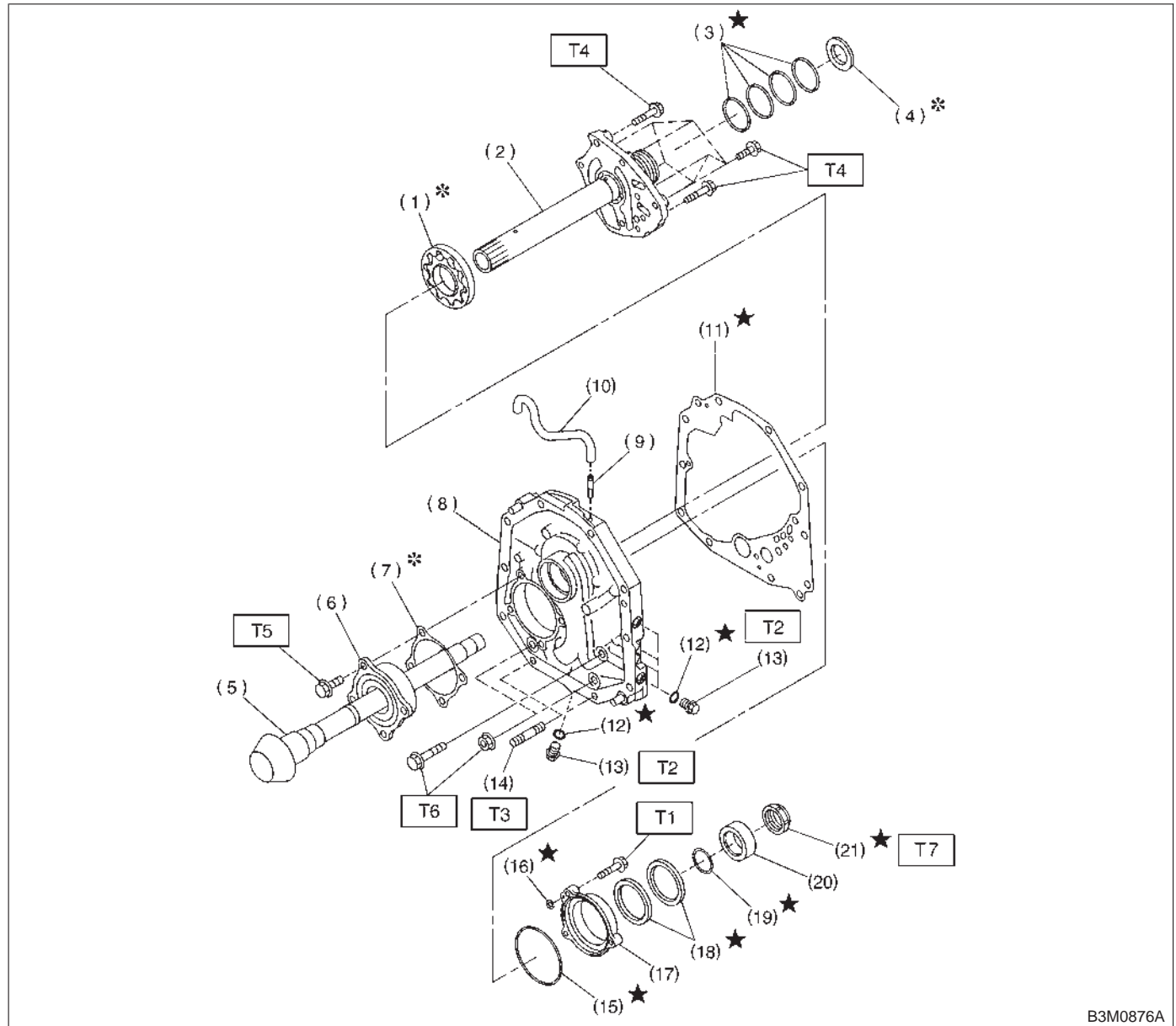
Tightening torque: N-m (kg-m, ft-lb)

T1: 18±5 (1.8±0.5, 13.0±3.6)

T2: 41±3 (4.2±0.3, 30.4±2.2)

T3: 44±3 (4.5±0.3, 32.5±2.2)

2. Oil Pump



B3M0876A

- | | |
|---------------------------|--------------------------|
| (1) Oil pump rotor | (12) O-ring |
| (2) Oil pump cover | (13) Test plug |
| (3) Seal ring | (14) Stud bolt |
| (4) Thrust needle bearing | (15) O-ring |
| (5) Drive pinion shaft | (16) O-ring |
| (6) Roller bearing | (17) Oil seal retainer |
| (7) Shim | (18) Oil seal |
| (8) Oil pump housing | (19) O-ring |
| (9) Nipple | (20) Drive pinion collar |
| (10) Air breather hose | (21) Lock nut |
| (11) Gasket | |

Tightening torque: N-m (kg-m, ft-lb)

T1: 7±1 (0.7±0.1, 5.1±0.7)

T2: 13±1 (1.3±0.1, 9.4±0.7)

T3: 18±5 (1.8±0.5, 13.0±3.6)

T4: 25±2 (2.5±0.2, 18.1±1.4)

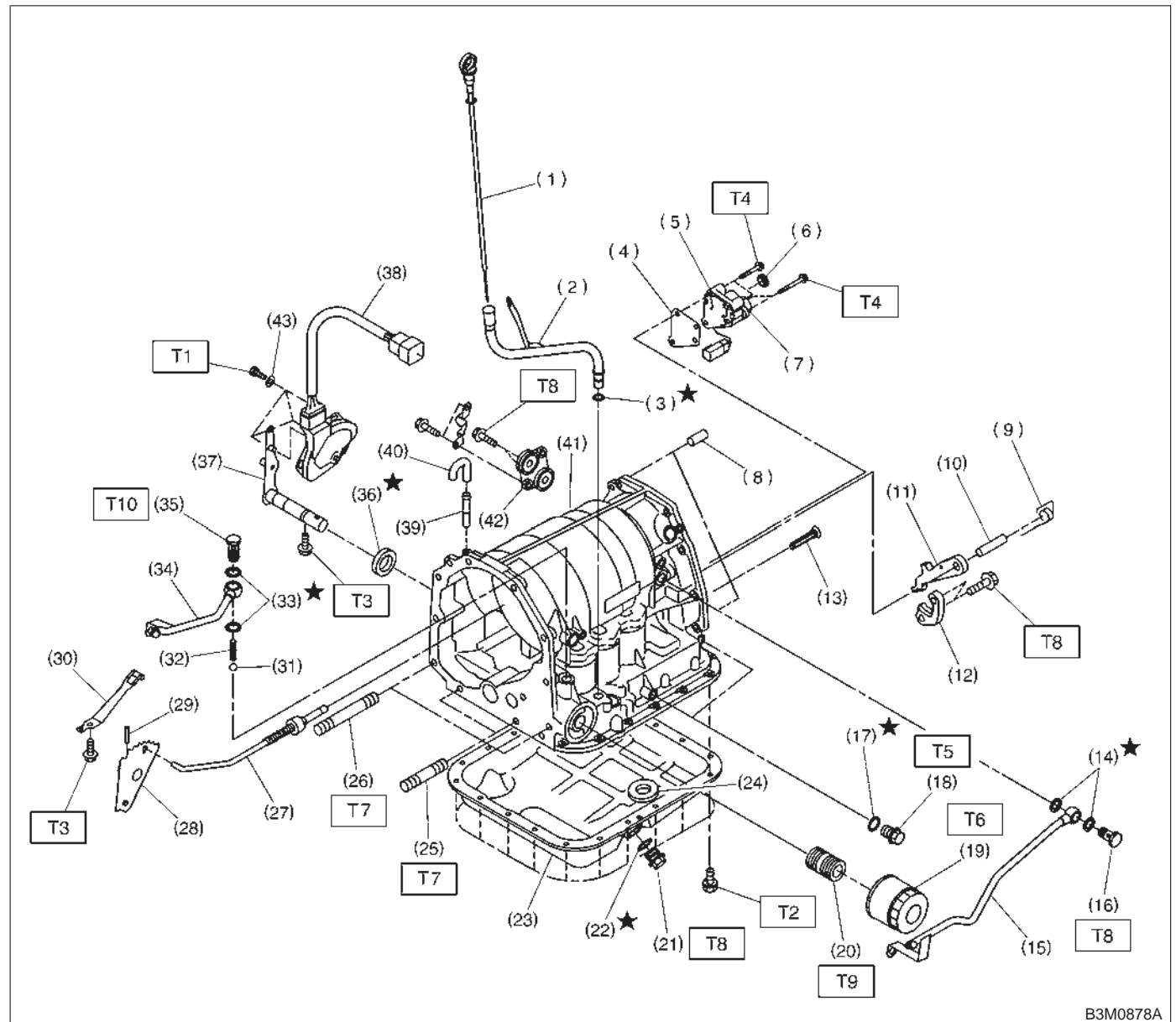
T5: 39±3 (4.0±0.3, 28.9±2.2)

T6: 41±3 (4.2±0.3, 30.4±2.2)

T7: 121±5 (12.3±0.5, 89.0±3.6)

MEMO:

3. Transmission Case and Control Device



- | | |
|--------------------------------|----------------------------|
| (1) Oil level gauge | (20) Oil filter stud bolt |
| (2) Oil charger pipe | (21) Drain plug |
| (3) O-ring | (22) Gasket |
| (4) Transfer valve plate | (23) Oil pan |
| (5) Transfer valve ASSY | (24) Magnet |
| (6) Transfer clutch seal | (25) Stud bolt (Short) |
| (7) Duty solenoid C (Transfer) | (26) Stud bolt (Long) |
| (8) Straight pin | (27) Parking rod |
| (9) Return spring | (28) Manual plate |
| (10) Shaft | (29) Spring pin |
| (11) Parking pawl | (30) Detention spring |
| (12) Parking support | (31) Ball |
| (13) Inlet filter | (32) Spring |
| (14) Gasket | (33) Gasket |
| (15) Inlet pipe | (34) Outlet pipe |
| (16) Union screw | (35) Union screw |
| (17) O-ring | (36) Oil seal |
| (18) Test plug | (37) Select lever |
| (19) Oil filter | (38) Inhibitor switch ASSY |

- (39) Nipple
 (40) Air breather hose
 (41) Transmission case
 (42) Plate ASSY
 (43) Washer

Tightening torque: N·m (kg-m, ft-lb)

T1: 3.4±0.5 (0.35±0.05, 2.5±0.4)

T2: 4.9±0.5 (0.50±0.05, 3.6±0.4)

T3: 5.9±1.0 (0.60±0.10, 4.3±0.7)

T4: 7.8±1.0 (0.80±0.10, 5.8±0.7)

T5: 12.7±1.0 (1.30±0.10, 9.4±0.7)

T6: 13.7±2.0 (1.4±0.2, 10.1±1.4)

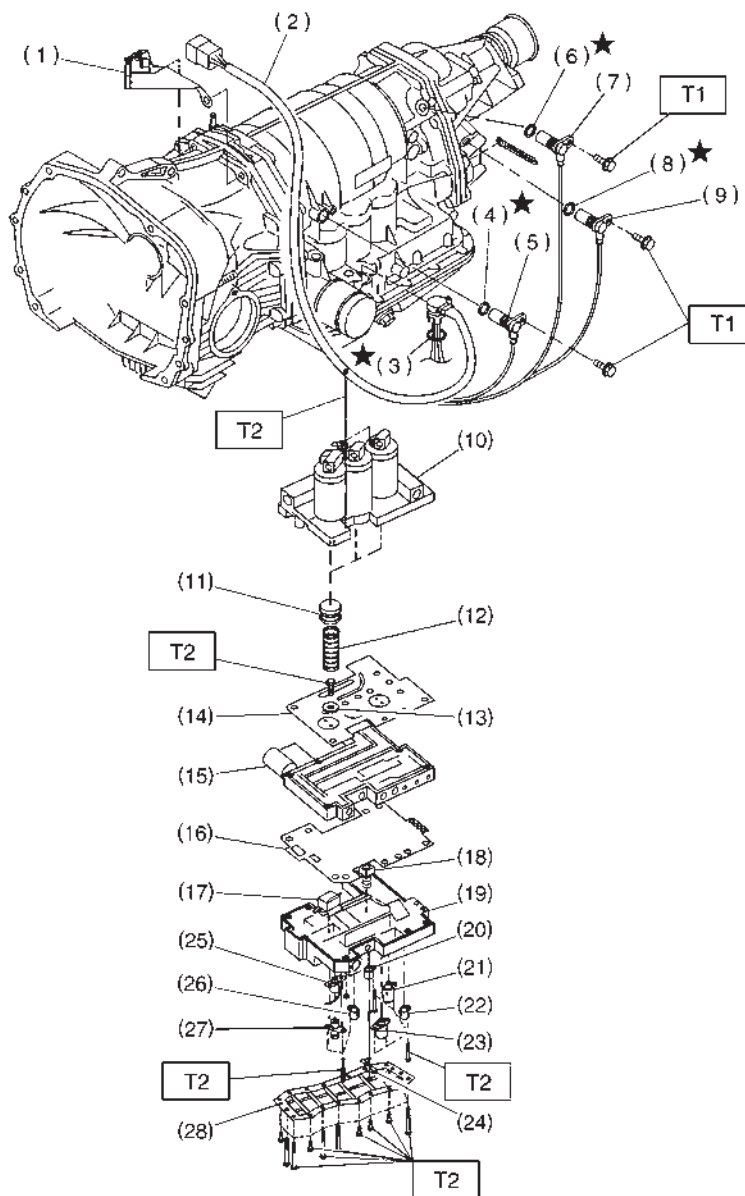
T7: 17.7±2.9 (1.80±0.30, 13.0±2.2)

T8: 24.5±2.0 (2.50±0.20, 18.1±1.4)

T9: 24.5±2.9 (2.5±0.3, 18.1±2.2)

T10: 34.3±2.9 (3.50±0.30, 25.3±2.2)

4. Control Valve and Harness Routing



B3M0928A

- (1) Stay
- (2) Transmission harness
- (3) O-ring
- (4) O-ring
- (5) Torque converter turbine speed sensor
- (6) O-ring
- (7) Vehicle speed sensor 2 (Front)
- (8) O-ring
- (9) Vehicle speed sensor 1 (Rear)
- (10) Upper valve body
- (11) Accumulator piston

- (12) Accumulator spring
- (13) Side plate
- (14) Separate plate
- (15) Middle valve body
- (16) Separate plate
- (17) Fluid filter
- (18) Fluid filter
- (19) Lower valve body
- (20) Shift solenoid 2
- (21) Shift solenoid 1
- (22) 2-4 brake timing solenoid
- (23) Duty solenoid D (2-4 brake)

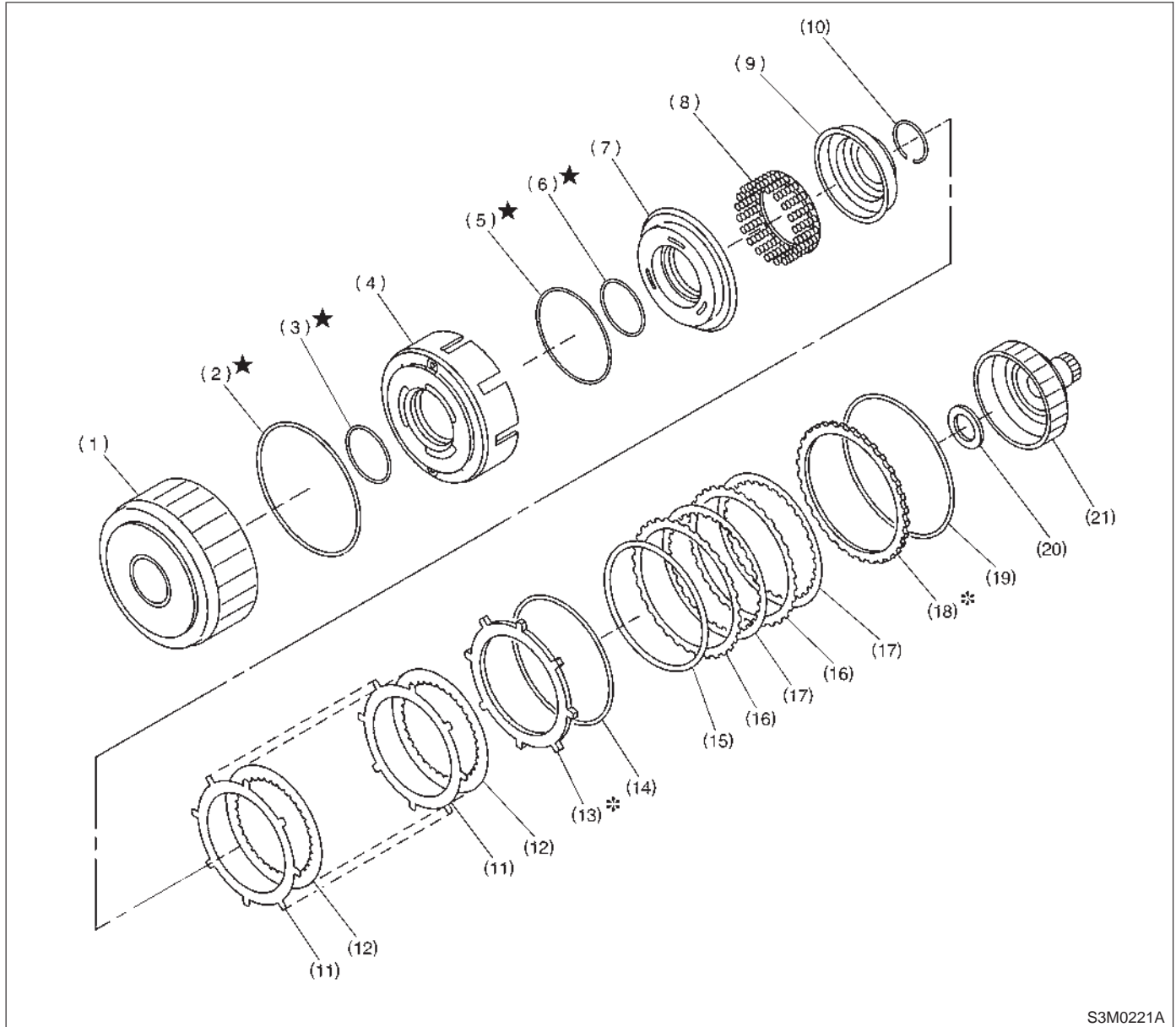
- (24) ATF temperature sensor
- (25) Duty solenoid A (Line pressure)
- (26) Low clutch timing solenoid
- (27) Duty solenoid B (Lock-up)
- (28) Oil strainer

Tightening torque: N·m (kg·m, ft·lb)

T1: 7±1 (0.7±0.1, 5.1±0.7)

T2: 8±1 (0.8±0.1, 5.8±0.7)

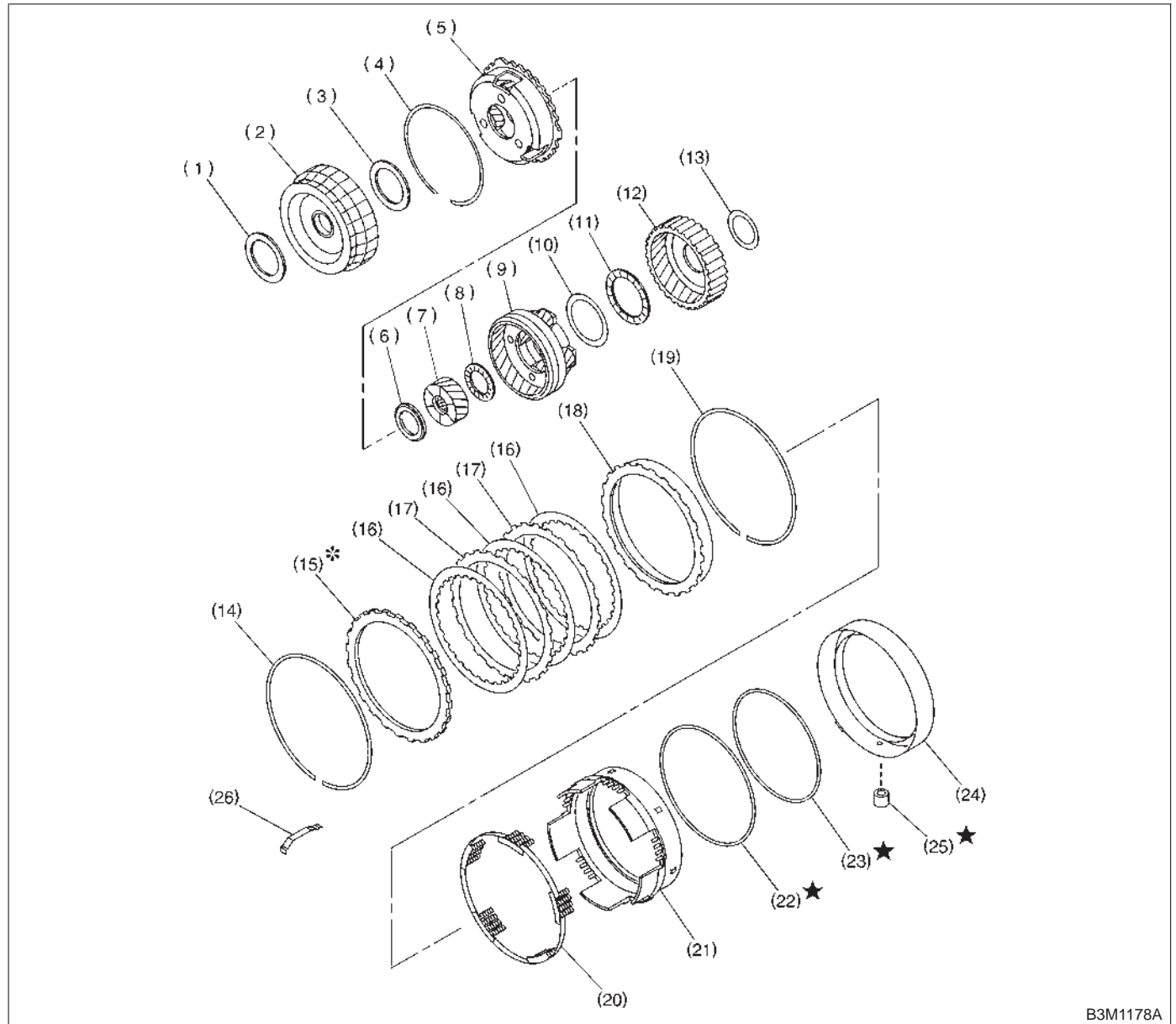
5. High Clutch and Reverse Clutch



S3M0221A

- | | | |
|---------------------------|----------------------|----------------------------|
| (1) High clutch drum | (8) Spring retainer | (15) Dish plate |
| (2) Lip seal | (9) Cover | (16) Driven plate |
| (3) Lathe cut seal ring | (10) Snap ring | (17) Drive plate |
| (4) Reverse clutch piston | (11) Driven plate | (18) Retaining plate |
| (5) Lathe cut seal ring | (12) Drive plate | (19) Snap ring |
| (6) Lathe cut seal ring | (13) Retaining plate | (20) Thrust needle bearing |
| (7) High clutch piston | (14) Snap ring | (21) High clutch hub |

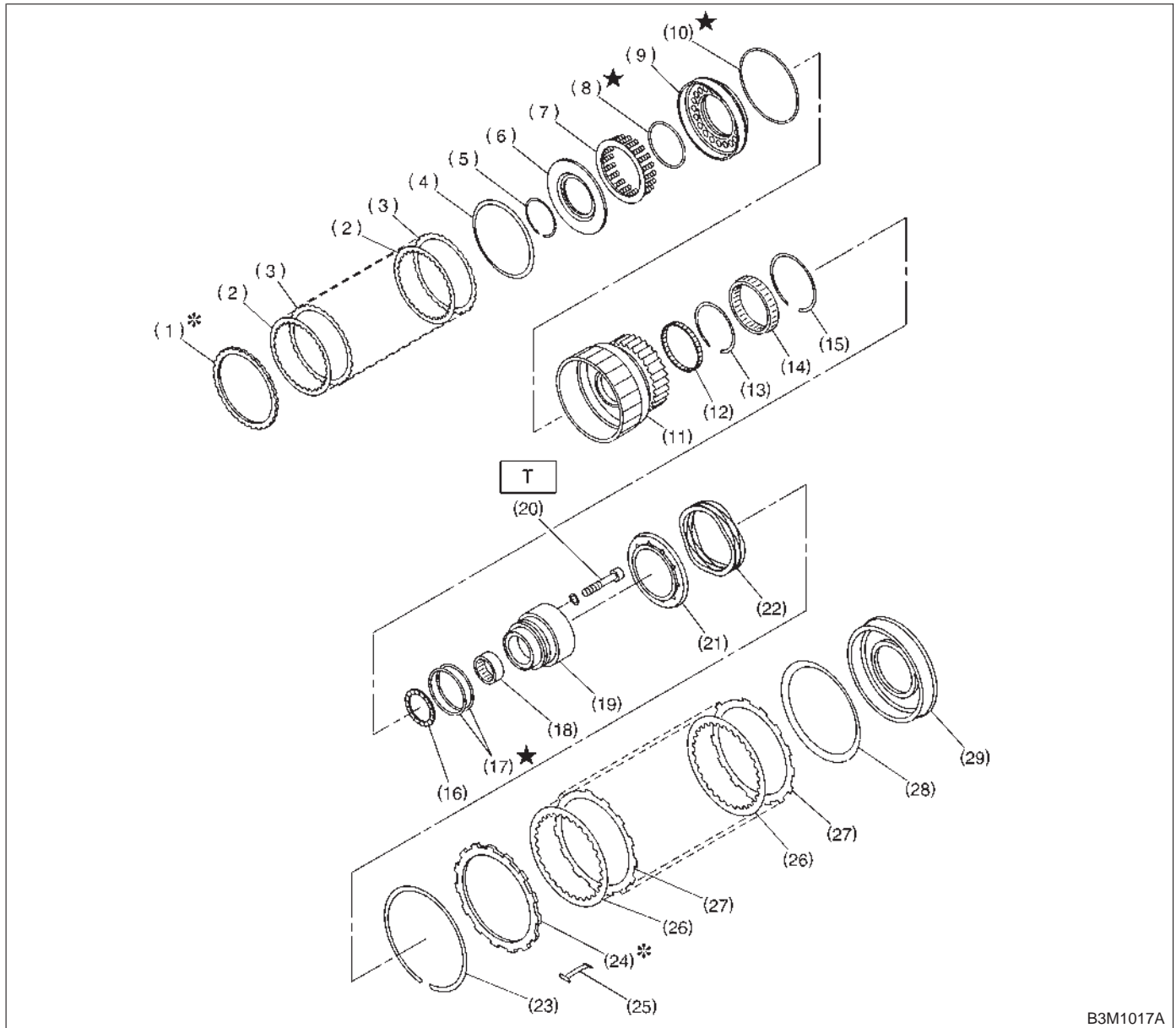
6. Planetary Gear and 2-4 Brake



B3M1178A

- | | | |
|-----------------------------|----------------------------|--------------------------------|
| (1) Thrust needle bearing | (10) Washer | (19) Snap ring |
| (2) Front sun gear | (11) Thrust needle bearing | (20) Spring retainer |
| (3) Thrust needle bearing | (12) Rear internal gear | (21) 2-4 brake piston |
| (4) Snap ring | (13) Washer | (22) Lathe cut seal ring |
| (5) Front planetary carrier | (14) Snap ring | (23) Lathe cut seal ring |
| (6) Thrust needle bearing | (15) Retaining plate | (24) 2-4 brake piston retainer |
| (7) Rear sun gear | (16) Drive plate | (25) 2-4 brake seal |
| (8) Thrust needle bearing | (17) Driven plate | (26) Leaf spring |
| (9) Rear planetary carrier | (18) Pressure rear plate | |

7. Low Clutch and Low & Reverse Brake



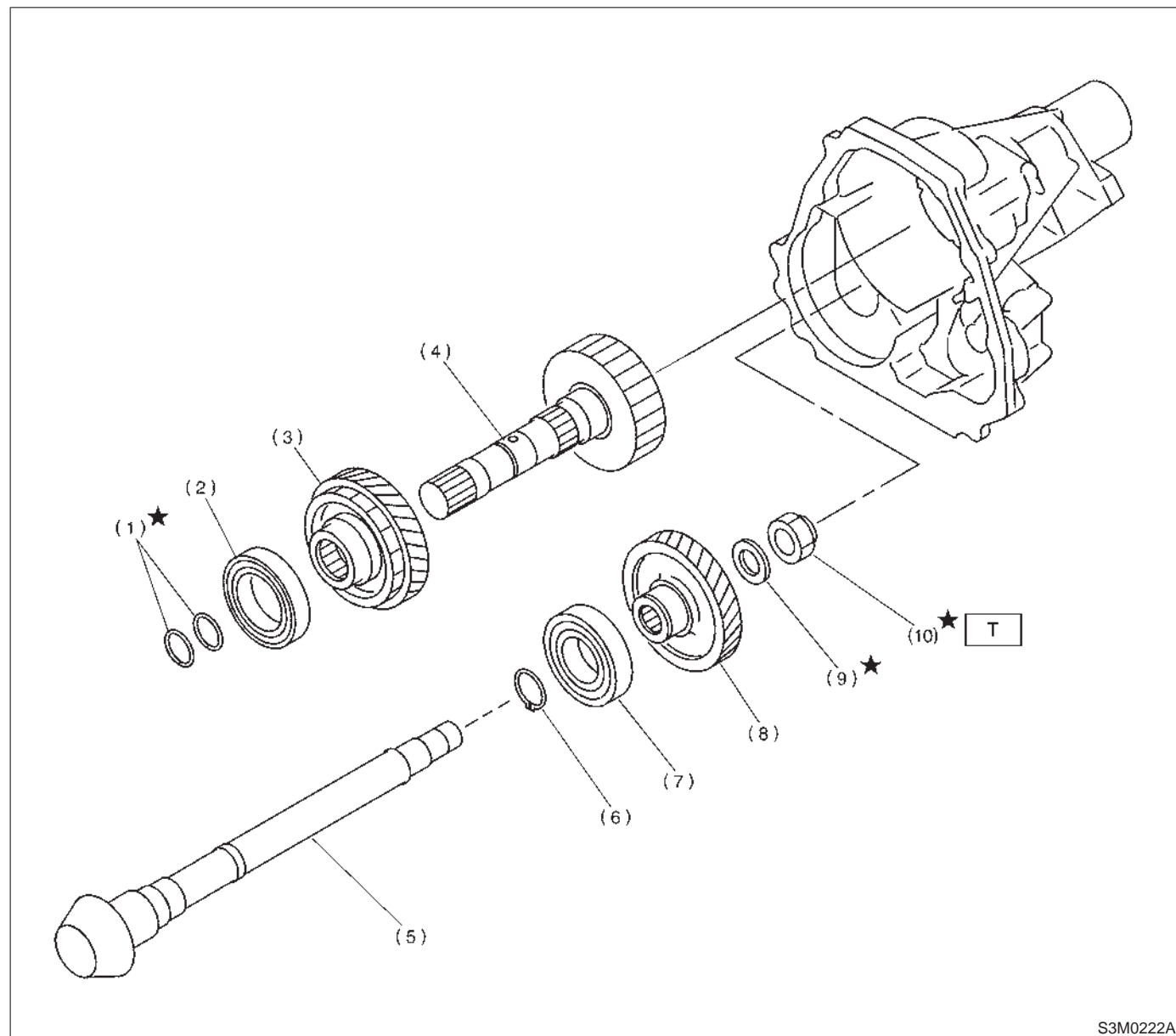
B3M1017A

- | | | |
|--------------------------|--------------------------------|-----------------------------------|
| (1) Retaining plate | (12) Needle bearing | (23) Snap ring |
| (2) Drive plate | (13) Snap ring | (24) Retaining plate |
| (3) Driven plate | (14) One-way clutch | (25) Leaf spring |
| (4) Dish plate | (15) Snap ring | (26) Drive plate |
| (5) Snap ring | (16) Thrust needle bearing | (27) Driven plate |
| (6) Cover | (17) Seal ring | (28) Dish plate |
| (7) Spring retainer | (18) Needle bearing | (29) Low and reverse brake piston |
| (8) Lathe cut seal ring | (19) One-way clutch inner race | |
| (9) Low piston | (20) Socket bolt | |
| (10) Lathe cut seal ring | (21) Spring retainer | |
| (11) Low clutch drum | (22) Return spring | |

Tightening torque: N-m (kg-m, ft-lb)

T: 25±2 (2.5±0.2, 18.1±1.4)

8. Reduction Gear

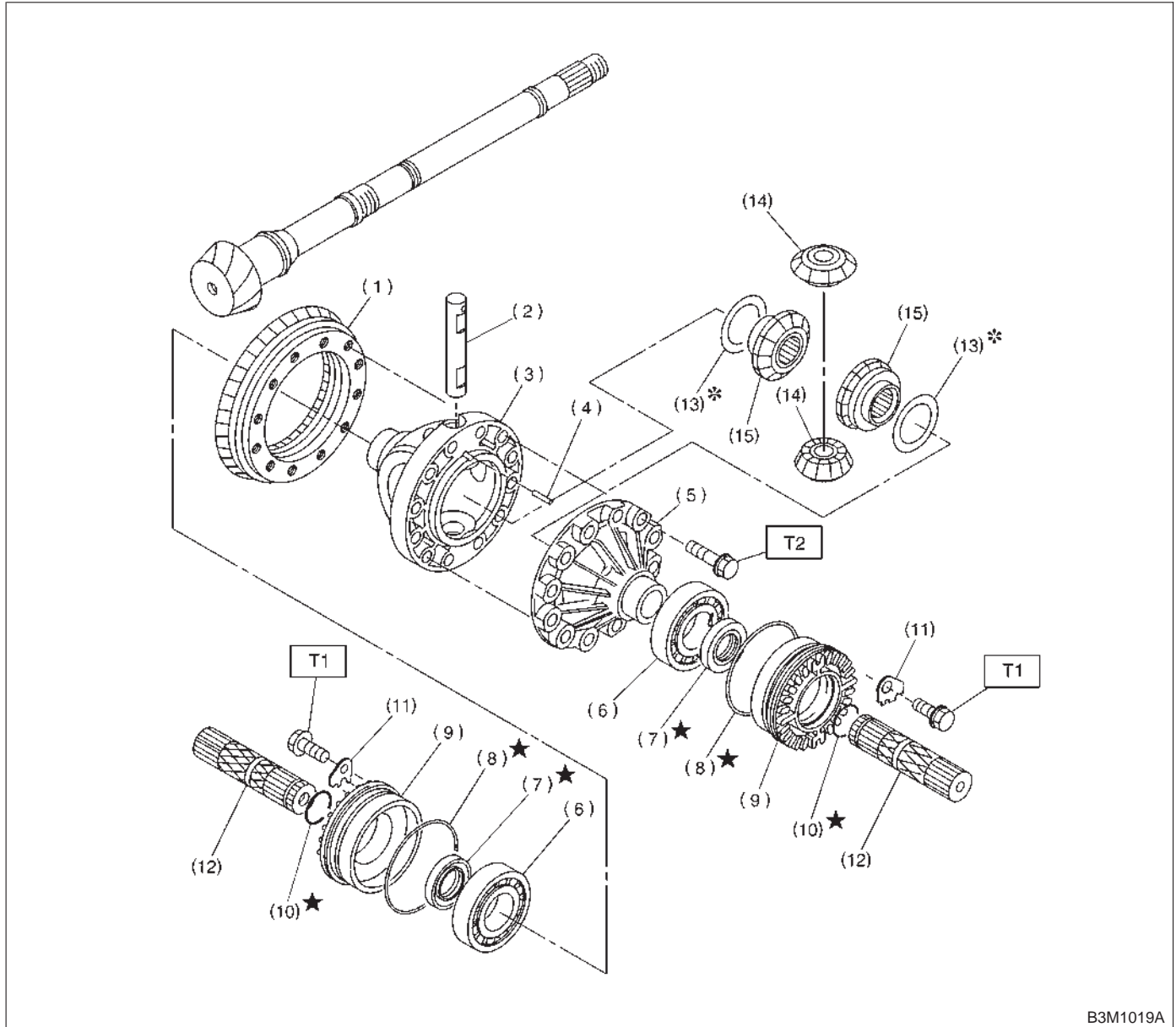


S3M0222A

- | | |
|---------------------------|---------------------------|
| (1) Seal ring | (6) Snap ring |
| (2) Ball bearing | (7) Ball bearing |
| (3) Reduction drive gear | (8) Reduction driven gear |
| (4) Reduction drive shaft | (9) Washer |
| (5) Drive pinion shaft | (10) Lock nut |

Tightening torque: N-m (kg-m, ft-lb)
T: 100±5 (10.2±0.5, 73.8±3.6)

9. Differential Case



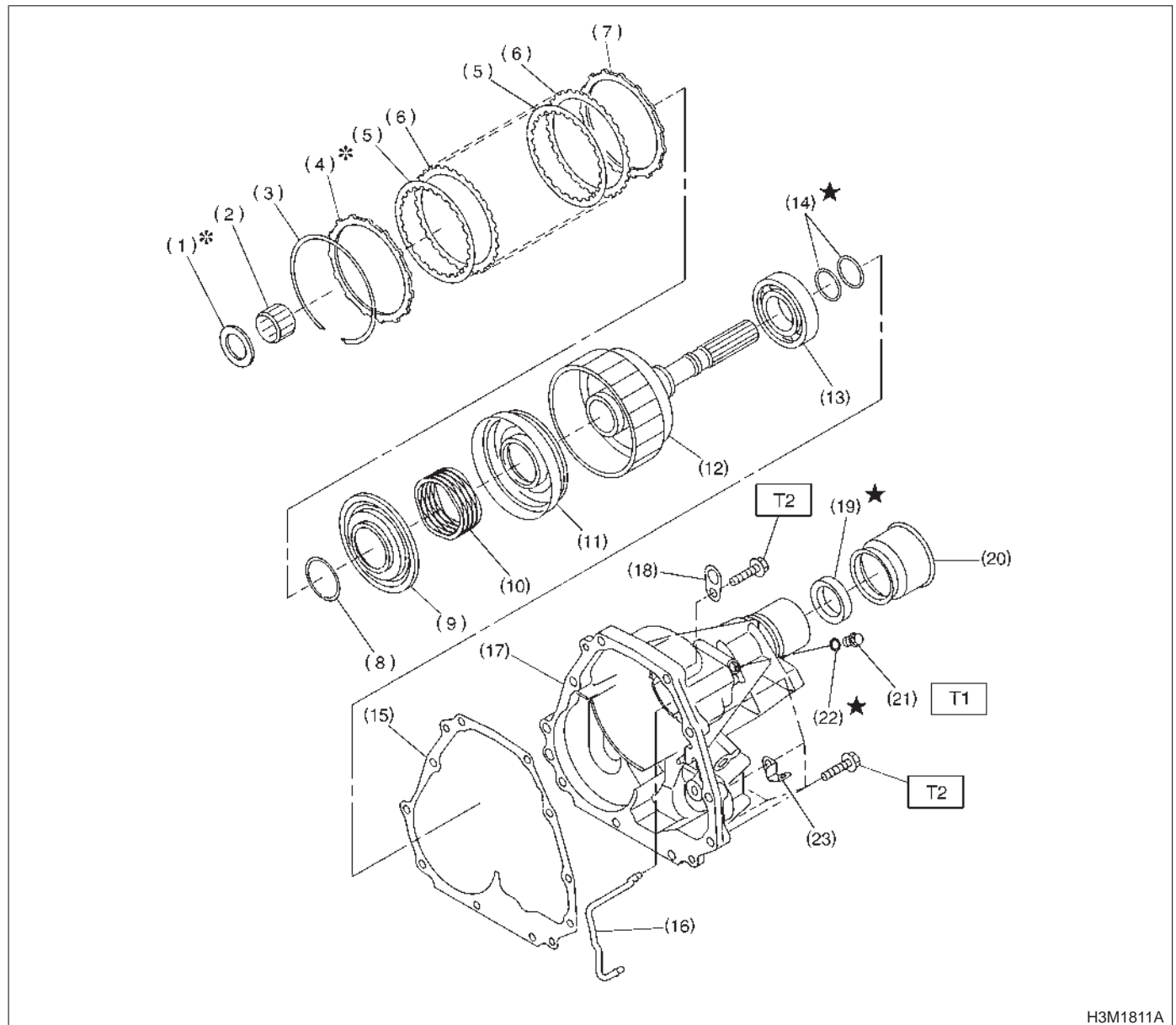
B3M1019A

- | | |
|----------------------------|--------------------------------|
| (1) Crown gear | (8) O-ring |
| (2) Pinion shaft | (9) Differential side retainer |
| (3) Differential case (RH) | (10) Circlip |
| (4) Straight pin | (11) Lock plate |
| (5) Differential case (LH) | (12) Axle shaft |
| (6) Taper roller bearing | (13) Washer |
| (7) Oil seal | (14) Differential bevel pinion |

- (15) Differential bevel gear

Tightening torque: N·m (kg·m, ft·lb)**T1: 25±2 (2.5±0.2, 18.1±1.4)****T2: 62±5 (6.3±0.5, 45.6±3.6)**

10. Transfer and Extension



H3M1811A

- | | |
|---------------------------|-----------------------------|
| (1) Thrust needle bearing | (11) Transfer clutch piston |
| (2) Needle bearing | (12) Rear drive shaft |
| (3) Snap ring | (13) Ball bearing |
| (4) Pressure plate | (14) Seal ring |
| (5) Drive plate | (15) Gasket |
| (6) Driven plate | (16) Transfer clutch pipe |
| (7) Pressure plate | (17) Extension case |
| (8) Snap ring | (18) Transmission hanger |
| (9) Transfer piston seal | (19) Oil seal |
| (10) Return spring | (20) Dust cover |

- | |
|----------------|
| (21) Test plug |
| (22) O-ring |
| (23) Clip |

Tightening torque: N·m (kg·m, ft·lb)

T1: 13±1 (1.3±0.1, 9.4±0.7)

T2: 25±2 (2.5±0.2, 18.1±1.4)

1. General

A: PRECAUTION

When disassembling or assembling the automatic transmission, observe the following instructions.

1) Workshop

Provide a place that is clean and free from dust. Principally the conventional workshop is suitable except for a dusty place. In a workshop where grinding work, etc. which produces fine particles is done, make independent place divided by the vinyl curtain or the equivalent.

2) Work table

The size of 1 x 1.5 m (40 x 60 in) is large enough to work, and it is more desirable that its surface be covered with flat plate like iron plate which is not rusted too much.

3) Cleaning of exterior

(1) Clean the exterior surface of transmission with steam and/or kerosene prior to disassembly, however it should be noted that vinyl tape be placed on the air breather or oil level gauge to prevent infiltration of the steam into the transmission and also the cleaning job be done away from the place of disassembly and assembly.

(2) Partial cleaning will do, depending on the extent of disassembly (such as when disassembly is limited to some certain parts).

4) Disassembly, assembly and cleaning

(1) Disassemble and assemble the transmission while inspecting the parts in accordance with the Diagnostics.

(2) During job, do not use gloves. Do not clean the parts with rags: Use chamois or nylon cloth.

(3) Pay special attention to the air to be used for cleaning. Get the moisture and the dust rid of the air as much as possible. Be careful not to scratch or dent any part while checking for proper operation with an air gun.

(4) Complete the job from cleaning to completion of assembly as continuously and speedily as possible in order to avoid occurrence of secondary troubles caused by dust. When stopping the job unavoidably cover the parts with clean chamois or nylon cloth to keep them away from any dust.

(5) Use kerosene, white gasoline or the equivalent as washing fluid. Use always new fluid for cleaning the automatic transmission parts and never reuse. The used fluid is usable in disassemble and assemble work of engine and manual transmission.

(6) Although the cleaning should be done by dipping into the washing fluid or blowing of the pressurized washing fluid, the dipping is more desirable. (Do not rub with a brush.) Assemble

the parts immediately after the cleaning without exposure to the air for a while. Besides in case of washing rubber parts, perform the job quickly not to dip them into the washing fluid for long time.

(7) Apply the automatic transmission fluid (ATF) onto the parts immediately prior to assembly, and the specified tightening torque should be observed carefully.

(8) Use vaseline if it is necessary to hold parts in the position when assembling.

(9) Drain ATF and differential gear oil into a saucer so that the conditions of fluid and oil can be inspected.

(10) Do not support axle drive shaft, stator shaft, input shaft or various pipes when moving transmission from one place to another.

(11) Always discard old oil seals and O-ring, and install new ones.

(12) Always discard old oil seals and O-ring, and install new ones.

(13) Be sure to replace parts which are damaged, worn, scratched, discolored, etc.

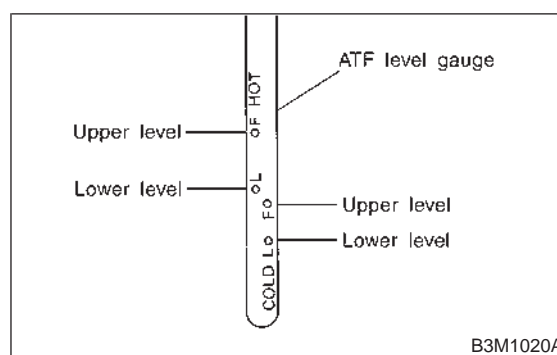
B: INSPECTION

1. ATF LEVEL

1) Raise ATF temperature to 60 to 80°C (140 to 176°F) from 40 to 60°C (104 to 140°F) (when cold) by driving a distance of 5 to 10 km (3 to 6 miles).

NOTE:

The level of ATF varies with fluid temperature. Pay attention to the fluid temperature when checking oil level.



2) Make sure the vehicle is level. After selecting all positions (P, R, N, D, 3, 2, 1), set the selector lever in "P" range. Measure fluid level with the engine idling.

NOTE:

After running, idle the engine for one or two minutes before measurement.

3) If the fluid level is below the center between upper and lower marks, add the recommended ATF until the fluid level is found within the specified

1. General

range (above the center between upper and lower marks). When the transmission is hot, the level should be above the center of upper and lower marks, and when it is cold, the level should be found below the center of these two marks.

CAUTION:

- Use care not to exceed the upper limit level.
- ATF level varies with temperature. Remember that the addition of fluid to the upper limit mark when the transmission is cold will result in the overfilling of fluid.

4) Fluid temperature rising speed

- By idling the engine

Time for temperature rise to 60°C (140°F) with atmospheric temperature of 0°C (32°F): More than 25 minutes

<Reference>

Time for temperature rise to 30°C (86°F) with atmospheric temperature of 0°C (32°F): Approx. 8 minutes

- By running the vehicle

Time for temperature rise to 60°C (140°F) with atmospheric temperature of 0°C (32°F): More than 10 minutes

5) Method for checking fluid level upon delivery or at periodic inspection

Check fluid level after a warm-up run of approx. 10 minutes. During the warm-up period, the automatic transmission functions can also be checked.

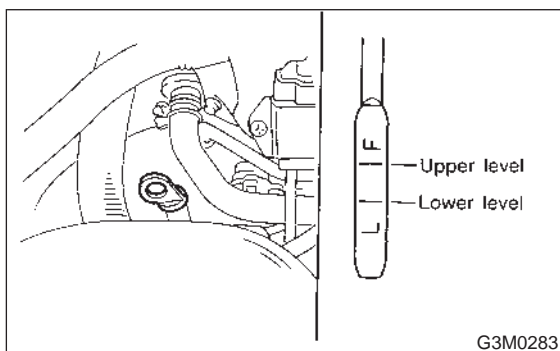
2. DIFFERENTIAL GEAR OIL LEVEL

1) Ensure the vehicle is in safe condition.

NOTE:

Do not check the oil level nor add oil to the case with the front end of the vehicle jacked-up; this will result in an incorrect reading of the oil level.

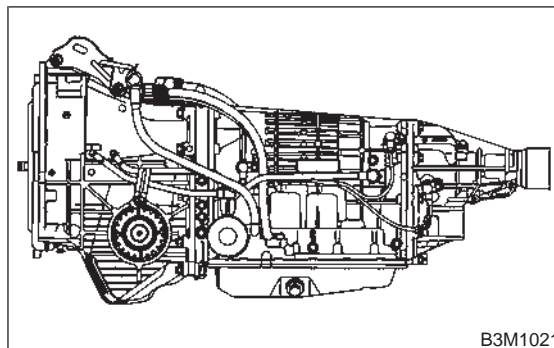
2) Check whether the oil level is between the upper (F) and lower (L) marks. If it is below the lower limit mark, add oil until the level reaches the upper mark.

**3. OIL LEAKAGE**

It is difficult to accurately determine the precise position of a oil leak, since the surrounding area also becomes wet with oil. The places where oil seals and gaskets are used are as follows:

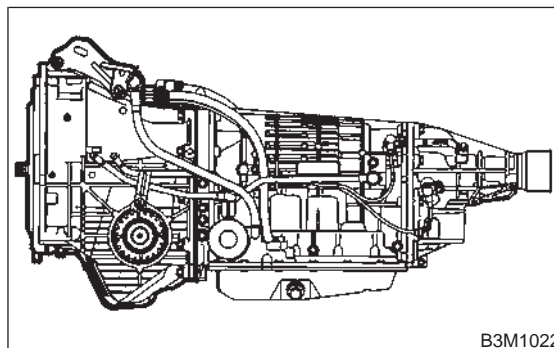
1) Jointing portion of the case

- Transmission case and oil pump housing jointing portion
- Torque converter clutch case and oil pump housing jointing portion
- Transmission case and extension case jointing portion

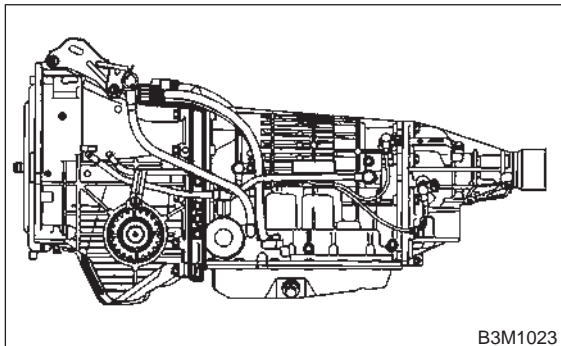


2) Torque converter clutch case

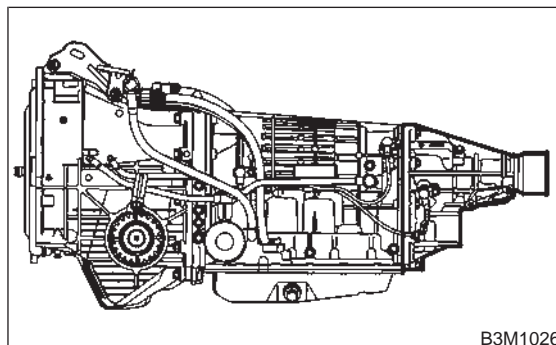
- Engine crankshaft oil seal
- Torque converter clutch impeller sleeve oil seal
- ATF cooler pipe connector
- Torque converter clutch
- Torque converter clutch case
- Axle shaft oil seal
- O-ring on the outside diameter of axle shaft oil seal holder
- O-ring on the differential oil gauge
- Differential oil drain plug
- Location of steel balls



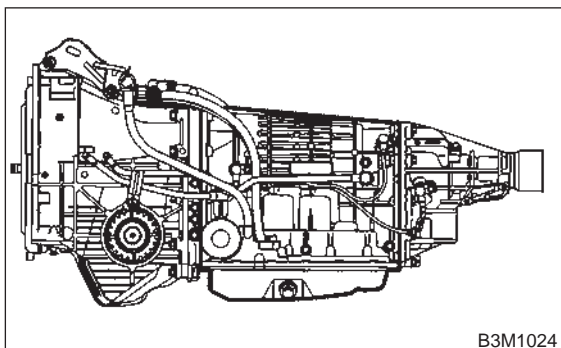
- 3) Oil pump housing
 - Oil pump housing (Defective casting)
 - O-ring on the test plugs
 - Differential gear breather



- 5) Extension case
 - Extension case (Defective casting)
 - O-ring on the vehicle speed sensor 1 (Rear)
 - Rear drive shaft oil seal
 - O-ring on the test plugs



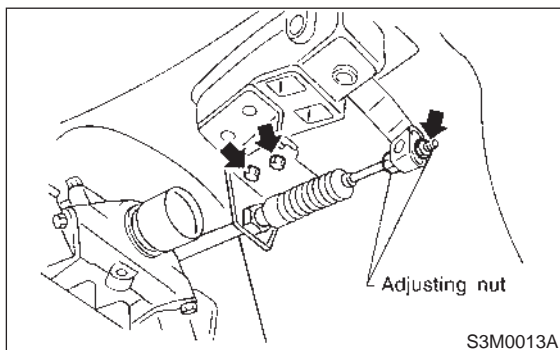
- 4) Automatic transmission case
 - Transmission case (Defective casting)
 - Mating surface of oil pan
 - O-ring on the test plugs
 - Oil supply pipe connector
 - ATF cooler pipe connector and gasket
 - Oil pan drain plug
 - O-ring on the transmission harness holder
 - Oil pump plugs
 - ATF breather
 - Shift lever oil seal
 - O-ring on the vehicle speed sensor 2 (Front)
 - O-ring on the turbine revolution sensor
 - ATF filter oil seal



2. Inhibitor Switch

A: INSPECTION

When driving condition or starter motor operation is erroneous, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.



- 1) Disconnect cable end from select lever.
- 2) Disconnect inhibitor switch connector.
- 3) Check continuity in inhibitor switch circuits with select lever moved to each position.

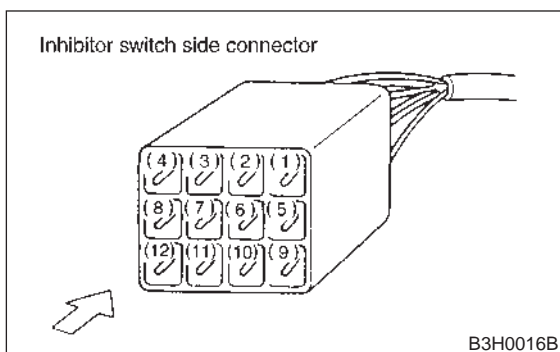
CAUTION:

Also check that continuity in ignition circuit does not exist when select lever is in R, D, 3, 2 and 1 ranges.

NOTE:

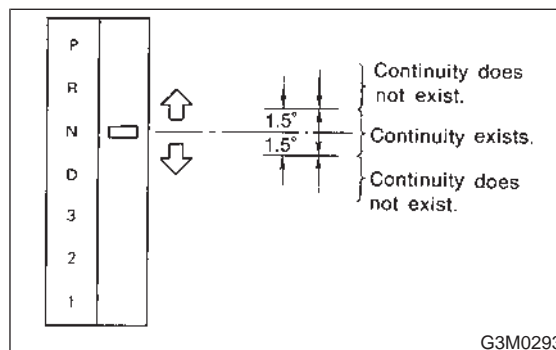
If inhibitor switch is inoperative, check for poor contact of connector on transmission side.

	Position	Pin No.
Signal sent to TCM	P	4 — 3
	R	4 — 2
	N	4 — 1
	D	4 — 8
	3	4 — 7
	2	4 — 6
	1	4 — 5
Ignition circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9



- 4) Check if there is continuity at equal points when the select lever is turned 1.5° in both directions from the N range.

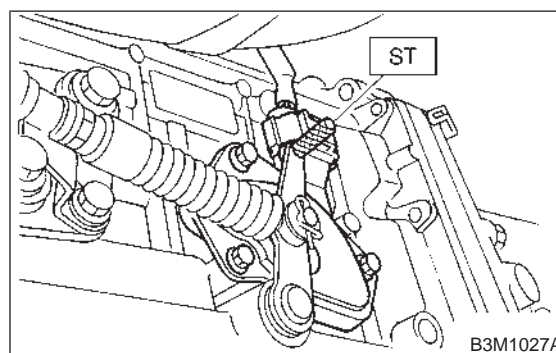
If there is continuity in one direction and the continuity in the other or if there is continuity at unequal points, adjust the inhibitor switch.



B: ADJUSTMENT

- 1) Loosen the three inhibitor switch securing bolts.
- 2) Shift the select lever to the N range.
- 3) Insert ST as vertical as possible into the holes in the inhibitor switch lever and switch body.

ST 499267300 STOPPER PIN



- 4) Tighten the three inhibitor switch bolts.

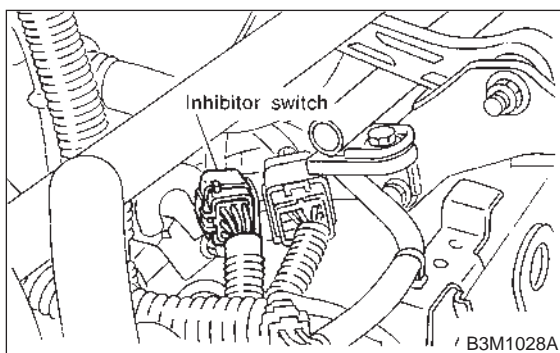
Tightening torque:

3.4±0.5 N·m (0.35±0.05 kg·m, 2.5±0.4 ft·lb)

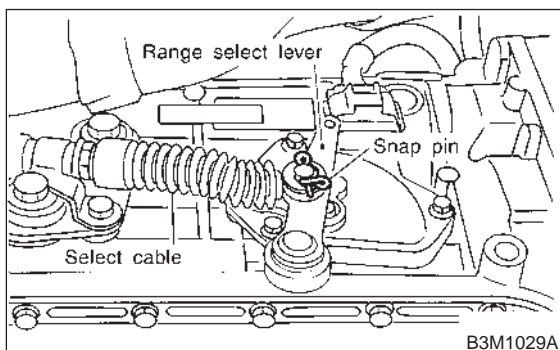
- 5) Repeat the above checks. If the inhibitor switch is determined to be "faulty", replace it.

C: REMOVAL

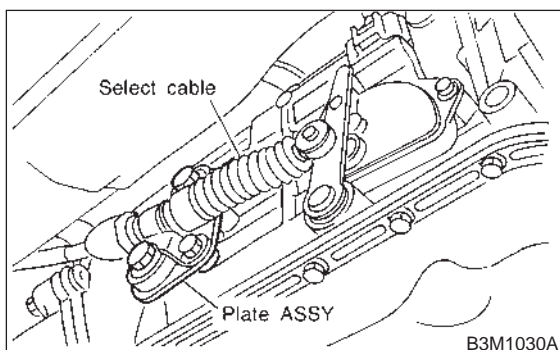
- 1) Move select lever to neutral position.
- 2) Remove air intake chamber and duct. (Except 2200 cc California spec. vehicles) <Ref. to 2-7 [W1A0].>
- 3) Remove air cleaner case and duct. (2200 cc California spec. vehicles) <Ref. to 2-7 [W1A0].> and <Ref. to 2-7 [W18A0].>
- 4) Disconnect inhibitor switch connector.



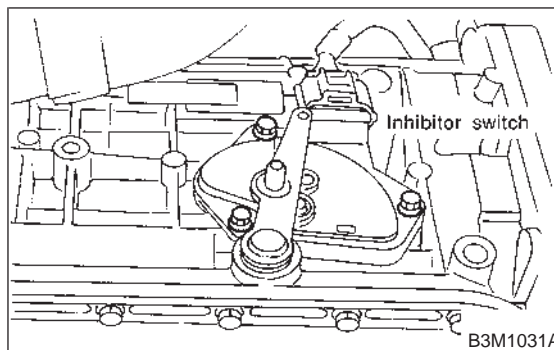
- 5) Remove front and center exhaust pipe. <Ref. to 2-9 [W1A0].>
- 6) Remove snap pin from range select lever.



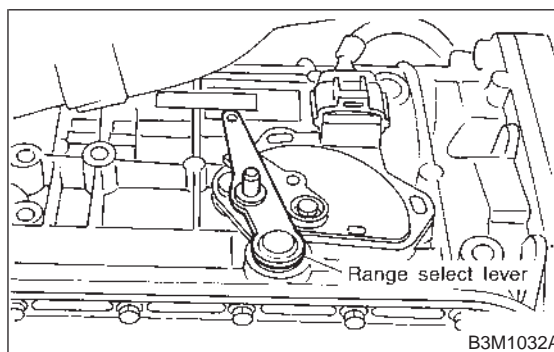
- 7) Remove plate assembly from transmission case.



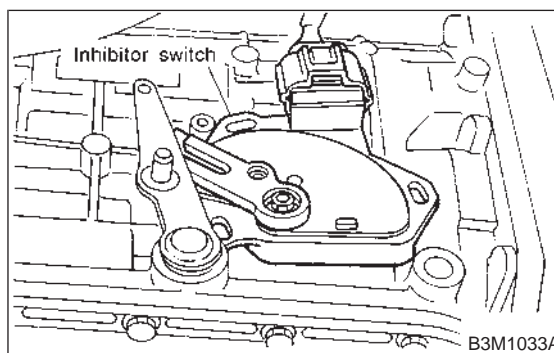
- 8) Remove bolts.



- 9) Move range select lever to parking position (left side).

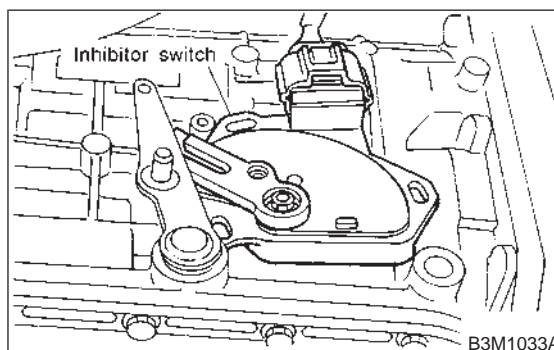


- 10) Remove inhibitor switch from transmission.



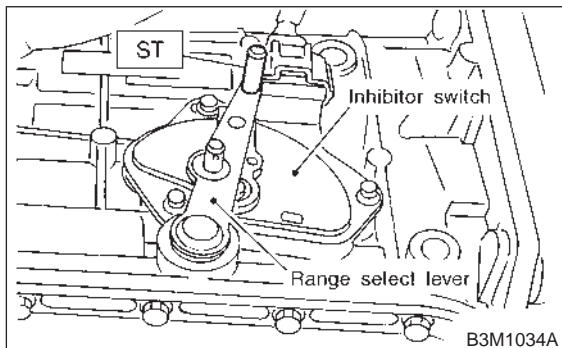
D: INSTALLATION

- 1) Install inhibitor switch to transmission case.



- 2) Move range select lever to neutral position.
- 3) Using ST, tighten bolts of inhibitor switch. <Ref. to 3-2 [W2B0].>

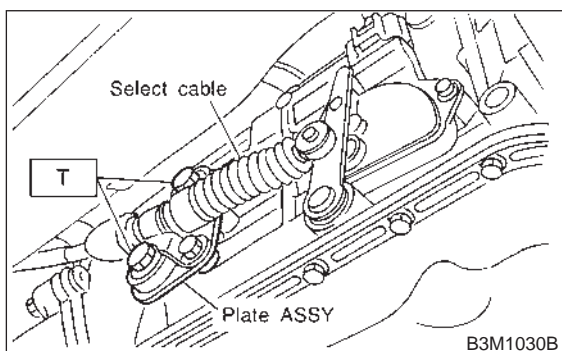
ST 499267300 STOPPER PIN



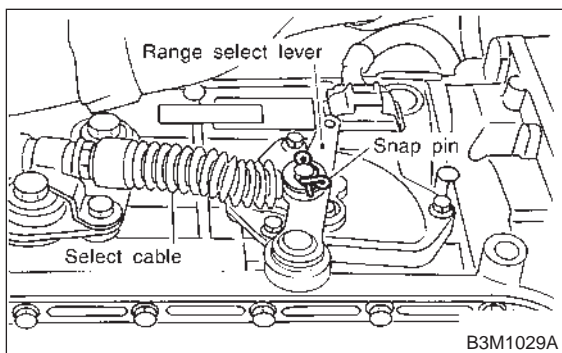
- 4) Install select cable to range select lever.
- 5) Install plate assembly to transmission.

Tightening torque:

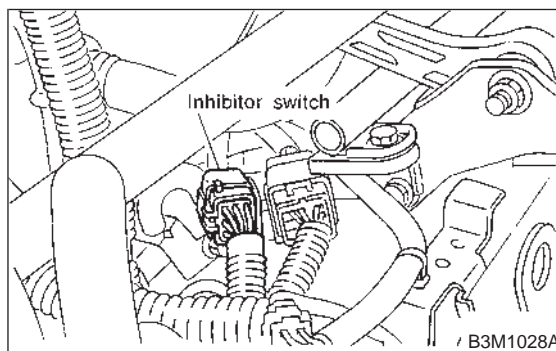
T: 24.5 ± 2.0 N·m (2.50 ± 0.20 kg·m, 18.1 ± 1.4 ft·lb)



- 6) Install snap pin to range select lever.



- 7) Install front and center exhaust pipe. <Ref. to 2-9 [W1B0].>
- 8) Connect inhibitor switch connector.

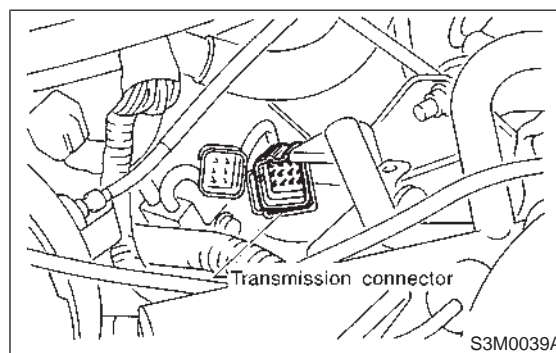
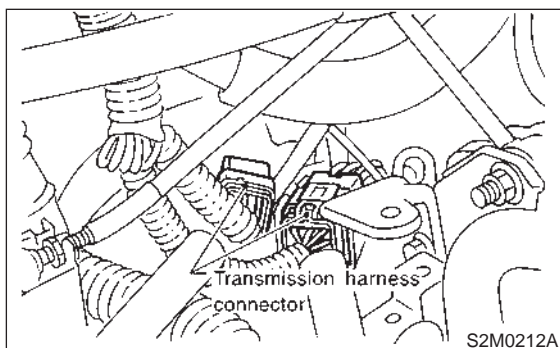


- 9) Install air intake chamber and duct. (Except 2200 cc California spec. vehicles) <Ref. to 2-7 [W1A0].>
- 10) Install air cleaner case and duct. (2200 cc California spec. vehicles) <Ref. to 2-7 [W1A0].> and <Ref. to 2-7 [W18A0].>

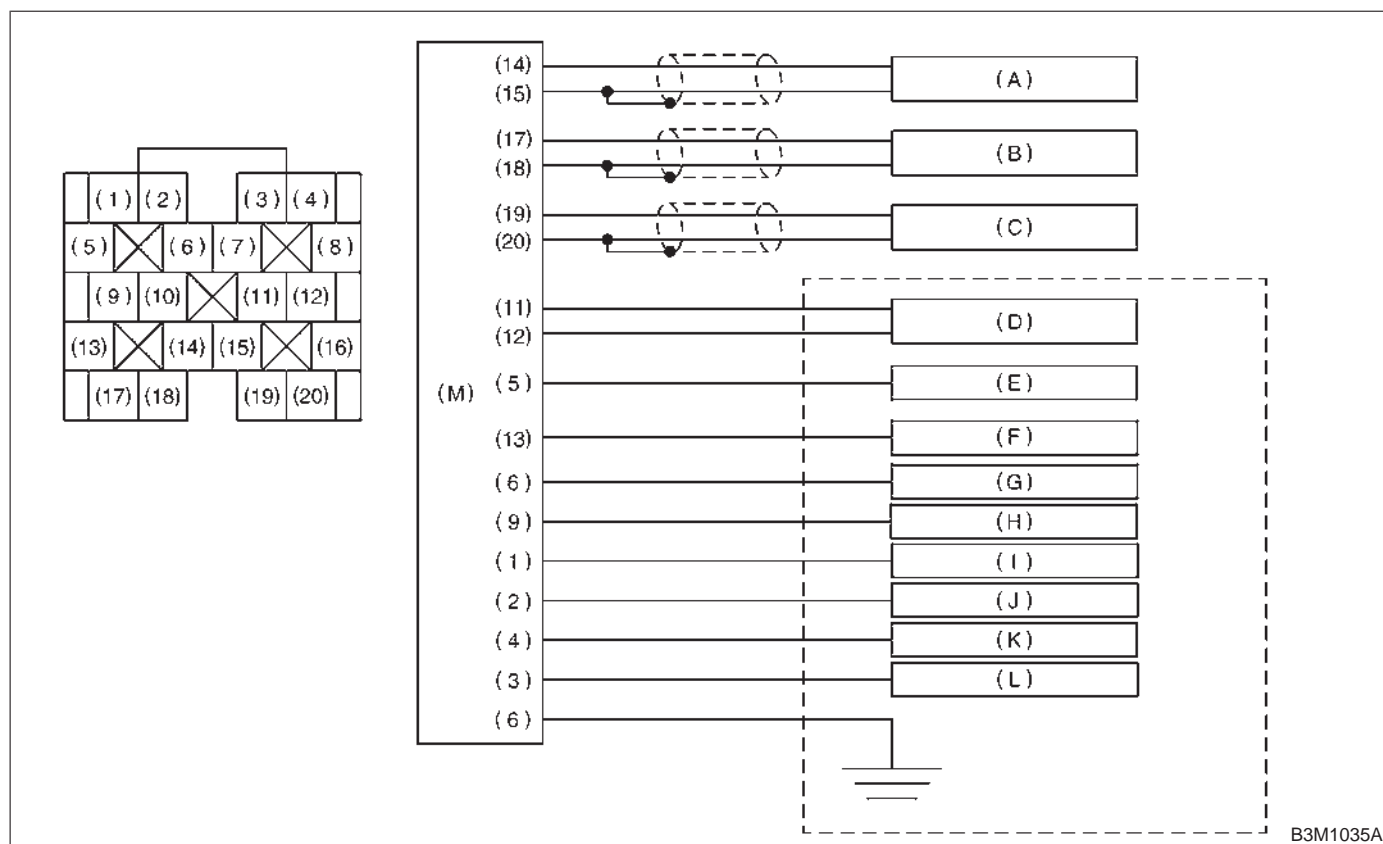
3. Sensor (in transmission)

A: INSPECTION

- 1) Remove air intake chamber and duct.
- 2) Disconnect transmission connector.



- 3) Check each sensor, solenoid and ground system for short circuits.



- (A) Torque converter turbine speed sensor
 (B) Vehicle speed sensor 2 (Front)
 (C) Vehicle speed sensor 1 (Rear)
 (D) ATF temperature sensor

- (E) Duty solenoid A (Line pressure)
 (F) Duty solenoid B (Lock-up)
 (G) Duty solenoid C (Transfer)
 (H) Duty solenoid D (2-4 brake)
 (I) Shift solenoid 1

- (J) Shift solenoid 2
 (K) 2-4 brake timing solenoid
 (L) Low clutch timing solenoid
 (M) Transmission connector

1. EVALUATION

NOTE:

If part is faulty, its resistance value will be different from the standard value indicated.

Part name	Terminal	Resistance (Ω)
Vehicle speed sensor 1	17 — 18	450 — 650
Vehicle speed sensor 2	19 — 20	450 — 650
ATF temperature sensor	11 — 12	2,100 — 2,900/ 20°C (68°F) 275 — 375/ 80°C (176°F)
Torque converter turbine speed sensor	14 — 15	450 — 650
Shift solenoid 1	1 — 16	10 — 17
Shift solenoid 2	2 — 16	10 — 17
Duty solenoid A (Line pressure solenoid)	5 — 16	2.0 — 4.5
Duty solenoid B (Lock-up solenoid)	13 — 16	10 — 17
Duty solenoid D (2-4 brake solenoid)	9 — 16	2.0 — 4.5
Low clutch timing solenoid	3 — 16	10 — 16
2-4 brake timing solenoid	4 — 16	10 — 16
Duty solenoid C (Transfer clutch solenoid)	6 — 16	10 — 17

4. Shift Solenoid, Duty Solenoid and Valve

A: REMOVAL

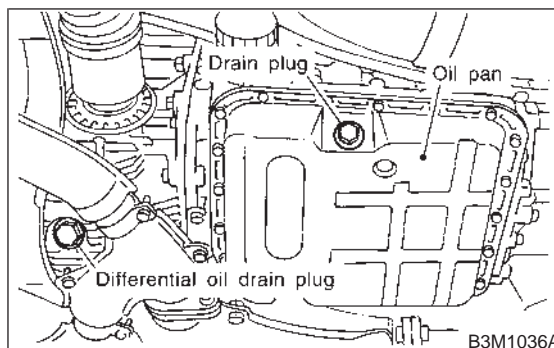
- 1) Clean transmission exterior.
- 2) Drain ATF completely.

NOTE:

Tighten ATF drain plug after draining ATF.

Tightening torque:

25 ± 2 N·m (2.5 ± 0.2 kg·m, 18.1 ± 1.4 ft·lb)

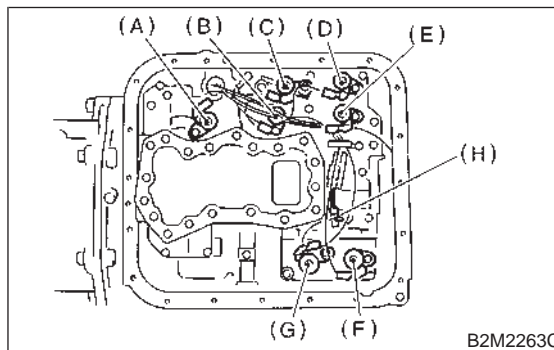


- 3) Remove oil pan.

NOTE:

Drain oil into a container.

- 4) Disconnect solenoid and sensor connectors. Remove connectors from clip and disconnect connectors at 8 places.



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor

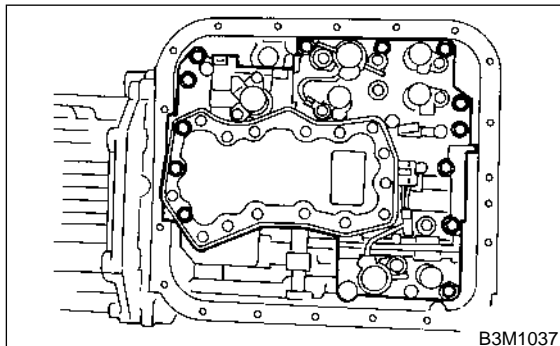
5) Remove control valve body.

CAUTION:

When removing control valve body, be careful not to interfere with transfer duty solenoid C wiring.

NOTE:

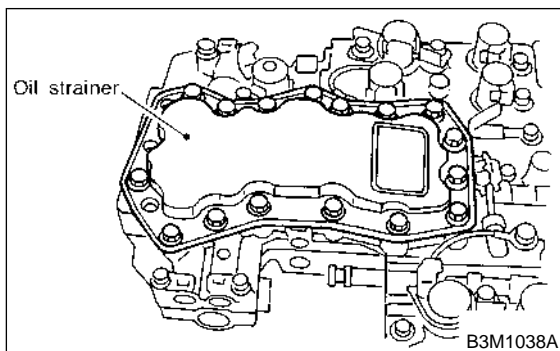
Be careful because oil flows from valve body.



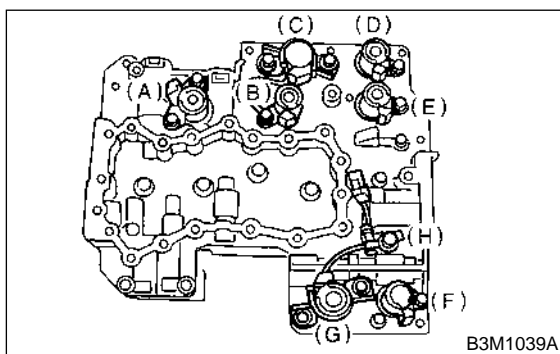
6) Remove oil strainer.

NOTE:

Be careful because oil flows from oil strainer.



7) Remove solenoids and duty solenoids.



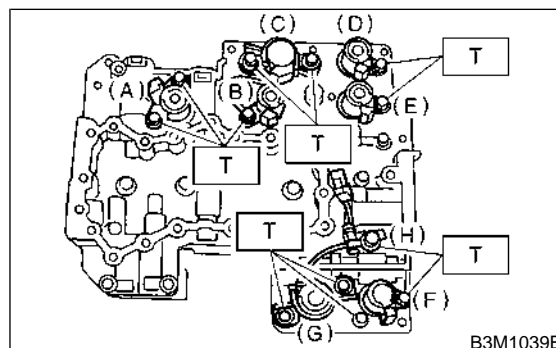
- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor

B: INSTALLATION

1) Install 7 solenoids and ATF temperature sensor.

Tightening torque:

T: 8 ± 1 N-m (0.8 ± 0.1 kg-m, 5.8 ± 0.7 ft-lb)

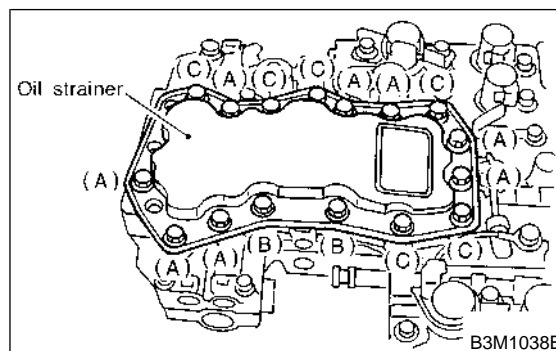


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor

2) Install oil strainer.

Tightening torque:

8 ± 1 N-m (0.8 ± 0.1 kg-m, 5.8 ± 0.7 ft-lb)



- (A) Short bolt
- (B) Middle bolt
- (C) Long bolt

4. Shift Solenoid, Duty Solenoid and Valve

- 3) Install valve body to transmission case.
 - (1) Temporarily tighten the valve body on the transmission case.

CAUTION:

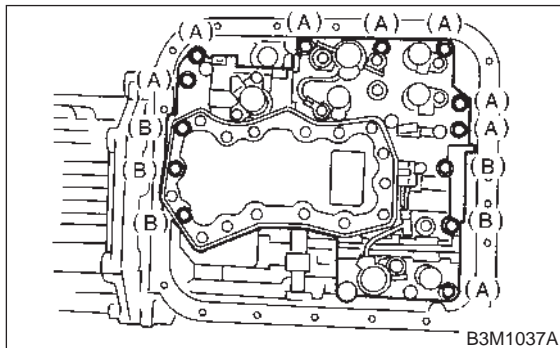
When installing control valve body, be careful not to interfere with transfer duty solenoid wiring (brown).

NOTE:

Align manual valve connections.

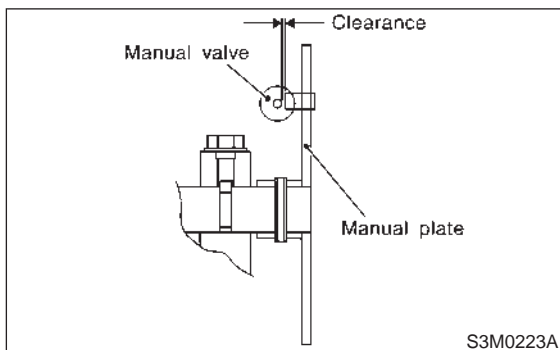
Tightening torque:

$8 \pm 1 \text{ N-m}$ ($0.8 \pm 0.1 \text{ kg-m}$, $5.8 \pm 0.7 \text{ ft-lb}$)



- (A) Short bolts
- (B) Long bolts

- (2) Adjust the clearance between the manual valve and manual plate in the 0.1 to 0.9 mm (0.004 to 0.035 in) range.

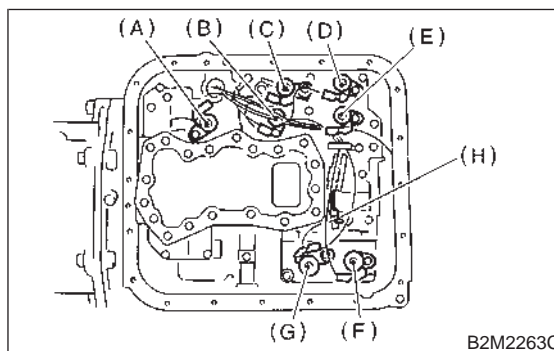


- (3) Tighten the valve body to the specified torque.

Tightening torque:

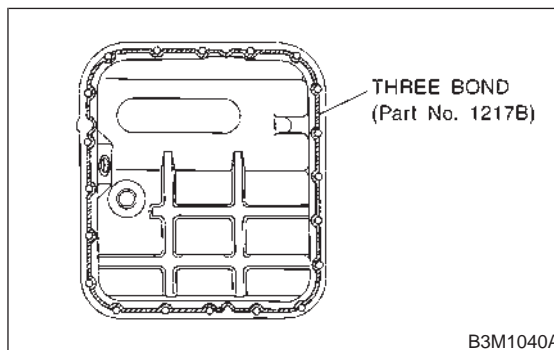
$8 \pm 1 \text{ N-m}$ ($0.8 \pm 0.1 \text{ kg-m}$, $5.8 \pm 0.7 \text{ ft-lb}$)

- 4) Connect harness connectors at 8 places. Connect connectors of same color, and secure connectors to valve body using clips.



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor

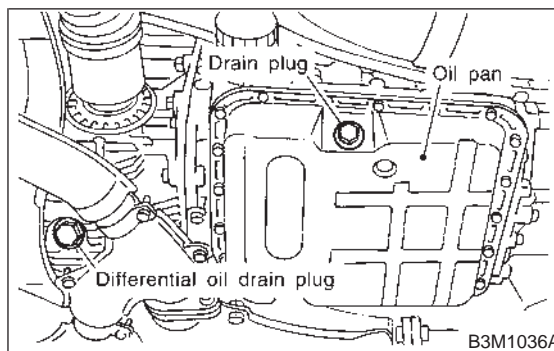
- 5) Apply proper amount of liquid gasket (THREE BOND Part No. 1217B) to the entire oil pan mating surface.



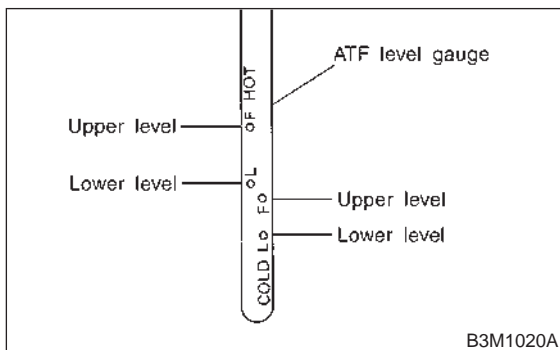
- 6) Install oil pan.

Tightening torque:

$4.9 \pm 0.5 \text{ N-m}$ ($0.50 \pm 0.05 \text{ kg-m}$, $3.6 \pm 0.4 \text{ ft-lb}$)



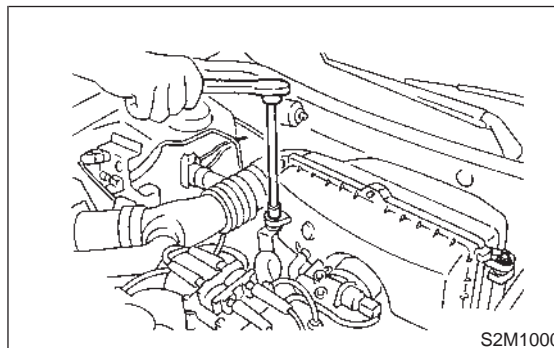
7) Add ATF and check level.



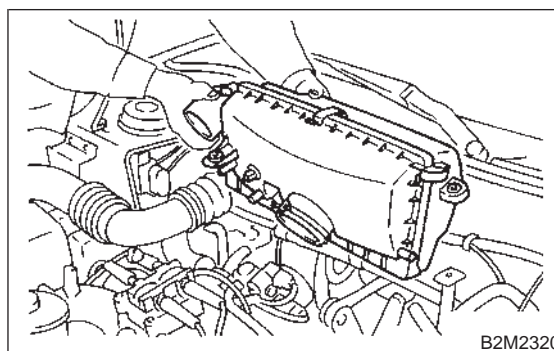
5. Duty Solenoid C and Transfer Valve Body

A: REMOVAL

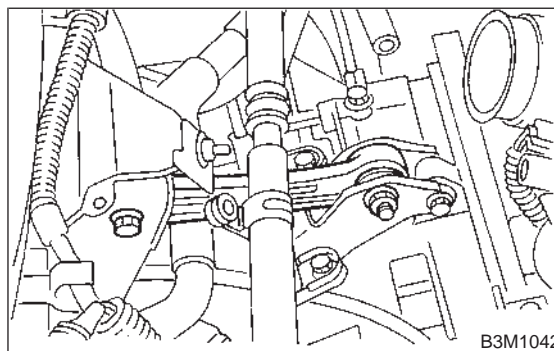
1) Remove air intake duct and chamber. (Except 2200 cc California spec. vehicles)
<Ref. to 2-7 [W1A0].>



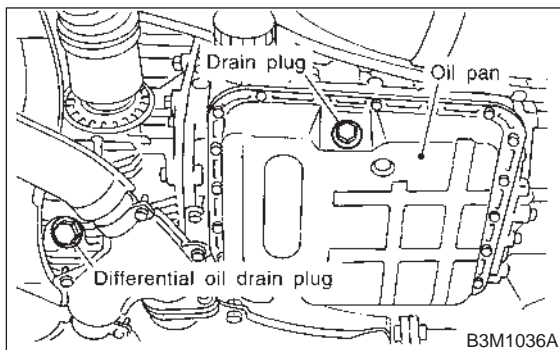
2) Remove air intake duct and cleaner case. (2200 cc California spec. vehicles)
<Ref. to 2-7 [W1A0].> and <Ref. to 2-7 [W18A0].>



3) Remove pitching stopper.



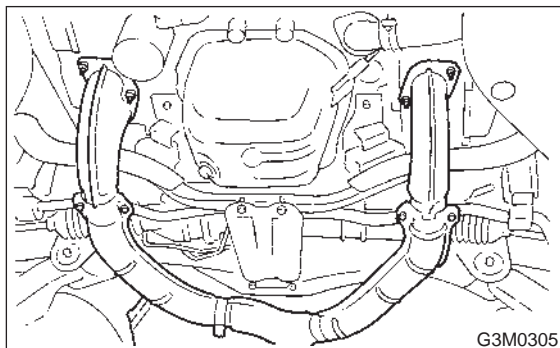
4) Raise vehicle and drain ATF.



5) Remove front and center exhaust pipe assembly.

Disconnect oxygen sensor connector, and remove front and center exhaust pipes.

<Ref. to 2-9 [W1A0].>

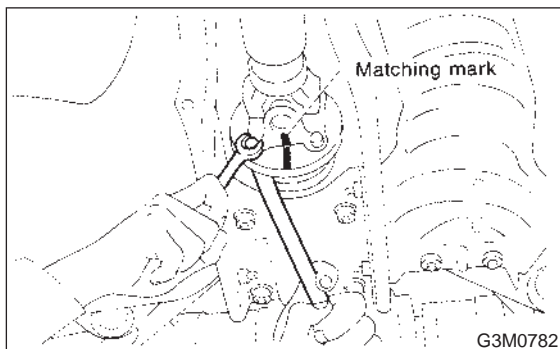


6) Remove propeller shaft.

<Ref. to 3-4 [W1B0].>

NOTE:

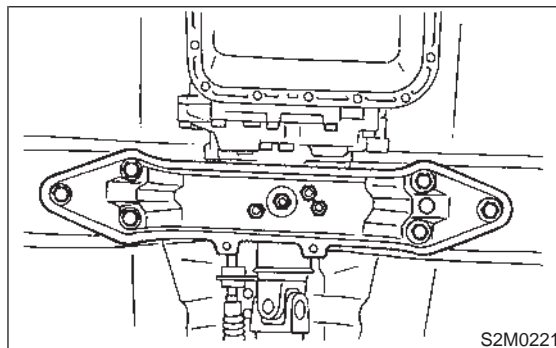
Before removing propeller shaft, scribe matching marks on propeller shaft and rear differential coupling.



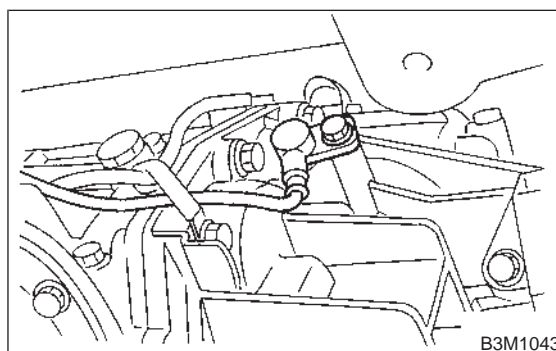
7) Remove rear crossmember.

(1) Support transmission using a transmission jack and raise slightly.

(2) Remove bolts and nuts as shown in Figure.

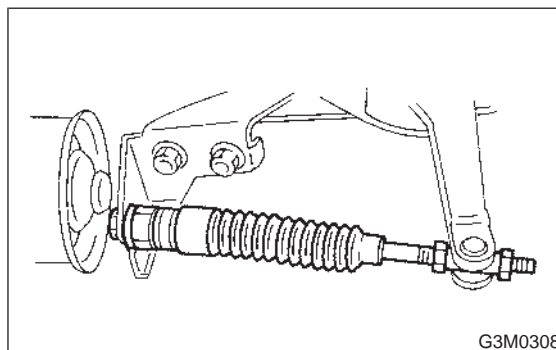


8) Remove vehicle speed sensor 1 (rear).



9) Remove extension and gasket.

(1) Remove select cable nut.



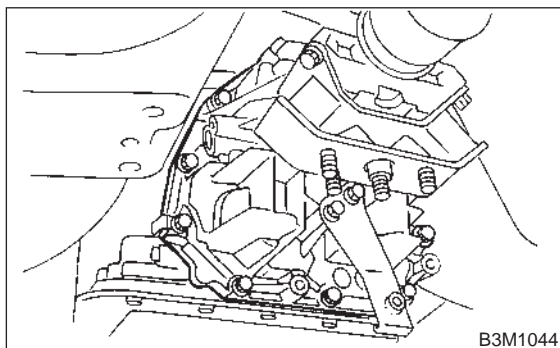
(2) Move gear select cable so that extension bolts can be removed.

(3) Remove bolts.

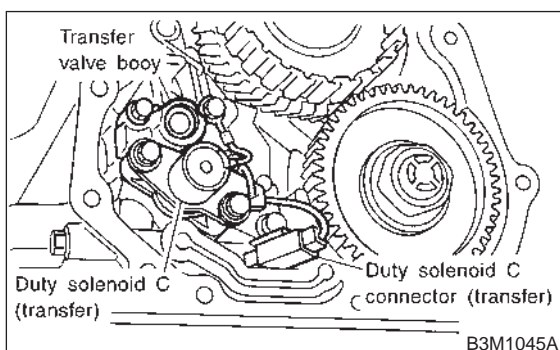
- (4) Remove extension case.

NOTE:

Use a container to catch oil flowing from extension.



- 10) Disconnect duty solenoid C (transfer) connector.
11) Remove duty solenoid C (transfer) and transfer valve body.



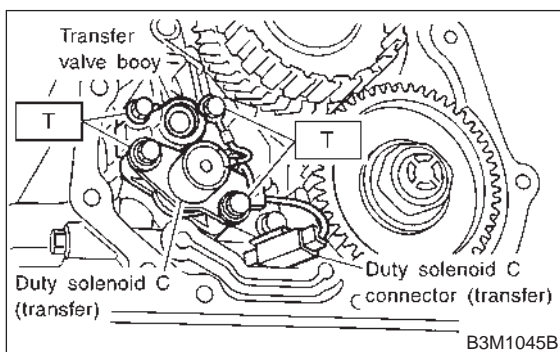
B: INSTALLATION

- 1) Install duty solenoid C and transfer valve body.
(1) Install duty solenoid C and transfer valve body.

Tightening torque:

T: 8 ± 1 N-m (0.8 ± 0.1 kg-m, 5.8 ± 0.7 ft-lb)

- (2) Connect duty solenoid C (transfer) connector.



- 2) Install extension case to transmission case.
(1) Tighten 11 bolts.

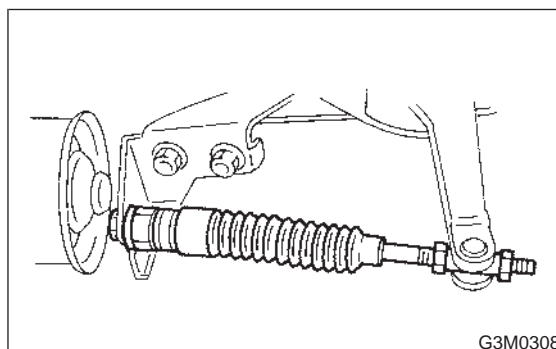
Tightening torque:

25 ± 2 N-m (2.5 ± 0.2 kg-m, 18.1 ± 1.4 ft-lb)

- (2) Install select cable.

Tightening torque:

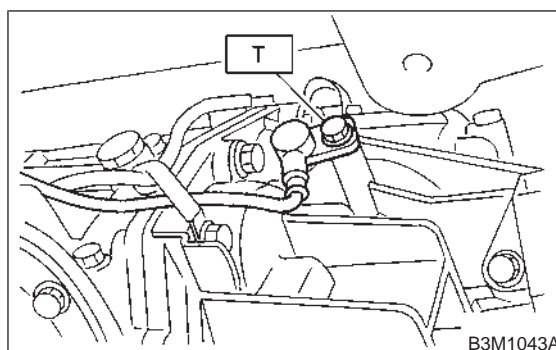
14 ± 4 N-m (1.4 ± 0.4 kg-m, 10.1 ± 2.9 ft-lb)



- 3) Install vehicle speed sensor 1 (rear).

Tightening torque:

T: 7 ± 1 N-m (0.7 ± 0.1 kg-m, 5.1 ± 0.7 ft-lb)

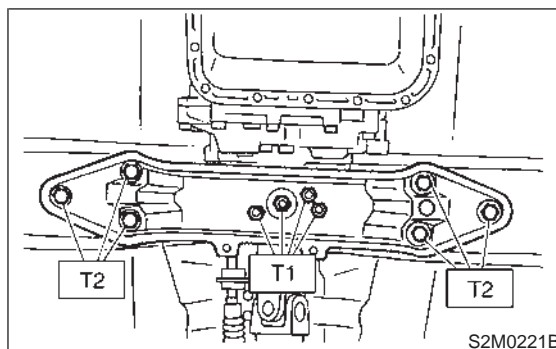


- 4) Install rear crossmember.
(1) Tighten bolts.

Tightening torque:

T1: 37 ± 10 N-m (3.8 ± 1.0 kg-m, 27 ± 7 ft-lb)

T2: 69 ± 15 N-m (7.0 ± 1.5 kg-m, 51 ± 11 ft-lb)



- (2) Lower and remove transmission jack.

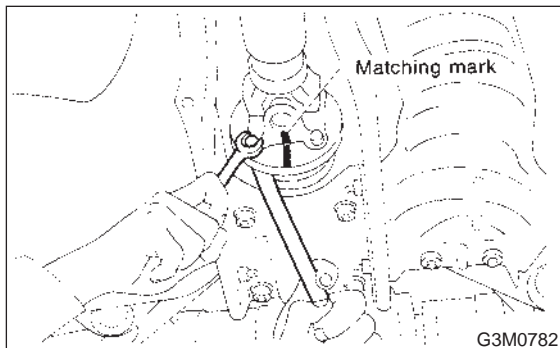
5. Duty Solenoid C and Transfer Valve Body

5) Install propeller shaft.

<Ref. to 3-4 [W1F0].>

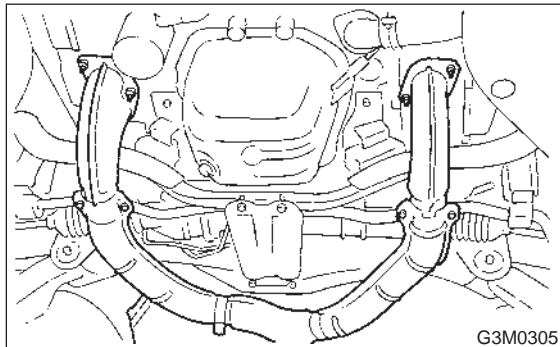
NOTE:

Align matching marks on propeller shaft and rear differential coupling.



6) Install front and center exhaust pipe assembly.

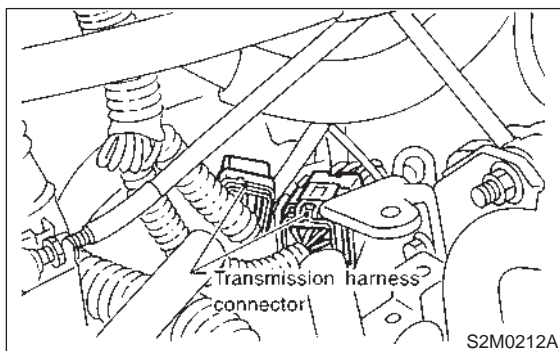
<Ref. to 2-9 [W1B0].>



7) Lower and remove jack.

8) Connect the following parts:

- (1) Oxygen sensor connector
- (2) Transmission harness connector

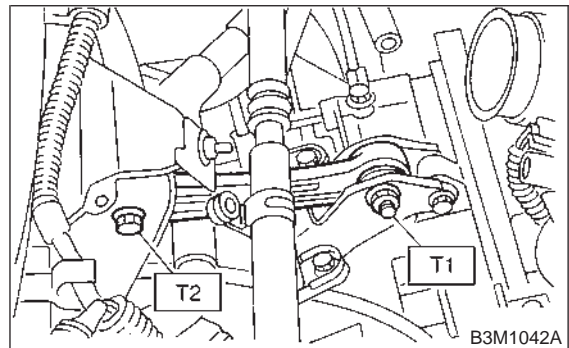


9) Install pitching stopper.

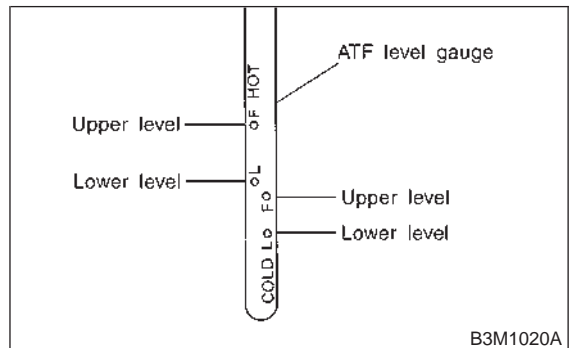
Tightening torque:

T1: 49 ± 5 N·m (5.0 ± 0.5 kg-m, 36.2 ± 3.6 ft-lb)

T2: 57 ± 10 N·m (5.8 ± 1.0 kg-m, 42 ± 7 ft-lb)



10) Replenish ATF and check oil level. Check for leaks.



MEMO:

6. Road Test

A: INSPECTION

1. GENERAL PRECAUTION

Road tests should be conducted to properly diagnose the condition of the automatic transmission.

CAUTION:

When performing test, do not exceed posted speed limit.

2. SHIFT PATTERNS

Check "kick-down".

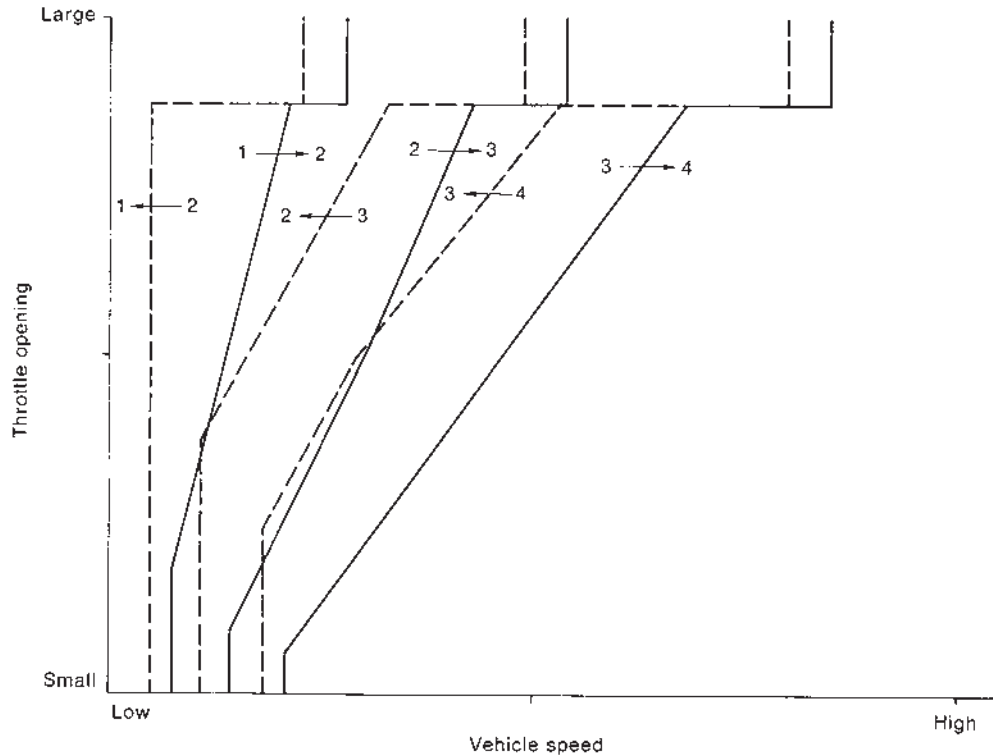
D range: 1st \leftarrow 2nd \leftarrow 3rd \leftarrow 4th

3 range: 1st \leftarrow 2nd \leftarrow 3rd \leftarrow 4th

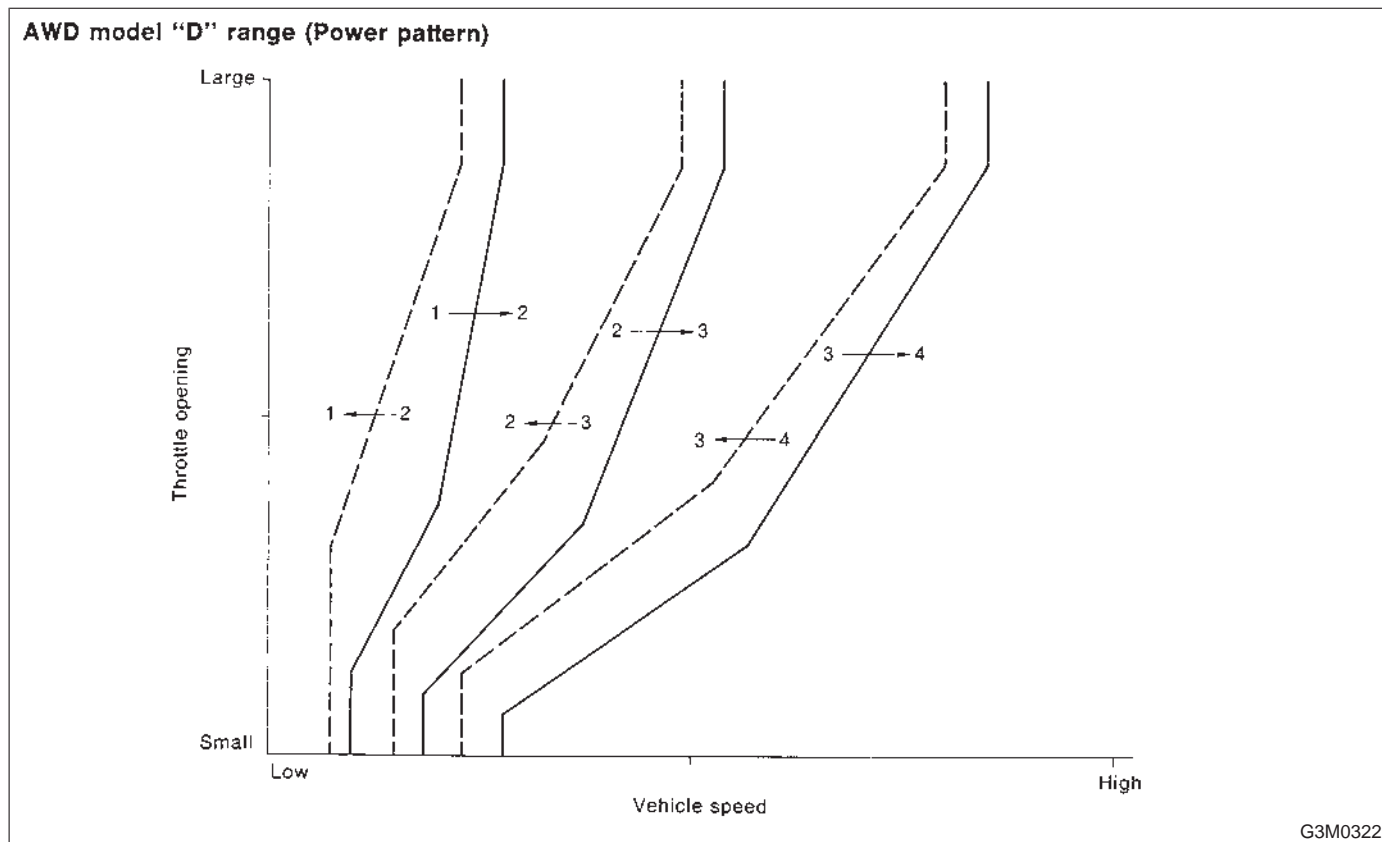
2 range: 2nd \leftarrow 3rd \leftarrow 4th

1 range: 1st \leftarrow 2nd \leftarrow 3rd \leftarrow 4th

AWD model "D" range (Normal pattern)



G3M0321



3. ENGINE BRAKE OPERATION

Engine brake operation:

D range → 4th gear

3 range → 3rd gear

2 range → 2nd gear

1 range → 1st gear

4. AWD FUNCTION

If "tight-corner braking" occurs when the steering wheel is fully turned at low speed:

- 1) Determine the applicable trouble code and check the corresponding duty solenoid C (transfer) for improper operation.
- 2) If the solenoid is operating properly, check transfer clutch pressure.
- 3) If oil pressure is normal but "tight-corner braking" occurs:

Check the transfer control valve for sticking, and the transfer clutch facing for wear. <Ref. to 3-2 [W20B0].> and <Ref. to 3-2 [W21B0].>

7. Stall Test

A: MEASUREMENT

1. GENERAL INFORMATION

The stall test is of extreme importance in diagnosing the condition of the automatic transmission and the engine. It should be conducted to measure the engine stall speeds in R and 2 ranges.

Purposes of the stall test:

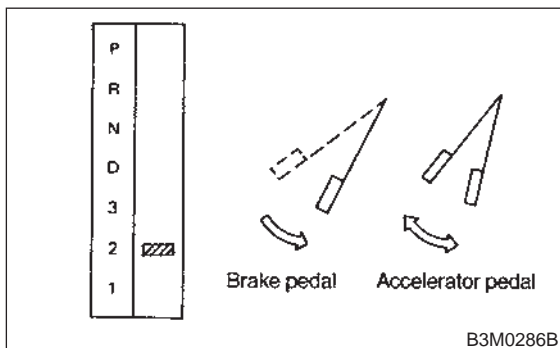
- 1) To check the operation of the automatic transmission clutch.
- 2) To check the operation of the torque converter clutch.
- 3) To check engine performance.

2. TEST METHODS

- 1) Preparations before test:
 - (1) Check that throttle valve opens fully.
 - (2) Check that engine oil level is correct.
 - (3) Check that coolant level is correct.
 - (4) Check that ATF level is correct.
 - (5) Check that differential gear oil level is correct.
 - (6) Increase ATF temperature to 50 to 80°C (122 to 176°F) by idling the engine for approximately 30 minutes (with select lever set to "N" or "P").
- 2) Install an engine tachometer at a location visible from the driver's compartment and mark the

stall speed range on the tachometer scale.

- 3) Place the wheel chocks at the front and rear of all wheels and engage the parking brake.
- 4) Move the manual linkage to ensure it operates properly, and shift the select lever to the 2 range.
- 5) While forcibly depressing the foot brake pedal, gradually depress the accelerator pedal until the engine operates at full throttle.



- 6) When the engine speed is stabilized, read that speed quickly and release the accelerator pedal.
- 7) Shift the select lever to Neutral, and cool down the engine by idling it for more than one minute.
- 8) Record the stall speed.

- 9) If stall speed in 2 range is higher than specifications, low clutch slipping and 2-4 brake slipping may occur. To identify it, conduct the same test as above in D range.

- 10) Perform the stall tests with the select lever in the R range.

NOTE:

- Do not continue the stall test for MORE THAN FIVE SECONDS at a time (from closed throttle, fully open throttle to stall speed reading). Failure to follow this instruction causes the engine oil and ATF to deteriorate and the clutch and brake to be adversely affected.

Be sure to cool down the engine for at least one minute after each stall test with the select lever set in the P or N range and with the idle speed lower than 1,200 rpm.

- If the stall speed is higher than the specified range, attempt to finish the stall test in as short a time as possible, in order to prevent the automatic transmission from sustaining damage.

Stall speed (at sea level):

2200 cc 2,200 — 2,700 rpm

2500 cc 2,100 — 2,600 rpm

3. EVALUATION

Stall speed (at sea level)	Position	Cause
Less than specifications	2 R	<ul style="list-style-type: none"> ● Throttle valve not fully open ● Erroneous engine operation ● Torque converter clutch's one-way clutch slipping
Greater than specifications	D	<ul style="list-style-type: none"> ● Low clutch slipping ● One-way clutch malfunctioning
	R	<ul style="list-style-type: none"> ● Line pressure too low ● Reverse clutch slipping ● Low & reverse brake slipping
	2	<ul style="list-style-type: none"> ● Line pressure too low ● Low clutch slipping ● 2-4 brake slipping

8. Time Lag Test

A: INSPECTION

1. GENERAL INFORMATION

If the shift lever is shifted while the engine is idling, there will be a certain time elapse or lag before the shock can be felt. This is used for checking the condition of the low clutch, reverse clutch, low & reverse brake and one-way clutch.

CAUTION:

- Perform the test at normal operation fluid temperature 60 to 80°C (140 to 176°F).
- Be sure to allow a one minute interval between tests.
- Make three measurements and take the average value.

2. TEST METHODS

- 1) Fully apply the parking brake.
- 2) Start the engine.
Check idling speed (A/C OFF).
"N" range: 700±100 rpm
- 3) Shift the shift lever from "N" to "D" range.
Using a stop watch, measure the time it takes from shifting the lever until the shock is felt.
Time lag: Less than 1.2 seconds
- 4) In same manner, measure the time lag for "N" → "R".
Time lag: Less than 1.5 seconds

3. EVALUATION

- 1) If "N" → "D" time lag is longer than specified:
 - Line pressure too low
 - Low clutch worn
 - One-way clutch not operating properly
- 2) If "N" → "R" time lag is longer than specified:
 - Line pressure too low
 - Reverse clutch worn
 - Low & reverse brake worn

9. Line Pressure Test

A: MEASUREMENT

1. GENERAL INFORMATION

If the clutch or the brake shows a sign of slippage or shifting sensation is not correct, the line pressure should be checked.

- Excessive shocks during upshifting or shifting takes place at a higher point than under normal circumstances, may be due to the line pressure being too high.
 - Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake or control valve.
- 1) Line pressure measurement (under no load)

CAUTION:

- Before measuring line pressure, jack-up all wheels.
- Maintain temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with select lever in "N" or "P".)

- 2) Line pressure measurement (under heavy load)

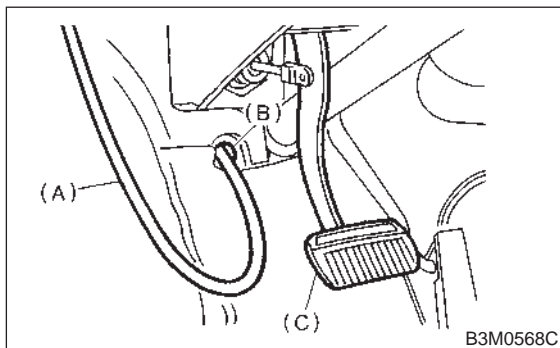
CAUTION:

- Before measuring line pressure, apply both foot and parking brakes with all wheels chocked (Same as for "stall" test conditions).
- Measure line pressure when select lever is in "R", "2" with engine under stall conditions.
- Measure line pressure within 5 seconds after shifting the select lever to each position. (If line pressure needs to be measured again, allow the engine to idle and then stop. Wait for at least one minute before measurement.)
- Maintain the temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with the select lever in "N" or "P".)

2. TEST METHODS

1) Temporarily attach the ST to a suitable place in the driver's compartment, remove the blind plug located in front of the toe board and pass the hose of the ST to the engine compartment.

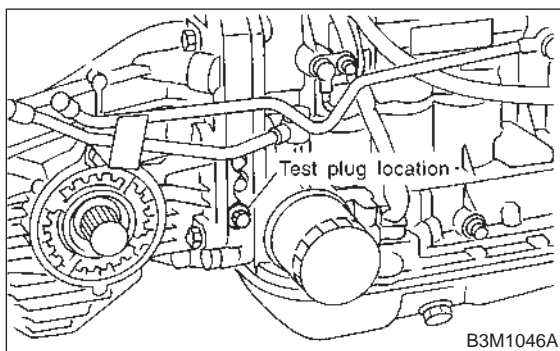
ST 498575400 OIL PRESSURE GAUGE ASSY



- (A) Pressure gauge hose
- (B) Hole in toe board (blank cap hole)
- (C) Brake pedal

2) Remove the test plug and install ST instead.

ST 498897200 OIL PRESSURE GAUGE ADAPTER



3) Connect ST1 with ST2.

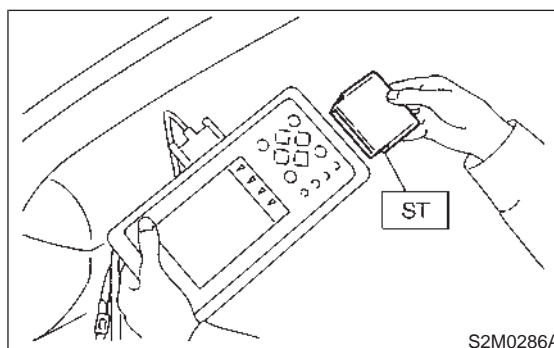
ST1 498897200 OIL PRESSURE GAUGE ADAPTER

ST2 498575400 OIL PRESSURE GAUGE ASSY

4) Check for duty ratio changes by opening and closing throttle valve using Subaru Select Monitor.

(1) Insert the cartridge to Subaru Select Monitor.

ST 24082AA090 CARTRIDGE



(2) Connect Subaru Select Monitor to data link connector.

5) Check line pressure in accordance with the following chart.

3. EVALUATION

NOTE:

- Under no load: "D"
 - Under full load: "R", "2"
- (With engine running at stall speed)

Standard line pressure		
Range position	Line pressure duty ratio (%)	Line pressure kPa (kg/cm ² , psi)
2	5	1,128 — 1,304 (11.5 — 13.3, 164 — 189)
R	5	1,520 — 1,716 (15.5 — 17.5, 220 — 249)
D	95	304 — 412 (3.1 — 4.2, 44 — 60)

10. Transfer Clutch Pressure Test

A: MEASUREMENT

1. TEST METHODS

Check transfer clutch pressure in accordance with the following chart in the same manner as with line pressure.

ST 499897700 OIL PRESSURE ADAPTER SET

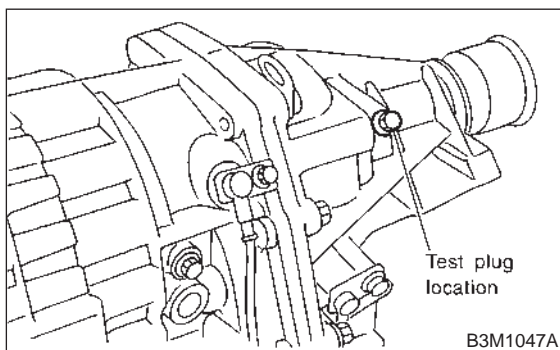
ST 498575400 OIL PRESSURE GAUGE ASSY

AWD mode: "D" range

FWD mode: "P" range, engine speed 2,000 rpm

CAUTION:

Before setting in FWD mode, install spare fuse on FWD mode switch.



2. EVALUATION

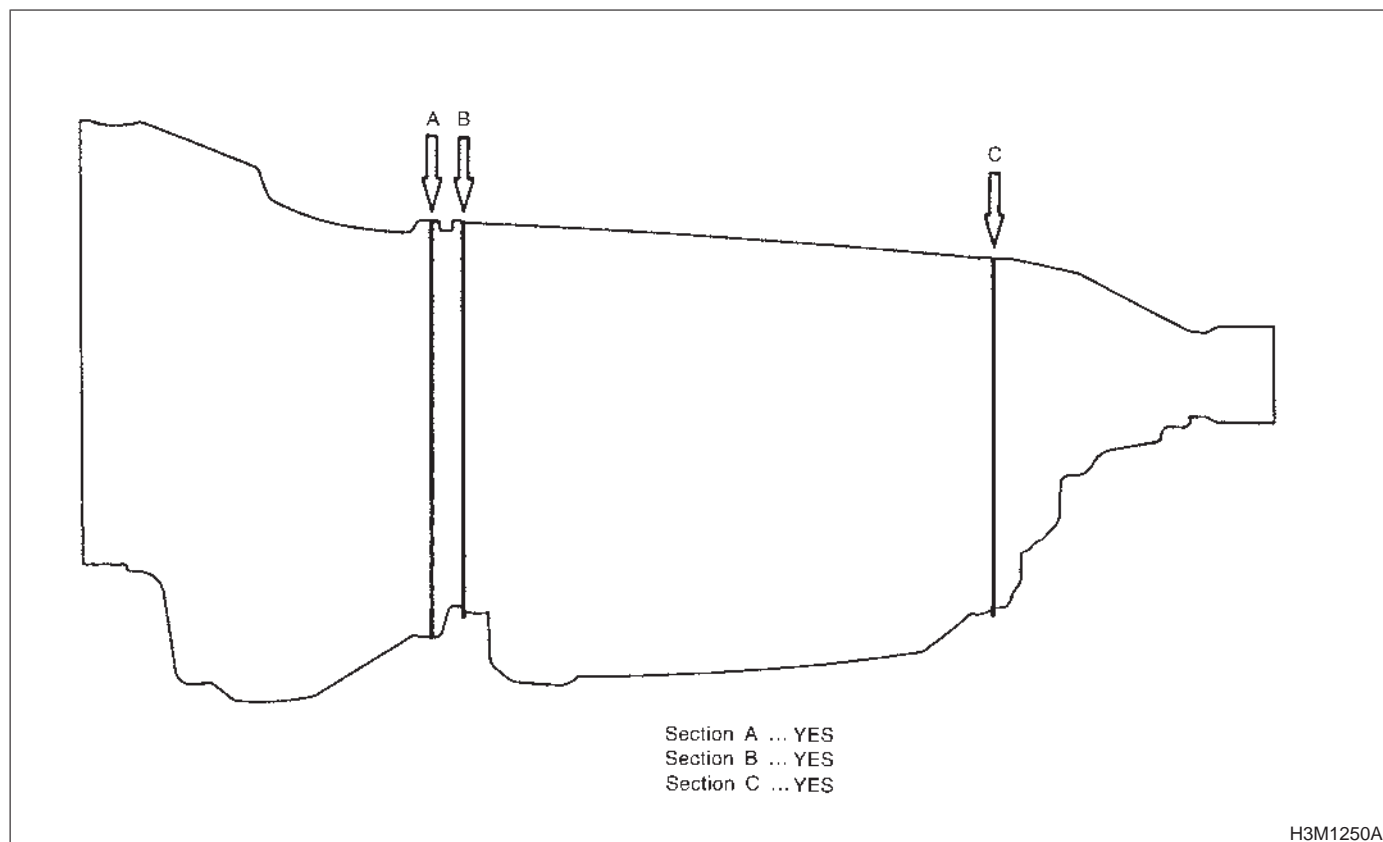
NOTE:

If oil pressure is not produced or if it does not change in the AWD mode, the duty solenoid C or transfer valve assembly may be malfunctioning. If oil pressure is produced in the FWD mode, the problem is similar to that in the AWD mode.

Standard transfer clutch pressure kPa (kg/cm ² , psi)		
Duty ratio (%)	AWD mode	FWD mode
5	951 — 1,089 (9.7 — 11.1, 138 — 158)	—
60	226 — 294 (2.3 — 3.0, 33 — 43)	—
95	—	0 (0, 0)

11. Overall Transmission

A: SECTIONS THAT CAN BE DETACHED/ASSEMBLED



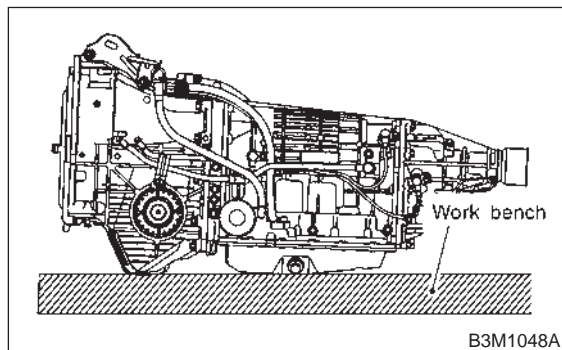
B: DISASSEMBLY

1. EXTERNAL PARTS

1) Place the transmission unit on a work bench, with the oil pan facing down.

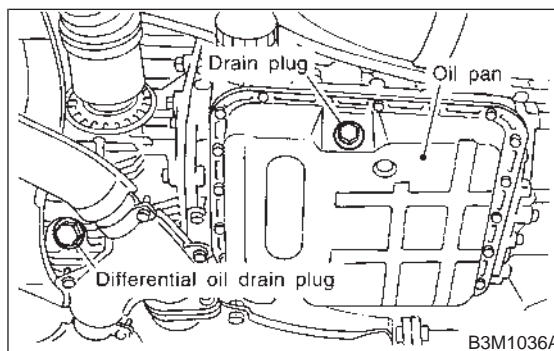
CAUTION:

Be careful not to bend or damage external parts.



2) Remove the drain plug, and drain differential oil. Tighten the plug temporarily after draining.

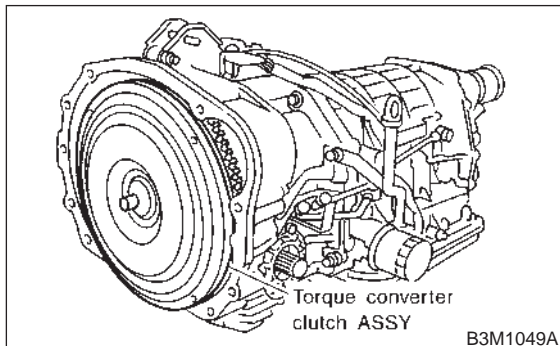
3) Remove the drain plug, and drain automatic transmission fluid (ATF). Tighten the plug temporarily after draining.



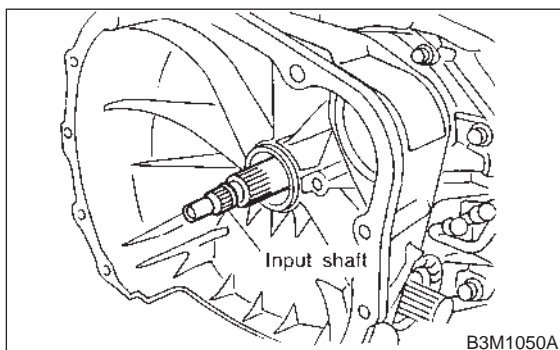
4) Extract the torque converter clutch assembly.

NOTE:

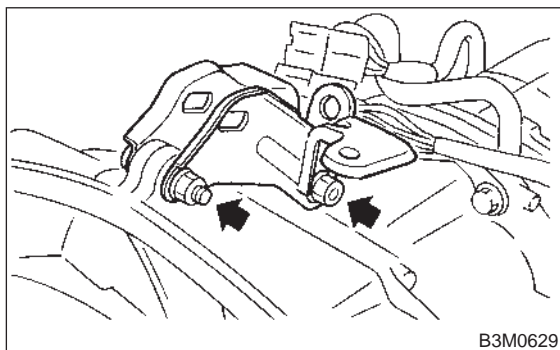
- Extract the torque converter clutch horizontally. Be careful not to scratch the bushing inside the oil pump shaft.
- Note that oil pump shaft also comes out.



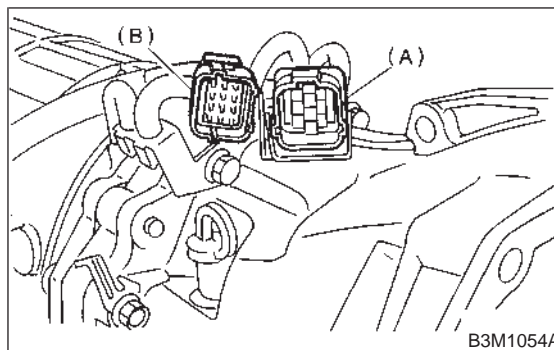
5) Remove the input shaft.



6) Remove the pitching stopper bracket.

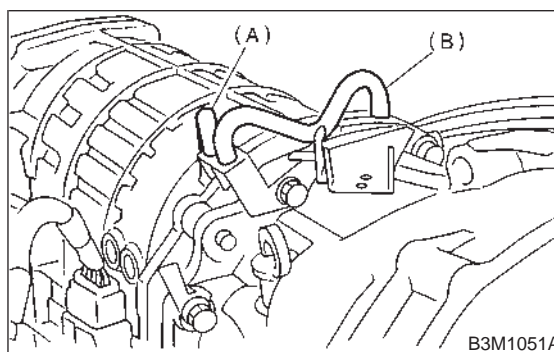


7) Remove harnesses from bracket.



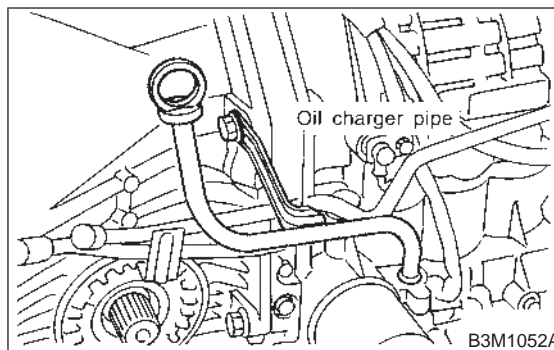
- (A) Transmission harness
(B) Inhibitor switch harness

8) Disconnect the air breather hose.



- (A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

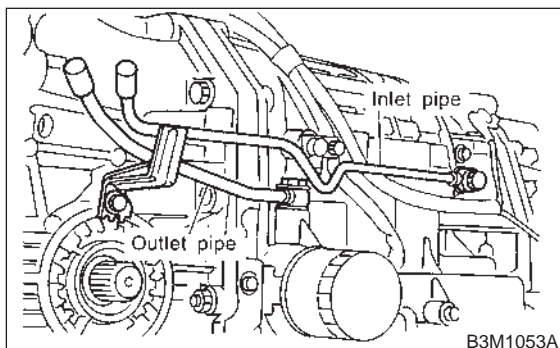
9) Remove the oil charger pipe, and remove the O-ring from the flange face. Attach the O-ring to the pipe.



10) Remove the oil cooler inlet and outlet pipes.

CAUTION:

When removing outlet pipes, be careful not to lose balls and springs used with retaining screws.



2. SEPARATION OF EACH SECTION

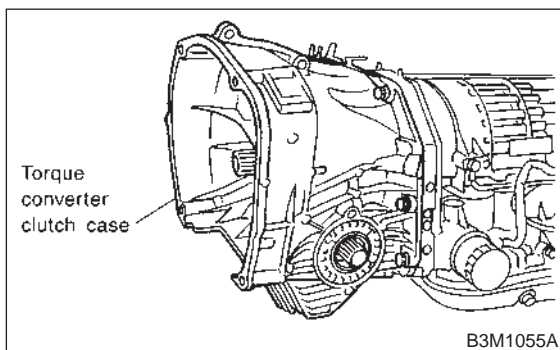
1) Separation of torque converter clutch case and transmission case sections

CAUTION:

- Be careful not to damage the oil seal and bushing inside the torque converter clutch case by the oil pump cover.
- Be careful not to lose the rubber seal.

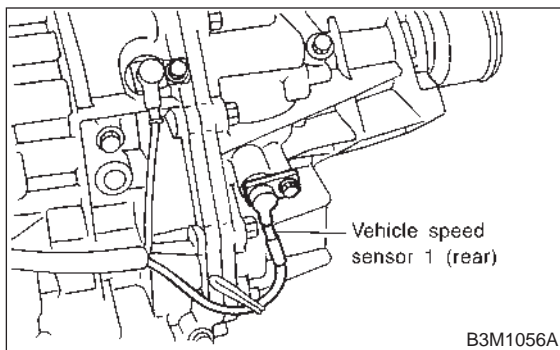
NOTE:

Separate these cases while tapping lightly on the housing.

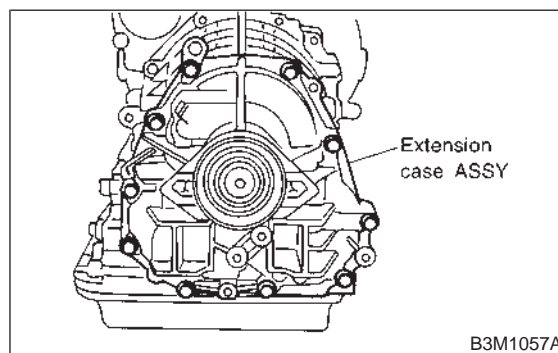


2) Separation of transmission case and extension sections

(1) Remove vehicle speed sensor 1 (rear).



(2) Separation of transmission case and extension case sections



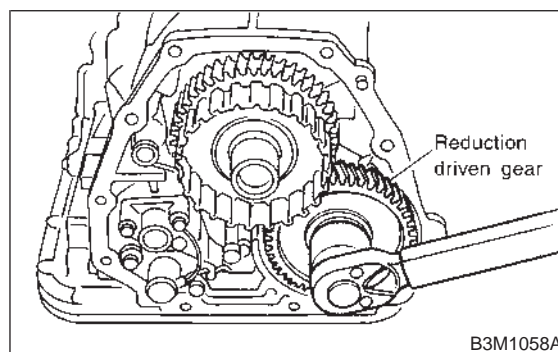
3. TRANSMISSION CASE SECTION

1) Remove the reduction driven gear.

(1) Straighten the staked portion, and remove the lock nut.

NOTE:

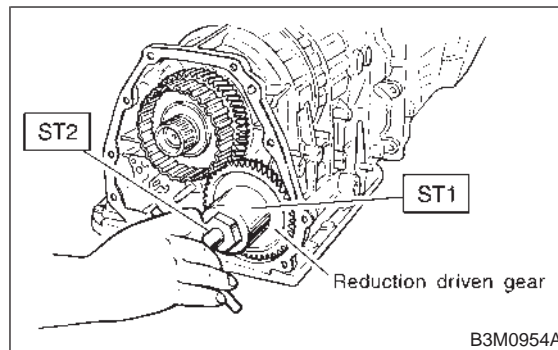
Set the range selector lever to "P".



(2) Using the ST1 and ST2, extract the reduction driven gear.

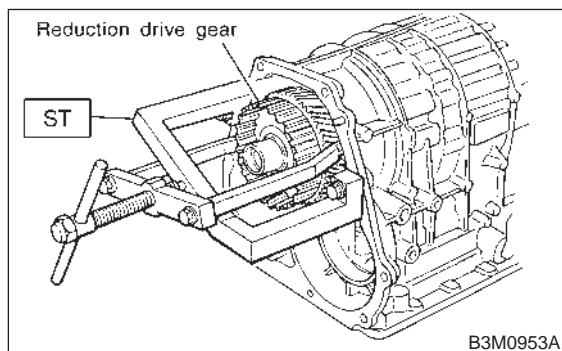
NOTE:

ST1 499737000 PULLER
ST2 899524100 PULLER SET



- (3) Using the ST, extract the reduction drive gear.

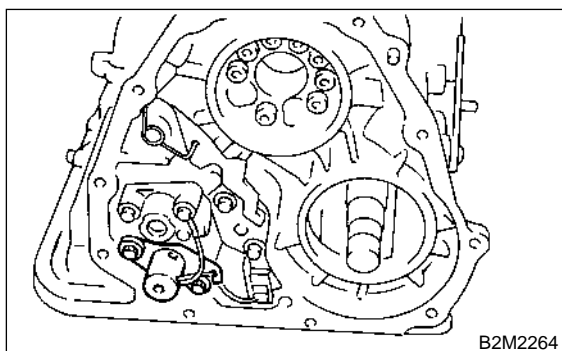
ST 499737100 PULLER SET



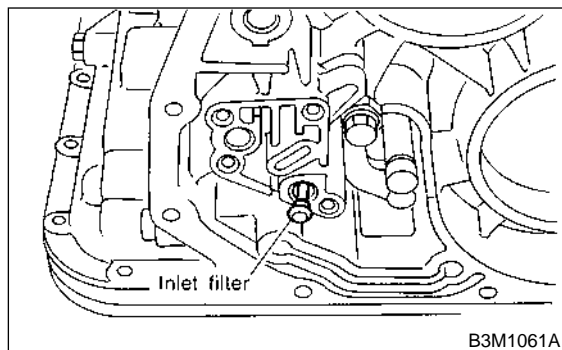
- 2) Remove transfer valve body and duty solenoid C (Transfer).

(1) Disconnect connector from duty solenoid C (Transfer).

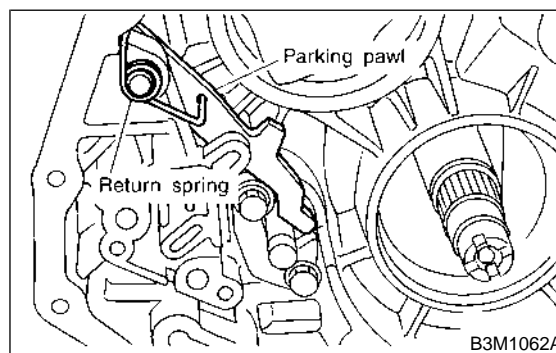
(2) Remove transfer valve body and duty solenoid C (Transfer).



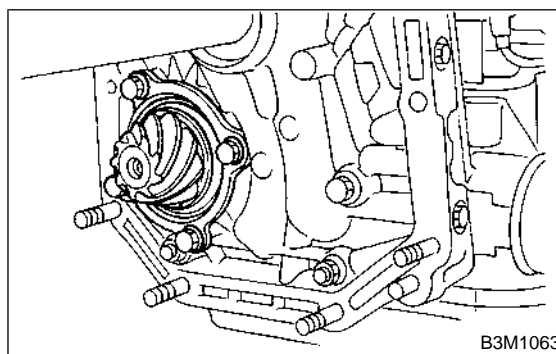
- (3) Pull out inlet filter



- 3) Remove the parking pawl, return spring and shaft.



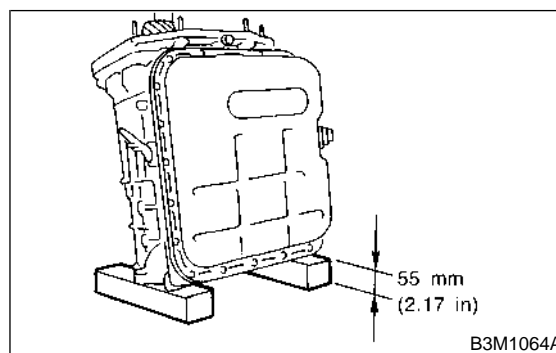
- 4) Loosen the taper roller bearing mounting bolts.



- 5) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

CAUTION:

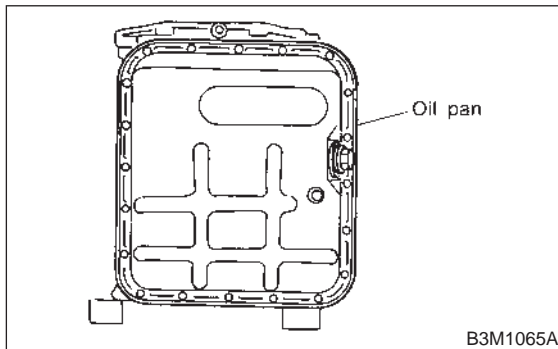
- Be careful not to scratch the rear mating surface of the transmission case.
- Note that the parking rod and drive pinion protrude from the mating surface.



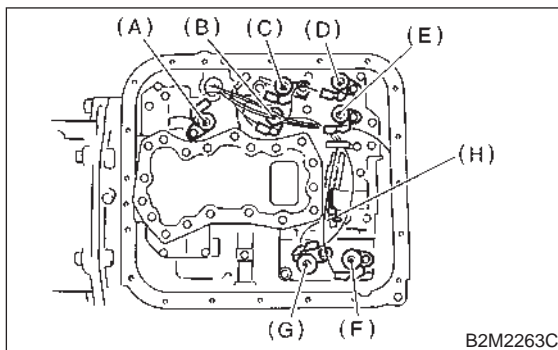
6) Remove the oil pan.

NOTE:

Use a scraper to remove oil pan.



7) Disconnect the harness connectors for the solenoids, duty solenoids, ATF temperature sensor and the ground cord.

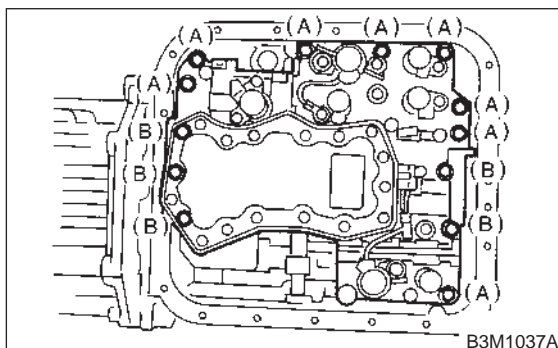


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor

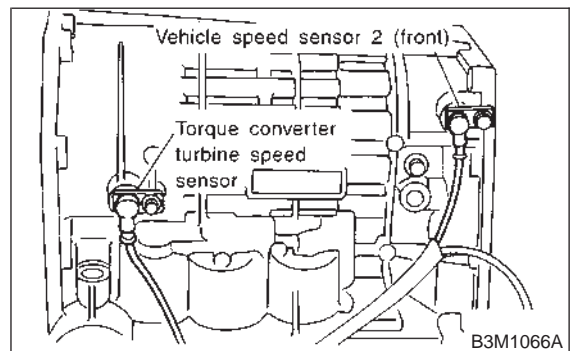
8) Remove the control valve body.

CAUTION:

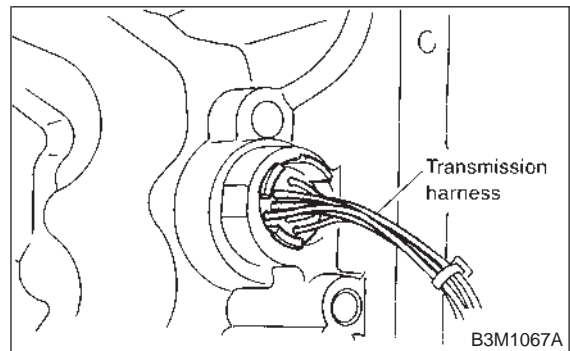
When removing control valve body, be careful not to interfere with transfer duty solenoid C wiring.



9) Remove vehicle speed sensor 2 (front) and torque converter turbine speed sensor.



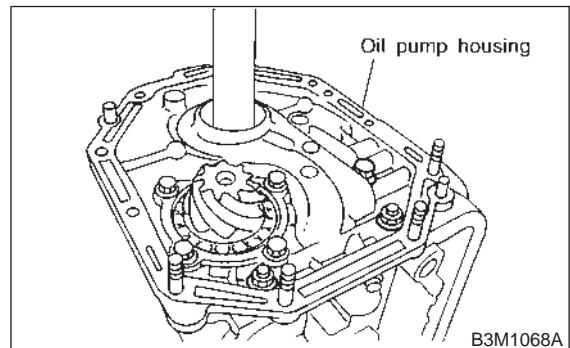
10) Remove transmission harness.



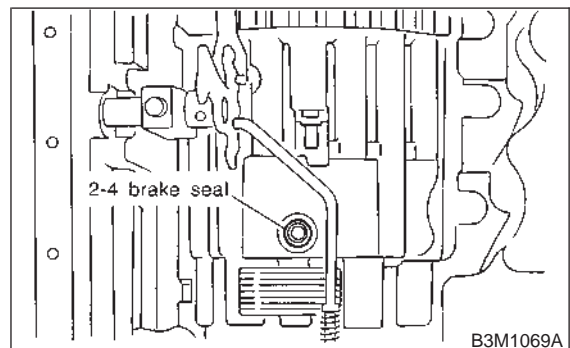
11) Remove the oil pump housing.

CAUTION:

Be careful not to lose the total end play adjusting thrust washer.



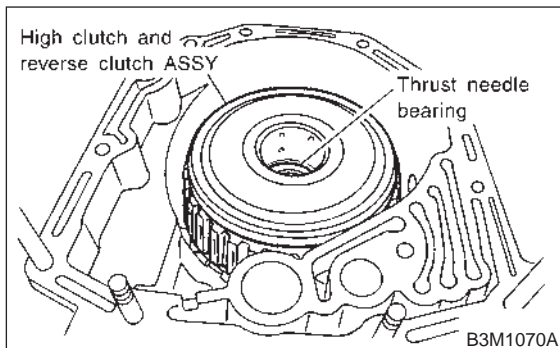
12) Remove 2-4 brake seal.



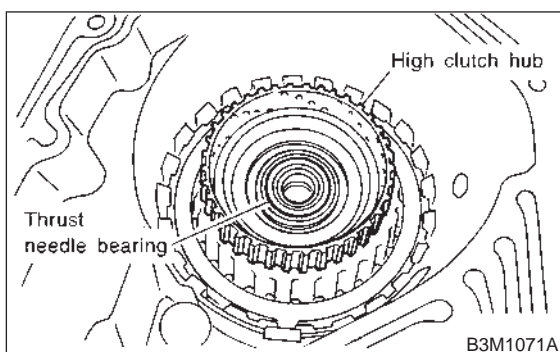
13) Take out the high clutch and reverse clutch assembly.

CAUTION:

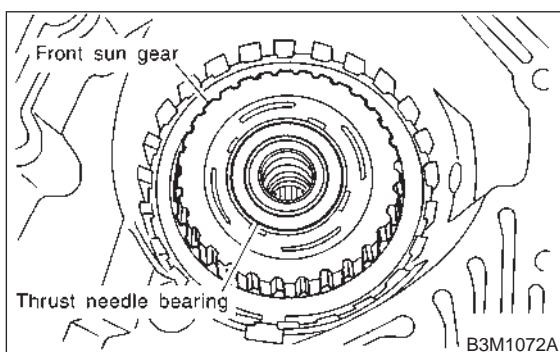
Be careful not to lose thrust needle bearing.



14) Take out the high clutch hub and the thrust bearing.



15) Take out the front sun gear and the thrust bearing.



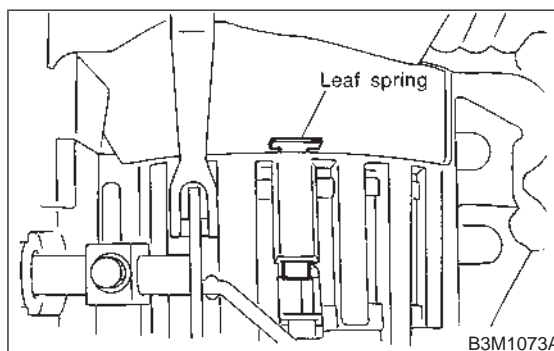
16) Pull out leaf spring.

CAUTION:

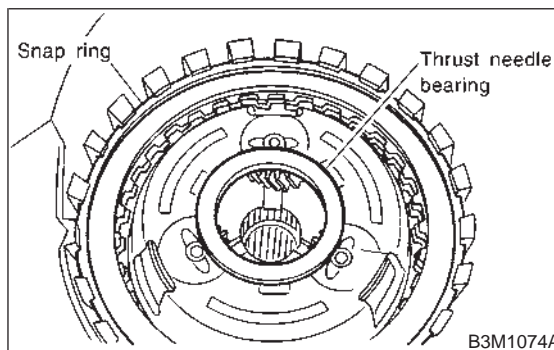
Be careful not to bend leaf spring during removal.

NOTE:

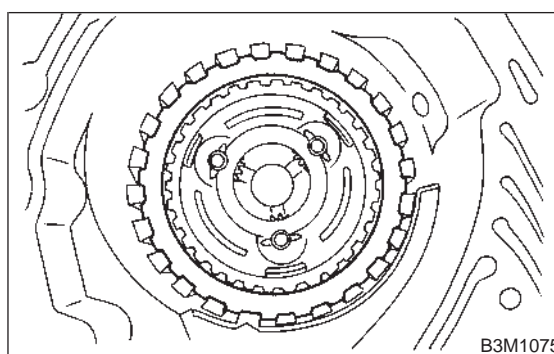
Remove it while pressing down on lower leaf spring.



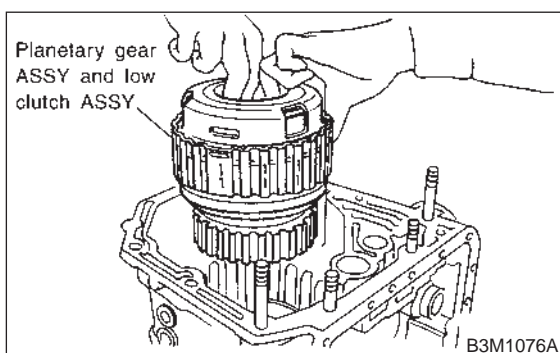
17) Remove snap ring and thrust needle bearing.



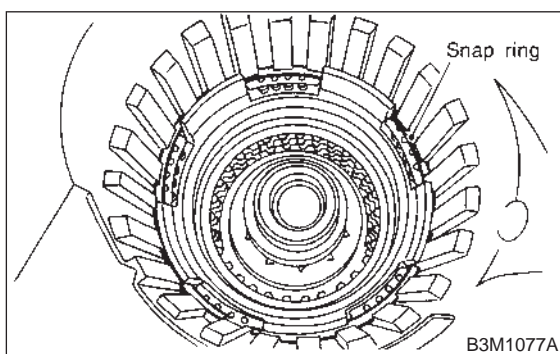
18) Take out retaining plate, drive plate and driven plate of 2-4 brake.



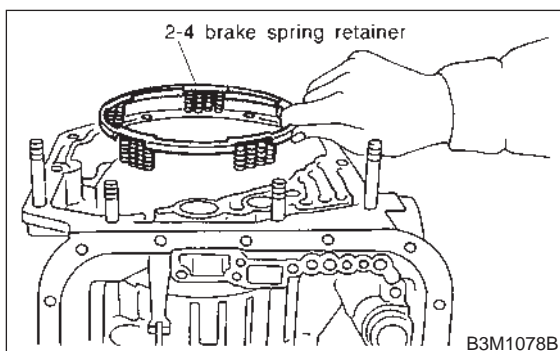
- 19) Take out the thrust needle bearing, planetary gear assembly and the low clutch assembly.



- 20) Remove snap ring.



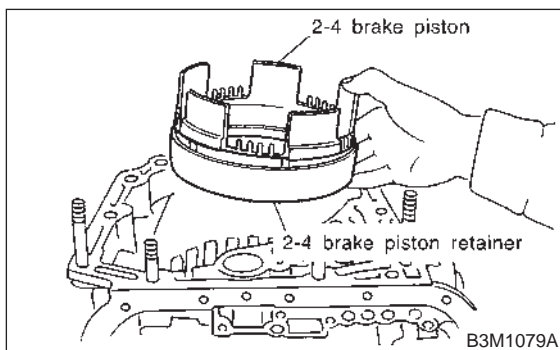
- 21) Take out 2-4 brake spring retainer.



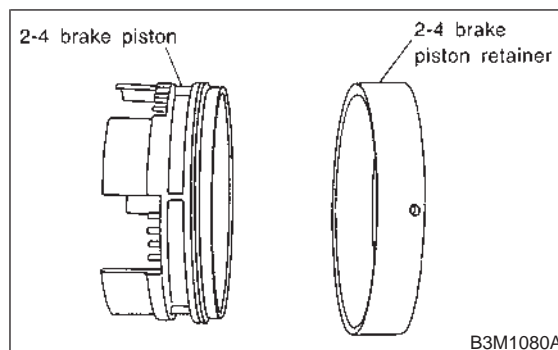
- 22) Take out 2-4 brake piston and piston retainer.

CAUTION:

When removing the brake piston 2-4 and piston retainer, be careful not to rub or bump them against the transmission case.



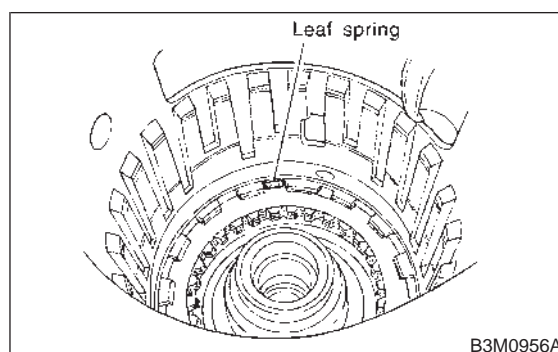
- 23) Separate 2-4 brake piston and piston retainer.



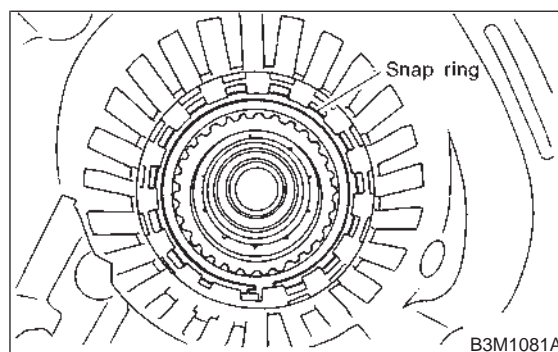
- 24) Pull out leaf spring.

CAUTION:

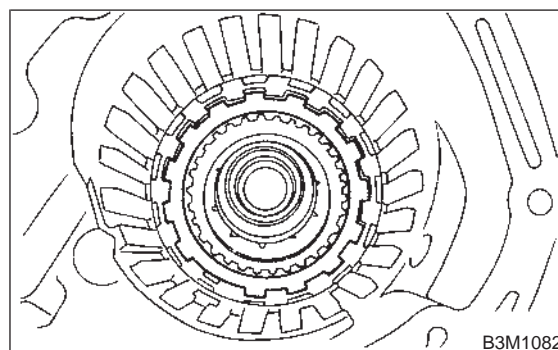
Be careful not to bend leaf spring during removal.



- 25) Remove snap ring.



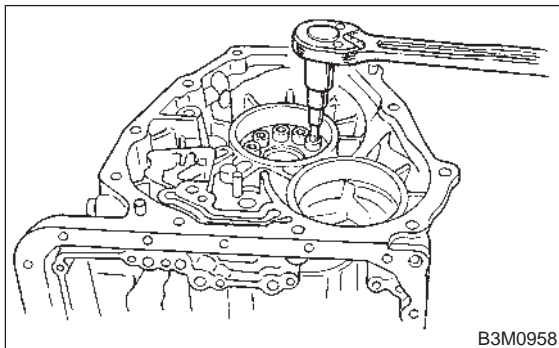
- 26) Take out retaining plate, drive plate, driven plate and dish plate.



27) Turning the case upside down, take out the one-way clutch inner race, retainer and wave spring.

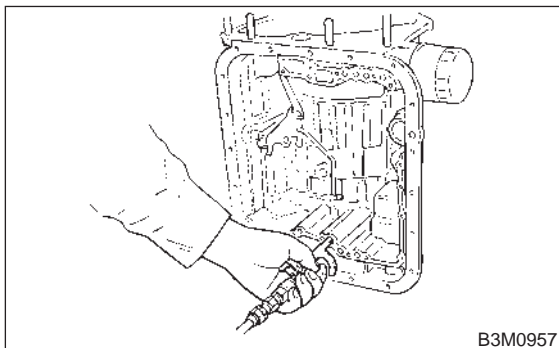
NOTE:

After loosening all socket bolts, place the side of the transmission case on the floor.



B3M0958

28) Take out the low & reverse piston by applying compressed air.



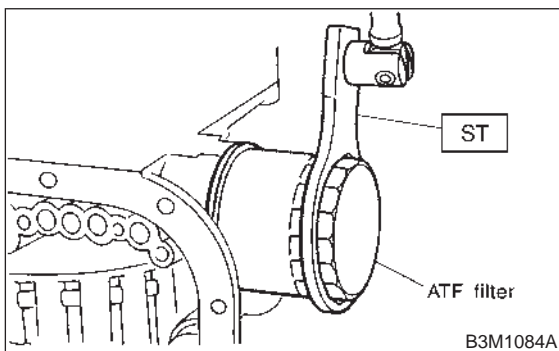
B3M0957

29) Using ST, remove ATF filter.

NOTE:

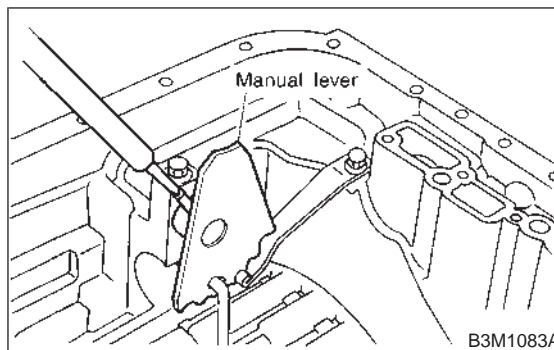
If any of the clutches or brakes are abnormally worn, replace ATF filter and oil seal with new ones.

ST 498545400 OIL FILTER WRENCH



B3M1084A

30) Pull off the straight pin of manual lever.

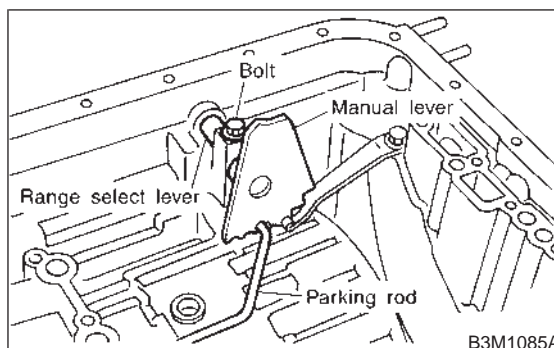


B3M1083A

31) Remove bolts securing select lever, then remove select lever, manual lever and parking rod.

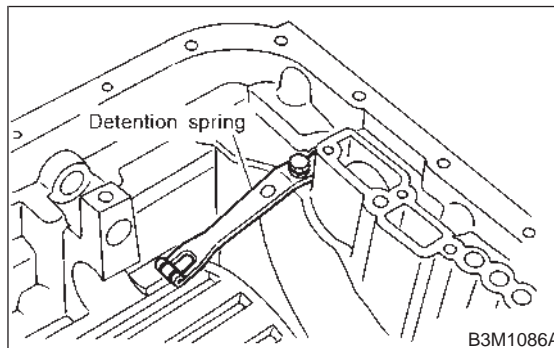
CAUTION:

Be careful not to damage the lips of the press-fitted oil seal in the case.



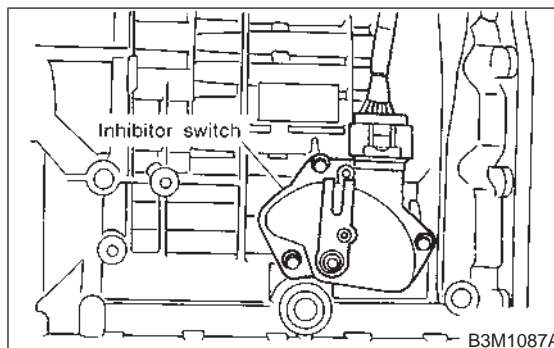
B3M1085A

32) Remove the detention spring.



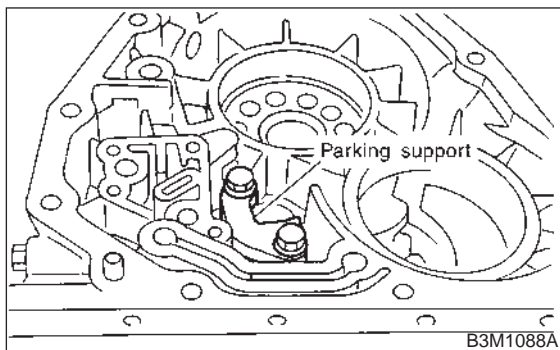
B3M1086A

33) Remove the inhibitor switch.



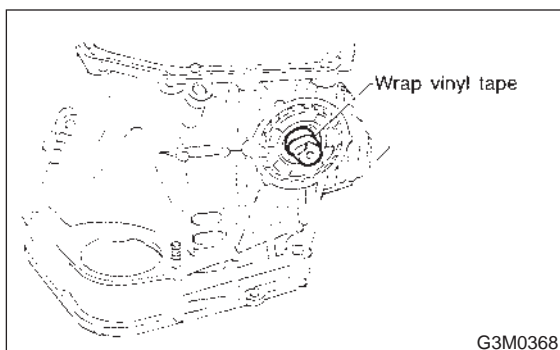
B3M1087A

34) Remove parking support.



4. TORQUE CONVERTER CLUTCH CASE SECTION

1) Wrap the axle shaft serration with vinyl tape.



2) Remove the differential side retainer with ST.

CAUTION:

Hold the differential case assembly by hand to avoid damaging retainer mounting hole of the torque converter clutch case and speedometer gears.

ST 499787000 WRENCH ASSY

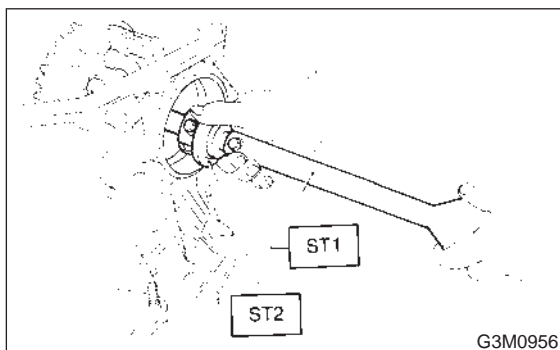
3) Extract the axle shaft with ST1 and ST2.

CAUTION:

Do not reuse the circlip.

ST1 499095500 REMOVER

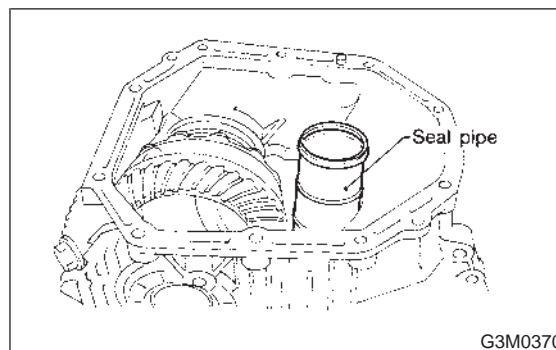
ST2 499247300 INSTALLER



4) Remove the differential case assembly.

CAUTION:

- Remove the seal pipe if it is attached. (Reusing is not allowed.)
- Be careful not to damage the retainer mounting hole of the torque converter clutch case and the speedometer gears.

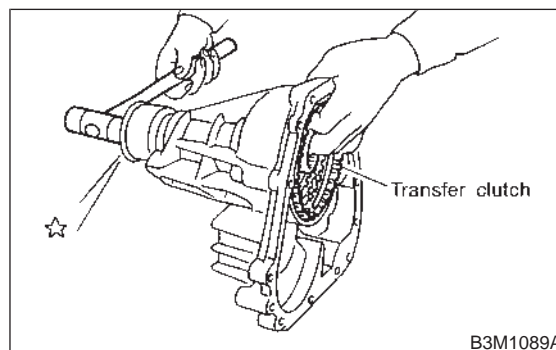


5. EXTENSION SECTION

1) Take out the transfer clutch by lightly tapping the end of the rear drive shaft.

CAUTION:

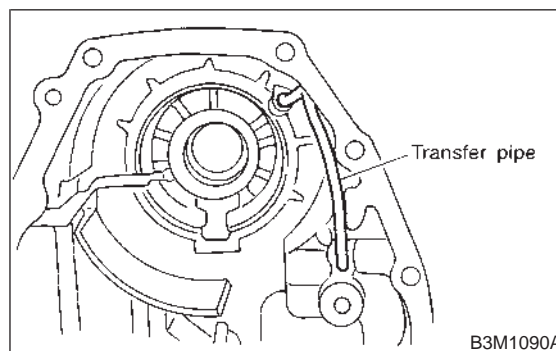
Be careful not to damage the oil seal in the extension.



2) Remove the transfer pipe.

CAUTION:

Be careful not to bend the pipe.



C: ASSEMBLY OF OVERALL TRANSMISSION

1. TORQUE CONVERTER CLUTCH CASE SECTION

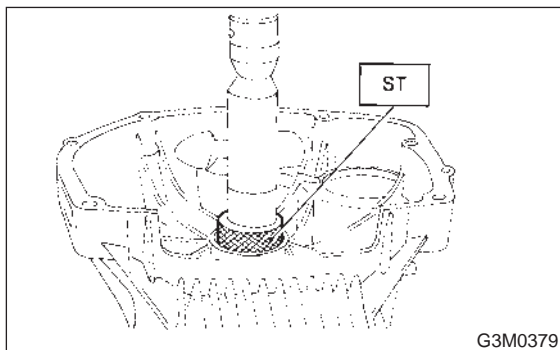
1) Check the appearance of each component and clean.

CAUTION:

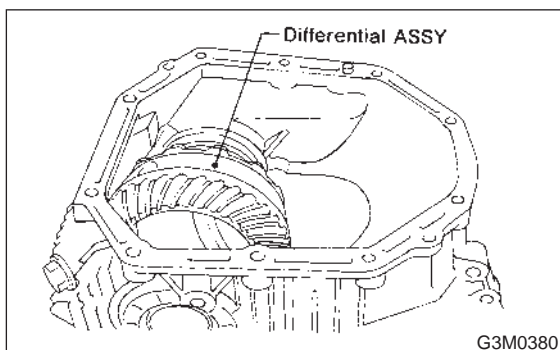
Make sure each part is free of harmful cuts, damage and other faults.

2) Force-fit the oil seal to the torque converter clutch case with ST.

ST 398437700 DRIFT



3) Install the differential assembly to the case, paying special attention not to damage the inside of the case (particularly, the differential side retainer contact surface).



4) Install the circlip to the axle shaft, insert the shaft into the differential assembly, and tap it into position with a plastic hammer.

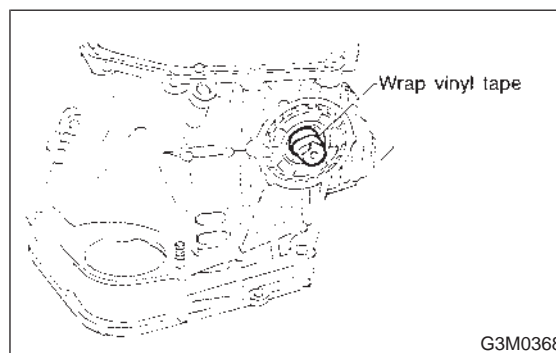
CAUTION:

- If no play is felt, check whether the shaft is fully inserted. If shaft insertion is correct, replace the axle shaft.
- Be sure to use a new circlip.

Thrust play:

0.3 — 0.5 mm (0.012 — 0.020 in)

5) Wrap vinyl tape around the splined portion of the axle shaft.



6) Install the oil seal and outer race (taper roller bearing) to the differential side retainer. Then screw in the retainer and the O-ring after coating the threads with oil.

CAUTION:

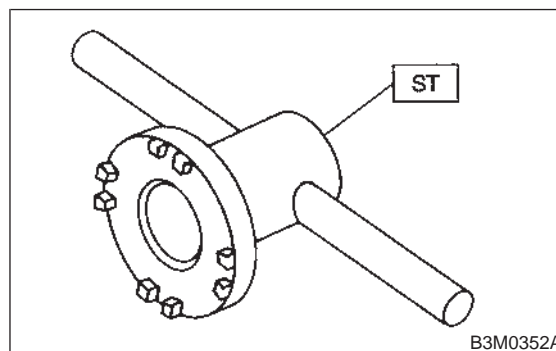
- Pay attention not to damage the oil seal lips.
- Do not confuse the RH and LH oil seals.
- Keep the O-ring removed from the retainer.

7) Using the ST, screw in the retainer until light contact is felt.

NOTE:

Screw in the RH side slightly deeper than the LH side.

ST 499787000 WRENCH ASSY



8) Hypoid gear backlash adjustment and tooth contact check

(1) Assemble the drive pinion assembly to the oil pump housing.

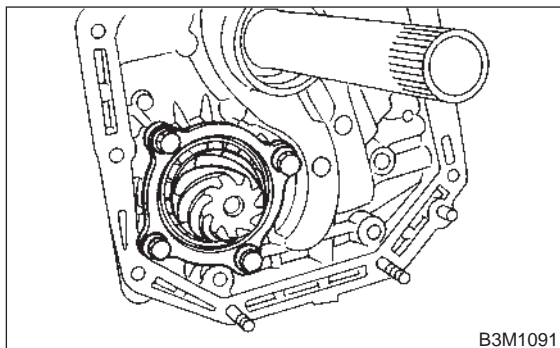
CAUTION:

- Be careful not to bend the shims.
- Be careful not to force the pinion against the housing bore.

- (2) Tighten four bolts to secure the roller bearing.

Tightening torque:

$41 \pm 3 \text{ N}\cdot\text{m}$ ($4.2 \pm 0.3 \text{ kg}\cdot\text{m}$, $30.4 \pm 2.2 \text{ ft}\cdot\text{lb}$)



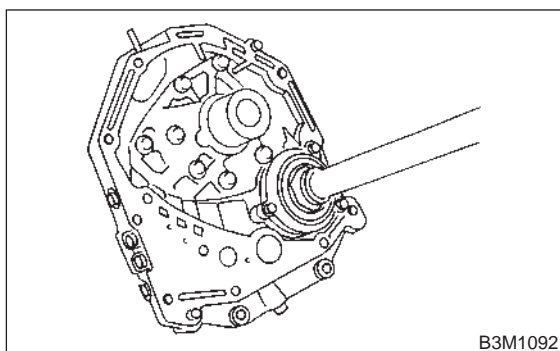
- (3) Install the oil pump housing assembly to the torque converter clutch case, and secure evenly by tightening four bolts.

CAUTION:

- Thoroughly remove the liquid gasket from the case mating surface beforehand.
- Use an old gasket or an aluminum washer so as not to damage the mating surface of the housing.

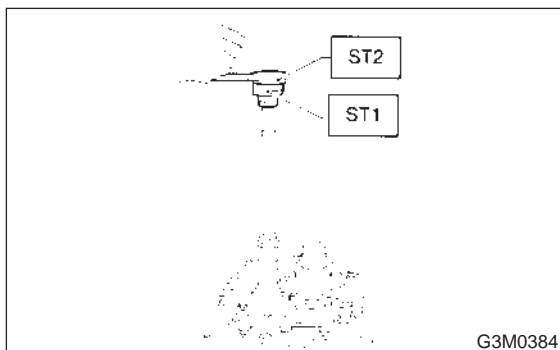
Tightening torque:

$41 \pm 3 \text{ N}\cdot\text{m}$ ($4.2 \pm 0.3 \text{ kg}\cdot\text{m}$, $30.4 \pm 2.2 \text{ ft}\cdot\text{lb}$)

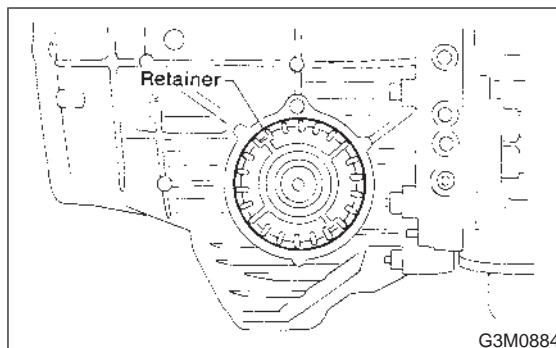


- (4) Rotate the drive pinion several times with ST1 and ST2.

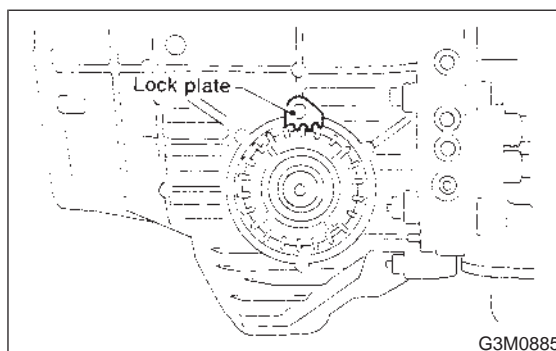
ST1 498937100 HOLDER
ST2 499787100 WRENCH



- (5) Tighten the LH retainer until contact is felt while rotating the shaft. Then loosen the RH retainer. Keep tightening the LH retainer and loosening the RH retainer until the pinion shaft can no longer be turned. This is the "zero" state.

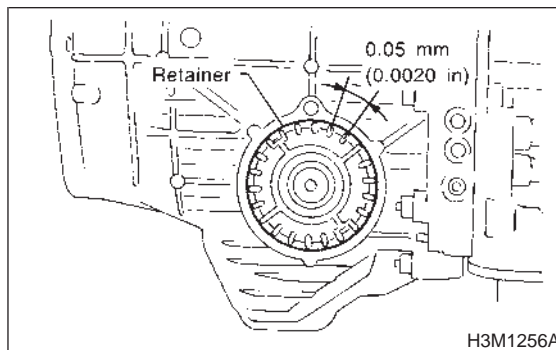


- (6) After the "zero" state is established, back off the LH retainer 3 notches and secure it with the lock plate. Then back off the RH retainer and retighten until it stops. Repeat this procedure several times. Tighten the RH retainer 1-3/4 notches further. This sets the preload. Finally, secure the retainer with its lock plate.



NOTE:

Turning the retainer by one tooth changes the backlash about 0.05 mm (0.0020 in).



(7) Turn the drive pinion several rotations with ST1 and check to see if the backlash is within the standard value with ST2, ST3, ST4 and ST5.

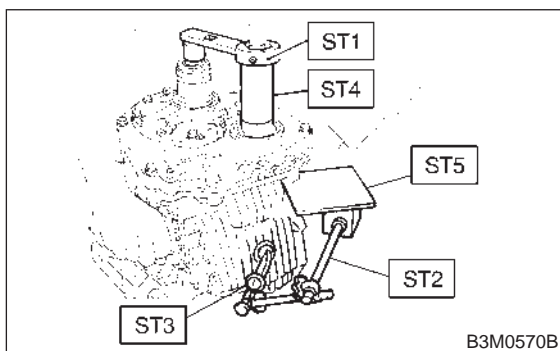
NOTE:

After confirming that the backlash is correct, check the tooth contact.

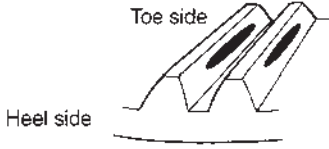
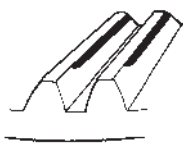
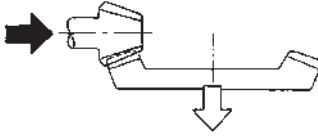

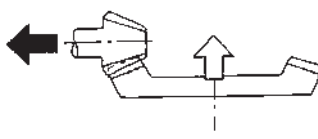

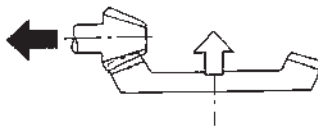

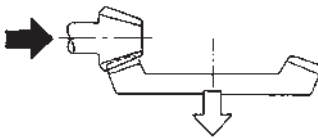
ST1 499787100 WRENCH
ST2 498247001 MAGNET BASE
ST3 498247100 DIAL GAUGE
ST4 499787500 ADAPTER WRENCH
ST5 498255400 PLATE

Backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



(8) Apply red lead evenly to the surfaces of three or four teeth of the crown gear. Rotate the drive pinion in the forward and reverse directions several times. Then remove the oil pump housing, and check the tooth contact pattern. If tooth contact is improper, readjust the backlash or shim thickness.

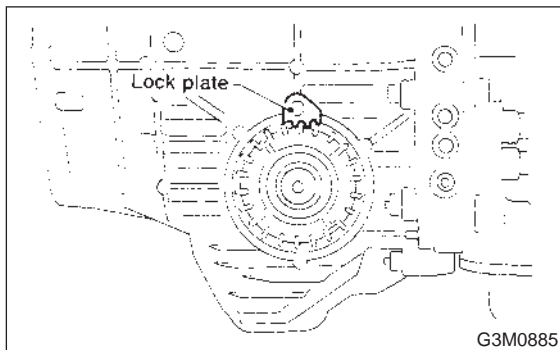
Checking item	Contact pattern	Corrective action
Tooth contact Tooth contact pattern is slightly shifted toward to under no-load rotation. [When loaded, contact pattern moves toward heel.]	 B3M0317A	—
Face contact Backlash is too large.	This may cause noise and chipping at tooth ends.  B3M0319	Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.  B3M0323
Flank contact Backlash is too small.	This may cause noise and stepped wear on surfaces.  B3M0320	Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.  B3M0324
Toe contact (Inside end contact) Contact areas is small.	This may cause chipping at toe.  B3M0321	Adjust as for flank contact.  B3M0324
Heel contact (Outside end contact) Contact area is small.	This may cause chipping at heel ends.  B3M0322	Adjust as for face contact.  B3M0323

 : Adjusting direction of drive pinion
 : Adjusting direction of crown gear

(9) If tooth contact is correct, mark the retainer position and loosen it. After fitting the O-ring, screw in the retainer to the marked position. Then tighten the lock plate to the specified torque.

Tightening torque:

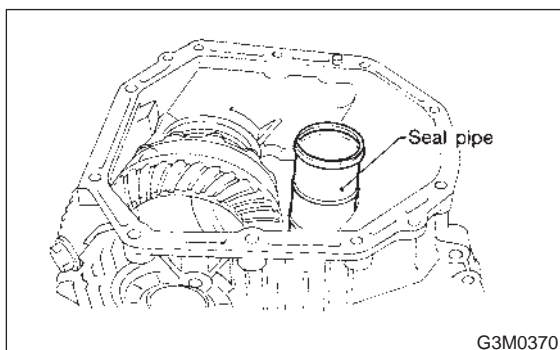
$25 \pm 2 \text{ N-m}$ ($2.5 \pm 0.2 \text{ kg-m}$, $18.1 \pm 1.4 \text{ ft-lb}$)



9) Install the seal pipe to the torque converter clutch case.

CAUTION:

Be sure to use a new seal pipe.

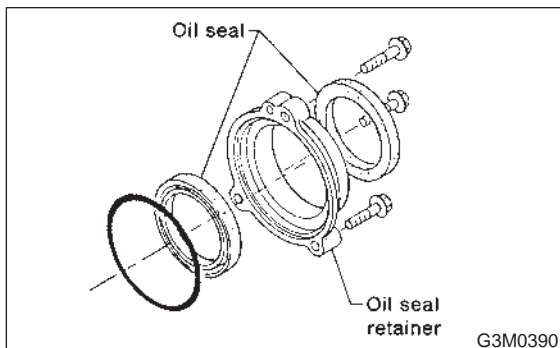


10) Install two oil seals to the oil seal retainer with ST.

CAUTION:

- Always discard old oil seals, and install new ones.
- Pay attention to the orientation of the oil seals.

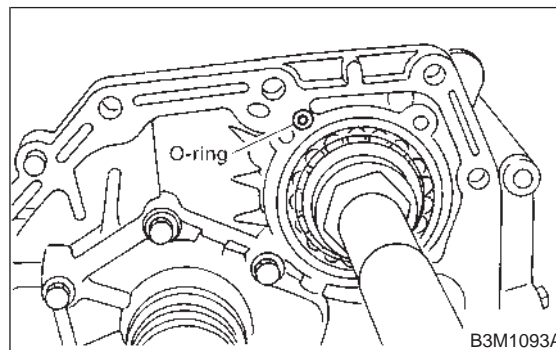
ST 499247300 INSTALLER



11) Attach the O-ring to the oil seal retainer with vaseline. Install the seal to the oil pump housing bore.

CAUTION:

Always discard old O-rings and install new ones.



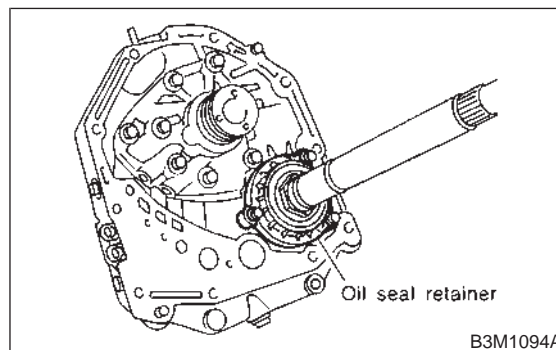
12) Install the oil seal retainer taking care not to damage the oil seal lips. Then secure with three bolts.

NOTE:

Make sure the O-ring is fitted correctly in position.

Tightening torque:

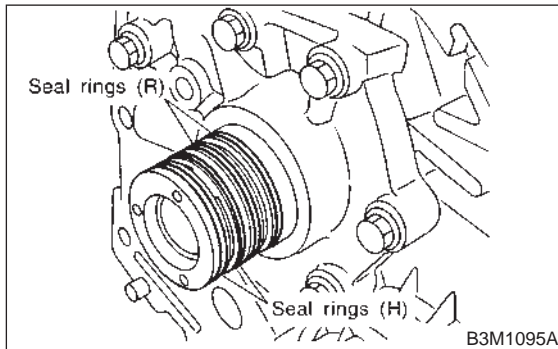
$7 \pm 1 \text{ N-m}$ ($0.7 \pm 0.1 \text{ kg-m}$, $5.1 \pm 0.7 \text{ ft-lb}$)



13) Apply vaseline to the groove on the oil pump cover, and install two (R) seal rings and two (H) seal rings.

NOTE:

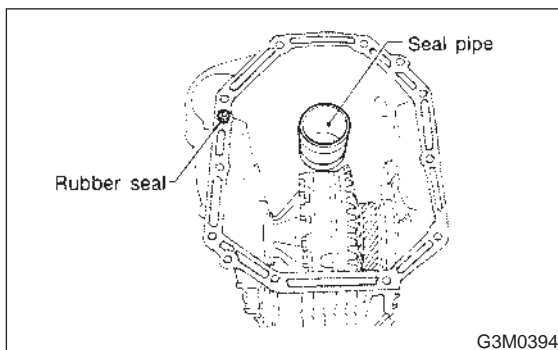
- Fit the seal ring after compressing, and rub vaseline into the seal ring to avoid expansion.
- The “R” seal ring has a large diameter, while “H” has small diameter.



14) Install the rubber seal to the torque converter clutch case.

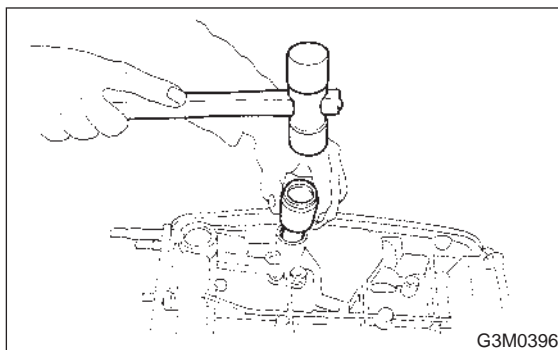
CAUTION:

Be careful not to lose the rubber seal.



2. TRANSMISSION CASE SECTION

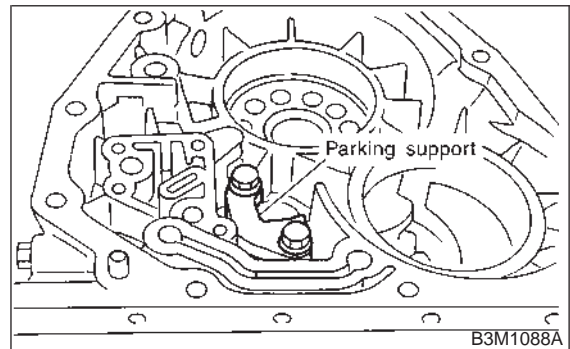
1) Using a plastic hammer, force-fit the oil seal.



2) Install parking support to transmission case.

Tightening torque:

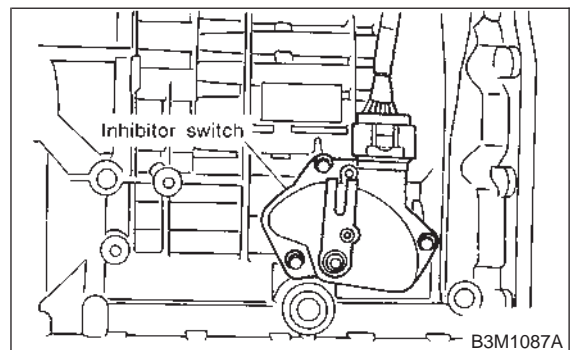
$25 \pm 2 \text{ N-m}$ ($2.5 \pm 0.2 \text{ kg-m}$, $18.1 \pm 1.4 \text{ ft-lb}$)



3) Install inhibitor switch to transmission case.

NOTE:

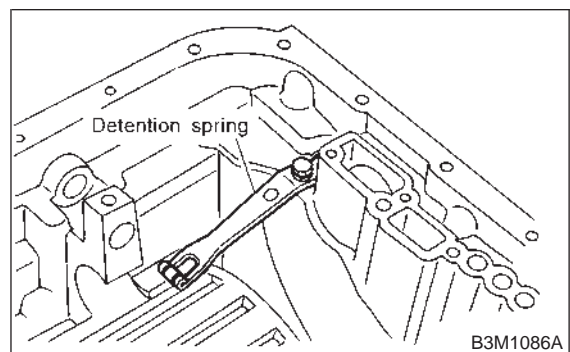
Temporary tighten inhibitor switch.



4) Install detention spring to transmission case.

Tightening torque:

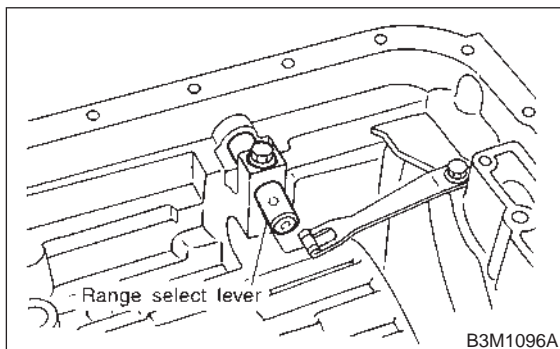
$6 \pm 1 \text{ N-m}$ ($0.6 \pm 0.1 \text{ kg-m}$, $4.3 \pm 0.7 \text{ ft-lb}$)



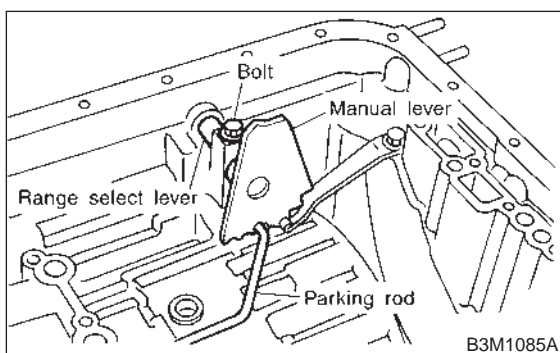
5) Insert range select lever, and tighten bolt.

Tightening torque:

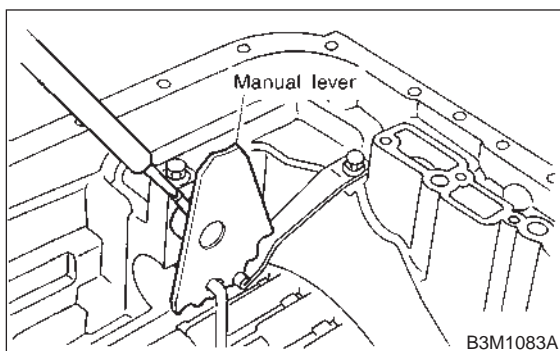
$6 \pm 1 \text{ N}\cdot\text{m}$ ($0.6 \pm 0.1 \text{ kg}\cdot\text{m}$, $4.3 \pm 0.7 \text{ ft}\cdot\text{lb}$)



6) Insert manual lever and parking rod.



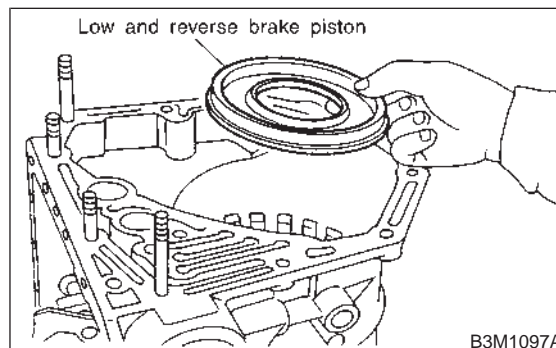
7) Insert spring pin to manual lever.



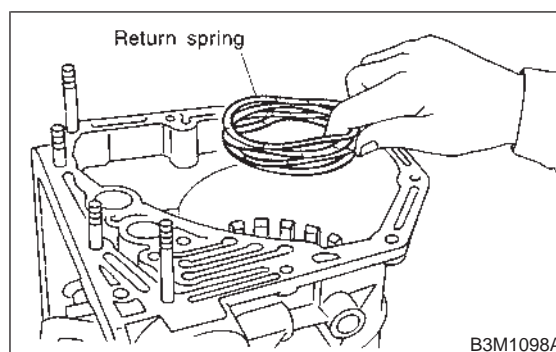
8) Install the low and reverse piston.

CAUTION:

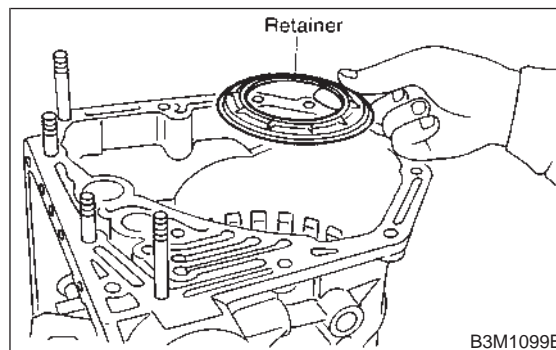
- Be careful not to tilt the piston when installing.
- Be careful not to damage the lip seal.



9) Install return spring.



10) Install spring retainer.



11) Install the one-way clutch inner race.

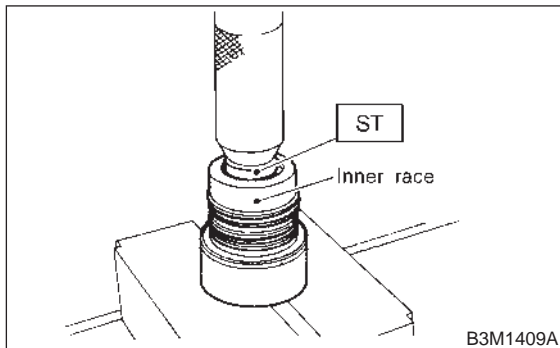
- (1) Using a press and ST1, install the needle bearing to the inner race.

ST1 398497701 INSTALLER

NOTE:

Use the following ST when removing.

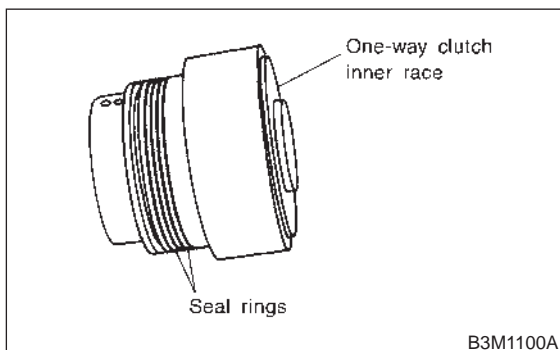
ST 398527700 PULLER ASSY



- (2) Install two seal rings to one-way clutch inner race.

NOTE:

Apply vaseline to the groove of the inner race and to the seal ring after installation, so that the seal ring will not expand.



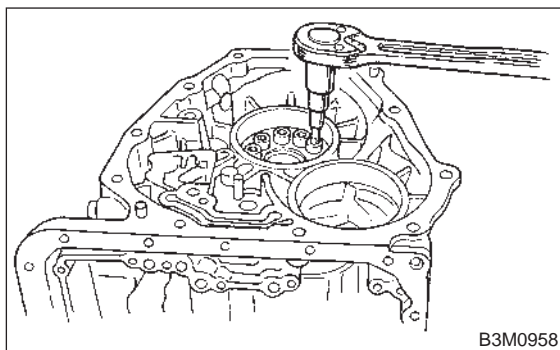
- (3) Tighten eight socket head bolts from the rear side of the transmission case.

Tightening torque:

$25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)

CAUTION:

Be sure to tighten evenly.



- (4) Install thrust needle bearing.

NOTE:

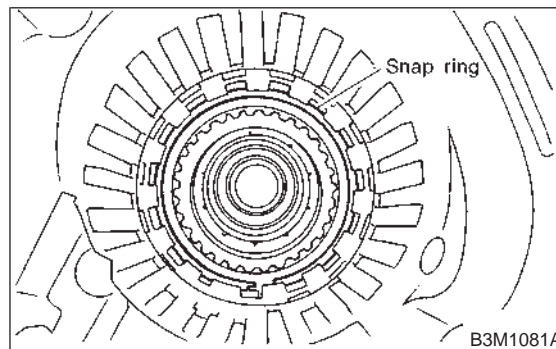
Place transmission case with the front facing up.

- 12) Installation of the low & reverse brake:

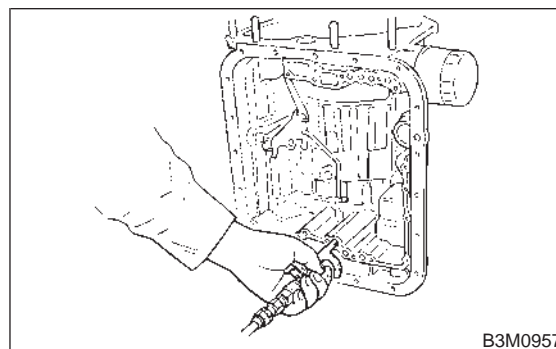
- (1) Install dish plate, driven plates, drive plates, and a retaining plate, and secure with a snap ring.

NOTE:

Pay attention to the orientation of the dish plate.



- (2) Apply compressed air intermittently to check for operation.



- (3) Check the clearance. (Selection of retaining plate)

NOTE:

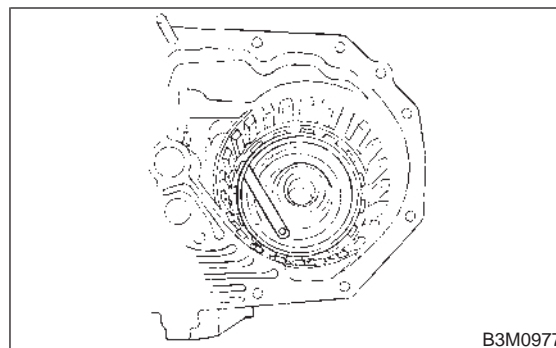
Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting.

Standard value:

$0.7 - 1.2 \text{ mm}$ ($0.028 - 0.047 \text{ in}$)

Allowable limit:

2.2 mm (0.087 in)

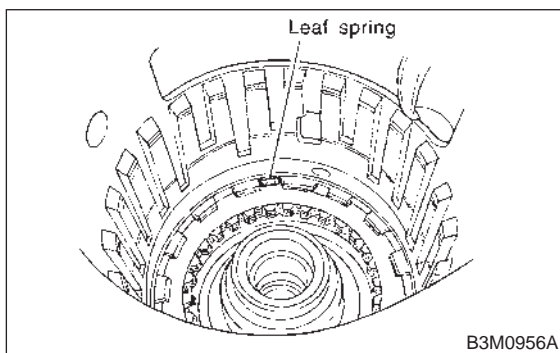


Available retaining plates	
Part No.	Thickness mm (in)
31667AA320	4.2 (0.165)
31667AA330	4.5 (0.177)
31667AA340	4.8 (0.189)
31667AA350	5.1 (0.201)
31667AA360	5.4 (0.213)
31667AA370	5.7 (0.224)
31667AA380	6.0 (0.236)

13) Install leaf spring of low and reverse brake.

CAUTION:

Pay attention to the direction and position of leaf spring during installation.

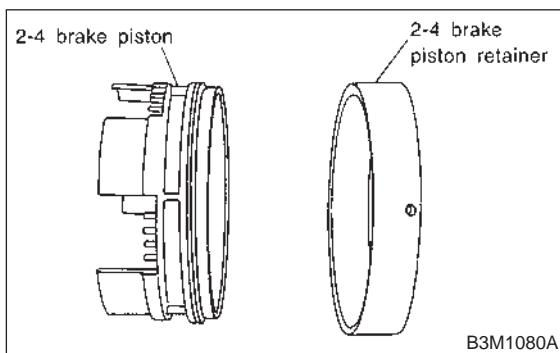


14) Install O-ring to 2-4 brake piston.

CAUTION:

- If O-ring breaks or damage is noted, replace with new O-ring.
- Apply a coat of vaseline to inner side of O-ring before installation.

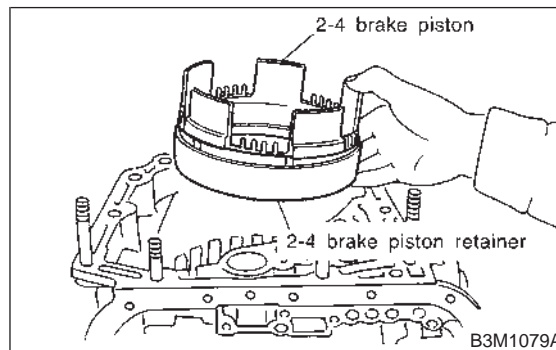
15) Install 2-4 brake piston to 2-4 brake piston retainer.



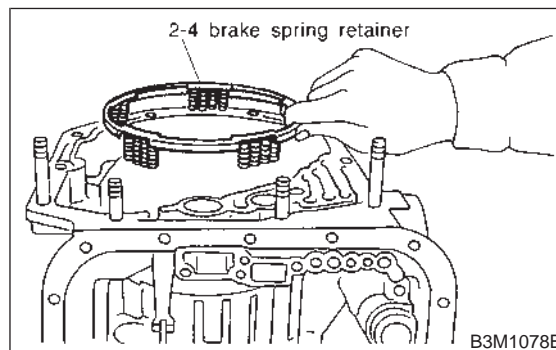
16) Install 2-4 brake piston and retainer to transmission case.

CAUTION:

Align the hole in the 2-4 brake seal of transmission case with the hole in 2-4 brake piston retainer during installation.

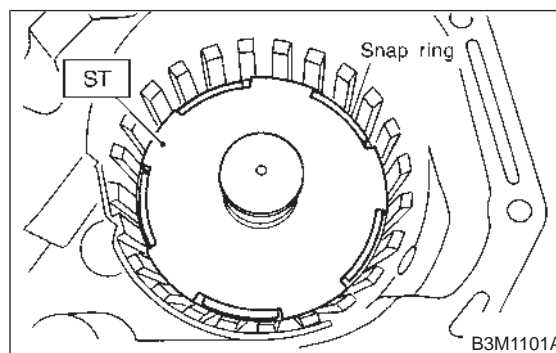


17) Install 2-4 brake piston spring retainer to transmission case.



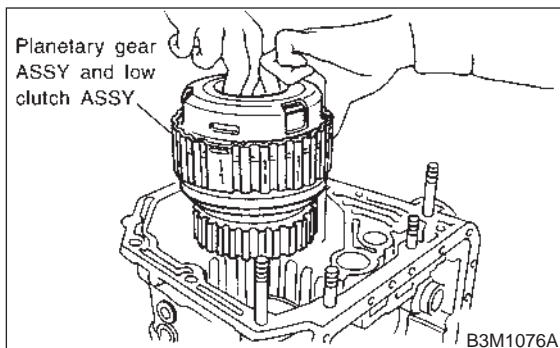
18) Position snap ring in transmission. Using ST, press the snap ring into place.

ST 498677100 COMPRESSOR



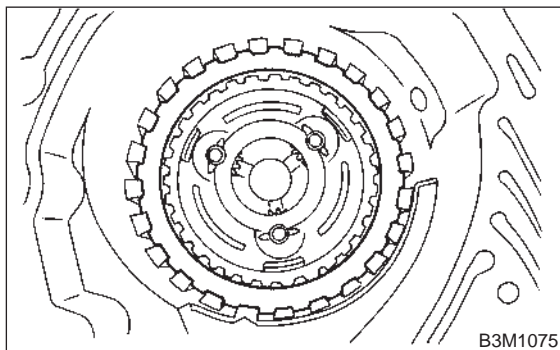
19) Install planetary gear and low clutch assembly to transmission case.

Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring.



20) Installation of the 2-4 brake:

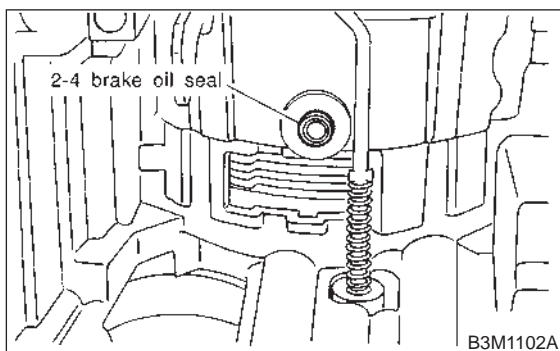
(1) Install pressure plate, drive plate, driven plate, retaining plate and snap ring.



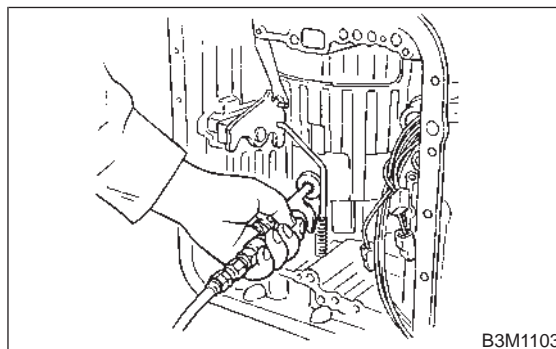
(2) Install 2-4 brake oil seal to transmission case.

NOTE:

Be sure to use a new one.



(3) After all 2-4 brake component parts have been installed, blow in air intermittently and confirm the operation of the brake.



(4) Measure the clearance between the retaining plate and the snap ring.

NOTE:

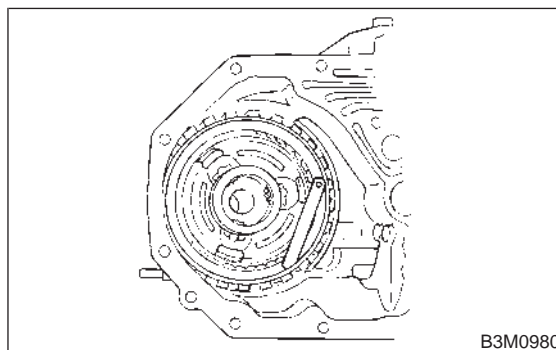
Select a retaining plate with a suitable value from the following table, so that the clearance becomes the standard value.

Standard value:

0.8 — 1.2 mm (0.031 — 0.047 in)

Allowable limit:

1.5 mm (0.059 in)

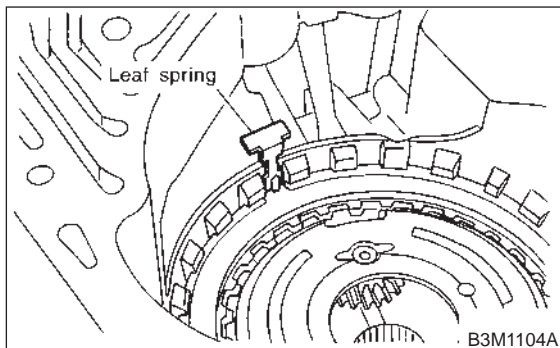


Available retaining plates	
Part No.	Thickness mm (in)
31567AA610	5.6 (0.220)
31567AA620	5.8 (0.228)
31567AA630	6.0 (0.236)
31567AA640	6.2 (0.244)
31567AA650	6.4 (0.252)
31567AA660	6.6 (0.260)

21) Install leaf spring of 2-4 brake.

NOTE:

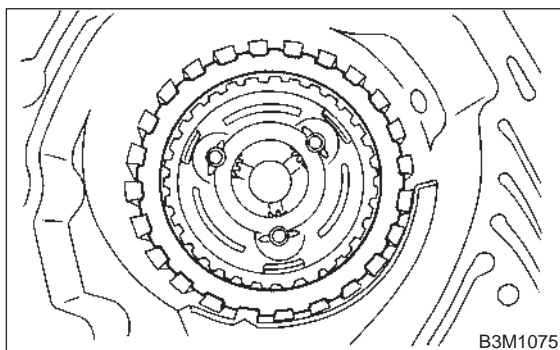
Be careful not to mistake the location of the leaf spring to be inserted.



22) Install thrust needle bearing.

CAUTION:

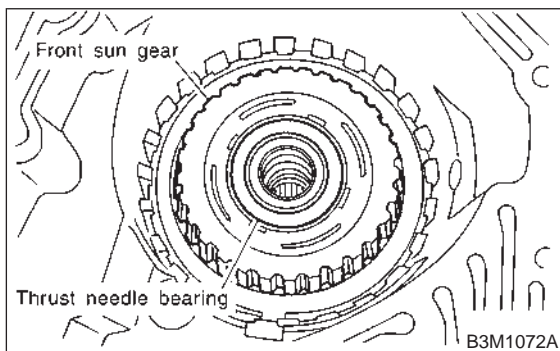
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1C0].>



23) Install front sun gear and thrust needle bearing.

CAUTION:

Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1C0].>

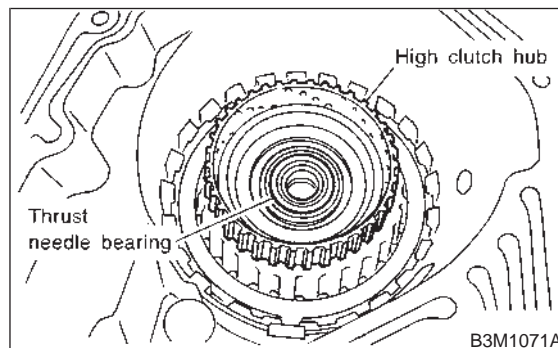


24) Install the high clutch hub and thrust needle bearing.

Attach the thrust needle bearing to the hub with vaseline and install the hub by correctly engaging the splines of the front planetary carrier.

CAUTION:

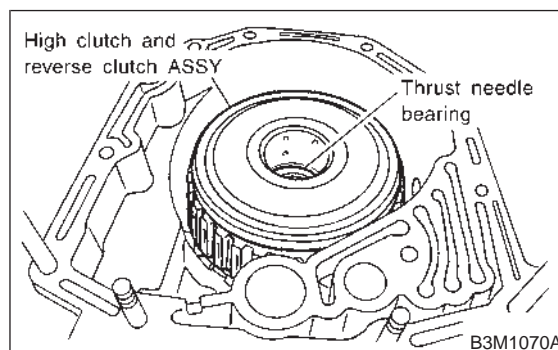
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1C0].>



25) Install the high clutch assembly.

NOTE:

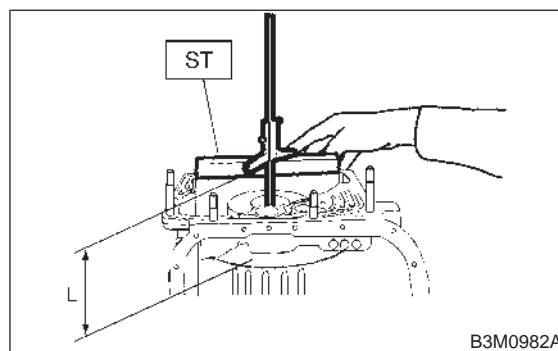
Correctly engage the high clutch hub and clutch splines.



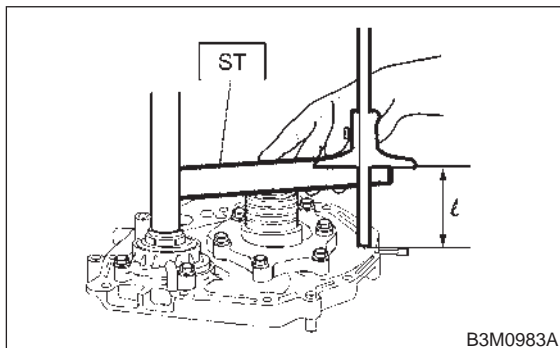
26) Adjustment of total end play:

(1) Using ST, measure the distance from the transmission case mating surface to the recessed portion of the high clutch drum "L".

ST 398643600 GAUGE

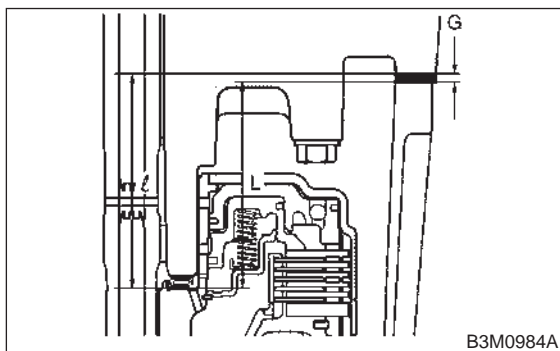


- (2) Using ST, measure the distance from the oil pump housing mating surface to the top surface of the oil pump cover with thrust needle bearing.
ST 398643600 GAUGE



- (3) Calculation of total end play
Select suitable bearing race from among those listed in this table so that clearance C is in the 0.25 — 0.55 mm (0.0098 — 0.0217 in) range.
 $C = (L + G) - \ell$

C	Clearance between concave portion of high clutch and end of clutch drum support
L	Length from case mating surface to concave portion of high clutch
G	Gasket thickness (0.28 mm, 0.0110 in)
ℓ	Height from housing mating surface to upper surface of clutch drum support



Thrust needle bearing	
Part No.	Thickness mm (in)
806528050	4.1 (0.161)
806528060	4.3 (0.169)
806528070	4.5 (0.177)
806528080	4.7 (0.185)
806528090	4.9 (0.193)
806528100	5.1 (0.201)

- 27) Install the oil pump housing assembly.
(1) After completing end play adjustment, insert the bearing race in the recess of the high clutch. Attach the thrust needle bearing to the oil pump cover with vaseline.

- (2) After correctly installing the gasket to the case mating surface, carefully install the oil pump housing assembly. Be careful to avoid hitting the drive pinion against the inside of the case.

CAUTION:

- Be careful not to damage the seal ring.
- Be sure to use a new gasket.

- (3) Install both parts with dowel pins aligned. Make sure no clearance exists at the mating surface.

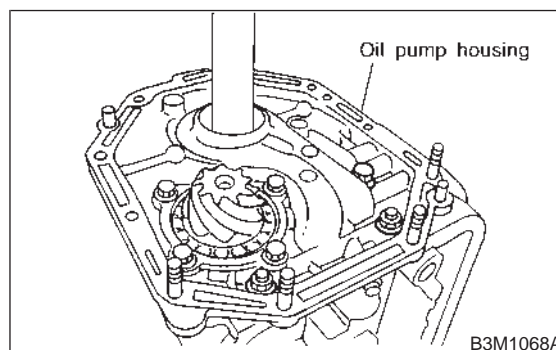
NOTE:

Any clearance suggests a damaged seal ring.

- (4) Secure the housing with two nuts.

Tightening torque:

T: 41±3 N·m (4.2±0.3 kg·m, 30.4±2.2 ft·lb)

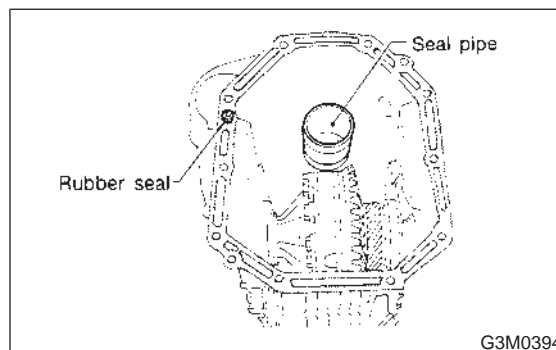


3. TORQUE CONVERTER CLUTCH CASE AND TRANSMISSION CASE

- 1) Apply proper amount of liquid gasket (THREE BOND Part No. 1215) to the entire torque converter clutch case mating surface.

NOTE:

Make sure that the rubber seal and seal pipe are fitted in position.



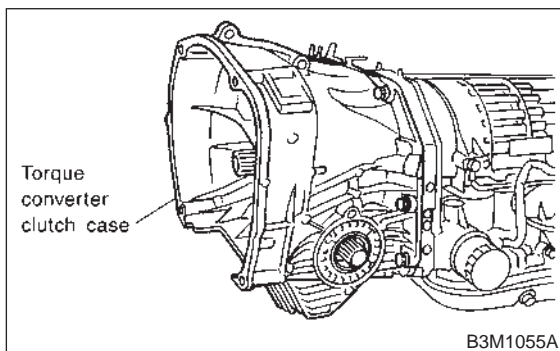
- 2) Install the torque converter clutch case assembly to the transmission case assembly, and secure with six bolts and four nuts.

CAUTION:

When installing, be careful not to damage the torque converter clutch case bushing and oil seal.

Tightening torque:

$41 \pm 3 \text{ N}\cdot\text{m}$ ($4.2 \pm 0.3 \text{ kg}\cdot\text{m}$, $30.4 \pm 2.2 \text{ ft}\cdot\text{lb}$)

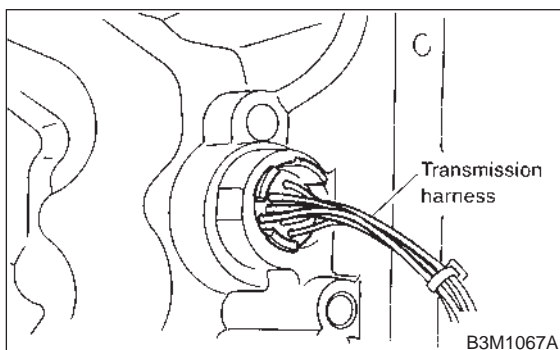


4. CONTROL VALVE AND OIL PAN

- 1) Install and route the transmission harness.

CAUTION:

Be careful not to damage the harness.

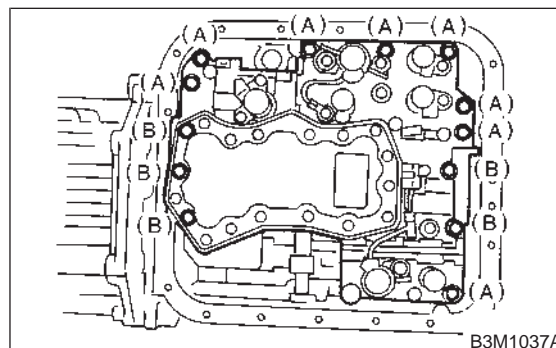


- 2) Install the control valve assembly.
 - (1) Set the select lever in range "N".

- (2) Temporarily tighten the valve body on the transmission case.

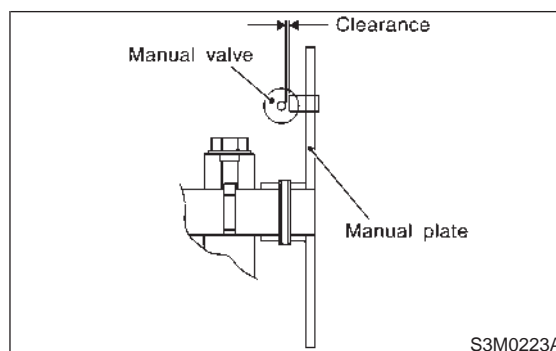
CAUTION:

Be sure to engage the manual valve with the manual plate during installation.



- (A) Short bolts
(B) Long bolts

- (3) Adjust the clearance between the manual valve and manual plate in the 0.1 to 0.9 mm (0.004 to 0.035 in) range.

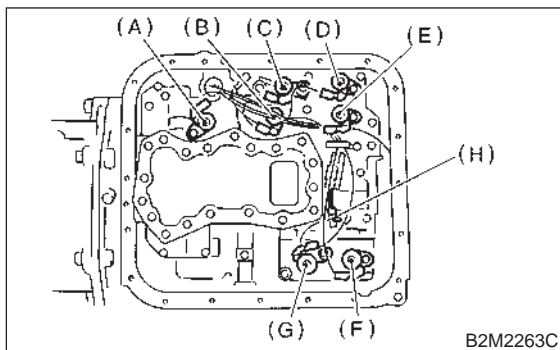


- (4) Tighten the valve body to the specified torque.

Tightening torque:

$8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)

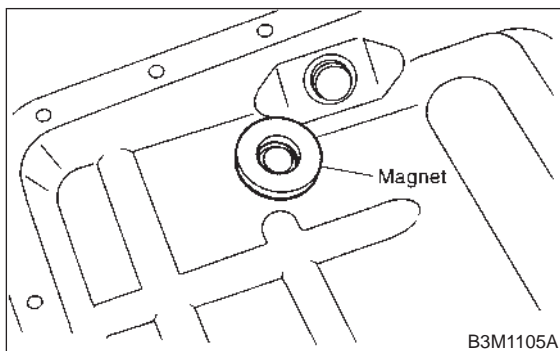
3) Connect all connectors.



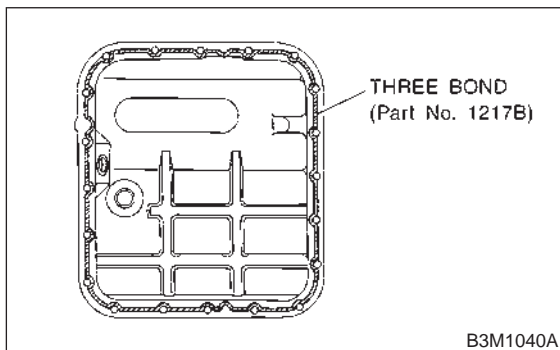
- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor

4) Install the oil pan.

- (1) Attach the magnet at the specified position.



- (2) Apply proper amount of liquid gasket (THREE BOND Part No. 1217B) to the entire oil pan mating surface.



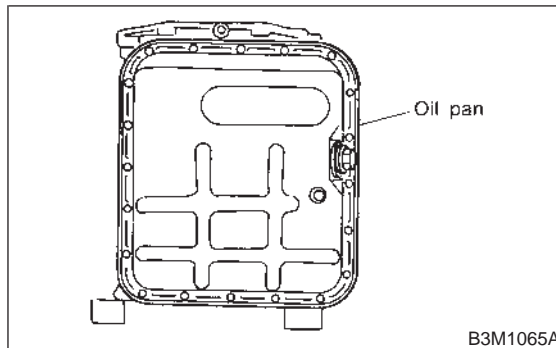
- (3) Install the oil pan to the transmission case assembly, and secure with 20 bolts.

NOTE:

Tighten the bolts evenly.

Tightening torque:

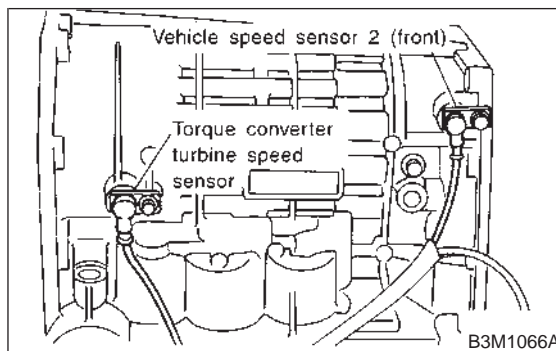
4.9 ± 0.5 N·m (0.50 ± 0.05 kg-m, 3.6 ± 0.4 ft-lb)



- 5) Install torque converter turbine speed sensor and vehicle speed sensor 2 (front).

Tightening torque:

7 ± 1 N·m (0.7 ± 0.1 kg-m, 5.1 ± 0.7 ft-lb)



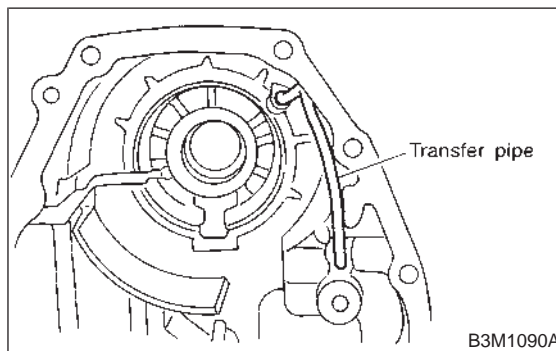
5. EXTENSION SECTION

NOTE:

When installing new oil seal into extension case, press it with ST.

ST 498057300 INSTALLER

- 1) Install the transfer pipe to extension case.



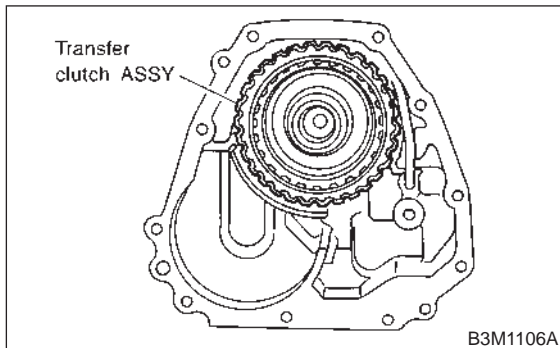
2) Install the transfer clutch assembly to the case.

CAUTION:

Be careful not to damage the seal rings.

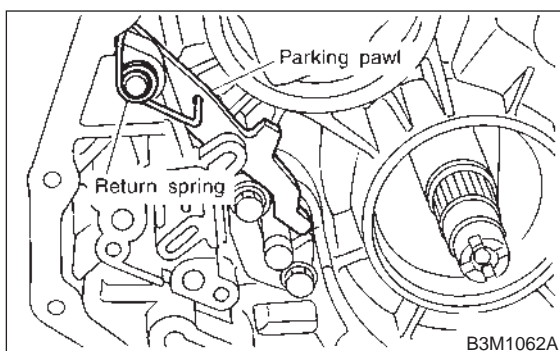
NOTE:

Insert the clutch assembly fully into position until the bearing shoulder bottoms.

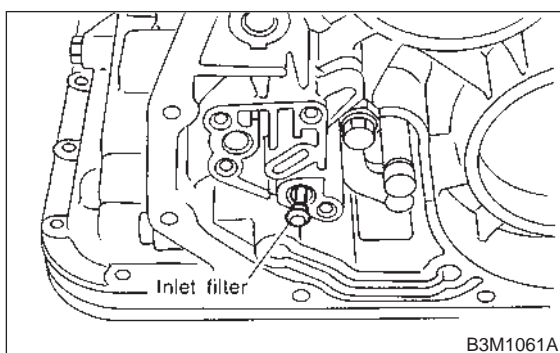


6. CONNECTION OF EACH SECTION

1) Install the parking pawl, shaft and return spring.



2) Install inlet filter to transmission case.



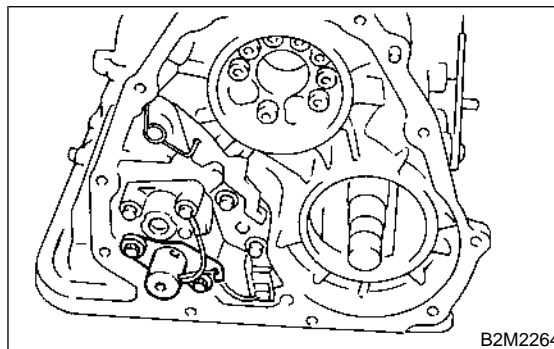
3) Install transfer valve plate, valve body and duty solenoid C (transfer) to transmission case.

CAUTION:

- Be sure to install transfer seal lip to transfer control valve body.
- If transfer seal lip is damaged, replace seal with new one.

Tightening torque:

$8 \pm 1 \text{ N-m}$ ($0.8 \pm 0.1 \text{ kg-m}$, $5.8 \pm 0.7 \text{ ft-lb}$)

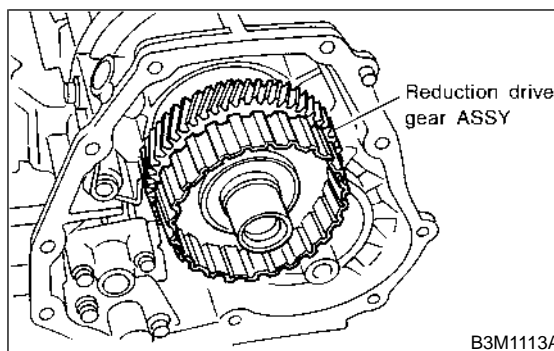


4) Connect connector to duty solenoid C (transfer).

5) Install the reduction drive gear assembly.

NOTE:

Insert it fully into position until the bearing shoulder bottoms.



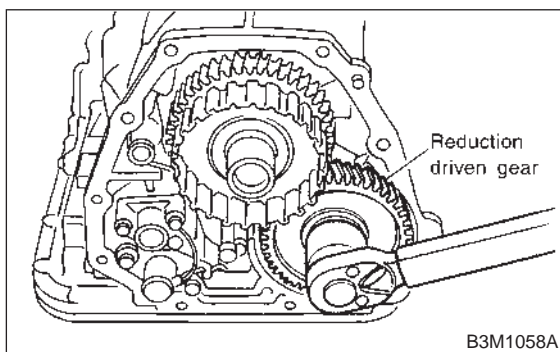
6) Using a plastic hammer, install reduction driven gear assembly, and tighten drive pinion lock nut.

NOTE:

- Be sure to use a new lock nut and a washer.
- Set the select lever in the "P" range.
- After tightening, stake the lock nut securely.

Tightening torque:

98±5 N·m (10.0±0.5 kg-m, 72.3±3.6 ft-lb)

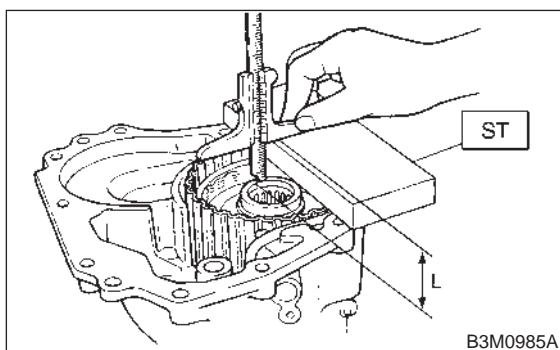


7) Measurement and adjustment of extension end play

(1) Measure distance L from end of extension case and rear drive shaft with ST.

ST 398643600 GAUGE

L = Measured value - 15 mm

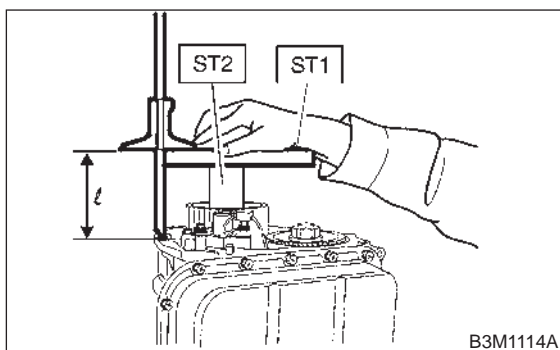


(2) Measure the distance "ℓ" from the transmission case mating surface to the reduction drive gear end surface with ST1 and ST2.

ℓ = Measured value - 50 mm

ST1 398643600 GAUGE

ST2 499577000 GAUGE



(3) Calculation equation:

NOTE:

Add 0.05 mm (0.0020 in) and 0.20 mm (0.0079 in) thick shims to area "T". Calculate formula 2 to determine "H". The calculated "H" refers to the shim thickness range. Select shims of suitable thicknesses within the calculated "H" range.

$$T = (L + G) - \ell - H$$

T : Shim clearance

L : Distance from end of extension case to end of rear drive shaft

G: Gasket thickness (0.45 mm, 0.0177 in)

ℓ : Height from end of transmission case to end of reduction drive gear

H : Thrust needle bearing thickness

0.05 — 0.25 mm (0.0020 — 0.0098 in)

Thrust needle bearing	
Part No.	Thickness mm (in)
806536020	3.8 (0.150)
806535030	4.0 (0.157)
806535040	4.2 (0.165)
806535050	4.4 (0.173)
806535060	4.6 (0.181)
806535070	4.8 (0.189)
806535090	5.0 (0.197)

8) Installation of extension case and transmission case

(1) Attach the selected thrust needle bearing to the end surface of reduction drive gear with vaseline.

CAUTION:

Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1C0].>

(2) Install the extension case to the transmission case.

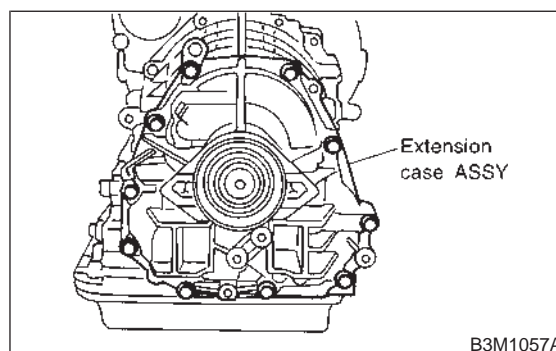
CAUTION:

Be sure to use a new gasket.

(3) Tighten bolts to secure the case.

Tightening torque:

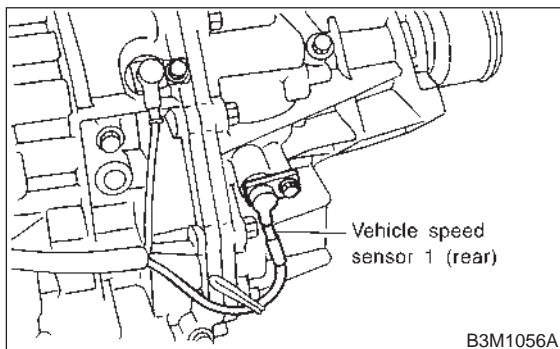
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



- 9) Install the vehicle speed sensor 1 (rear).

Tightening torque:

$7 \pm 1 \text{ N}\cdot\text{m}$ ($0.7 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.1 \pm 0.7 \text{ ft}\cdot\text{lb}$)



7. EXTERNAL PARTS

- 1) Using ST, install ATF filter to transmission case. Calculate ATF filter torque specifications using the following formula.

$$T_2 = L_2 / (L_1 + L_2) \times T_1$$

T_1 : $14 \pm 2 \text{ N}\cdot\text{m}$ ($1.4 \pm 0.2 \text{ kg}\cdot\text{m}$, $10.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)

[Required torque setting]

T_2 : Tightening torque

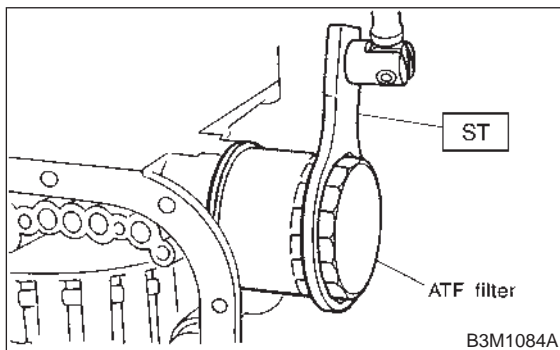
L_1 : ST length 0.078 m (3.07 in)

L_2 : Torque wrench length

CAUTION:

Align ST with torque wrench while tightening ATF filter.

ST 498545400 OIL FILTER WRENCH



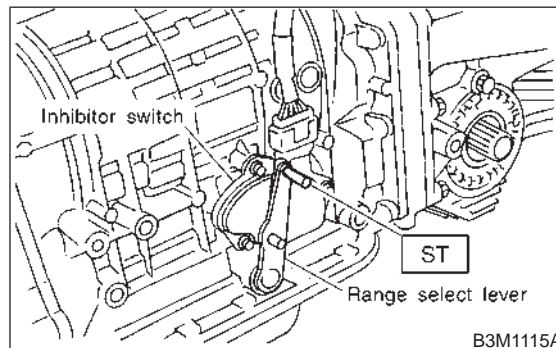
- 2) Adjustment of inhibitor switch

- (1) With the select lever set to "N" adjust the inhibitor switch so that the hole of range select lever is aligned with the inhibitor switch hole with ST.

NOTE:

Ensure that gauge moves properly.

ST 499267300 STOPPER PIN

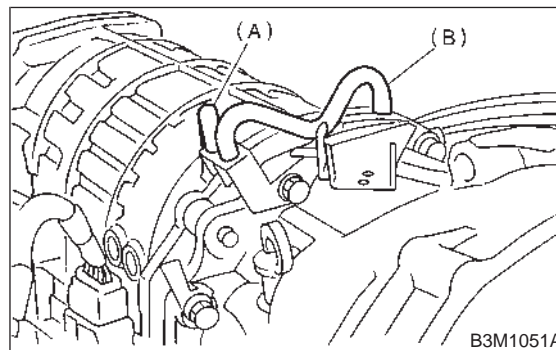


- (2) With hole aligned, tighten three bolts to secure the inhibitor switch.

Tightening torque:

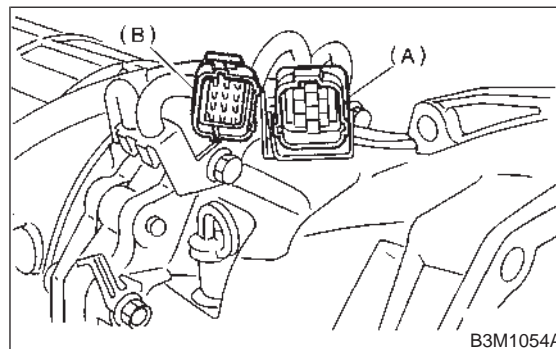
$3.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.35 \pm 0.05 \text{ kg}\cdot\text{m}$, $2.5 \pm 0.4 \text{ ft}\cdot\text{lb}$)

- 3) Install air breather hose.



- (A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

- 4) Clip the following cords and harness.



- (A) Transmission harness
(B) Inhibitor switch harness

5) Install the oil cooler outlet pipe.

CAUTION:

Be sure to use a new aluminum washer.

Tightening torque:

$34 \pm 3 \text{ N-m}$ ($3.5 \pm 0.3 \text{ kg-m}$, $25.3 \pm 2.2 \text{ ft-lb}$)

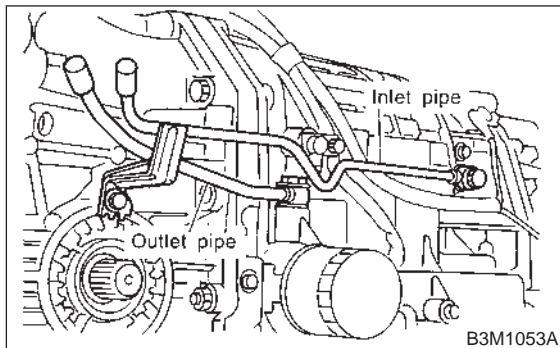
6) Install the oil cooler inlet pipe.

CAUTION:

Be sure to use a new aluminum washer.

Tightening torque:

$25 \pm 2 \text{ N-m}$ ($2.5 \pm 0.2 \text{ kg-m}$, $18.1 \pm 1.4 \text{ ft-lb}$)



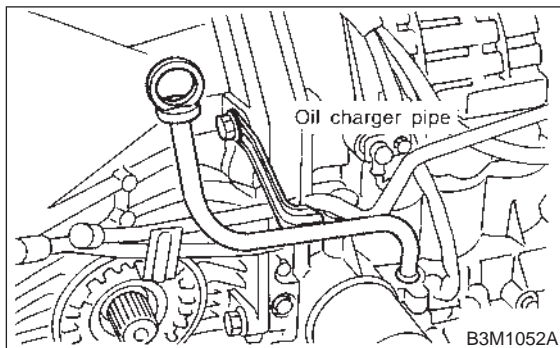
7) Install the oil charge pipe.

CAUTION:

Be careful not to damage the O-ring.

Tightening torque:

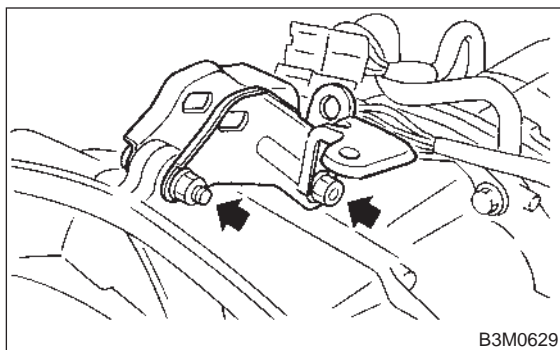
$41 \pm 3 \text{ N-m}$ ($4.2 \pm 0.3 \text{ kg-m}$, $30.4 \pm 2.2 \text{ ft-lb}$)



8) Install the pitching stopper bracket.

Tightening torque:

$41 \pm 3 \text{ N-m}$ ($4.2 \pm 0.3 \text{ kg-m}$, $30.4 \pm 2.2 \text{ ft-lb}$)



9) Tighten the drain plugs.

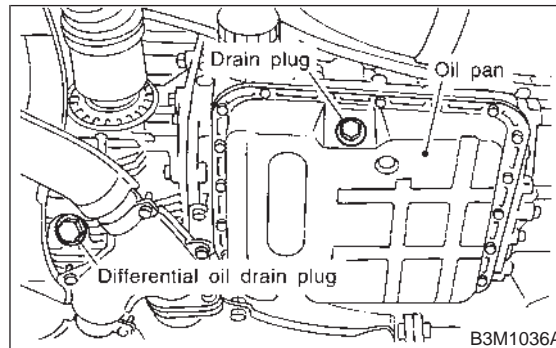
Tightening torque:

Diff.

$44 \pm 3 \text{ N-m}$ ($4.5 \pm 0.3 \text{ kg-m}$, $32.5 \pm 2.2 \text{ ft-lb}$)

ATF

$25 \pm 2 \text{ N-m}$ ($2.5 \pm 0.2 \text{ kg-m}$, $18.1 \pm 1.4 \text{ ft-lb}$)



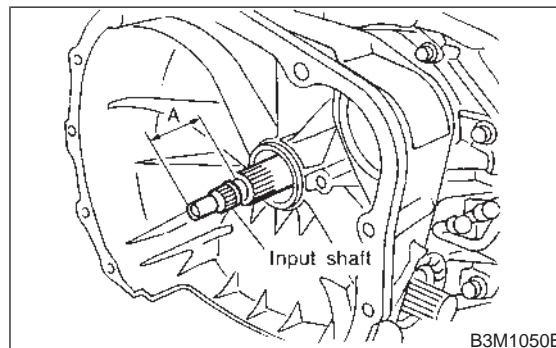
10) Insert the input shaft while turning lightly by hand.

CAUTION:

Be careful not to damage the bushing.

Normal protrusion A:

$50 - 55 \text{ mm}$ ($1.97 - 2.17 \text{ in}$)



11) Install the torque converter clutch assembly.

(1) Install the oil pump shaft to the torque converter clutch.

NOTE:

Make sure the clip fits securely in its groove.

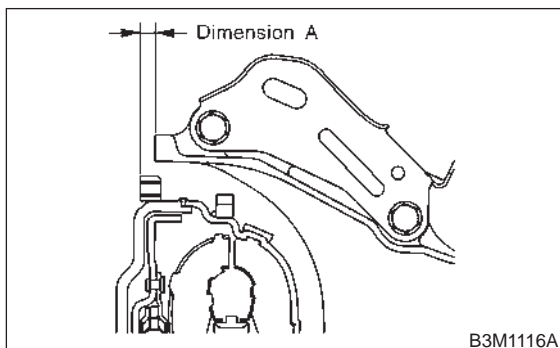
(2) Holding the torque converter clutch assembly by hand, carefully install it to the torque converter clutch case. Be careful not to damage the bushing. Also avoid undue contact between the oil pump shaft bushing and stator shaft portion of the oil pump cover.

- (3) Rotate the shaft lightly by hand to engage the splines securely.

Dimension A:

2200 cc; -1.3 to -1.1 mm (-0.051 to -0.043 in)

2500 cc; 2.7 — 2.9 mm (0.106 — 0.114 in)



- 12) Fill ATF and differential gear oil.

NOTE:

After filling oil, insert the oil level gauge into the oil inlet.

Differential gear oil capacity:

1.1 — 1.3 ℓ (1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)

Automatic transmission fluid capacity:

2200 cc; 8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)

2500 cc; 9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)

Recommended fluid:

Dexron IIE or Dexron III type automatic transmission

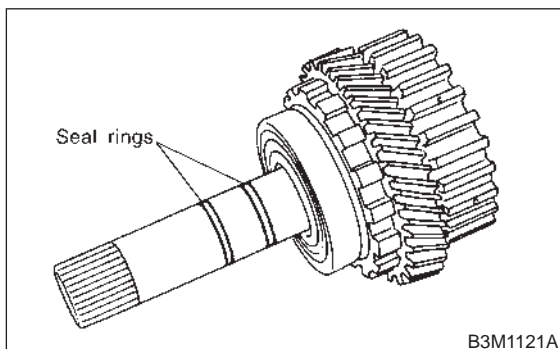
12. Reduction Drive Gear Assembly

A: DISASSEMBLY

- 1) Take out the seal rings.

CAUTION:

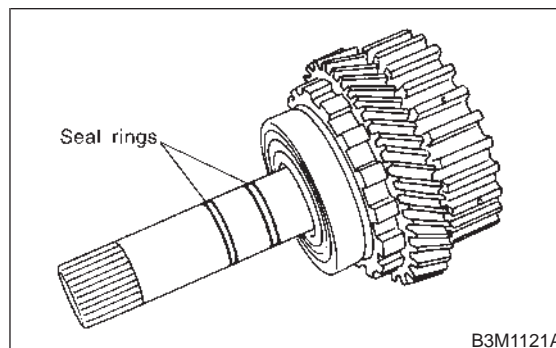
Be careful not to damage the seal rings.



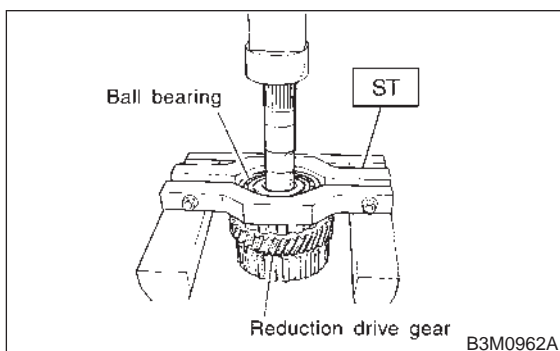
- 3) Attach two seal rings.

NOTE:

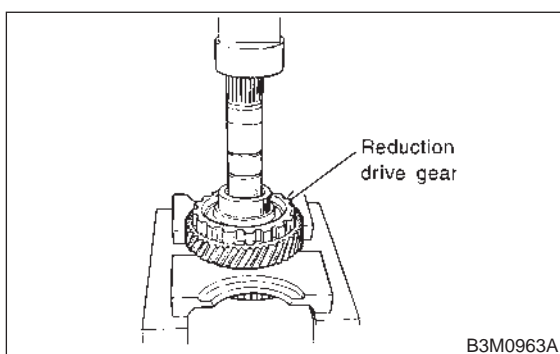
To make subsequent assembly easier, apply vaseline to the grooves of the shaft and to the exterior of the seal ring.



- 2) Using ST, remove the ball bearing.
ST 498077600 REMOVER



- 3) Using a press, remove the reduction drive gear.



B: INSPECTION

Make sure that each component is free of harmful gouges, cuts, or dust.

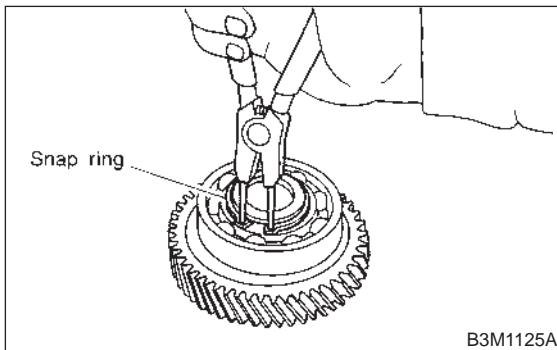
C: ASSEMBLY

- 1) Press-fit the reduction drive gear to the shaft.
- 2) Press-fit the ball bearing to the reduction drive gear.

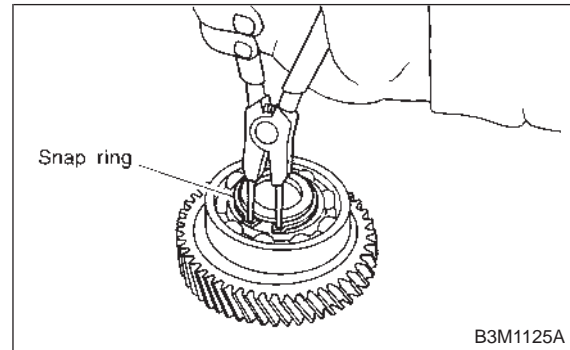
13. Reduction Driven Gear

A: DISASSEMBLY

- 1) Remove snap ring from reduction driven gear.

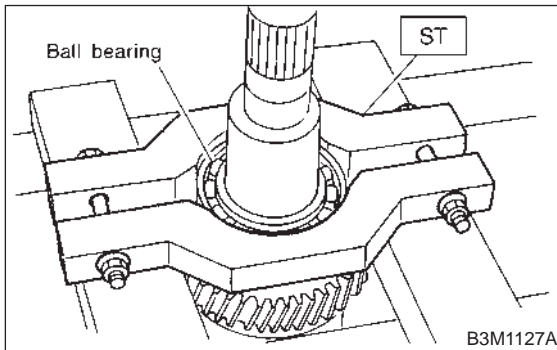


- 2) Install snap ring to reduction driven gear.



- 2) Using ST, remove ball bearing from reduction driven gear.

ST 498077600 REMOVER

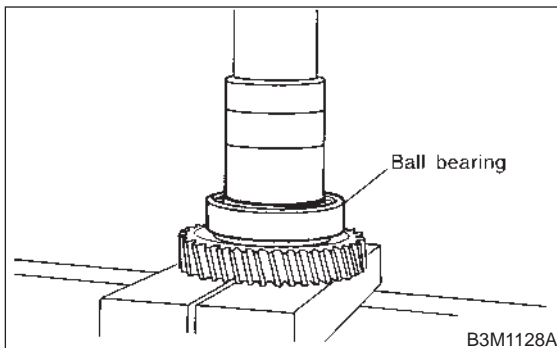


B: INSPECTION

Check ball bearing and gear for dents or damage.

C: ASSEMBLY

- 1) Using a press, install ball bearing to reduction driven gear.

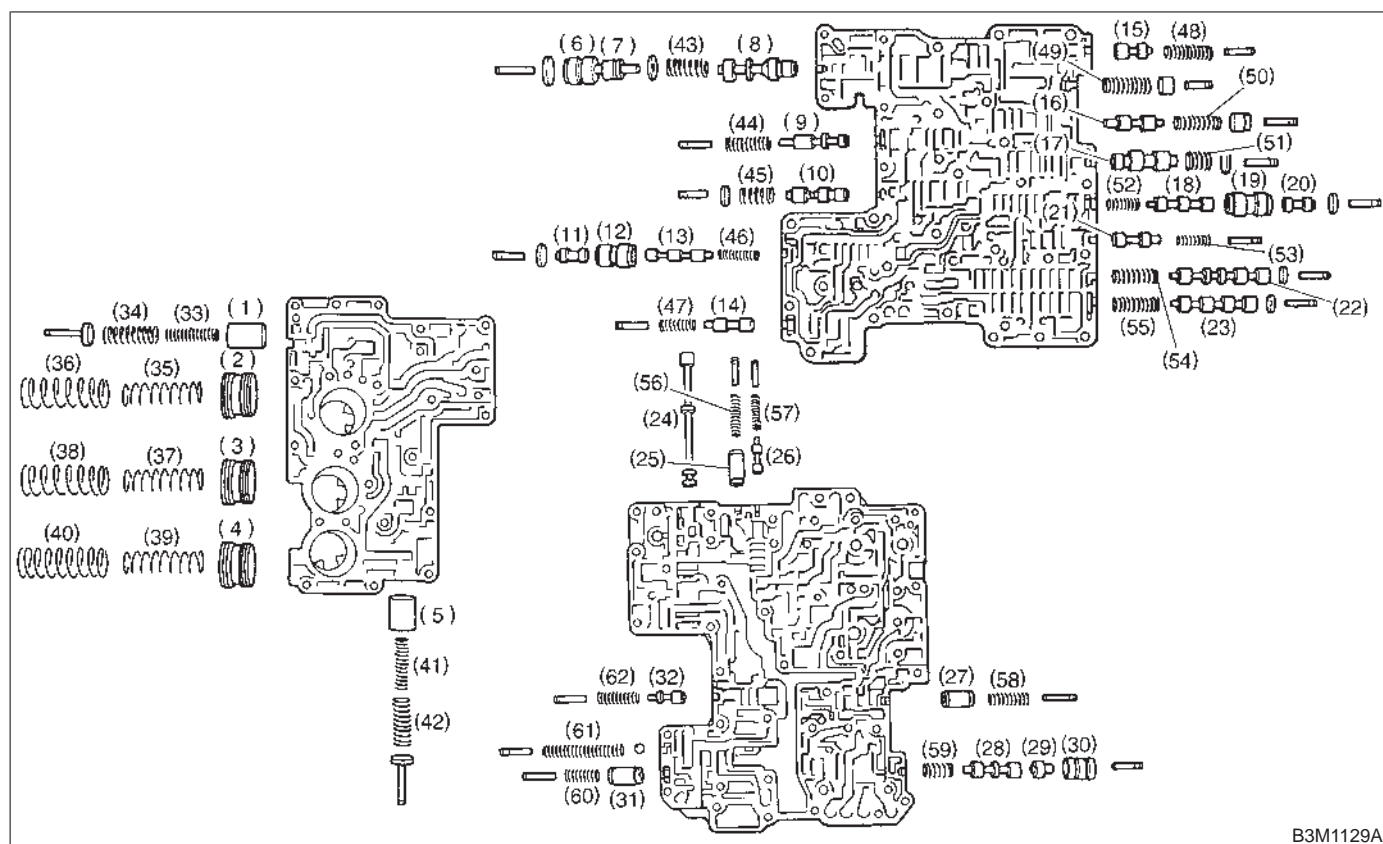


14. Control Valve Body

A: PRECAUTION

The control valve is composed of parts which are accurately machined to a high degree and should be handled carefully during disassembly and assembly. As these parts are similar in shape, they should be arranged in neat order on a table after disassembly so that they can be easily installed to their original positions. Spring loaded parts should

be also handled carefully, as springs may jump out of place when the parts are disassembled or removed. Extreme care should be taken so as not to drop valves on the floor. Before assembling, the parts and valves should be dipped in a container filled with the ATF. Make sure that the valves are clean and free from any foreign material before assembly. Torque specifications should also be observed.



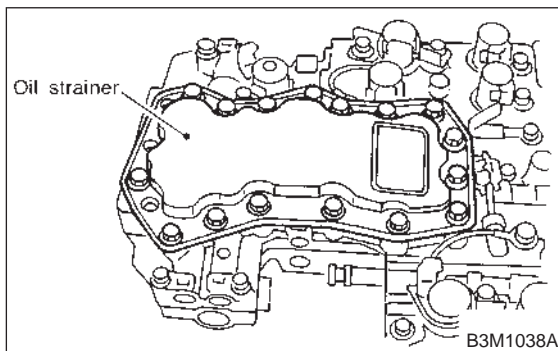
B3M1129A

- | | | |
|---|---------------------------------------|------------------------------------|
| (1) 2-4 brake clutch accumulator piston B | (11) 2-4 brake timing plug | (23) Shift valve A |
| (2) 2-4 brake clutch accumulator piston A | (12) 2-4 brake timing sleeve | (24) Manual valve |
| (3) Low clutch accumulator piston | (13) 2-4 brake timing valve A | (25) Throttle accumulator piston B |
| (4) High clutch accumulator piston A | (14) 2-4 brake timing valve B | (26) 1st reducing valve |
| (5) High clutch accumulator piston B | (15) Torque converter regulator valve | (27) Throttle accumulator piston A |
| (6) Pressure regulator sleeve | (16) Pressure modifier valve | (28) Lock-up control valve |
| (7) Pressure regulator plug | (17) Accumulator control valve A | (29) Lock-up control plug |
| (8) Pressure regulator valve | (18) Low clutch timing valve A | (30) Lock-up control sleeve |
| (9) Reverse inhibit valve | (19) Low clutch timing sleeve | (31) Modifier accumulator piston |
| (10) Accumulator control valve B | (20) Low clutch timing plug | (32) Pilot valve |
| | (21) Low clutch timing valve B | |
| | (22) Shift valve B | |

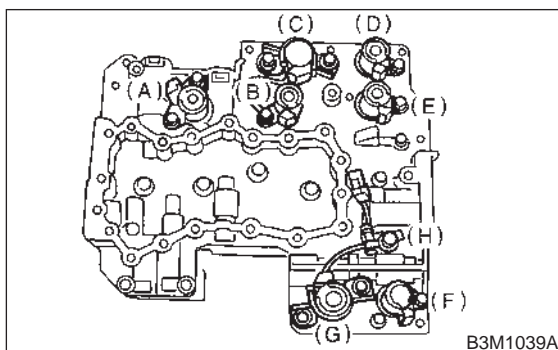
No.	Part name	Wire dia. mm (in)	Average dia. mm (in)	Effective turn	Free length mm (in)
33	2-4 brake accumulator B spring (Inlet)	1.6 (0.063)	9.3 (0.366)	14.6	47.0 (1.850)
34	2-4 brake accumulator B spring (Outlet)	2.3 (0.091)	13.7 (0.539)	8.79	45.0 (1.772)
35	2-4 brake accumulator A spring (Inlet)	1.8 (0.071)	21.3 (0.839)	8.0	69.1 (2.720)
36	2-4 brake accumulator A spring (Outlet)	1.7 (0.067)	25.3 (0.996)	6.3	69.1 (2.720)
37	Low clutch accumulator spring (Inlet)	1.8 (0.071)	21.3 (0.839)	8.0	69.1 (2.720)
38	Low clutch accumulator spring (Outlet)	1.7 (0.067)	25.3 (0.996)	6.3	69.1 (2.720)
39	High clutch accumulator A spring (Inlet)	1.8 (0.071)	21.3 (0.839)	8.0	69.1 (2.720)
40	High clutch accumulator A spring (Outlet)	1.7 (0.067)	25.3 (0.996)	6.3	69.1 (2.720)
41	High clutch accumulator B spring (Inlet)	1.6 (0.063)	9.3 (0.366)	14.6	47.0 (1.850)
42	High clutch accumulator B spring (Outlet)	2.3 (0.091)	13.7 (0.539)	8.79	45.0 (1.772)
43	Pressure regulator valve spring	1.0 (0.039)	13.5 (0.531)	6.5	35.0 (1.378)
44	Reverse inhibit valve spring	0.65 (0.0256)	8.4 (0.331)	7.7	26.5 (1.043)
45	Accumulator control valve B spring	0.5 (0.020)	10.5 (0.413)	4.5	21.5 (0.846)
46	2-4 brake timing valve A spring	0.50 (0.0197)	6.5 (0.256)	7.78	19.3 (0.760)
47	2-4 brake timing valve B spring	0.60 (0.0236)	5.8 (0.228)	7.7	20.0 (0.787)
48	Torque converter regulator valve spring	1.40 (0.0551)	7.6 (0.299)	12.1	34.7 (1.366)
49	Hold spring	0.8 (0.031)	9.7 (0.382)	11.5	40.0 (1.575)
50	Pressure modifier valve spring	0.7 (0.028)	8.3 (0.327)	8.2	26.9 (1.059)
51	Accumulator control valve A	0.7 (0.028)	10.3 (0.406)	3.6	15.1 (0.594)
52	Low clutch timing valve A spring	0.5 (0.020)	6.5 (0.256)	7.78	19.3 (0.760)
53	Low clutch timing valve B spring	0.60 (0.0236)	5.8 (0.228)	7.7	20.0 (0.787)
54	Shift valve B spring	0.80 (0.0315)	8.2 (0.323)	7.9	25.2 (0.992)
55	Shift valve A spring	0.80 (0.0315)	8.2 (0.323)	7.9	25.2 (0.992)
56	Throttle accumulator B spring	1.6 (0.063)	8.4 (0.331)	9.77	36.0 (1.417)
57	1st reducing valve spring	0.75 (0.0295)	6.0 (0.236)	12.5	25.4 (1.000)
58	Throttle accumulator A spring	1.7 (0.067)	8.0 (0.315)	9.61	36.0 (1.417)
59	Lock-up control valve spring	0.9 (0.035)	11.2 (0.441)	4.0	19.7 (0.776)
60	Modifier accumulator spring	1.7 (0.067)	8.0 (0.315)	9.61	36.0 (1.417)
61	Line pressure relief valve spring	1.6 (0.063)	8.0 (0.315)	22.5	69.3 (2.728)
62	Pilot valve spring	1.1 (0.043)	7.9 (0.311)	10.76	30.6 (1.205)

B: DISASSEMBLY

- 1) Remove oil strainer from lower control valve body.

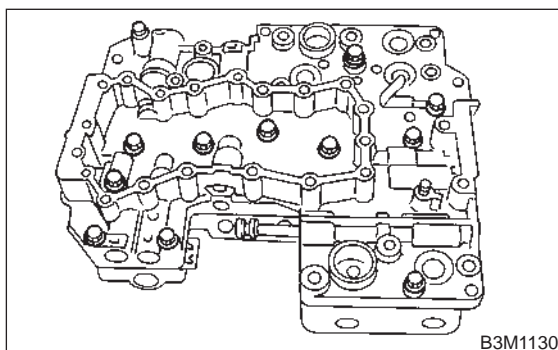


- 2) Remove the duty solenoid S, solenoids and sensor from the lower valve body.



- (A) Lock-up duty solenoid (Blue)
 (B) Low clutch timing solenoid (Gray)
 (C) Line pressure duty solenoid (Red)
 (D) Shift solenoid 1 (Yellow)
 (E) Shift solenoid 2 (Green)
 (F) 2-4 brake timing solenoid (Black)
 (G) 2-4 brake duty solenoid D (Red)
 (H) ATF temperature sensor

- 3) Remove the upper-lower valve body tightening bolts.



- 4) Separate the control valve body.

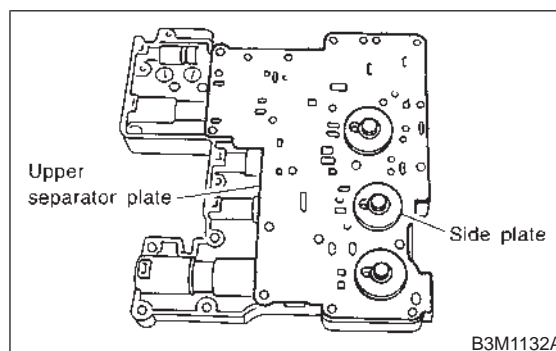
CAUTION:

- Do not lose the ten (10) steel balls contained in the upper valve body and middle valve body.
- Do not lose strainers contained in the lower valve body.

NOTE:

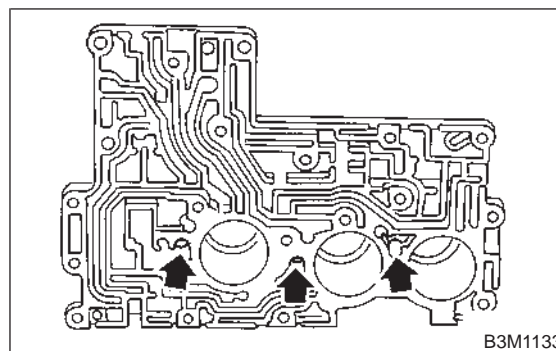
During ordinary servicing, clean the control valve bodies in this condition, without further disassembly. In the event of a seized clutch or other problem, disassemble the control valve bodies further, and clean the component parts.

- 5) Remove upper separator plate from middle valve body.



- 6) Remove valve springs from upper valve body.

- 7) Using air compressor, remove accumulator piston from upper valve body.

**C: INSPECTION**

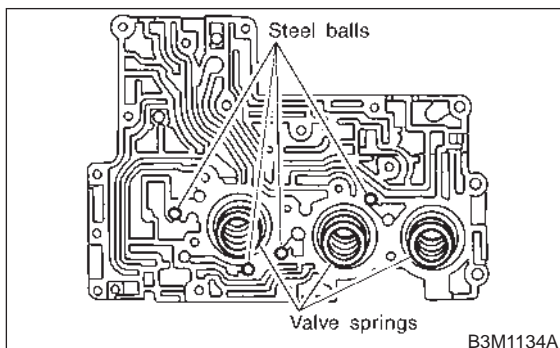
Make sure that each component is free of harmful gouges, cuts, or dust.

D: ASSEMBLY

1) Install accumulator pistons, valve springs and steel balls to upper valve body.

CAUTION:

Insert steel balls in their proper positions.



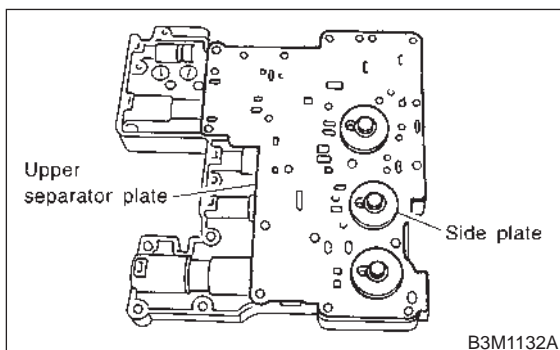
2) Install support plate and upper separate plate to middle valve body.

CAUTION:

Align the hole in support plate with the hole in separate plate.

Tightening torque:

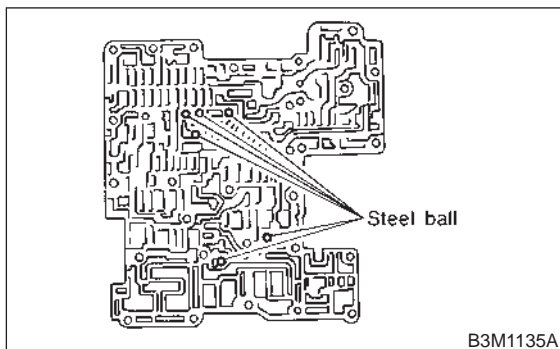
$8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)



3) Install steel balls to middle valve body.

CAUTION:

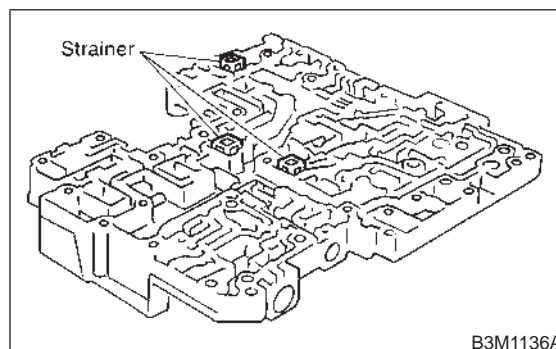
Insert steel balls in their proper positions.



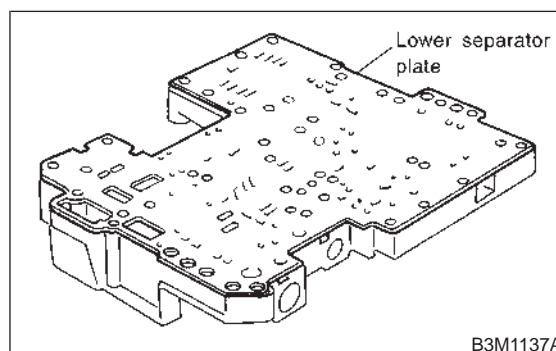
4) Install three filters to lower valve body.

CAUTION:

Pay attention to the location of filters.



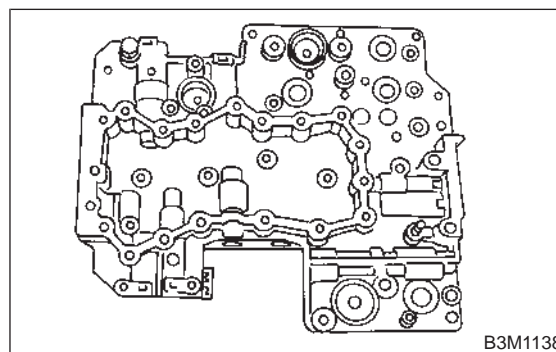
5) Install lower separate plate to lower valve body.



6) Temporarily assemble valve body.

CAUTION:

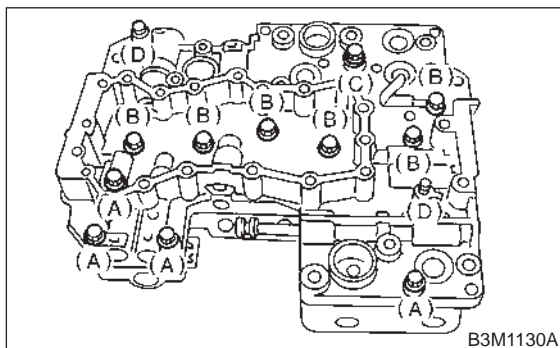
Be careful not to drop the middle valve body and upper body interior steel ball, or the lower body filter.



7) Tighten bolts.

Tightening torque:

$8 \pm 1 \text{ N-m}$ ($0.8 \pm 0.1 \text{ kg-m}$, $5.8 \pm 0.7 \text{ ft-lb}$)

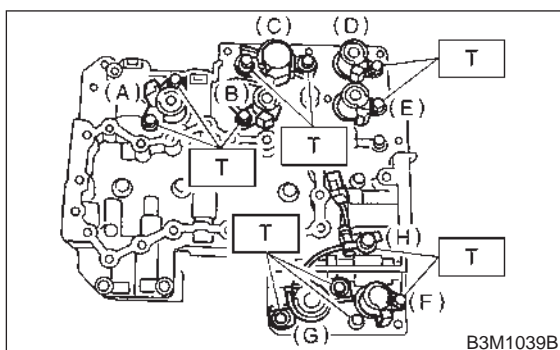


- (A) Short bolts
- (B) Middle bolts
- (C) Long bolt
- (D) Reamer bolts

8) Install the sensor, solenoids and duty solenoid S.

Tightening torque:

$8 \pm 1 \text{ N-m}$ ($0.8 \pm 0.1 \text{ kg-m}$, $5.8 \pm 0.7 \text{ ft-lb}$)



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 1 (Yellow)
- (E) Shift solenoid 2 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid D (Red)
- (H) ATF temperature sensor

9) Install oil strainer to lower valve body.

Tightening torque:

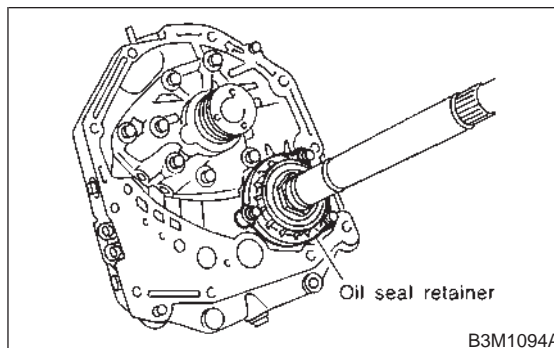
$8 \pm 1 \text{ N-m}$ ($0.8 \pm 0.1 \text{ kg-m}$, $5.8 \pm 0.7 \text{ ft-lb}$)

15. Oil Pump Assembly

A: DISASSEMBLY

1) Remove the oil seal retainer.

Also remove the O-ring and oil seal (air breather).



2) Remove O-rings from oil pump housing.

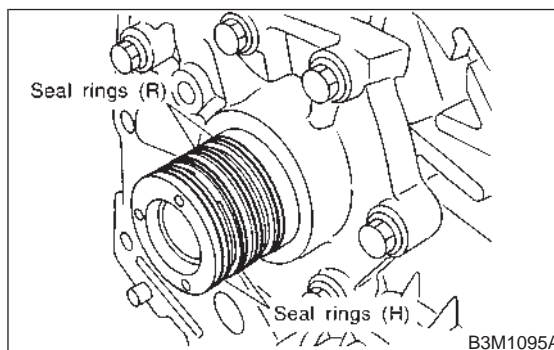
CAUTION:

Be careful not to damage O-ring.

3) Remove four seal rings.

CAUTION:

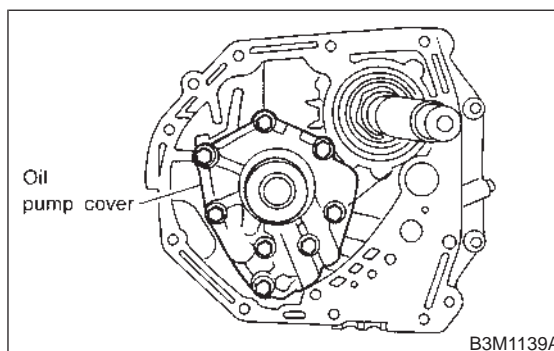
Be careful not to damage O-ring.



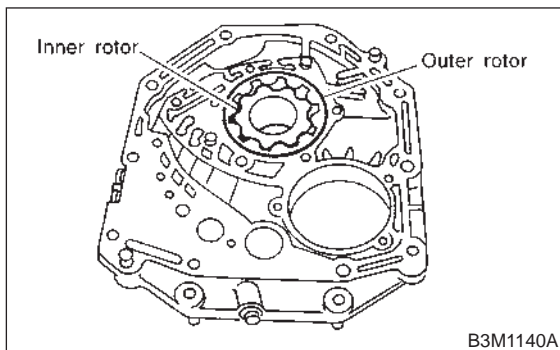
4) Remove the oil pump cover.

NOTE:

Lightly tap the end of the stator shaft to remove the cover.



5) Remove the inner and outer rotor.



B: INSPECTION

1) Check seal ring and O-ring oil seal for breaks or damage.

2) Check other parts for dents or abnormalities.

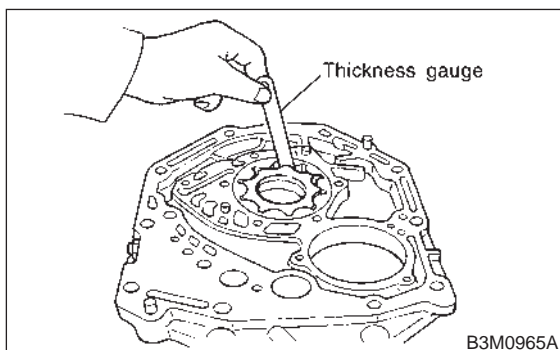
3) Selection of oil pump rotor assembly

(1) Tip clearance

Install inner rotor and outer rotor to oil pump. With rotor gears facing each other, measure crest-to-crest clearance.

Tip clearance:

0.02 — 0.15 mm (0.0008 — 0.0059 in)

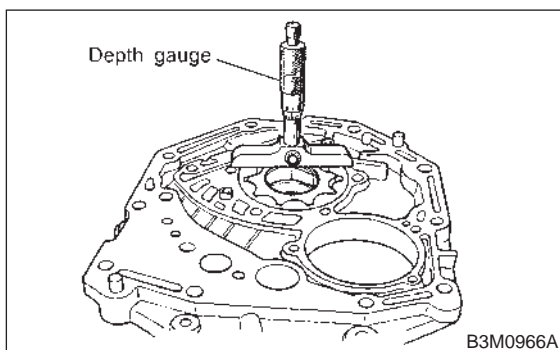


(2) Side clearance

Set a depth gauge to oil pump housing, then measure oil pump housing-to-rotor clearances.

Side clearance:

0.02 — 0.04 mm (0.0008 — 0.0016 in)

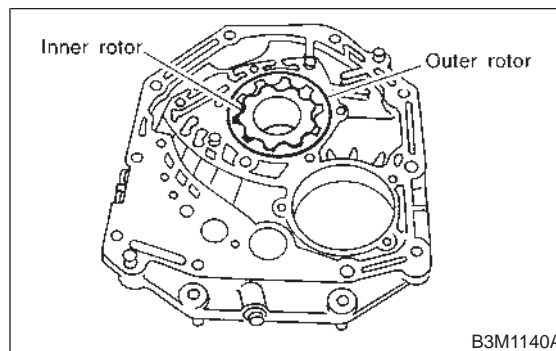


(3) If depth and/or side clearances are outside specifications, replace rotor assembly.

Oil pump rotor assembly	
Part No.	Thickness mm (in)
15008AA060	11.37 — 11.38 (0.4476 — 0.4480)
15008AA070	11.38 — 11.39 (0.4480 — 0.4484)
15008AA080	11.39 — 11.40 (0.4484 — 0.4488)

C: ASSEMBLY

1) Install oil pump rotor assembly to oil pump housing.



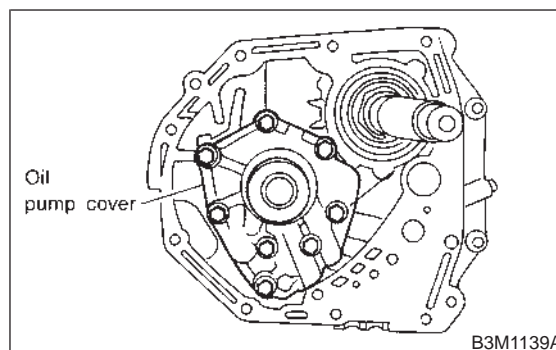
2) Install the oil pump cover.

Tightening torque:

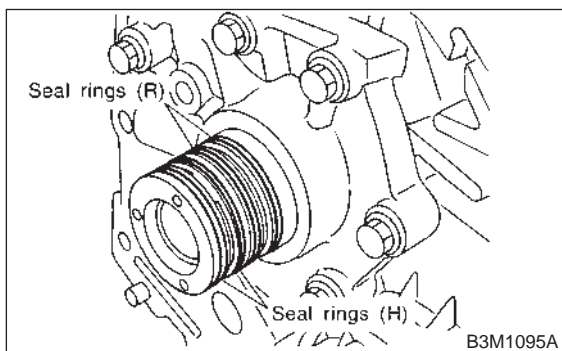
25±2 N·m (2.5±0.2 kg·m, 18.1±1.4 ft·lb)

NOTE:

- Align both pivots with the pivot holes of the cover, and install the cover being careful not to apply undue force to the pivots.
- After assembling, turn the oil pump shaft to check for smooth rotation of the rotor.



- Install the oil seal retainer and seal rings. After adjusting the drive pinion backlash and tooth contact.



16. Drive Pinion Shaft

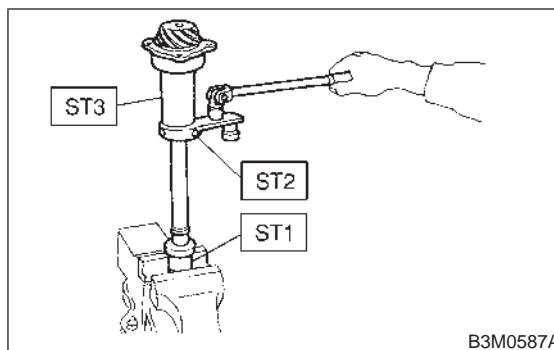
A: DISASSEMBLY

- 1) Straighten the staked portion of the lock nut, and remove the lock nut while locking the rear spline portion of the shaft with ST1 and ST2. Then pull off the drive pinion collar.

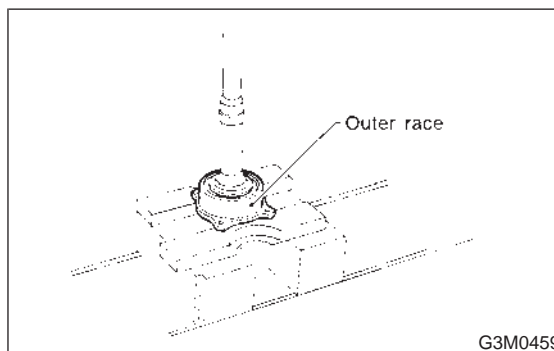
ST1 498937100 HOLDER

ST2 499787100 WRENCH

ST3 499787500 ADAPTER

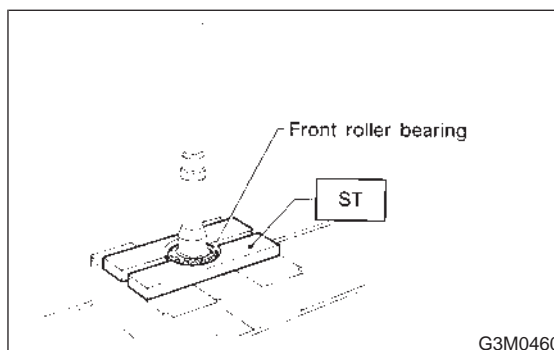


- 2) Remove the O-ring.
- 3) Using a press, separate the rear roller bearing and outer race from the shaft.



- 4) Using a press and ST, separate the front roller bearing from the shaft.

ST 498517000 REPLACER



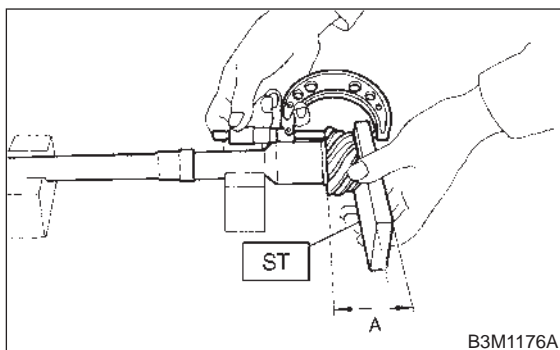
B: INSPECTION

Make sure that all component parts are free of harmful cuts, gouges, and other faults.

C: ASSEMBLY

1) Measure dimension "A" of the drive pinion shaft.

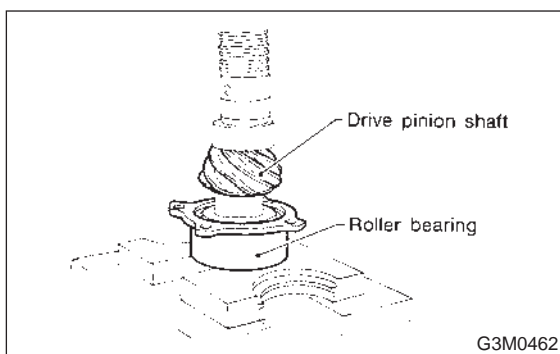
ST 398643600 GAUGE



2) Using a press, force-fit the roller bearing in position.

CAUTION:

Do not change the relative positions of the outer race and bearing cone.



3) After fitting the O-ring to the shaft, attach the drive pinion collar to the shaft.

CAUTION:

Be careful not to damage the O-ring.

4) Tighten the lock washer and lock nut with ST1, ST2 and ST3.

ST1 498937110 HOLDER

ST2 499787100 WRENCH

ST3 499787500 ADAPTER

Actual tightening torque:

$116 \pm 5 \text{ N}\cdot\text{m}$ ($11.8 \pm 0.5 \text{ kg}\cdot\text{m}$, $85.3 \pm 3.6 \text{ ft}\cdot\text{lb}$)

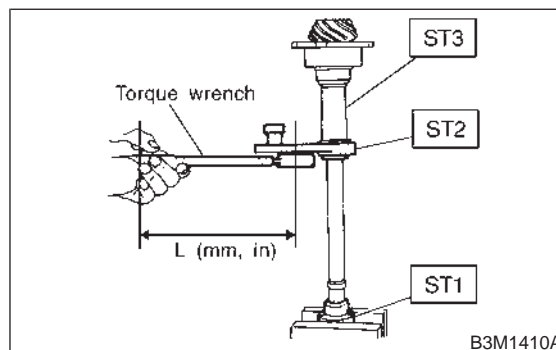
NOTE:

- Pay attention to the orientation of lock washer.
- Tightening torque using torque wrench is determined by the following equation.

$$T_1 = L/L + 72.2 \times T$$

T: Actual tightening torque

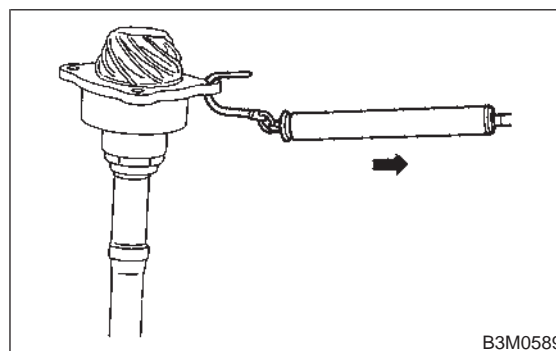
- Install ST2 to torque wrench as straight as possible.



5) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If out of the allowable range, replace the roller bearing.

Starting torque:

$0.3 - 2.0 \text{ N}\cdot\text{m}$ ($0.03 - 0.2 \text{ kg}\cdot\text{m}$, $0.2 - 1.4 \text{ ft}\cdot\text{lb}$)

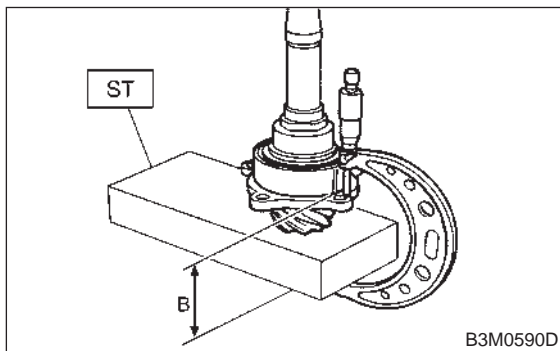


6) Stake the lock nut securely at two places.

16. Drive Pinion Shaft

7) Measure dimension "B" of the drive pinion shaft.

ST 398643600 GAUGE



8) Determine the thickness "t" (mm) of the drive pinion shim.

NOTE:

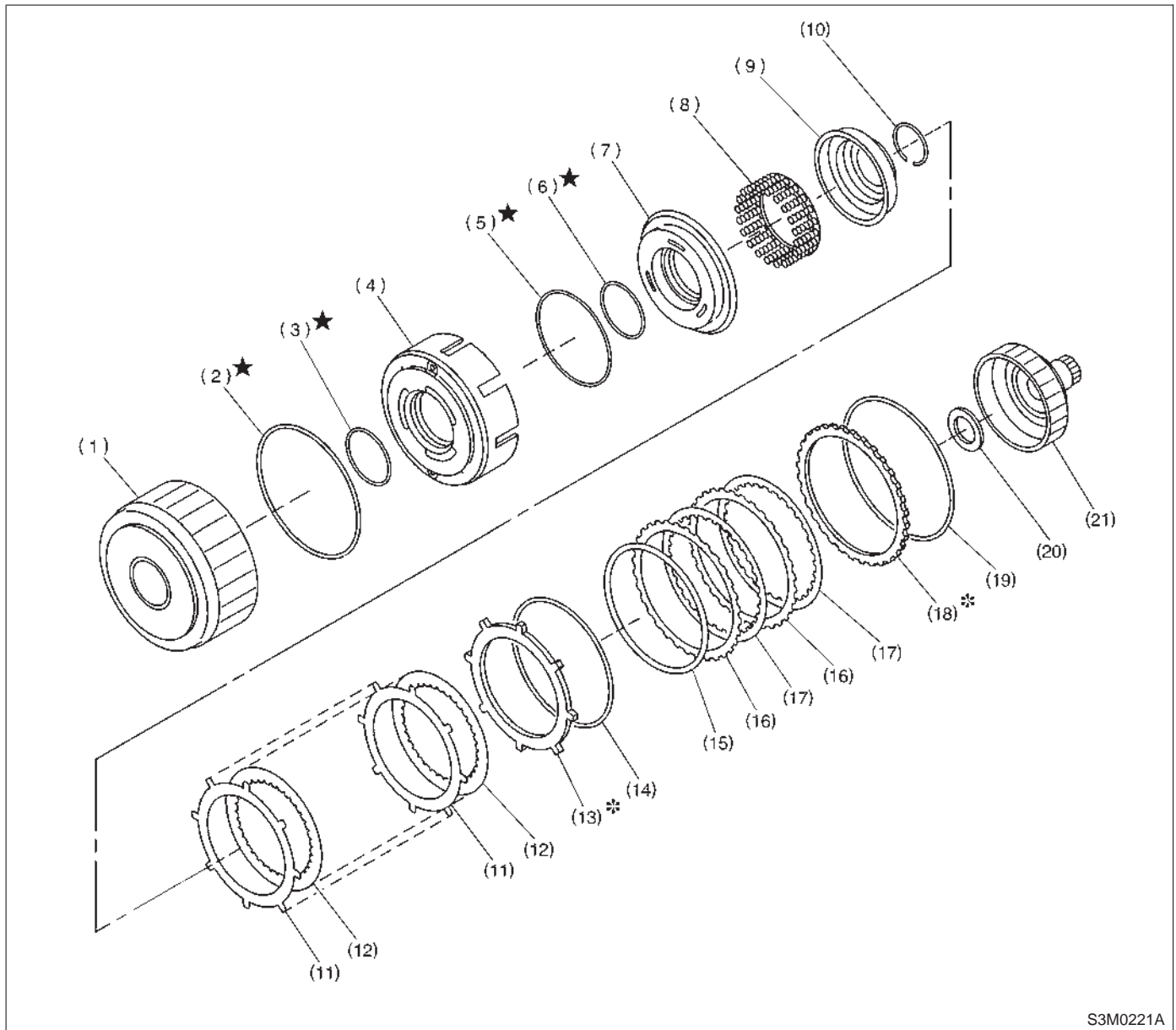
The number of shims must be three or less.

$$t = 6.5 \pm 0.0625 - (B - A)$$

Available drive pinion shims	
Part No.	Thickness mm (in)
31451AA050	0.150 (0.0059)
31451AA060	0.175 (0.0069)
31451AA070	0.200 (0.0079)
31451AA080	0.225 (0.0089)
31451AA090	0.250 (0.0098)
31451AA100	0.275 (0.0108)

17. High Clutch and Reverse Clutch

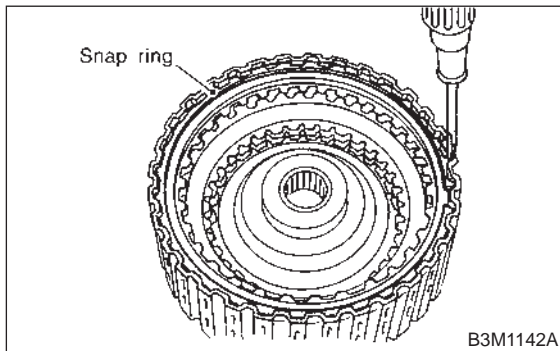
A: DISASSEMBLY



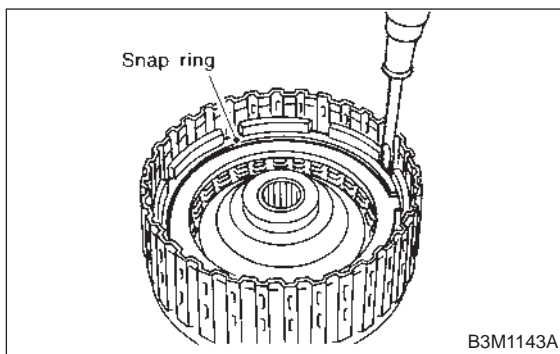
S3M0221A

- | | | |
|---------------------------|----------------------|----------------------------|
| (1) Reverse clutch drum | (8) Spring retainer | (15) Dish plate |
| (2) Lip seal | (9) Cover | (16) Driven plate |
| (3) Lathe cut seal ring | (10) Snap ring | (17) Drive plate |
| (4) Reverse clutch piston | (11) Driven plate | (18) Retaining plate |
| (5) Lathe cut seal ring | (12) Drive plate | (19) Snap ring |
| (6) Lathe cut seal ring | (13) Retaining plate | (20) Thrust needle bearing |
| (7) High clutch piston | (14) Snap ring | (21) High clutch hub |

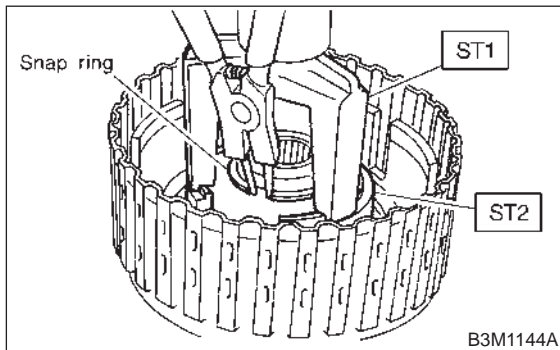
1) Remove the snap ring, and take out the retaining plate, drive plates, driven plates.



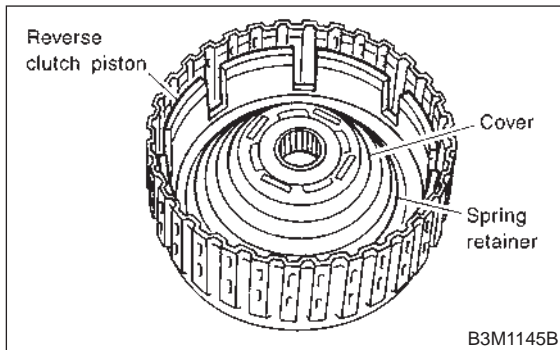
2) Remove snap ring, and take out the retaining plate, drive plates and driven plates.



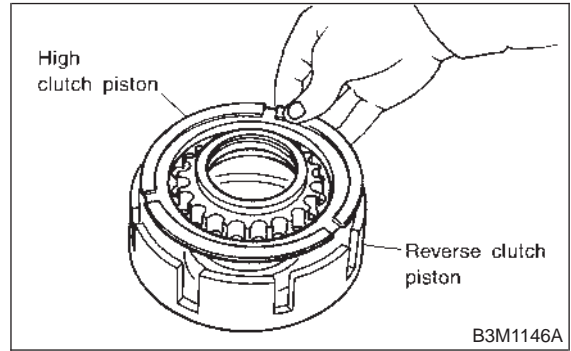
3) Using ST1 and ST2, remove snap ring.
 ST1 398673600 COMPRESSOR
 ST2 498627100 SEAT



4) Take out clutch cover, spring retainer, high clutch piston and reverse clutch piston.

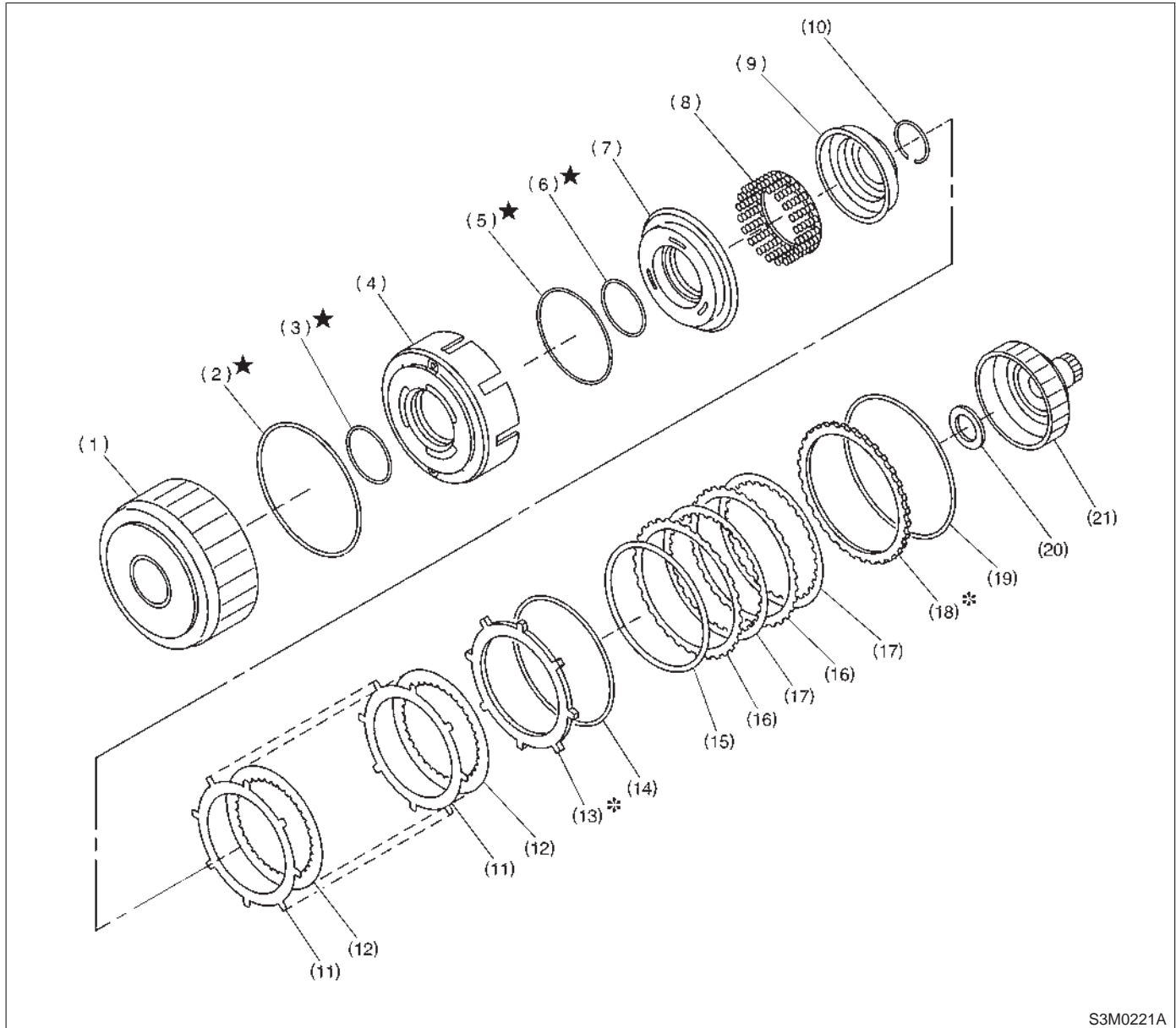


5) Remove seal rings and lip seal from high clutch piston and reverse clutch piston.



B: INSPECTION

- 1) Drive plate facing for wear and damage
- 2) Snap ring for wear, return spring for breakage or setting, and spring retainer for deformation
- 3) Lip seal and lathe cut seal ring for damage
- 4) Piston check ball for operation

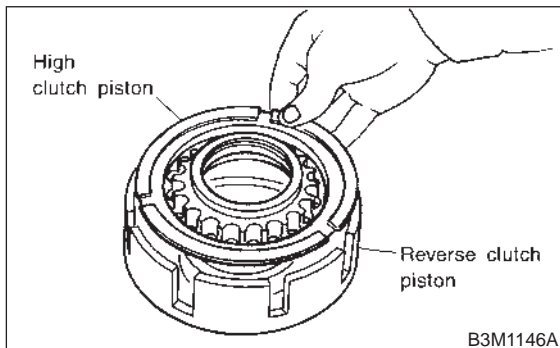
C: ASSEMBLY

S3M0221A

- | | | |
|---------------------------|----------------------|----------------------------|
| (1) Reverse clutch drum | (8) Spring retainer | (15) Dish plate |
| (2) Lip seal | (9) Cover | (16) Driven plate |
| (3) Lathe cut seal ring | (10) Snap ring | (17) Drive plate |
| (4) Reverse clutch piston | (11) Driven plate | (18) Retaining plate |
| (5) Lathe cut seal ring | (12) Drive plate | (19) Snap ring |
| (6) Lathe cut seal ring | (13) Retaining plate | (20) Thrust needle bearing |
| (7) High clutch piston | (14) Snap ring | (21) High clutch hub |

17. High Clutch and Reverse Clutch

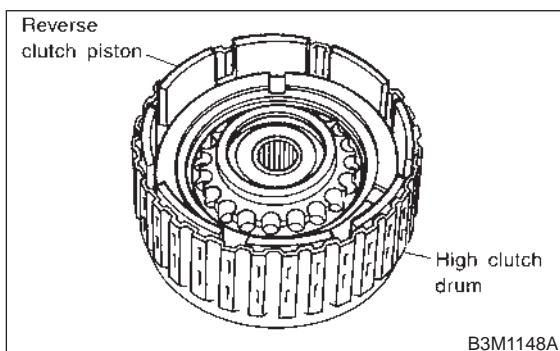
- 1) Install seal rings and lip seal to high clutch piston and reverse clutch piston.
- 2) Install high clutch piston to reverse clutch piston.



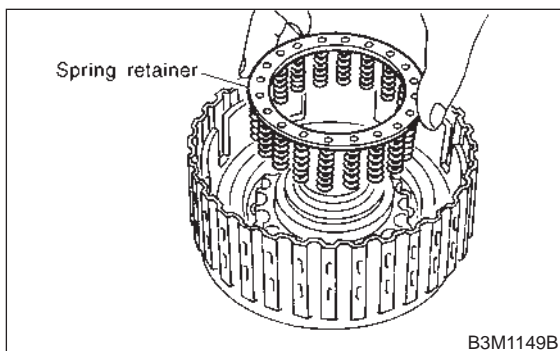
- 3) Install reverse clutch to high clutch drum.

NOTE:

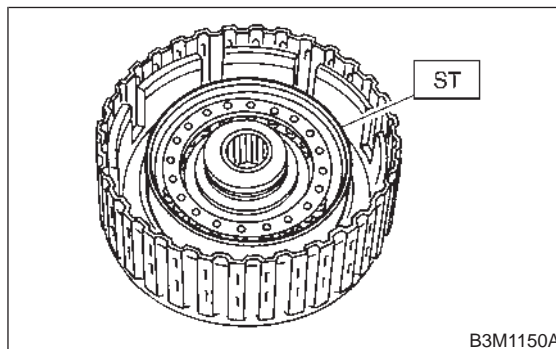
Align the groove on the reverse clutch piston with the groove on the high clutch drum during installation.



- 4) Install spring retainer to high clutch piston.



- 5) Install ST to high clutch piston.
ST 498437000 HIGH CLUTCH PISTON GAUGE



- 6) Install cover to high clutch piston.

CAUTION:

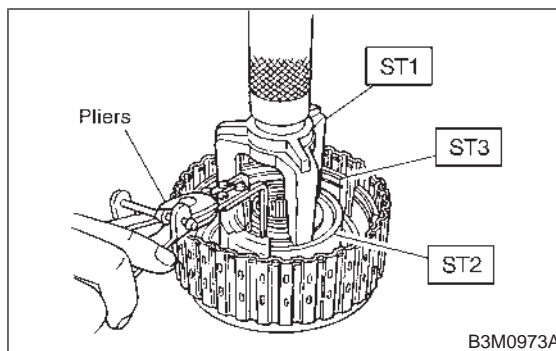
Be careful not to fold over the high clutch piston seal during installation.

- 7) Using ST1 and ST2, install snap ring.

NOTE:

After installing snap ring, remove STs.

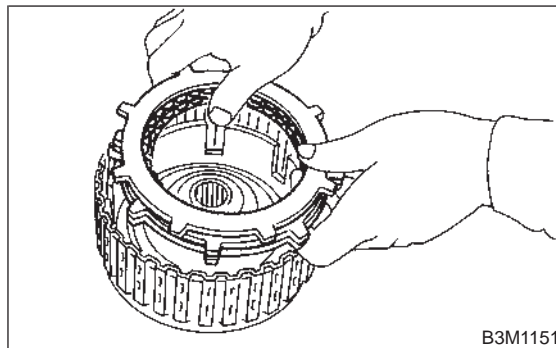
- | | | |
|-----|-----------|--------------------------|
| ST1 | 398673600 | COMPRESSOR |
| ST2 | 498627100 | SEAT |
| ST3 | 498437000 | HIGH CLUTCH PISTON GAUGE |



- 8) Install driven plate, drive plate and retaining plate to high clutch drum.

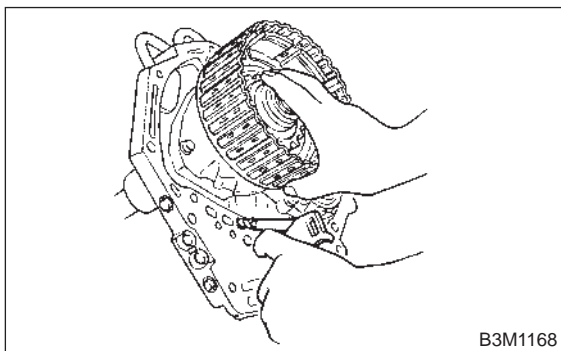
NOTE:

Install thicker driven plate on the piston side.



- 9) Install snap ring to high clutch drum.

10) Apply compressed air intermittently to check for operation.



11) Measure the clearance between the retaining plate and snap ring.

CAUTION:

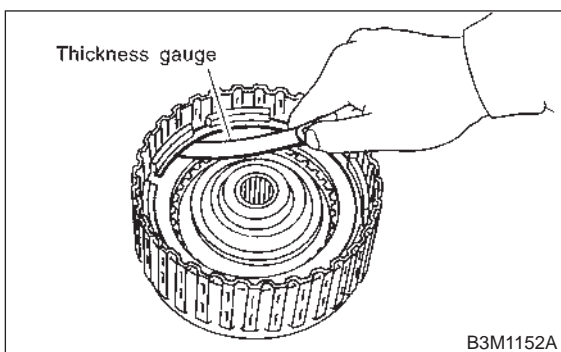
Do not press down retaining plate during clearance measurements.

Standard value:

0.8 — 1.1 mm (0.031 — 0.043 in)

Allowable limit:

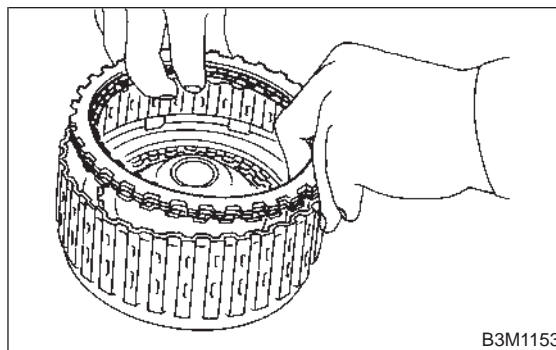
1.5 mm (0.059 in)



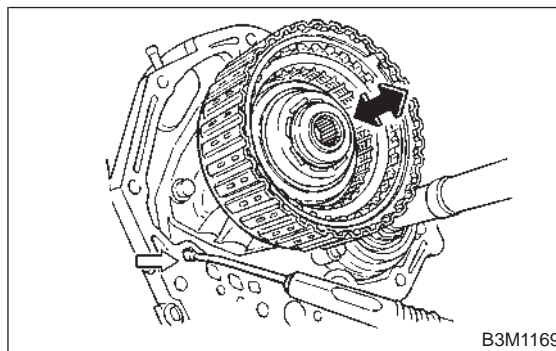
12) If specified tolerance limits are exceeded, select a suitable high clutch retaining plate.

High clutch retaining plate	
Part No.	Thickness mm (in)
31567AA710	4.7 (0.185)
31567AA720	4.8 (0.189)
31567AA730	4.9 (0.193)
31567AA740	5.0 (0.197)
31567AA670	5.1 (0.201)
31567AA680	5.2 (0.205)
31567AA690	5.3 (0.209)
31567AA700	5.4 (0.213)

13) Install driven plate, drive plate, retaining plate and snap ring.



14) Apply compressed air intermittently to check for operation.



15) Measure the clearance between the retaining plate and snap ring.

CAUTION:

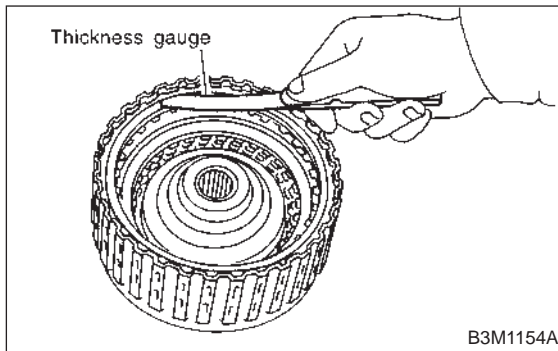
Do not press down retaining plate during clearance measurements.

Standard value:

0.5 — 0.8 mm (0.020 — 0.031 in)

Allowable limit:

1.2 mm (0.047 in)

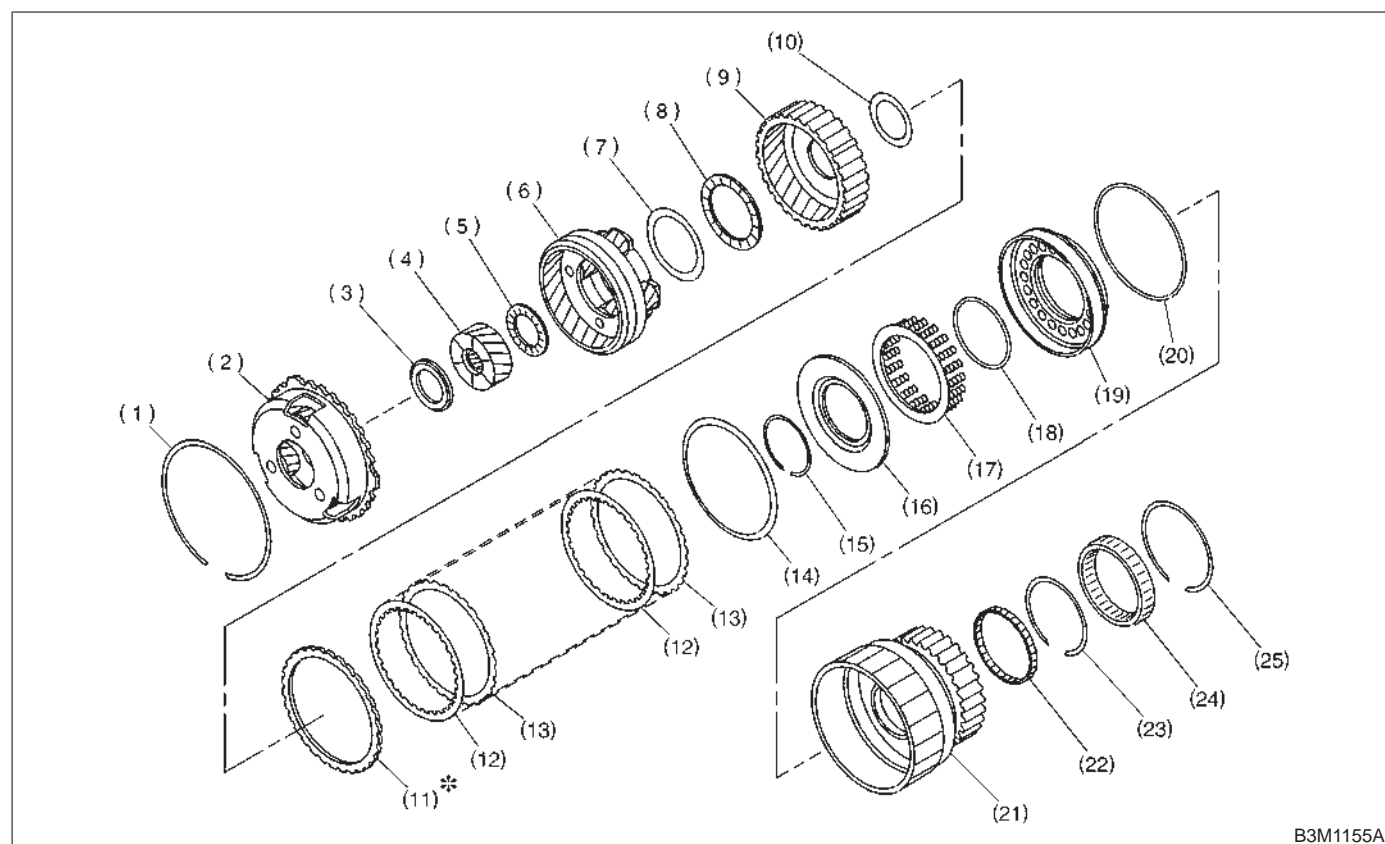


16) If specified tolerance limits are exceeded, select a suitable high clutch retaining plate.

Reverse clutch retaining plates	
Part No.	Thickness mm (in)
31567AA750	3.8 (0.150)
31567AA760	4.0 (0.157)
31567AA770	4.2 (0.165)
31567AA780	4.4 (0.173)
31567AA790	4.6 (0.181)
31567AA800	4.8 (0.189)
31567AA810	5.0 (0.197)
31567AA820	5.2 (0.205)

18. Low Clutch Drum and Planetary Gear

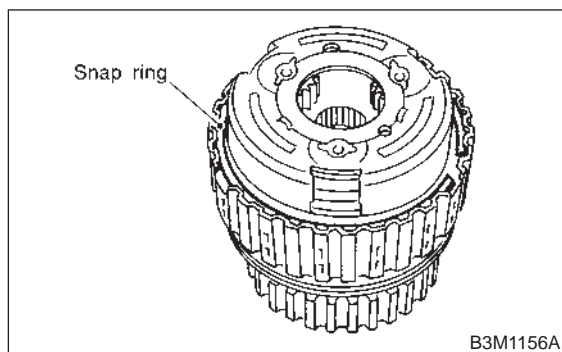
A: DISASSEMBLY



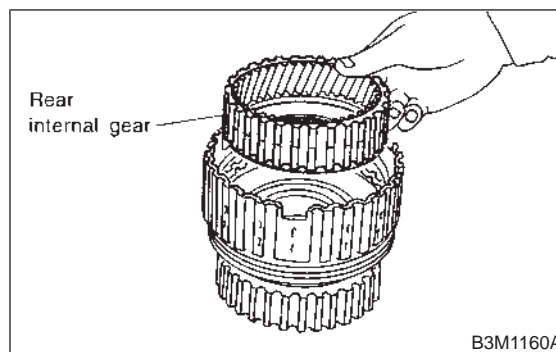
B3M1155A

- | | | |
|-----------------------------|--------------------------|--------------------------|
| (1) Snap ring | (10) Washer | (19) Low clutch piston |
| (2) Front planetary carrier | (11) Retaining plate | (20) Lathe cut seal ring |
| (3) Thrust needle bearing | (12) Drive plate | (21) Low clutch drum |
| (4) Rear sun gear | (13) Driven plate | (22) Needle bearing |
| (5) Thrust needle bearing | (14) Dish plate | (23) Inner snap ring |
| (6) Rear planetary carrier | (15) Snap ring | (24) One-way clutch |
| (7) Washer | (16) Cover | (25) Outer snap ring |
| (8) Thrust needle bearing | (17) Spring retainer | |
| (9) Rear internal gear | (18) Lathe cut seal ring | |

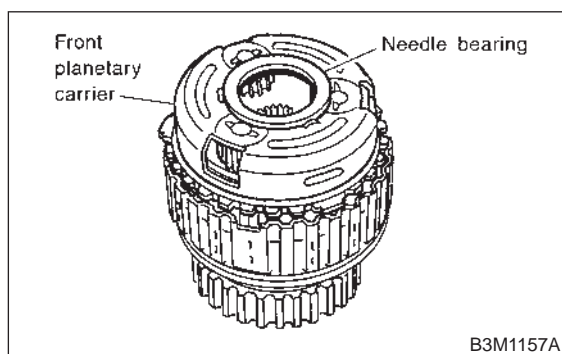
1) Remove snap ring from the low clutch drum.



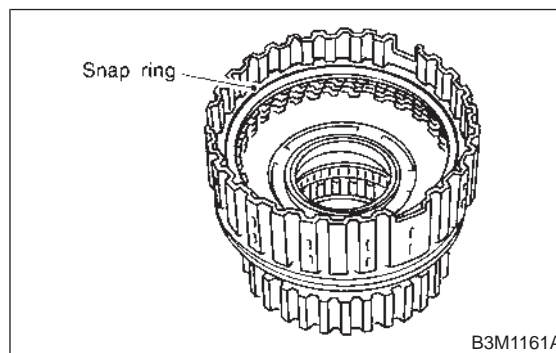
5) Take out rear internal gear.



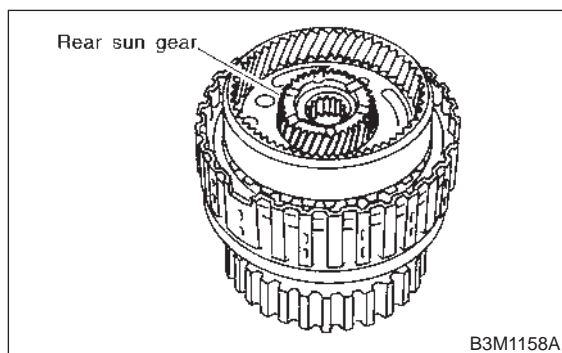
2) Take out front planetary carrier and thrust needle bearing from low clutch drum.



6) Remove the snap ring from the low clutch drum.



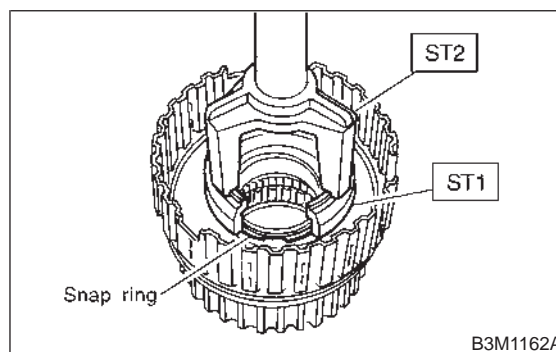
3) Take out rear sun gear.



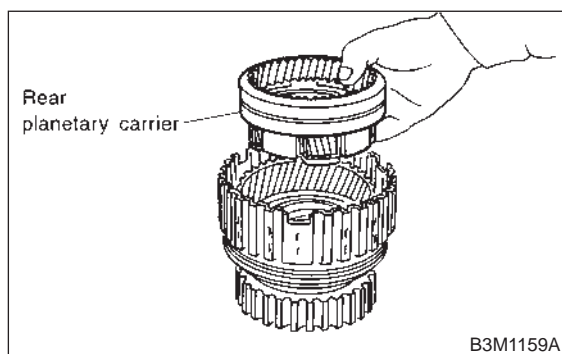
7) Remove the retaining plate, drive plates, driven plates and dish plate.

8) Compress the spring retainer, and remove the snap ring from the low clutch drum, by using ST1 and ST2.

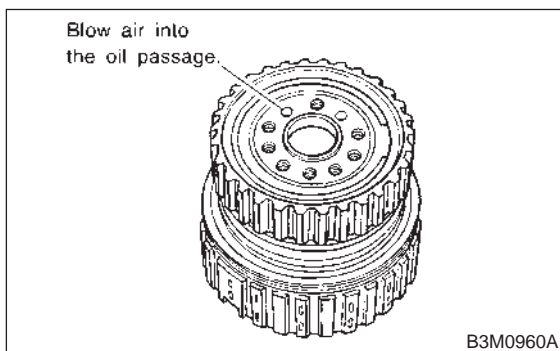
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



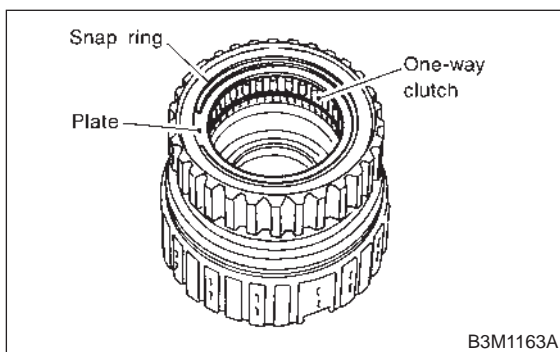
4) Take out rear planetary carrier, washer and thrust needle bearing.



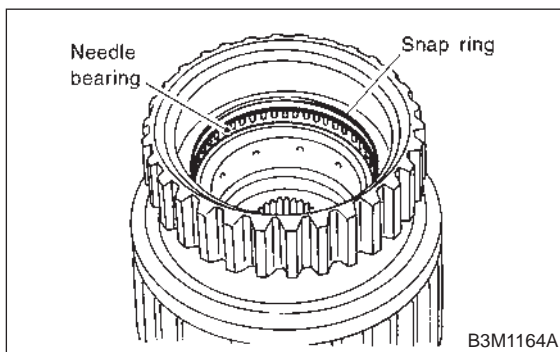
- 9) Install the one-way clutch inner race to the low clutch drum, and apply compressed air to remove the low clutch piston.



- 10) Remove the one-way clutch inner race.
11) Remove the one-way clutch after taking out the snap ring.



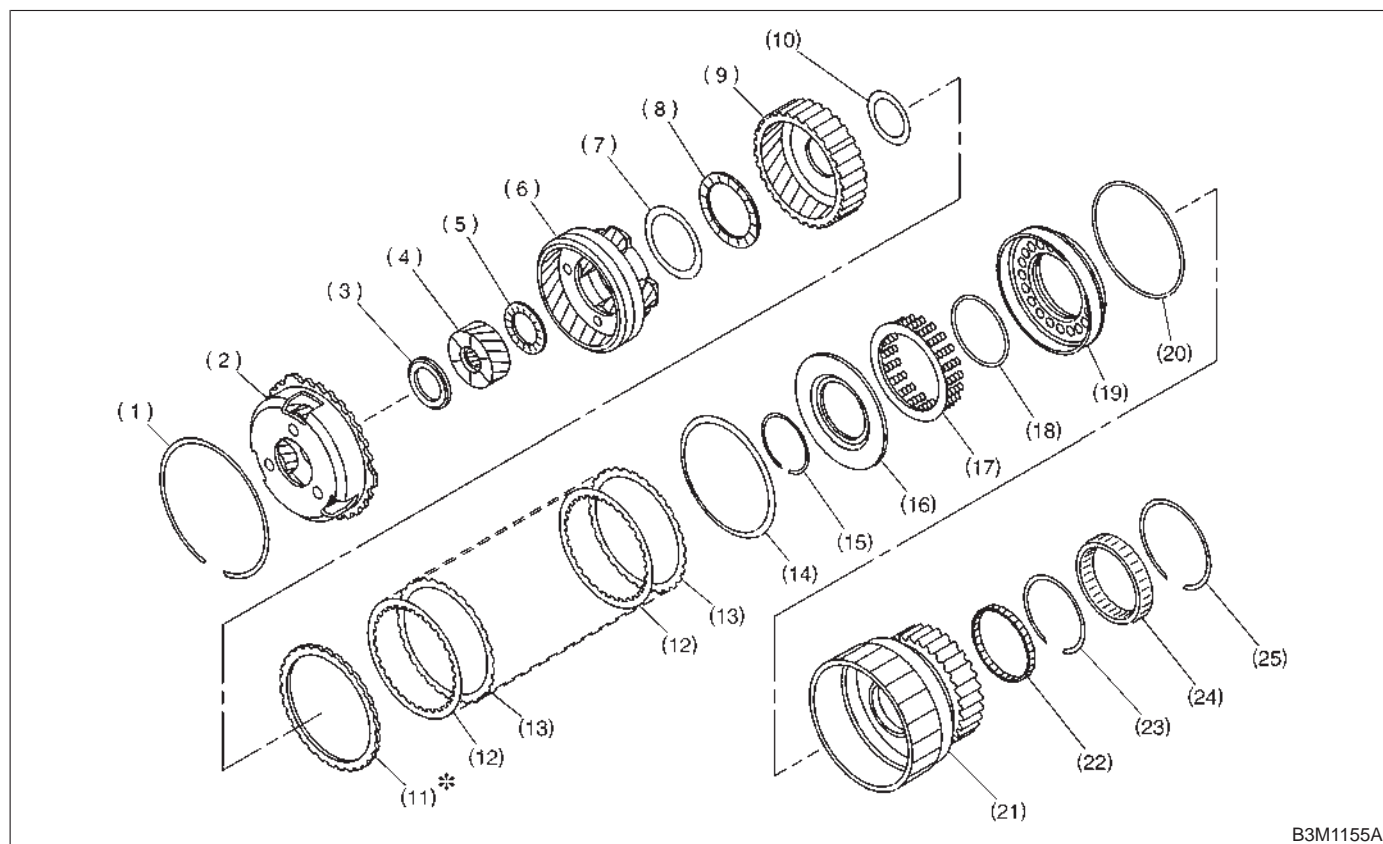
- 12) Remove the needle bearing after taking out the snap ring.



B: INSPECTION

- 1) Drive plate facing for wear and damage
- 2) Snap ring for wear, return spring for setting and breakage, and snap ring retainer for deformation
- 3) Lip seal and lathe cut ring for damage
- 4) Piston and drum check ball for operation

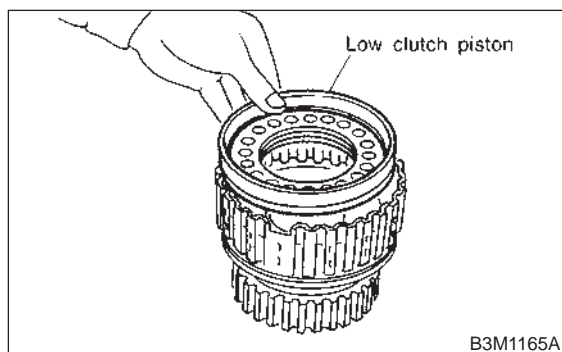
C: ASSEMBLY



B3M1155A

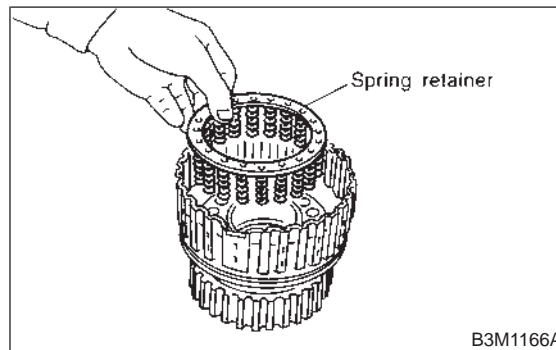
- | | | |
|-----------------------------|--------------------------|--------------------------|
| (1) Snap ring | (10) Washer | (19) Low clutch piston |
| (2) Front planetary carrier | (11) Retaining plate | (20) Lathe cut seal ring |
| (3) Thrust needle bearing | (12) Drive plate | (21) Low clutch drum |
| (4) Rear sun gear | (13) Driven plate | (22) Needle bearing |
| (5) Thrust needle bearing | (14) Dish plate | (23) Inner snap ring |
| (6) Rear planetary carrier | (15) Snap ring | (24) One-way clutch |
| (7) Washer | (16) Cover | (25) Outer snap ring |
| (8) Thrust needle bearing | (17) Spring retainer | |
| (9) Rear internal gear | (18) Lathe cut seal ring | |

- 1) Install lathe cut seal ring to low clutch piston.
- 2) Fit the low clutch piston to the low clutch drum.



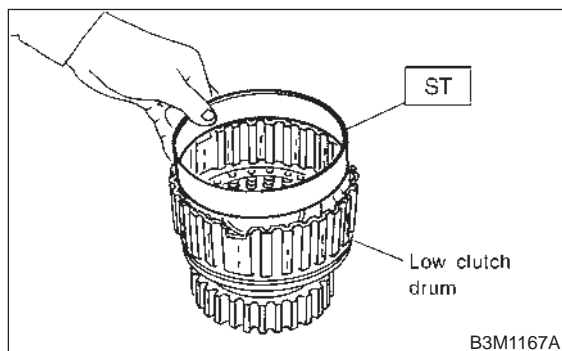
B3M1165A

- 3) Install spring retainer to low clutch piston.



B3M1166A

- 4) Install ST to low clutch drum.
ST 498437100 LOW CLUTCH PISTON GUIDE



- 5) Set the cover on the piston with a press using ST1 and ST2, and attach the snap ring.

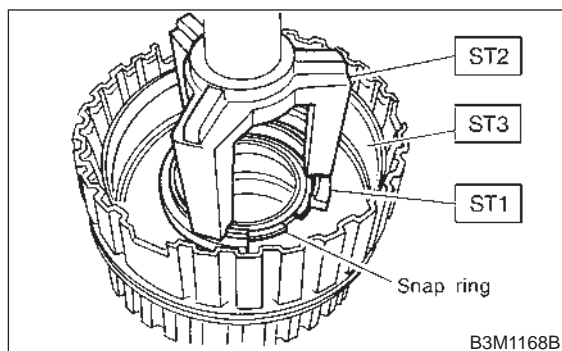
CAUTION:

Be careful not to fold cover seal during installation.

NOTE:

After installing snap ring, remove ST1, ST2 and ST3.

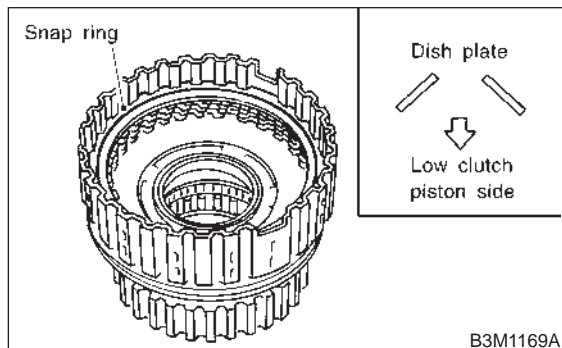
- ST1 498627100 SEAT
ST2 398673600 COMPRESSOR
ST3 498437100 LOW CLUTCH PISTON GUIDE



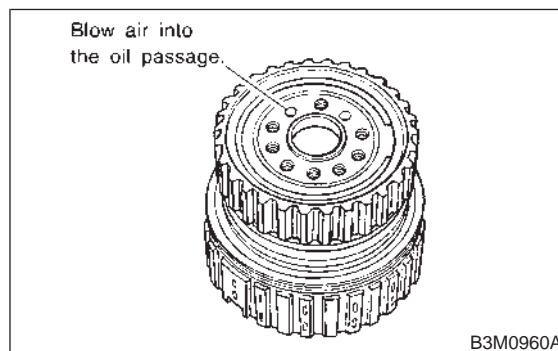
- 6) Install the dish plate, driven plates, drive plates, and retaining plate, and secure with the snap ring.

NOTE:

Pay attention to the orientation of the dish plate.



- 7) Check the low clutch for operation.
Set the one-way clutch inner race, and apply compressed air for checking.



- 8) Checking low clutch clearance
Measure the gap between the retaining plate and the operation of the low clutch.

NOTE:

Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting.

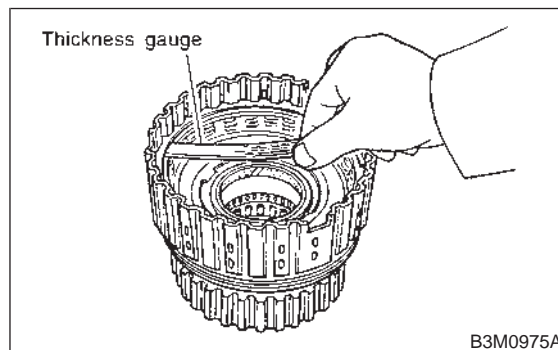
If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.

Standard value:

0.7 — 1.1 mm (0.028 — 0.043 in)

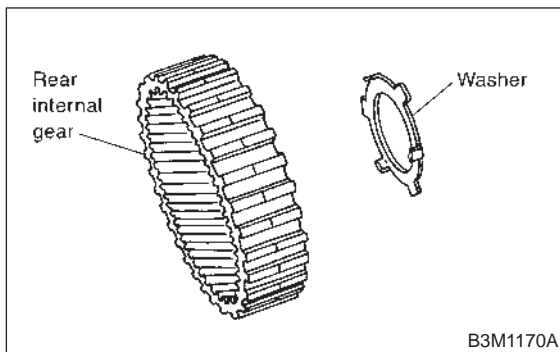
Allowable limit:

1.6 mm (0.063 in)

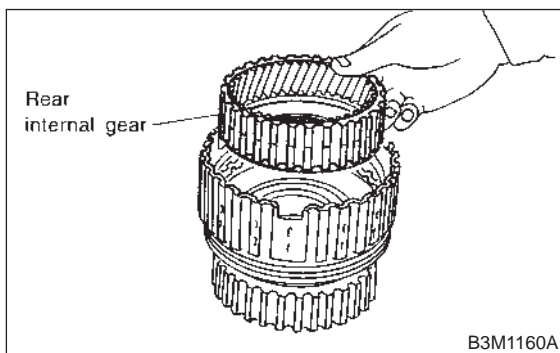


Available retaining plates	
Part No.	Thickness mm (in)
31567AA830	3.8 (0.150)
31567AA840	4.0 (0.157)
31567AA850	4.2 (0.165)
31567AA860	4.4 (0.173)
31567AA870	4.6 (0.181)

9) Install washer to rear internal gear.



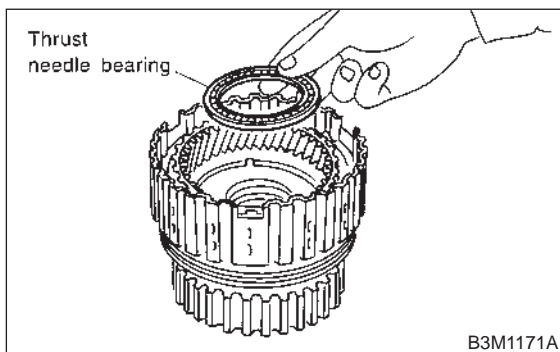
10) Install rear internal gear.



11) Install thrust needle bearing.

CAUTION:

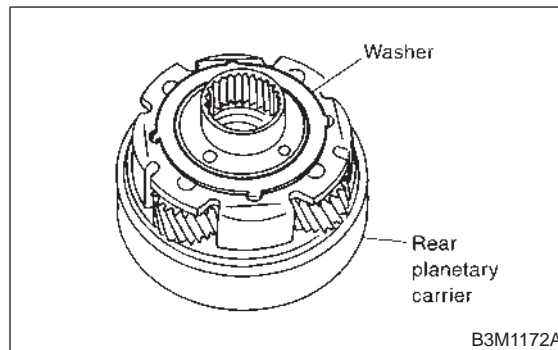
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1C0].>



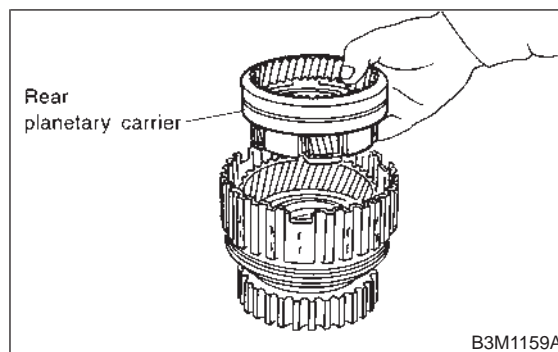
12) Install washer to rear planetary carrier.

NOTE:

Make sure washer tooth is inserted into hole on planetary carrier.



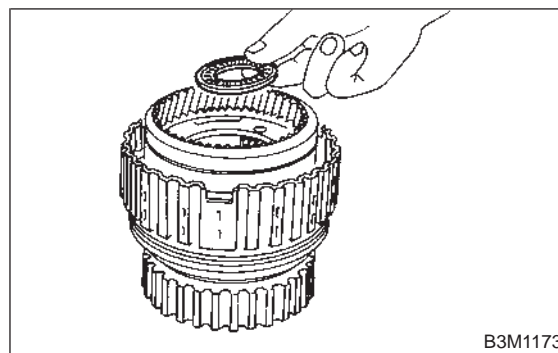
13) Install rear planetary carrier to low clutch drum.



14) Install thrust needle bearing to rear planetary carrier.

CAUTION:

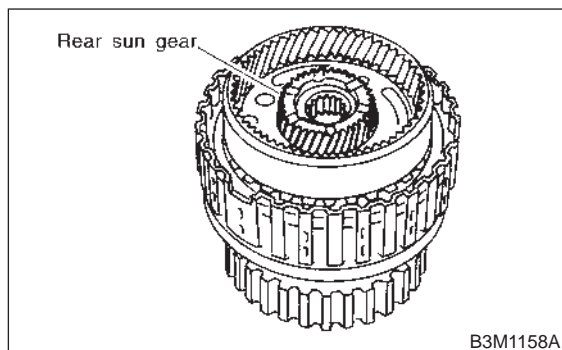
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1C0].>



15) Install rear sun gear.

NOTE:

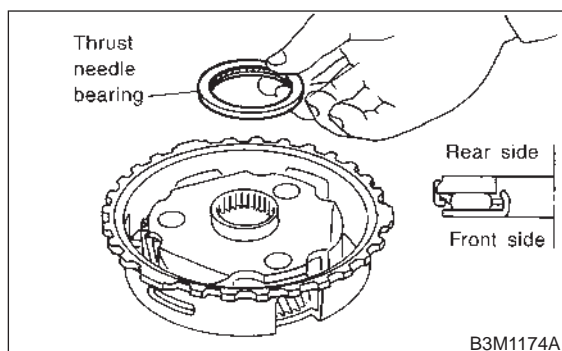
Pay attention to the orientation of the rear sun gear.



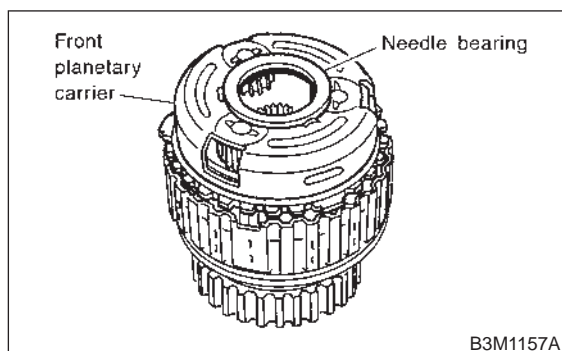
16) Install thrust needle bearing to front planetary carrier.

NOTE:

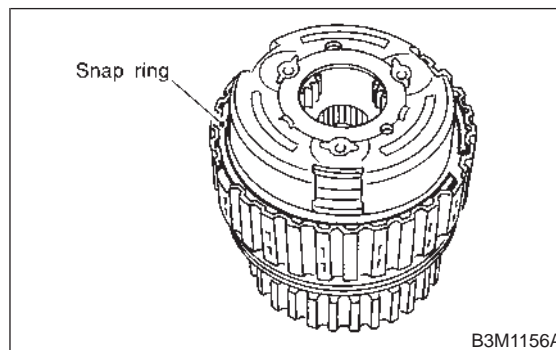
Pay attention to the orientation of the thrust needle bearing.



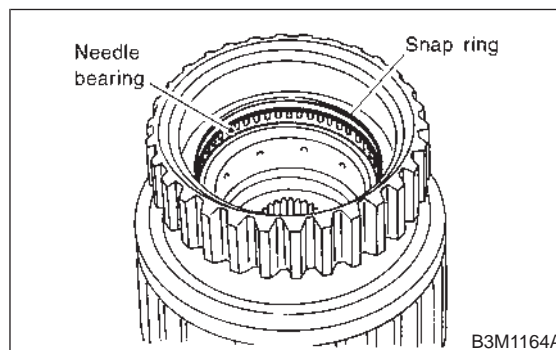
17) Install front planetary carrier to low clutch drum.



18) Install snap ring to low clutch drum.



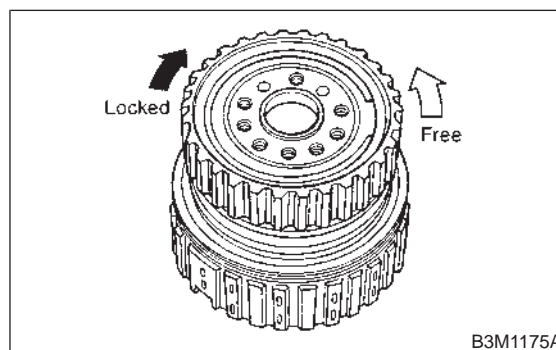
19) Install the needle bearing, and secure with the snap ring.



20) Install the one-way clutch, one-way clutch inner race and plate, and secure with the snap ring.

NOTE:

Set the inner race. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.

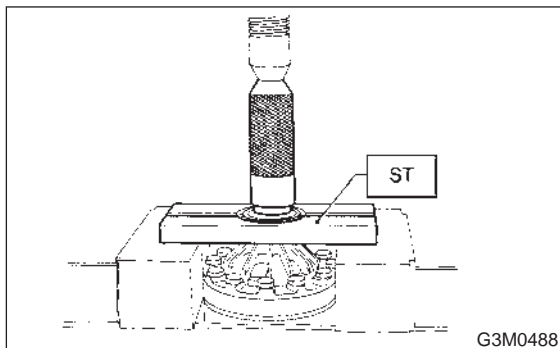


19. Differential Case Assembly

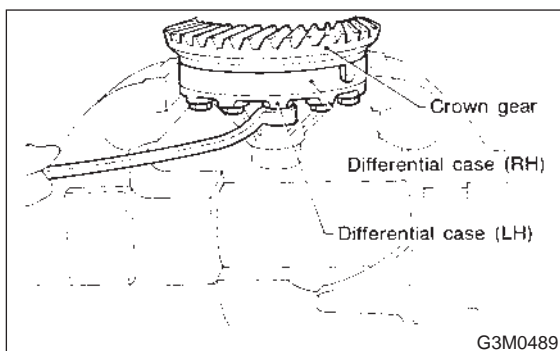
A: DISASSEMBLY

- 1) Using a press and ST, remove the taper roller bearing.

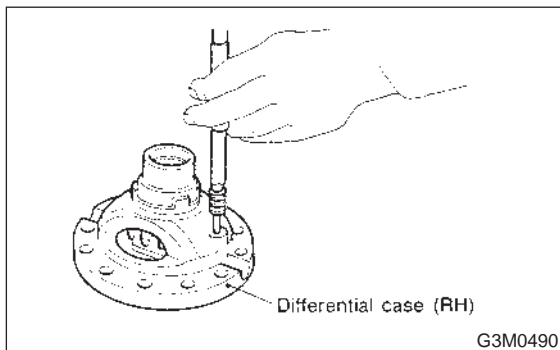
ST 498077000 REMOVER



- 2) Secure the case in a vise and remove the crown gear tightening bolts, then separate the crown gear, case (RH) and case (LH).



- 3) Pull out the straight pin and shaft, and remove the differential bevel gear, washer, and differential bevel pinion.



B: INSPECTION

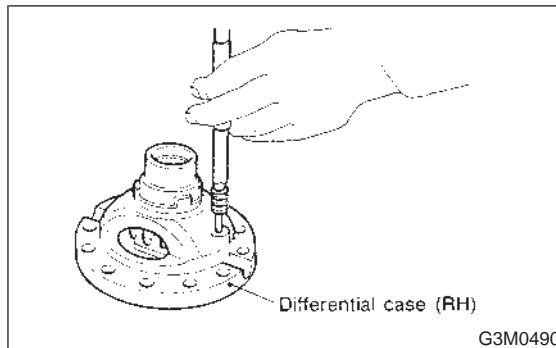
Check each component for harmful cuts, damage and other faults.

C: ASSEMBLY

- 1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft, and fit the straight pin.

NOTE:

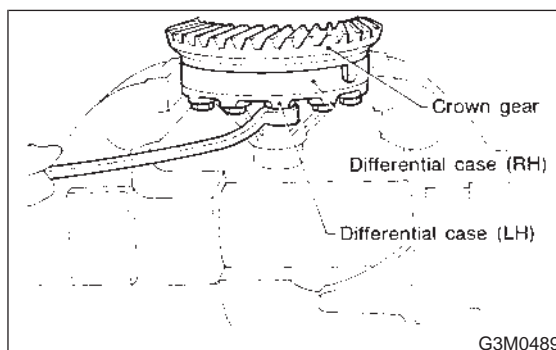
Install straight pin from reverse direction.



- 2) Install the washer and differential bevel gear to the differential case (LH). Then put the case over the differential case (RH), and connect both cases.
- 3) Install the crown gear and secure by tightening the bolt.

Standard tightening torque:

62 ± 5 N·m (6.3 ± 0.5 kg·m, 45.6 ± 3.6 ft·lb)



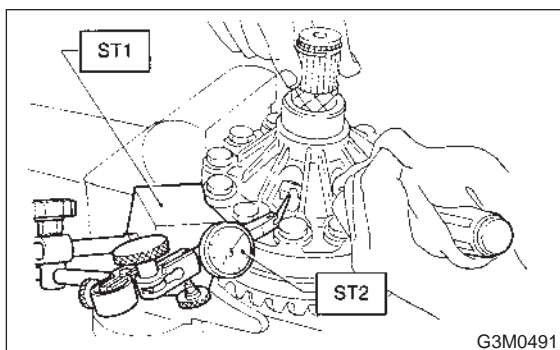
- 4) Measurement of backlash (Selection of washer)
Measure the gear backlash with ST1 and ST2, and insert ST2 through the access window of the case.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

NOTE:

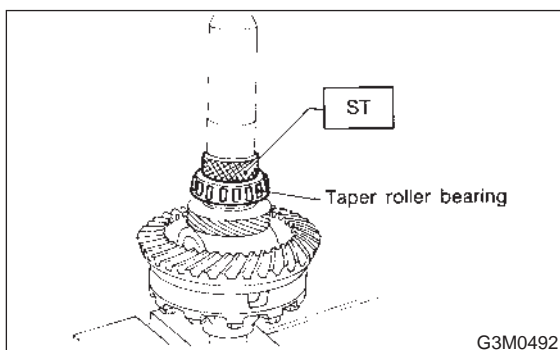
Measure the backlash by applying a pinion tooth between two bevel gear teeth.

Standard value:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



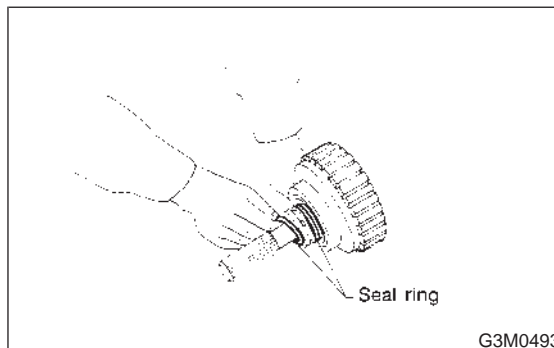
- 5) Using ST, install taper roller bearing.
ST 398487700 DRIFT

**20. Transfer Clutch****A: DISASSEMBLY**

- 1) Remove the seal ring.

CAUTION:

Be careful not to damage the seal ring.

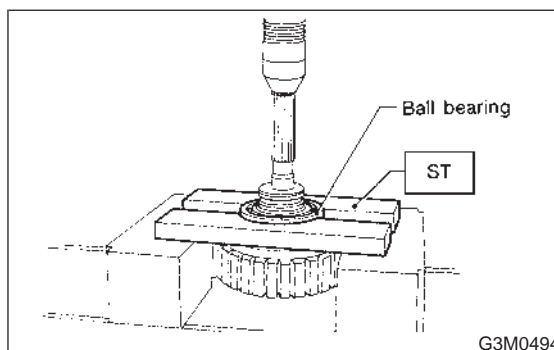


- 2) Using a press and ST, remove the ball bearing.

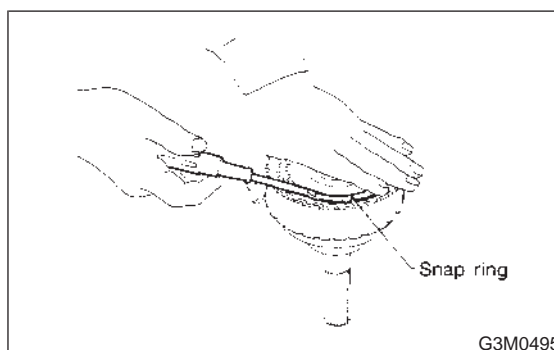
CAUTION:

Do not reuse the bearing.

ST 498077600 REMOVER

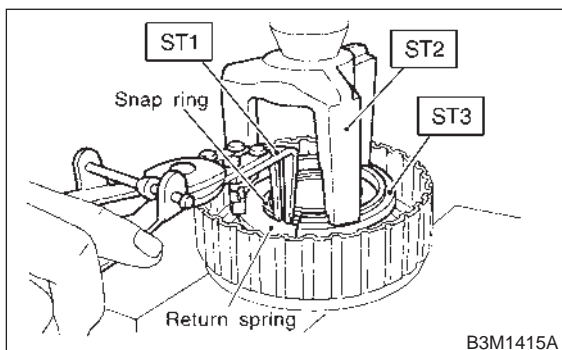


- 3) Remove the snap ring, and take out the pressure plate, drive plates, and driven plates.

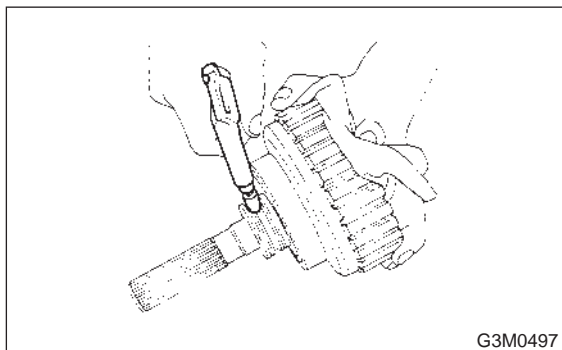


4) Remove the snap ring with ST1, ST2 and ST3, and take out the return spring and transfer clutch piston seal.

ST1 399893600 PLIERS
ST2 398673600 COMPRESSOR
ST3 398623600 SEAT



5) Apply compressed air to the rear drive shaft to remove the piston.

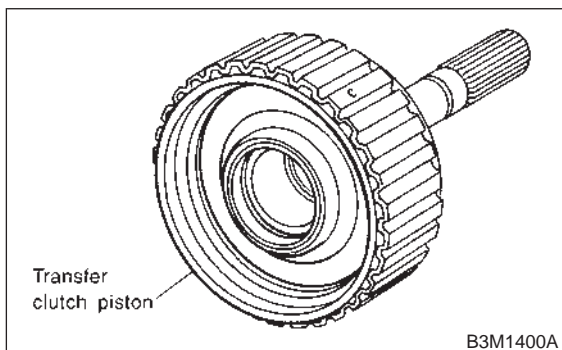


B: INSPECTION

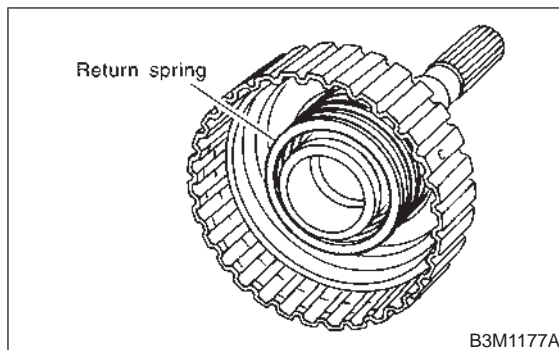
- 1) Check the drive plate facing for wear and damage.
- 2) Check the snap ring for wear, return spring for permanent set and breakage, and return spring for deformation.
- 3) Check the lathe cut ring for damage.

C: ASSEMBLY

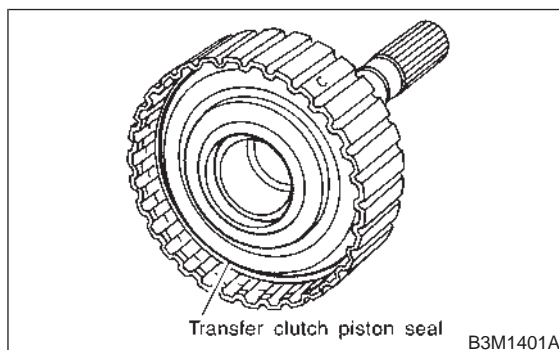
- 1) Install the transfer clutch piston.



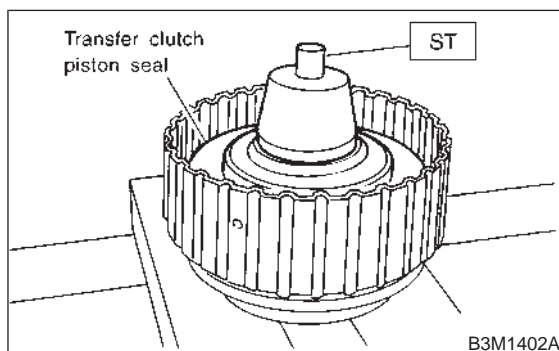
- 2) Install return spring to transfer piston.



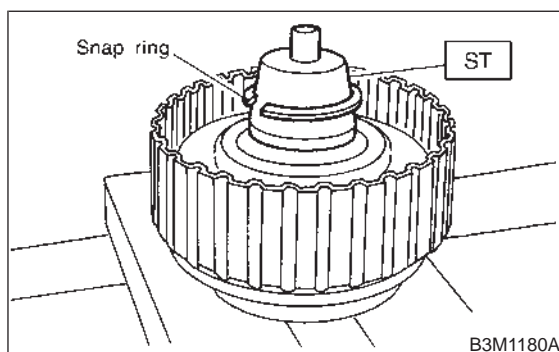
- 3) Install transfer clutch piston seal.



- 4) Install ST to rear drive shaft.
ST 499257300 SNAP RING OUTER GUIDE



- 5) Install snap ring to ST.
ST 499257300 SNAP RING OUTER GUIDE



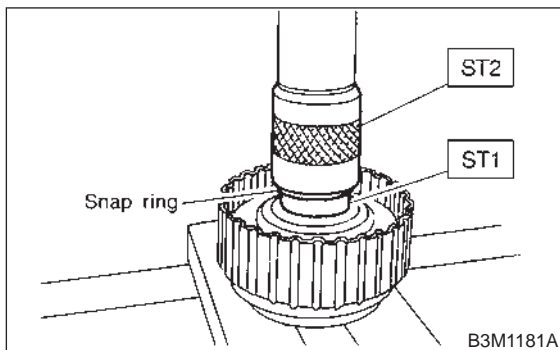
6) Using ST1 and ST2, install snap ring to rear drive shaft.

NOTE:

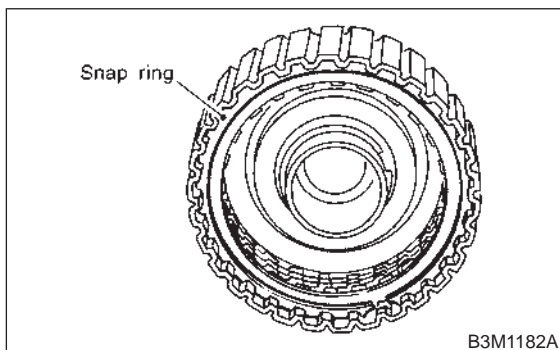
After installing snap ring, remove ST1 and ST2.

ST1 499257300 SNAP RING OUTER GUIDE

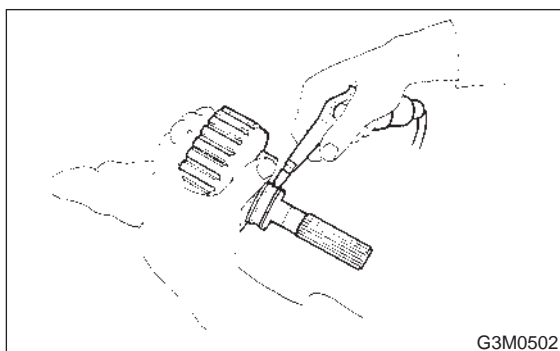
ST2 499247400 INSTALLER



7) Install the driven plates, drive plates, pressure plate and snap ring.



8) Apply compressed air to see if the assembled parts move smoothly.



9) Check the clearance.

NOTE:

Before measuring clearance, place the same thickness of shim on both sides to prevent pressure plate from tilting.

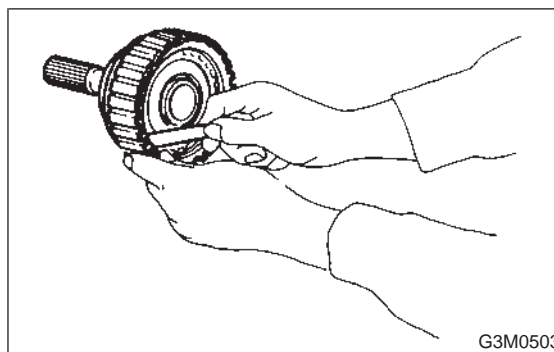
If the clearance is not within the specified range, select a proper pressure plate.

Standard value:

0.2 — 0.6 mm (0.008 — 0.024 in)

Allowable limit:

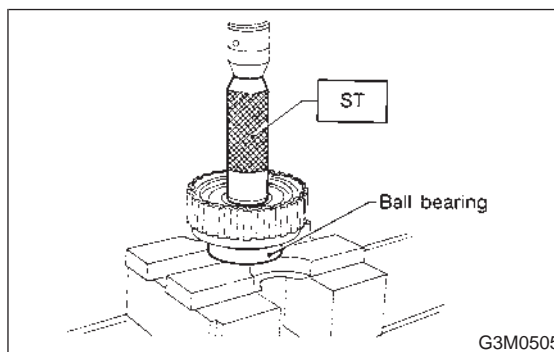
1.6 mm (0.063 in)



Available pressure plates	
Part No.	Thickness mm (in)
31593AA151	3.3 (0.130)
31593AA161	3.7 (0.146)
31593AA171	4.1 (0.161)
31593AA181	4.5 (0.177)

10) Press-fit the ball bearing with ST.

ST 899580100 INSTALLER

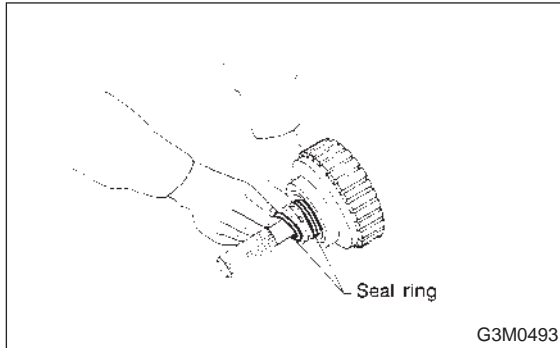


11) Coat the seal ring with vaseline, and install it in the seal ring groove of the shaft.

CAUTION:

Do not expand the seal ring excessively when installing.

ST 899580100 INSTALLER



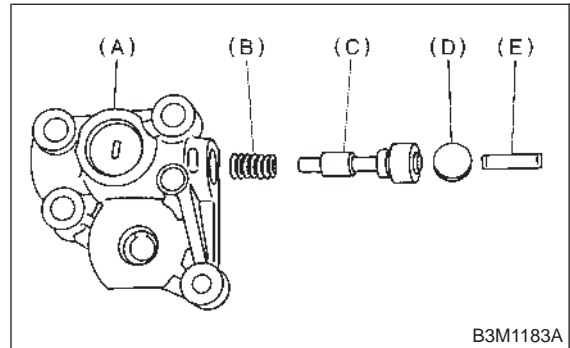
21. Transfer Valve Body

A: DISASSEMBLY

- 1) Separate duty solenoid C (transfer) and transfer valve body.
- 2) Remove the stopper plate and pry out the plug with a screwdriver. Then extract the spring and transfer control valve together.

CAUTION:

Be careful not to damage the valve and valve body.



- (A) Transfer valve body
- (B) Return spring
- (C) Transfer control valve
- (D) Plug
- (E) Stopper plate

B: INSPECTION

Check each component for harmful cuts, damage, or other faults.

C: ASSEMBLY

To assemble, reverse the removal sequence.

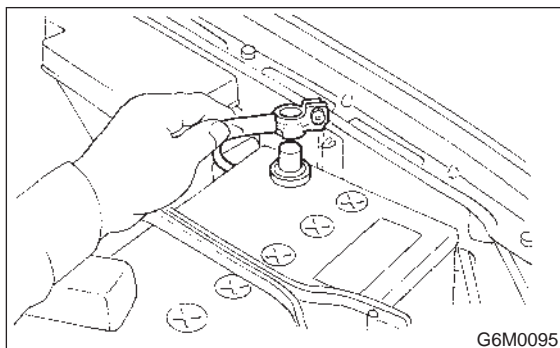
NOTE:

Make sure the valve slides smoothly after assembling.

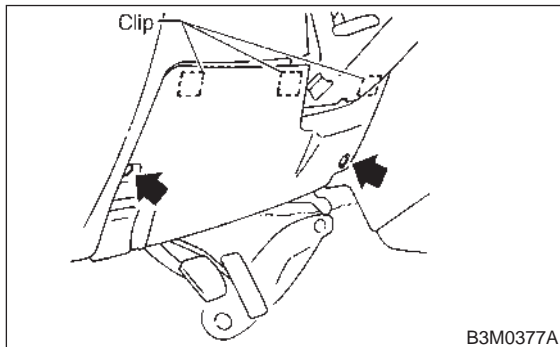
22. Transmission Control Module

A: REMOVAL

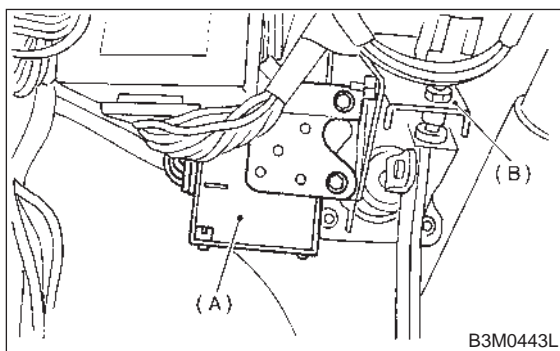
- 1) Disconnect battery ground cable.



- 2) Remove lower cover and then disconnect connector.



- 3) Remove transmission control module.



- (A) Transmission control module
(B) Pedal bracket

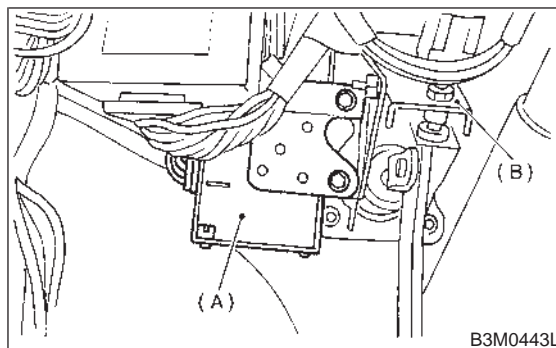
- 4) Disconnect connectors from TCM.

B: INSTALLATION

- 1) Connect connectors to TCM.
- 2) Install TCM to steering support beam.

Tightening torque:

$7.4 \pm 2.0 \text{ N}\cdot\text{m}$ ($0.75 \pm 0.2 \text{ kg}\cdot\text{m}$, $5.4 \pm 1.4 \text{ ft}\cdot\text{lb}$)



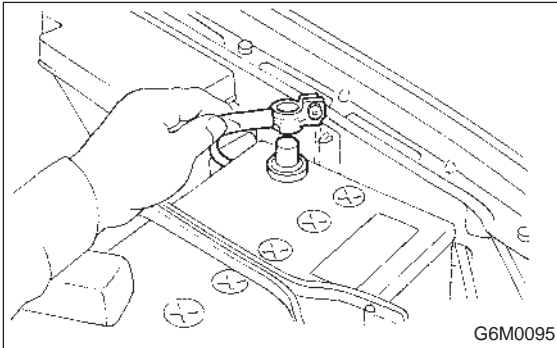
- (A) Transmission control module
(B) Pedal bracket

- 3) Remove TCM from steering support beam.

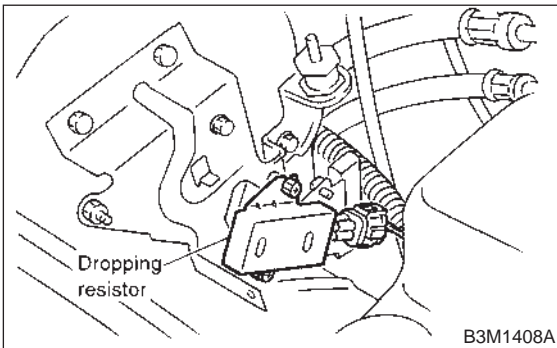
23. Dropping Resistor

A: REMOVAL AND INSTALLATION

- 1) Disconnect battery ground cable.



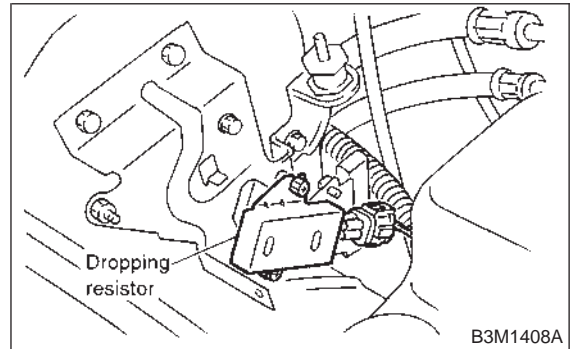
- 2) Remove air intake duct. <Ref. to 2-7 [W1A0].>
3) Disconnect connector from dropping resistor.
4) Remove dropping resistor from bracket.



- 5) Installation is in the reverse order of removal.

Tightening torque:

$6.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.65 \pm 0.05 \text{ kg}\cdot\text{m}$, $4.7 \pm 0.4 \text{ ft}\cdot\text{lb}$)



AUTOMATIC TRANSMISSION AND DIFFERENTIAL

3-2

	Page
T DIAGNOSTICS	2
1. Precaution	2
2. Pre-inspection.....	2
3. Electrical Components Location.....	4
4. Schematic.....	9
5. Transmission Control Module (TCM) I/O Signal.....	10
6. Diagnostic Chart for On-board Diagnostics System.....	13
7. Diagnostics for On-board Diagnostics Failed	16
8. Diagnostic Chart with Trouble Code	23
9. Diagnostic Chart with Select Monitor	115
10. General Diagnostic Table	155

1. Precaution

A: SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the transmission control module (TCM).

CAUTION:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage Airbag system wiring harness when performing diagnostics and servicing the TCM.

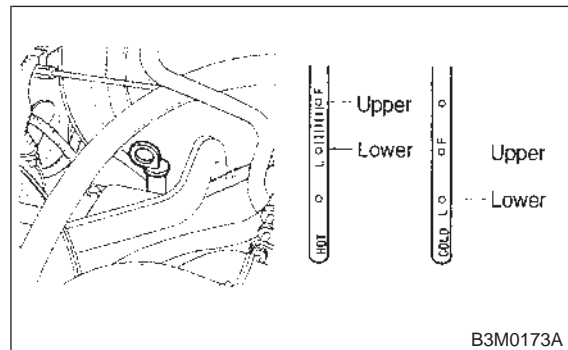
B: MEASUREMENT

When measuring voltage and resistance of the ECM, TCM or each sensor, use a tapered pin with a diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert the pin more than 5 mm (0.20 in).

2. Pre-inspection

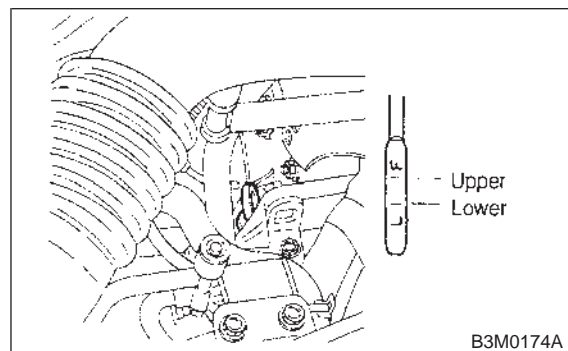
A: ATF LEVEL

Make sure that ATF level is in the specification.



B: FRONT DIFFERENTIAL OIL LEVEL

Make sure that front differential oil level is in the specification.

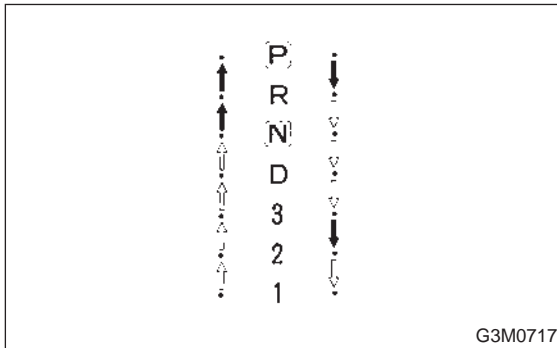


C: OPERATION OF SHIFT SELECTOR LEVER

WARNING:

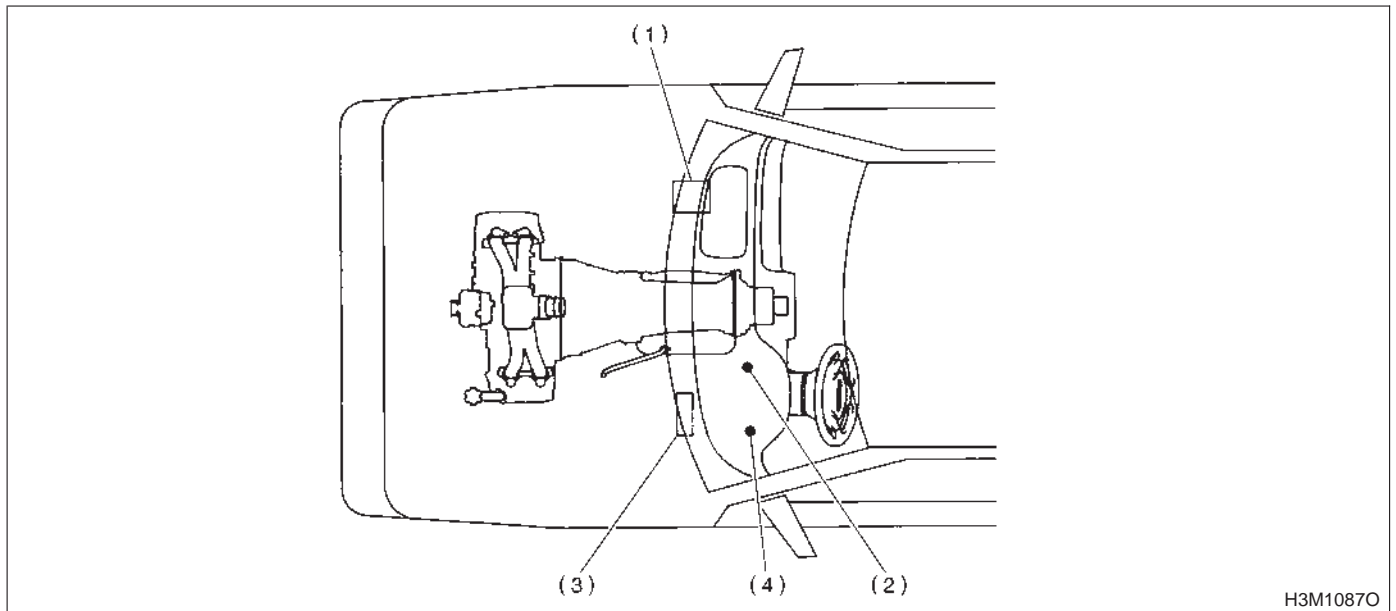
Stop the engine while checking operation of selector lever.

- 1) Check that selector lever does not move from "N" to "R" without pushing the button.
- 2) Check that selector lever does not move from "R" to "P" without pushing the button.
- 3) Check that selector lever does not move from "P" to "R" without pushing the button.
- 4) Check that selector lever does not move from "3" to "2" without pushing the button.

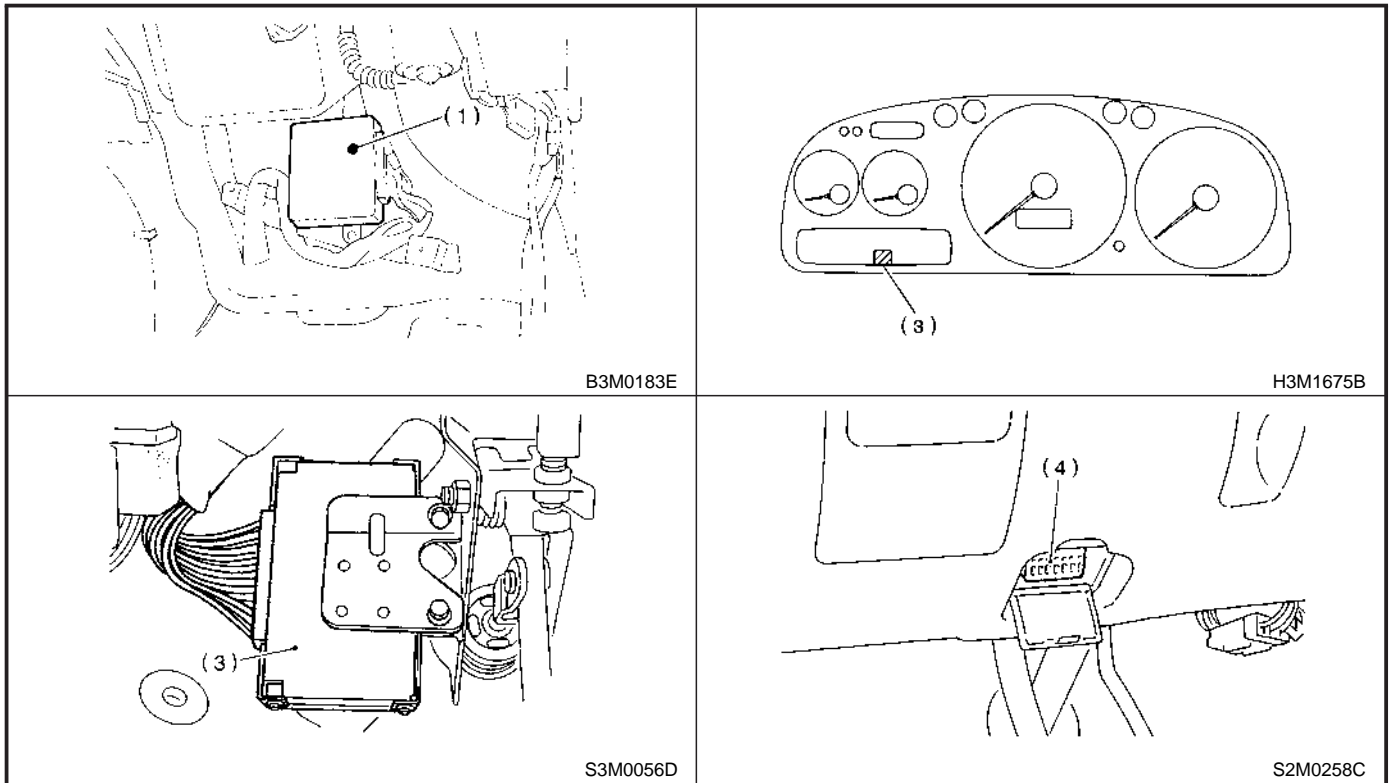


3. Electrical Components Location

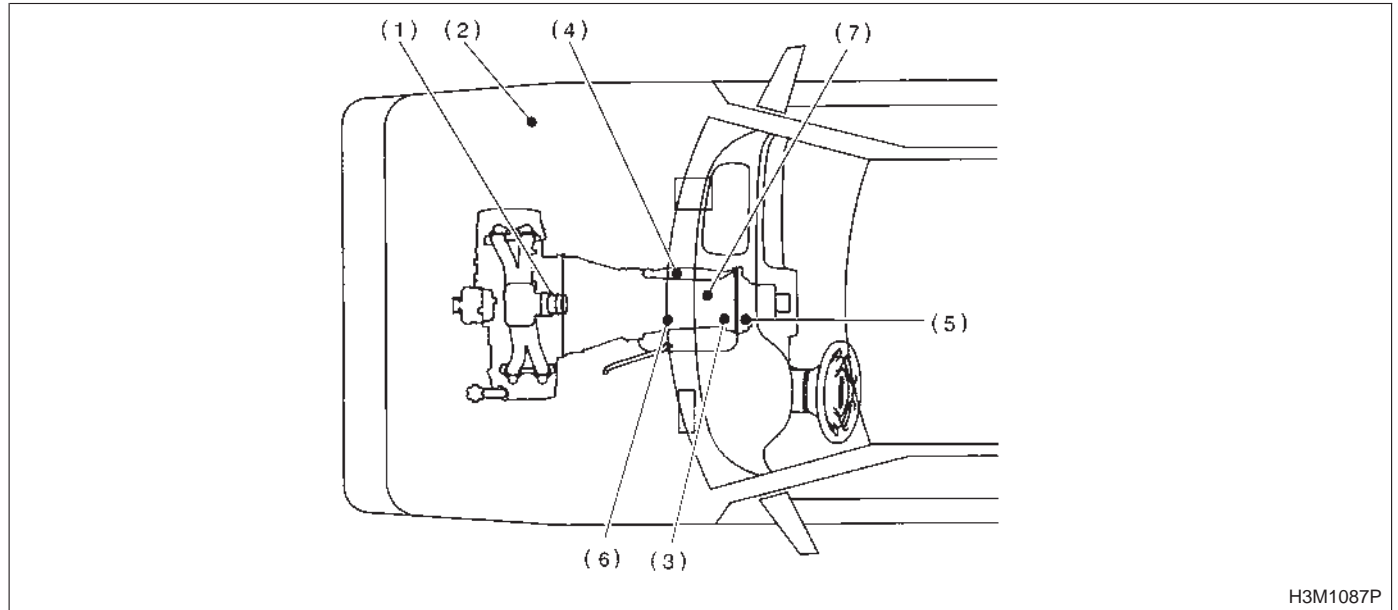
A: MODULE



- | | | |
|---|---------|--|
| (1) ECM | (3) TCM | (4) Data link connector (for Subaru select monitor and OBD-II general scan tool) |
| (2) AT OIL TEMP indicator light (AT diagnostic indicator light) | | |

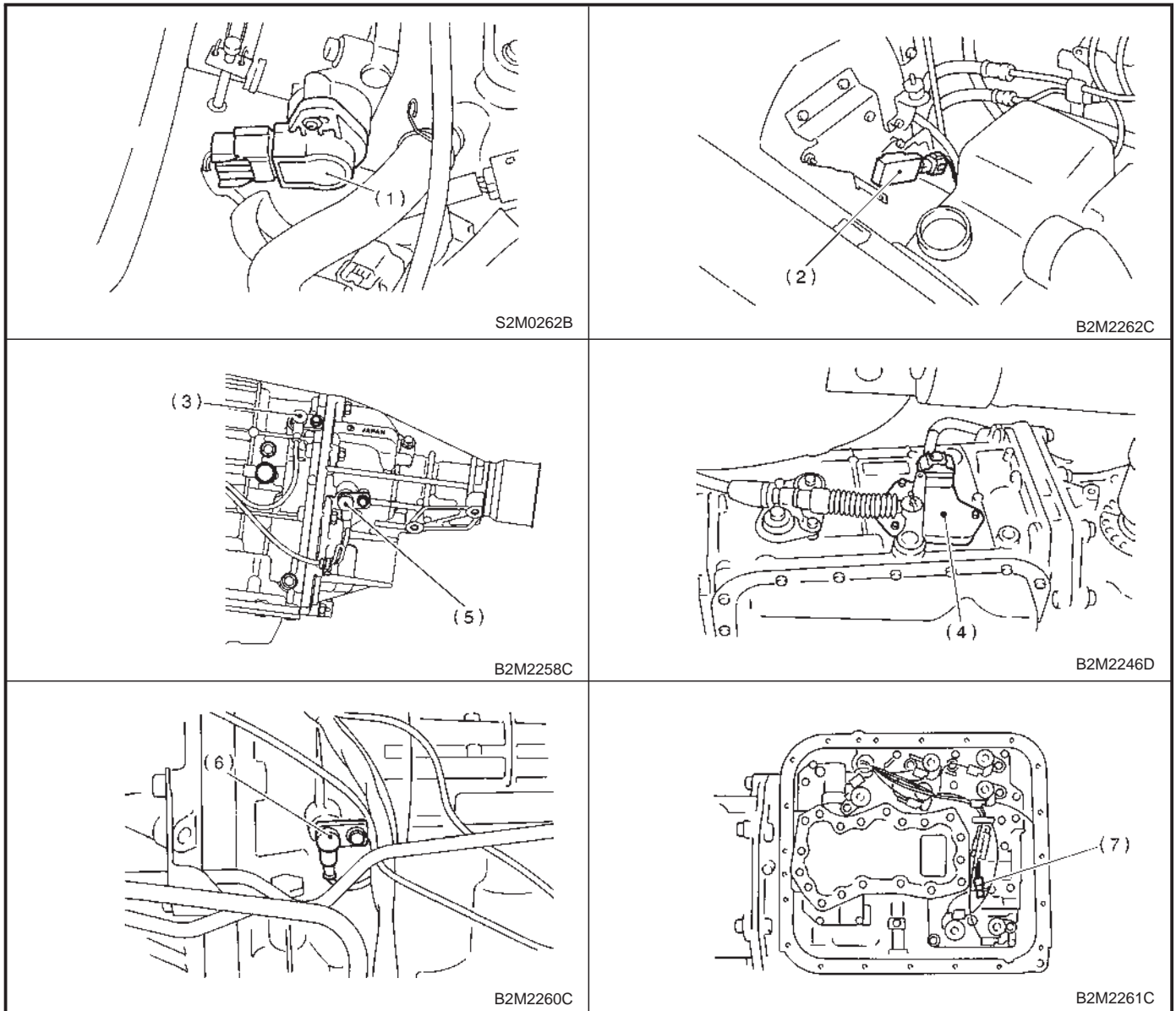


B: SENSOR

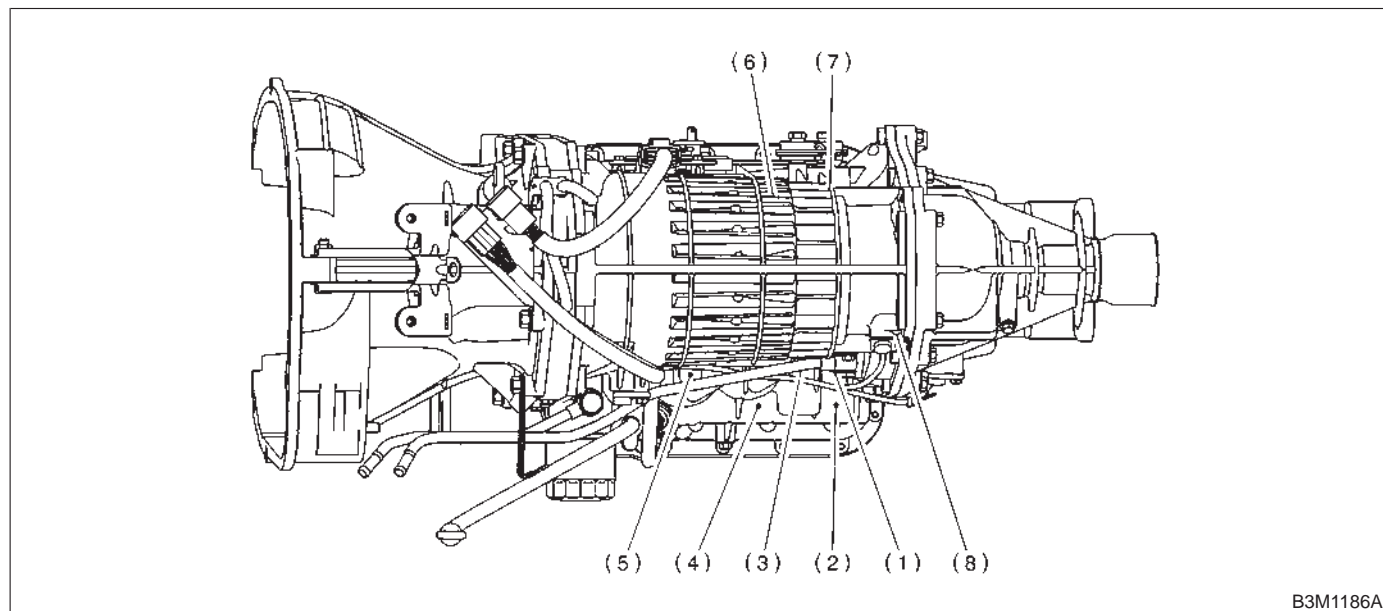


H3M1087P

- | | | |
|------------------------------------|-----------------------------------|---|
| (1) Throttle position sensor | (4) Inhibitor switch | (6) Torque converter turbine speed sensor |
| (2) Dropping resistor | (5) Vehicle speed sensor 1 (Rear) | (7) ATF temperature sensor |
| (3) Vehicle speed sensor 2 (Front) | | |

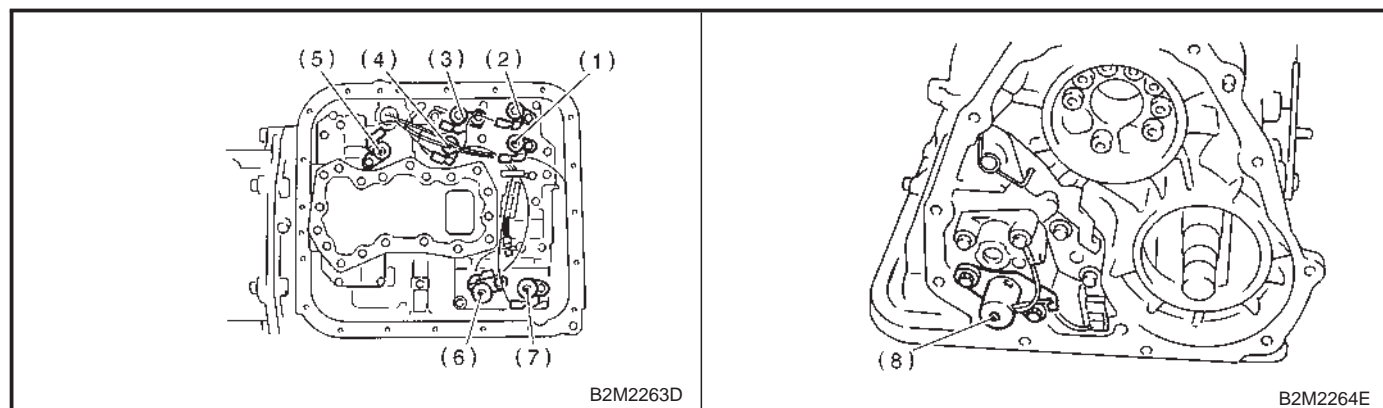


C: SOLENOID



B3M1186A

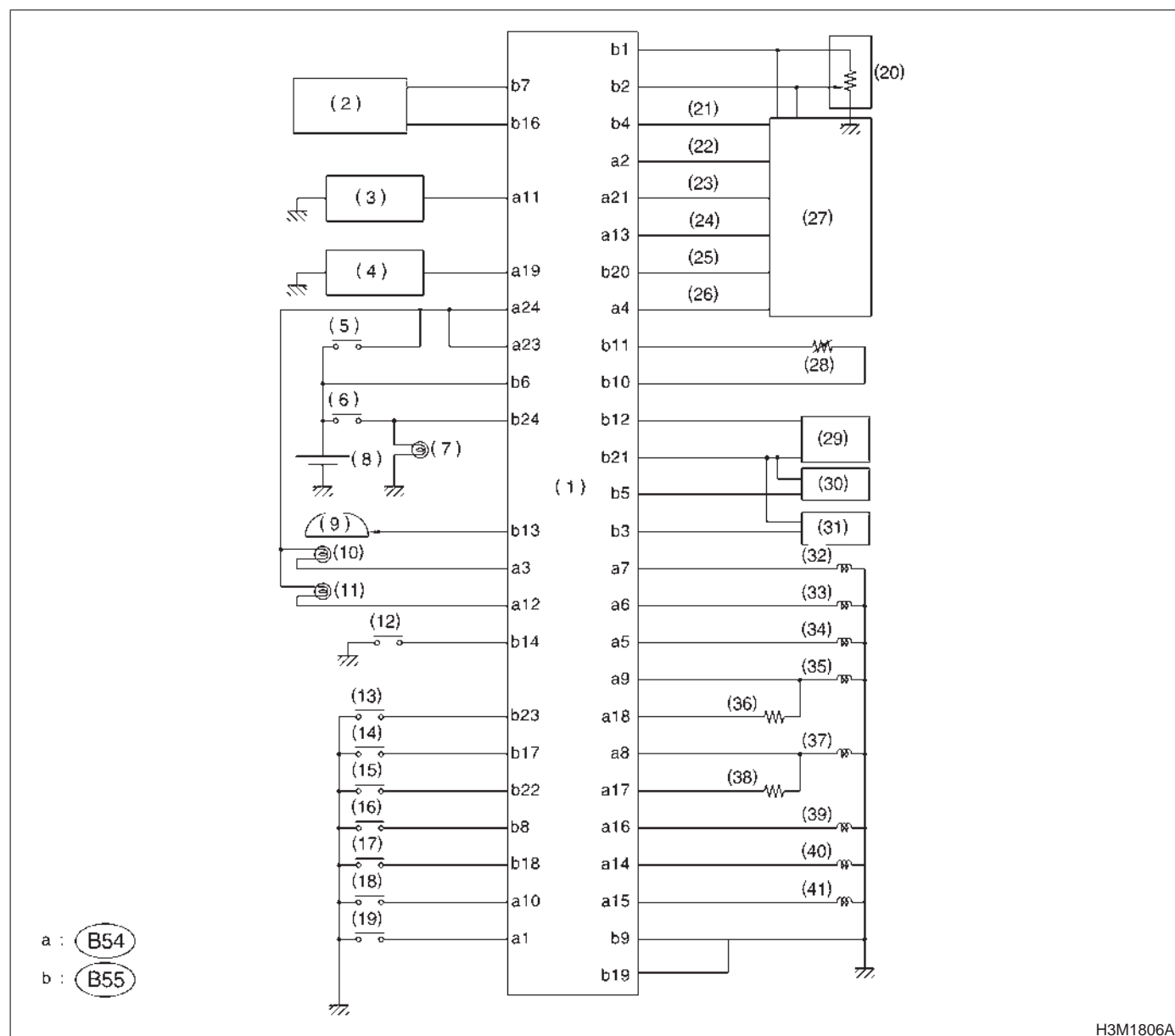
- | | | |
|---------------------|--------------------------------|-------------------------------|
| (1) Solenoid 1 | (4) Low clutch timing solenoid | (7) 2-4 brake timing solenoid |
| (2) Solenoid 2 | (5) Duty solenoid B | (8) Duty solenoid C |
| (3) Duty solenoid A | (6) Duty solenoid D | |



B2M2263D

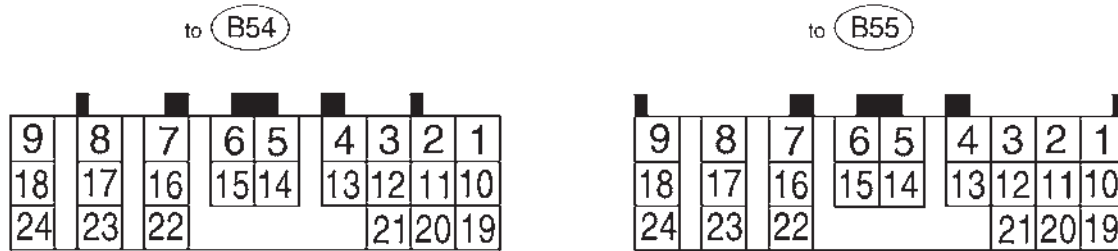
B2M2264E

4. Schematic



- | | | |
|--|--|--|
| <ul style="list-style-type: none"> (1) Transmission control module (2) Data link connector (3) Cruise set switch (4) ABS control module (5) Ignition switch (6) Brake switch (7) Brake light (8) Battery (9) Combination meter (10) AT OIL TEMP indicator light (11) FWD indicator light (12) FWD switch (13) "P" range switch (14) "R" range switch | <ul style="list-style-type: none"> (15) "N" range switch (16) "D" range switch (17) "3" range switch (18) "2" range switch (19) "1" range switch (20) Throttle position sensor (21) Engine speed signal (22) Torque control cut signal (23) Torque control signal 2 (24) Torque control signal 1 (25) AT load signal (26) AT diagnostics signal (27) Engine control module (28) ATF temperature sensor | <ul style="list-style-type: none"> (29) Torque converter turbine speed sensor (30) Vehicle speed sensor 2 (Front) (31) Vehicle speed sensor 1 (Rear) (32) Shift solenoid 1 (33) Shift solenoid 2 (34) 2-4 brake timing solenoid (35) Duty solenoid A (36) Line pressure dropping resistor (37) Duty solenoid D (38) 2-4 brake dropping resistor (39) Duty solenoid B (40) Low clutch timing solenoid (41) Duty solenoid C |
|--|--|--|

5. Transmission Control Module (TCM) I/O Signal



B2M2269A

Check with ignition switch ON.						
Content		Connec- tor No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply		B55	6	Ignition switch OFF	10 — 16	—
Ignition power supply		B54	23	Ignition switch ON (with engine OFF)	10 — 16	—
		B54	24			
Inhibitor switch	“P” range switch	B55	23	Select lever in “P” range	Less than 1	—
				Select lever in any other than “P” range (except “N” range)	More than 8	
	“N” range switch	B55	22	Select lever in “N” range	Less than 1	—
				Select lever in any other than “N” range (except “P” range)	More than 8	
	“R” range switch	B55	17	Select lever in “R” range	Less than 1	—
				Select lever in any other than “R” range	More than 9.5	
	“D” range switch	B55	8	Select lever in “D” range	Less than 1	—
				Select lever in any other than “D” range	More than 9.5	
	“3” range switch	B55	18	Select lever in “3” range	Less than 1	—
				Select lever in any other than “3” range	More than 9.5	
	“2” range switch	B54	10	Select lever in “2” range	Less than 1	—
				Select lever in any other than “2” range	More than 9.5	
	“1” range switch	B54	1	Select lever in “1” range	Less than 1	—
				Select lever in any other than “1” range	More than 9.5	
Brake switch		B55	24	Brake pedal depressed.	More than 10.5	—
				Brake pedal released.	Less than 1	
ABS signal		B54	19	ABS switch ON	Less than 1	—
				ABS switch OFF	6.5 — 15	

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
AT OIL TEMP LAMP	B54	3	Lamp ON	Less than 1	—
			Lamp OFF	More than 9	
Throttle position sensor	B55	2	Throttle fully closed.	0.5±0.2	—
			Throttle fully open.	4.6±0.3	
Throttle position sensor power supply	B55	1	Ignition switch ON (With engine OFF)	5.05±0.25	—
ATF temperature sensor	B55	11	ATF temperature 20°C (68°F)	3.45±0.55	2.1 — 2.9 k
			ATF temperature 80°C (176°F)	1.2±0.2	272 — 374
Vehicle speed sensor 1 (Rear)	B55	3	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Vehicle speed sensor 2 (Front)	B55	5	Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range) 4	450 — 650
Torque converter turbine speed sensor	B55	12	Vehicle stopped	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Vehicle speed output signal	B55	13	Vehicle speed at most 10 km/h (6 MPH)	Less than 1← →More than 4	—
Engine speed signal	B55	4	Ignition switch ON (with engine OFF)	More than 10.5	—
			Ignition switch ON (with engine ON)	8 — 11	
Cruise set signal	B54	11	When cruise control is set (SET lamp ON)	Less than 1	—
			When cruise control is not set (SET lamp OFF)	More than 6.5	
Torque control signal 1	B54	13	Ignition switch ON (with engine ON)	5±1	—
Torque control signal 2	B54	21	Ignition switch ON (with engine ON)	More than 9	—
Torque control cut signal	B54	2	Ignition switch ON	8	—
AT load signal	B55	20	Engine idling after warm-up.	1.2 — 1.8*1	—
				0.5 — 1.2*2	
Shift solenoid 1	B54	7	1st or 4th gear	More than 9	10 — 16
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B54	6	1st or 2nd gear	More than 9	10 — 16
			3rd or 4th gear	Less than 1	
Duty solenoid A	B54	9	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
Dropping resistor	B54	18	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	9 — 15
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
Duty solenoid B	B54	16	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	

3-2 [T500] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

5. Transmission Control Module (TCM) I/O Signal

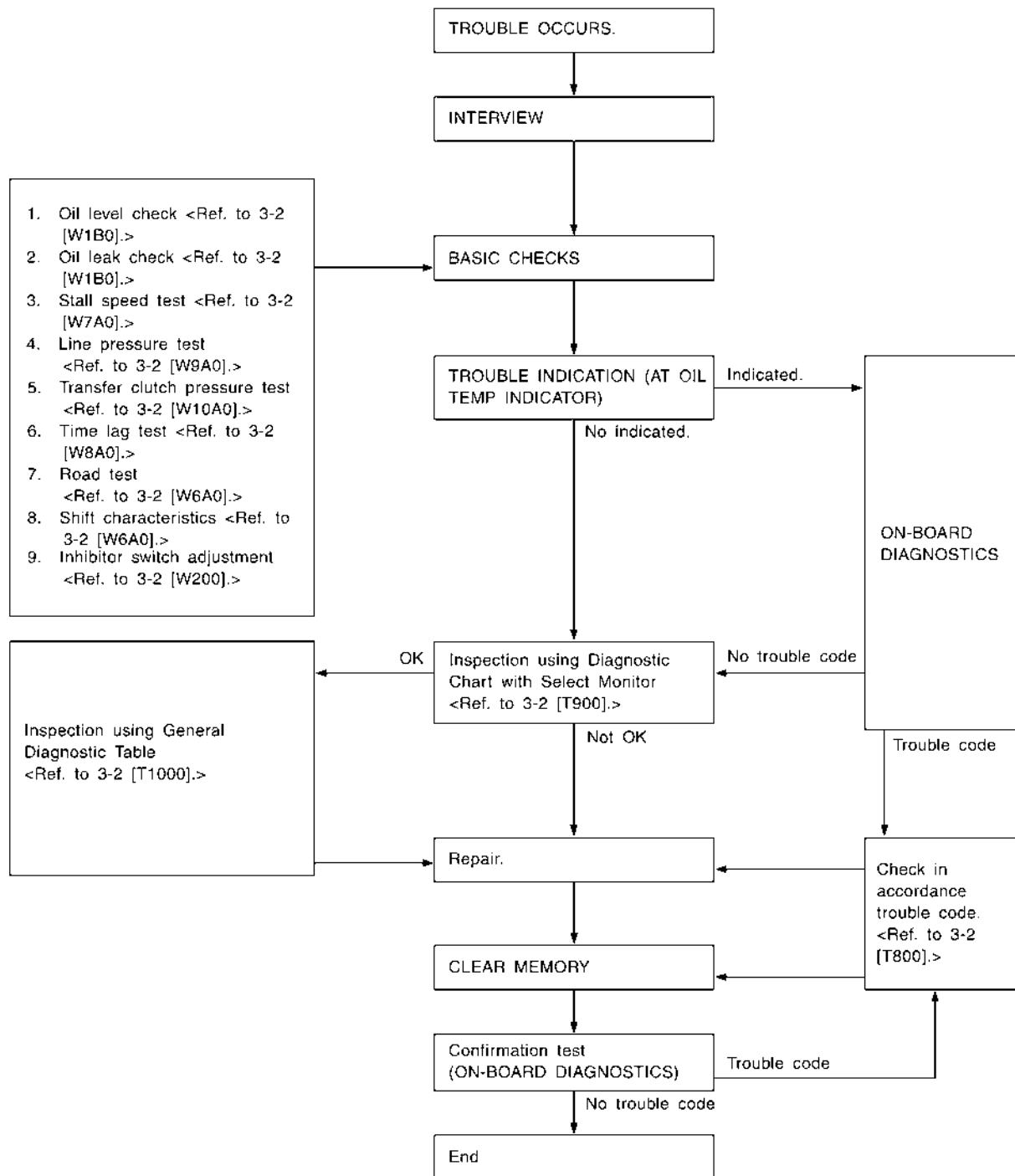
Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Duty solenoid C	B54	15	Fuse on FWD switch	More than 8.5	10 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
Duty solenoid D	B54	8	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake dropping resistor	B54	17	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	9 — 15
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake timing solenoid	B54	5	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	14	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
Sensor ground line 1	B55	10	—	0	Less than 1
Sensor ground line 2	B55	21	—	0	Less than 1
System ground line	B55	9	—	0	Less than 1
		19			
FWD switch	B55	14	Fuse removed.	6 — 9.1	—
			Fuse installed.	Less than 1	
FWD indicator lamp	B54	12	Fuse ON FWD switch	Less than 1	—
			Fuse removed from FWD switch	More than 9	
AT diagnosis signal	B54	4	Ignition switch ON	Less than 1 ← → More than 4	—
Data link signal (Subaru Select Monitor)	B55	7	—	—	—
		16	—	—	

*1: 2200 cc California spec. vehicles

*2: Except 2200 cc California spec. vehicles

6. Diagnostic Chart for On-board Diagnostics System

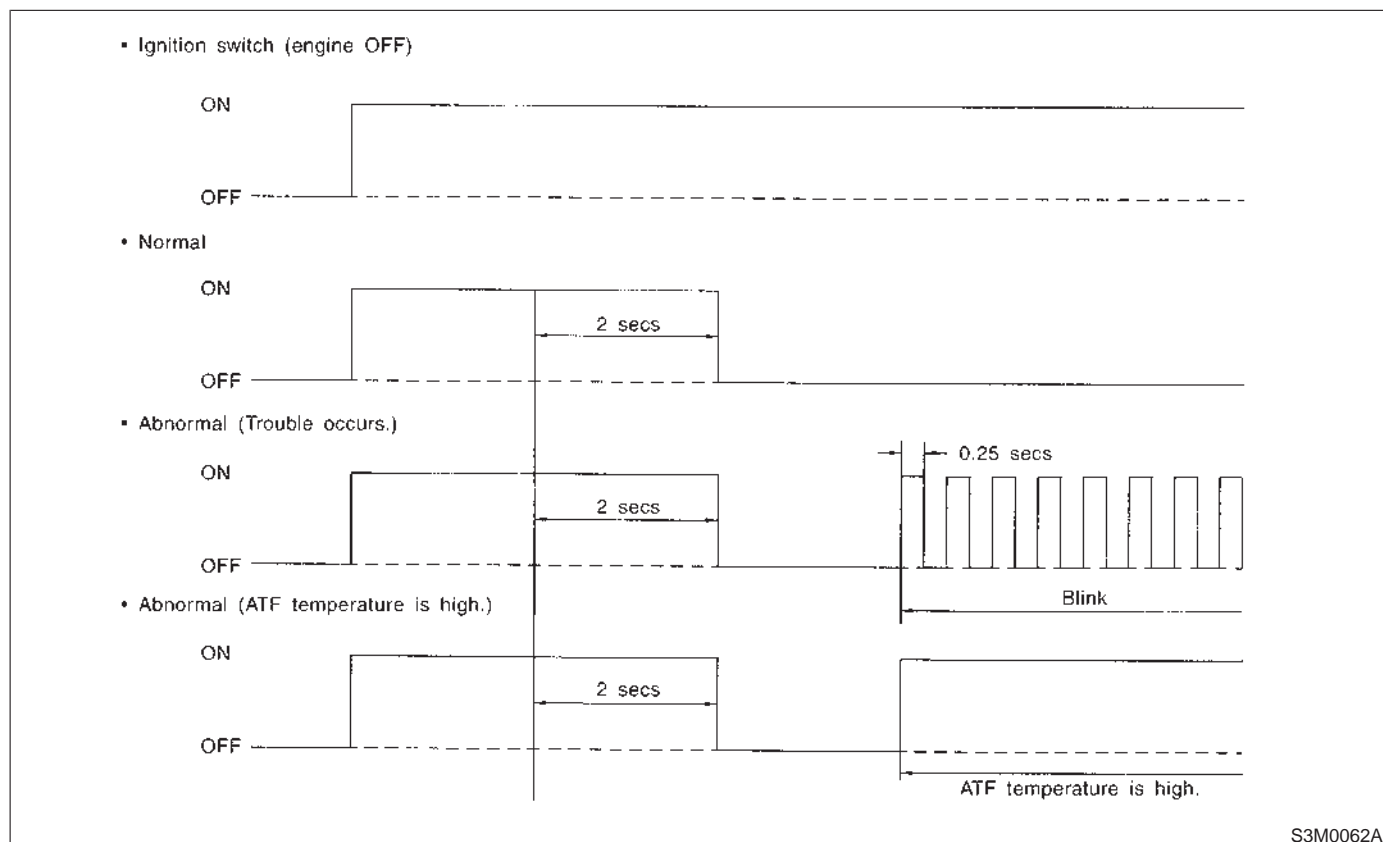
A: BASIC DIAGNOSTICS PROCEDURE



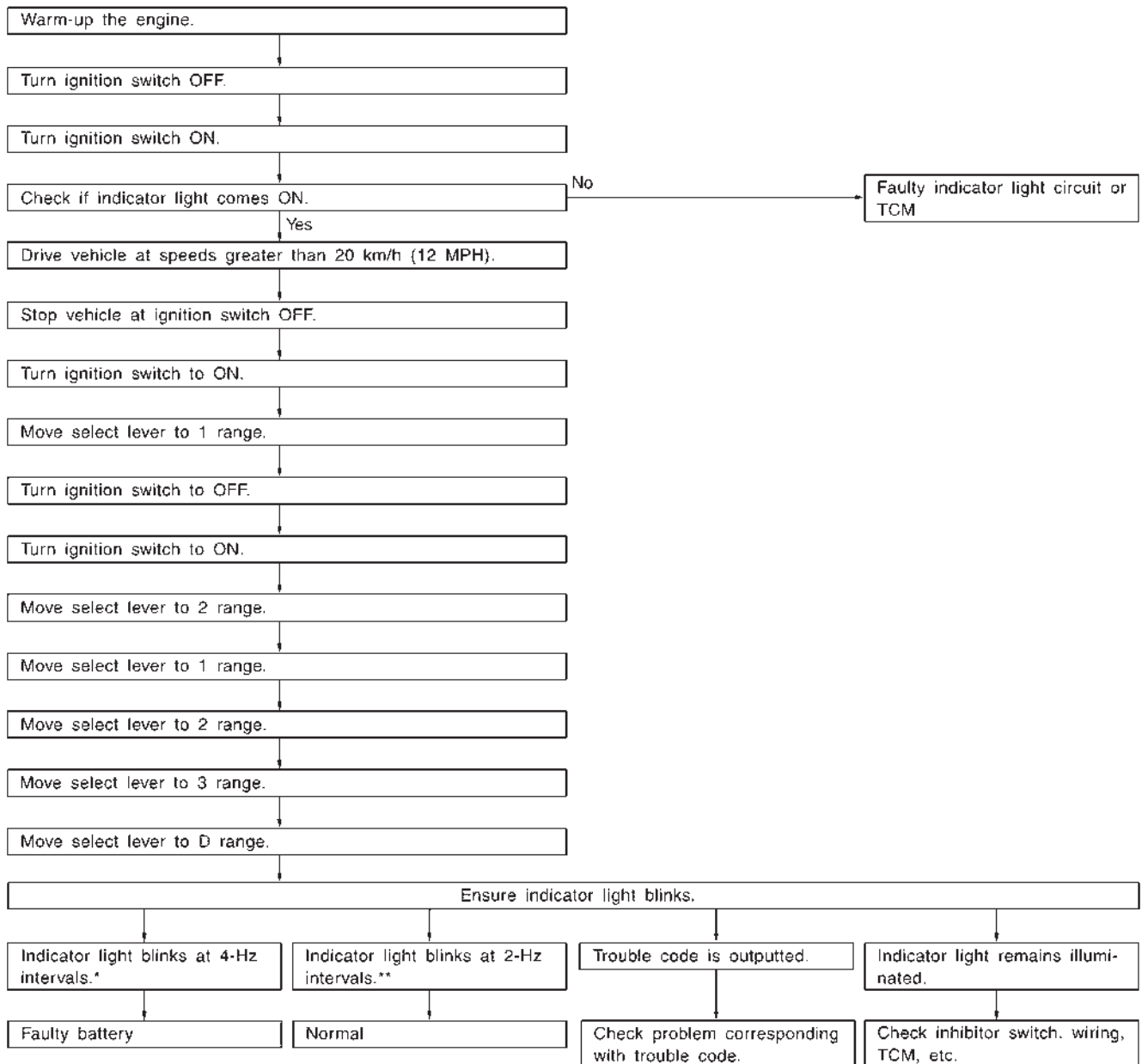
B: ABNORMAL DISPLAY ON AT OIL TEMP INDICATOR

When any on-board diagnostics item is malfunctioning, the display on the AT OIL TEMP indicator lamp blinks from the time the malfunction is detected after starting the engine until the ignition switch is turned OFF. The malfunctioning part or unit can be determined by a trouble code dur-

ing on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the AT OIL TEMP indicator does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using the select monitor. Indicator signal is as shown in the figure.



C: ON-BOARD DIAGNOSTICS



* : Blinks every 0.125 (1/8) seconds (until ignition switch is turned OFF).
 ** : Blinks every 0.25 (1/4) seconds (until ignition switch is turned OFF).

S3M0063A

7. Diagnostics for On-board Diagnostics Failed

A: AT OIL TEMP INDICATOR LIGHT

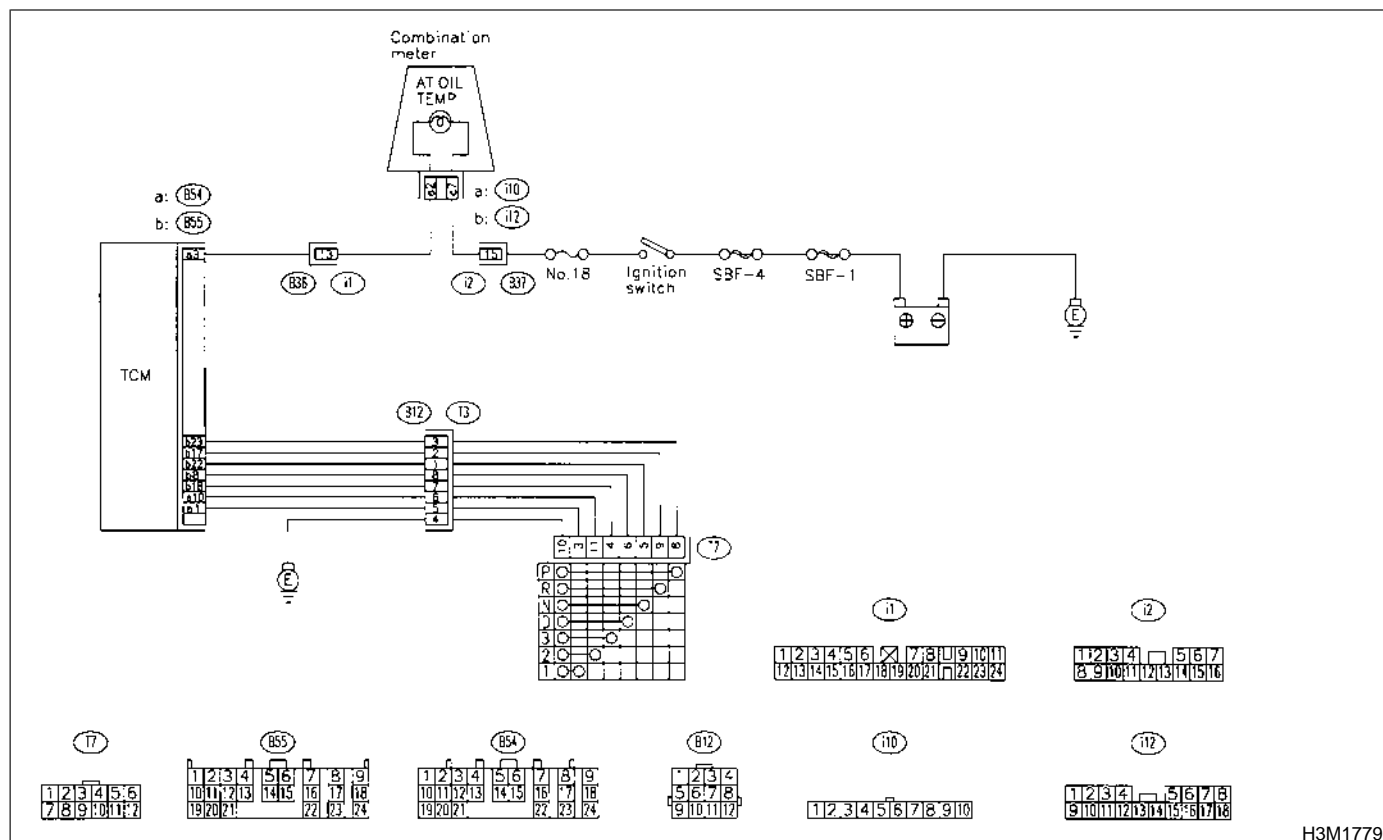
DIAGNOSIS:

The AT OIL TEMP indicator light circuit is open or shorted.

TROUBLE SYMPTOM:

- When ignition switch is turned to ON (engine OFF), AT OIL TEMP indicator light does not illuminate.
- When on-board diagnostics is performed, AT OIL TEMP indicator light remains illuminated.

WIRING DIAGRAM:



H3M1779

7A1 : CHECK AT OIL TEMP INDICATOR LIGHT.

Turn ignition switch to ON (engine OFF).

- CHECK** : Does AT OIL TEMP indicator light illuminate?
- YES** : Go to step 7A2.
- NO** : Go to step 7A3.

7A2 : CHECK AT OIL TEMP INDICATOR LIGHT.

Perform on-board diagnostics. <Ref. to 3-2 [T6C0].>

- CHECK** : Does AT OIL TEMP indicator light blink?
- YES** : A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM, inhibitor switch and combination meter.
- NO** : Go to step 7A8.

7A3 : CHECK FUSE (NO. 18).

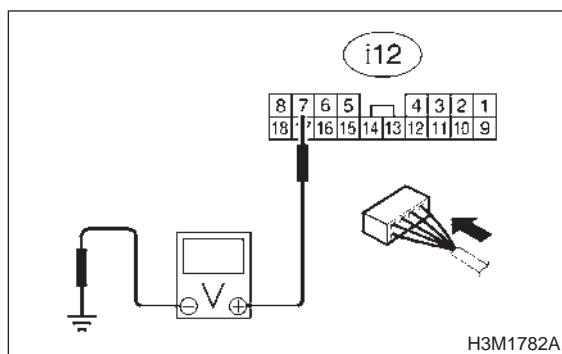
Remove fuse (No. 18).

- CHECK** : *Is the fuse (No. 18) blown out?*
- YES** : Replace fuse (No. 18). If replaced fuse (No. 18) is blown out easily, repair short circuit in harness between fuse (No. 18) and combination meter.
- NO** : Go to step 7A4.

7A4 : CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND IGNITION SWITCH.

- 1) Turn ignition switch to ON (engine OFF).
- 2) Measure voltage between combination meter connector and chassis ground.

Connector & terminal
(i12) No. 7 (+) — Chassis ground (-):

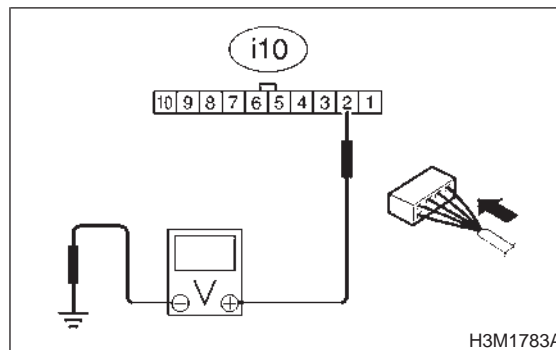


- CHECK** : *Is voltage more than 10 V?*
- YES** : Go to step 7A5.
- NO** : Repair open circuit in harness between combination meter and fuse, and poor contact in coupling connector.

7A5 : CHECK COMBINATION METER.

Measure voltage between combination meter connector and chassis ground.

Connector & terminal
(i10) No. 2 (+) — Chassis ground (-):

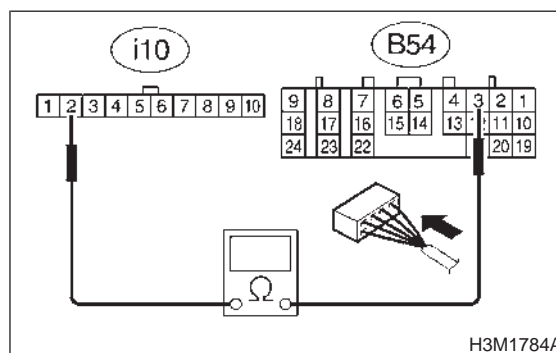


- CHECK** : *Is voltage less than 1 V?*
- YES** : Go to step 7A6.
- NO** : Replace combination meter. <Ref. to 6-2 [W800].>

7A6 : CHECK OPEN CIRCUIT OF HARNESS.

- 1) Disconnect connector from combination meter connector.
- 2) Measure resistance of harness between combination meter.

Connector & terminal
(B54) No. 3 — (i10) No. 2:



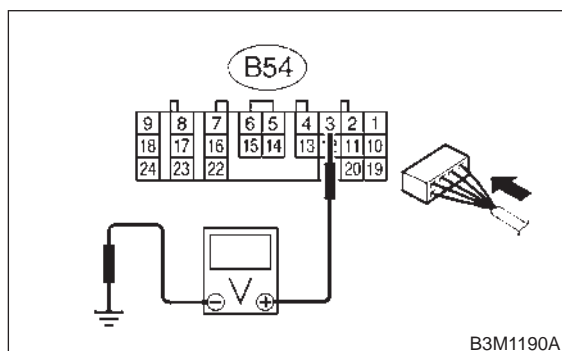
- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step 7A7.
- NO** : Repair open circuit in harness between TCM and combination meter, and poor contact in coupling connector.

7A7 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect connector to TCM and combination meter.
- 2) Turn ignition switch to ON (engine OFF).
- 3) Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 3 (+) — Chassis ground (-):



- CHECK** : **Is the voltage less than 1 V?**
- YES** : Even if AT OIL TEMP indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

7A8 : CHECK INHIBITOR SWITCH.

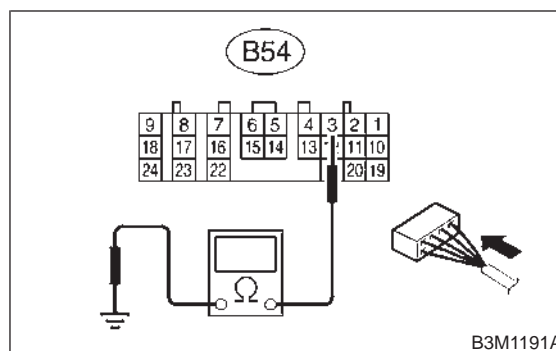
- 1) Connect Subaru Select Monitor to data link connector.
 - 2) Turn ignition switch to ON.
 - 3) Subaru Select Monitor to ON.
 - 4) Read data of range switch using Subaru Select Monitor.
- Range switch is indicated in ON ⇔ OFF.

- CHECK** : **When each range is selected, does LED of Subaru Select Monitor light up?**
- YES** : Go to step **7A9**.
- NO** : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

7A9 : CHECK SHORT CIRCUIT OF HARNESS.

- 1) Disconnect connector from TCM.
- 2) Remove combination meter.
- 3) Disconnect connector from combination meter.
- 4) Measure resistance of harness connector between TCM and combination meter.

Connector & terminal/specified resistance (B54) No. 3 — Chassis ground:

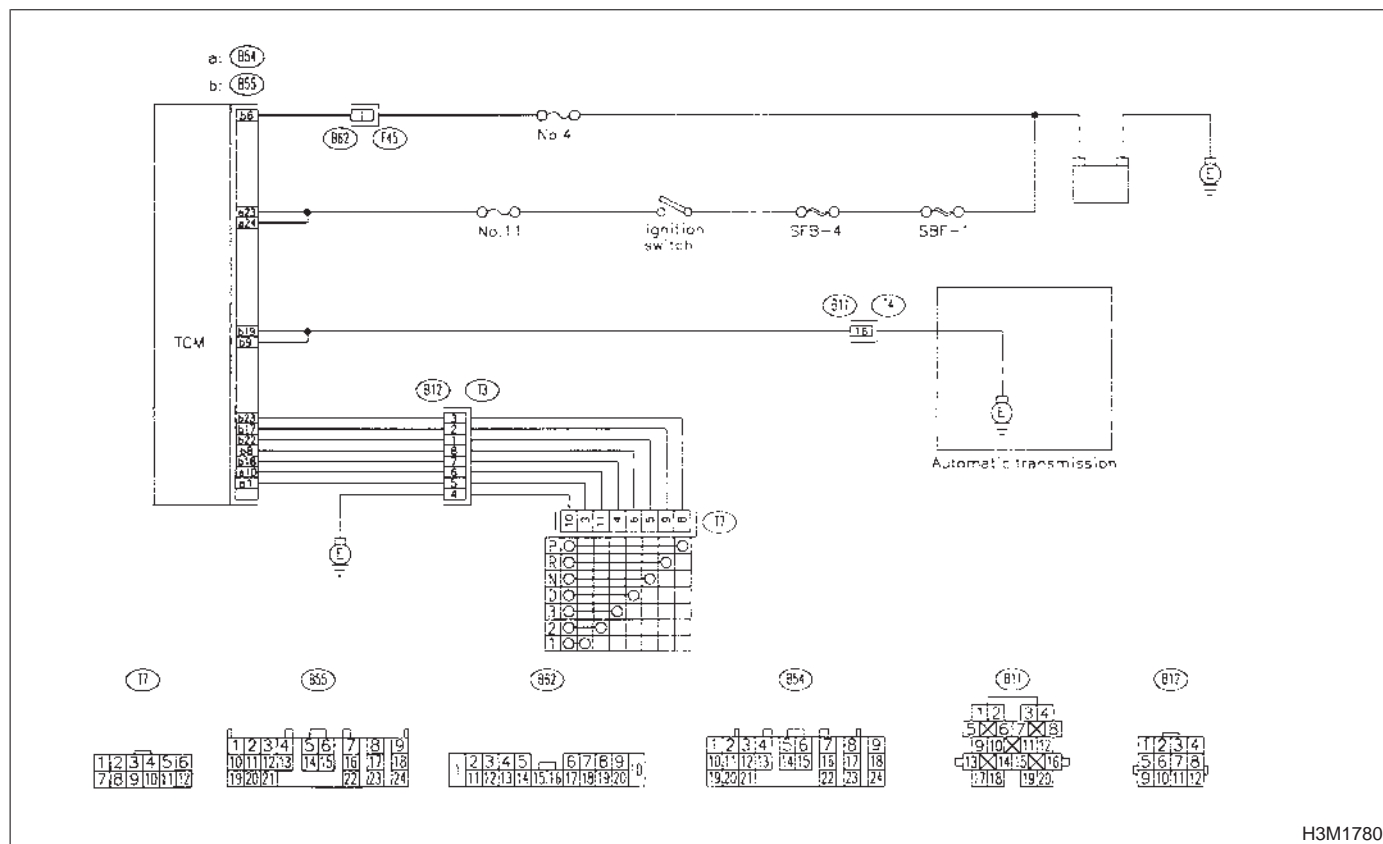


- CHECK** : **Is the resistance less than 1 MΩ?**
- YES** : Replace TCM. <Ref. to 3-2 [W22A0].>
- NO** : Repair short circuit in harness between combination meter connector and TCM connector.

MEMO:

B: CONTROL MODULE POWER SUPPLY AND GROUND LINE

WIRING DIAGRAM:

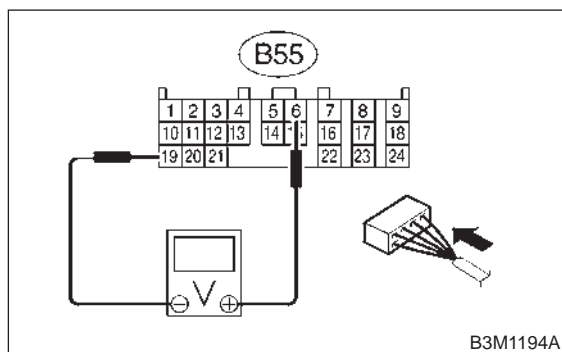


H3M1780

7B1 : CHECK BACK-UP POWER SUPPLY CIRCUIT.

- 1) Turn ignition switch to ON.
- 2) Measure back-up power supply voltage between TCM connector terminal.

Connector & terminal
(B55) No. 6 (+) — No. 19 (–):



B3M1194A

- CHECK** : **Is the voltage more than 10 V?**
- YES** : Go to step **7B3**.
- NO** : Go to step **7B2**.

7B2 : CHECK FUSE (NO. 4).

Remove fuse (No. 4).

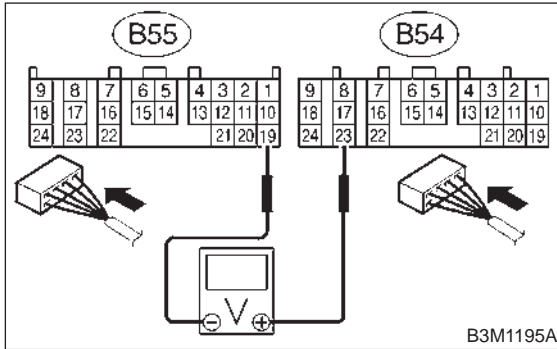
- CHECK** : **Is the fuse (No. 4) blown out?**
- YES** : Replace fuse (No. 4). If replaced fuse (No. 4) has blown out easily, repair short circuit in harness between fuse (No. 4) and TCM.
- NO** : Repair open circuit in harness between fuse (No. 4) and TCM, and poor contact in coupling connector.

7B3 : CHECK IGNITION POWER SUPPLY CIRCUIT.

- 1) Turn ignition switch to ON (engine OFF).
- 2) Measure ignition power supply voltage between TCM connector terminal.

Connector & terminal

(B54) No. 23 (+) — (B55) No. 19 (-):



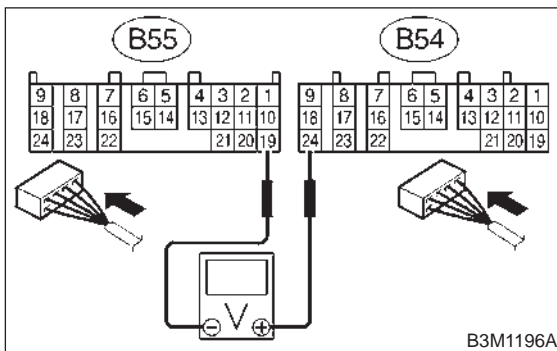
- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 7B4.
- NO** : Go to step 7B5.

7B4 : CHECK IGNITION POWER SUPPLY CIRCUIT.

- 1) Turn ignition switch to ON (engine OFF).
- 2) Measure ignition power supply voltage between TCM connector terminal.

Connector & terminal

(B54) No. 24 (+) — (B55) No. 19:



- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 7B6.
- NO** : Go to step 7B5.

7B5 : CHECK FUSE (NO. 11).

Remove fuse (No. 11).

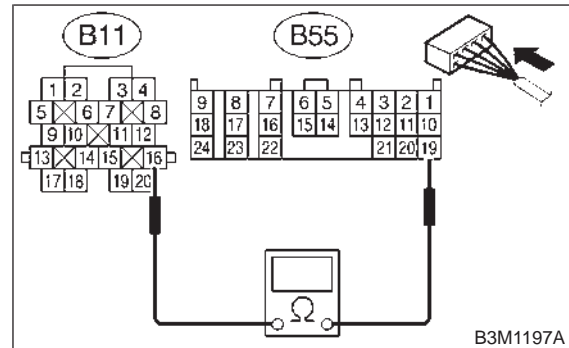
- CHECK** : Is the fuse (No. 11) blown out?
- YES** : Replace fuse (No. 11). If replaced fuse (No. 11) has blown out easily, repair short circuit in harness between fuse (No. 11) and TCM.
- NO** : Repair open circuit in harness between fuse (No. 11) and TCM, and poor contact in coupling connector.

7B6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from TCM and transmission.
- 3) Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 19 — (B11) No. 16:



- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 7B7.
- NO** : Repair open circuit in harness between TCM and transmission harness connector.

3-2 [T7B7] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

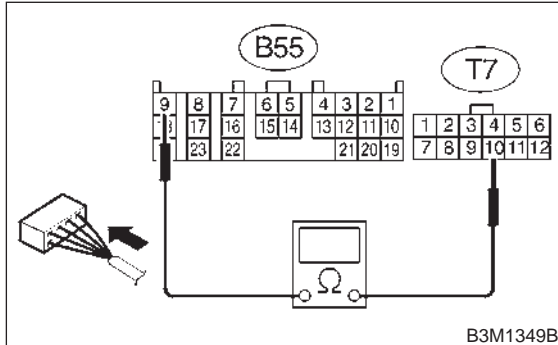
7. Diagnostics for On-board Diagnostics Failed

7B7 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from inhibitor switch.
- 3) Measure resistance of harness between inhibitor switch side connector and chassis ground.

Connector & terminal

(T7) No. 10 — (B55) No. 9:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 7B8.

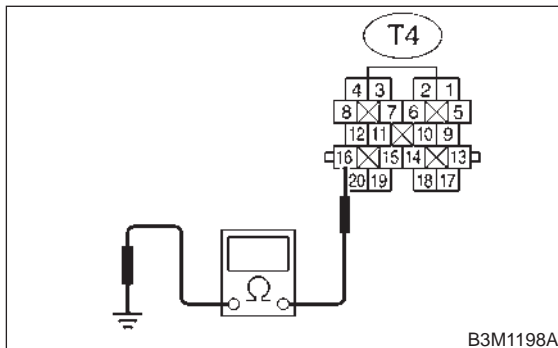
NO : Repair open circuit in harness between TCM and inhibitor side connector, and poor contact in coupling connector.

7B8 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND.

Measure resistance of harness between transmission and transmission ground.

Connector & terminal

(T4) No. 16 — Transmission ground:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 7B9.

NO : Repair open circuit in harness between transmission and transmission ground.

7B9 : CHECK POOR CONTACT.

CHECK : Is there poor contact in control module power supply and ground line?

YES : Repair poor contact and ground terminal.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

8. Diagnostic Chart with Trouble Code

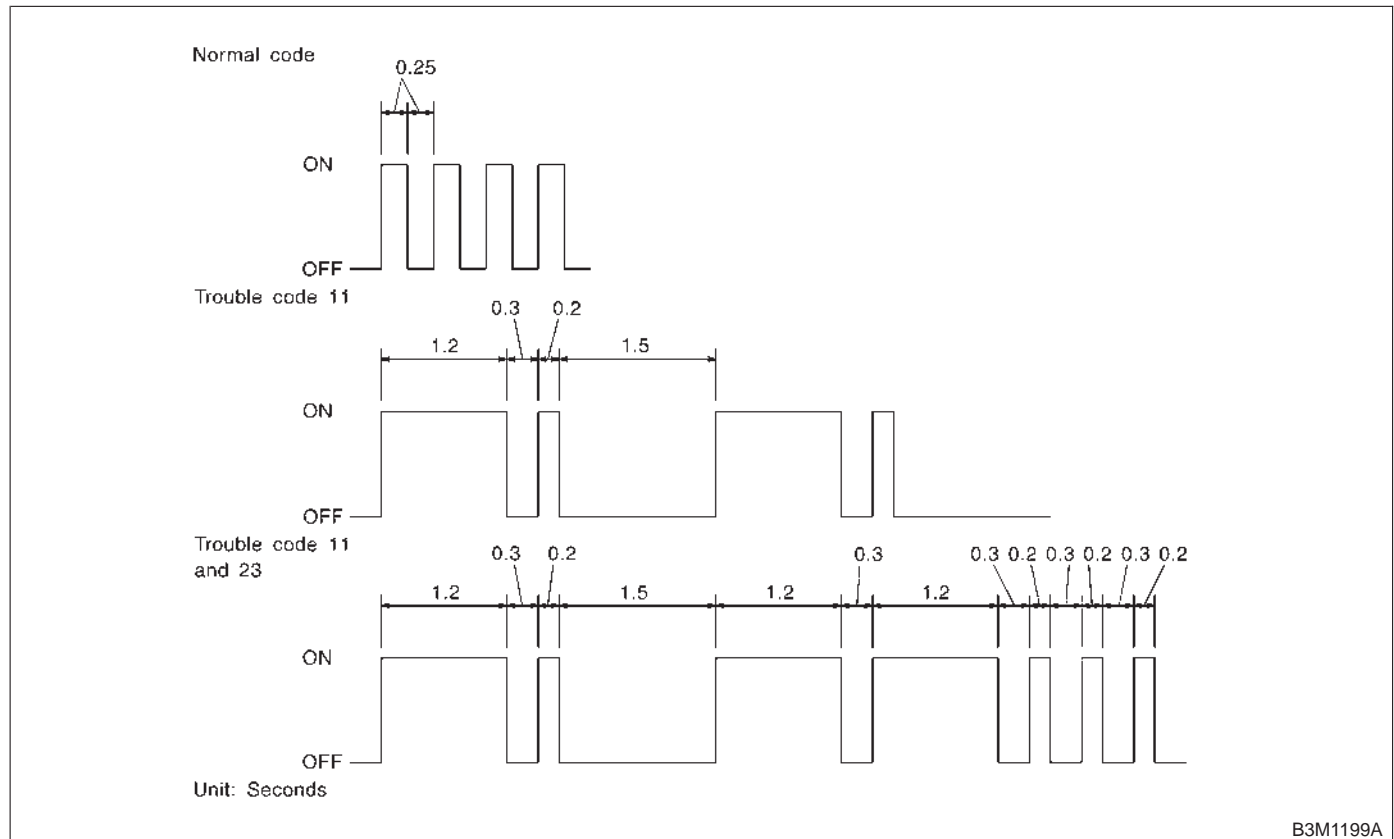
A: LIST OF TROUBLE CODE

1. TROUBLE CODE

Trouble code	Item	Content of diagnosis	Title index No.
11	Engine speed signal	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8C0].>
23	AT load signal (Except 2200 cc California spec. vehicles)	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8D0].>
27	ATF temperature sensor	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8E0].>
31	Throttle position sensor	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8F0].>
33	Vehicle speed sensor 2 (Front)	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8G0].>
36	Torque converter turbine speed sensor	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8H0].>
38	Torque control signal	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8I0].>
45	AT load signal (2200 cc California spec. vehicles)	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8J0].>
71	Shift solenoid 1	Detects open or shorted drive circuit, as well as solenoid seizure.	<Ref. to 3-2 [T8K0].>
72	Shift solenoid 2	Detects open or shorted drive circuit, as well as solenoid seizure.	<Ref. to 3-2 [T8L0].>
73	Low clutch timing solenoid	Detects open or shorted drive circuit, as well as solenoid seizure.	<Ref. to 3-2 [T8M0].>
74	2-4 brake timing solenoid	Detects open or shorted drive circuit, as well as solenoid seizure.	<Ref. to 3-2 [T8N0].>
75	Duty solenoid A	Detects open or shorted drive circuit, as well as solenoid seizure.	<Ref. to 3-2 [T8O0].>
76	Duty solenoid D	Detects open or shorted drive circuit, as well as solenoid seizure.	<Ref. to 3-2 [T8P0].>
77	Duty solenoid B	Detects open or shorted drive circuit, as well as solenoid seizure.	<Ref. to 3-2 [T8Q0].>
79	Duty solenoid C	Detects open or shorted drive circuit, as well as solenoid seizure.	<Ref. to 3-2 [T8R0].>
93	Vehicle speed sensor 1 (Rear)	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8S0].>

2. HOW TO READ TROUBLE CODE OF INDICATOR LIGHT

The AT OIL TEMP indicator light flashes the code corresponding to the faulty part.
 The long segment (1.2 sec on) indicates a “ten”, and the short segment (0.2 sec on) signifies a “one”.



B: CLEAR MEMORY

Current trouble codes shown on the display are cleared by turning the ignition switch OFF after conducting on-board diagnostics operation. Previous trouble codes, however, cannot be cleared since they are stored in the TCM memory which is operating on the back-up power supply. These trouble codes can be cleared by removing the specified fuse (located under the light or left lower position of the instrument panel).

CLEAR MEMORY:

Removal of No. 4 fuse (for at least one minute)

- The No. 4 fuse is located in the line to the memory back-up power supply of the TCM. Removal of this fuse clears the previous trouble codes stored in the TCM memory.
- Be sure to remove the No. 4 fuse for at least the specified length of time. Otherwise, trouble codes may not be cleared.

MEMO:

C: TROUBLE CODE 11 — ENGINE SPEED SIGNAL —

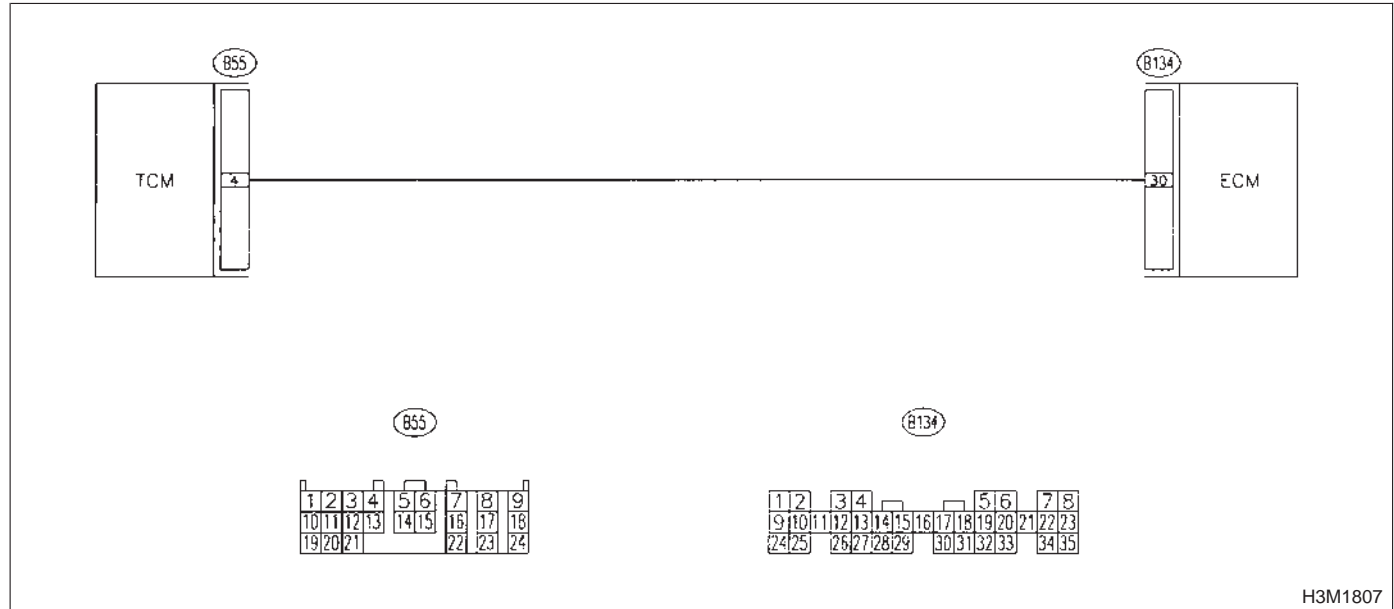
DIAGNOSIS:

Engine speed input signal circuit is open or shorted.

TROUBLE SYMPTOM:

- No lock-up (after engine warm-up).
- AT OIL TEMP indicator remains on when vehicle speed is "0".

WIRING DIAGRAM:

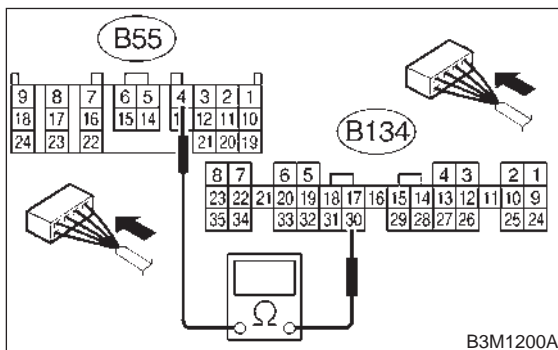


8C1 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from TCM and ECM.
- 3) Measure resistance of harness between TCM and ECM connector.

Connector & terminal

(B55) No. 4 — (B134) No. 30:



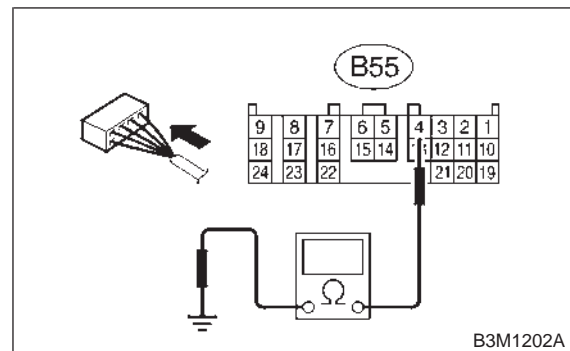
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8C2.
- NO** : Repair open circuit in harness between TCM and ECM connector.

8C2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B55) No. 4 — Chassis ground:



- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 8C3.
- NO** : Repair short circuit in harness between TCM and ECM connector.

8C3 : PREPARE SUBARU SELECT MONITOR.

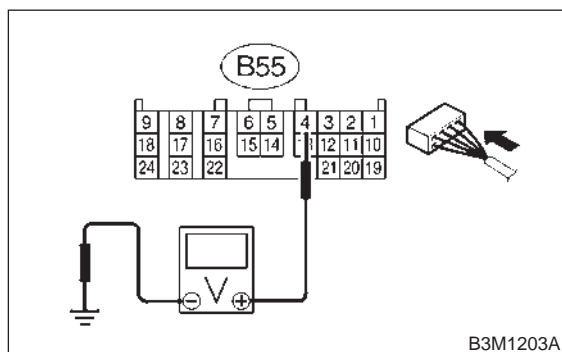
- CHECK** : *Do you have a Subaru Select Monitor?*
- YES** : Go to step **8C5**.
- NO** : Go to step **8C4**.

8C4 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect connectors to TCM and ECM.
- 2) Turn ignition switch to ON (engine OFF).
- 3) Measure voltage between TCM connector and chassis ground.

Connector & terminal

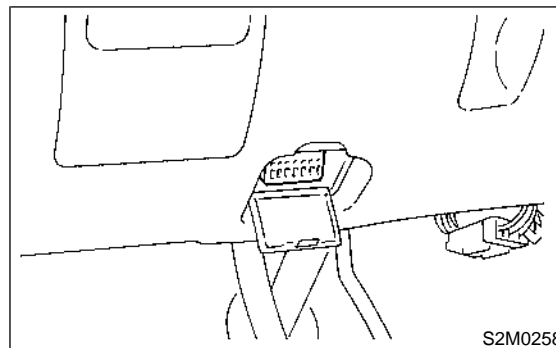
(B55) No. 4 (+) — Chassis ground (-):



- CHECK** : *Is the voltage more than 10.5 V?*
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
- NO** : Go to step **8C6**.

8C5 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Connect connectors to TCM and ECM.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Start the engine, and turn Subaru Select Monitor switch to ON.
 - 4) Warm-up the engine until engine coolant temperature is above 80°C (176°F).
 - 5) Engine idling.
 - 6) Read data of engine speed using Subaru Select Monitor.
- Display shows engine speed signal value sent from ECM.

- CHECK** : *Is the revolution value the same as the tachometer reading shown on the combination meter?*
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
- NO** : Go to step **8C6**.

8C6 : CHECK POOR CONTACT.

- CHECK** : *Is there poor contact in engine speed signal circuit?*
- YES** : Repair poor contact.
- NO** : Go to step **8C7**.

8C7 : CONFIRM TROUBLE CODE 11.

- CHECK** : *Replace ECM with a new one. Does the trouble code appear again, after the memory has been cleared?*
- YES** : Replace TCM. <Ref. to 3-2 [W22A0].>
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

MEMO:

D: TROUBLE CODE 23 — AT LOAD SIGNAL (EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES) —

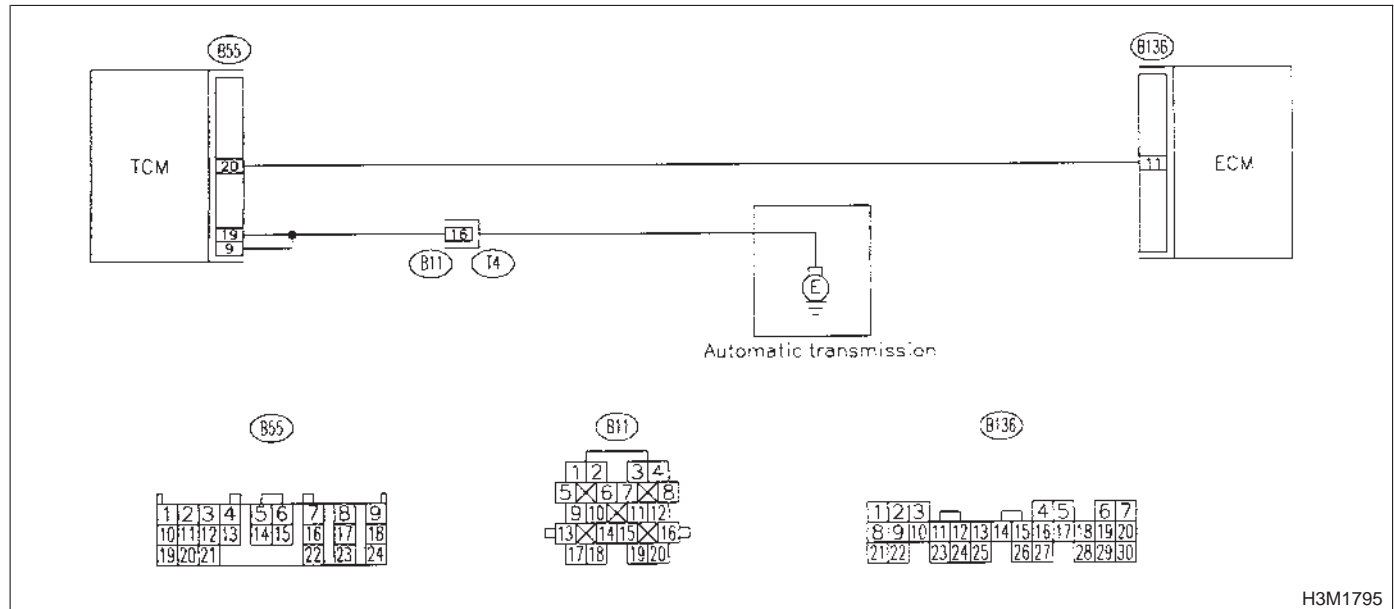
DIAGNOSIS:

Input signal circuit of TCM from ECM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

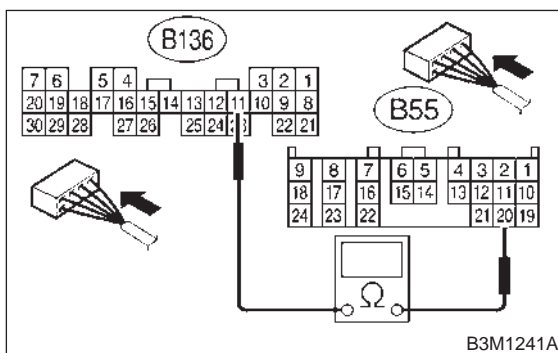


8D1 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from TCM and ECM.
- 3) Measure resistance of harness between TCM and ECM connector.

Connector & terminal

(B55) No. 20 — (B136) No. 11:



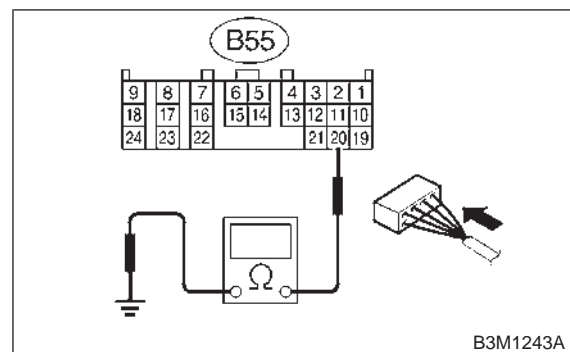
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8D2.
- NO** : Repair open circuit in harness between TCM and ECM connector.

8D2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B55) No. 20 — Chassis ground:



- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 8D3.
- NO** : Repair short circuit in harness between TCM and ECM connector.

3-2 [T8D3] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

8D3 : PREPARE SUBARU SELECT MONITOR.

CHECK : *Do you have a Subaru Select Monitor?*

YES : Go to step 8D5.

NO : Go to step 8D4.

8D4 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect connectors to TCM and ECM.
- 2) Start the engine, and warm-up the transmission until ATF temperature is above 80°C (176°F).

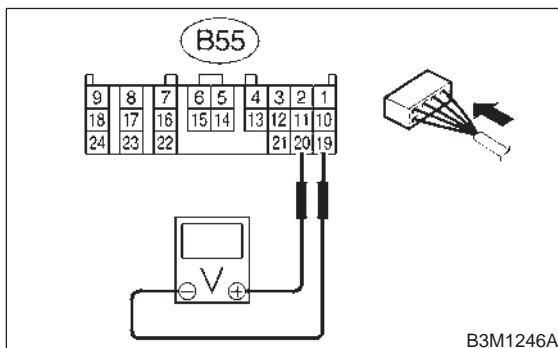
NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 3) Engine idling.
- 4) Measure voltage between TCM connectors.

Connector & terminal

(B55) No. 20 (+) — No. 19 (-):



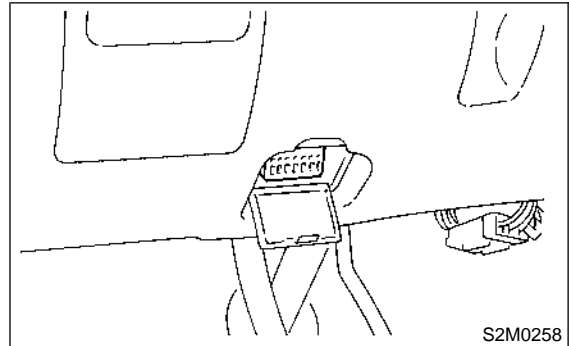
CHECK : *Is the voltage between 0.5 and 1.2 V?*

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.

NO : Go to step 8D6.

8D5 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Connect connectors to TCM and ECM.
- 2) Turn ignition switch to OFF.
- 3) Connect Subaru Select Monitor to data link connector.



- 4) Start the engine, and turn Subaru Select monitor switch to ON.
- 5) Warm-up the engine until engine coolant temperature is above 80°C (176°F).
- 6) Engine idling.
- 7) Read data of mass air flow signal using Subaru Select Monitor.

● Display shows mass air flow signal value sent from ECM.

CHECK : *Is the value between 0.5 and 1.2 V?*

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.

NO : Go to step 8D6.

8D6 : CHECK POOR CONTACT.

CHECK : *Is there poor contact in mass air flow signal circuit?*

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

E: TROUBLE CODE 27 — ATF TEMPERATURE SENSOR —

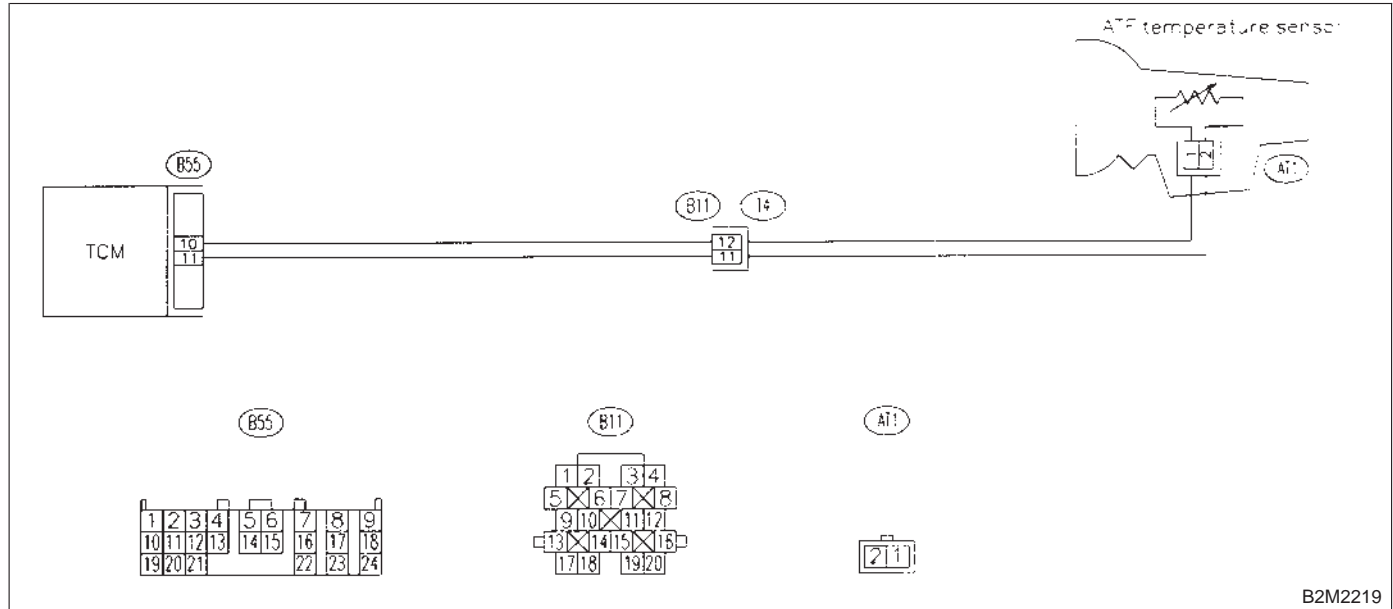
DIAGNOSIS:

Input signal circuit of TCM to ATF temperature sensor is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

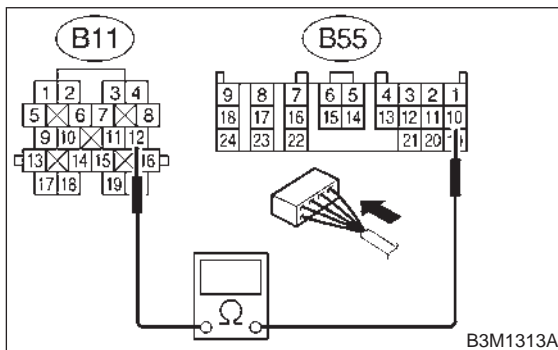


8E1 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission and TCM.
- 3) Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 10 — (B11) No. 12:



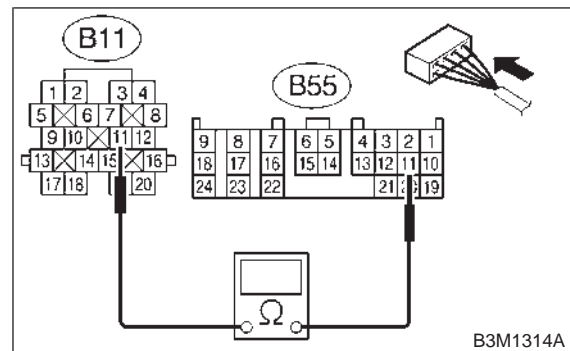
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8E2.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8E2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 11 — (B11) No. 11:



- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8E3.
- NO** : Repair open circuit in harness between TCM and transmission connector.

3-2 [T8E3] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

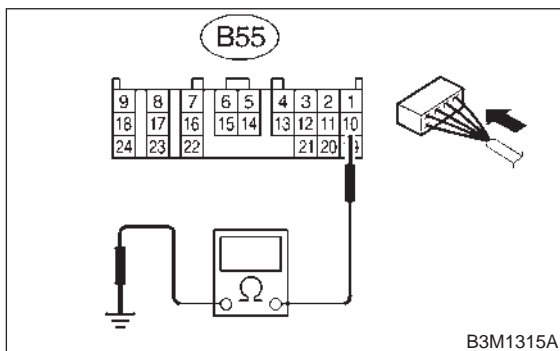
8. Diagnostic Chart with Trouble Code

8E3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal

(B55) No. 10 — Chassis ground:



CHECK : Is the resistance more than 1 MΩ?

YES : Go to step 8E4.

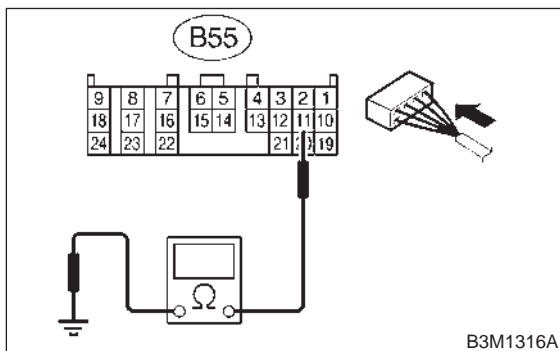
NO : Repair short circuit in harness between TCM and transmission connector.

8E4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal

(B55) No. 11 — Chassis ground:



CHECK : Is the resistance more than 1 MΩ?

YES : Go to step 8E5.

NO : Repair short circuit in harness between TCM and transmission connector.

8E5 : CHECK ATF TEMPERATURE SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Connect connectors to transmission and TCM.
- 3) Turn ignition switch to ON and start engine.
- 4) Warm-up the transmission until ATF temperature reaches to 80°C (176°F).

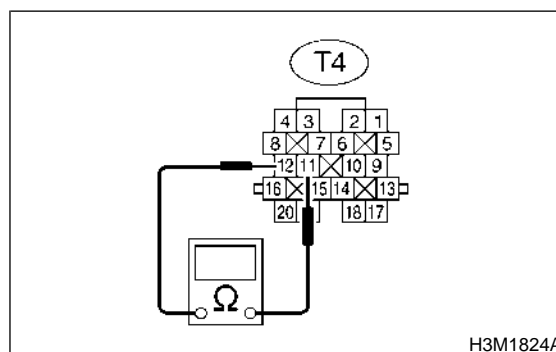
NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 5) Measure resistance between transmission connector terminals.
- 6) Disconnect connector from transmission.

Connector & terminal

(T4) No. 11 — No. 12:



CHECK : Is the resistance between 275 and 375 Ω?

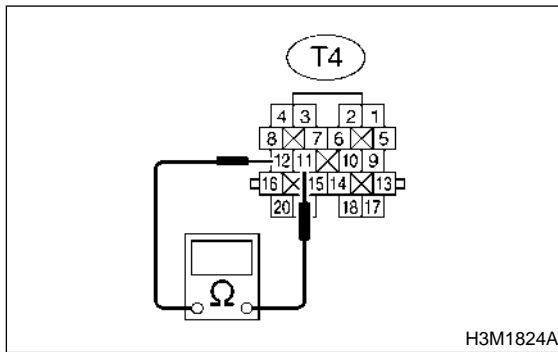
YES : Go to step 8E6.

NO : Go to step 8E13.

8E6 : CHECK ATF TEMPERATURE SENSOR.

- 1) Turn ignition switch to ON (engine OFF).
- 2) Measure resistance between transmission connector terminals.

Connector & terminal
(T4) No. 11 — No. 12:



CHECK : Does the resistance value increase while the ATF temperature decreases?

YES : Go to step 8E7.

NO : Go to step 8E13.

8E7 : PREPARE SUBARU SELECT MONITOR.

CHECK : Do you have a Subaru Select Monitor?

YES : Go to step 8E10.

NO : Go to step 8E8.

8E8 : CHECK INPUT SIGNAL FOR TCM.

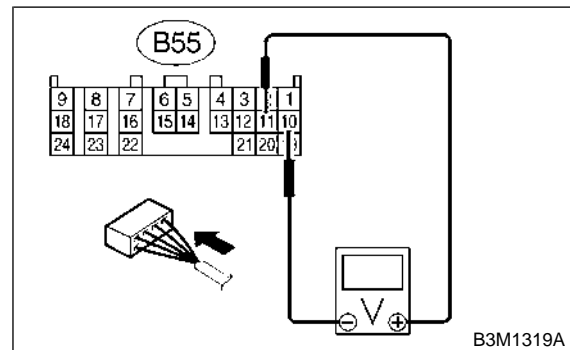
- 1) Warm-up the transmission until ATF temperature is about 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 2) Measure voltage between TCM connector terminal.

Connector & terminal
(B55) No. 11 (+) — No. 10 (-):



CHECK : Is the voltage between 2.9 and 4.0 V?

YES : Go to step 8E9.

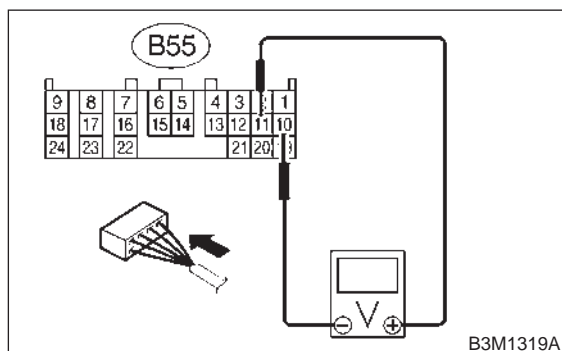
NO : Go to step 8E12.

8E9 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to ON (engine OFF).
- 2) Measure voltage between TCM connector terminal.

Connector & terminal

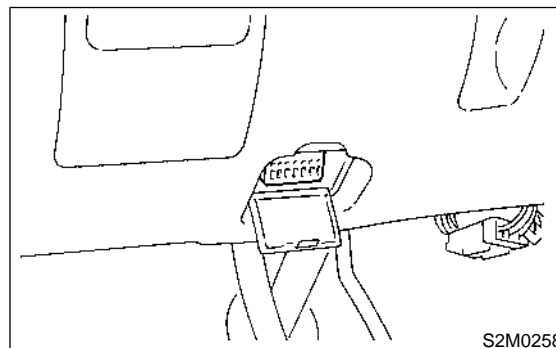
(B55) No. 11 (+) — No. 10 (-):



- CHECK** : **Is the voltage between 1.0 and 1.4 V?**
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.
- NO** : Go to step **8E12**.

8E10 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Turn ignition switch to OFF.
- 2) Connect connectors to TCM and transmission.
- 3) Connect Subaru Select Monitor to data link connector.



- 4) Start the engine, and turn Subaru Select Monitor switch to ON.
- 5) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 6) Read data of ATF temperature using Subaru Select Monitor.

- ATF temperature is indicated in "°F" or "°C".

- CHECK** : **Is the ATF temperature between 70 and 110°C (158 and 230°F).**
- YES** : Go to step **8E11**.
- NO** : Go to step **8E12**.

8E11 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

Turn ignition switch to ON (engine OFF).

- CHECK** : **Does the ATF temperature gradually decrease?**
- YES** : Even if "AT OIL TEMP" light up, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the case. Repair harness or contact in the ATF temperature sensor and transmission connector.
- NO** : Go to step **8E12**.

8E12 : CHECK POOR CONTACT.

- CHECK** : *Is there poor contact in ATF temperature sensor circuit?*
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

8E13 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Remove transmission connector from bracket.
- 4) Lift-up the vehicle and place safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 5) Drain automatic transmission fluid.

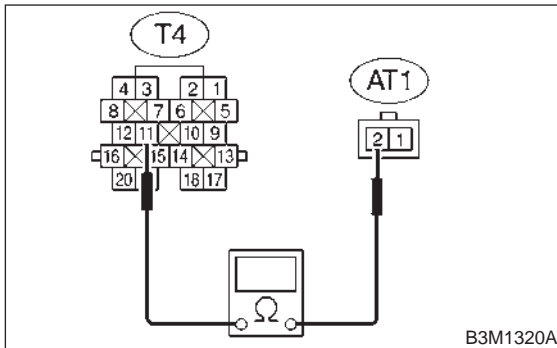
CAUTION:

Do not drain the automatic transmission fluid until it cools down.

- 6) Remove oil pan, and disconnect connector from ATF temperature sensor connector.
- 7) Measure resistance of harness between ATF temperature sensor and transmission connector.

Connector & terminal

(T4) No. 11 — (AT1) No. 2:



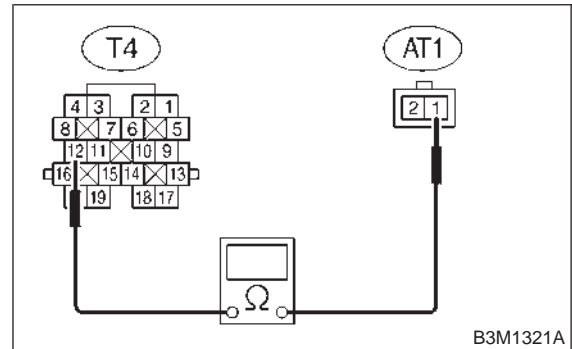
- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step **8E14**.
- NO** : Repair open circuit in harness between ATF temperature sensor and transmission connector.

8E14 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between ATF temperature sensor and transmission connector.

Connector & terminal

(T4) No. 12 — (AT1) No. 1:



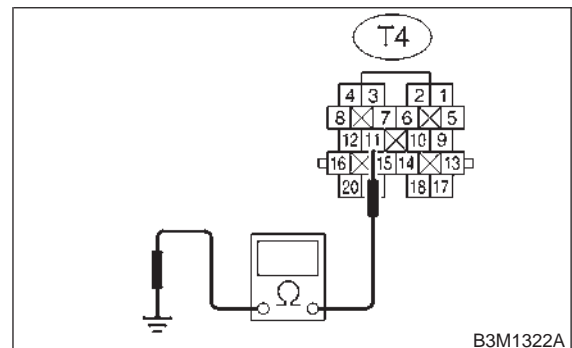
- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step **8E15**.
- NO** : Repair open circuit in harness between ATF temperature sensor and transmission connector.

8E15 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between transmission connector and transmission ground.

Connector & terminal

(T4) No. 11 — Transmission ground:



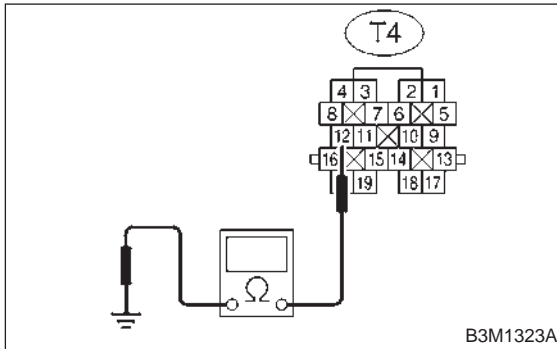
- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step **8E16**.
- NO** : Repair short circuit in harness between ATF temperature sensor and transmission connector.

8E16 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between transmission connector and transmission ground.

Connector & terminal

(T4) No. 12 — Transmission ground:



- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Replace ATF temperature sensor. <Ref. to 3-2 [W4A0].>
- NO** : Repair short circuit in harness between ATF temperature sensor and transmission connector.

F: TROUBLE CODE 31 — THROTTLE POSITION SENSOR —

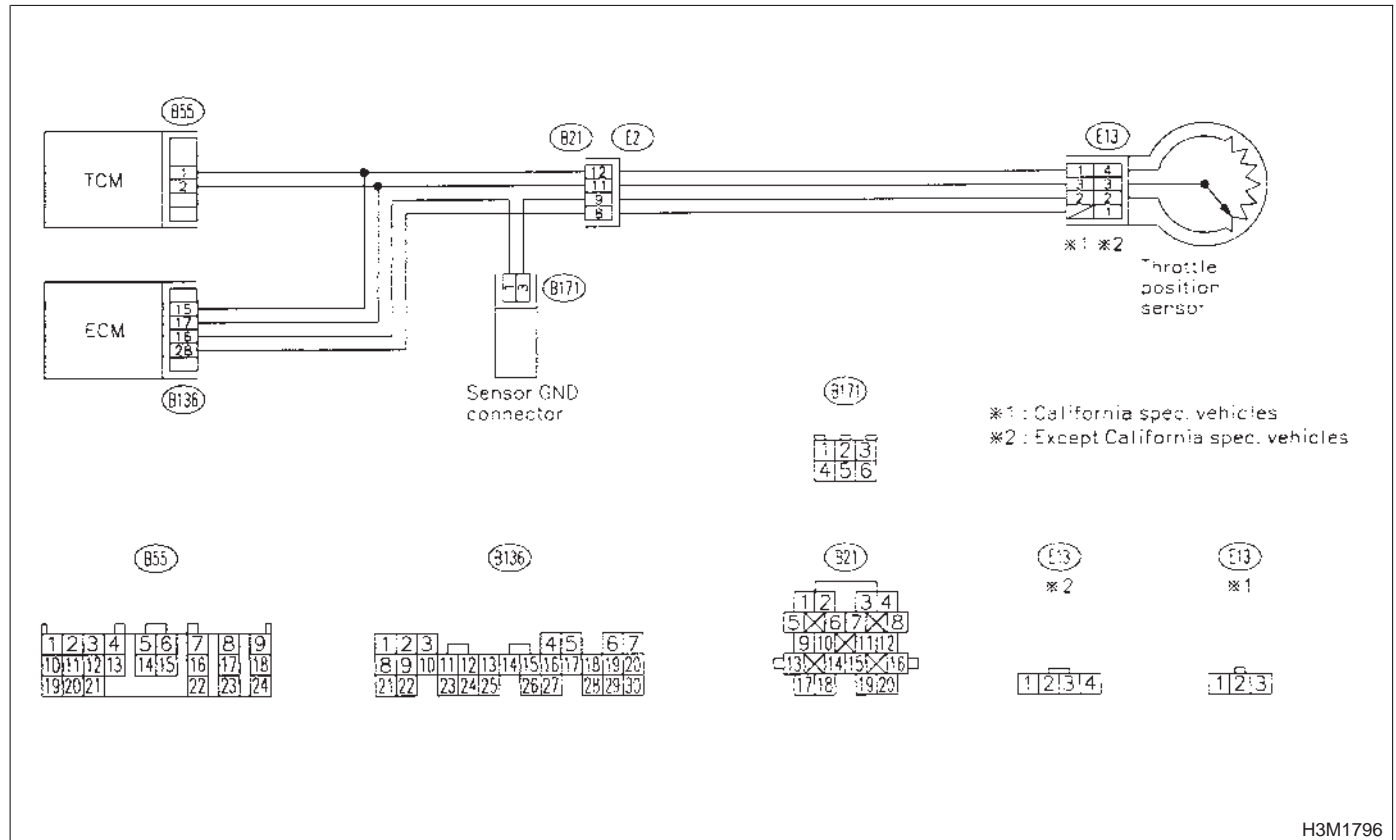
DIAGNOSIS:

Input signal circuit of throttle position sensor is open or shorted.

TROUBLE SYMPTOM:

Shift point too high or too low; engine brake not effected in “3” range; excessive shift shock; excessive tight corner “braking”.

WIRING DIAGRAM:



H3M1796

8F1 : CHECK CALIFORNIA SPEC. VEHICLES.

- CHECK** : Is the vehicle California spec. vehicle?
- YES** : Go to step 8F6.
- NO** : Go to step 8F2.

3-2 [T8F2] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

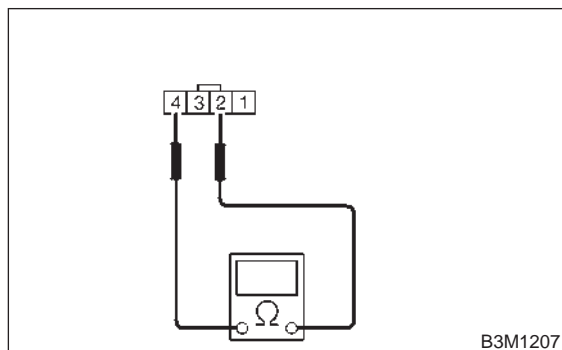
8. Diagnostic Chart with Trouble Code

8F2 : CHECK THROTTLE POSITION SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from throttle position sensor.
- 3) Measure resistance between throttle position sensor connector receptacle's terminals.

Terminals

No. 4 — No. 2:



CHECK : Is the resistance between 0.3 and 0.7 kΩ?

YES : Go to step 8F3.

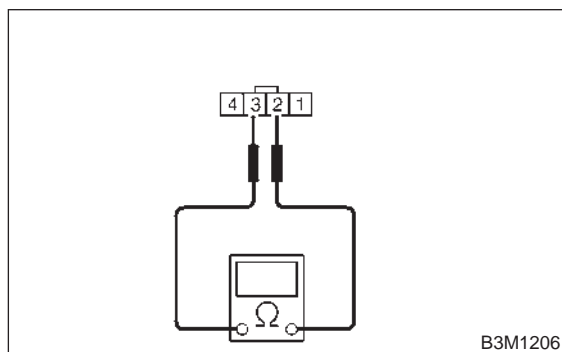
NO : Replace throttle position sensor. <Ref. to 2-7 [W9A0].>

8F3 : CHECK THROTTLE POSITION SENSOR.

Measure resistance between throttle position sensor connector receptacle's terminals.

Terminals

No. 2 — No. 3:



CHECK : Is the resistance between 3.5 and 6.5 kΩ?

YES : Go to step 8F4.

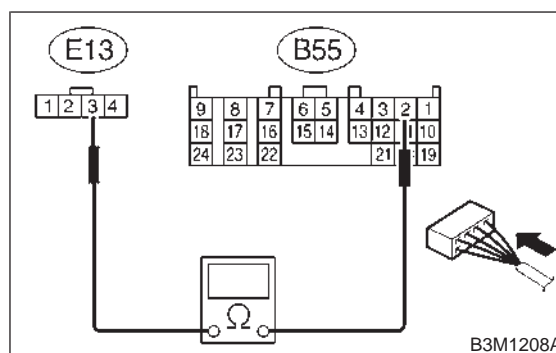
NO : Replace throttle position sensor. <Ref. to 2-7 [W9A0].>

8F4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

- 1) Disconnect connector from TCM.
- 2) Measure resistance of harness between TCM and throttle position sensor connector.

Connector & terminal

(B55) No. 2 — (E13) No. 3:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 8F5.

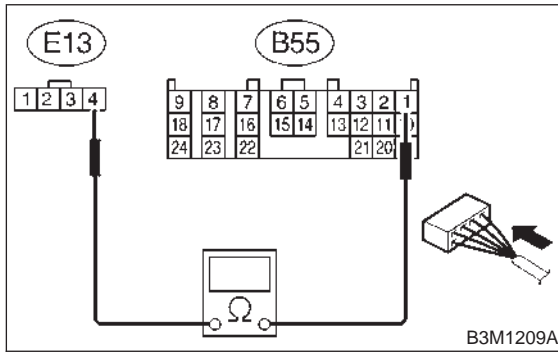
NO : Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.

8F5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

Measure resistance of harness between TCM and throttle position sensor connector.

Connector & terminal

(B55) No. 1 — (E13) No. 4:



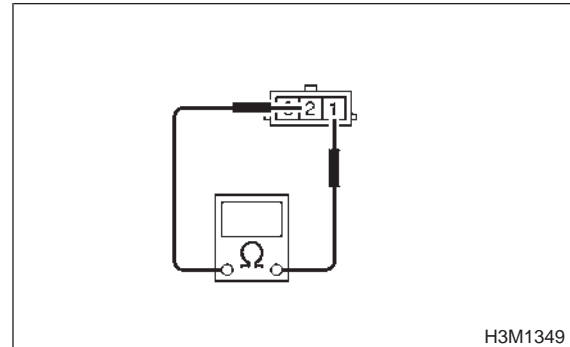
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8F10.
- NO** : Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.

8F6 : CHECK THROTTLE POSITION SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from throttle position sensor.
- 3) Measure resistance between throttle position sensor connector receptacle's terminals.

Terminals

No. 1 — No. 2:



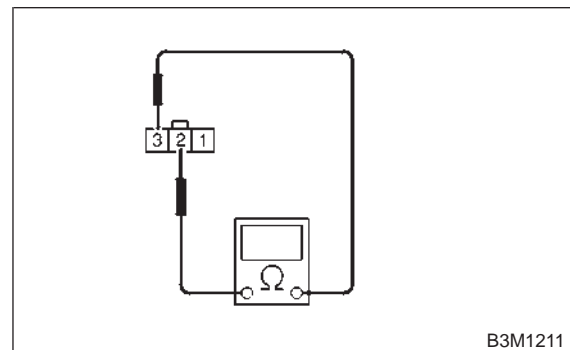
- CHECK** : Is the resistance between 0.3 and 0.7 $k\Omega$?
- YES** : Go to step 8F7.
- NO** : Replace throttle position sensor. <Ref. to 2-7 [W9A0].>

8F7 : CHECK THROTTLE POSITION SENSOR.

Measure resistance between throttle position sensor connector receptacle's terminals.

Terminals

No. 2 — No. 3:

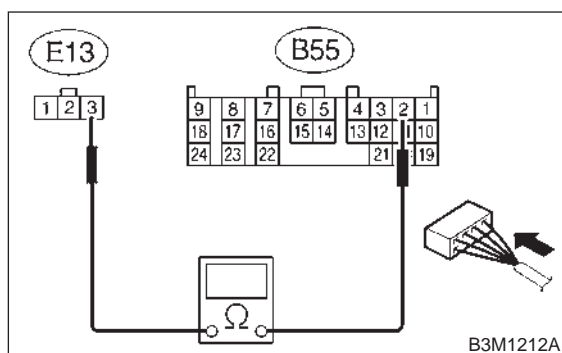


- CHECK** : Is the resistance between 3.5 and 6.5 $k\Omega$?
- YES** : Go to step 8F8.
- NO** : Replace throttle position sensor. <Ref. to 2-7 [W9A0].>

8F8 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

- 1) Disconnect connector from TCM.
- 2) Measure resistance of harness between TCM and throttle position sensor connector.

Connector & terminal
(B55) No. 2 — (E13) No. 3:

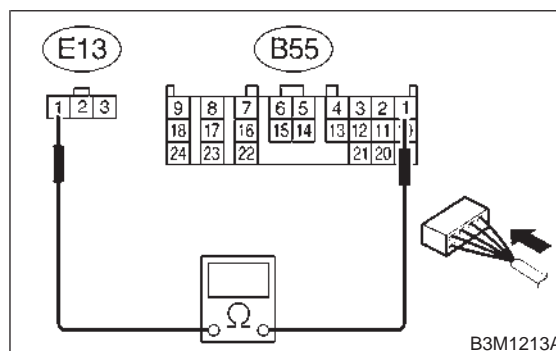


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8F9.
- NO** : Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.

8F9 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

Measure resistance of harness between TCM and throttle position sensor connector.

Connector & terminal
(B55) No. 1 — (E13) No. 1:

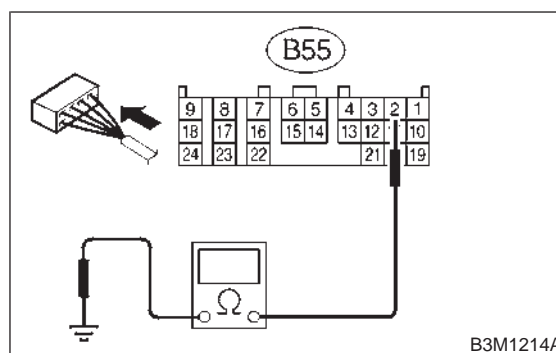


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8F10.
- NO** : Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.

8F10 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal
(B55) No. 2 — Chassis ground:

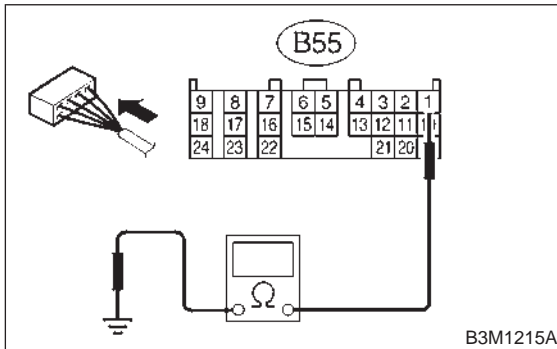


- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 8F11.
- NO** : Repair short circuit in harness between TCM and throttle position sensor connector.

8F11 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal
(B55) No. 1 — Chassis ground:

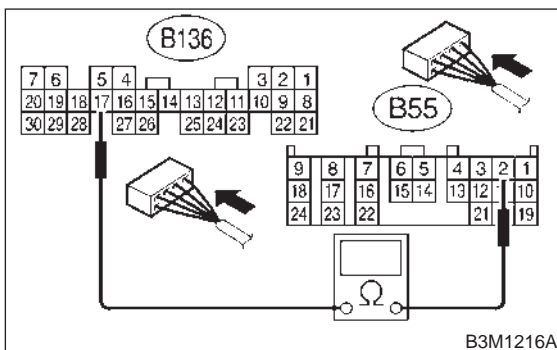


- CHECK** : Is the resistance more than 1 MΩ?
YES : Go to step 8F12.
NO : Repair short circuit in harness between TCM and throttle position sensor connector.

8F12 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

- 1) Disconnect connector from ECM.
- 2) Measure resistance of harness between TCM and ECM connector.

Connector & terminal
(B55) No. 2 — (B136) No. 17:

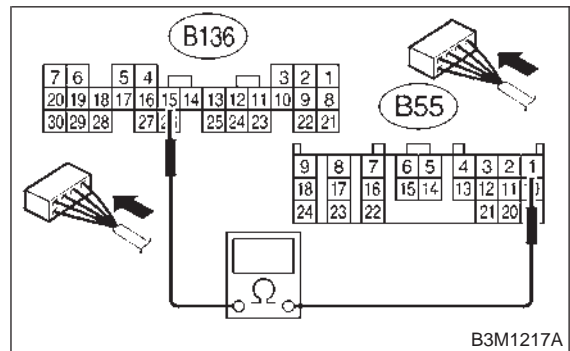


- CHECK** : Is the resistance less than 1 Ω?
YES : Go to step 8F13.
NO : Repair open circuit in harness between TCM and ECM connector.

8F13 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM and ECM connector.

Connector & terminal
(B55) No. 1 — (B136) No. 15:



- CHECK** : Is the resistance less than 1 Ω?
YES : Go to step 8F14.
NO : Repair open circuit in harness between TCM and ECM connector.

8F14 : PREPARE SUBARU SELECT MONITOR.

- CHECK** : Do you have a Subaru Select Monitor?
YES : Go to step 8F17.
NO : Go to step 8F15.

3-2 [T8F15] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

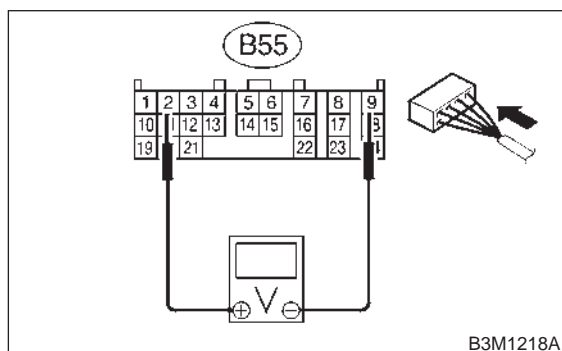
8. Diagnostic Chart with Trouble Code

8F15 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect connectors to TCM, throttle position sensor and ECM.
- 2) Turn ignition switch to ON (engine OFF).
- 3) Measure voltage between TCM connector terminals.

Connector & terminal

(B55) No. 2 (+) — No. 9 (-):



CHECK : Is the voltage between 0.3 and 0.7 V in throttle fully closed?

YES : Go to step 8F16.

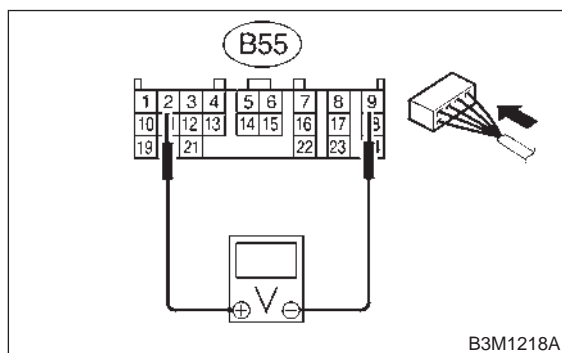
NO : Go to step 8F21.

8F16 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM connector terminals.

Connector & terminal

(B55) No. 2 (+) — No. 9 (-):



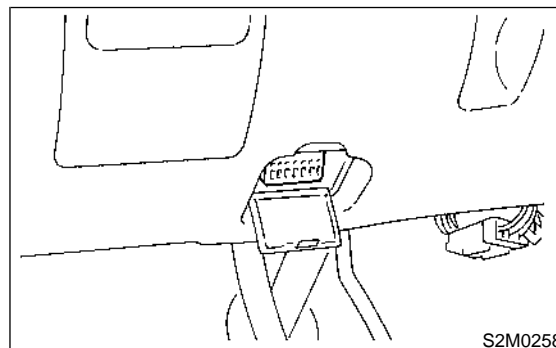
CHECK : Is the voltage between 4.3 and 4.9 V with throttle fully open?

YES : Go to step 8F19.

NO : Go to step 8F21.

8F17 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Connect connectors to TCM, throttle position sensor and ECM.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Turn ignition switch to ON (engine OFF).
 - 4) Turn Subaru Select Monitor switch to ON.
 - 5) Throttle fully closed.
 - 6) Read data of throttle position sensor using Subaru Select Monitor.
- Throttle position sensor input signal is indicated.

CHECK : Is the value voltage between 0.3 and 0.7 V?

YES : Go to step 8F18.

NO : Go to step 8F21.

8F18 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

Throttle fully open.

NOTE:

Must be changed correspondingly with accelerator pedal operation (from "released" to "depressed" position).

CHECK : Is the value voltage between 4.3 and 4.9 V?

YES : Go to step 8F20.

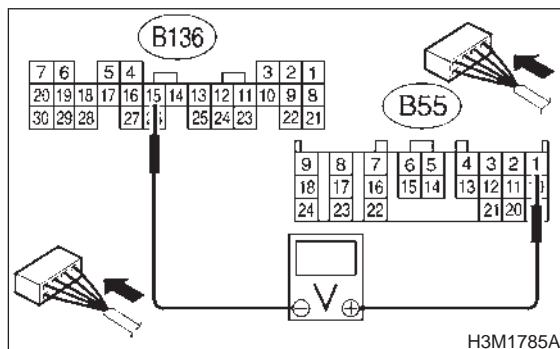
NO : Go to step 8F21.

8F19 : CHECK INPUT SIGNAL FOR TCM (THROTTLE POSITION SENSOR POWER SUPPLY).

Measure voltage between TCM connector terminals.

Connector & terminal

(B55) No. 1 (+) — (B136) No. 15 (–):



CHECK : **Is the voltage between 5.02 and 5.22 V?**

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in throttle position sensor circuit.

NO : Go to step **8F21**.

8F20 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR (THROTTLE POSITION SENSOR POWER SUPPLY).

Read data of throttle position sensor power supply using Subaru Select Monitor.

● Throttle position sensor power supply voltage is indicated.

CHECK : **Is the value voltage between 5.02 and 5.22 V?**

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in throttle position sensor circuit.

NO : Go to step **8F21**.

8F21 : CHECK POOR CONTACT.

CHECK : **Is there poor contact in throttle position sensor circuit?**

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

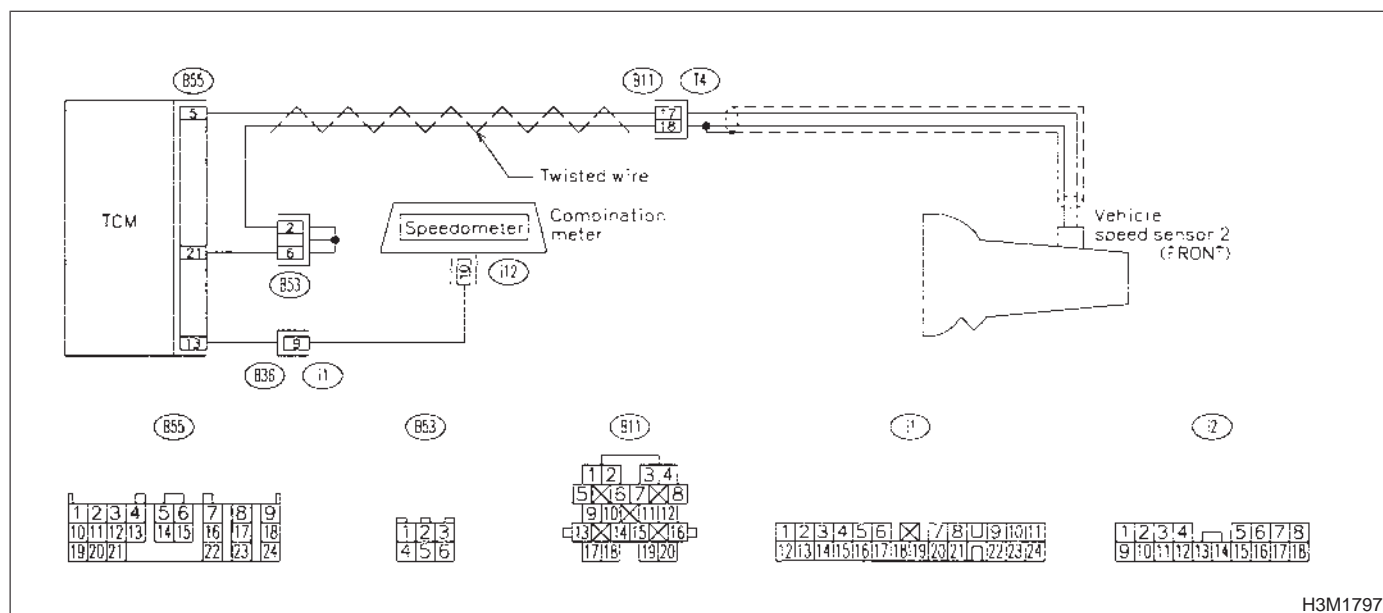
MEMO:

G: TROUBLE CODE 33 — VEHICLE SPEED SENSOR 2 (FRONT) —**DIAGNOSIS:**

- The vehicle speed signal is abnormal.
- The circuit in combination meter is faulty.
- The harness connector between TCM and vehicle speed sensor is in short or open.

TROUBLE SYMPTOM:

- Erroneous idling.
- Engine stalls.
- Poor driving performance.

WIRING DIAGRAM:

H3M1797

8G1 : CHECK OPERATION OF SPEEDOMETER.

CHECK : Does speedometer operate normally?

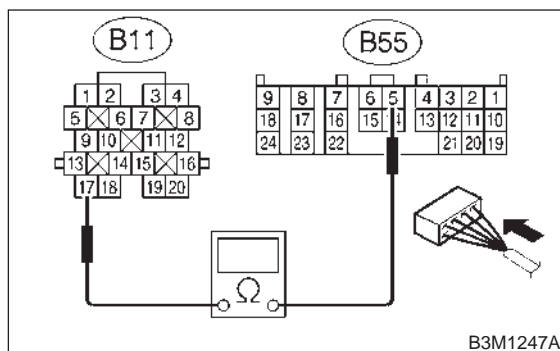
YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.

NO : Go to step **8G2**.

8G2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

- 1) Disconnect connector from TCM.
- 2) Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 5 — (B11) No. 17:

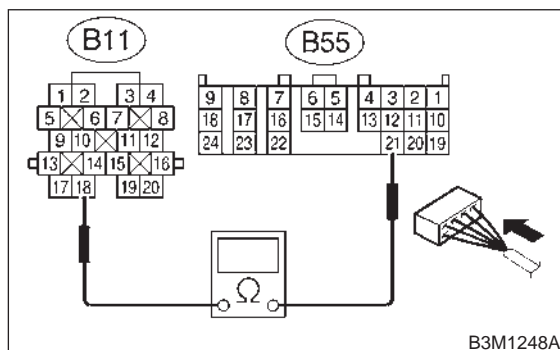


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8G3.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8G3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 21 — (B11) No. 18:

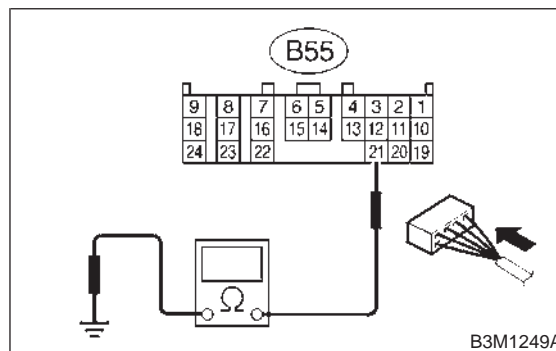


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8G4.
- NO** : Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.

8G4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 21 — Chassis ground:

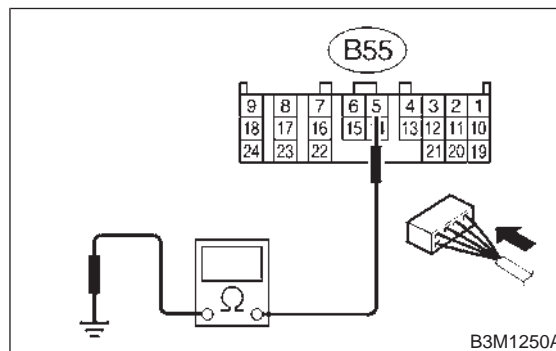


- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 8G5.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8G5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 5 — Chassis ground:



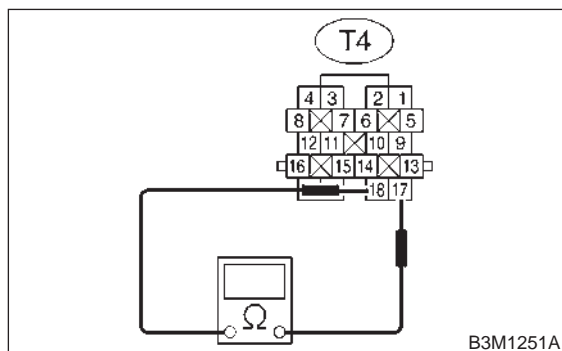
- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 8G6.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8G6 : CHECK VEHICLE SPEED SENSOR 2.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector receptacle's terminals.

Connector & terminal

(T4) No. 17 — No. 18:



- CHECK** : Is the resistance between 450 and 650 Ω ?
- YES** : Go to step 8G7.
- NO** : Replace transmission harness connector. <Ref. to 3-2 [W11B0].>

8G7 : PREPARE OSCILLOSCOPE.

- CHECK** : Do you have oscilloscope?
- YES** : Go to step 8G10.
- NO** : Go to step 8G8.

8G8 : PREPARE SUBARU SELECT MONITOR.

- CHECK** : Do you have a Subaru Select Monitor?
- YES** : Go to step 8G11.
- NO** : Go to step 8G9.

8G9 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect all connectors.
- 2) Lift-up or raise the vehicle and place safety stands.

CAUTION:

On AWD models, raise all wheels off floor.

- 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition.

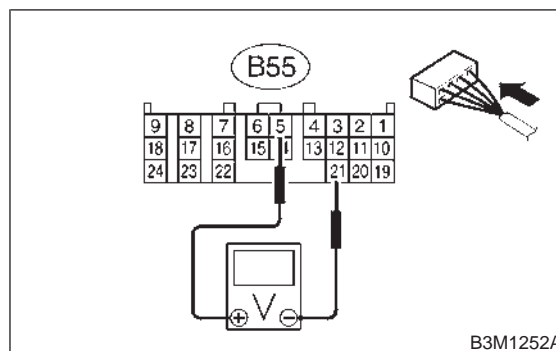
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 4) Measure voltage between TCM connector terminals.

Connector & terminal

(B55) No. 5 (+) — No. 21 (-):



- CHECK** : Is the voltage more than AC 1 V?
- YES** : Go to step 8G12.
- NO** : Go to step 8G19.

3-2 [T8G10] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

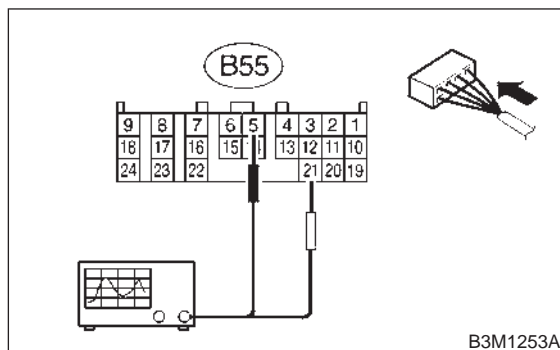
8G10 : CHECK VEHICLE SPEED SENSOR 2 USING OSCILLOSCOPE.

- 1) Connect all connectors.
- 2) Lift-up the vehicle and place safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Set oscilloscope to TCM connector terminals. Positive probe; (B55) No. 5
Earth lead; (B55) No. 21

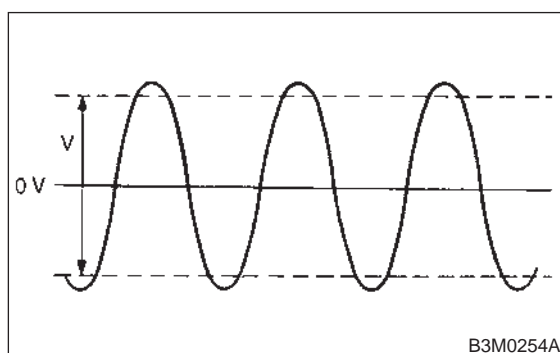


- 4) Start the engine, and drive the wheels slowly.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When AT control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system. <Ref. to 4-4 [T6D2].>

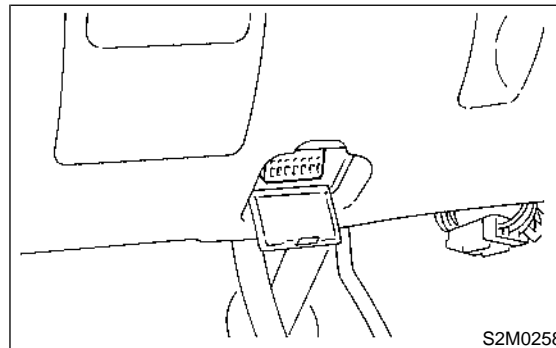
- 5) Measure signal voltage indicated on oscilloscope.



- CHECK** : Is the voltage more than AC 4 V?
- YES** : Go to step **8G12**.
- NO** : Go to step **8G19**.

8G11 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Connect all connectors.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Lift-up or raise the vehicle and place safety stands.

CAUTION:

On AWD models, raise all wheels off floor.

- 4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON.
- 5) Start the engine.
- 6) Read data of vehicle speed using Subaru Select Monitor.
 - Compare speedometer with Subaru Select Monitor indications.
 - Vehicle speed is indicated in "km/h" or "MPH".
- 7) Slowly increase vehicle speed to 60 km/h or 37 MPH.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- CHECK** : Does the speedometer indication increase as the Subaru Select Monitor data increases?

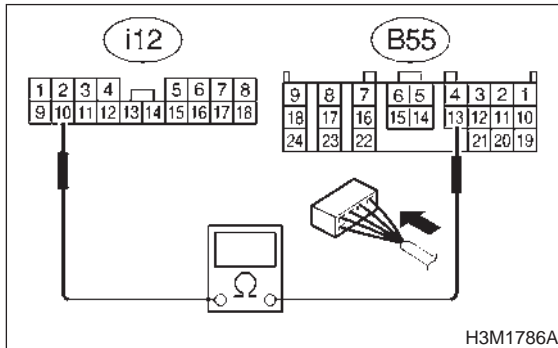
- YES** : Go to step **8G12**.
- NO** : Go to step **8G19**.

8G12 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from TCM and combination meter.
- 3) Measure resistance of harness between TCM and combination meter connector.

Connector & terminal

(B55) No. 13 — (i12) No. 10:



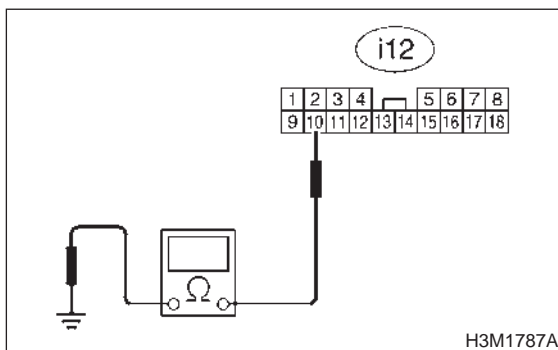
- CHECK** : **Is the resistance less than 1 Ω ?**
- YES** : Go to step **8G13**.
- NO** : Repair open circuit in harness between TCM and combination meter connector, and poor contact in coupling connector.

8G13 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

Measure resistance of harness between combination meter and chassis ground.

Connector & terminal

(i12) No. 10 — Chassis ground:



- CHECK** : **Is the resistance more than 1 $M\Omega$?**
- YES** : Go to step **8G14**.
- NO** : Repair short circuit in harness between TCM and combination meter connector.

8G14 : PREPARE OSCILLOSCOPE.

- CHECK** : **Do you have oscilloscope?**
- YES** : Go to step **8G17**.
- NO** : Go to step **8G15**.

8G15 : PREPARE SUBARU SELECT MONITOR.

- CHECK** : **Do you have a Subaru Select Monitor?**
- YES** : Go to step **8G18**.
- NO** : Go to step **8G16**.

3-2 [T8G16] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

8G16 : CHECK OUTPUT SIGNAL FOR TCM.

- 1) Connect all connectors.
- 2) Lift-up the vehicle and place safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Set vehicle in 10 km/h (6 MPH) condition.

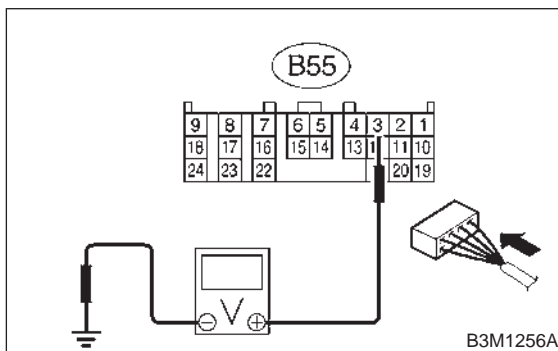
NOTE:

The speed difference between front and rear wheels may light ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure on on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 4) Measure voltage between TCM connector terminals.

Connector & terminal

(B55) No. 3 — Chassis ground:



CHECK : **Is the voltage less than 1 V ←→ more than 4 V?**

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM.

NO : Go to step **8G19**.

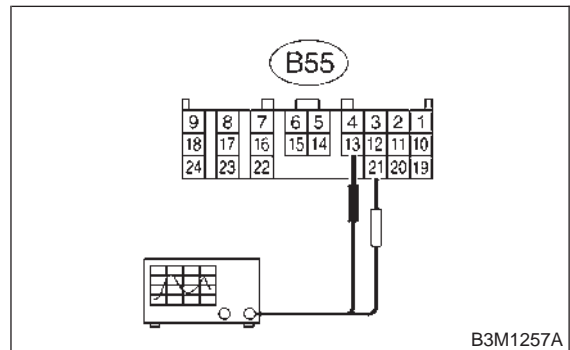
8G17 : CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.

- 1) Connect connectors to TCM and combination meter.
- 2) Lift-up or raise the vehicle and place safety stands.

CAUTION:

On AWD models, raise all wheels off floor.

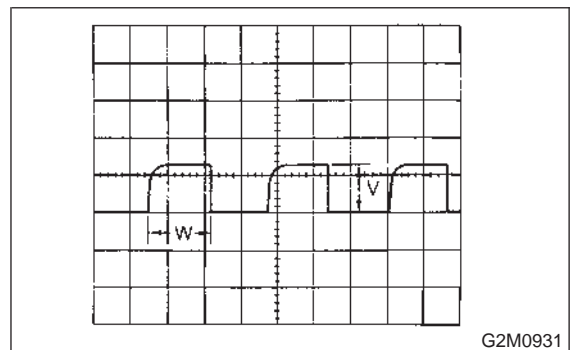
- 3) Set oscilloscope to TCM connector terminals.
Positive probe; (B55) No. 13
Earth lead; (B55) No. 21



- 4) Start the engine.
- 5) Shift on the gear position, and keep the vehicle speed at constant.
- 6) Measure signal voltage indicated on oscilloscope.

NOTE:

- If vehicle speed increases, the width of amplitude (W) decreases.
- The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>



CHECK : **Is the voltage more than AC 2 V?**

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM.

NO : Go to step **8G19**.

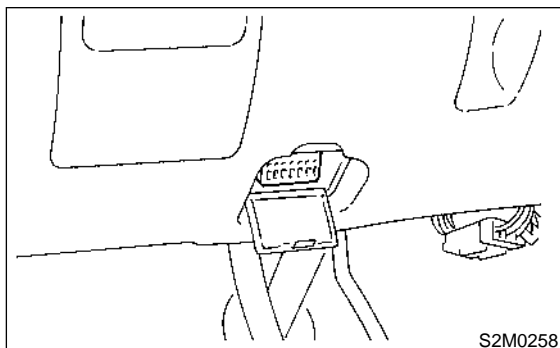
8G18 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Connect all connectors.
- 2) Lift-up the vehicle and place safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Connect Subaru Select Monitor to data link connector.



- 4) Turn ignition switch to ON and Subaru Select Monitor switch to ON.
- 5) Start the engine, and drive all wheels.
- 6) Read data of vehicle speed using Subaru Select Monitor.
 - Compare speedometer with Subaru Select Monitor indications.
 - Vehicle speed is indicated in "km/h" or "MPH".
- 7) Slowly increase vehicle speed to 60 km/h or 37 MPH.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : ***Does the speedometer indication increase as the Subaru Select Monitor data increases?***

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM.

NO : Go to step **8G19**.

8G19 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in vehicle speed sensor 2 circuit?***

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

MEMO:

H: TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR

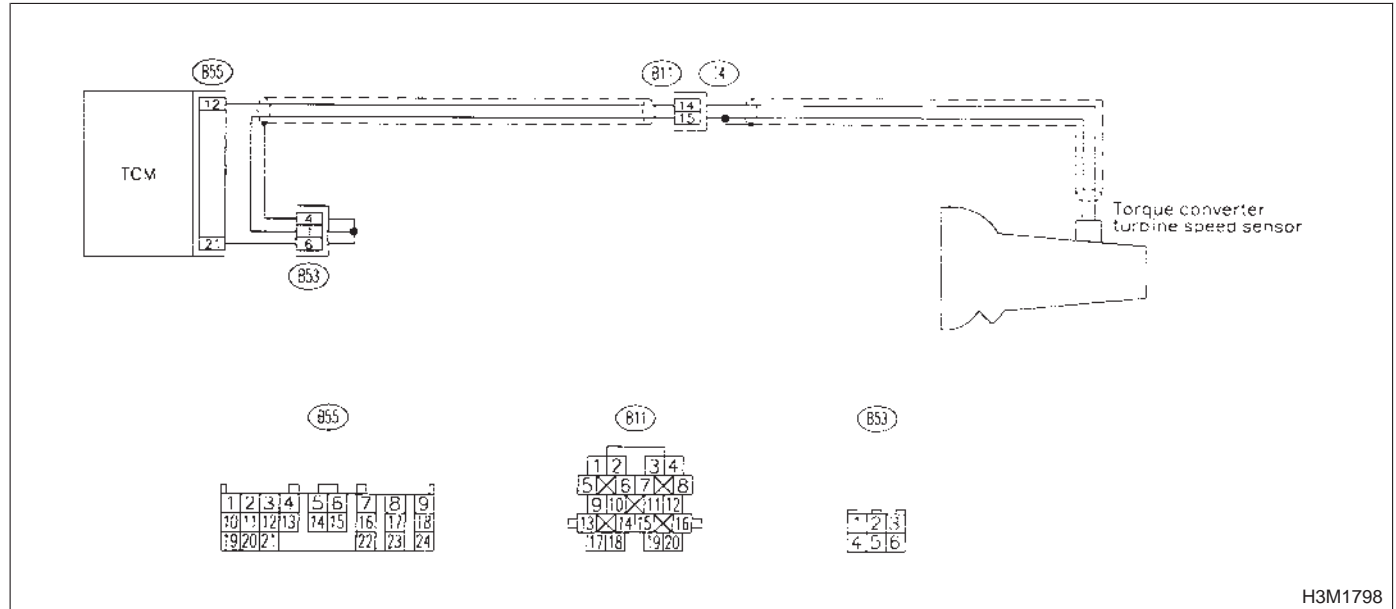
DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

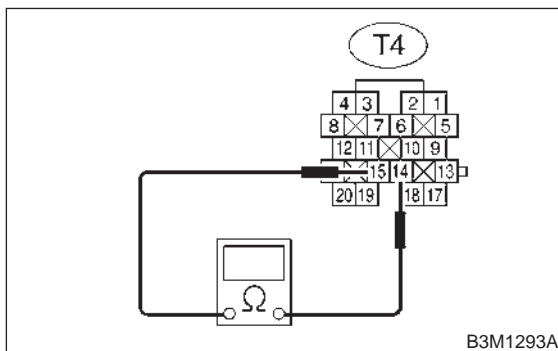


8H1 : CHECK TORQUE CONVERTER TURBINE SPEED SENSOR 1.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector receptacle's terminals.

Connector & terminal

(T4) No. 14 — No. 15:



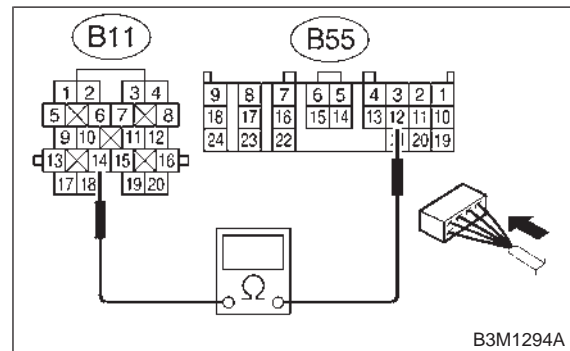
- CHECK** : Is the resistance between 450 and 650 Ω ?
- YES** : Go to step 8H2.
- NO** : Replace turbine speed sensor. <Ref. to 3-2 [W11B0].>

8H2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

- 1) Disconnect connector from TCM.
- 2) Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 12 — (B11) No. 14:



- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8H3.
- NO** : Repair open circuit in harness between TCM and transmission connector.

3-2 [T8H3] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

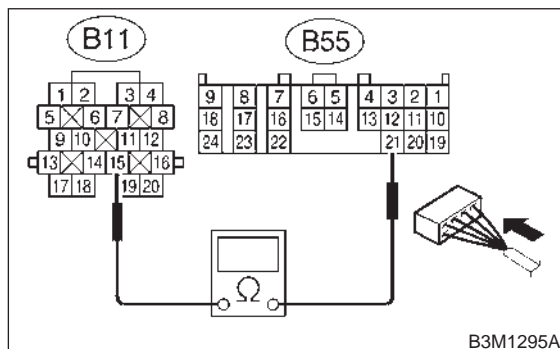
8. Diagnostic Chart with Trouble Code

8H3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 21 — (B11) No. 15:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 8H4.

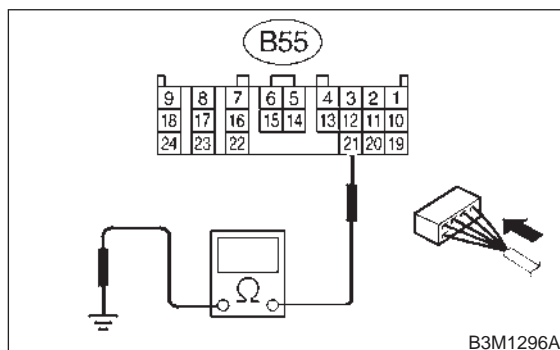
NO : Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.

8H4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 21 — Chassis ground:



CHECK : Is the resistance more than 1 $M\Omega$?

YES : Go to step 8H5.

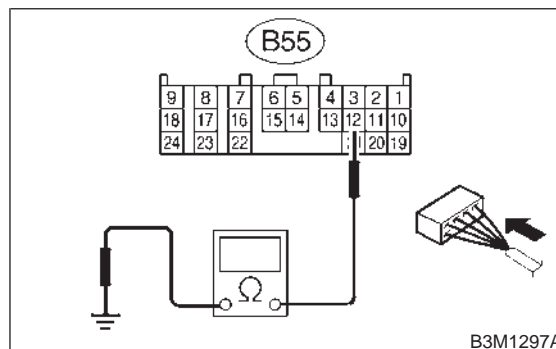
NO : Repair short circuit in harness between TCM and transmission connector.

8H5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 12 — Chassis ground:



CHECK : Is the resistance more than 1 $M\Omega$?

YES : Go to step 8H6.

NO : Repair short circuit in harness between TCM and transmission connector.

8H6 : PREPARE OSCILLOSCOPE.

CHECK : Do you have oscilloscope?

YES : Go to step 8H10.

NO : Go to step 8H7.

8H7 : PREPARE SUBARU SELECT MONITOR.

CHECK : Do you have a Subaru Select Monitor?

YES : Go to step 8H9.

NO : Go to step 8H8.

8H8 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect connectors to TCM and transmission.
- 2) Lift-up or raise the vehicle and place safety stands.

CAUTION:

Raise all wheels off floor.

- 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition.

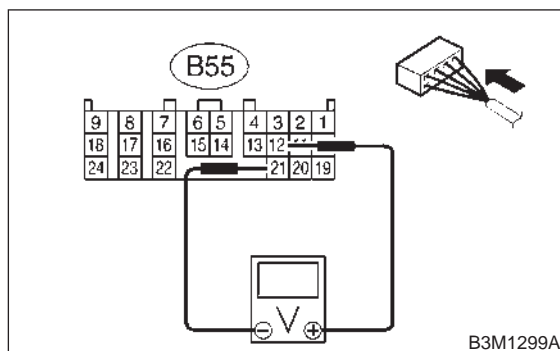
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 4) Measure voltage between TCM connector terminals.

Connector & terminal

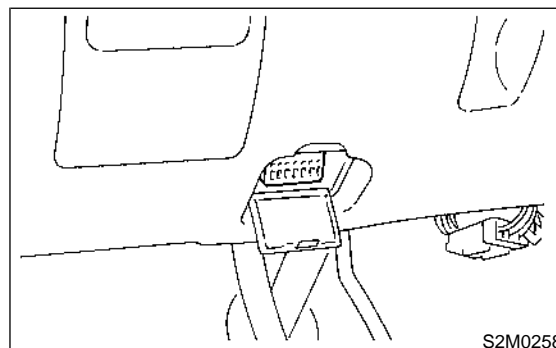
(B55) No. 12 (+) — No. 21 (-):



- CHECK** : **Is the voltage more than AC 1 V?**
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.
- NO** : Go to step **8H11**.

8H9 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Connect connectors to TCM and transmission.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Lift-up or raise the vehicle and place safety stands.

CAUTION:

Raise all wheels off floor.

- 4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON.
- 5) Start the engine.
- 6) Read data of vehicle speed using Subaru Select Monitor.
 - Compare speedometer with Subaru Select Monitor indications.
 - Vehicle speed is indicated in "km/h" or "MPH".
- 7) Slowly increase vehicle speed to 20 km/h or 12 MPH.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- CHECK** : **Is the revolution value same as the tachometer reading shown on the combination meter?**
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.
- NO** : Go to step **8H11**.

3-2 [T8H10] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

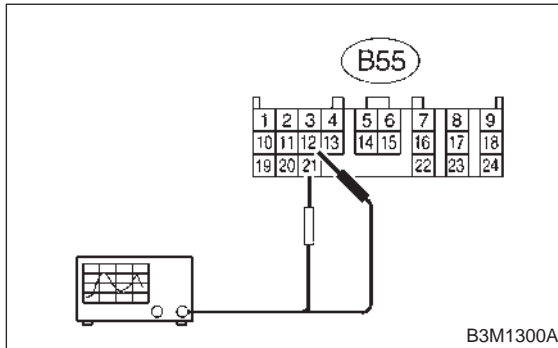
8H10 : CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.

- 1) Connect connectors to TCM and transmission.
- 2) Lift-up or raise the vehicle and place safety stands.

CAUTION:

Raise all wheels off floor.

- 3) Set oscilloscope to TCM connector terminals.
Positive probe; (B55) No. 12
Earth lead; (B55) No. 21

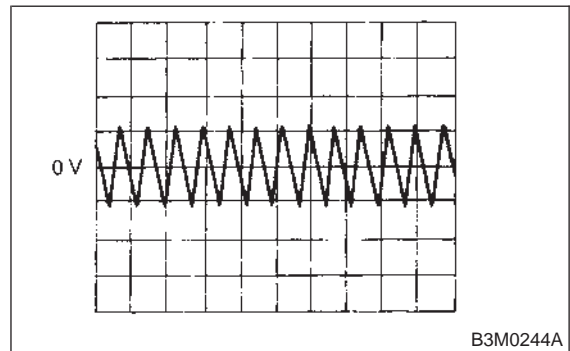


- 4) Start the engine and set vehicle in 20 km/h (12 MPH) condition.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 5) Measure signal voltage indicated on oscilloscope.



CHECK : *Is the signal voltage more than AC 1 V?*

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.

NO : Go to step **8H11**.

8H11 : CHECK POOR CONTACT.

CHECK : *Is there poor contact in vehicle speed sensor 1 circuit?*

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

I: TROUBLE CODE 38 — TORQUE CONTROL SIGNAL —

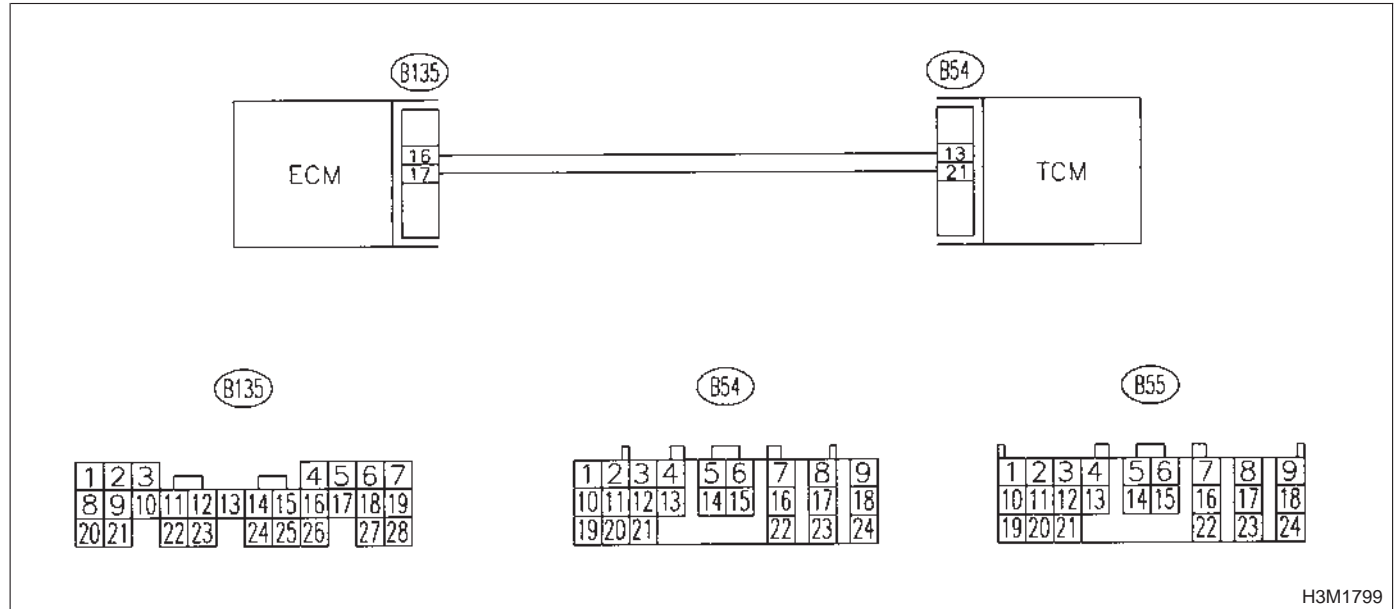
DIAGNOSIS:

- The signal circuit is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

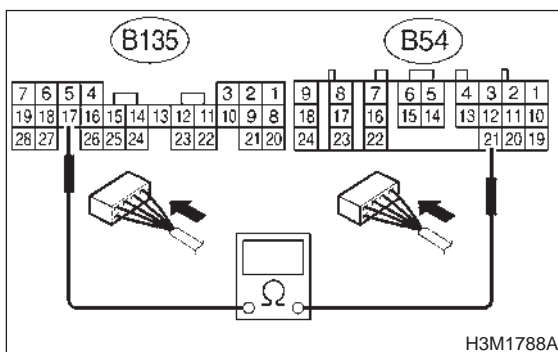


811 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from TCM and ECM.
- 3) Measure resistance of harness between TCM and ECM connector.

Connector & terminal

(B54) No. 21 — (B135) No. 17:



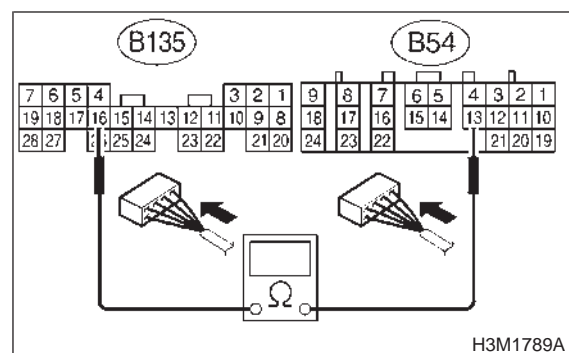
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 812.
- NO** : Repair open circuit in harness between TCM and ECM connector.

812 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM and ECM connector.

Connector & terminal

(B54) No. 13 — (B135) No. 16:



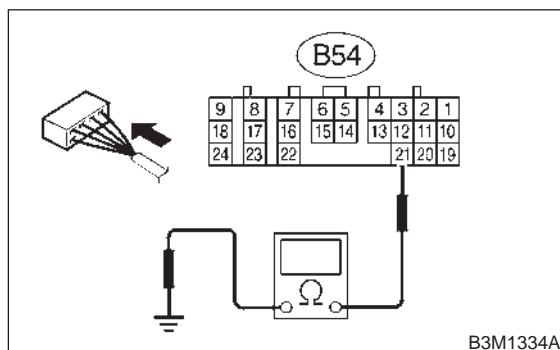
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 813.
- NO** : Repair open circuit in harness between TCM and ECM connector.

8I3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B54) No. 21 — Chassis ground:



CHECK : Is the resistance more than 1 MΩ?

YES : Go to step 8I4.

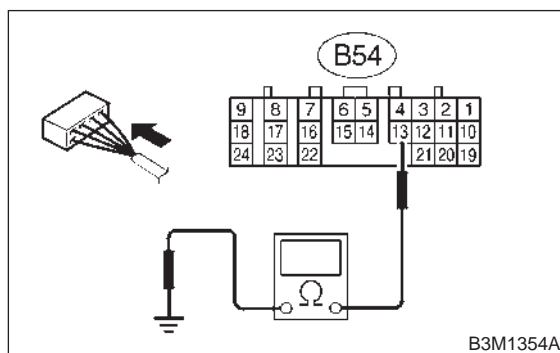
NO : Repair short circuit in harness between TCM and ECM connector.

8I4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B54) No. 13 — Chassis ground:



CHECK : Is the resistance more than 1 MΩ?

YES : Go to step 8I5.

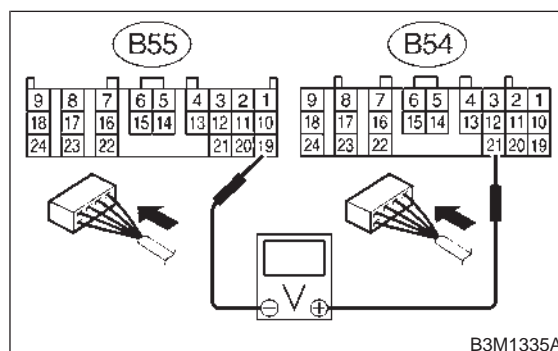
NO : Repair short circuit in harness between TCM and ECM connector.

8I5 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Connect connectors to TCM and ECM.
- 2) Turn ignition switch to ON (engine OFF).
- 3) Measure voltage between TCM connector terminals.

Connector & terminal

(B54) No. 21 (+) — (B55) No. 19:



CHECK : Is the voltage more than 9 V?

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.

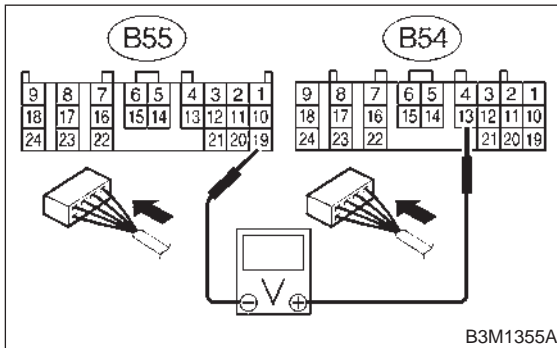
NO : Go to step 8I6.

8I6 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminals.

Connector & terminal

(B54) No. 13 (+) — (B55) No. 19 (-):



- CHECK** : **Is the voltage more than 9 V?**
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
- NO** : Go to step **8I7**.

8I7 : CHECK POOR CONTACT.

- CHECK** : **Is there poor contact in torque control signal circuit?**
- YES** : Repair poor contact.
- NO** : Go to step **8I8**.

8I8 : CONFIRM TROUBLE CODE 38.

- CHECK** : **Replace ECM with a new one. Does the trouble code appear again, after the memory has been cleared?**
- YES** : Replace TCM. <Ref. to 3-2 [W22A0].>
- NO** : Replace ECM. <Ref. to 2-7 [W15A0].>

MEMO:

J: TROUBLE CODE 45 — AT LOAD SIGNAL (2200 cc CALIFORNIA SPEC. VEHICLES) —

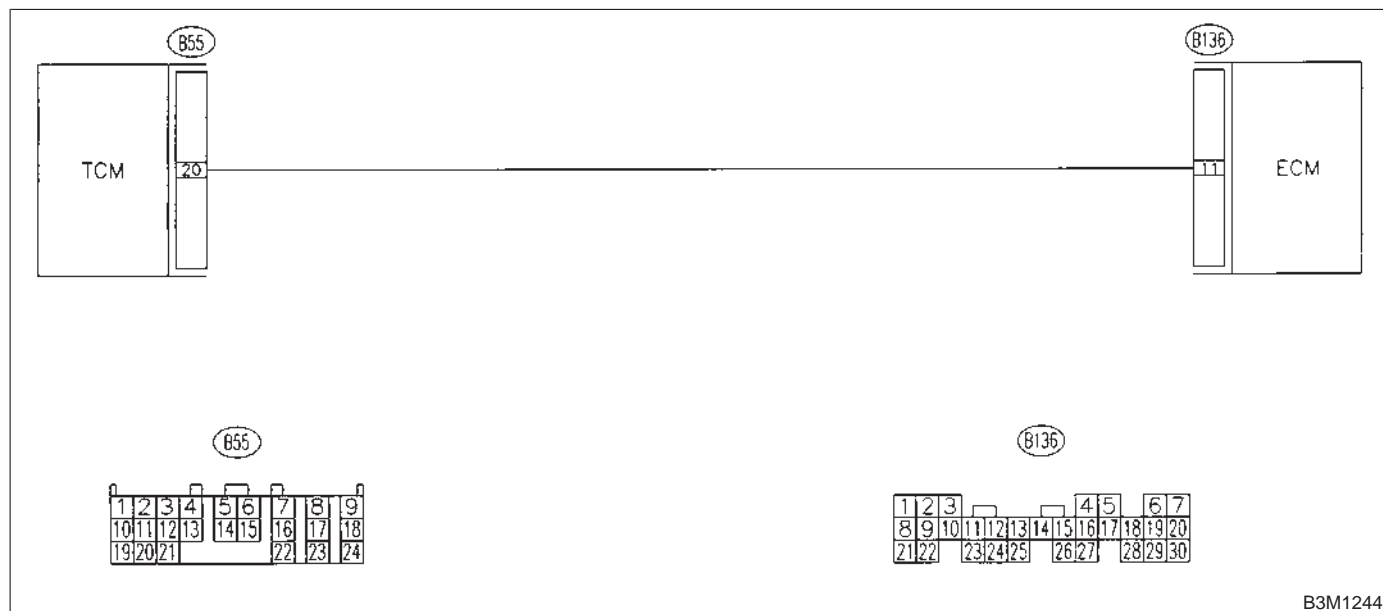
DIAGNOSIS:

Input signal circuit of TCM from ECM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

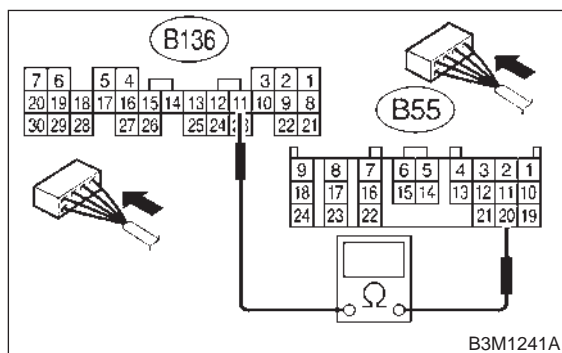


8J1 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from TCM and ECM.
- 3) Measure resistance of harness between TCM and ECM connector.

Connector & terminal

(B55) No. 20 — (B136) No. 11:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 8J2.

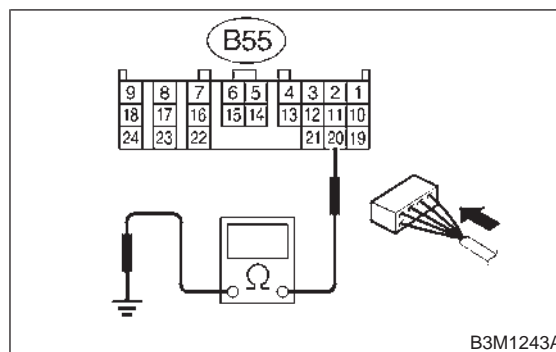
NO : Repair open circuit in harness between TCM and ECM connector.

8J2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B55) No. 20 — Chassis ground:



CHECK : Is the resistance more than 1 MΩ?

YES : Go to step 8J3.

NO : Repair short circuit in harness between TCM and ECM connector.

3-2 [T8J3] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

8J3 : PREPARE SUBARU SELECT MONITOR.

- CHECK** : *Do you have a Subaru Select Monitor?*
- YES** : Go to step **8J5**.
- NO** : Go to step **8J4**.

8J4 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect connectors to TCM and ECM.
- 2) Start the engine, and warm-up the transmission until ATF temperature is above 80°C (176°F).

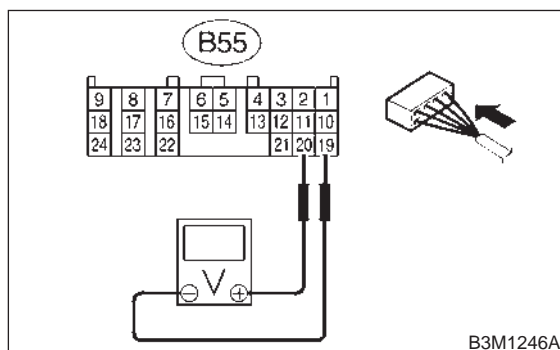
NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 3) Engine idling.
- 4) Measure voltage between TCM connectors.

Connector & terminal

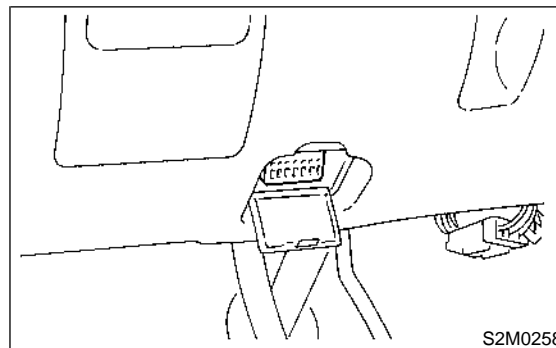
(B55) No. 20 (+) — No. 19 (-):



- CHECK** : *Is the voltage between 1.2 and 1.8 V?*
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
- NO** : Go to step **8J6**.

8J5 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Connect connectors to TCM and ECM.
- 2) Turn ignition switch to OFF.
- 3) Connect Subaru Select Monitor to data link connector.



- 4) Start the engine, and turn Subaru Select monitor switch to ON.
 - 5) Warm-up the engine until engine coolant temperature is above 80°C (176°F).
 - 6) Engine idling.
 - 7) Read data of mass air flow signal using Subaru Select Monitor.
- Display shows mass air flow signal value sent from ECM.

- CHECK** : *Is the value between 1.2 and 1.8 V?*
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
- NO** : Go to step **8J6**.

8J6 : CHECK POOR CONTACT.

- CHECK** : *Is there poor contact in mass air flow signal circuit?*
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

K: TROUBLE CODE 71 — SHIFT SOLENOID 1 —

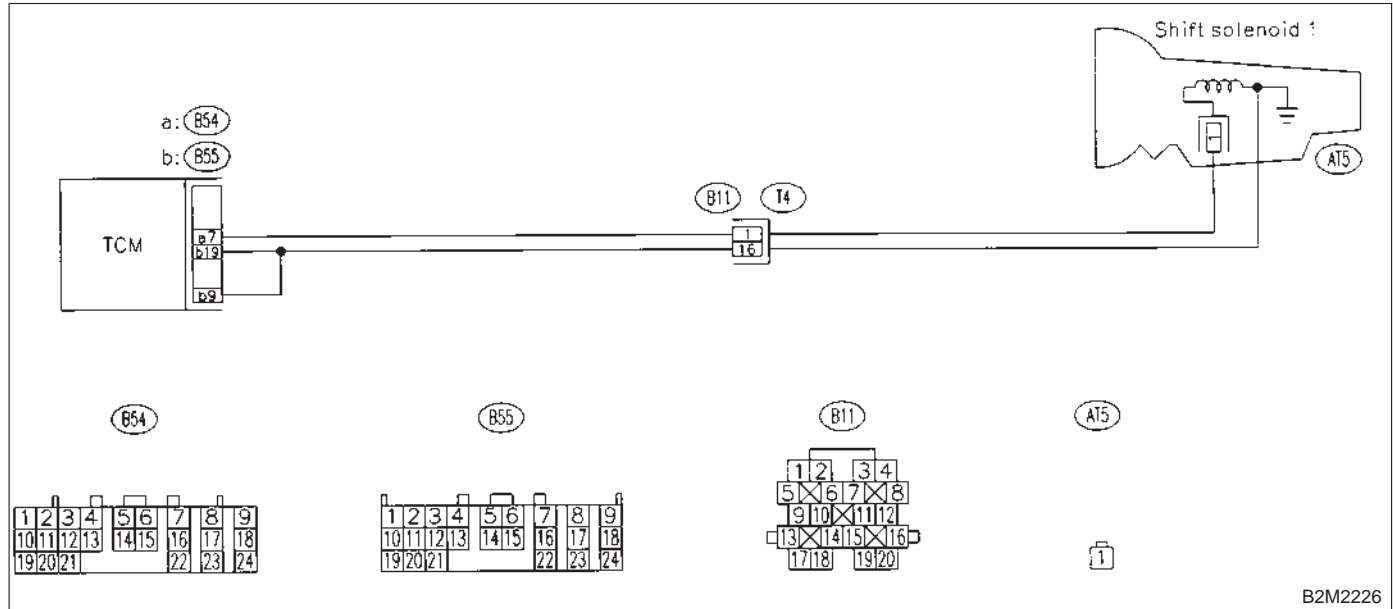
DIAGNOSIS:

Output signal circuit of shift solenoid 1 is open or shorted.

TROUBLE SYMPTOM:

Does not shift.

WIRING DIAGRAM:

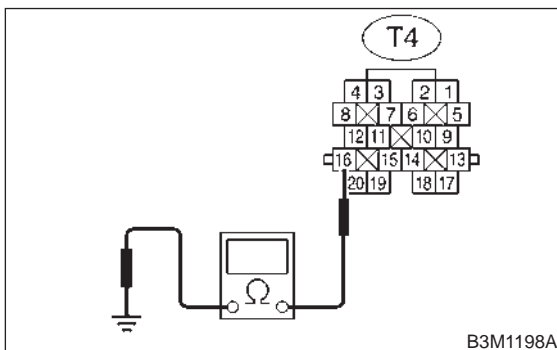


8K1 : CHECK SHIFT SOLENOID 1 GROUND LINE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 16 — Chassis ground:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 8K2.

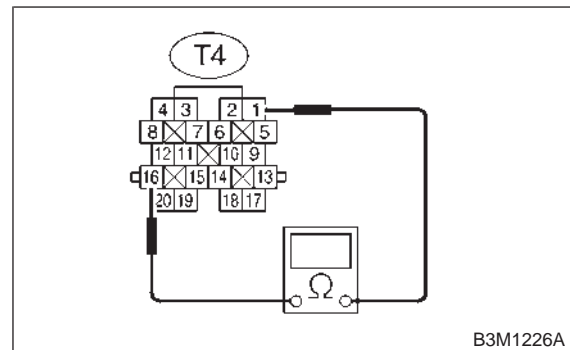
NO : Repair open circuit in transmission harness.

8K2 : CHECK SHIFT SOLENOID 1.

Measure resistance between transmission connector terminals.

Connector & terminal

(T4) No. 1 — No. 16:



CHECK : Is the resistance between 10 and 16 Ω?

YES : Go to step 8K3.

NO : Go to step 8K9.

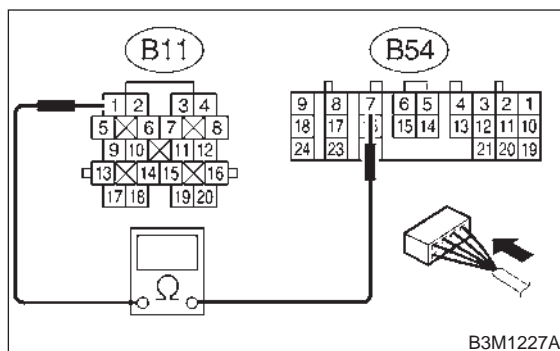
3-2 [T8K3] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

8K3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

- 1) Disconnect connector from TCM.
- 2) Measure resistance of harness between TCM and shift solenoid 1 connector.

Connector & terminal
(B54) No. 7 — (B11) No. 1:

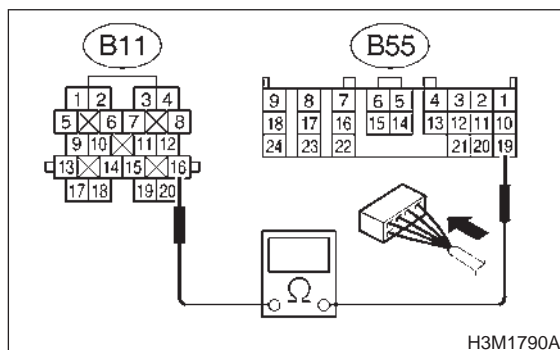


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8K4.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8K4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and shift solenoid 1 connector.

Connector & terminal
(B55) No. 19 — (B11) No. 16:

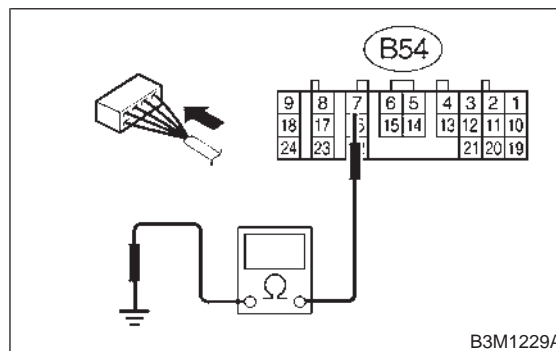


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8K5.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8K5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B54) No. 7 — Chassis ground:

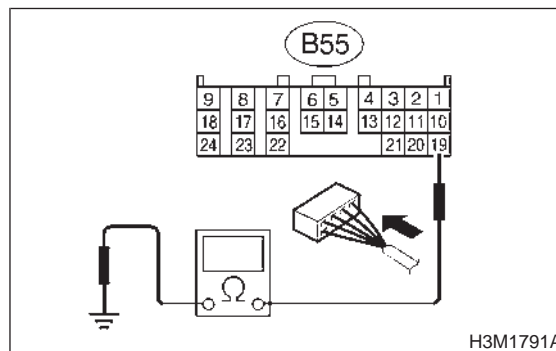


- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 8K6.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8K6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness TCM connector and transmission ground.

Connector & terminal
(B55) No. 19 — Chassis ground:



- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 8K7.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8K7 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Connect connectors to TCM and transmission.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 4) Move selector lever to "D", and slowly increase vehicle speed to 50 km/h (31 MPH).

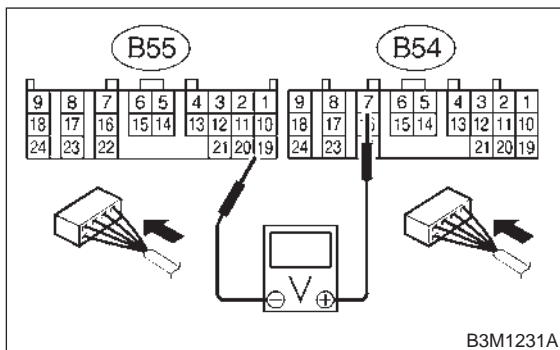
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 5) Measure voltage between TCM connector terminals.

Connector & terminal

(B54) No. 7 (+) — (B55) No. 19 (-):



- CHECK** : **Is the voltage 1 V → 9 V?**
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM.
- NO** : Go to step **8K8**.

8K8 : CHECK POOR CONTACT.

- CHECK** : **Is there poor contact in shift solenoid 1 circuit?**

- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

8K9 : CHECK SHIFT SOLENOID 1 (IN TRANSMISSION).

- 1) Remove transmission connector from bracket.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Drain automatic transmission fluid.

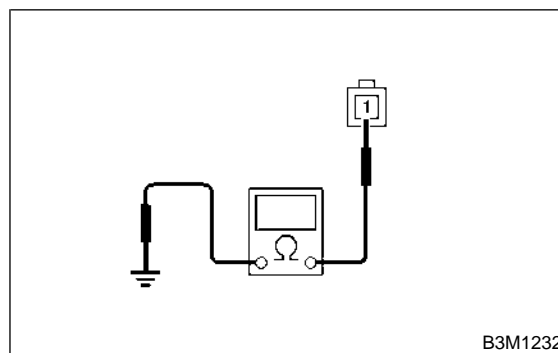
CAUTION:

Do not drain the automatic transmission fluid until it cools down.

- 4) Remove oil pan, and disconnect connector from shift solenoid 1.
- 5) Measure resistance between shift solenoid 1 connector and transmission ground.

Terminal

No. 1 — Transmission ground:



- CHECK** : **Is the resistance between 10 and 16 Ω?**
- YES** : Go to step **8K10**.
- NO** : Replace shift solenoid 1. <Ref. to 3-2 [W4A0].>

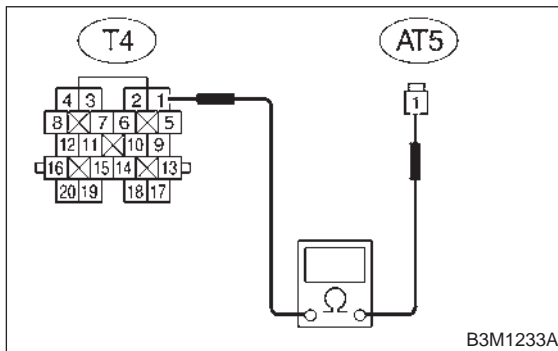
3-2 [T8K10] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

8K10 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.

Measure resistance of harness between shift solenoid 1 and transmission connector.

Connector & terminal
(AT5) No. 1 — (T4) No. 1:

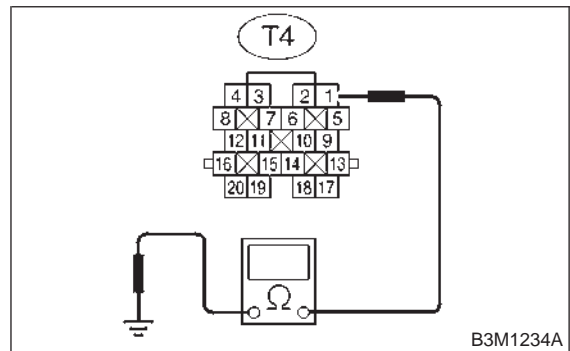


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8K11.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8K11 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.

Measure resistance of harness between shift solenoid 1 connector and transmission ground.

Connector & terminal
(T4) No. 1 — Transmission ground:



- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in shift solenoid 1 and transmission.
- NO** : Repair short circuit harness between TCM and transmission connector.

L: TROUBLE CODE 72 — SHIFT SOLENOID 2 —

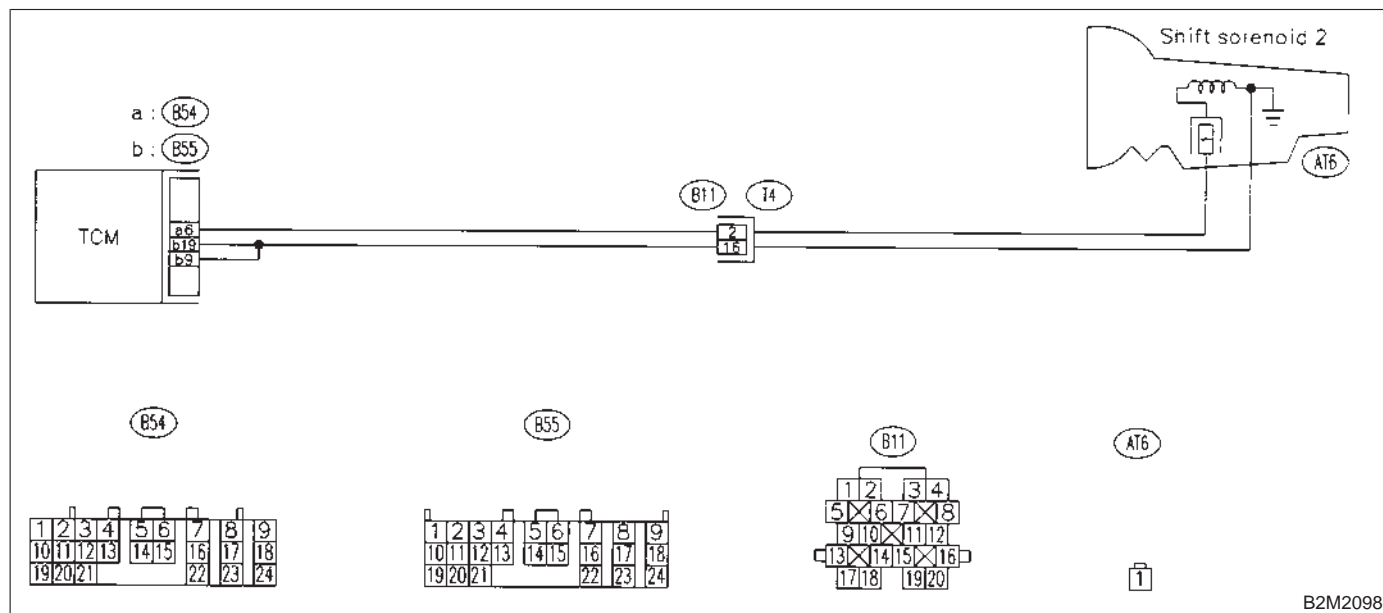
DIAGNOSIS:

Output signal circuit of shift solenoid 2 is open or shorted.

TROUBLE SYMPTOM:

Does not shift.

WIRING DIAGRAM:

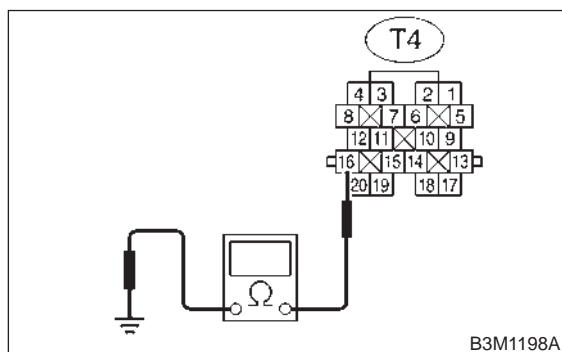


8L1 : CHECK SHIFT SOLENOID 2 GROUND LINE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 16 — Chassis ground:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 8L2.

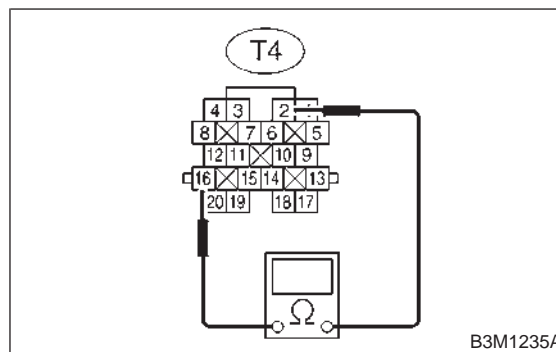
NO : Repair open circuit in transmission harness.

8L2 : CHECK SHIFT SOLENOID 2.

Measure resistance between transmission connector terminals.

Connector & terminal

(T4) No. 2 — No. 16:



CHECK : Is the resistance between 10 and 16 Ω?

YES : Go to step 8L3.

NO : Go to step 8L9.

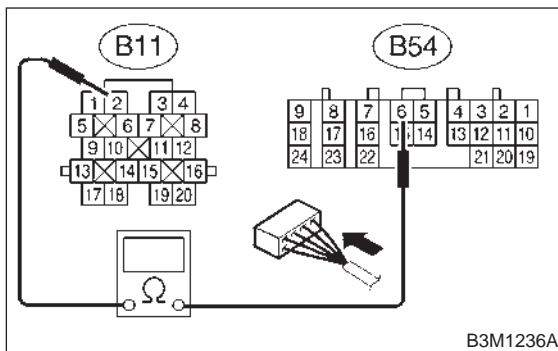
3-2 [T8L3] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

8L3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

- 1) Disconnect connector from TCM.
- 2) Measure resistance of harness between TCM and shift solenoid 2 connector.

Connector & terminal
(B54) No. 6 — (B11) No. 2:

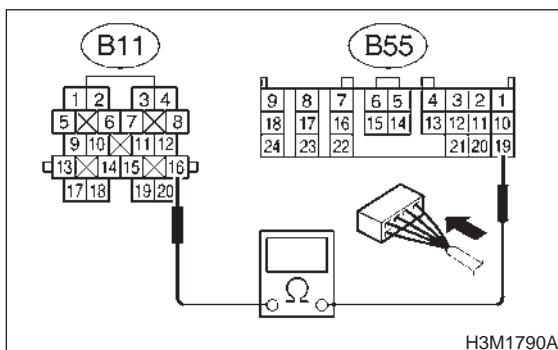


- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8L4.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8L4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and shift solenoid 2 connector.

Connector & terminal
(B55) No. 19 — (B11) No. 16:

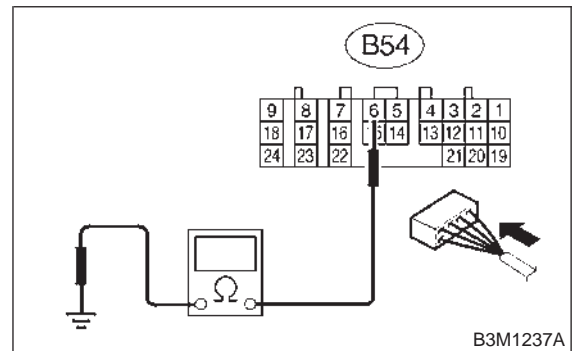


- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8L5.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8L5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B54) No. 6 — Chassis ground:

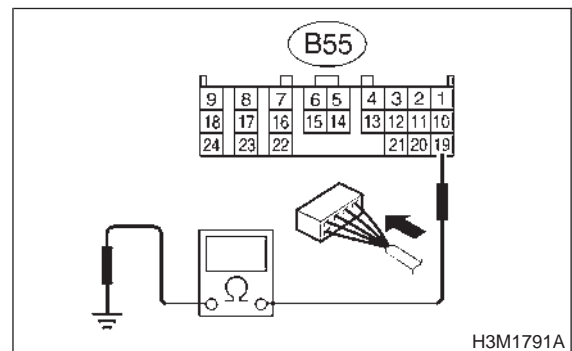


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 8L6.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8L6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B55) No. 19 — Chassis ground:



- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 8L7.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8L7 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Connect connectors to TCM and transmission.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Start the engine, and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 4) Move selector lever to "D", and slowly increase vehicle speed to 50 km/h (31 MPH).

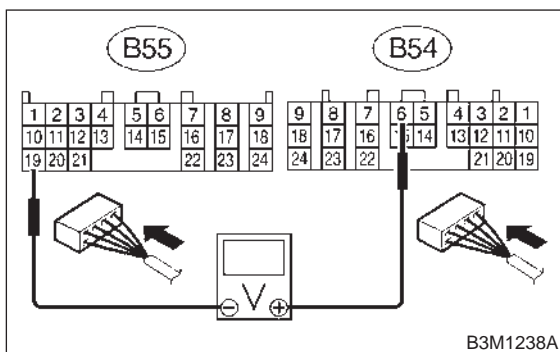
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 5) Measure voltage between TCM connector terminals.

Connector & terminal

(B54) No. 6 (+) — (B55) No. 19:



CHECK : **Is the voltage 9 V → 1 V?**

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.

NO : Go to step **8L8**.

8L8 : CHECK POOR CONTACT.

CHECK : **Is there poor contact in shift solenoid 2 circuit?**

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

8L9 : CHECK SHIFT SOLENOID 2 (IN TRANSMISSION).

- 1) Remove transmission connector from bracket.
- 2) Drain automatic transmission fluid.

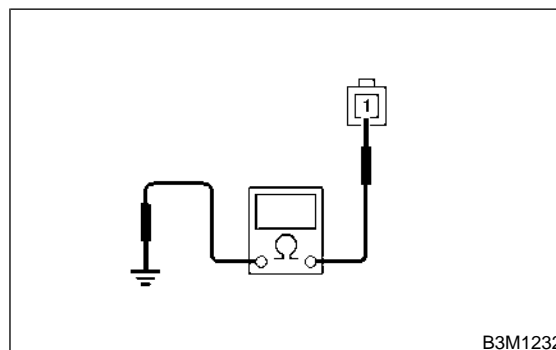
CAUTION:

Do not drain the automatic transmission fluid until it cools down.

- 3) Remove oil pan, and disconnect connector from shift solenoid 2.
- 4) Measure resistance between shift solenoid 2 connector and transmission ground.

Connector & terminal

No. 1 — Transmission ground:



CHECK : **Is the resistance between 10 and 16 Ω?**

YES : Go to step **8L10**.

NO : Replace shift solenoid assembly. <Ref. to 3-2 [W4A0].>

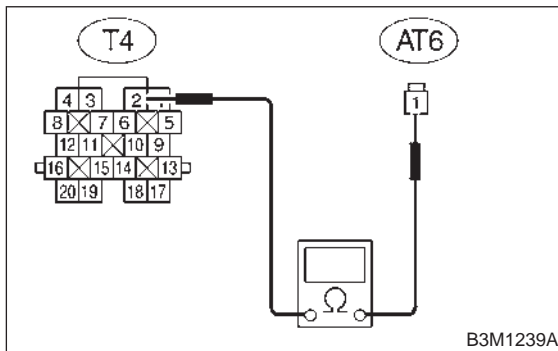
3-2 [T8L10] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

8L10 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.

Measure resistance of harness between shift solenoid 2 and transmission connector.

Connector & terminal
(AT6) No. 1 — (T4) No. 2:

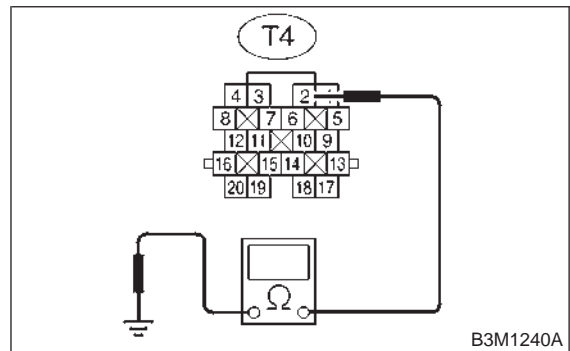


- CHECK** : **Is the resistance less than 1 Ω ?**
- YES** : Go to step 8L11.
- NO** : Repair open circuit in harness between shift solenoid 2 and transmission connector.

8L11 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.

Measure resistance of harness between shift solenoid 2 connector and transmission ground.

Connector & terminal
(T4) No. 2 — Transmission ground:



- CHECK** : **Is the resistance more than 1 $M\Omega$?**
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.
- NO** : Repair short circuit harness between TCM and transmission connector.

M: TROUBLE CODE 73 — LOW CLUTCH TIMING SOLENOID —

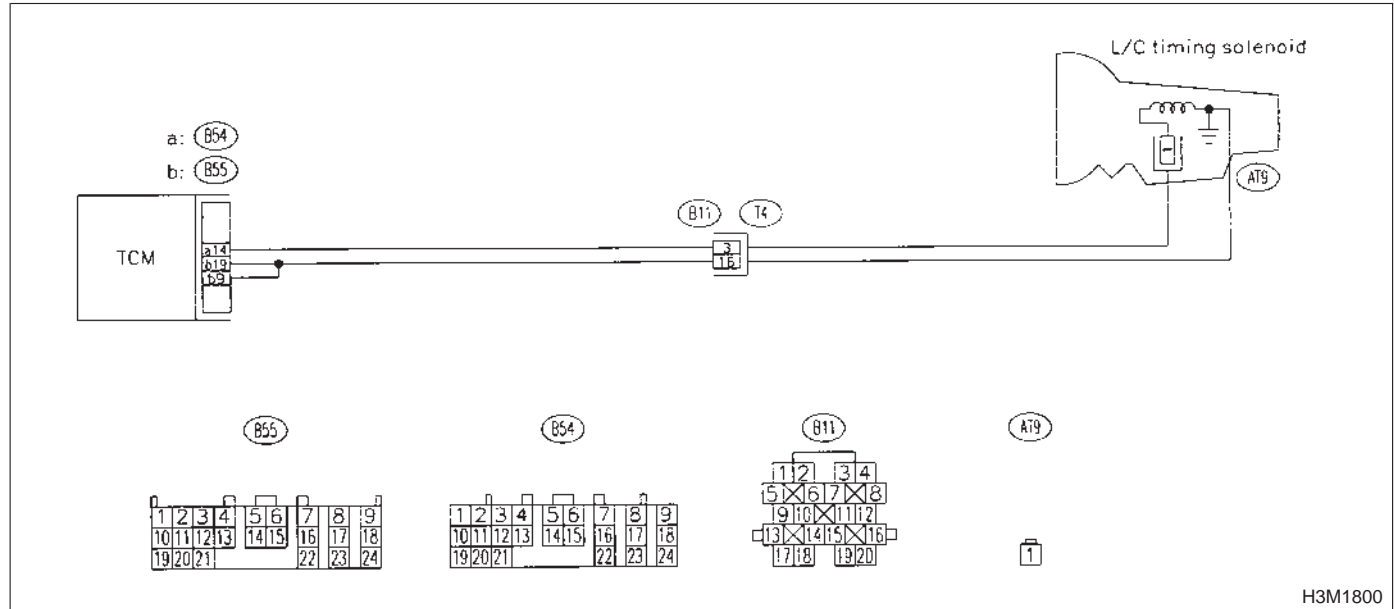
DIAGNOSIS:

Output signal circuit of low clutch timing solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

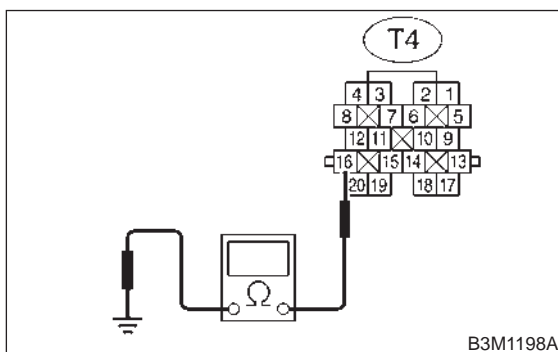


8M1 : CHECK LOW CLUTCH TIMING SOLENOID GROUND LINE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 16 — Chassis ground:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 8M2.

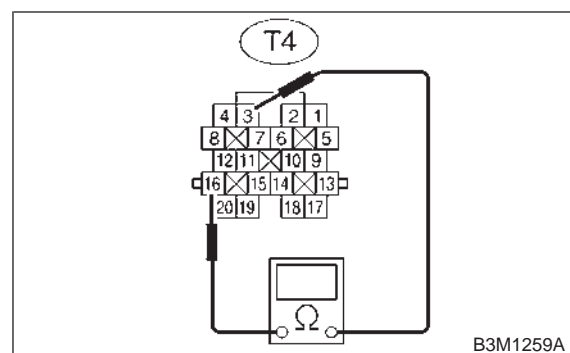
NO : Repair open circuit in transmission harness.

8M2 : CHECK LOW CLUTCH TIMING SOLENOID.

Measure resistance between transmission connector terminals.

Connector & terminal

(T4) No. 3 — No. 16:



CHECK : Is the resistance between 10 and 16 Ω?

YES : Go to step 8M3.

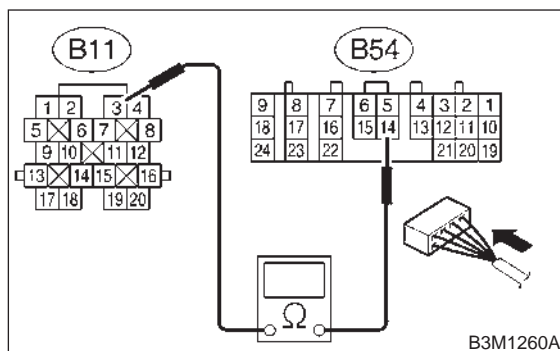
NO : Go to step 8M10.

8M3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

- 1) Disconnect connector from TCM.
- 2) Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B54) No. 14 — (B11) No. 3:



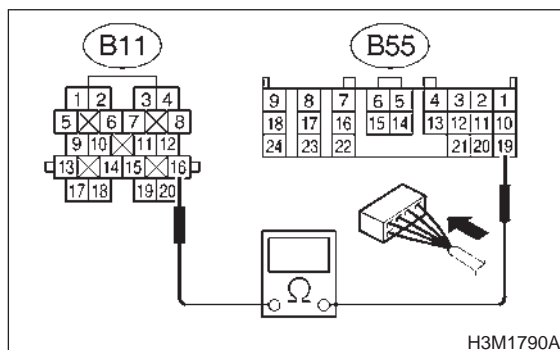
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8M4.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8M4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 19 — (B11) No. 16:



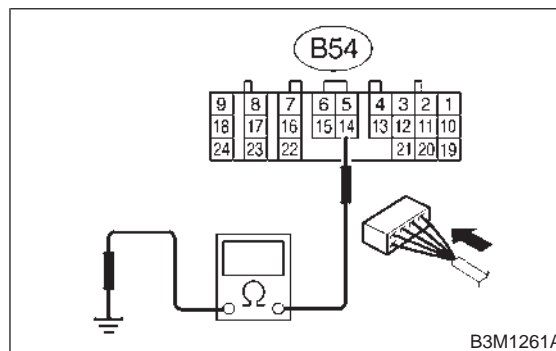
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8M5.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8M5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal

(B54) No. 14 — Chassis ground:



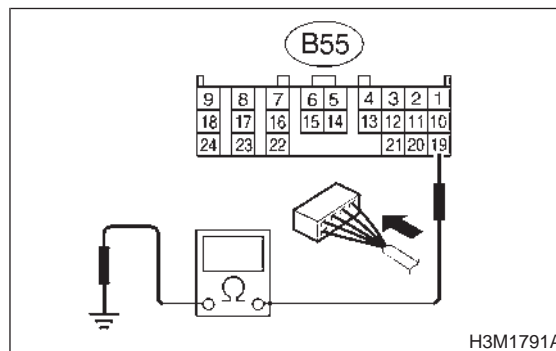
- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 8M6.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8M6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal

(B55) No. 19 — Chassis ground:



- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 8M7.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8M7 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Connect connectors to TCM and transmission.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 4) Move selector lever to "2", and slowly increase vehicle speed to 35 km/h (22 MPH).

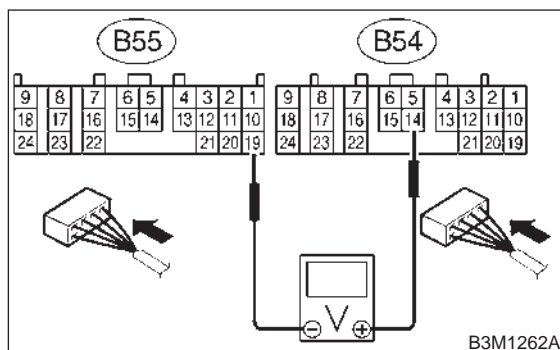
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 5) Measure voltage between TCM connector terminals.

Connector & terminal

(B54) No. 14 (+) — (B55) No. 19 (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step **8M8**.

NO : Go to step **8M9**.

8M8 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Move selector lever to "D", and slowly increase vehicle speed to 65 km/h (40 MPH).

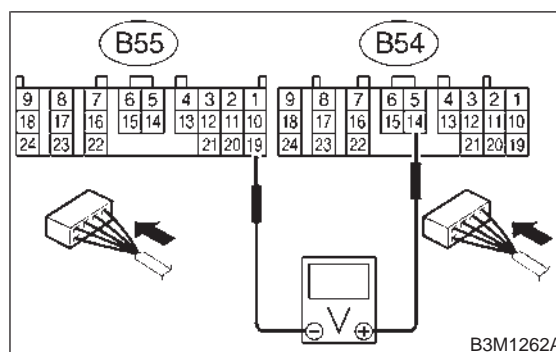
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 2) Measure voltage between TCM connector terminals.

Connector & terminal

(B54) No. 14 (+) — (B55) No. 19 (-):



CHECK : Is the voltage more than 9 V?

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.

NO : Go to step **8M9**.

8M9 : CHECK POOR CONTACT.

CHECK : Is there poor contact in low clutch timing solenoid circuit?

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

3-2 [T8M10] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

8M10 : CHECK LOW CLUTCH TIMING SOLENOID (IN TRANSMISSION).

- 1) Remove transmission connector from bracket.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Drain automatic transmission fluid.

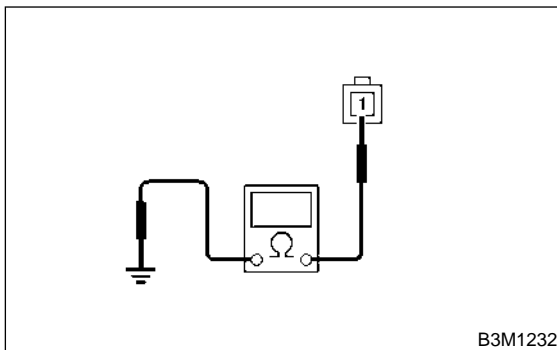
CAUTION:

Do not drain the automatic transmission fluid until it cools down.

- 4) Remove oil pan, and disconnect connector from low clutch timing solenoid.
- 5) Measure resistance between low clutch timing solenoid connector and transmission ground.

Terminal

No. 1 — Transmission ground:



CHECK : Is the resistance between 10 and 16 Ω ?

YES : Go to step 8M11.

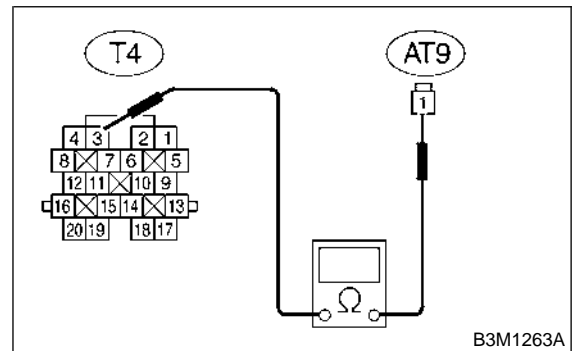
NO : Replace low clutch timing solenoid.
<Ref. to 3-2 [W4A0].>

8M11 : CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION.

Measure resistance of harness between low clutch timing solenoid and transmission connector.

Connector & terminal

(AT9) No. 1 — (T4) No. 3:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 8M12.

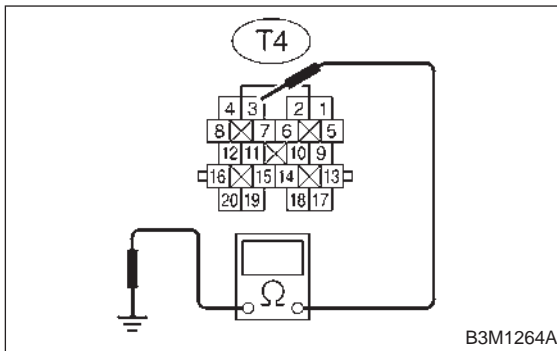
NO : Repair open circuit in harness between low clutch timing solenoid and transmission connector.

8M12 : CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION.

Measure resistance of harness between low clutch timing solenoid connector and transmission ground.

Connector & terminal

(T4) No. 3 — Transmission ground:



- CHECK** : **Is the resistance more than 1 MΩ?**
- YES** : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in low clutch timing solenoid and transmission.
- NO** : Repair short circuit harness between TCM and transmission connector.

MEMO:

N: TROUBLE CODE 74 — 2-4 BRAKE TIMING SOLENOID —

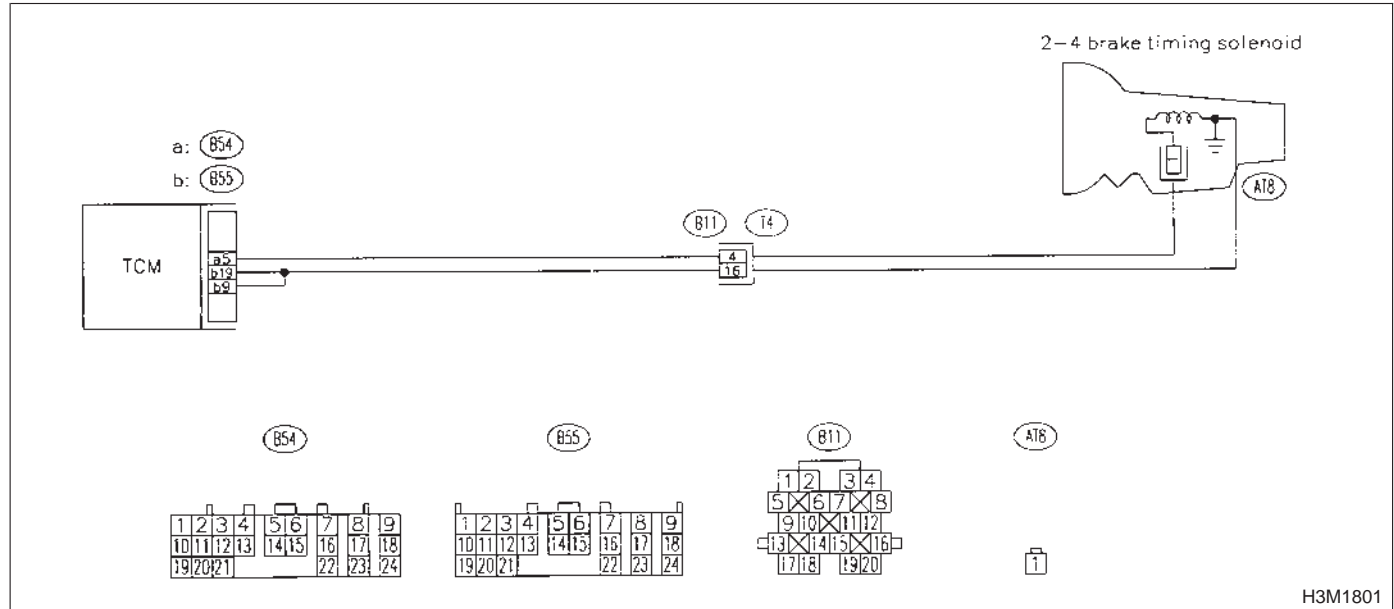
DIAGNOSIS:

Output signal circuit of 2-4 brake timing solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

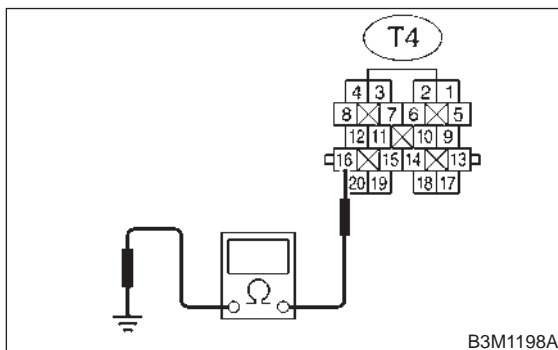


8N1 : CHECK 2-4 BRAKE TIMING SOLENOID GROUND LINE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 16 — Chassis ground:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 8N2.

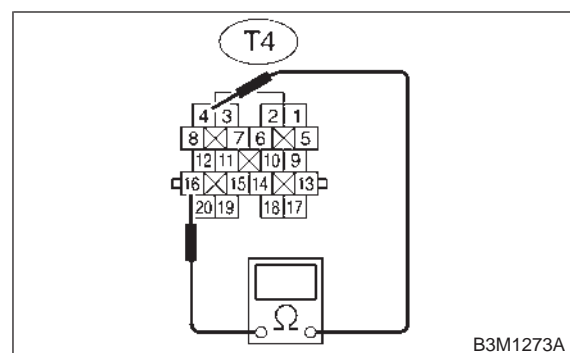
NO : Repair open circuit in transmission harness.

8N2 : CHECK 2-4 BRAKE TIMING SOLENOID.

Measure resistance between transmission connector terminals.

Connector & terminal

(T4) No. 4 — No. 16:



CHECK : Is the resistance between 10 and 16 Ω?

YES : Go to step 8N3.

NO : Go to step 8N10.

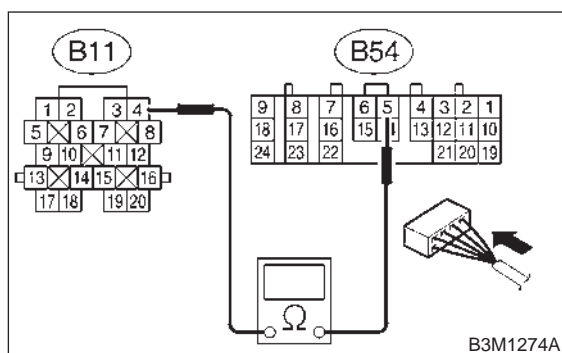
3-2 [T8N3] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

8N3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

- 1) Disconnect connector from TCM.
- 2) Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B54) No. 5 — (B11) No. 4:

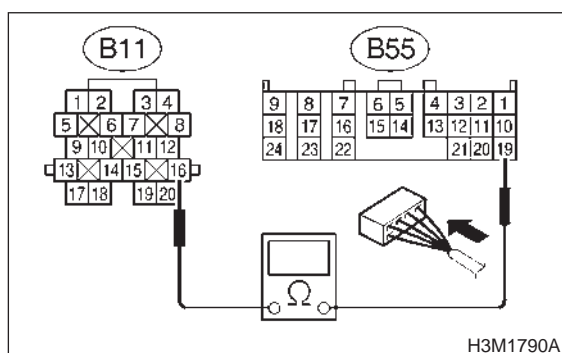


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8N4.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8N4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 19 — (B11) No. 16:

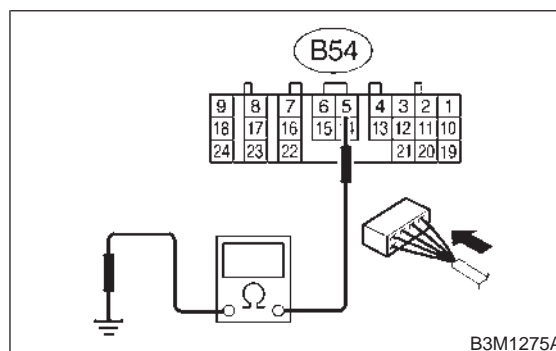


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8N5.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8N5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B54) No. 5 — Chassis ground:

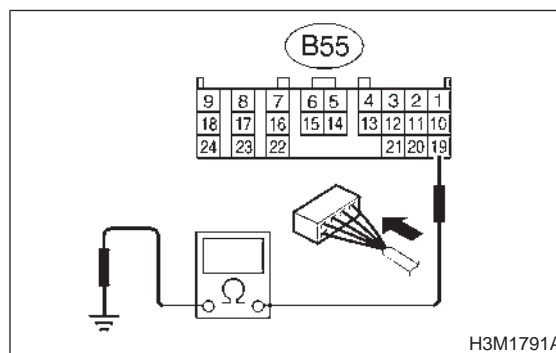


- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 8N6.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8N6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B55) No. 19 — Chassis ground:



- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 8N7.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8N7 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Connect connectors to TCM and transmission.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 4) Move selector lever to "1", and slowly increase vehicle speed to 10 km/h (6 MPH).

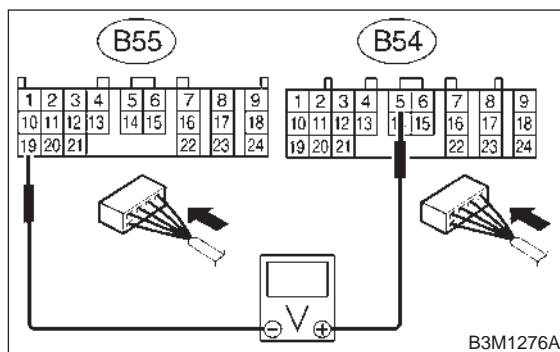
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 5) Measure voltage between TCM connector terminals.

Connector & terminal

(B54) No. 5 (+) — (B55) No. 19 (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step **8N8**.

NO : Go to step **8N9**.

8N8 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Move selector lever to "D", and slowly increase vehicle speed to 65 km/h (40 MPH).

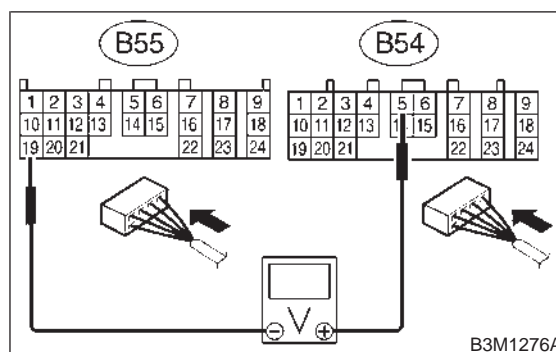
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 2) Measure voltage between TCM connector terminals.

Connector & terminal

(B54) No. 5 (+) — (B55) No. 19 (-):



CHECK : Is the voltage more than 9 V?

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.

NO : Go to step **8N9**.

8N9 : CHECK POOR CONTACT.

CHECK : Is there poor contact in 2-4 brake timing solenoid circuit?

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

3-2 [T8N10] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

8N10 : CHECK 2-4 BRAKE TIMING SOLENOID (IN TRANSMISSION).

- 1) Remove transmission connector from bracket.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Drain automatic transmission fluid.

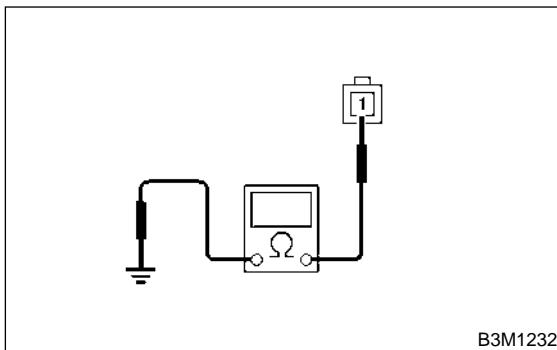
CAUTION:

Do not drain the automatic transmission fluid until it cools down.

- 4) Remove oil pan, and disconnect connector from 2-4 brake timing solenoid.
- 5) Measure resistance between 2-4 brake timing solenoid connector and transmission ground.

Terminal

No. 1 — Transmission ground:



CHECK : Is the resistance between 10 and 16 Ω ?

YES : Go to step 8N11.

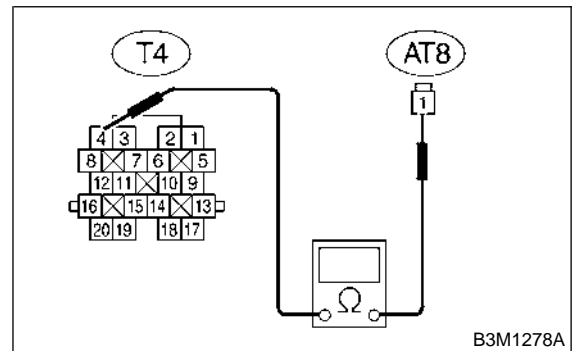
NO : Replace 2-4 brake timing solenoid.
<Ref. to 3-2 [W4A0].>

8N11 : CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION.

Measure resistance of harness between 2-4 brake timing solenoid and transmission connector.

Connector & terminal

(AT8) No. 1 — (T4) No. 4:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 8N12.

NO : Repair open circuit in harness between 2-4 brake timing solenoid and transmission connector.

MEMO:

O: TROUBLE CODE 75 — DUTY SOLENOID A —

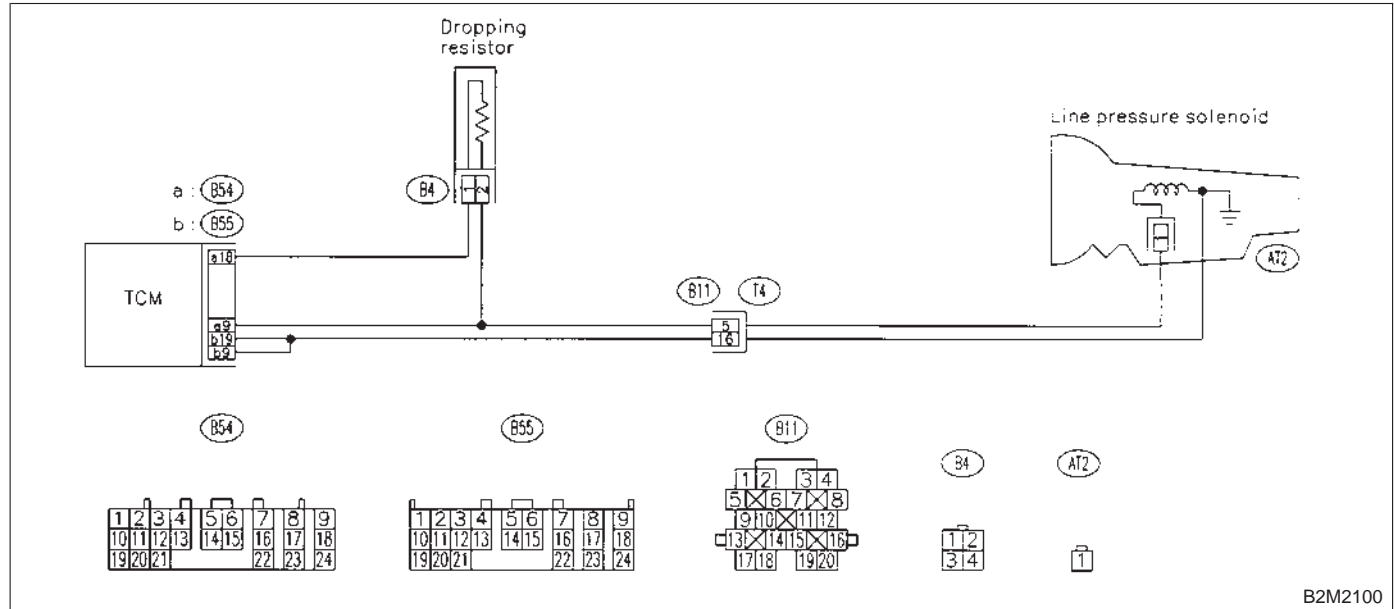
DIAGNOSIS:

Output signal circuit of duty solenoid A or resistor is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



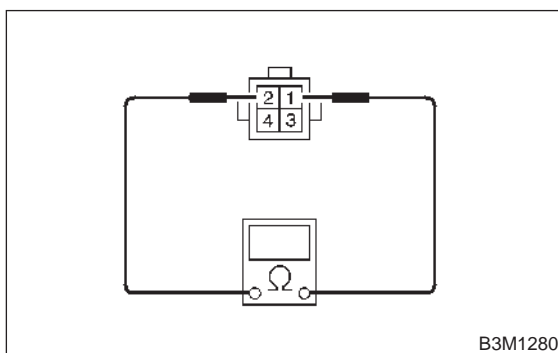
B2M2100

801 : CHECK RESISTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from dropping resistor.
- 3) Measure resistance between dropping resistor terminal.

Terminals

No. 1 — No. 2:



B3M1280

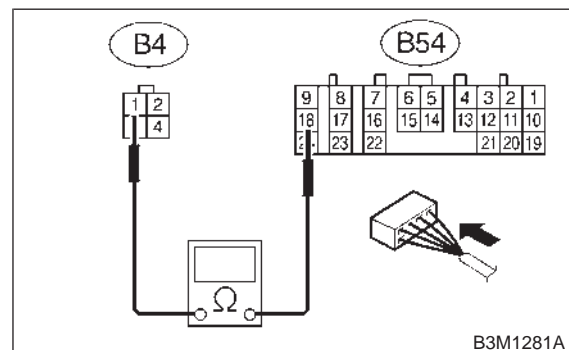
- CHECK** : Is the resistance between 9 and 15 Ω ?
- YES** : Go to step 802.
- NO** : Replace dropping resistor. <Ref. to 3-2 [W23A0].>

802 : CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.

- 1) Disconnect connector from TCM.
- 2) Measure resistance of harness between TCM connector and dropping resistor connector.

Connector & terminal

(B54) No. 18 — (B4) No. 1:



B3M1281A

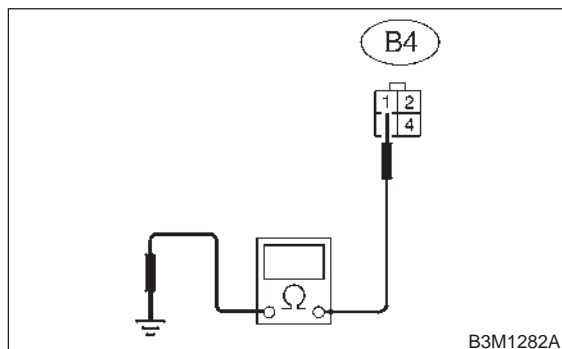
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 803.
- NO** : Repair open circuit in harness between TCM and dropping resistor connector.

803 : CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.

Measure resistance of harness between dropping resistor connector and chassis ground.

Connector & terminal

(B4) No. 1 — Chassis ground:



CHECK : Is the resistance more than 1 MΩ?

YES : Go to step 804.

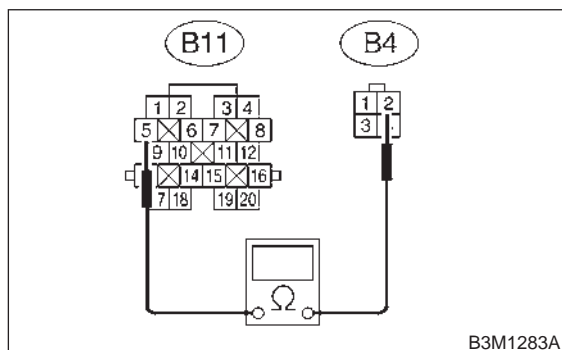
NO : Repair short circuit in harness between TCM and dropping resistor connector.

804 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.

- 1) Disconnect connector from transmission.
- 2) Measure resistance of harness between transmission and dropping resistor connector.

Connector & terminal

(B4) No. 2 — (B11) No. 5:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 805.

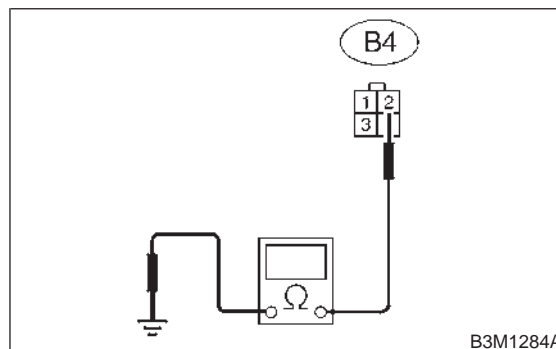
NO : Repair open circuit in harness between dropping resistor and transmission connector.

805 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.

Measure resistance of harness between dropping resistor connector and chassis ground.

Connector & terminal

(B4) No. 2 — Chassis ground:



CHECK : Is the resistance more than 1 MΩ?

YES : Go to step 806.

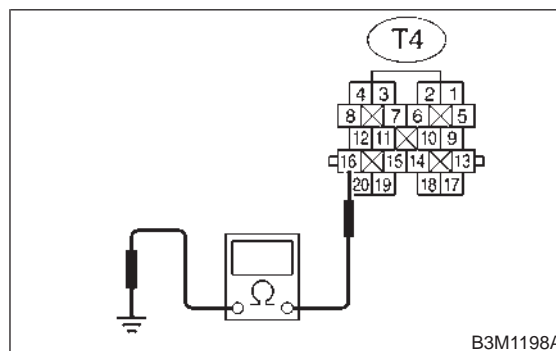
NO : Repair short circuit in harness between dropping resistor and transmission connector.

806 : CHECK DUTY SOLENOID A GROUND LINE.

Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 16 — Transmission ground:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 807.

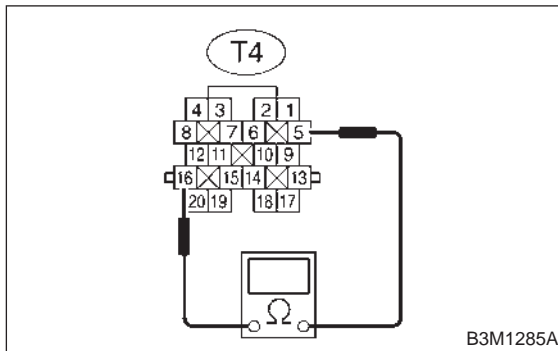
NO : Repair open circuit in transmission harness.

807 : CHECK DUTY SOLENOID A.

Measure resistance between transmission connector receptacle's terminals.

Terminal

(T4) No. 5 — No. 16:



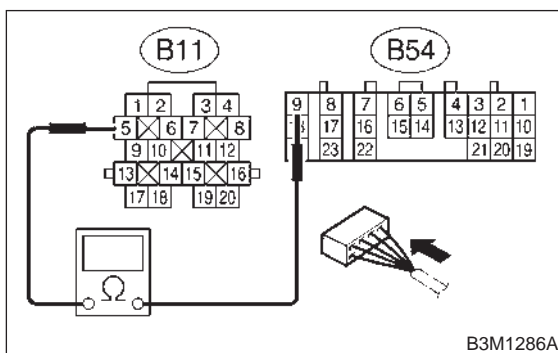
- CHECK** : Is the resistance between 2.0 and 4.5 Ω ?
- YES** : Go to step 808.
- NO** : Go to step 8020.

808 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B54) No. 9 — (B11) No. 5:



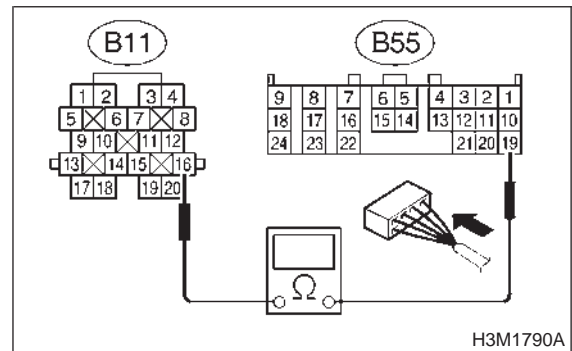
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 809.
- NO** : Repair open circuit in harness between TCM and transmission connector.

809 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 19 — (B11) No. 16:



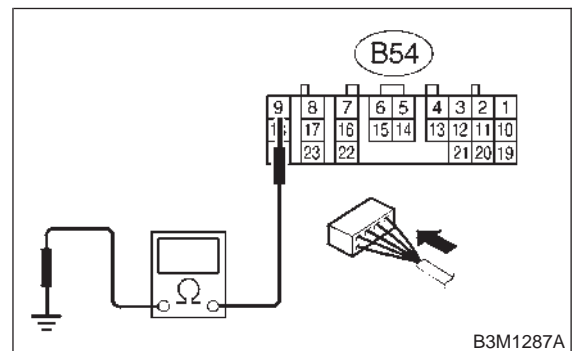
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8010.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8010 : CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B54) No. 9 — Chassis ground:



- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 8011.
- NO** : Repair short circuit in harness between TCM and transmission connector.

3-2 [T8011] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

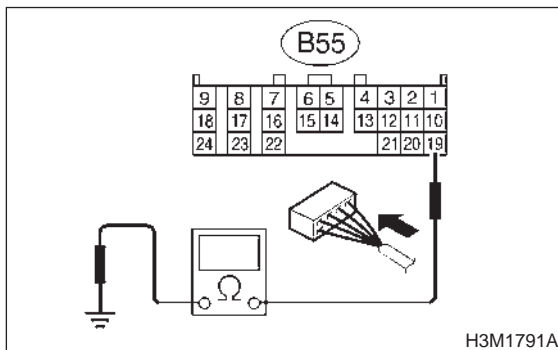
8011 : PREPARE SUBARU SELECT MONITOR.

- CHECK** : *Do you have a Subaru Select Monitor?*
- YES** : Go to step **8017**.
- NO** : Go to step **8012**.

8012 : CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 19 — Chassis ground:



- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step **8013**.
- NO** : Repair short circuit harness between TCM and transmission connector.

8013 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

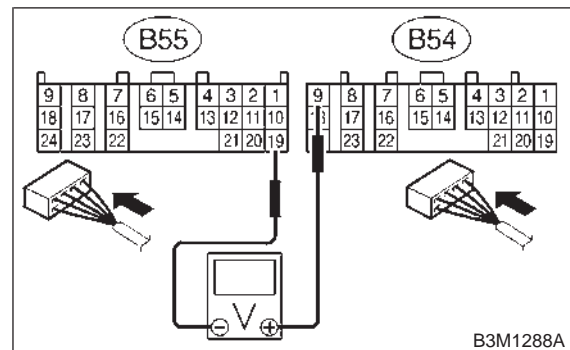
- 1) Connect all connectors.
- 2) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 3) Turn ignition switch to ON (engine OFF).
- 4) Move selector lever to "N".
- 5) Measure voltage between TCM connector terminal.

Connector & terminal
(B54) No. 9 (+) — (B55) No. 19 (-):



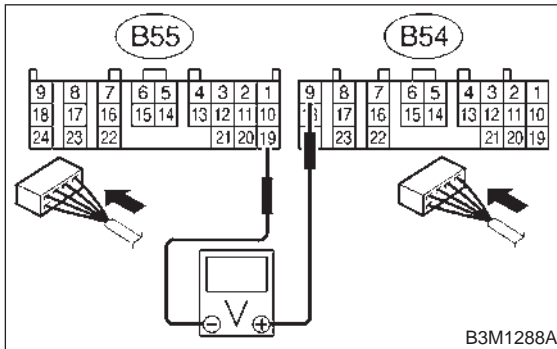
- CHECK** : *Is the voltage between 1.5 and 4.0 V with throttle fully closed?*
- YES** : Go to step **8014**.
- NO** : Go to step **8019**.

8014 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal.

Connector & terminal

(B54) No. 9 (+) — (B55) No. 19 (-):



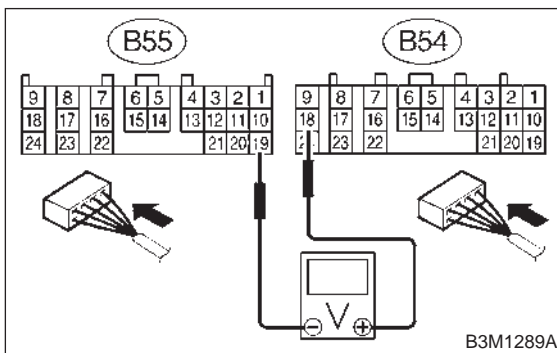
- CHECK** : Is the voltage less than 1 V with throttle fully open?
- YES** : Go to step **8015**.
- NO** : Go to step **8019**.

8015 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal.

Connector & terminal

(B54) No. 18 (+) — (B55) No. 19 (-):



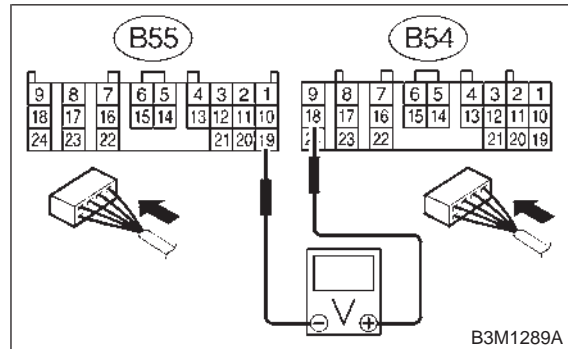
- CHECK** : Is the voltage more than 8.5 V with throttle fully closed?
- YES** : Go to step **8016**.
- NO** : Go to step **8019**.

8016 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal.

Connector & terminal

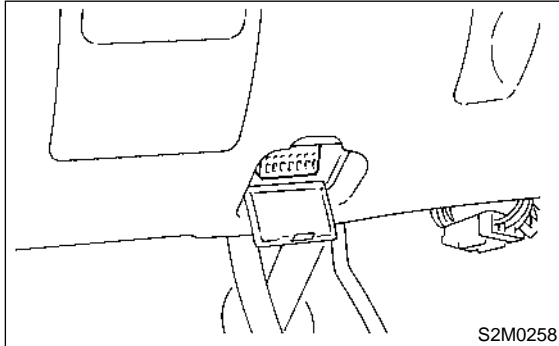
(B54) No. 18 (+) — (B55) No. 19:



- CHECK** : Is the voltage less than 1 V with throttle fully open?
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.
- NO** : Go to step **8019**.

8017 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

- 1) Connect connectors to TCM and transmission.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Start the engine, and turn Subaru Select Monitor switch to ON.
- 4) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 5) Stop the engine and turn ignition switch to ON (engine OFF).
- 6) Move selector lever to "N".
- 7) Read data of duty solenoid A using Subaru Select Monitor.
- Line pressure duty is indicated in "%".
- 8) Throttle is fully closed.

- CHECK** : *Is the value 100%?*
- YES** : Go to step **8018**.
- NO** : Go to step **8019**.

8018 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

- 1) Turn ignition switch to ON (Engine OFF).
- 2) Throttle is fully open.

- CHECK** : *Is the value between 10 and 20%?*
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.
- NO** : Go to step **8019**.

8019 : CHECK POOR CONTACT.

- CHECK** : *Is there poor contact in duty solenoid A circuit?*
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

8020 : CHECK DUTY SOLENOID A (IN TRANSMISSION).

- 1) Remove transmission connector from bracket.
- 2) Drain automatic transmission fluid.

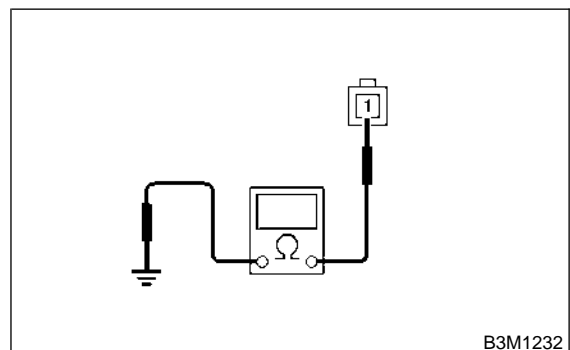
CAUTION:

Do not drain the automatic transmission fluid until it cools down.

- 3) Remove oil pan, and disconnect connector from duty solenoid A.
- 4) Measure resistance between duty solenoid A connector and transmission ground.

Terminal

No. 1 — Transmission ground:

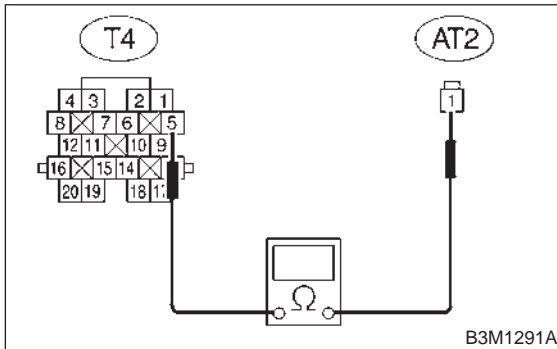


- CHECK** : *Is the resistance between 2.0 and 4.5 Ω?*
- YES** : Go to step **8021**.
- NO** : Replace duty solenoid A. <Ref. to 3-2 [W4A0].>

8021 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DUTY SOLENOID A.

Measure resistance of harness between duty solenoid A and transmission connector.

Connector & terminal
(T4) No. 5 — (AT2) No. 1:

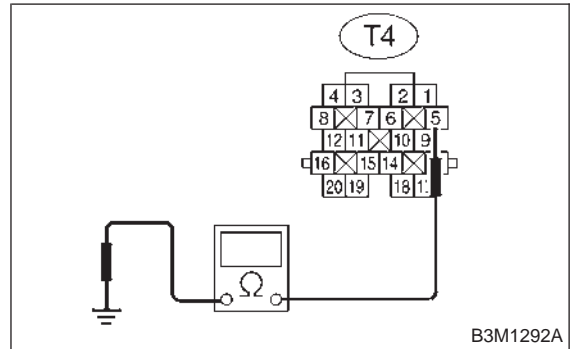


- CHECK** : **Is the resistance less than 1 Ω ?**
YES : Go to step **8022**.
NO : Repair open circuit in harness between duty solenoid A and transmission connector.

8022 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DUTY SOLENOID A.

Measure resistance of harness between transmission connector and transmission ground.

Connector & terminal
(T4) No. 5 — Transmission ground:



- CHECK** : **Is the resistance more than 1 $M\Omega$?**
YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in duty solenoid A and transmission connector.
NO : Repair short circuit in harness between duty solenoid A and transmission connector.

MEMO:

P: TROUBLE CODE 76 — DUTY SOLENOID D —

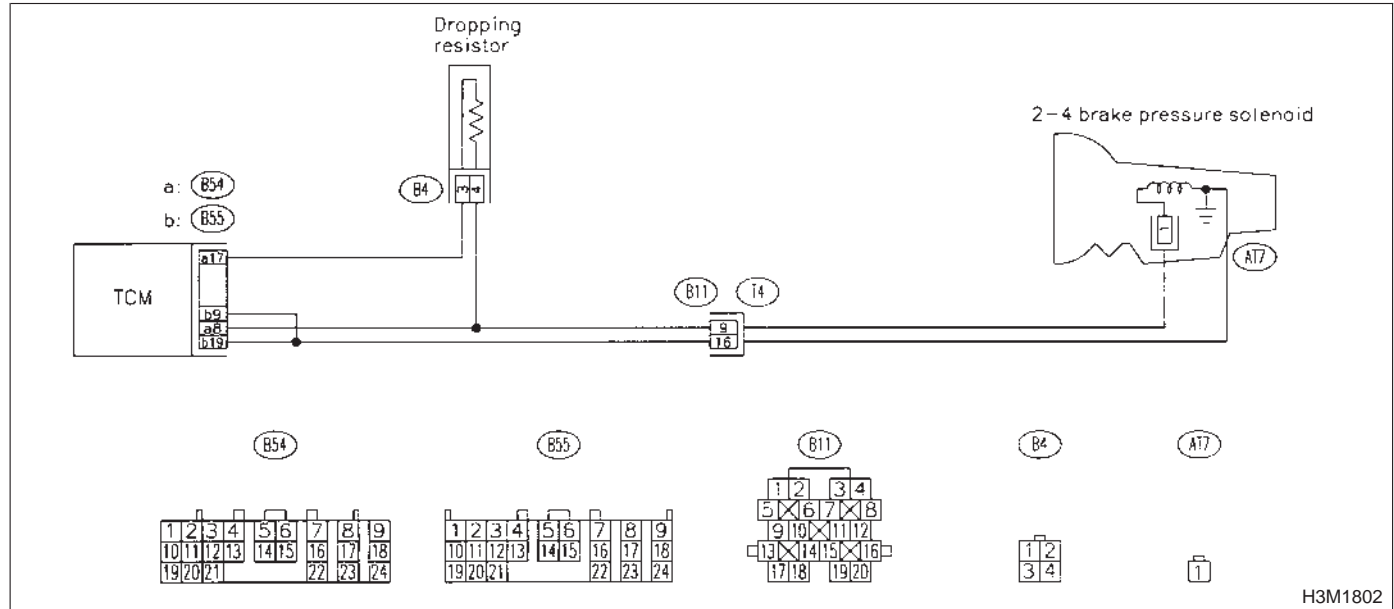
DIAGNOSIS:

Output signal circuit of duty solenoid D is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

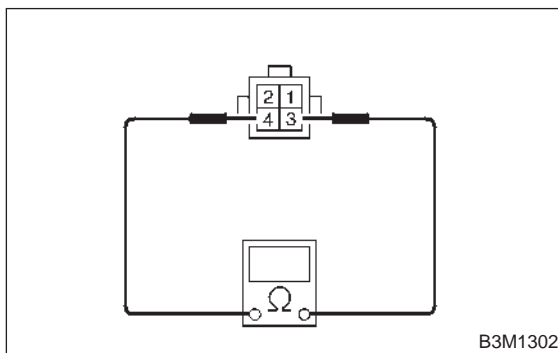


8P1 : CHECK RESISTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from dropping resistor.
- 3) Measure resistance between dropping resistor terminal.

Terminals

No. 3 — No. 4:



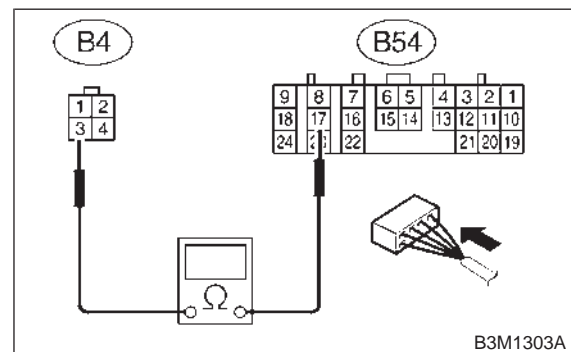
- CHECK** : Is the resistance between 9 and 15 Ω ?
- YES** : Go to step 8P2.
- NO** : Replace dropping resistor. <Ref. to 3-2 [W23A0].>

8P2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.

- 1) Disconnect connector from TCM.
- 2) Measure resistance of harness between TCM connector and dropping resistor connector.

Connector & terminal

(B54) No. 17 — (B4) No. 3:



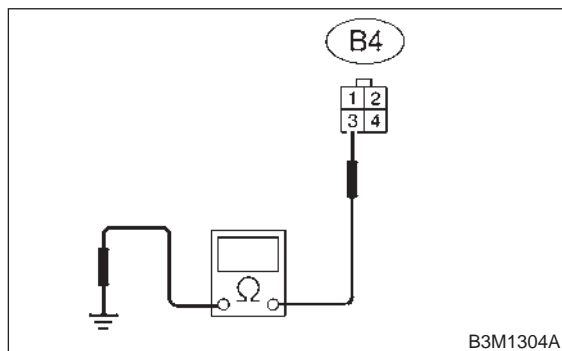
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8P3.
- NO** : Repair open circuit in harness between TCM and dropping resistor connector.

8P3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.

Measure resistance of harness between dropping resistor connector and chassis ground.

Connector & terminal

(B4) No. 3 — Chassis ground:



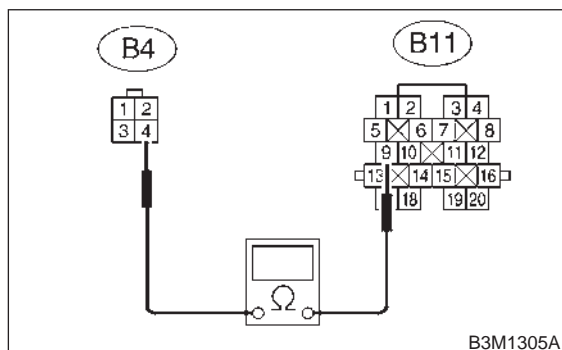
- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 8P4.
- NO** : Repair short circuit in harness between TCM and dropping resistor connector.

8P4 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.

- 1) Disconnect connector from transmission.
- 2) Measure resistance of harness between transmission and dropping resistor connector.

Connector & terminal

(B4) No. 4 — (B11) No. 9:



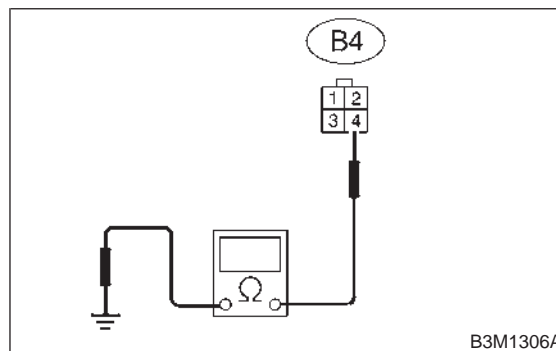
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8P5.
- NO** : Repair open circuit in harness between dropping resistor and transmission connector.

8P5 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.

Measure resistance of harness between dropping resistor connector and chassis ground.

Connector & terminal

(B4) No. 4 — Chassis ground:



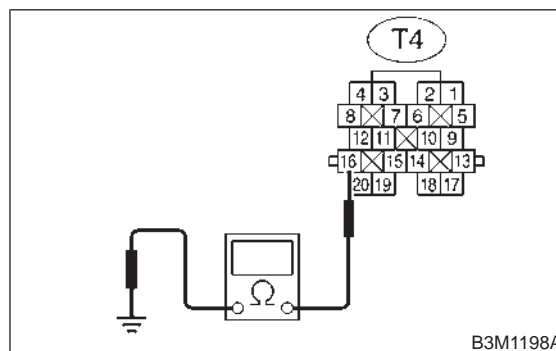
- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 8P6.
- NO** : Repair short circuit in harness between dropping resistor and transmission connector.

8P6 : CHECK DUTY SOLENOID D GROUND LINE.

Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 16 — Transmission ground:



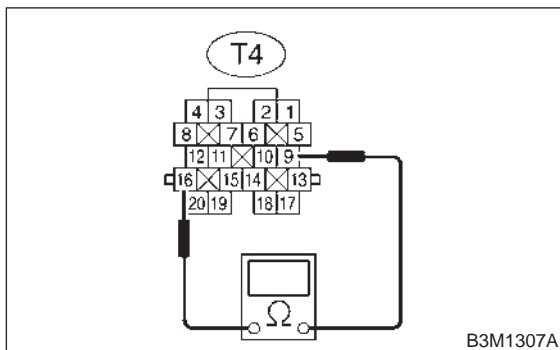
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8P7.
- NO** : Repair open circuit in transmission harness.

8P7 : CHECK DUTY SOLENOID D.

Measure resistance between transmission connector receptacle's terminals.

Terminal

(T4) No. 16 — No. 9:



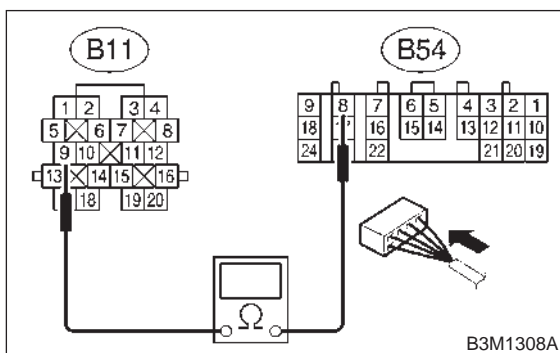
- CHECK** : Is the resistance between 2.0 and 4.5 Ω?
- YES** : Go to step 8P8.
- NO** : Go to step 8P20.

8P8 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B54) No. 8 — (B11) No. 9:



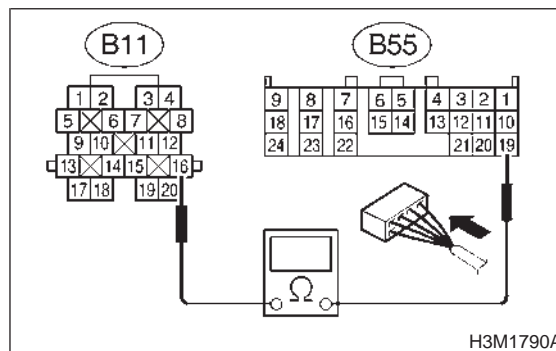
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8P9.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8P9 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 19 — (B11) No. 16:



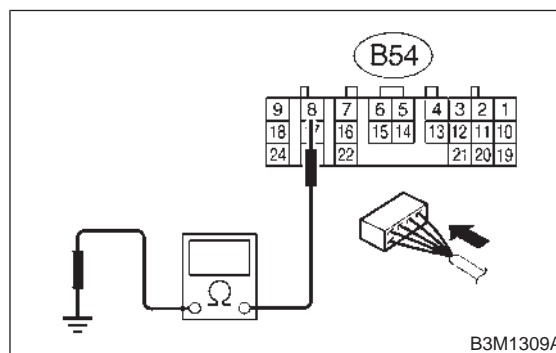
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8P10.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8P10 : CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B54) No. 8 — Chassis ground:



- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 8P11.
- NO** : Repair short circuit in harness between TCM and transmission connector.

3-2 [T8P11] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

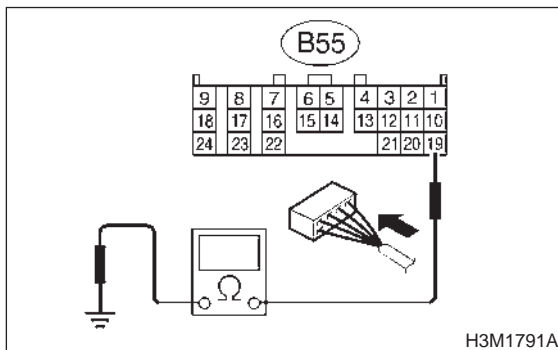
8P11 : PREPARE SUBARU SELECT MONITOR.

- CHECK** : *Do you have a Subaru Select Monitor?*
- YES** : Go to step 8P17.
- NO** : Go to step 8P12.

8P12 : CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 19 — Chassis ground:



- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step 8P13.
- NO** : Repair short circuit harness between TCM and transmission connector.

8P13 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

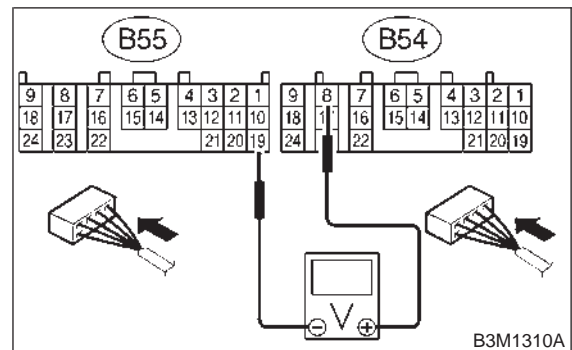
- 1) Connect all connectors.
- 2) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 3) Turn ignition switch to ON (engine OFF).
- 4) Move selector lever to "N".
- 5) Measure voltage between TCM connector terminal.

Connector & terminal
(B54) No. 8 (+) — (B55) No. 19 (–):



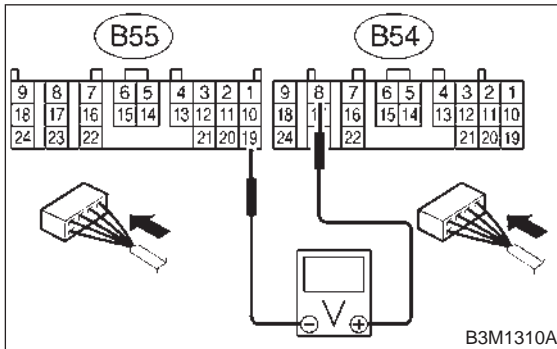
- CHECK** : *Is the voltage between 1.5 and 4.0 V with throttle fully closed?*
- YES** : Go to step 8P14.
- NO** : Go to step 8P19.

8P14 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal.

Connector & terminal

(B54) No. 8 (+) — (B55) No. 19 (-):



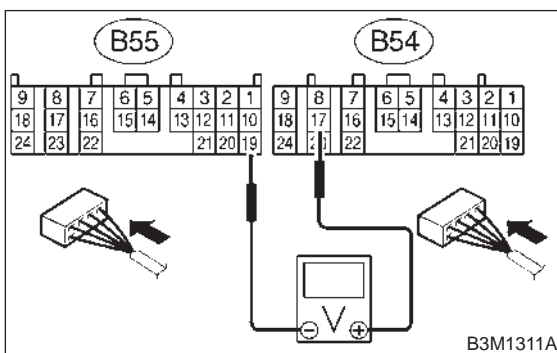
- CHECK** : Is the voltage less than 1 V with throttle fully open?
- YES** : Go to step 8P15.
- NO** : Go to step 8P19.

8P15 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal.

Connector & terminal

(B54) No. 17 (+) — (B55) No. 19 (-):



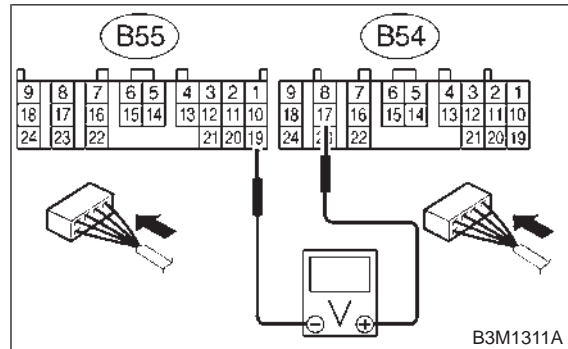
- CHECK** : Is the voltage more than 8.5 V with throttle fully closed?
- YES** : Go to step 8P16.
- NO** : Go to step 8P19.

8P16 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal.

Connector & terminal

(B54) No. 17 (+) — (B55) No. 19 (-):



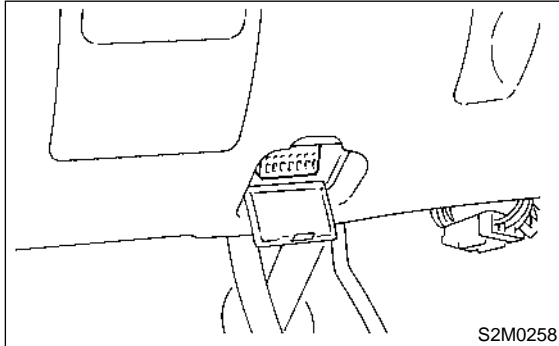
- CHECK** : Is the voltage less than 1 V with throttle fully open?
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.
- NO** : Go to step 8P19.

3-2 [T8P17] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

8P17 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

- 1) Connect all connectors.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Start the engine, and turn Subaru Select Monitor switch to ON.
- 4) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 5) Stop the engine and turn ignition switch to ON (engine OFF).
- 6) Move selector lever to "N".
- 7) Read data of duty solenoid D using Subaru Select Monitor.
- Line pressure duty is indicated in "%".
- 8) Throttle is fully closed.

CHECK : Is the value 100%?

YES : Go to step 8P18.

NO : Go to step 8P19.

8P18 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

- 1) Turn ignition switch to ON (Engine OFF).
- 2) Throttle is fully open.

CHECK : Is the value between 10 and 20%?

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.

NO : Go to step 8P19.

8P19 : CHECK POOR CONTACT.

CHECK : Is there poor contact in duty solenoid A circuit?

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

8P20 : CHECK DUTY SOLENOID D (IN TRANSMISSION).

- 1) Remove transmission connector from bracket.
- 2) Drain automatic transmission fluid.

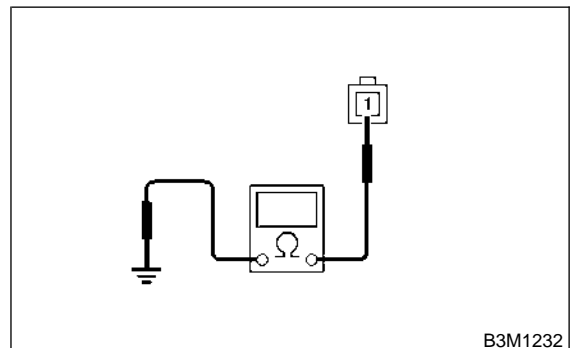
CAUTION:

Do not drain the automatic transmission fluid until it cools down.

- 3) Remove oil pan, and disconnect connector from duty solenoid D.
- 4) Measure resistance between duty solenoid D connector and transmission ground.

Terminal

No. 1 — Transmission ground:



CHECK : Is the resistance between 2.0 and 4.5 Ω?

YES : Go to step 8P21.

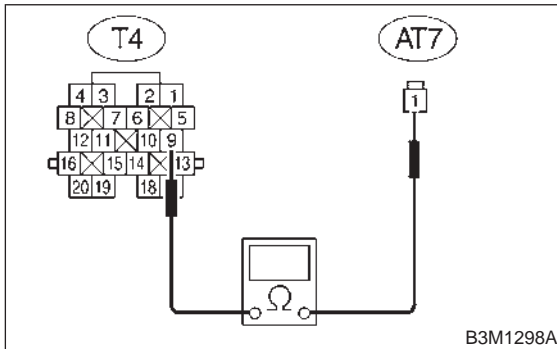
NO : Replace duty solenoid D. <Ref. to 3-2 [W4A0].>

8P21 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DUTY SOLENOID D.

Measure resistance of harness between duty solenoid D and transmission connector.

Connector & terminal

(T4) No. 9 — (AT7) No. 1:



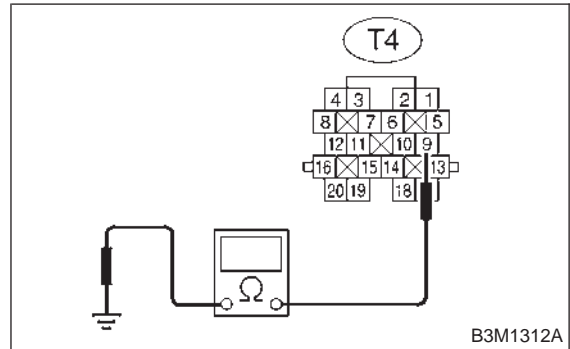
- CHECK** : **Is the resistance less than 1 Ω ?**
- YES** : Go to step **8P22**.
- NO** : Repair open circuit in harness between duty solenoid D and transmission connector.

8P22 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DUTY SOLENOID D.

Measure resistance of harness between transmission connector and transmission ground.

Connector & terminal

(T4) No. 9 — Transmission ground:



- CHECK** : **Is the resistance more than 1 $M\Omega$?**
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in duty solenoid A and transmission connector.
- NO** : Repair short circuit in harness between duty solenoid D and transmission connector.

MEMO:

Q: TROUBLE CODE 77 — DUTY SOLENOID B —

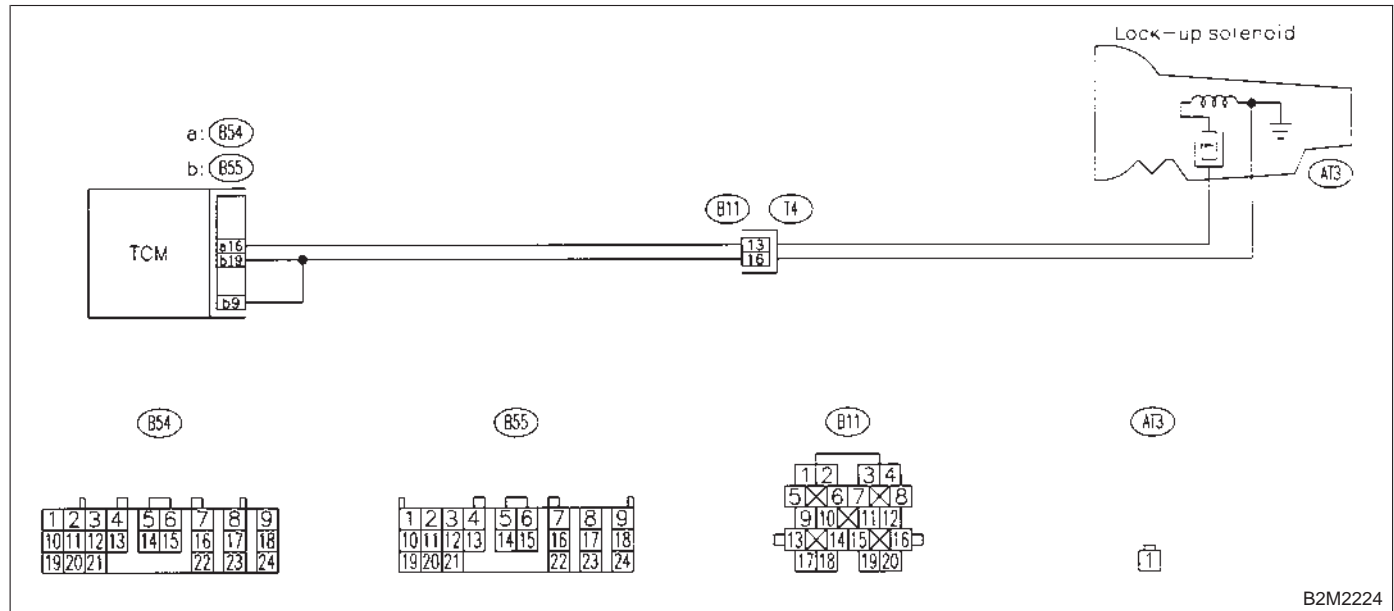
DIAGNOSIS:

Output signal circuit of duty solenoid B is open or shorted.

TROUBLE SYMPTOM:

No "lock-up" (after engine warm-up).

WIRING DIAGRAM:



8Q1 : CHECK TROUBLE CODE.

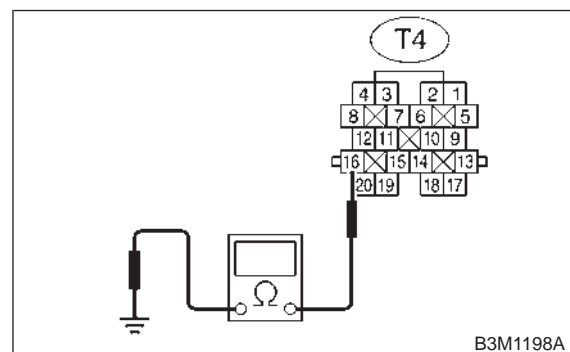
- CHECK** : *Do multiple trouble codes appear in the on-board diagnostics test mode?*
- YES** : Go to another trouble code.
- NO** : Go to step **8Q2**.

8Q2 : CHECK DUTY SOLENOID B GROUND LINE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector receptacle's terminals.

Connector & terminal

(T4) No. 16 — Chassis ground:



- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step **8Q3**.
- NO** : Repair open circuit in transmission harness.

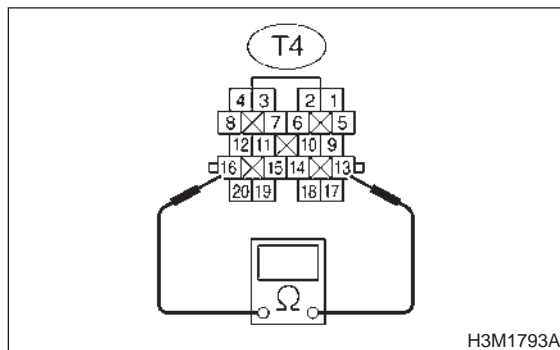
3-2 [T8Q3] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

8Q3 : CHECK DUTY SOLENOID B.

Measure resistance between transmission connector receptacle's terminals.

Connector & terminal
(T4) No. 13 — No. 16:

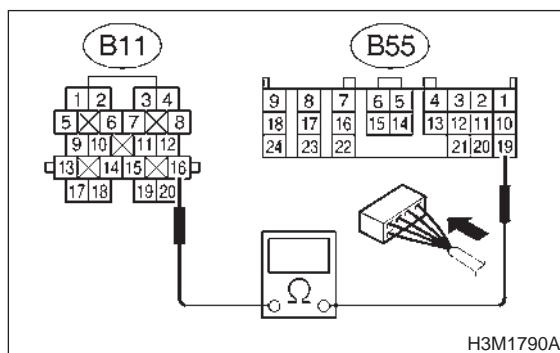


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8Q4.
- NO** : Go to step 8Q14.

8Q4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

- 1) Disconnect connector from TCM.
- 2) Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 19 — (B11) No. 16:

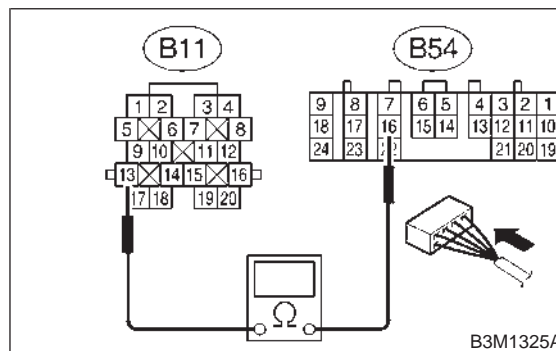


- CHECK** : Is the resistance than 1 Ω ?
- YES** : Go to step 8Q5.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8Q5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness connector between TCM and transmission.

Connector & terminal
(B54) No. 16 — (B11) No. 13:

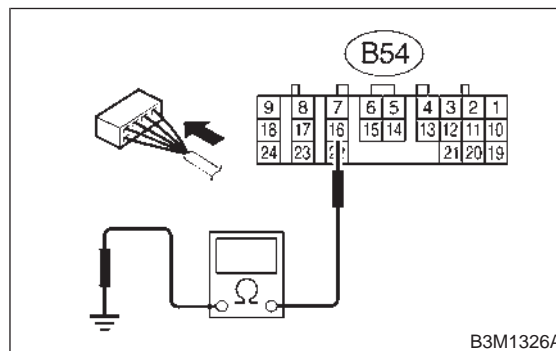


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8Q6.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8Q6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness connector between TCM and chassis ground.

Connector & terminal
(B54) No. 16 — Chassis ground:



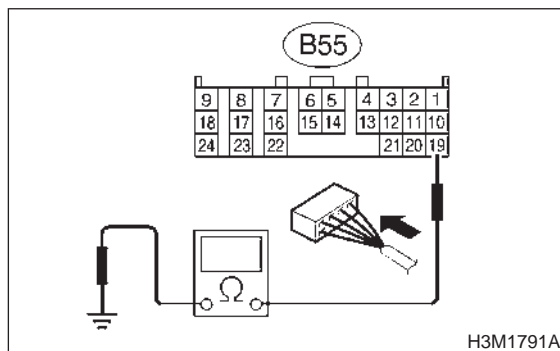
- CHECK** : Is the resistance more than 1 M Ω ?
- YES** : Go to step 8Q7.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8Q7 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness connector between TCM and chassis ground.

Connector & terminal

(B55) No. 19 — Chassis ground:



- CHECK** : **Is the resistance more than 1 MΩ?**
- YES** : Go to step **8Q8**.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8Q8 : PREPARE SUBARU SELECT MONITOR.

- CHECK** : **Do you have a Subaru Select Monitor?**
- YES** : Go to step **8Q11**.
- NO** : Go to step **8Q9**.

8Q9 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Connect connectors to TCM and transmission.
- 2) Lift-up the vehicle and place safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 4) Move selector lever to "D" and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up.

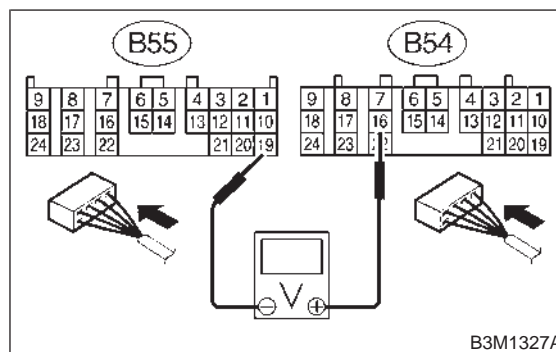
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 5) Measure voltage between TCM connector terminals.

Connector & terminal

(B54) No. 16 (+) — (B55) No. 19 (-):



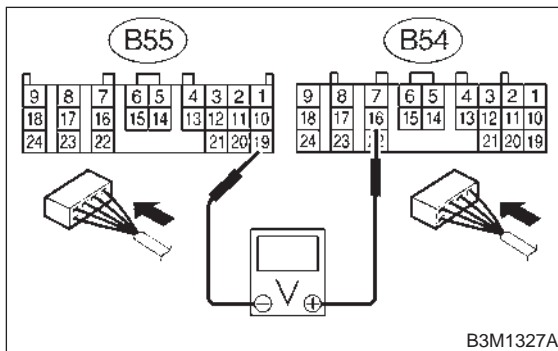
- CHECK** : **Is the voltage more than 8.5 V?**
- YES** : Go to step **8Q10**.
- NO** : Go to step **8Q13**.

8Q10 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Return the engine to idling speed and move selector lever to "N".
- 2) Measure voltage between TCM connector terminals.

Connector & terminal

(B54) No. 16 (+) — (B55) No. 19 (-):



- CHECK** : Is the voltage less than 0.5 V?
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.
- NO** : Go to step **8Q13**.

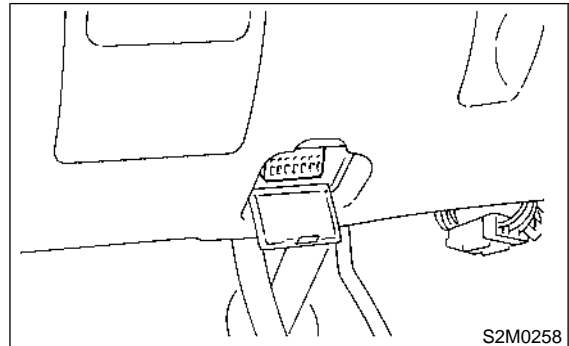
8Q11 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

- 1) Connect connectors to TCM and transmission.
- 2) Lift-up the vehicle and place safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Connect Subaru Select Monitor to data link connector.



- 4) Start the engine, and turn Subaru Select Monitor switch to ON.
- 5) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 6) Read data of duty solenoid B using Subaru Select Monitor.
 - Lock-up duty is indicated in "%".
- 7) Move selector lever to "D" and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- CHECK** : Is the value 95%?
- YES** : Go to step **8Q12**.
- NO** : Go to step **8Q13**.

8Q12 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

Return the engine to idling speed and move selector lever to "N".

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : *Is the value 5%?*

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.

NO : Go to step **8Q13**.

8Q13 : CHECK POOR CONTACT.

CHECK : *Is there poor contact in duty solenoid B circuit?*

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

8Q14 : CHECK DUTY SOLENOID B (IN TRANSMISSION).

- 1) Remove transmission connector from bracket.
- 2) Drain automatic transmission fluid.

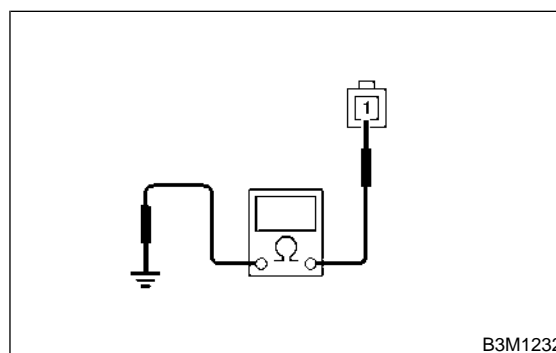
CAUTION:

Do not drain the automatic transmission fluid until it cools down.

- 3) Remove oil pan, and disconnect connector from duty solenoid B.
- 4) Measure resistance between duty solenoid B connector and transmission ground.

Terminal

No. 1 — Transmission ground:



CHECK : *Is the resistance between 10 and 17 Ω ?*

YES : Go to step **8Q15**.

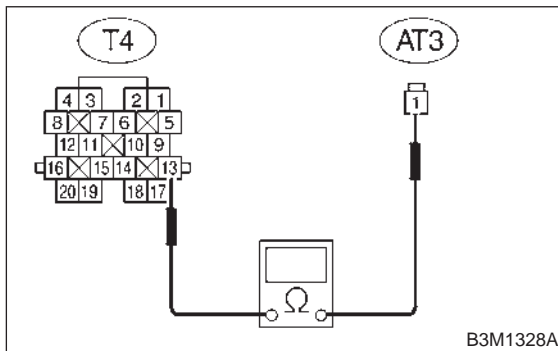
NO : Replace duty solenoid B. <Ref. to 3-2 [W4A0].>

8Q15 : CHECK HARNESS CONNECTOR BETWEEN DUTY SOLENOID B AND TRANSMISSION.

Measure resistance of harness between duty solenoid B and transmission connector.

Connector & terminal

(T4) No. 13 — (AT3) No. 1:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 8Q16.

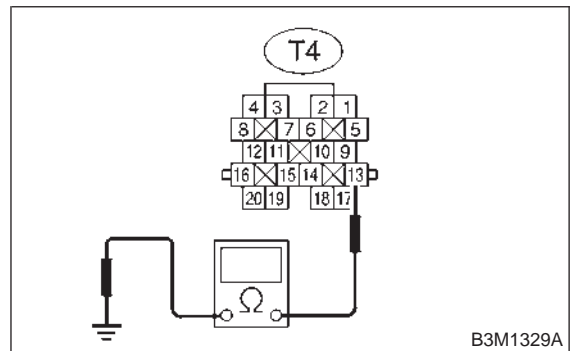
NO : Repair open circuit in harness between TCM and transmission connector.

8Q16 : CHECK HARNESS CONNECTOR BETWEEN DUTY SOLENOID B AND TRANSMISSION.

Measure resistance of harness between transmission connector and transmission ground.

Connector & terminal

(T4) No. 13 — Transmission ground:



CHECK : Is the resistance more than 1 $M\Omega$?

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in duty solenoid B and transmission.

NO : Repair short circuit in harness between TCM and transmission connector.

R: TROUBLE CODE 79 — DUTY SOLENOID C —

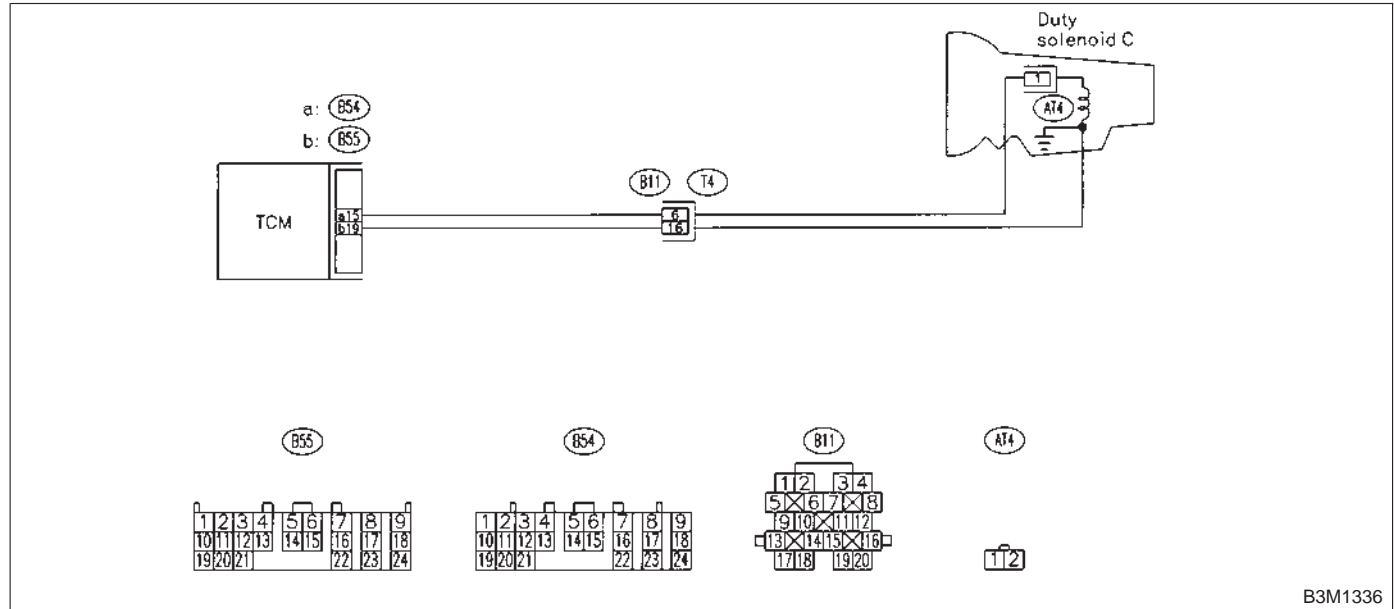
DIAGNOSIS:

Output signal circuit of duty solenoid C is open or shorted.

TROUBLE SYMPTOM:

Excessive "braking" in tight corners.

WIRING DIAGRAM:

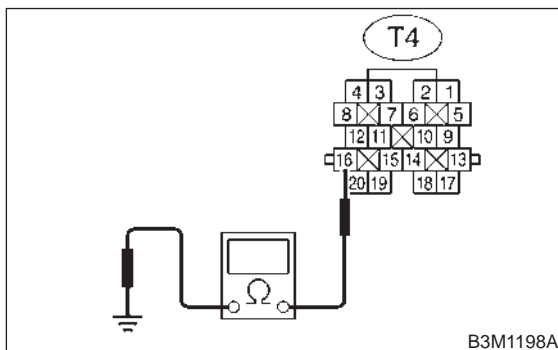


8R1 : CHECK DUTY SOLENOID C GROUND LINE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 16 — Chassis ground:



CHECK : Is the resistance less than 1 Ω?

YES : Go to step 8R2.

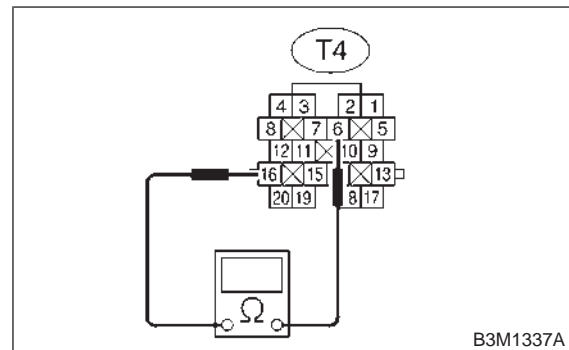
NO : Repair open circuit in transmission harness.

8R2 : CHECK DUTY SOLENOID C.

Measure resistance between transmission connector and transmission terminals.

Connector & terminal

(T4) No. 6 — No. 16:



CHECK : Is the resistance between 10 and 17 Ω?

YES : Go to step 8R3.

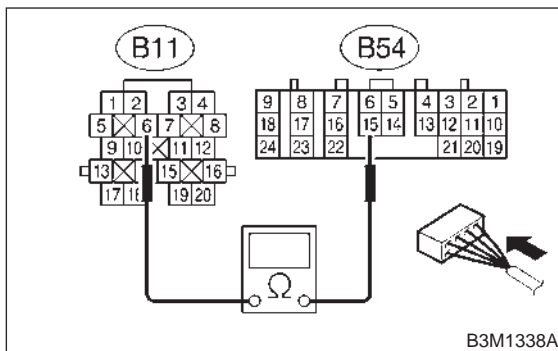
NO : Go to step 8R13.

8R3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

- 1) Disconnect connector from TCM.
- 2) Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B54) No. 15 — (B11) No. 6:



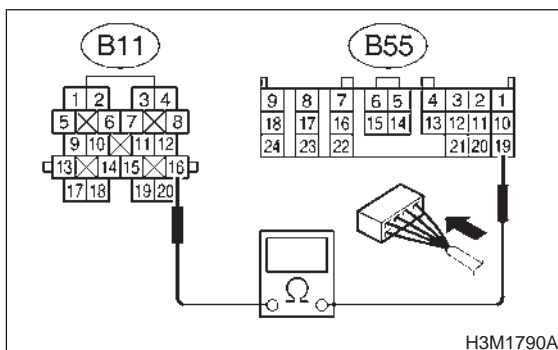
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8R4.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8R4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance harness connector between TCM and transmission connector.

Connector & terminal

(B55) No. 19 — (B11) No. 16:



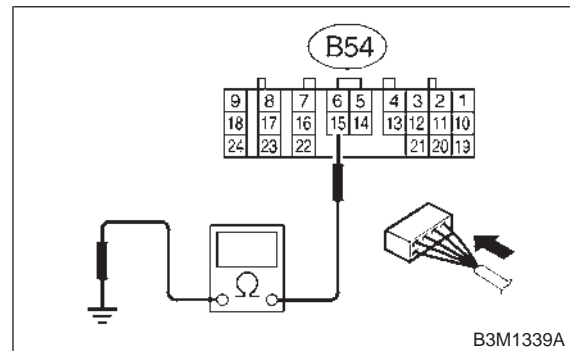
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8R5.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8R5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance harness connector between TCM and chassis ground.

Connector & terminal

(B54) No. 15 — Chassis ground:



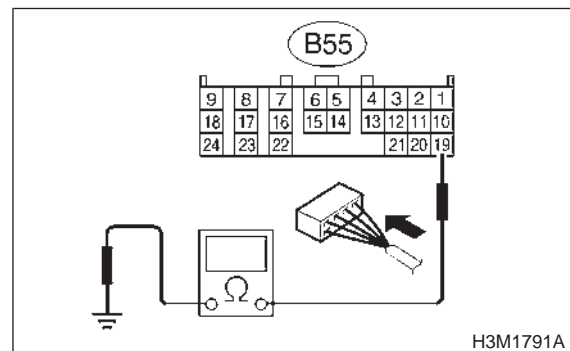
- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 8R6.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8R6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance harness connector between TCM and chassis ground.

Connector & terminal

(B55) No. 19 — Chassis ground:



- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 8R7.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8R7 : PREPARE SUBARU SELECT MONITOR.

CHECK : *Do you have a Subaru Select Monitor?*

YES : Go to step 8R10.

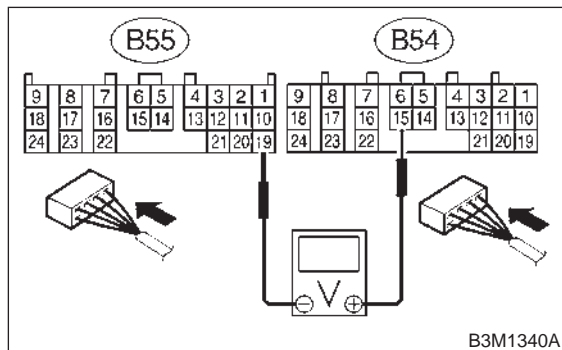
NO : Go to step 8R8.

8R8 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Connect connectors to TCM and transmission.
- 2) Turn ignition switch to ON (engine OFF).
- 3) Throttle is fully closed.
- 4) Measure voltage between TCM connector terminals.

Connector & terminal

(B54) No. 15 (+) — (B55) No. 19 (-):



CHECK : *Is the voltage less than 1 V in "P" range?*

YES : Go to step 8R9.

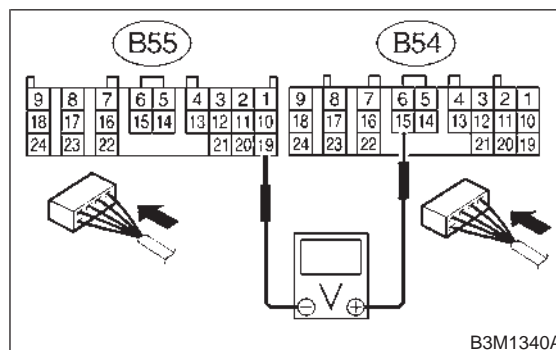
NO : Go to step 8R12.

8R9 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminals.

Connector & terminal

(B54) No. 15 (+) — (B55) No. 19 (-):



CHECK : *Is the voltage between 5 and 7 V in "D" range?*

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the duty solenoid C and TCM connector.

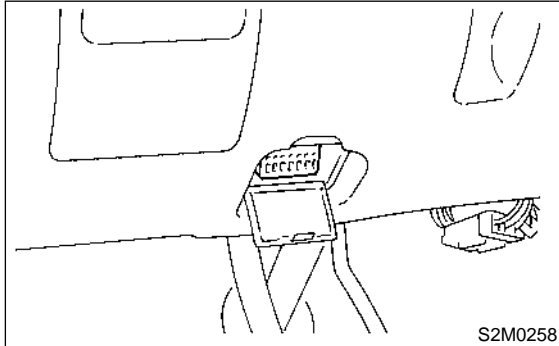
NO : Go to step 8R12.

3-2 [T8R10] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

8. Diagnostic Chart with Trouble Code

8R10 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

- 1) Connect connectors to TCM and transmission.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON.
- 4) Move selector lever to "D" with throttle fully open (vehicle speed 0 km/h or 0 MPH).
- 5) Read data of duty solenoid C using Subaru Select Monitor.

● Duty solenoid C is indicated in "%".

- CHECK** : Is the value between 5 and 10%?
- YES** : Go to step 8R11.
- NO** : Go to step 8R12.

8R11 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

- 1) Set FWD mode.
- 2) Throttle fully closed.

- CHECK** : Is the value 95%?
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the duty solenoid C and TCM connector.
- NO** : Go to step 8R12.

8R12 : CHECK POOR CONTACT.

- CHECK** : Is there poor contact in duty solenoid C circuit?
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

8R13 : CHECK DUTY SOLENOID C (IN TRANSMISSION).

- 1) Lift-up the vehicle and place safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 2) Drain automatic transmission fluid.

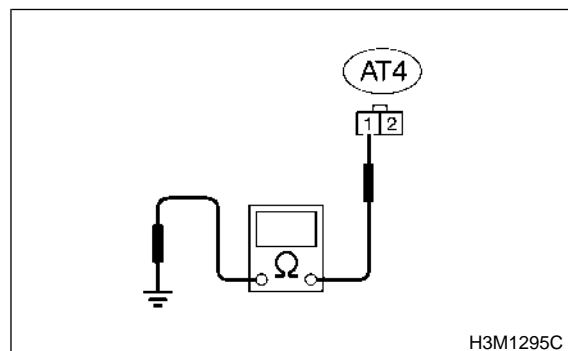
CAUTION:

Do not drain the automatic transmission fluid until it cools down.

- 3) Remove extension case, and disconnect connector from duty solenoid C.
- 4) Measure resistance between duty solenoid C connector and transmission ground.

Connector & terminal

(AT4) No. 1 — Transmission ground:

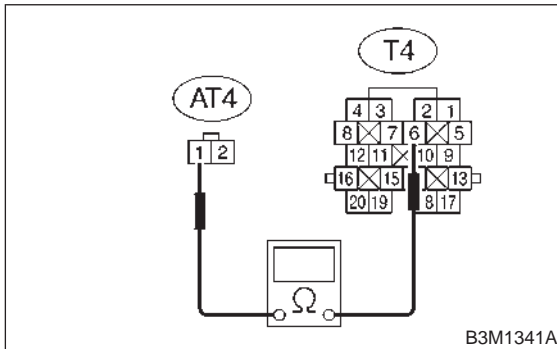


- CHECK** : Is the resistance between 10 and 17 Ω?
- YES** : Go to step 8R14.
- NO** : Replace duty solenoid C. <Ref. to 3-2 [W5A0].>

8R14 : CHECK HARNESS CONNECTOR BETWEEN DUTY SOLENOID C AND TRANSMISSION.

Measure resistance of harness between duty solenoid C and transmission connector.

Connector & terminal
(T4) No. 6 — (AT4) No. 1:

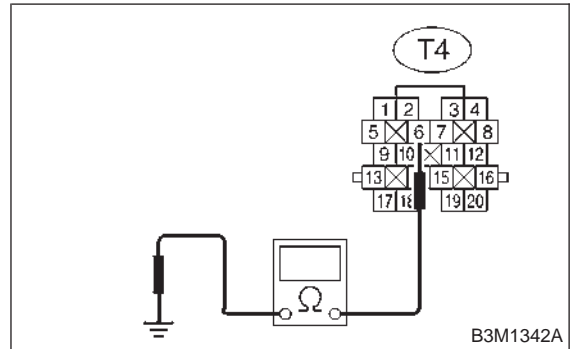


- CHECK** : **Is the resistance less than 1 Ω ?**
- YES** : Go to step **8R15**.
- NO** : Repair open circuit in harness between duty solenoid C and transmission connector.

8R15 : CHECK HARNESS CONNECTOR BETWEEN DUTY SOLENOID C AND TRANSMISSION.

Measure resistance of harness between transmission connector and transmission ground.

Connector & terminal
(T4) No. 6 — Transmission ground:



- CHECK** : **Is the resistance more than 1 $M\Omega$?**
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the duty solenoid C and transmission connector.
- NO** : Repair short circuit in harness between duty solenoid C and transmission connector.

MEMO:

S: TROUBLE CODE 93 — VEHICLE SPEED SENSOR 1 (REAR) —

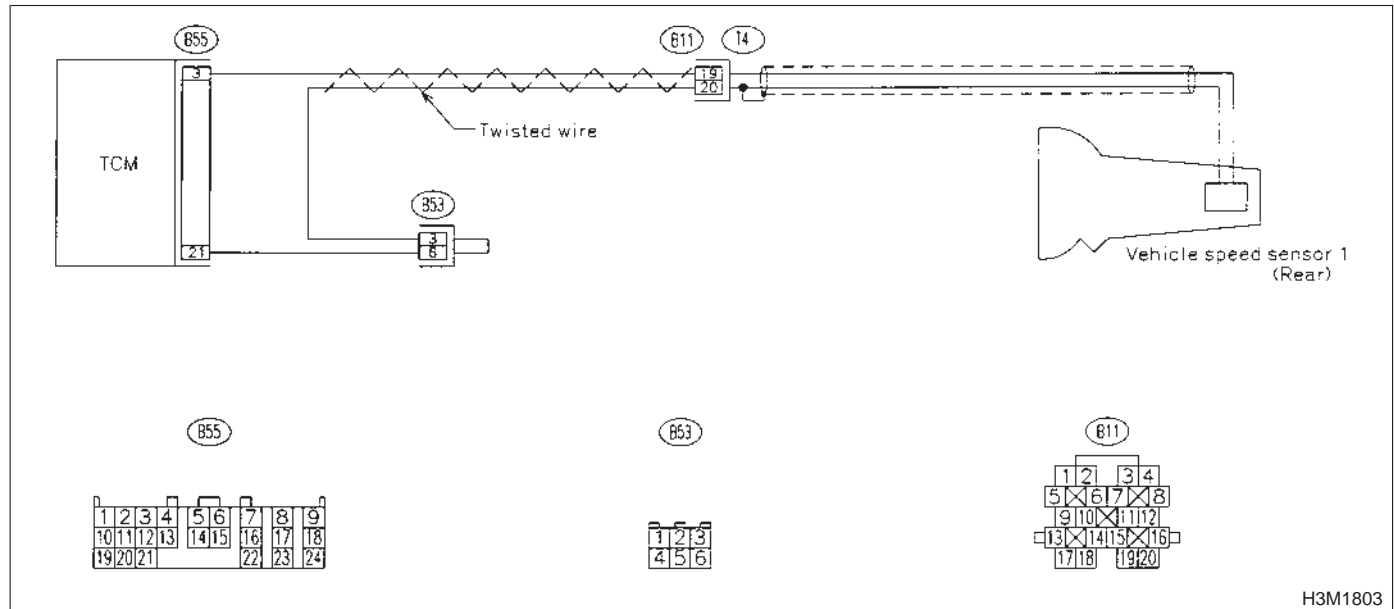
DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

No lock-up or excessive tight corner "braking".

WIRING DIAGRAM:

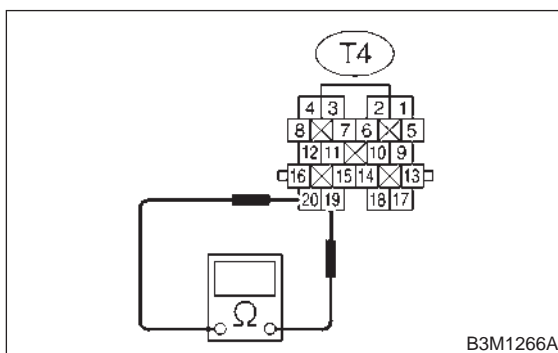


8S1 : CHECK VEHICLE SPEED SENSOR 1.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector receptacle's terminals.

Connector & terminal

(T4) No. 19 — No. 20:



CHECK : Is the resistance between 450 and 650 Ω ?

YES : Go to step 8S1.

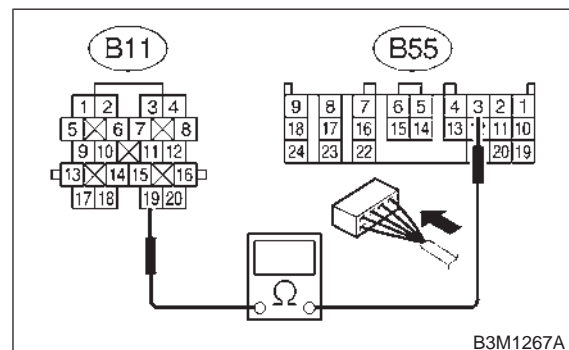
NO : Replace transmission harness connector. <Ref. to 3-2 [W11B0].>

8S2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

- 1) Disconnect connector from TCM.
- 2) Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 3 — (B11) No. 19:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 8S3.

NO : Repair open circuit in harness between TCM and transmission connector.

3-2 [T8S3] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

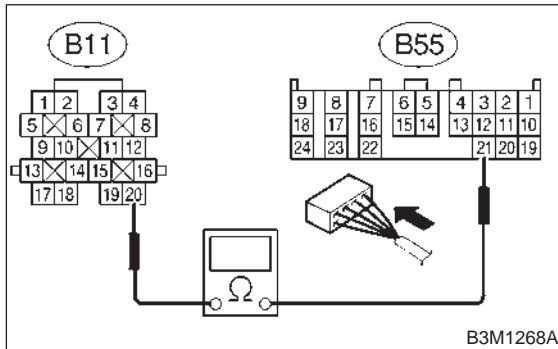
8. Diagnostic Chart with Trouble Code

8S3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 21 — (B11) No. 20:



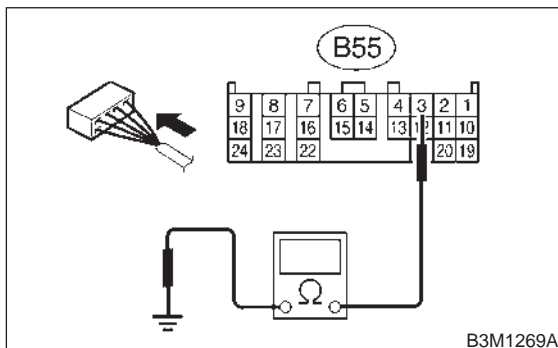
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8S4.
- NO** : Repair open circuit in harness between TCM and transmission, and poor contact in coupling connector.

8S4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 3 — Chassis ground:



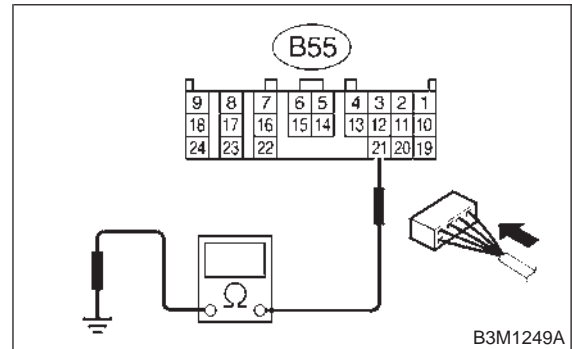
- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 8S5.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8S5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 21 — Chassis ground:



- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 8S6.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8S6 : PREPARE OSCILLOSCOPE.

- CHECK** : Do you have oscilloscope?
- YES** : Go to step 8S10.
- NO** : Go to step 8S7.

8S7 : PREPARE SUBARU SELECT MONITOR.

- CHECK** : Do you have a Subaru Select Monitor?
- YES** : Go to step 8S9.
- NO** : Go to step 8S8.

8S8 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect connectors to TCM and transmission.
- 2) Lift-up or raise the vehicle and place safety stands.

CAUTION:

On AWD models, raise all wheels off floor.

- 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition.

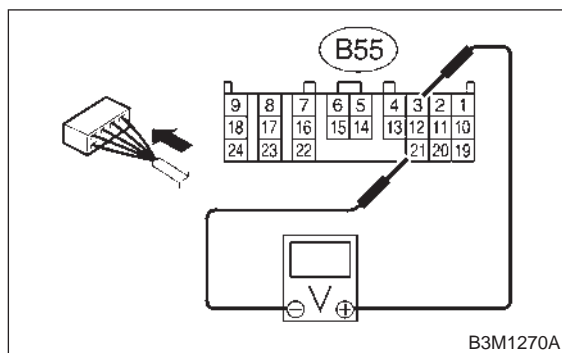
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 4) Measure voltage between TCM connector terminals.

Connector & terminal

(B55) No. 3 (+) — No. 21 (-):



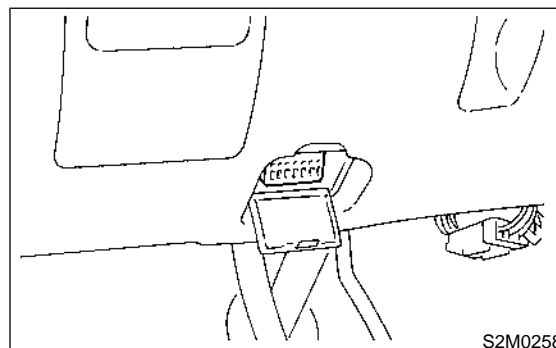
CHECK : **Is the voltage more than AC 1 V?**

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.

NO : Go to step **8S11**.

8S9 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Connect connectors to TCM and transmission.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Lift-up or raise the vehicle and place safety stands.

CAUTION:

On AWD models, raise all wheels off floor.

- 4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON.
- 5) Start the engine.
- 6) Read data of vehicle speed using Subaru Select Monitor.

- Compare speedometer with Subaru Select Monitor indications.

- Vehicle speed is indicated in "km/h" or "MPH".

- 7) Slowly increase vehicle speed to 60 km/h or 37 MPH.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : **Does the speedometer indication increase as the Subaru Select Monitor data increases?**

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.

NO : Go to step **8S11**.

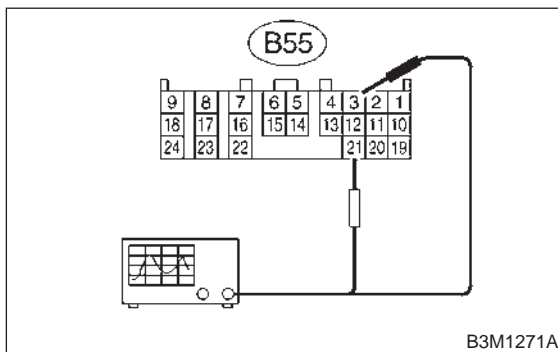
8S10 : CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.

- 1) Connect connectors to TCM and transmission.
- 2) Lift-up or raise the vehicle and place safety stands.

CAUTION:

On AWD models, raise all wheels off floor.

- 3) Set oscilloscope to TCM connector terminals.
Positive probe; (B55) No. 3
Earth lead; (B55) No. 21

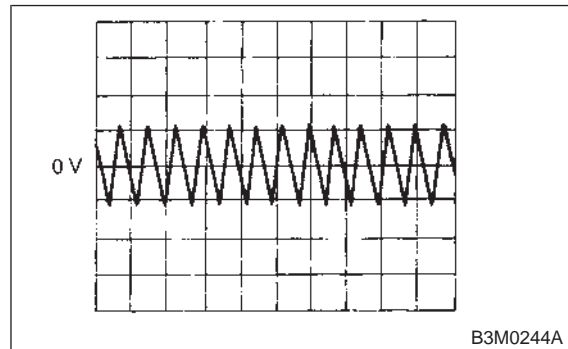


- 4) Start the engine and set vehicle in 20 km/h (12 MPH) condition.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 5) Measure signal voltage indicated on oscilloscope.



- CHECK** : *Is the signal voltage more than AC 1 V?*
- YES** : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.
- NO** : Go to step **8S11**.

8S11 : CHECK POOR CONTACT.

- CHECK** : *Is there poor contact in vehicle speed sensor 1 circuit?*
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

9. Diagnostic Chart with Select Monitor

A: BASIC DIAGNOSTIC CHART

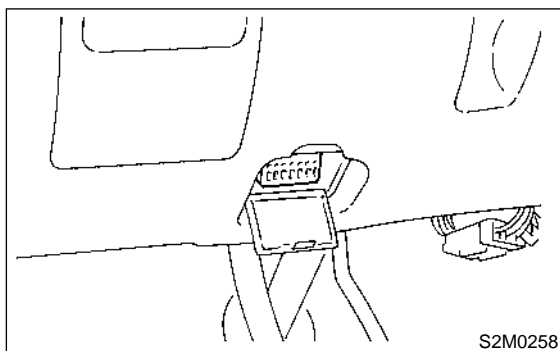
If no trouble codes appear in the on-board diagnostics operation (although problems have occurred or are occurring), measure performance characteristics of sensors, actuators, etc., in the Subaru Select Monitor and compare with the "basic data" to determine the cause of problems.

- 1) Trouble occurs.
- 2) No trouble codes appear in on-board diagnostics operation.
- 3) Measure each item using Subaru Select Monitor.
- 4) Compare measured values with basic data.
- 5) Determine item which is outside basic data specifications.
- 6) Check sensor and actuator affected.

B: BATTERY VOLTAGE

9B1 : CHECK BATTERY VOLTAGE.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor to data link connector.



S2M0258

- 3) Start the engine, and engine idling after warm-up.
- 4) Turn Subaru Select Monitor switch to ON.
- 5) Read data of battery voltage using Subaru Select Monitor.

- Battery voltage applied to TCM.

CHECK : *Is voltage between 10 and 16 V?*

YES : Go to step VEHICLE SPEED SENSOR 1. <Ref. to 3-2 [T9C0].>

NO : Check battery voltage and specification of electrolyte, regulating voltage under no loads and generator (as a single unit).

C: CHECK VEHICLE SPEED SENSOR 1.

9C1 : CHECK VEHICLE SPEED SENSOR 1.

- 1) Lift-up the vehicle and place safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 2) Read data of vehicle speed #1 using Subaru Select Monitor.

- Compare speedometer with Subaru Select Monitor indications.
- Vehicle speed is indicated in "MPH" or "km/h".

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : *Does the speedometer indication increase as the Subaru Select Monitor data increases?*

YES : Go to step VEHICLE SPEED SENSOR 2. <Ref. to 3-2 [T9D0].>

NO : Check vehicle speed sensor 1 circuit. <Ref. to 3-2 [T8S0].>

D: CHECK VEHICLE SPEED SENSOR 2.

9D1 : CHECK VEHICLE SPEED SENSOR 2.

Read data of vehicle speed #2 using Subaru Select Monitor.

- Compare speedometer with Subaru Select Monitor indications.
- Vehicle speed is indicated in "MPH" or "km/h".

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : *Does the speedometer indication increase as the Subaru Select Monitor data increases?*

YES : Go to step ENGINE SPEED SIGNAL. <Ref. to 3-2 [T9E0].>

NO : Check vehicle speed sensor 2 circuit. <Ref. to 3-2 [T8G0].>

E: CHECK ENGINE SPEED SIGNAL.

9E1 : CHECK ENGINE SPEED SIGNAL.

- 1) Turn A/C switch to OFF (with A/C models).
- 2) Warm-up the engine until engine coolant temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 3) Read data of engine speed using Subaru Select Monitor.

- Engine speed is indicated in "rpm".

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : *Does the tachometer revolution increase as the Subaru Select Monitor revolution data increases?*

YES : Go to step ATF TEMPERATURE SENSOR. <Ref. to 3-2 [T9F0].>

NO : Check engine speed signal circuit. <Ref. to 3-2 [T8C0].>

F: CHECK ATF TEMPERATURE SENSOR.

9F1 : CHECK AT OIL TEMP WARNING LIGHT.

CHECK : *Does the AT OIL TEMP warning light remain on 2 seconds after the engine has been started?*

YES : Go to step 9F2.

NO : Check ATF temperature sensor and TCM circuit. <Ref. to 3-2 [T8E0].>

9F2 : CHECK ATF TEMPERATURE SENSOR.

- 1) Read data of ATF temperature using Subaru Select Monitor.

- ATF temperature is indicated in "°F" or "°C".

- 2) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 3) Turn ignition switch to ON (engine OFF).

CHECK : *Does the ATF temperature change from 80°C (176°F)?*

YES : Go to step THROTTLE POSITION SENSOR. <Ref. to 3-2 [T9G0].>

NO : Check ATF temperature sensor circuit. <Ref. to 3-2 [T8E0].>

G: CHECK THROTTLE POSITION SENSOR.

9G1 : CHECK INPUT SIGNAL FOR TCM.

Read data of throttle position sensor using Subaru Select Monitor.

- Throttle position sensor input signal is indicated.

CHECK : *Is voltage between 0.3 and 0.7 V when the accelerator pedal is completely released?*

YES : Go to step 9G2.

NO : Check throttle position sensor circuit. <Ref. to 3-2 [T8F0].>

9G2 : CHECK INPUT SIGNAL FOR TCM.

CHECK : *Is voltage between 4.4 and 4.8 V when the accelerator pedal is completely depressed?*

YES : Go to step 9G3.

NO : Check throttle position sensor circuit. <Ref. to 3-2 [T8F0].>

9G3 : CHECK INPUT SIGNAL FOR TCM.

- CHECK** : *Does voltage decrease smoothly when the accelerator pedal is fully depressed and then fully released?*
- YES** : Go to step GEAR POSITION. <Ref. to 3-2 [T9H0].>
- NO** : Check throttle position sensor circuit. <Ref. to 3-2 [T8F0].>

H: CHECK GEAR POSITION.**9H1 : CHECK GEAR POSITION.**

- 1) Lift-up the vehicle and place safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 2) Start the engine.
- 3) Move select lever to "D", and drive vehicle.
- 4) Read data of gear position using Subaru Select Monitor.
- Gear position is indicated.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- CHECK** : *Does the transmission gear correspond to the gear which is shown on display?*
- YES** : Go to step LINE PRESSURE DUTY. <Ref. to 3-2 [T9I0].>
- NO** : Check shift solenoid 1 and shift solenoid 2 signal circuit. <Ref. to 3-2 [T8K0].> and <Ref. to 3-2 [T8L0].>

I: CHECK LINE PRESSURE DUTY.**9I1 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.**

- 1) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 2) Stop the engine and turn ignition switch to ON (engine OFF).
- 3) Move selector lever to "N".
- 4) Read data of line pressure duty ratio using Subaru Select Monitor.
- Line pressure duty is indicated in "%".

- CHECK** : *Does the Subaru Select Monitor indicate 100% when the accelerator pedal is completely released?*
- YES** : Go to step 9I2.
- NO** : Go to step 9I4.

9I2 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- CHECK** : *Does the Subaru Select Monitor indicate between 10 and 20% when the accelerator pedal is completely depressed?*
- YES** : Go to step 9I3.
- NO** : Go to step 9I4.

9I3 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- CHECK** : *Does the Subaru Select Monitor change smoothly when the accelerator pedal is fully depressed and then fully released?*
- YES** : Go to step LOCK-UP DUTY. <Ref. to 3-2 [T9J0].>
- NO** : Go to step 9I4.

9I4 : CHECK THROTTLE POSITION SENSOR.**NOTE:**

For the diagnostics procedure on throttle position sensor circuit, <Ref. to 3-2 [T9G0].>.

- CHECK** : ***Is there any trouble in throttle position sensor circuit?***
- YES** : Repair or replace throttle position sensor circuit, <Ref. to 3-2 [T8F0].>.
- NO** : Go to step **9I5**.

9I5 : CHECK ENGINE SPEED SIGNAL.**NOTE:**

For the diagnostics procedure on engine speed signal circuit, <Ref. to 3-2 [T9E0].>.

- CHECK** : ***Is there any trouble in engine speed signal circuit?***
- YES** : Repair or replace engine speed signal circuit, <Ref. to 3-2 [T8C0].>.
- NO** : Go to step **9I6**.

9I6 : CHECK ATF TEMPERATURE SENSOR.**NOTE:**

For the diagnostics procedure on ATF temperature sensor circuit, <Ref. to 3-2 [T9F1].>.

- CHECK** : ***Is there any trouble in ATF temperature sensor circuit?***
- YES** : Repair or replace ATF temperature sensor circuit, <Ref. to 3-2 [T8E0].>.
- NO** : Go to step **9I7**.

9I7 : CHECK INHIBITOR SWITCH.

1) Turn ignition switch and Subaru Select Monitor to ON.

2) Read data of range switch using Subaru Select Monitor.

- Range switch is indicated in ON ⇔ OFF.

- CHECK** : ***When each range is selected, does LED of the range switch on Subaru Select Monitor light up?***
- YES** : Go to step LOCK-UP DUTY. <Ref. to 3-2 [T9J0].>
- NO** : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

J: CHECK LOCK-UP DUTY.**9J1 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.**

Read data of lock-up duty ratio using Subaru Select Monitor.

- Lock-up duty ratio is indicated in "%".

- CHECK** : ***Does the Subaru Select Monitor indicate 5%?***
- YES** : Go to step **9J2**.
- NO** : Go to step **9J3**.

9J2 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Move selector lever to "D" and slowly increase vehicle speed to 75 km/h (47 MPH).

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- CHECK** : ***Does the Subaru Select Monitor indicate 95%?***
- YES** : Go to step TRANSFER DUTY RATIO. <Ref. to 3-2 [T9K0].>
- NO** : Go to step **9J3**.

9J3 : CHECK THROTTLE POSITION SENSOR.**NOTE:**

For the diagnostics procedure on throttle position sensor circuit, <Ref. to 3-2 [T9G0].>.

- CHECK** : ***Is there any trouble in throttle position sensor circuit?***
- YES** : Repair or replace throttle position sensor circuit, <Ref. to 3-2 [T8F0].>.
- NO** : Go to step **9J4**.

9J4 : CHECK VEHICLE SPEED SENSOR 1.**NOTE:**

For the diagnostics procedure on vehicle speed sensor 1 circuit, <Ref. to 3-2 [T9C0].>.

- CHECK** : ***Is there any trouble in vehicle speed sensor 1 circuit?***
- YES** : Repair or replace vehicle speed sensor 1 circuit, <Ref. to 3-2 [T8S0].>.
- NO** : Go to step **9J5**.

9J5 : CHECK VEHICLE SPEED SENSOR 2.**NOTE:**

For the diagnostics procedure on vehicle speed sensor 2 circuit, <Ref. to 3-2 [T9D0].>.

- CHECK** : ***Is there any trouble in vehicle speed sensor 2 circuit?***
- YES** : Repair or replace vehicle speed sensor 2 circuit, <Ref. to 3-2 [T8G0].>.
- NO** : Go to step **9J6**.

9J6 : CHECK ENGINE SPEED SIGNAL.**NOTE:**

For the diagnostics procedure on engine speed signal circuit, <Ref. to 3-2 [T9E0].>.

- CHECK** : ***Is there any trouble in engine speed signal circuit?***
- YES** : Repair or replace engine speed signal circuit, <Ref. to 3-2 [T8C0].>.
- NO** : Go to step **9J7**.

9J7 : CHECK INHIBITOR SWITCH.

Read data of range switch using Subaru Select Monitor.

- Range switch is indicated in ON ⇔ OFF.

- CHECK** : ***When each range is selected, does LED of the range switch on Subaru Select Monitor light up?***
- YES** : Go to step TRANSFER DUTY. <Ref. to 3-2 [T9K0].>
- NO** : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

K: CHECK TRANSFER DUTY.**9K1 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.**

- Turn ignition switch to ON (engine OFF).
 - Move selector lever to "D".
 - Read data of transfer duty ratio using Subaru Select Monitor.
- Transfer duty ratio is indicated in "%".

- CHECK** : ***Does the duty ratio change in response to the depress-release motion of the accelerator pedal?***
- YES** : Go to step **9K2**.
- NO** : Go to step **9K3**.

9K2 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- Turn ignition switch to OFF.
 - Set FWD mode.
 - Turn ignition switch to ON (engine OFF).
- CHECK** : ***Does the Subaru Select Monitor indicate 95%?***
- YES** : Go to step THROTTLE POSITION SENSOR POWER SUPPLY. <Ref. to 3-2 [T9L0].>
- NO** : Go to step **9K3**.

9K3 : CHECK THROTTLE POSITION SENSOR.**NOTE:**

For the diagnostics procedure on throttle position sensor circuit, <Ref to 3-2 [T9G0].>.

- CHECK** : ***Is there any trouble in throttle position sensor circuit?***
- YES** : Repair or replace throttle position sensor circuit, <Ref. to 3-2 [T8F0].>.
- NO** : Go to step **9K4**.

9K4 : CHECK VEHICLE SPEED SENSOR 1.**NOTE:**

For the diagnostics procedure on vehicle speed sensor 1 circuit, <Ref. to 3-2 [T9C0].>.

- CHECK** : ***Is there any trouble in vehicle speed sensor 1 circuit?***
- YES** : Repair or replace vehicle speed sensor 1 circuit, <Ref to 3-2 [T8S0].>.
- NO** : Go to step **9K5**.

9K5 : CHECK VEHICLE SPEED SENSOR 2 CIRCUIT.**NOTE:**

For the diagnostics procedure on vehicle speed sensor 2 circuit, <Ref. to 3-2 [T9D0]>.

- CHECK** : ***Is there any trouble in vehicle speed sensor 2 circuit?***
- YES** : Repair or replace vehicle speed sensor 2 circuit, <Ref. to 3-2 [T8G0]>.
- NO** : Go to step **9K6**.

9K6 : CHECK ATF TEMPERATURE SENSOR.**NOTE:**

For the diagnostics procedure on ATF temperature sensor circuit, <Ref. to 3-2 [T9F0]>.

- CHECK** : ***Is there any trouble in ATF temperature sensor circuit?***
- YES** : Repair or replace ATF temperature sensor circuit, <Ref. to 3-2 [T8E0]>.
- NO** : Go to step **9K7**.

9K7 : CHECK INHIBITOR SWITCH.

Read data of range switch using Subaru Select Monitor.

- Range switch is indicated in ON ⇔ OFF.

- CHECK** : ***When each range is selected, does LED of range switch on Subaru Select Monitor light up?***
- YES** : Go to step **9K8**.
- NO** : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0]>.

9K8 : CHECK ABS SIGNAL.

1) Start the engine, and turn Subaru Select Monitor switch to ON.

2) Read data of ABS signal using Subaru Select Monitor.

- ABS switch is indicated in ON ⇔ OFF.

- CHECK** : ***Does the LED of ABS switch light up?***
- YES** : Check ABS signal circuit. <Ref. to 4-4 [T10A0]> and <Ref. to 4-4 [T10U0]>.
- NO** : Go to step THROTTLE POSITION SENSOR POWER SUPPLY. <Ref. to 3-2 [T9L0]>.

L: CHECK THROTTLE POSITION SENSOR POWER SUPPLY.**9L1 : CHECK THROTTLE POSITION POWER SUPPLY.**

Read data of throttle position sensor power supply using Subaru Select Monitor.

- Throttle position sensor power supply voltage is indicated.

- CHECK** : ***Is the value fixed between 5.02 and 5.22 V?***
- YES** : Go to step MASS AIR FLOW SIGNAL. <Ref. to 3-2 [T9M0]>.
- NO** : Check throttle position sensor power supply circuit. <Ref. to 3-2 [T8F0]>.

M: CHECK MASS AIR FLOW SIGNAL. (EXCEPT 2200 cc CALIFORNIA SPEC. VEHICLES)**9M1 : CHECK VEHICLE MARKET.**

- CHECK** : ***Is it 2200 cc California spec. vehicle?***
- YES** : Go to step INTAKE MANIFOLD PRESSURE SIGNAL. <Ref. to 3-2 [T9N0]>.
- NO** : Go to step **9M2**.

9M2 : CHECK INPUT SIGNAL FOR TCM.

- 1) Start the engine.
- 2) Warm-up the engine until engine coolant temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 3) Engine idling after warm-up.
 - 4) Move selector lever to "N".
 - 5) Read data of mass air flow signal using Subaru Select Monitor.
- Display shows mass air flow signal value sent from ECM.

- CHECK** : ***Does voltage change in response to the depress-release motion of the accelerator pedal?***
- YES** : Go to step **9M3**.
- NO** : Check mass air flow signal circuit. <Ref. to 3-2 [T8D0]>.

9M3 : CHECK ECM.

CHECK : *Has trouble been eliminated after ECM replacement?*

YES : Replace ECM. <Ref. to 2-7 [W15A0].>

NO : Go to step **9M4**.

9M4 : CHECK TCM.

NOTE:

Install former ECM.

CHECK : *Has trouble been eliminated after TCM replacement?*

YES : Replace TCM. <Ref. to 3-2 [W22A0].>

NO : Go to step TURBINE SPEED SENSOR. <Ref. to 3-2 [T900].>

N: CHECK INTAKE MANIFOLD PRESSURE SIGNAL. (2200 cc CALIFORNIA SPEC. VEHICLES)

9N1 : CHECK INPUT SIGNAL FOR TCM.

1) Start the engine.

2) Warm-up the engine until engine coolant temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

3) Engine idling after warm-up.

4) Move selector lever to "N".

5) Read data of intake manifold pressure signal using Subaru Select Monitor.

- Display shows intake manifold pressure signal value sent from ECM.

CHECK : *Does voltage change in response to the depress-release motion of the accelerator pedal?*

YES : Go to step **9N2**.

NO : Check intake manifold pressure signal circuit. <Ref. to 3-2 [T8J0].>

9N2 : CHECK ECM.

CHECK : *Has trouble been eliminated after ECM replacement?*

YES : Replace ECM. <Ref. to 2-7 [W15A0].>

NO : Go to step **9N3**.

9N3 : CHECK TCM.

NOTE:

Install former ECM.

CHECK : *Has trouble been eliminated after TCM replacement?*

YES : Replace TCM. <Ref. to 3-2 [W22A0].>

NO : Go to step TORQUE CONVERTER TURBINE SPEED SENSOR. <Ref. to 3-2 [T900].>

O: CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.

9O1 : CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.

1) Lift-up the vehicle and place safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

2) Read data of torque converter turbine speed sensor using Subaru Select Monitor.

- Compare speedometer with Subaru Select Monitor indications.

- Vehicle speed is indicated in "MPH" or "km/h".

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : *Does the speedometer indication increase as the Subaru Select Monitor data increases?*

YES : Go to step 2-4 BRAKE PRESSURE DUTY. <Ref. to 3-2 [T9P0].>

NO : Check turbine speed sensor circuit. <Ref. to 3-2 [T8H0].>

P: CHECK 2-4 BRAKE PRESSURE DUTY.**9P1 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.**

1) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

2) Stop the engine and turn ignition switch to ON (engine OFF).

3) Move selector lever to "N".

4) Read data of 2-4 brake pressure duty ratio using Subaru Select Monitor.

- 2-4 brake pressure duty is indicated in "%".

CHECK : ***Does the Subaru Select Monitor indicate 100% when the accelerator pedal is completely released?***

YES : Go to step **9P2**.

NO : Go to step **9P4**.

9P2 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

CHECK : ***Does the Subaru Select Monitor indicate between 10 and 20% when the accelerator pedal is completely depressed?***

YES : Go to step **9P3**.

NO : Go to step **9P4**.

9P3 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

CHECK : ***Does the Subaru Select Monitor change smoothly when the accelerator pedal is fully depressed and then fully released?***

YES : Go to step FWD SWITCH. <Ref. to 3-2 [T9Q0].>

NO : Go to step **9P4**.

9P4 : CHECK THROTTLE POSITION SENSOR.**NOTE:**

For the diagnostics procedure on throttle position sensor circuit, <Ref. to 3-2 [T9G0].>.

CHECK : ***Is there any trouble in throttle position sensor circuit?***

YES : Repair or replace throttle position sensor circuit, <Ref. to 3-2 [T8F0].>.

NO : Go to step **9P5**.

9P5 : CHECK ENGINE SPEED SIGNAL.**NOTE:**

For the diagnostics procedure on engine speed signal circuit, <Ref. to 3-2 [T9E0].>.

CHECK : ***Is there any trouble in engine speed signal circuit?***

YES : Repair or replace engine speed signal circuit, <Ref. to 3-2 [T8C0].>.

NO : Go to step **9P6**.

9P6 : CHECK ATF TEMPERATURE SENSOR.**NOTE:**

For the diagnostics procedure on ATF temperature sensor circuit, <Ref. to 3-2 [T9F0].>.

CHECK : ***Is there any trouble in ATF temperature sensor circuit?***

YES : Repair or replace ATF temperature sensor circuit, <Ref. to 3-2 [T8E0].>.

NO : Go to step **9P7**.

9P7 : CHECK INHIBITOR SWITCH.

1) Turn ignition switch and Subaru Select Monitor to ON.

2) Read data of range switch using Subaru Select Monitor.

- Range switch is indicated in ON ⇔ OFF.

CHECK : ***When each range is selected, does LED of the range switch on Subaru Select Monitor light up?***

YES : Go to step FWD SWITCH. <Ref. to 3-2 [T9Q0].>

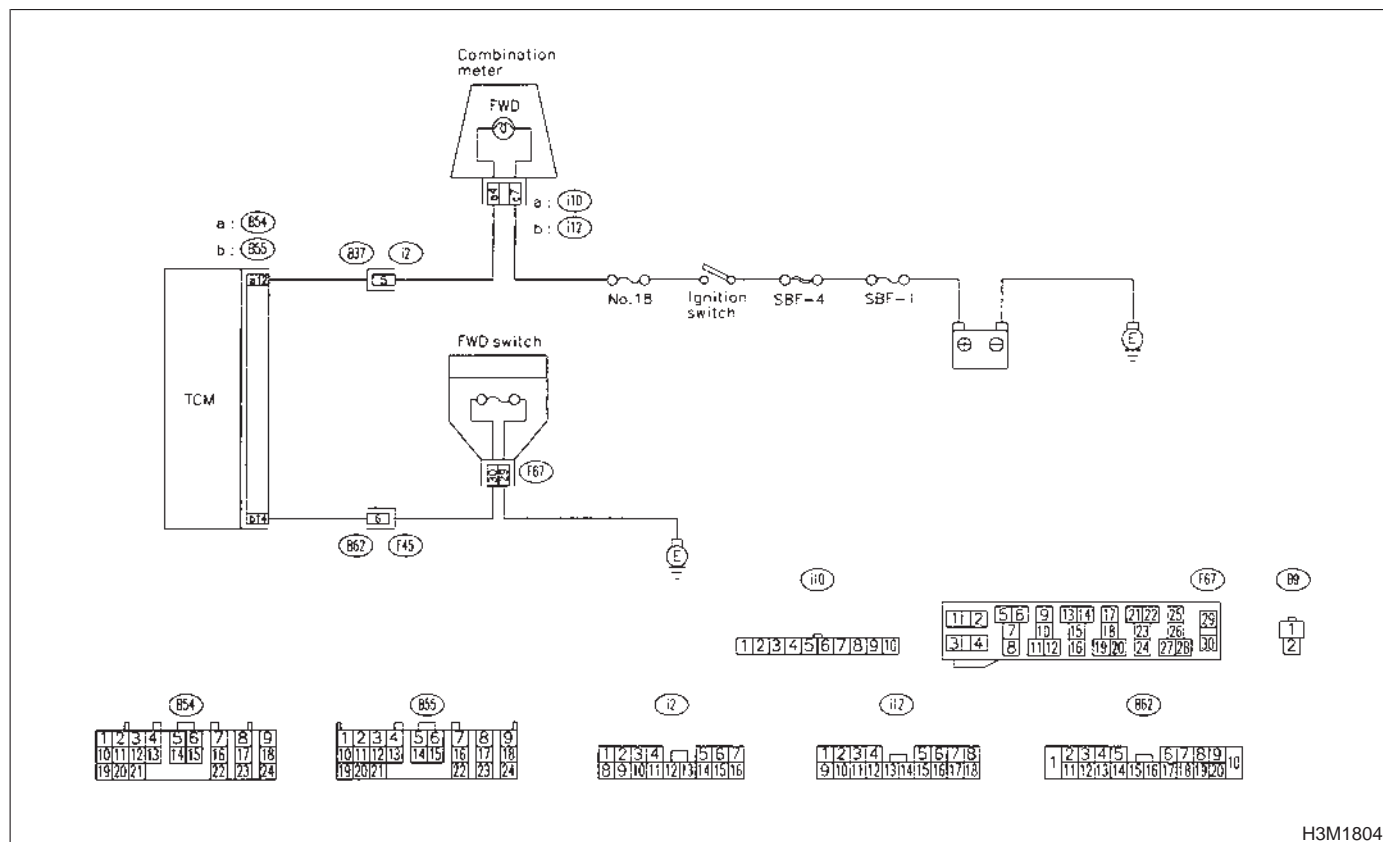
NO : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

Q: CHECK FWD SWITCH.

DIAGNOSIS:

- LED does not come on even if FWD switch is ON.
- FWD switch circuit is open or short.

WIRING DIAGRAM:



9Q1 : CHECK FWD SWITCH.

CHECK : When fuse is inserted to FWD switch, does LED light up?

YES : Go to step BRAKE SWITCH. <Ref. to 3-2 [T9R0].>

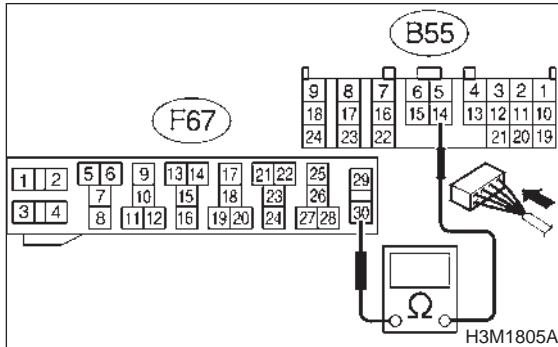
NO : Go to step **9Q2**.

9Q2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from TCM and FWD switch.
- 3) Measure resistance of harness between TCM and FWD switch connector.

Connector & terminal

(F67) No. 30 — (B55) No. 14:



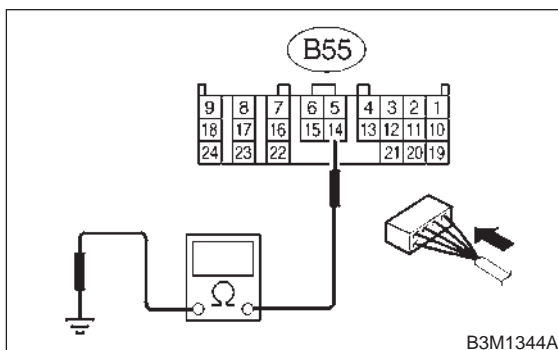
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 9Q3.
- NO** : Repair open circuit in harness between TCM and FWD switch connector.

9Q3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.

Measure resistance of harness connector between TCM and body to make sure that circuit does not short.

Connector & terminal

(B55) No. 14 — Chassis ground:



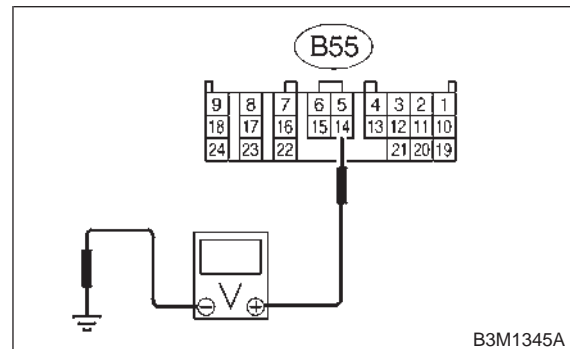
- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 9Q4.
- NO** : Repair short circuit in harness connector between TCM and chassis ground.

9Q4 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to TCM and FWD switch.
- 3) Turn ignition switch to ON.
- 4) Measure signal voltage for TCM while installing the fuse to FWD switch connector.

Connector & terminal

(B55) No. 14 (+) — Chassis ground (-):



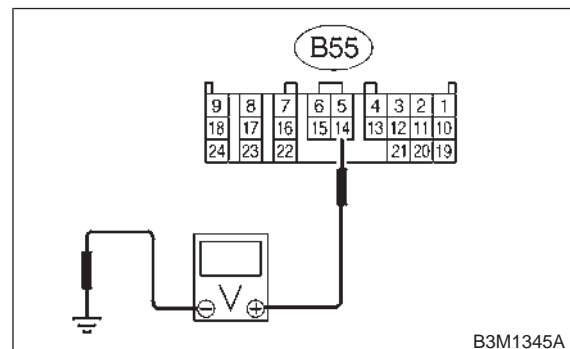
- CHECK** : Is the voltage less than 1 V in FWD switch while installing?
- YES** : Go to step 9Q5.
- NO** : Go to step 9Q10.

9Q5 : CHECK INPUT SIGNAL FOR TCM.

Measure signal voltage for TCM while removing the fuse from FWD switch connector.

Connector & terminal

(B55) No. 14 (+) — Chassis ground (-):



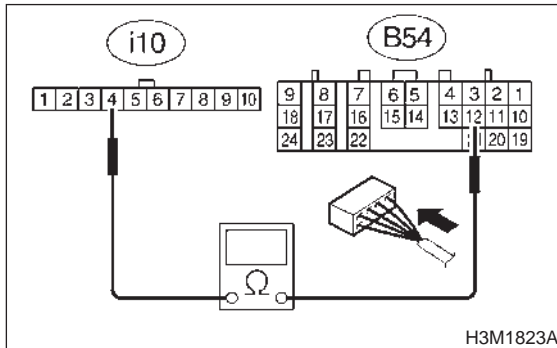
- CHECK** : Is the voltage more than 10 V in FWD switch while removing?
- YES** : Go to step 9Q6.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

9Q6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from TCM and combination meter.
- 3) Measure resistance of harness between TCM and diagnosis connector.

Connector & terminal

(B54) No. 12 — (i10) No. 4:



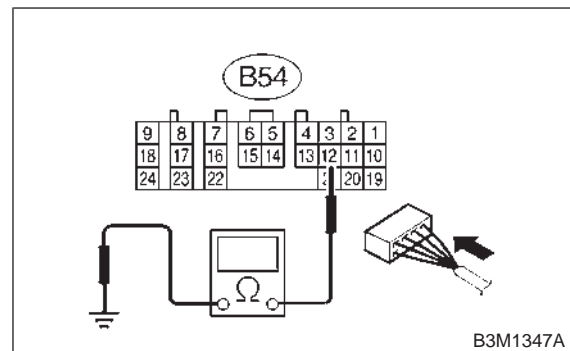
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 9Q7.
- NO** : Repair open circuit in harness between TCM and combination meter and poor contact in coupling connector.

9Q7 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

Measure resistance of harness connector between TCM and chassis ground to make sure that circuit does not short.

Connector & terminal

(B54) No. 12 — Chassis ground:



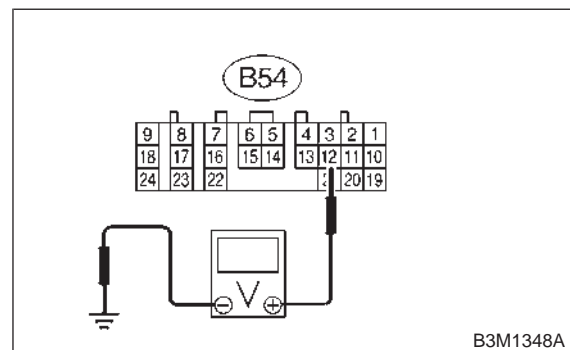
- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 9Q8.
- NO** : Repair short circuit in harness between TCM and combination meter connector.

9Q8 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to TCM and combination meter.
- 3) Turn ignition switch to ON.
- 4) Measure signal voltage for TCM while installing and removing the fuse to FWD switch connector.

Connector & terminal

(B54) No. 12 — Chassis ground:



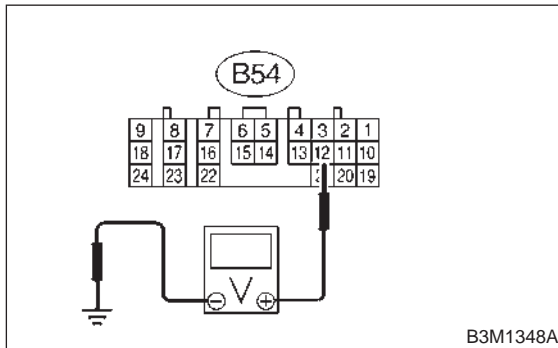
- CHECK** : Is the voltage less than 1 V in FWD switch while installing?
- YES** : Go to step 9Q9.
- NO** : Go to step 9Q10.

9Q9 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure signal voltage for TCM while removing the fuse from FWD switch connector.

Connector & terminal

(B54) No. 12 — Chassis ground:



- CHECK** : *Is the voltage more than 10 V in FWD switch while removing?*
- YES** : Go to step **9Q10**.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

9Q10 : CHECK POOR CONTACT.

- CHECK** : *Is there poor contact in FWD switch circuit?*
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W22A0].>

R: CHECK BRAKE SWITCH.

9R1 : CHECK BRAKE SWITCH.

- CHECK** : *When the brake pedal is depressed, does LED light up?*
- YES** : Go to step ABS SWITCH. <Ref. to 3-2 [T9S0].>
- NO** : Check brake switch circuit. <Ref. to 2-7 [T10AZ0].>

S: CHECK ABS SWITCH.

9S1 : CHECK ABS SWITCH.

- CHECK** : *Does the LED of ABS switch light up?*
- YES** : Check ABS switch circuit. <Ref. to 4-4 [T10A0].> and <Ref. to 4-4 [T10U0].>
- NO** : Go to step CRUISE CONTROL SWITCH. <Ref. to 3-2 [T9T0].>

T: CHECK CRUISE CONTROL SWITCH.

9T1 : CHECK CRUISE CONTROL SWITCH.

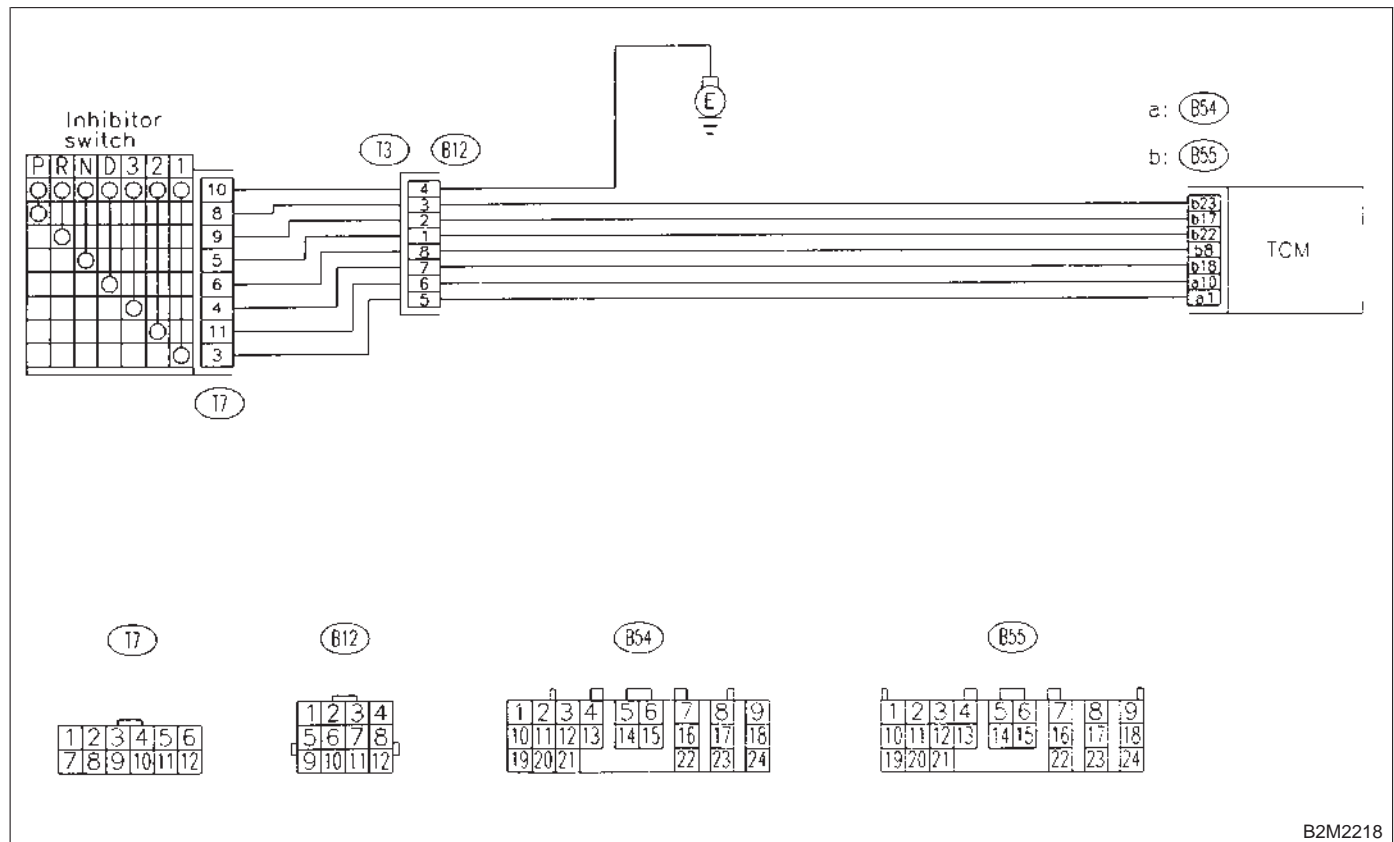
- CHECK** : *When cruise control is set, does LED light up?*
- YES** : Go to step "N/P" RANGE SWITCH. <Ref. to 3-2 [T9U0].>
- NO** : Check cruise control. <Ref. to 6-2 [W1100].>

U: CHECK “N/P” RANGE SWITCH.

DIAGNOSIS:

Input signal circuit of “P” or “N” range is open or shorted.

WIRING DIAGRAM:



B2M2218

9U1 : CHECK “P” RANGE SWITCH.

CHECK : When “P” range is selected, does LED light up?

YES : Go to step 9U2.

NO : Go to step 9U3.

9U2 : CHECK “N” RANGE SWITCH.

CHECK : When the “N” range is selected, does LED light up?

YES : Go to step “R” RANGE SWITCH. <Ref. to 3-2 [T9V0].>

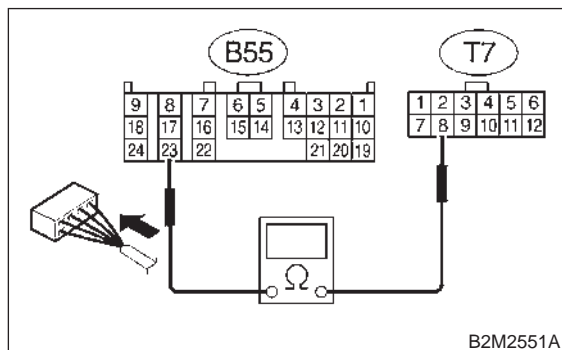
NO : Go to step 9U5.

9U3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from TCM and inhibitor switch.
- 3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal

(B55) No. 23 — (T7) No. 8:



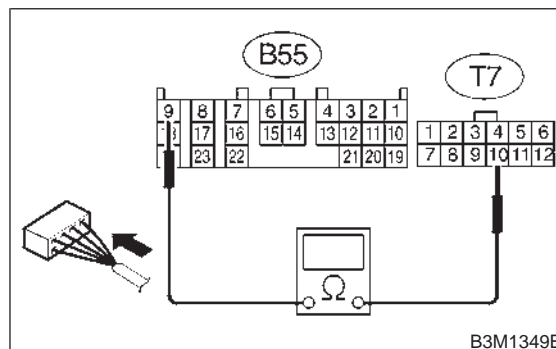
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 9U4.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9U4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between inhibitor switch connector and chassis ground.

Connector & terminal

(T7) No. 10 — (B55) No. 9:



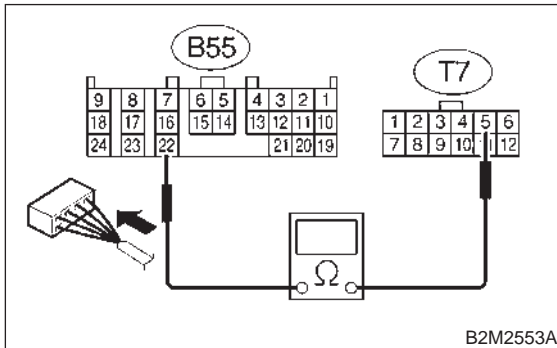
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 9U7.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9U5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from TCM and inhibitor switch.
- 3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal

(B55) No. 22 — (T7) No. 5:



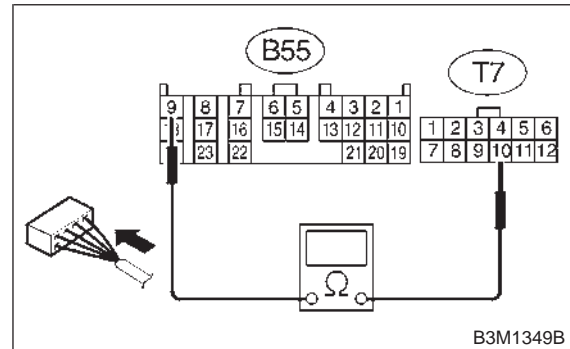
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 9U6.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9U6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between inhibitor switch connector chassis ground.

Connector & terminal

(T7) No. 10 — (B55) No. 9:



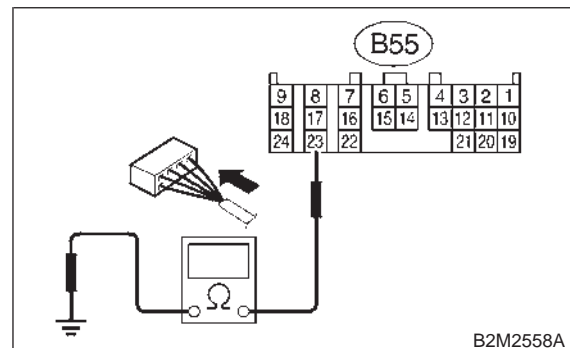
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 9U8.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9U7 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B55) No. 23 — Chassis ground:

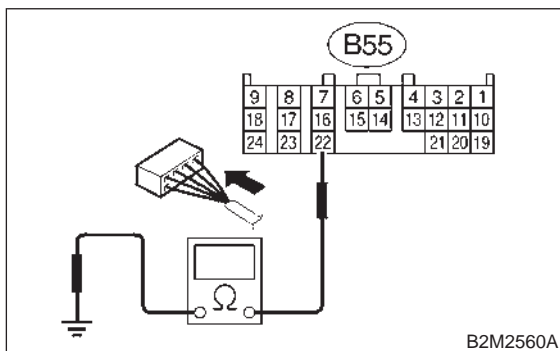


- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 9U9.
- NO** : Repair ground short circuit in harness between TCM and inhibitor switch connector.

9U8 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 22 — Chassis ground:

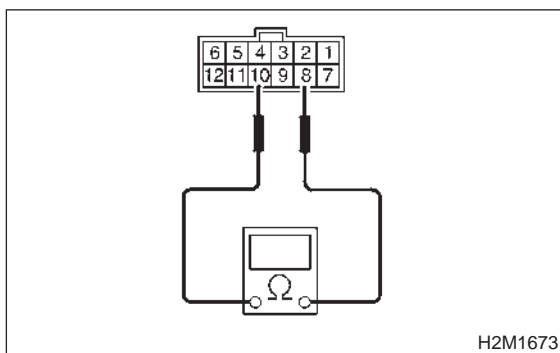


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 9U11.
- NO** : Repair ground short circuit in harness between TCM and inhibitor switch connector.

9U9 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 8 — No. 10:

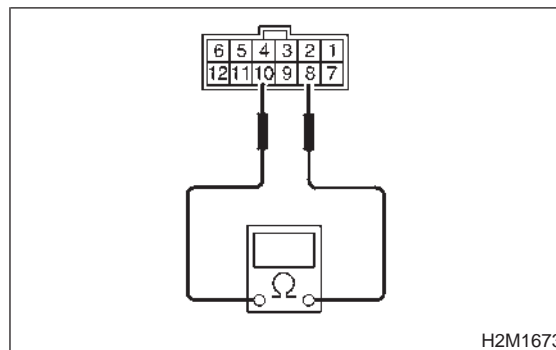


- CHECK** : Is the resistance less than 1 Ω in "P" range?
- YES** : Go to step 9U10.
- NO** : Go to step 9U18.

9U10 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 8 — No. 10:

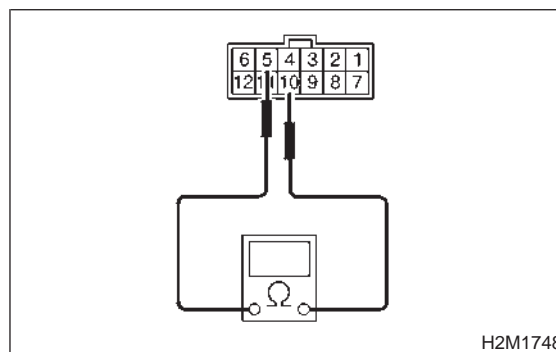


- CHECK** : Is the resistance more than 1 MΩ in other ranges?
- YES** : Go to step 9U13.
- NO** : Go to step 9U18.

9U11 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 5 — No. 10:



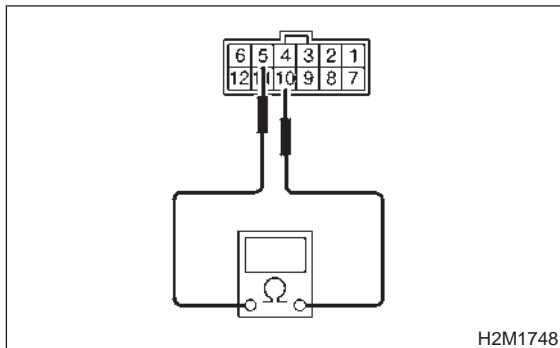
- CHECK** : Is the resistance less than 1 Ω in "N" range?
- YES** : Go to step 9U12.
- NO** : Go to step 9U18.

9U12 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals

No. 5 — No. 10:



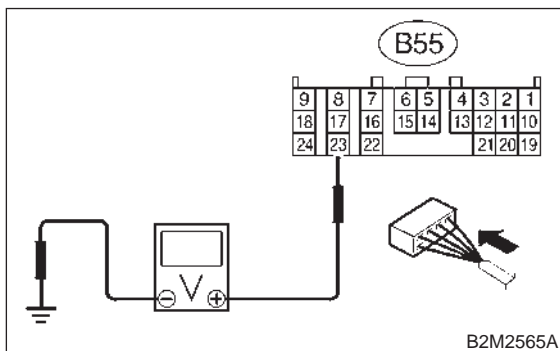
- CHECK** : Is the resistance more than 1 MΩ in other ranges?
- YES** : Go to step 9U15.
- NO** : Go to step 9U18.

9U13 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to TCM and inhibitor switch.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal

(B55) No. 23 (+) — Chassis ground (-):



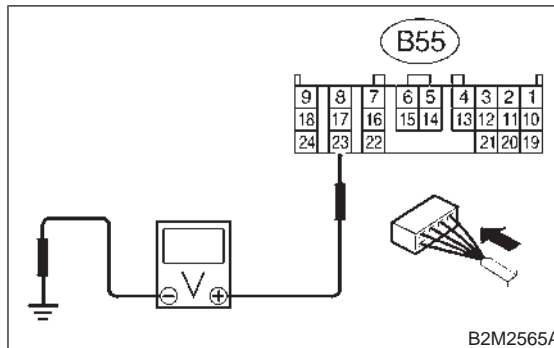
- CHECK** : Is the voltage less than 1 V in "P" range?
- YES** : Go to step 9U14.
- NO** : Go to step 9U17.

9U14 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal

(B55) No. 23 (+) — Chassis ground (-):



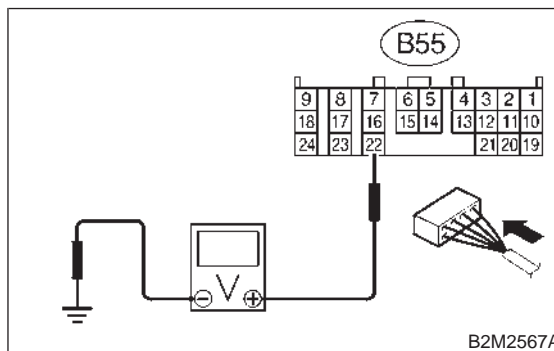
- CHECK** : Is the voltage more than 8 V in other ranges?
- YES** : Go to step 9U17.
- NO** : Go to step 9U18.

9U15 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to TCM and inhibitor switch.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal

(B55) No. 22 (+) — Chassis ground (-):



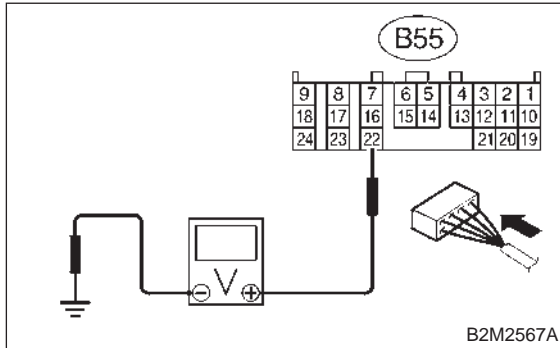
- CHECK** : Is the voltage less than 1 V in "N" range?
- YES** : Go to step 9U16.
- NO** : Go to step 9U17.

9U16 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal

(B55) No. 22 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 8 V in other ranges?**

YES : Go to step **9U17**.

NO : Go to step **9U18**.

9U17 : CHECK POOR CONTACT.

CHECK : **Is there poor contact in “N/P” range switch circuit?**

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

9U18 : CHECK SELECTOR CABLE.

CHECK : **Is there faulty connection in the selector cable?**

YES : Repair connection of selector cable.

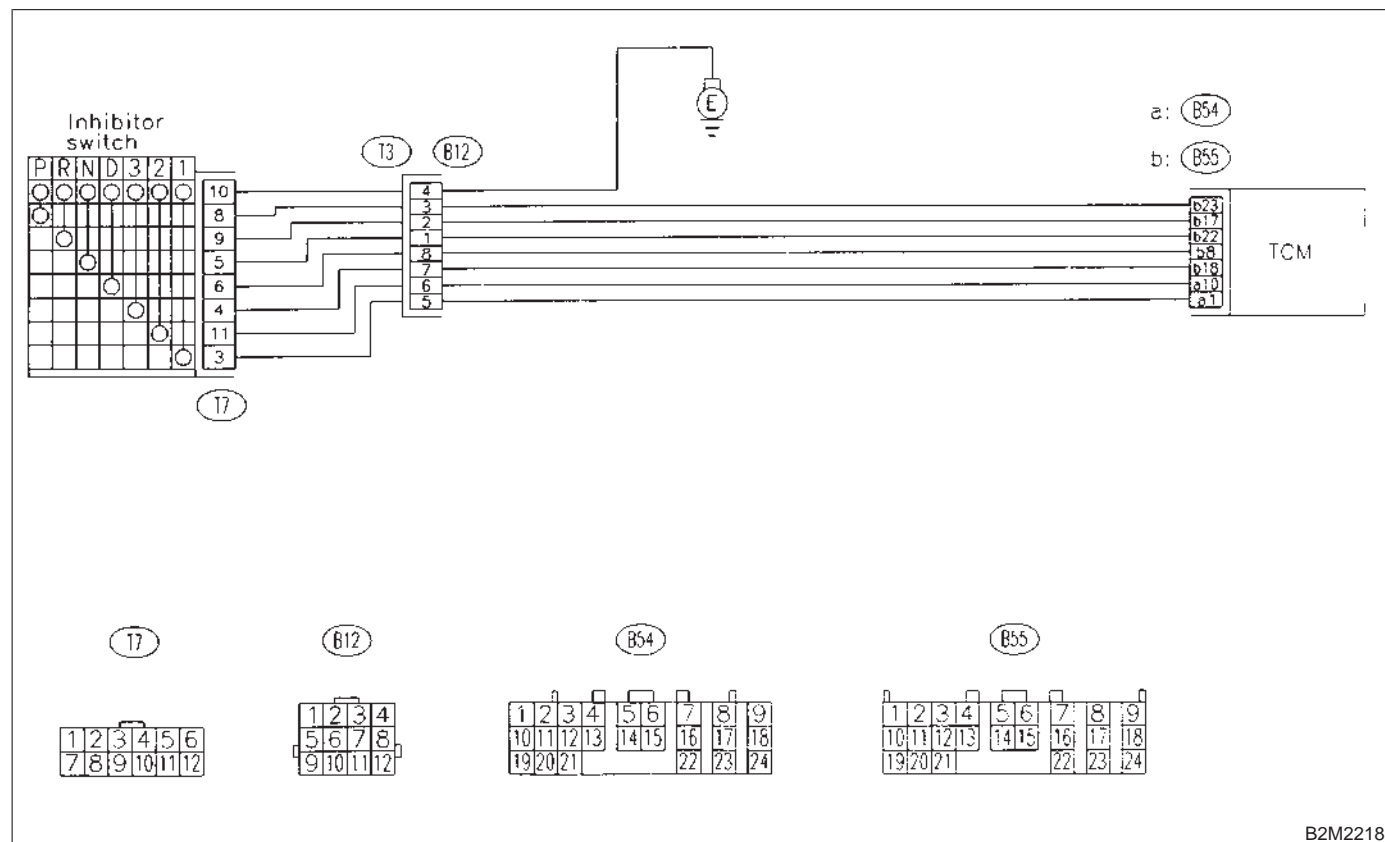
NO : Replace inhibitor switch. <Ref. to 3-2 [W2C0].>

V: CHECK "R" RANGE SWITCH.

DIAGNOSIS:

Input signal circuit of "R" range is open or shorted.

WIRING DIAGRAM:



B2M2218

9V1 : CHECK "R" RANGE SWITCH.

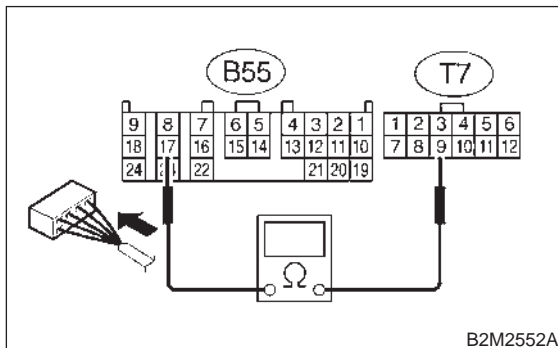
- CHECK** : When the "R" range is selected, does LED light up?
- YES** : Go to step "D" RANGE SWITCH. <Ref. to 3-2 [T9W0].>
- NO** : Go to step 9V2.

9V2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from TCM and inhibitor switch.
- 3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal

(B55) No. 17 — (T7) No. 9:



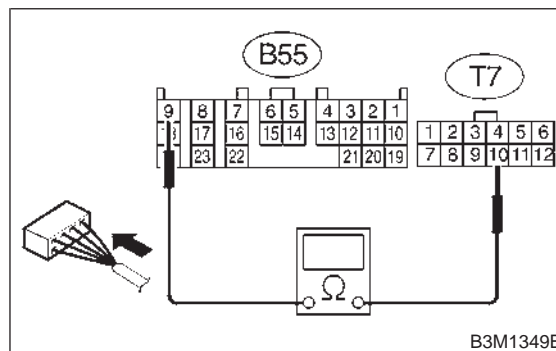
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 9V3.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9V3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between inhibitor switch connector and chassis ground.

Connector & terminal

(T7) No. 10 — (B55) No. 9:



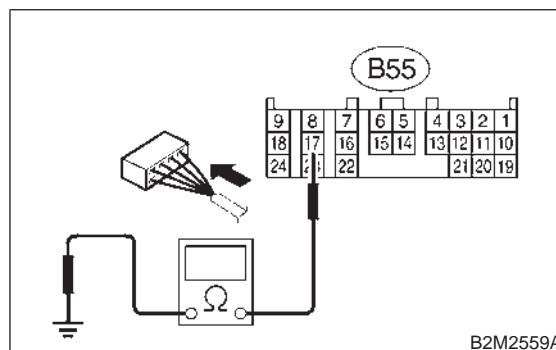
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 9V4.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9V4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B55) No. 17 — Chassis ground:



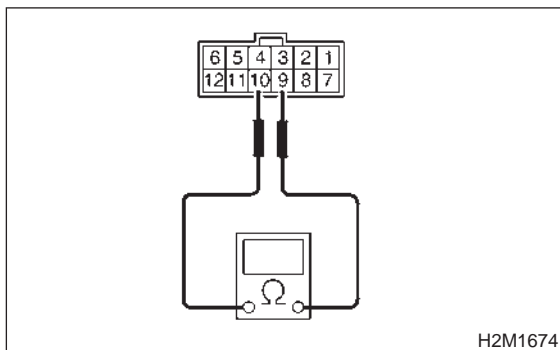
- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 9V5.
- NO** : Repair ground short circuit in harness between TCM and inhibitor switch connector.

9V5 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals

No. 9 — No. 10:



CHECK : *Is the resistance less than 1 Ω in "R" range?*

YES : Go to step **9V6**.

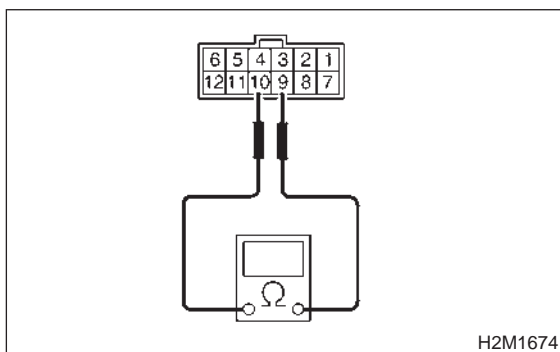
NO : Go to step **9V10**.

9V6 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals

No. 9 — No. 10:



CHECK : *Is the resistance more than 1 MΩ in other ranges?*

YES : Go to step **9V7**.

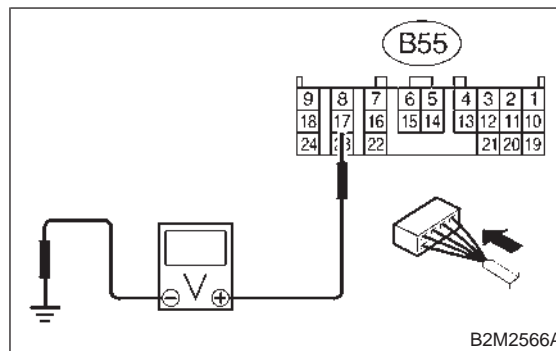
NO : Go to step **9V10**.

9V7 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to TCM and inhibitor switch.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal

(B55) No. 17 (+) — Chassis ground (-):



CHECK : *Is the voltage less than 1 V in "R" range?*

YES : Go to step **9V8**.

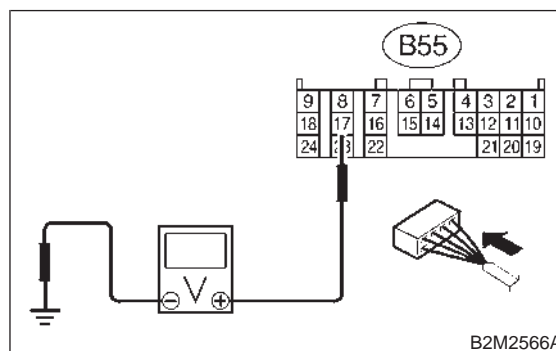
NO : Go to step **9V9**.

9V8 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal

(B55) No. 17 (+) — Chassis ground (-):



CHECK : *Is the voltage more than 9.5 V in other ranges?*

YES : Go to step **9V9**.

NO : Go to step **9V10**.

9V9 : CHECK POOR CONTACT.

CHECK : *Is there poor contact in "R" range switch circuit?*

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

9V10 : CHECK SELECTOR CABLE.

CHECK : *Is there faulty connection in the selector cable?*

YES : Repair connection of selector cable.

NO : Replace inhibitor switch. <Ref. to 3-2 [W2C0].>

W: CHECK “D” RANGE SWITCH.

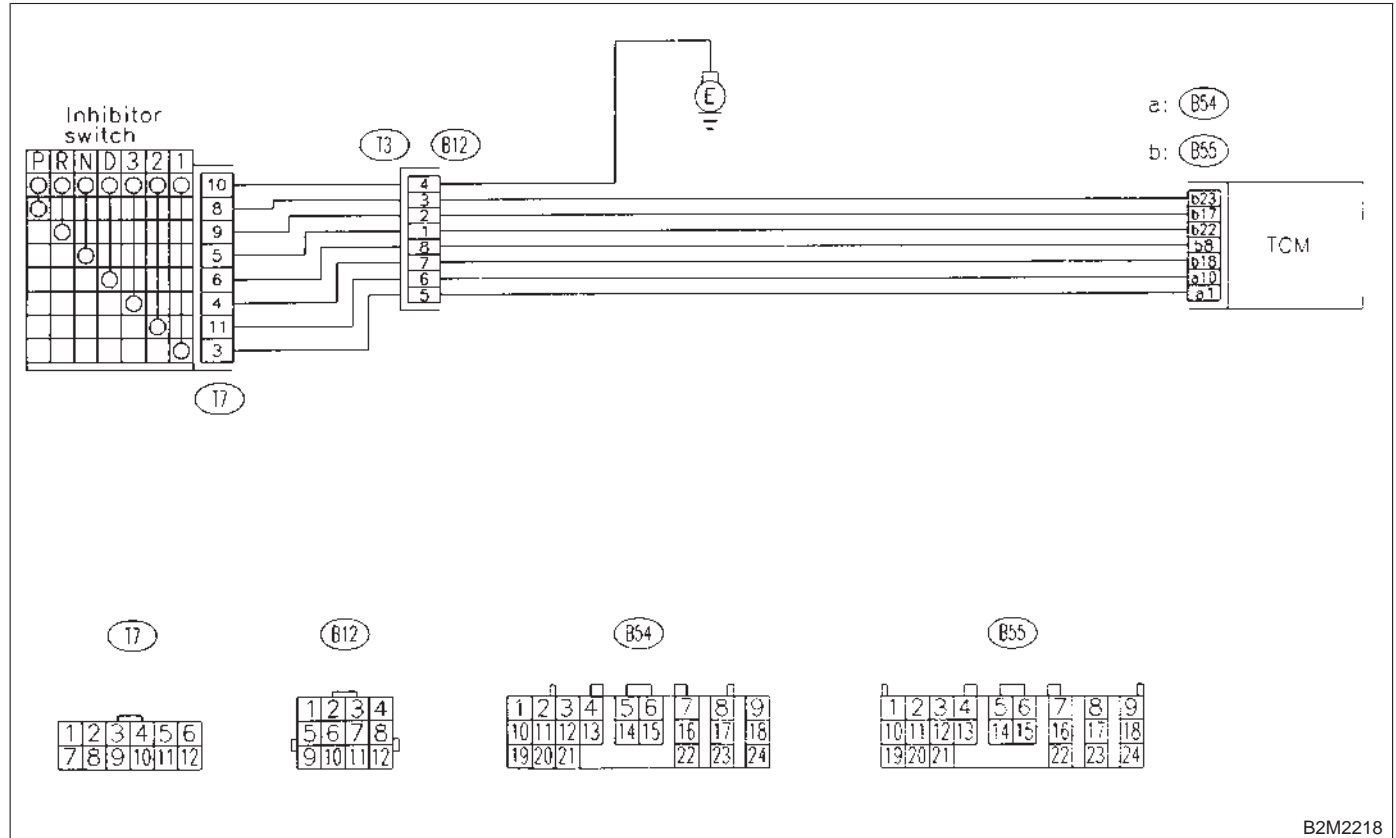
DIAGNOSIS:

Input signal circuit of “D” range is open or shorted.

TROUBLE SYMPTOM:

Shift characteristics are erroneous.

WIRING DIAGRAM:



B2M2218

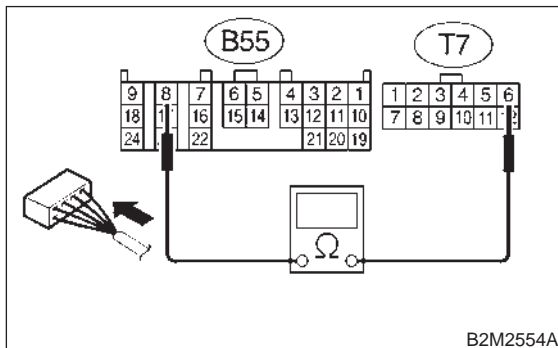
9W1 : CHECK “D” RANGE SWITCH.

- CHECK** : When the “D” range is selected, does LED light up?
- YES** : Go to step “3” RANGE SWITCH. <Ref. to 3-2 [T9X0].>
- NO** : Go to step 9W2.

9W2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from TCM and inhibitor switch.
- 3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B55) No. 8 — (T7) No. 6:

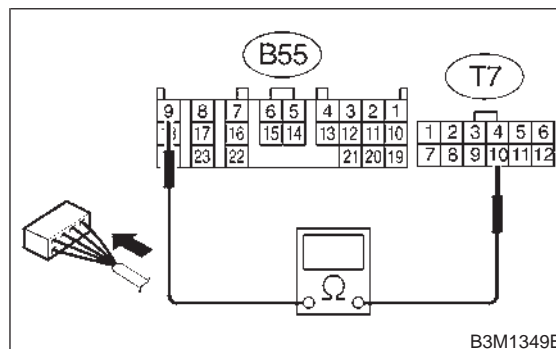


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 9W3.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9W3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between inhibitor switch connector and chassis ground.

Connector & terminal
(T7) No. 10 — (B55) No. 9:

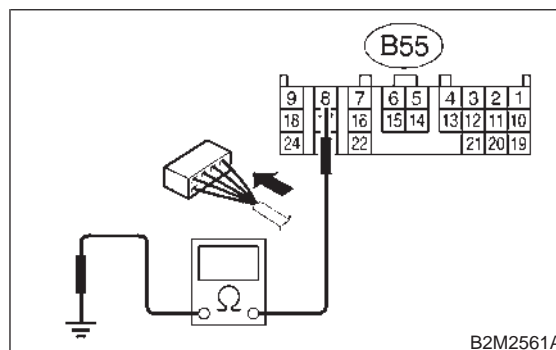


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 9W4.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9W4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 8 — Chassis ground:



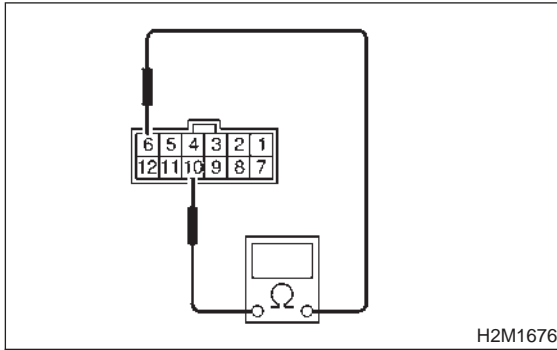
- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 9W5.
- NO** : Repair ground short circuit in harness between TCM and inhibitor switch connector.

9W5 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals

No. 6 — No. 10:



CHECK : Is the resistance less than 1 Ω in "D" range?

YES : Go to step 9W6.

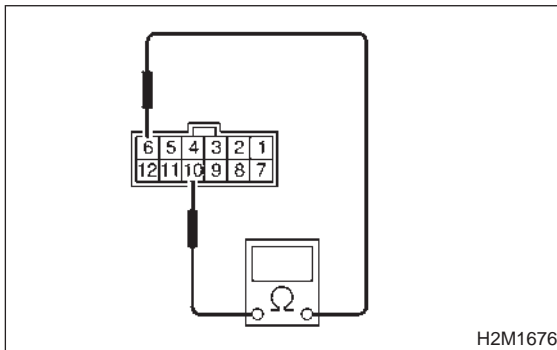
NO : Go to step 9W10.

9W6 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals

No. 6 — No. 10:



CHECK : Is the resistance more than 1 MΩ in other ranges?

YES : Go to step 9W7.

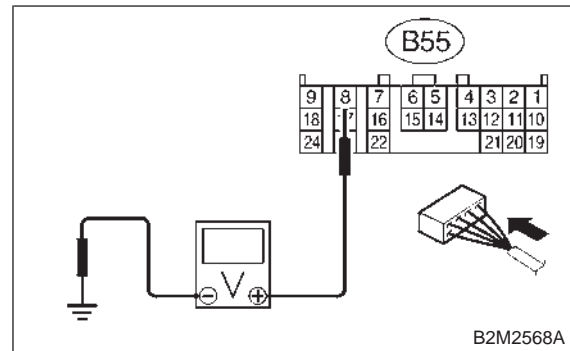
NO : Go to step 9W10.

9W7 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to TCM and inhibitor switch.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal

(B55) No. 8 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V in "D" range?

YES : Go to step 9W8.

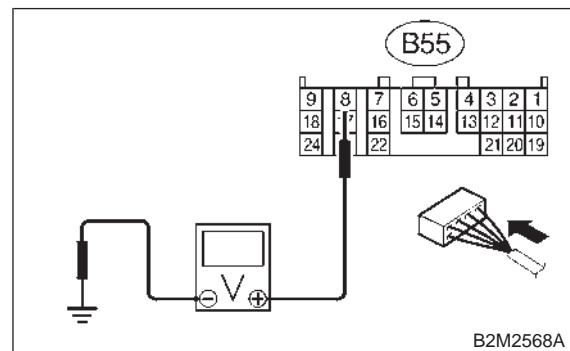
NO : Go to step 9W9.

9W8 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal

(B55) No. 8 (+) — Chassis ground (-):



CHECK : Is the voltage more than 9.5 V in other ranges?

YES : Go to step 9W9.

NO : Go to step 9W10.

9W9 : CHECK POOR CONTACT.

CHECK : *Is there poor contact in "D" range switch circuit?*

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

9W10 : CHECK SELECTOR CABLE.

CHECK : *Is there faulty connection in the selector cable?*

YES : Repair connection of selector cable.

NO : Replace inhibitor switch. <Ref. to 3-2 [W2C0].>

X: CHECK “3” RANGE SWITCH.

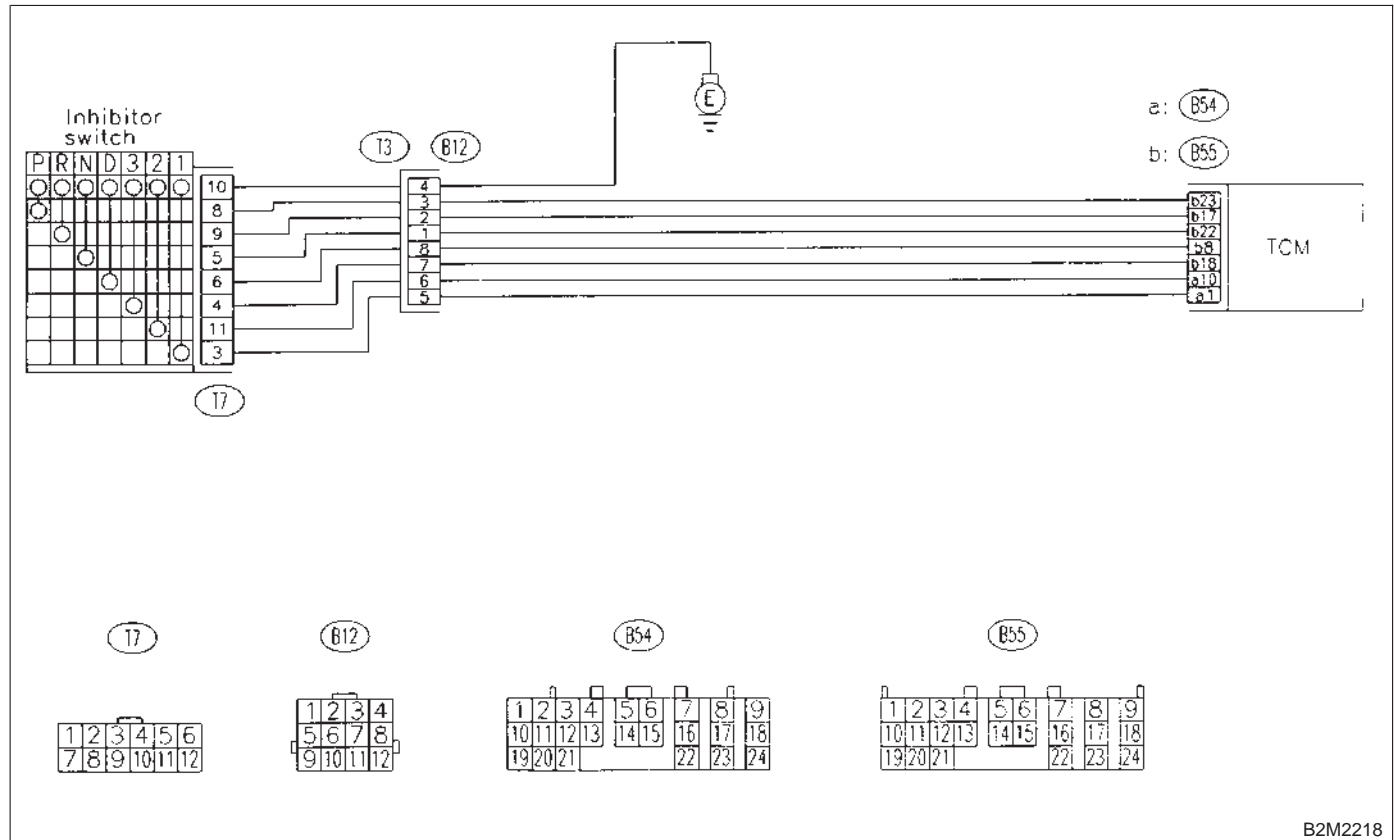
DIAGNOSIS:

Input signal circuit of “3” range is open or shorted.

TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- Engine brake is not effected when selector lever is in “3” range.

WIRING DIAGRAM:



9X1 : CHECK "3" RANGE SWITCH.

CHECK : When the “3” range is selected, does LED light up?

YES : Go to step "2" RANGE SWITCH. <Ref. to 3-2 [T9Y0].>

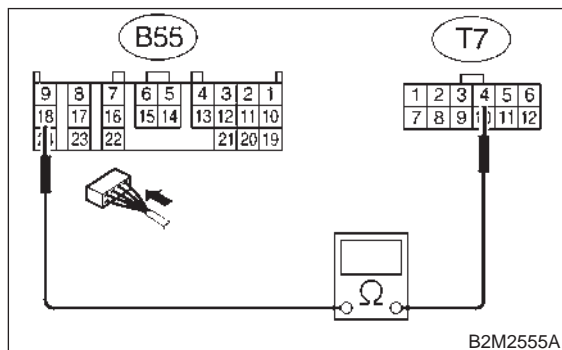
NO : Go to step **9X2**.

9X2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from TCM and inhibitor switch.
- 3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal

(B55) No. 18 — (T7) No. 4:



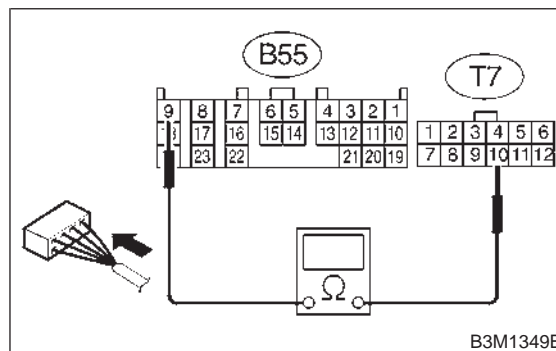
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 9X3.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9X3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between inhibitor switch connector and chassis ground.

Connector & terminal

(T7) No. 10 — (B55) No. 9:



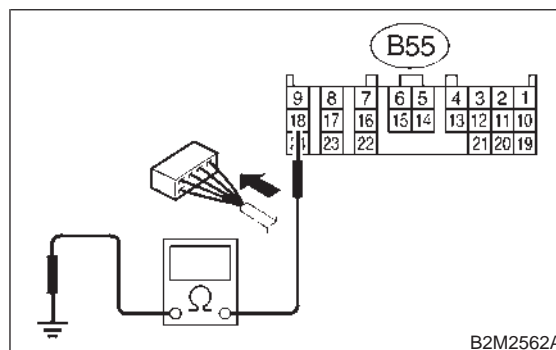
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 9X4.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9X4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B55) No. 18 — Chassis ground:



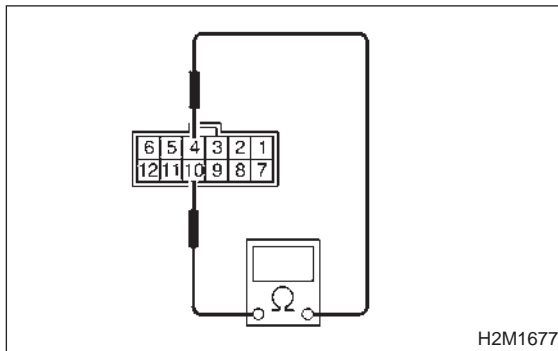
- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 9X5.
- NO** : Repair ground short circuit in harness between TCM and inhibitor switch connector.

9X5 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals

No. 4 — No. 10:



CHECK : Is the resistance less than 1 Ω in “3” range?

YES : Go to step 9X6.

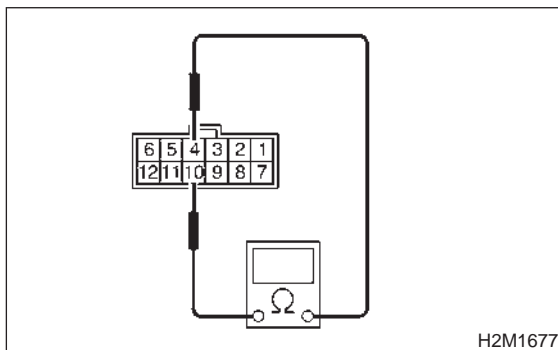
NO : Go to step 9X7.

9X6 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals

No. 4 — No. 10:



CHECK : Is the resistance more than 1 MΩ in other ranges?

YES : Go to step 9X7.

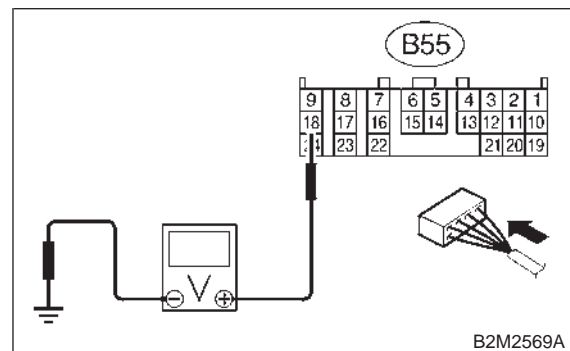
NO : Go to step 9X10.

9X7 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to TCM and inhibitor switch.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal

(B55) No. 18 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V in “3” range?

YES : Go to step 9X8.

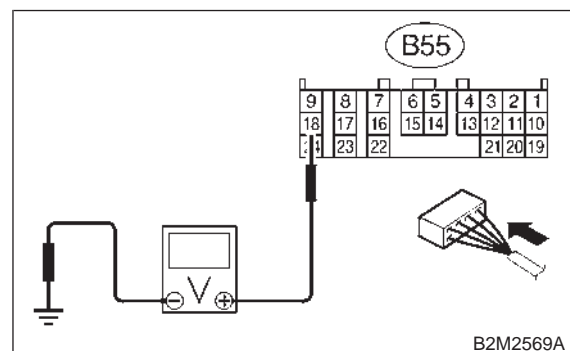
NO : Go to step 9X9.

9X8 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal

(B55) No. 18 (+) — Chassis ground (-):



CHECK : Is the voltage more than 9.5 V in other ranges?

YES : Go to step 9X9.

NO : Go to step 9X10.

9X9 : CHECK POOR CONTACT.

CHECK : *Is there poor contact in "3" range switch circuit?*

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

9X10 : CHECK SELECTOR CABLE.

CHECK : *Is there faulty connection in the selector cable?*

YES : Repair connection of selector cable.

NO : Replace inhibitor switch. <Ref. to 3-2 [W2C0].>

Y: CHECK "2" RANGE SWITCH.

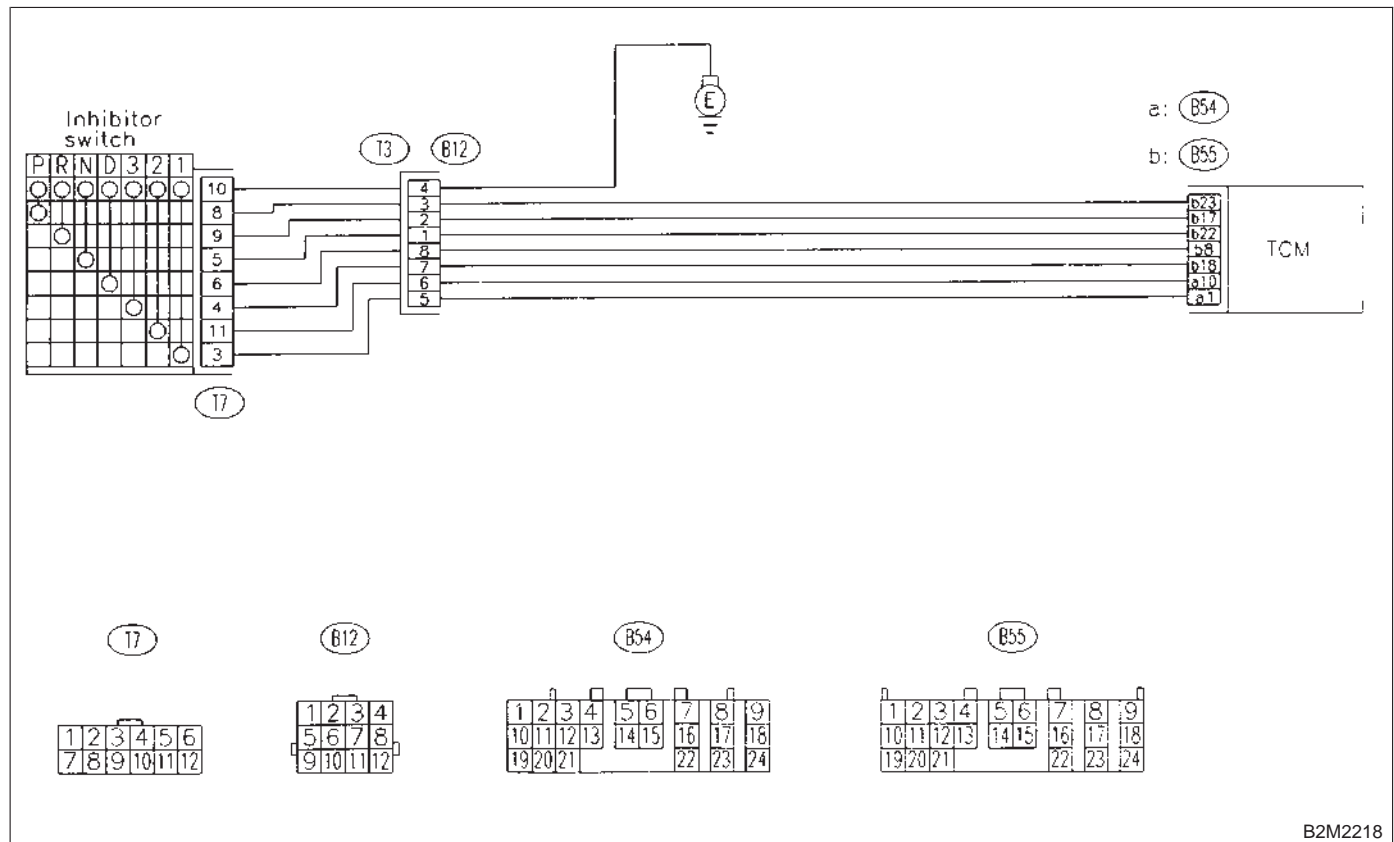
DIAGNOSIS:

Input signal circuit of "2" range is open or shorted.

TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- Engine brake is not effected when selector lever is in "2" range.

WIRING DIAGRAM:



B2M2218

9Y1 : CHECK "2" RANGE SWITCH.

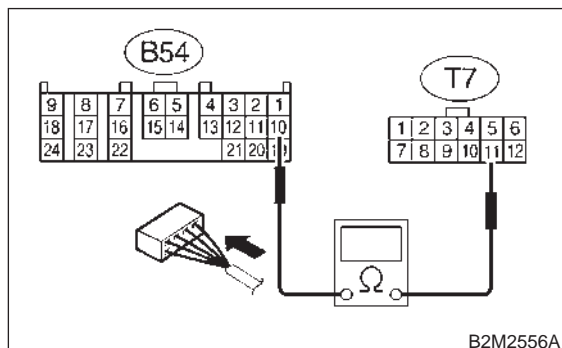
- CHECK** : When the "2" range is selected, does LED light up?
- YES** : Go to step "1" RANGE SWITCH. <Ref. to 3-2 [T9Z0].>
- NO** : Go to step 9Y2.

9Y2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from TCM and inhibitor switch.
- 3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal

(B54) No. 10 — (T7) No. 11:



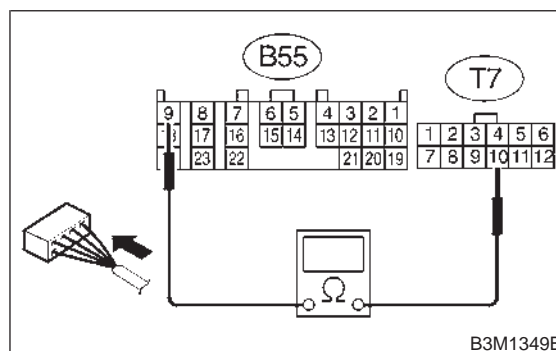
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 9Y3.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9Y3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between inhibitor switch connector and chassis ground.

Connector & terminal

(T7) No. 10 — (B55) No. 9:



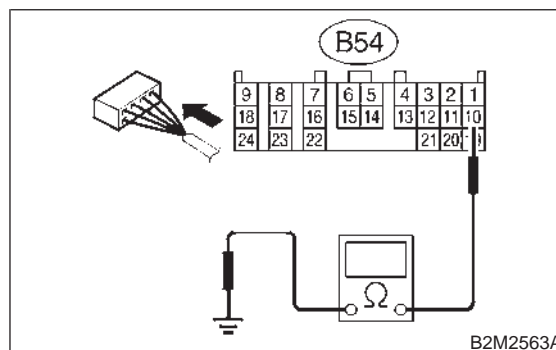
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 9Y4.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9Y4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B54) No. 10 — Chassis ground:



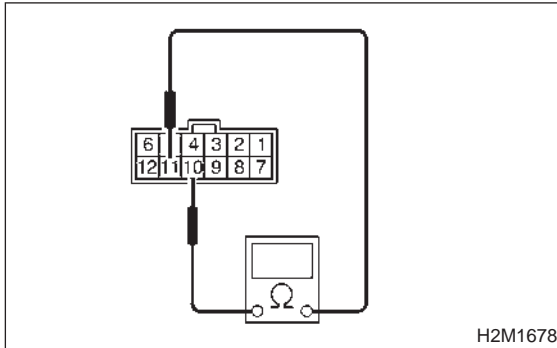
- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 9Y5.
- NO** : Repair ground short circuit in harness between TCM and inhibitor switch connector.

9Y5 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals

No. 11 — No. 10:



CHECK : Is the resistance less than 1 Ω in "2" range?

YES : Go to step 9Y6.

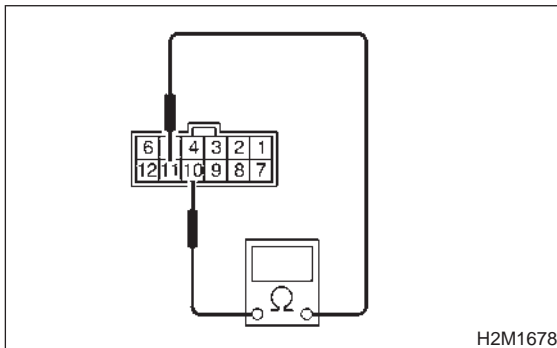
NO : Go to step 9Y10.

9Y6 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals

No. 11 — No. 10:



CHECK : Is the resistance more than 1 $M\Omega$ in other ranges?

YES : Go to step 9Y7.

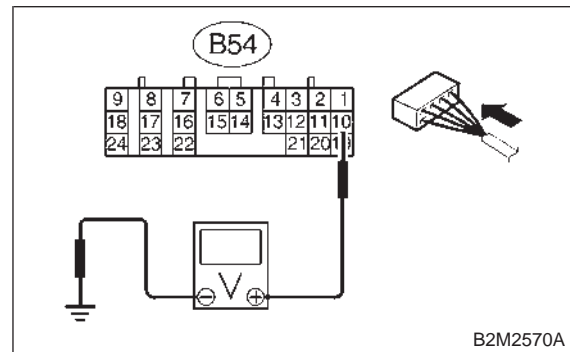
NO : Go to step 9Y10.

9Y7 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to TCM and inhibitor switch.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal

(B54) No. 10 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V in "2" range?

YES : Go to step 9Y8.

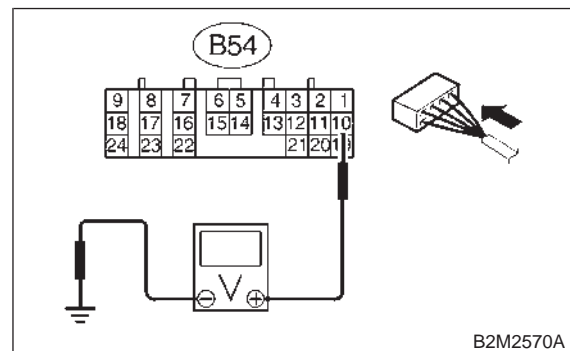
NO : Go to step 9Y9.

9Y8 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal

(B54) No. 10 (+) — Chassis ground (-):



CHECK : Is the voltage more than 9.5 V in other ranges?

YES : Go to step 9Y9.

NO : Go to step 9Y10.

9Y9 : CHECK POOR CONTACT.

CHECK : *Is there poor contact in "2" range switch circuit?*

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

9Y10 : CHECK SELECTOR CABLE.

CHECK : *Is there faulty connection in the selector cable?*

YES : Repair connection of selector cable.

NO : Replace inhibitor switch. <Ref. to 3-2 [W2C0].>

Z: CHECK "1" RANGE SWITCH.

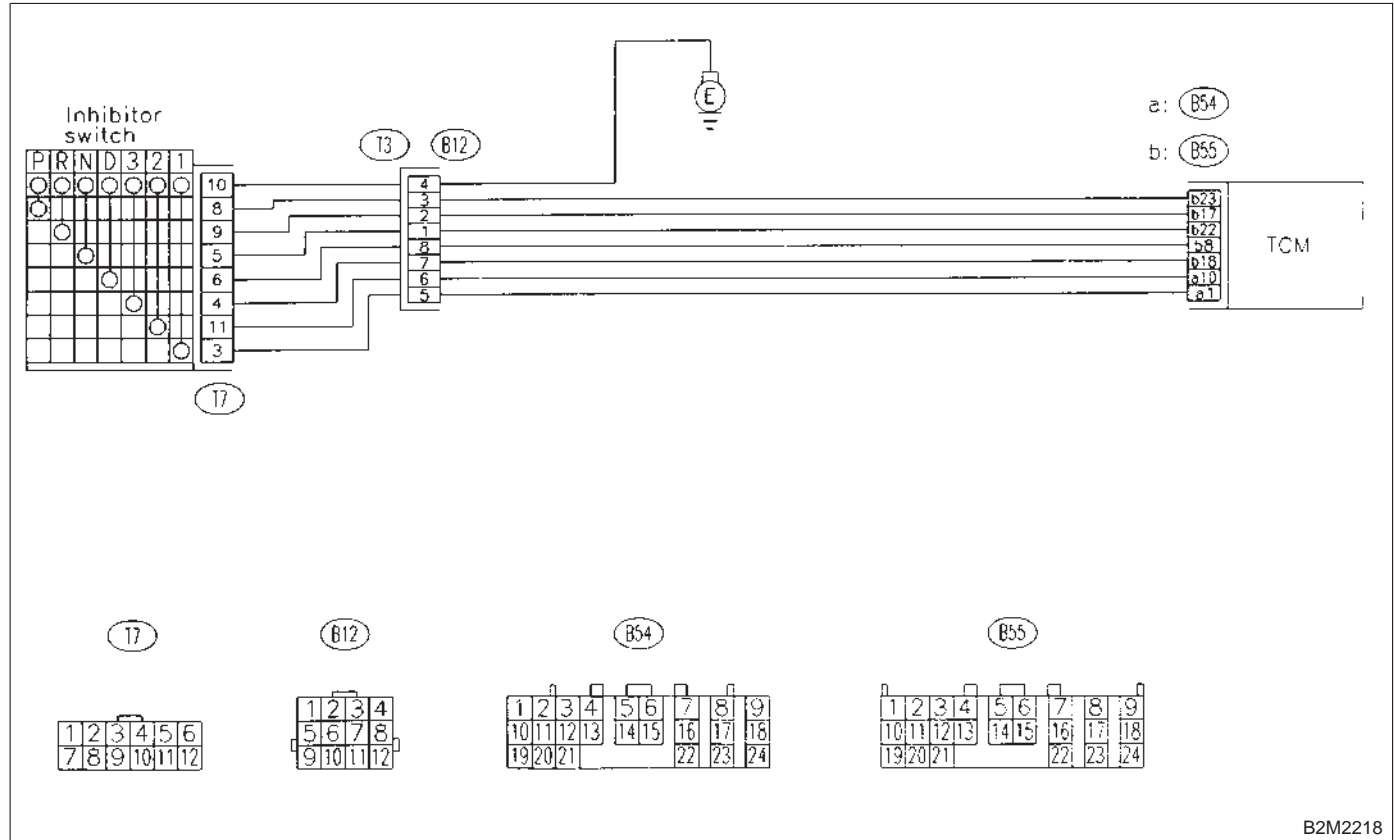
DIAGNOSIS:

Input signal circuit of "1" range is open or shorted.

TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- Engine brake is not effected when selector lever is in "1" range.

WIRING DIAGRAM:



B2M2218

9Z1 : CHECK "1" RANGE SWITCH.

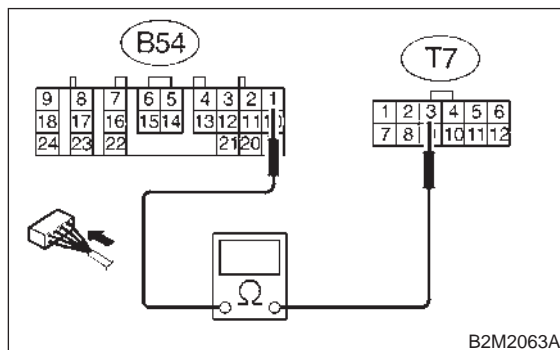
- CHECK** : When the "1" range is selected, does LED light up?
- YES** : Go to step SHIFT SOLENOID 1. <Ref. to 3-2 [T9AA0].>
- NO** : Go to step 9Z2.

9Z2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from TCM and inhibitor switch.
- 3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal

(B54) No. 1 — (T7) No. 3:



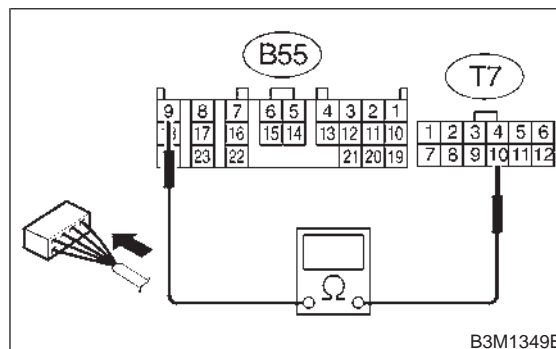
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 9Z3.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9Z3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between inhibitor switch connector and chassis ground.

Connector & terminal

(T7) No. 10 — (B55) No. 9:



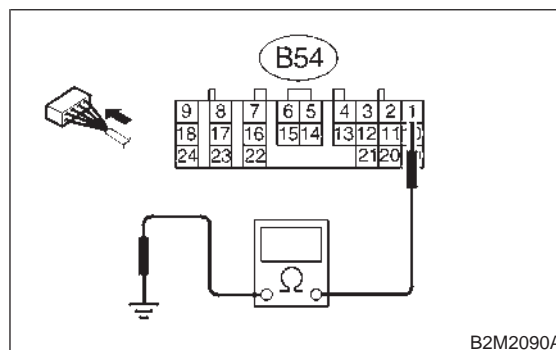
- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 9Z4.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9Z4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B54) No. 1 — Chassis ground:



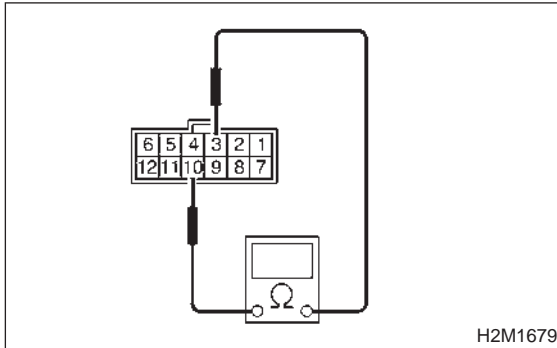
- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 9Z5.
- NO** : Repair ground short circuit in harness between TCM and inhibitor switch connector.

9Z5 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals

No. 3 — No. 10:



CHECK : Is the resistance less than 1 Ω in "1" range?

YES : Go to step 9Z6.

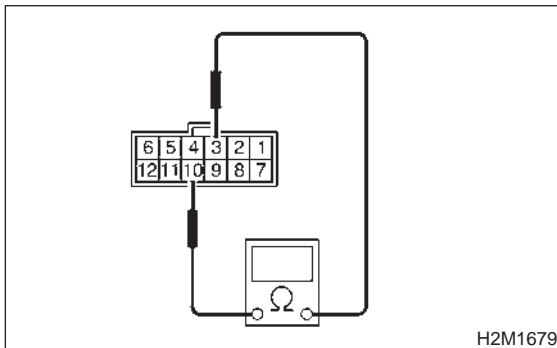
NO : Go to step 9Z10.

9Z6 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals

No. 3 — No. 10:



CHECK : Is the resistance more than 1 $M\Omega$ in other ranges?

YES : Go to step 9Z7.

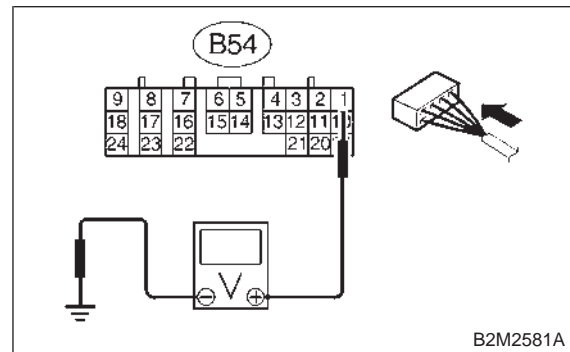
NO : Go to step 9Z10.

9Z7 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to TCM and inhibitor switch.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal

(B54) No. 1 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V in "1" range?

YES : Go to step 9Z8.

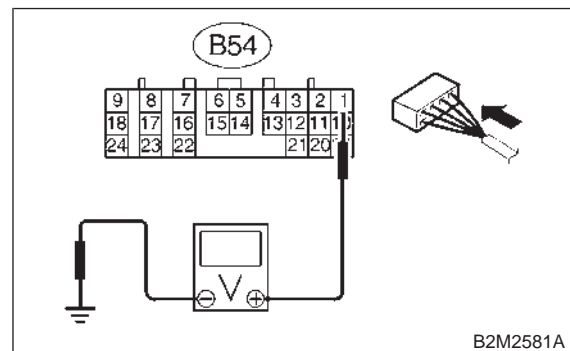
NO : Go to step 9Z9.

9Z8 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal

(B54) No. 1 (+) — Chassis ground (-):



CHECK : Is the voltage more than 9.5 V in other ranges?

YES : Go to step 9Z9.

NO : Go to step 9Z10.

9Z9 : CHECK POOR CONTACT.

CHECK : *Is there poor contact in "1" range switch circuit?*

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W22A0].>

9Z10 : CHECK SELECTOR CABLE.

CHECK : *Is there faulty connection in the selector cable?*

YES : Repair connection of selector cable.

NO : Replace inhibitor switch. <Ref. to 3-2 [W2C0].>

AA: CHECK SHIFT SOLENOID 1.**9AA1 : CHECK SHIFT SOLENOID 1.**

- CHECK** : *Does the LED of shift solenoid 1 light up?*
- YES** : Go to step SHIFT SOLENOID 2. <Ref. to 3-2 [T9AB0].>
- NO** : Check shift solenoid 1 circuit. <Ref. to 3-2 [T8K0].>

AB: CHECK SHIFT SOLENOID 2.**9AB1 : CHECK SHIFT SOLENOID 2.**

- CHECK** : *Does the LED of shift solenoid 2 light up?*
- YES** : Go to step TORQUE CONTROL 1 SIGNAL. <Ref. to 3-2 [T9AC0].>
- NO** : Check shift solenoid 2 circuit. <Ref. to 3-2 [T8L0].>

AC: CHECK TORQUE CONTROL 1 SIGNAL.**9AC1 : CHECK TORQUE CONTROL 1 SIGNAL.**

Turn ignition switch to ON (engine ON).

- CHECK** : *Does the LED of torque control 1 signal light up?*
- YES** : Go to step TORQUE CONTROL SIGNAL 2 CIRCUIT. <Ref. to 3-2 [T9AD0].>
- NO** : Check torque control 1 signal circuit. <Ref. to 3-2 [T8I0].>

AD: CHECK TORQUE CONTROL 2 SIGNAL.**9AD1 : CHECK TORQUE CONTROL 2 SIGNAL.**

Turn ignition switch to ON (engine ON).

- CHECK** : *Does the LED of torque control 2 signal light up?*
- YES** : Go to step 2-4 BRAKE TIMING SOLENOID. <Ref. to 3-2 [T9AE0].>
- NO** : Check torque control 2 signal circuit. <Ref. to 3-2 [T8I0].>

AE: CHECK 2-4 BRAKE TIMING SOLENOID.**9AE1 : CHECK 2-4 BRAKE TIMING SOLENOID.**

Turn ignition switch to ON, and select 1 range.

- CHECK** : *Does the LED of 2-4 brake timing solenoid light up?*
- YES** : Go to step LOW CLUTCH TIMING SOLENOID. <Ref. to 3-2 [T9AF0].>
- NO** : Check 2-4 brake timing solenoid circuit. <Ref. to 3-2 [T8N0].>

AF: CHECK LOW CLUTCH TIMING SOLENOID.**9AF1 : CHECK LOW CLUTCH TIMING SOLENOID.**

Turn ignition switch to ON, and select 2 range.

- CHECK** : *Does the LED of low clutch timing solenoid light up?*
- YES** : Go to step DIAGNOSIS LAMP. <Ref. to 3-2 [T9AG0].>
- NO** : Check low clutch timing solenoid circuit. <Ref. to 3-2 [T8M0].>

AG: CHECK DIAGNOSIS LAMP.**9AG1 : CHECK DIAGNOSIS LAMP.**

Turn ignition switch to ON (engine OFF).

- CHECK** : *Does diagnosis lamp light up?*
- YES** : Go to step FWD LAMP. <Ref. to 3-2 [T9AH0].>
- NO** : Check diagnosis lamp circuit.

AH: CHECK FWD LAMP.**9AH1 : CHECK FWD LAMP.**

- CHECK** : *Does the LED of FWD lamp light up?*
- YES** : Check FWD lamp circuit. <Ref. to 3-2 [T9Q0].>
- NO** : Go to step General Diagnostic Table. <Ref. to 3-2 [T1000].>

MEMO:

10. General Diagnostic Table

Symptom	Problem parts
Starter does not rotate when select lever is in "P" or "N"; starter rotates when select lever is in "R", "D", "3" or "2".	1) Inhibitor switch 2) Select cable 3) Select lever 4) Starter motor and harness
Abnormal noise when select lever is in "P" or "N".	1) Strainer 2) Duty solenoid C 3) Oil pump 4) Drive plate 5) ATF level too high or too low
Hissing noise occurs during standing start.	1) Strainer 2) ATF level too high or too low
Noise occurs while driving in "D1".	1) Final gear 2) Planetary gear
Noise occurs while driving in "D2".	3) Reduction gear 4) Differential gear oil level too high or too low
Noise occurs while driving in "D3".	1) Final gear 2) Low & reverse brake 3) Reduction gear 4) Differential gear oil level too high or too low
Noise occurs while driving in "D4".	1) Final gear 2) Low & reverse brake 3) Planetary gear 4) Reduction gear 5) Differential gear oil level too high or too low
Engine stalls while shifting from one range to another.	1) Control valve 2) Lock-up damper 3) Engine performance 4) Input shaft
Vehicle moves when select lever is in "N".	1) Control module 2) Low clutch
Shock occurs when select lever is moved from "N" to "D".	1) Control module 2) Harness 3) Control valve 4) ATF deterioration 5) Dropping resistor
Excessive time lag occurs when select lever is moved from "N" to "D".	1) Control valve 2) Low clutch 3) Duty solenoid A 4) Seal ring 5) Front gasket transmission case
Shock occurs when select lever is moved from "N" to "R".	1) Control module 2) Harness 3) Control valve 4) ATF deterioration 5) Dropping resistor
Excessive time lag occurs when select lever is moved from "N" to "R".	1) Control valve 2) Low & reverse clutch 3) Reverse clutch 4) Duty solenoid A 5) Seal ring 6) Front gasket transmission case
Vehicle does not start in any shift range (engine stalls).	1) Parking brake mechanism 2) Planetary gear

3-2 [T1000] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

10. General Diagnostic Table

Symptom	Problem parts
Vehicle does not start in any shift range (engine revving up).	1) Strainer 2) Duty solenoid A 3) Control valve 4) Drive pinion 5) Hypoid gear 6) Axle shaft 7) Differential gear 8) Oil pump 9) Input shaft 10) Output shaft 11) Planetary gear 12) Drive plate 13) ATF level too low 14) Front gasket transmission case
Vehicle does not start in "R" range only (engine revving up).	1) Select cable 2) Select lever 3) Control valve 4) Low & reverse clutch 5) Reverse clutch
Vehicle does not start in "R" range only (engine stalls).	1) Low clutch 2) 2-4 brake 3) Planetary gear 4) Parking brake mechanism
Vehicle does not start in "D", "3" range only (engine revving up).	1) Low clutch 2) One-way clutch
Vehicle does not start in "D", "3" or "2" range only (engine revving up).	1) Low clutch
Vehicle does not start in "D", "3" or "2" range only (engine stalls).	1) Reverse clutch
Vehicle starts in "R" range only (engine revving up).	1) Control valve
Acceleration during standing starts is poor (high stall rpm).	1) Control valve 2) Low clutch 3) Reverse clutch 4) ATF level too low 5) Front gasket transmission case 6) Differential gear oil level too high or too low
Acceleration during standing starts is poor (low stall rpm).	1) Oil pump 2) Torque converter one-way clutch 3) Engine performance
Acceleration is poor when select lever is in "D", "3" or "2" range (normal stall rpm).	1) Control module 2) Control valve 3) High clutch 4) 2-4 brake 5) Planetary gear
Acceleration is poor when select lever is in "R" (normal stall rpm).	1) Control valve 2) High clutch 3) 2-4 brake 4) Planetary gear
No shift occurs from 1st to 2nd gear.	1) Control module 2) Vehicle speed sensor 1 (Rear) 3) Vehicle speed sensor 2 (Front) 4) Throttle position sensor 5) Shift solenoid 1 6) Control valve 7) 2-4 brake
No shift occurs from 2nd to 3rd gear.	1) Control module 2) Control valve 3) High clutch 4) Shift solenoid 2

Symptom	Problem parts
No shift occurs from 3rd to 4th gear.	1) Control module 2) Shift solenoid 1 3) ATF temperature sensor 4) Control valve 5) 2-4 brake
Engine brake is not effected when select lever is in "3" range.	1) Inhibitor switch 2) Control module 3) Throttle position sensor 4) Control valve
Engine brake is not effected when select lever is in "3" or "2" range.	1) Control valve
Engine brake is not effected when select lever is in "1" range.	1) Control valve 2) Low & reverse brake
Shift characteristics are erroneous.	1) Inhibitor switch 2) Control module 3) Vehicle speed sensor 1 (Front) 4) Vehicle speed sensor 2 (Rear) 5) Throttle position sensor 6) Control valve 7) Ground earth
No lock-up occurs.	1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Control valve 5) Lock-up facing 6) Engine speed signal
Parking brake is not effected.	1) Select cable
Shift lever cannot be moved or is hard to move from "P" range.	2) Select lever 3) Parking mechanism
ATF spurts out.	1) ATF level too high
Differential oil spurts out.	1) Differential gear oil too high
Differential oil level changes excessively.	1) Seal pipe 2) Double oil seal
Odor is produced from ATF supply pipe.	1) High clutch 2) 2-4 brake 3) Low & reverse clutch 4) Reverse clutch 5) Lock-up facing 6) ATF deterioration
Shock occurs from 1st to 2nd gear.	1) Control module 2) Throttle position sensor 3) Duty solenoid D 4) ATF temperature sensor 5) Duty solenoid A 6) Control valve 7) 2-4 brake 8) ATF deterioration 9) Engine performance 10) Dropping resistor 11) 2-4 brake timing solenoid
Slippage occurs from 1st to 2nd gear.	1) Control module 2) Throttle position sensor 3) Duty solenoid D 4) ATF temperature sensor 5) Duty solenoid A 6) Control valve 7) 2-4 brake 8) 2-4 brake timing solenoid 9) High clutch

3-2 [T1000] AUTOMATIC TRANSMISSION AND DIFFERENTIAL

10. General Diagnostic Table

Symptom	Problem parts
Shock occurs from 2nd to 3rd gear.	1) Control module 2) Throttle position sensor 3) Duty solenoid D 4) ATF temperature sensor 5) Duty solenoid A 6) Control valve 7) High clutch 8) 2-4 brake 9) ATF deterioration 10) Engine performance 11) 2-4 brake timing solenoid
Slippage occurs from 2nd to 3rd gear.	1) Control module 2) Throttle position sensor 3) Duty solenoid D 4) ATF temperature sensor 5) Duty solenoid A 6) Control valve 7) High clutch 8) 2-4 brake 9) 2-4 brake timing solenoid
Shock occurs from 3rd to 4th gear.	1) Control module 2) Throttle position sensor 3) Duty solenoid D 4) ATF temperature sensor 5) Duty solenoid A 6) Control valve 7) 2-4 brake timing solenoid 8) 2-4 brake 9) ATF deterioration 10) Engine performance 11) Low clutch timing solenoid 12) Low clutch
Slippage occurs from 3rd to 4th gear.	1) Control module 2) Throttle position sensor 3) Duty solenoid D 4) ATF temperature sensor 5) Duty solenoid A 6) Control valve 7) 2-4 brake 8) 2-4 brake timing solenoid
Shock occurs when select lever is moved from "3" to "2" range.	1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Duty solenoid A 5) Control valve 6) Duty solenoid D 7) 2-4 brake 8) ATF deterioration 9) 2-4 brake timing solenoid
Shock occurs when select lever is moved from "D" to "1" range.	1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Duty solenoid A 5) Control valve 6) ATF deterioration 7) Duty solenoid D 8) 2-4 brake timing solenoid 9) Low clutch timing solenoid

Symptom	Problem parts
Shock occurs when select lever is moved from "2" to "1" range.	1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Duty solenoid A 5) Control valve 6) Low & reverse clutch 7) ATF deterioration 8) Duty solenoid D 9) 2-4 brake timing solenoid 10) Low clutch timing solenoid
Shock occurs when accelerator pedal is released at medium speeds.	1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Duty solenoid A 5) Control valve 6) Lock-up damper 7) Engine performance 8) Duty solenoid D 9) 2-4 brake timing solenoid 10) Low clutch timing solenoid
Vibration occurs during straight-forward operation.	1) Control module 2) Duty solenoid B 3) Lock-up facing 4) Lock-up damper
Vibration occurs during turns (tight corner "braking" phenomenon).	1) Control module 2) Vehicle speed sensor 1 (Front) 3) Vehicle speed sensor 2 (Rear) 4) Throttle position sensor 5) ATF temperature sensor 6) Transfer clutch 7) Transfer valve 8) Duty solenoid C 9) ATF deterioration 10) Harness
Front wheel slippage occurs during standing starts.	1) Control module 2) Vehicle speed sensor 2 (Front) 3) FWD switch 4) Throttle position sensor 5) ATF temperature sensor 6) Control valve 7) Transfer clutch 8) Transfer valve 9) Transfer pipe 10) Duty solenoid C
Vehicle is not set in FWD mode.	1) Control module 2) FWD switch 3) Transfer clutch 4) Transfer valve 5) Duty solenoid C
Select lever is hard to move.	1) Select cable 2) Select lever 3) Detent spring 4) Manual plate
Select lever is too high to move (unreasonable resistance).	1) Detent spring 2) Manual plate
Select lever slips out of operation during acceleration or while driving on rough terrain.	1) Select cable 2) Select lever 3) Detent spring 4) Manual plate

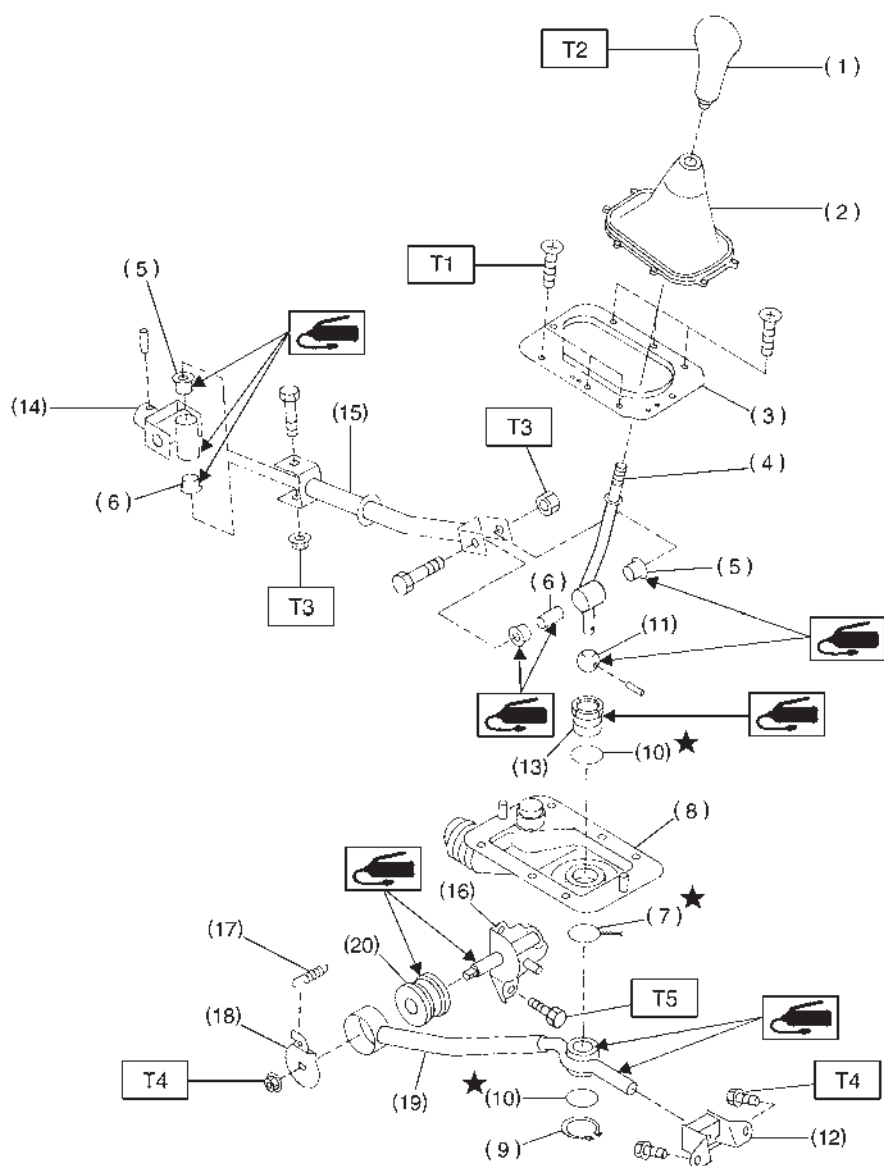
MEMO:

TRANSMISSION CONTROL SYSTEM

3-3

	Page
C COMPONENT PARTS	2
1. Manual Transmission	2
2. Automatic Transmission	3
W SERVICE PROCEDURE	4
1. Manual Transmission	4
2. Automatic Transmission	7

1. Manual Transmission



H3M1189B

- | | |
|----------------------|-------------------------|
| (1) Gear shift knob | (11) Bush (Shift lever) |
| (2) Console boot | (12) Cushion rubber |
| (3) Boot plate | (13) Bush (Stay rear) |
| (4) Gear shift lever | (14) Joint |
| (5) Bush | (15) Rod |
| (6) Spacer | (16) Bracket |
| (7) Locking wire | (17) Spring |
| (8) Boot | (18) Washer |
| (9) Snap ring | (19) Stay |
| (10) O-ring | (20) Bush (Stay front) |

Tightening torque: N·m (kg·m, ft·lb)

$T1: 4.4 \pm 1.5$ (0.45 ± 0.15 , 3.3 ± 1.1)

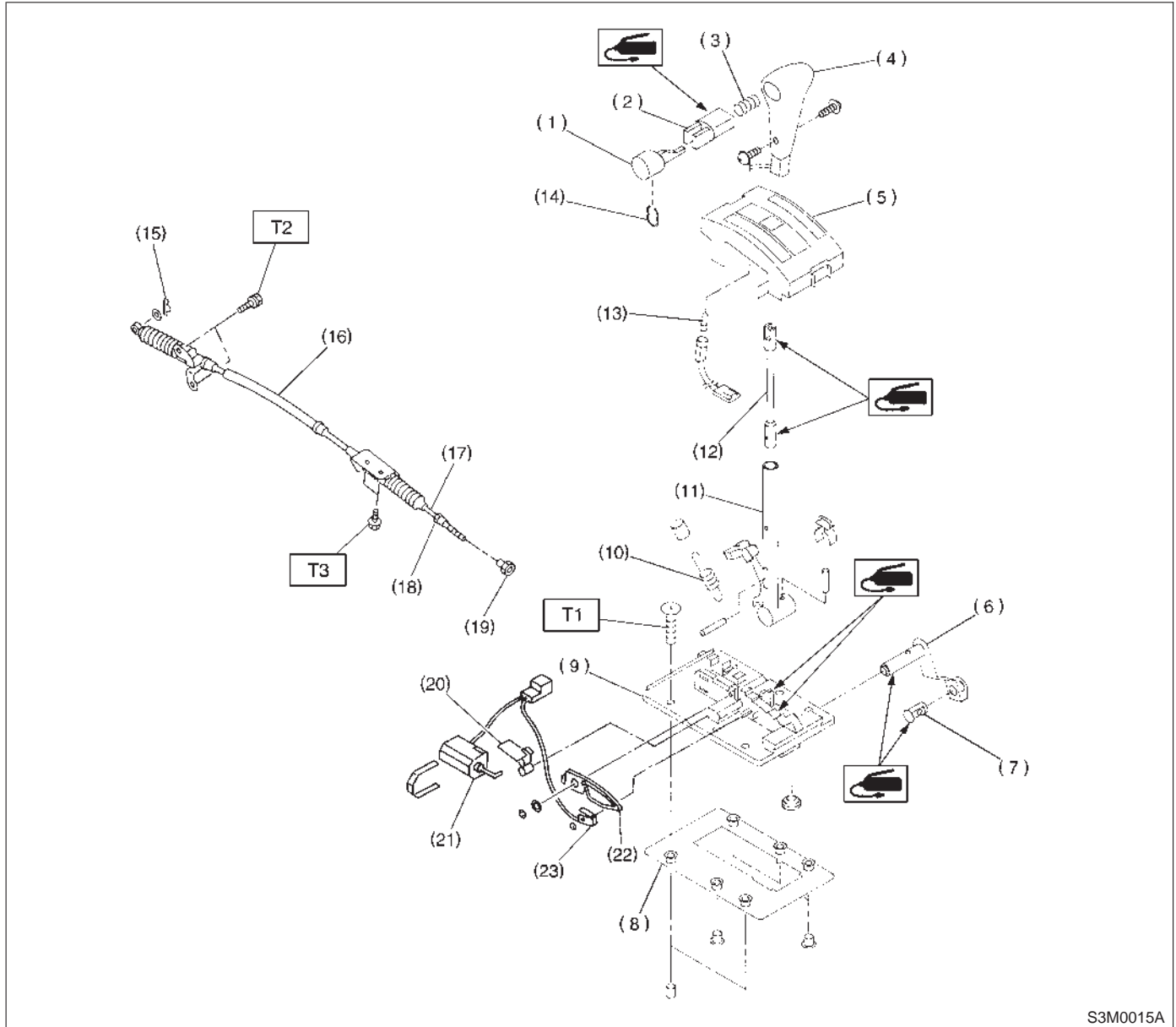
T2: 5 (0.51, 3.7)

T3: 12 ± 3 (1.2 ± 0.3 , 8.7 ± 2.2)

T4: 18 ± 5 (1.8 ± 0.5 , 13.0 ± 3.6)

**T5: 24.5 ± 2 (2.50 ± 0.20 ,
 18.07 ± 1.48)**

2. Automatic Transmission



S3M0015A

- | | | |
|--------------------------|---------------------------|--------------------------|
| (1) Button A | (11) Selector lever upper | (21) Shift-lock solenoid |
| (2) Button B | (12) Rod | (22) Lock arm |
| (3) Spring (button) | (13) Indicator light bulb | (23) "P" position switch |
| (4) Grip | (14) Retainer spring | |
| (5) Indicator cover | (15) Snap pin | |
| (6) Selector lever lower | (16) Outer cable | |
| (7) Pin | (17) Inner cable | |
| (8) Packing | (18) Nut (front) | |
| (9) Plate | (19) Nut (rear) | |
| (10) Detent spring | (20) Lock plate | |

Tightening torque: N·m (kg·m, ft·lb)

T1: 5.9±1.5 (0.6±0.15, 4.3±1.1)

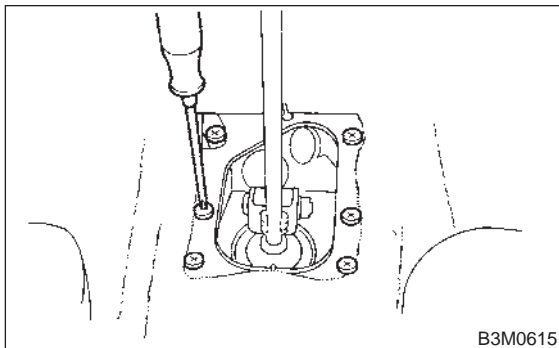
T2: 12±3 (1.2±0.3, 8.7±2.2)

T3: 25±7 (2.5±0.7, 18.1±5.1)

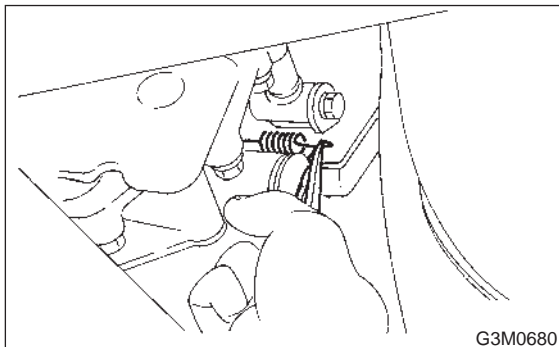
1. Manual Transmission

A: REMOVAL

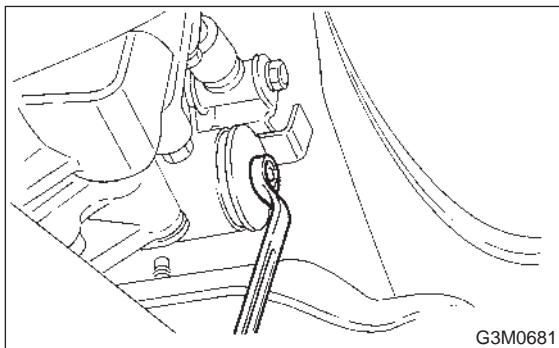
- 1) Remove console box. <Ref. to 5-4 [W1A0].>
- 2) Remove boot plate from the body.



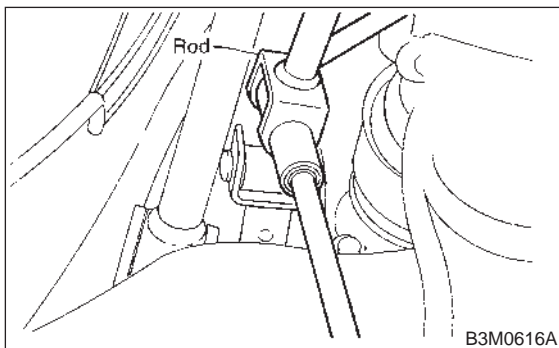
- 3) Remove the spring between the joint and bracket.



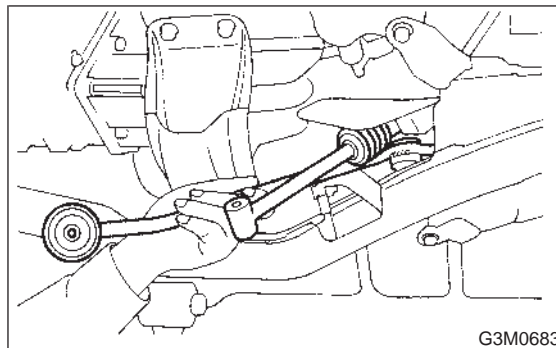
- 4) Remove stay from bracket.



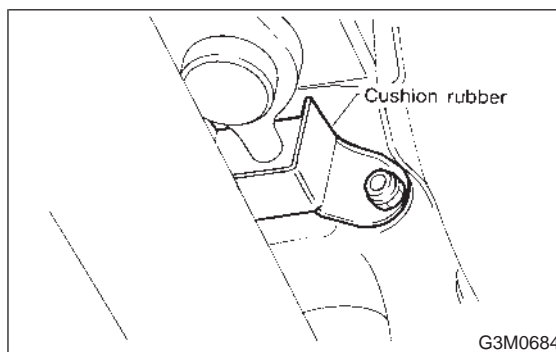
- 5) Remove rod from joint.



- 6) Remove gearshift lever.

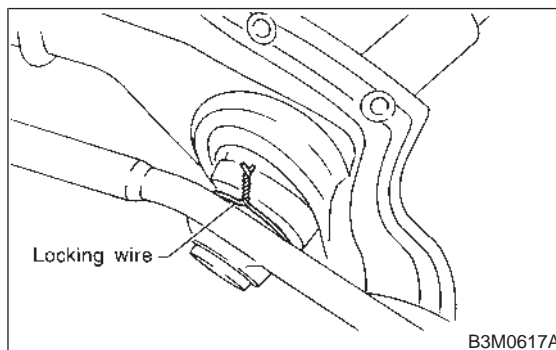


- 7) Remove the exhaust cover and remove cushion rubber from the body.

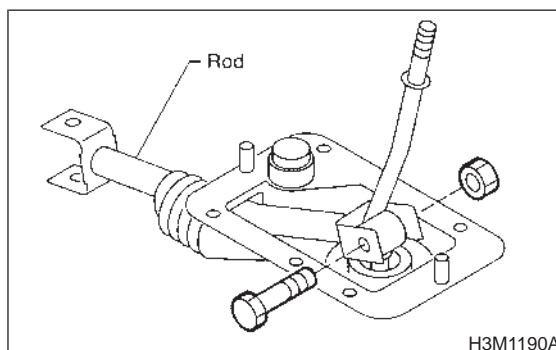


B: DISASSEMBLY

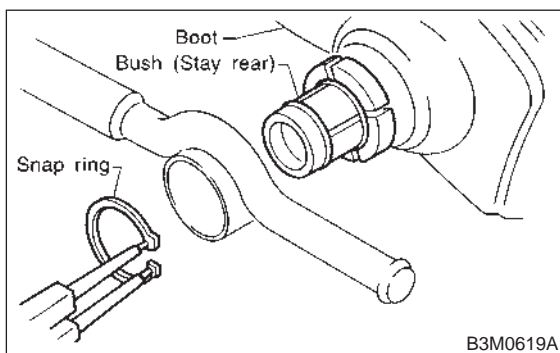
- 1) Disconnect locking wire.



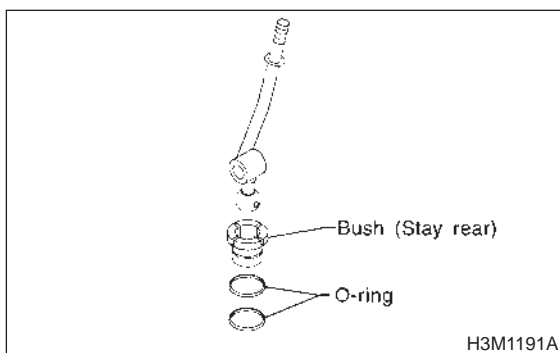
- 2) Remove rod from gearshift lever.



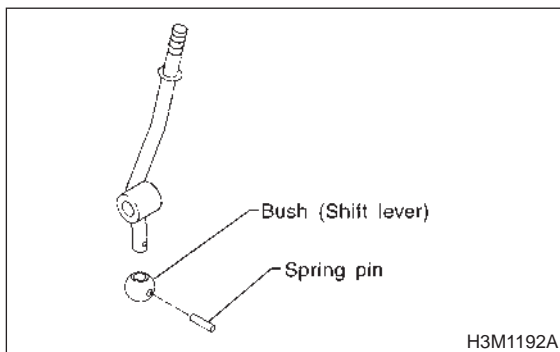
- 3) Remove snap ring, then disconnect gearshift lever from stay.



- 4) Remove boot from gearshift lever.
- 5) Remove O-ring, then disconnect bush (Stay rear).

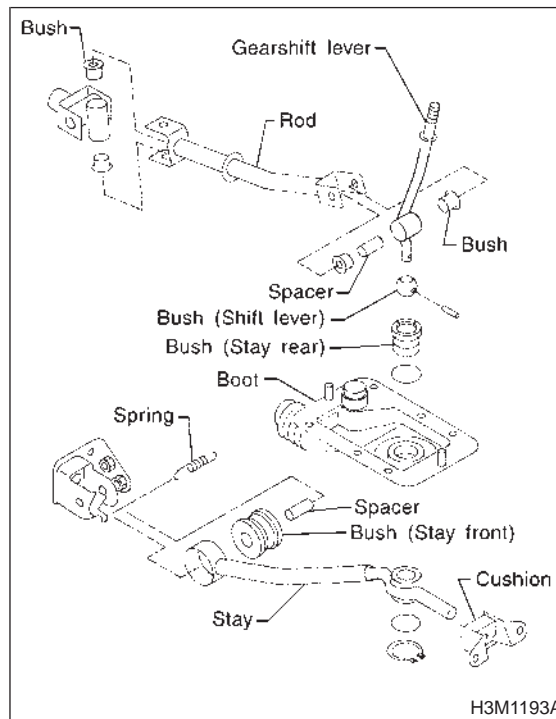


- 6) Draw out spring pin, then remove bush (Shift lever) from gearshift lever.



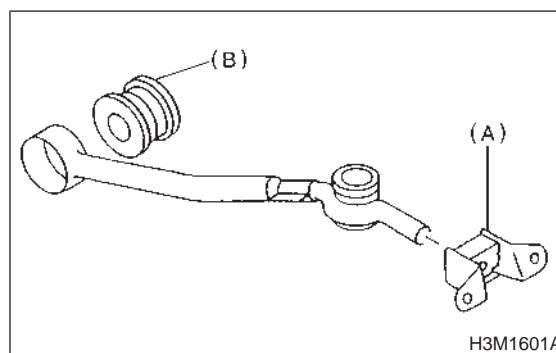
C: INSPECTION

Check each parts (Bush, cushion, spacer, boot, spring, stay and rod etc.) for deformation, damage and wear. Repair or replace any defective parts. Determine defective parts by comparing with new parts.



D: ASSEMBLY

- 1) Clean all parts before assembly.
- 2) Mount the following parts on the stay.

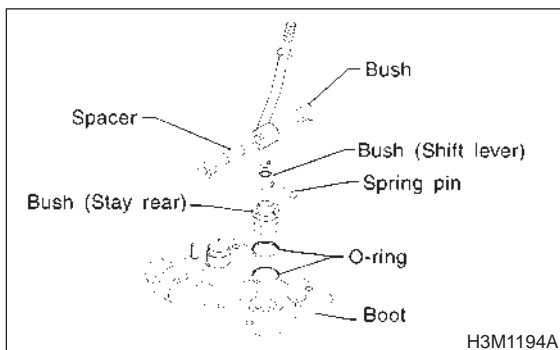


- (A) Cushion rubber
- (B) Bush (Stay front)

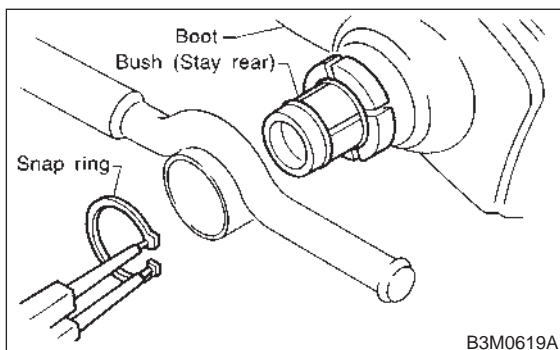
3) Mount each parts (Boot, O-ring, bush and spacer) on the gearshift lever.

CAUTION:

- Always use new O-rings.
- Apply grease [NIGTIGHT LYW No.2 or equivalent] to the inner and side surfaces of the bush when installing spacer.



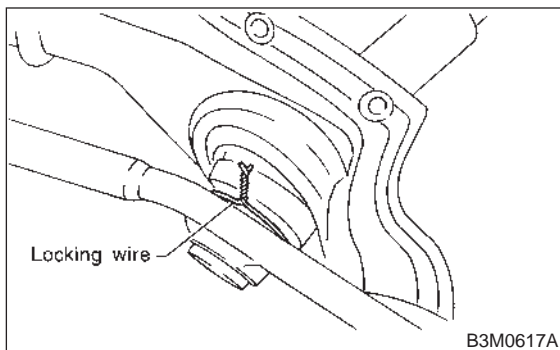
- 4) Insert the gearshift lever into the boot hole.
 5) Mount gearshift lever on the stay.
 6) Install snap ring to the bottom of the bush (Stay rear).



7) Tighten with locking wire to the extent that the boot will not come off.

CAUTION:

Always use new locking wire.



8) Insert the rod into the boot hole.

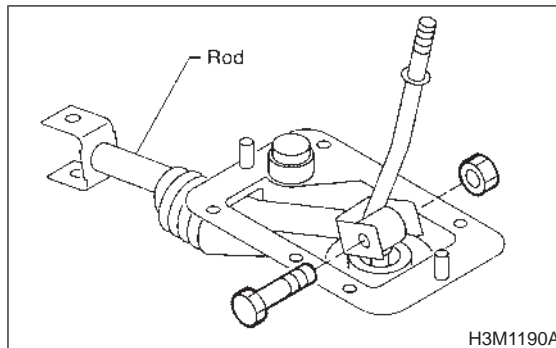
9) Connect rod to gearshift lever.

Tightening torque:

$12 \pm 3 \text{ N-m}$ ($1.2 \pm 0.3 \text{ kg-m}$, $8.7 \pm 2.2 \text{ ft-lb}$)

Rocking torque:

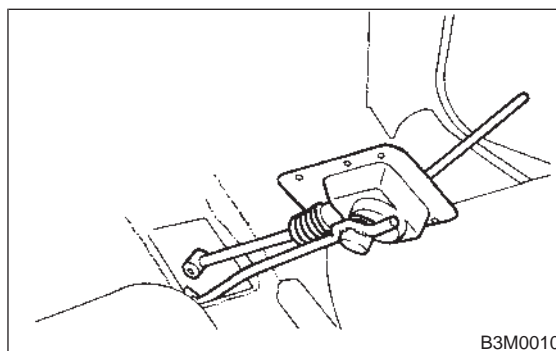
$0.74 \pm 0.25 \text{ N-m}$ ($0.075 \pm 0.025 \text{ kg-m}$, $0.54 \pm 0.18 \text{ ft-lb}$) or less



10) Check that there is no excessive play and that parts move smoothly.

E: INSTALLATION

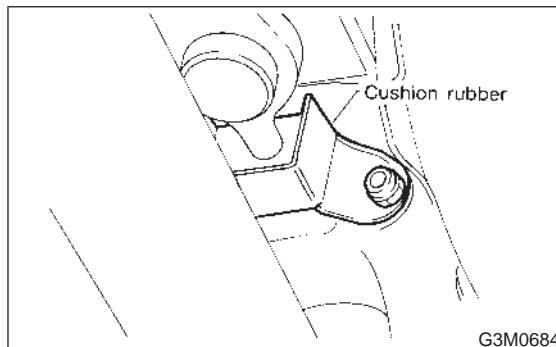
- 1) Put into gearshift lever to passenger compartment.
 2) Mount boot plate on the body.
 3) Install console box and gearshift knob. <Ref. to 5-4 [W1B0].>



4) Mount cushion rubber on the body.

Tightening torque:

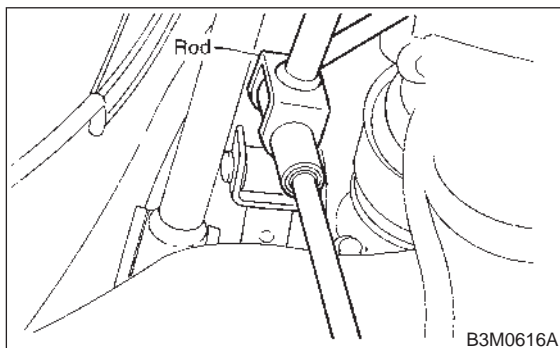
$18 \pm 5 \text{ N-m}$ ($1.84 \pm 0.51 \text{ kg-m}$, $13.3 \pm 3.7 \text{ ft-lb}$)



- 5) Connect rod to the joint.

Tightening torque:

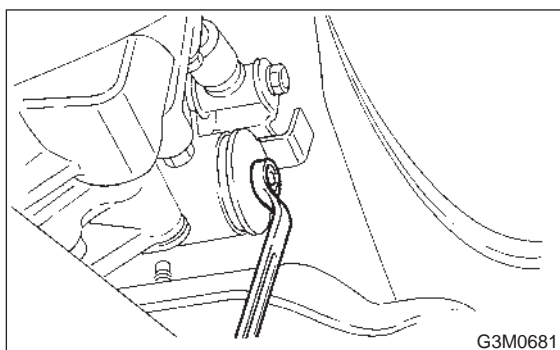
$12 \pm 3 \text{ N}\cdot\text{m}$ ($1.2 \pm 0.3 \text{ kg}\cdot\text{m}$, $8.7 \pm 2.2 \text{ ft}\cdot\text{lb}$)



- 6) Connect stay to the bracket.

Tightening torque:

$18 \pm 5 \text{ N}\cdot\text{m}$ ($1.84 \pm 0.51 \text{ kg}\cdot\text{m}$, $13.3 \pm 3.7 \text{ ft}\cdot\text{lb}$)

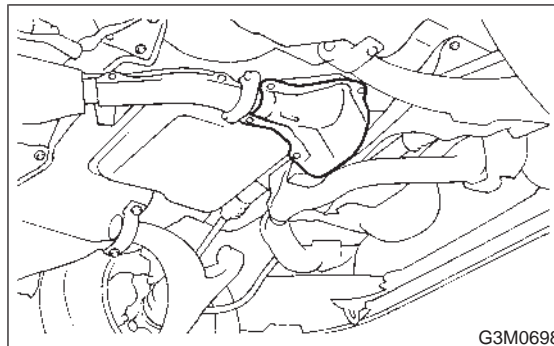


- 7) Install the exhaust cover.

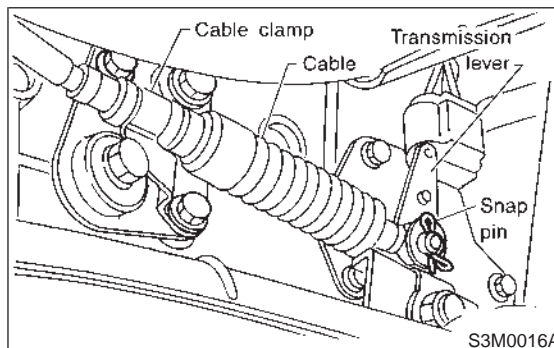
2. Automatic Transmission

A: REMOVAL

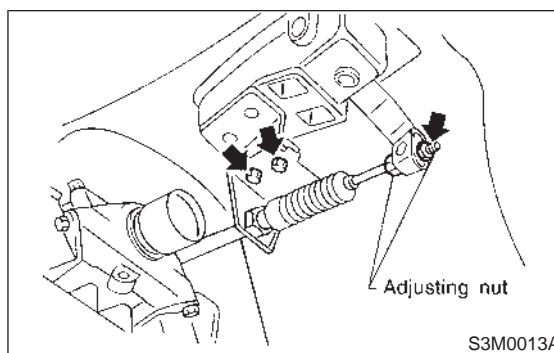
- 1) Remove the cable.
 - (1) Prior to removal, set lever to "N" position.
 - (2) Remove front exhaust pipe.



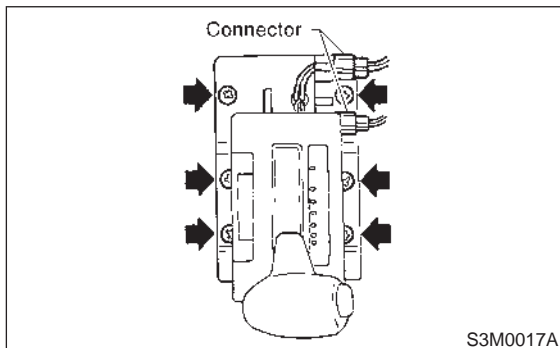
- (3) Separate cable from transmission lever.
- (4) Remove clamp from transmission case.



- (5) Disconnect cable from selector lever and then remove cable bracket.

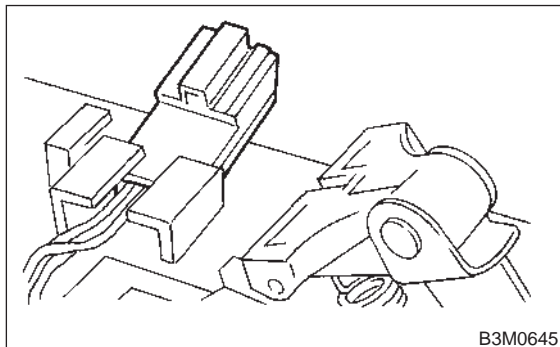


- 2) Remove console box. <Ref. to 5-4 [W1A0].>
- 3) Disconnect the connectors, then remove the six screws to take out the selector lever assembly from the body.



B: DISASSEMBLY

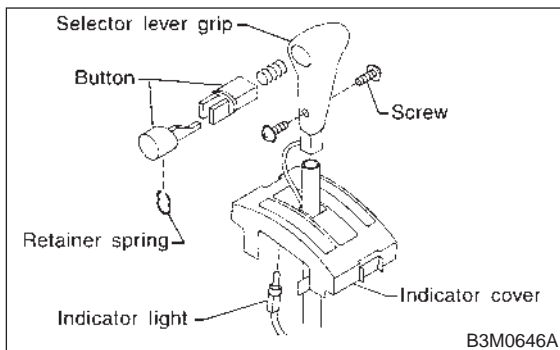
- 1) Remove connector from plate.



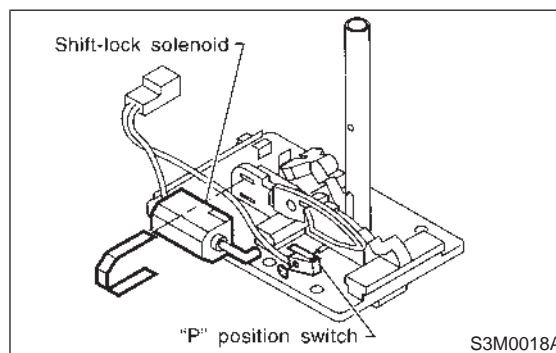
- 2) Remove indicator light and two screws.
- 3) Remove retainer spring, then pull up selector lever grip with indicator cover for holding selector lever button.

CAUTION:

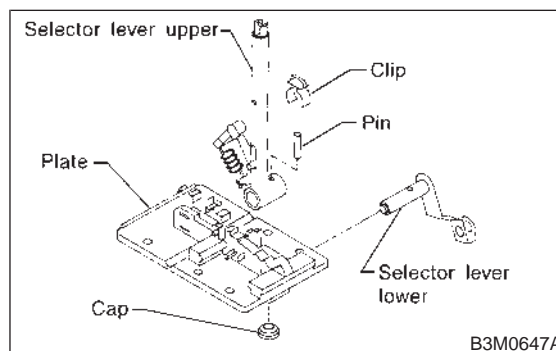
Pull the selector lever grip carefully so that the selector lever button may not jump out.



- 4) Remove shift-lock solenoid and "P" position switch.



- 5) Remove cap and clip, then extract pin.
- 6) Remove selector lever lower then take away selector lever upper from plate.



C: INSPECTION

- 1) Inspect removed parts by comparing with new ones for deformation, damage and wear. Correct or replace if defective.
- 2) Confirm the following parts for operating condition before assembly.
 - (1) Sliding condition of the button in the grip ... it should move smoothly.
 - (2) Insertion of the grip on the selector lever ... when pushing the grip on the selector lever by hand, screw holes should be aligned.
 - (3) Operation of selector lever and rod ... they should move smoothly.

D: ASSEMBLY

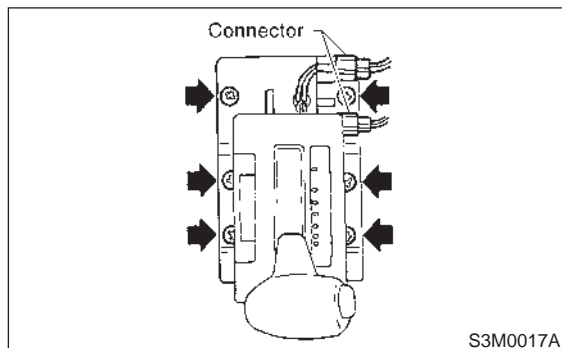
- 1) Clean all parts before assembly.
- 2) Apply grease [NIGTIGHT LYW No. 2 or equivalent] to each parts. <Ref. to 3-3 [C200].>
- 3) Assembly is in the reverse order of disassembly.
- 4) After completion of fitting, transfer selector lever to range "P" — "1", pressing the button of the grip; then check whether the indicator and selector lever agree, whether the pointer and position mark agree and what the operating force is.

E: INSTALLATION

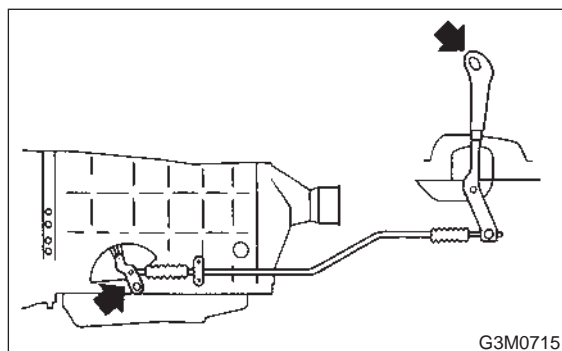
- 1) Mount the selector lever onto the vehicle body.
- 2) Tighten the six bolts to install the selector lever to the vehicle body, then connect connectors.

Tightening torque:

$5.9 \pm 1.5 \text{ N-m}$ ($0.6 \pm 0.15 \text{ kg-m}$, $4.3 \pm 1.1 \text{ ft-lb}$)



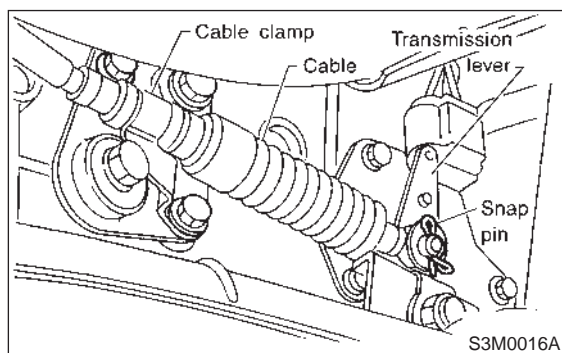
- 3) Install console box.
- 4) Set location of selector lever at "N" position.
- 5) Set location of selector arm installed on the transmission body at "N" position.



- 6) Pass inner cable through selector arm pin and then connect it using a washer and snap pin.
- 7) Attach outer cable to plate on transmission case with the bolts.

Tightening torque:

$14 \pm 4 \text{ N-m}$ ($1.4 \pm 0.4 \text{ kg-m}$, $10.1 \pm 2.9 \text{ ft-lb}$)

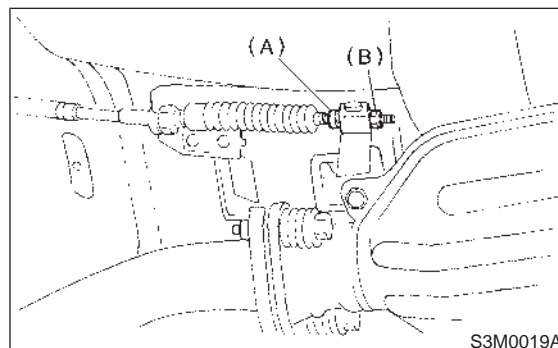


- 8) Insert the thread portion of the other inner cable and into the connector hole of the selector lever, and fix the other outer cable end to the bracket.

- 9) Adjust the inner cable length.
 - (1) Put connector into contact with nut (A).
 - (2) Tighten nut (B).

Tightening torque:

$7.4 \pm 2.0 \text{ N-m}$ ($0.75 \pm 0.2 \text{ kg-m}$, $5.4 \pm 1.4 \text{ ft-lb}$)

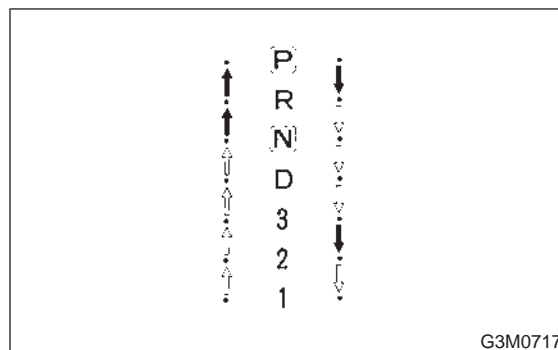


- 10) After completion of fitting, make sure that the selector lever operates smoothly all across the operating range.
- 11) Connect the harnesses and check the following items.
 - (1) The engine starts operating when selector lever is in position "P", but not in other positions.
 - (2) The back-up light is lit when the selector lever is in position "R", but not in other positions.
- 12) Check selector lever operation.

WARNING:

Stop the engine while checking operation of selector lever.

- (1) Check that selector lever does not move from "N" to "R" without pushing the button.
- (2) Check that selector lever does not move from "R" to "P" without pushing the button.
- (3) Check that selector lever does not move from "P" to "R" without pushing the button.
- (4) Check that selector lever does not move from "3" to "2" without pushing the button.



- 13) Check shift-lock system.
 - (1) Ensure ignition switch rotates from "ACC" to "LOCK" when the selector lever is set at "P". Also check that ignition key can be removed only from the "LOCK" position.

(2) Ensure selector lever moves from “P” to any other position when the brake pedal is

depressed with ignition key set at “ON” or “START”.

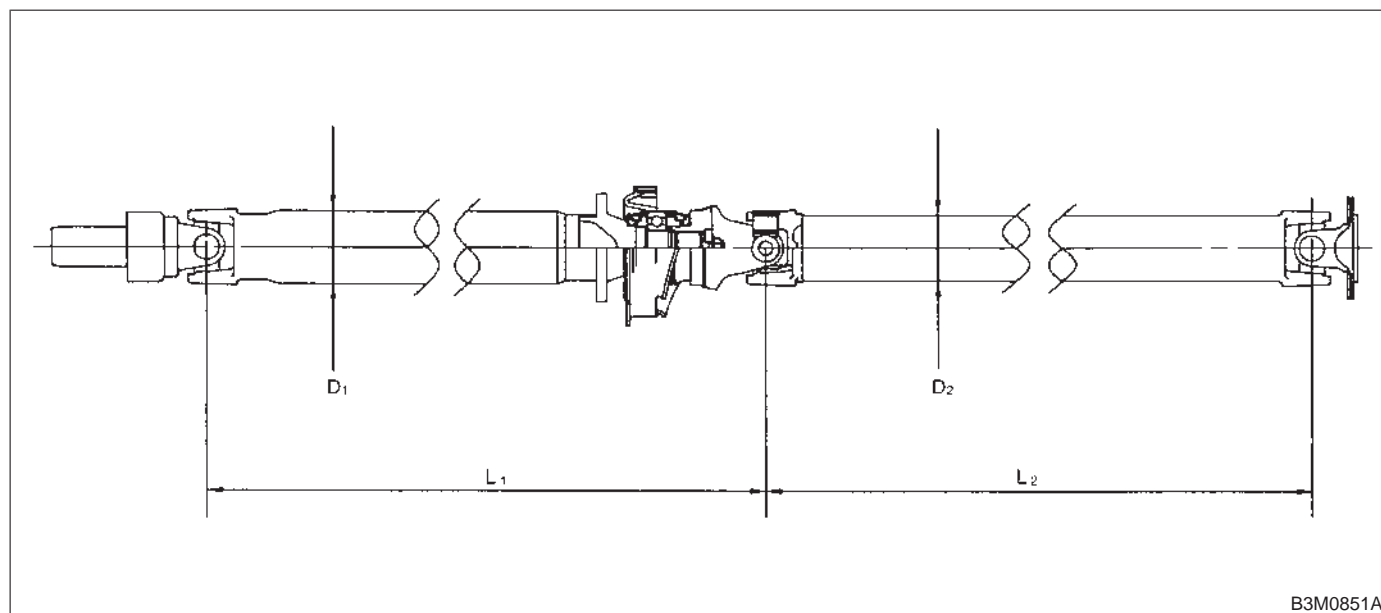
AWD SYSTEM **3-4**

	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Propeller Shaft.....	2
2. Rear Differential	3
C COMPONENT PARTS	8
1. Propeller Shaft.....	8
2. Rear Differential	9
3. Rear Differential Mounting System.....	11
W SERVICE PROCEDURE	12
1. Propeller Shaft.....	12
2. Rear Differential (VA-Type)	14
3. Rear Differential (T-Type).....	33
4. Rear Differential Front Member	52
K DIAGNOSTICS	54
1. Propeller Shaft.....	54
2. Rear Differential	54

1. Propeller Shaft

A: SPECIFICATIONS

Front propeller shaft Joint-to-joint length: L_1 mm (in)	AT	693 (27.28)
	MT	634 (24.96)
Rear propeller shaft Joint-to-joint length: L_2 mm (in)		768 (30.24)
Outside dia. of tube mm (in)	D_1	63.5 (2.500)
	D_2	57.0 (2.244)



B3M0851A

2. Rear Differential

A: SPECIFICATIONS

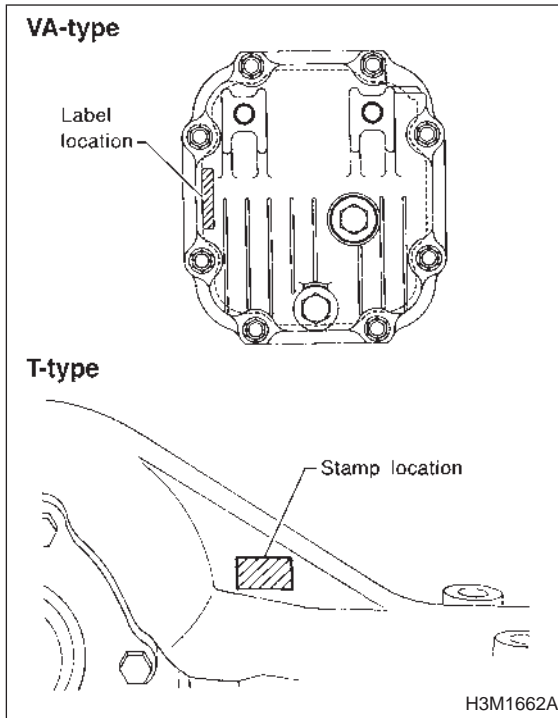
Type of gear	Hypoid			
	MT		AT	
	2200 cc	2500 cc	2200 cc	2500 cc
Gear ratio (Number of gear teeth)	3.900 (39/10)	4.111 (37/9)	4.111 (37/9)	4.444 (40/9)
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)			
Rear differential gear oil	GL-5			

B: IDENTIFICATION

When replacing a rear differential assembly, select the correct one according to the following table.

CAUTION:

Using the different rear differential assembly causes the drive line and tires to “drag” or emit abnormal noise when AWD is selected.



Rear differential	Gear ratio		Stamp or label on rear differential
VA-type	2200 cc AT	4.111	<div>VA1REF-XG</div> <div>H3M1159</div>
T-type	2200 cc MT	3.900	<div>T 1</div> <div>B3M0124</div>
	2500 cc MT	4.111	<div>T 2</div> <div>B3M0127</div>
	2500 cc AT	4.444	<div>T P</div> <div>B3M0421</div>

C: SERVICE DATA

1. VA-TYPE

Front and rear bearing preload at companion flange bolt hole	New bearing	12.7 — 32.4 N (1.3 — 3.3 kg, 2.9 — 7.3 lb)
Preload adjusting spacer	Part No.	Length mm (in)
	32288AA040	52.3 (2.059)
	32288AA050	52.5 (2.067)
	31454AA100	52.6 (2.071)
	32288AA060	52.7 (2.075)
	31454AA110	52.8 (2.079)
	32288AA070	52.9 (2.083)
	31454AA120	53.0 (2.087)
	32288AA080	53.1 (2.091)
	32288AA090	53.3 (2.098)

Preload adjusting washer	Part No.	Thickness mm (in)
	38336AA000	1.500 (0.0591)
	38336AA120	1.513 (0.0596)
	38336AA010	1.525 (0.0600)
	38336AA130	1.538 (0.0606)
	38336AA020	1.550 (0.0610)
	38336AA140	1.563 (0.0615)
	38336AA030	1.575 (0.0620)
	38336AA150	1.588 (0.0625)
	38336AA040	1.600 (0.0630)
	38336AA160	1.613 (0.0635)
	38336AA050	1.625 (0.0640)
	38336AA170	1.638 (0.0645)
	38336AA060	1.650 (0.0650)
	38336AA180	1.663 (0.0655)
	38336AA070	1.675 (0.0659)
	38336AA190	1.688 (0.0665)
	38336AA080	1.700 (0.0669)
	38336AA200	1.713 (0.0674)
	38336AA090	1.725 (0.0679)
	38336AA210	1.738 (0.0684)
	38336AA100	1.750 (0.0689)
	38336AA220	1.763 (0.0694)
	38336AA110	1.775 (0.0699)
Pinion height adjusting shim	Part No.	Thickness mm (in)
	32295AA200	0.150 (0.0059)
	32295AA210	0.175 (0.0069)
	32295AA220	0.200 (0.0079)
	32295AA230	0.225 (0.0089)
	32295AA240	0.250 (0.0098)
	32295AA250	0.275 (0.0108)
Side gear backlash	0.05 — 0.15 mm (0.0020 — 0.0059 in)	
Side gear thrust washer	Part No.	Thickness mm (in)
	803135011	0.925 — 0.950 (0.0364 — 0.0374)
	803135012	0.950 — 0.975 (0.0374 — 0.0384)
	803135013	0.975 — 1.000 (0.0384 — 0.0394)
	803135014	1.000 — 1.025 (0.0394 — 0.0404)
	803135015	1.025 — 1.050 (0.0404 — 0.0413)
Crown gear to drive pinion backlash	Limit	0.10 — 0.15 (0.0039 — 0.0059)
Crown gear runout on its back surface		0.05 (0.0020)
Oil capacity		0.8 ℓ (0.8 US qt, 0.7 Imp qt)

2. T-TYPE

Front and rear bearing preload at companion flange bolt hole	New bearing	19.6 — 28.4 N (2.0 — 2.9 kg, 4.4 — 6.4 lb)
Preload adjusting spacer	Part No.	Length mm (in)
	383695201	56.2 (2.213)
	383695202	56.4 (2.220)
	383695203	56.6 (2.228)
	383695204	56.8 (2.236)
	383695205	57.0 (2.244)
	383695206	57.2 (2.252)

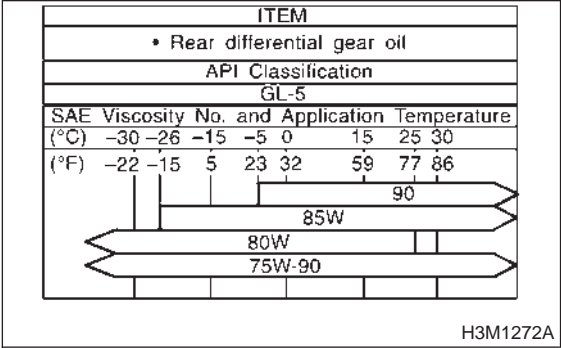
Preload adjusting washer	Part No.	Thickness mm (in)
	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	383805200	2.39 (0.0941)
	383815200	2.37 (0.0933)
	383825200	2.35 (0.0925)
	383835200	2.33 (0.0917)
	383845200	2.31 (0.0909)
Pinion height adjusting shim	Part No.	Thickness mm (in)
	383495200	3.09 (0.1217)
	383505200	3.12 (0.1228)
	383515200	3.15 (0.1240)
	383525200	3.18 (0.1252)
	383535200	3.21 (0.1264)
	383545200	3.24 (0.1276)
	383555200	3.27 (0.1287)
	383565200	3.30 (0.1299)
	383575200	3.33 (0.1311)
	383585200	3.36 (0.1323)
	383595200	3.39 (0.1335)
	383605200	3.42 (0.1346)
	383615200	3.45 (0.1358)
	383625200	3.48 (0.1370)
	383635200	3.51 (0.1382)
	383645200	3.54 (0.1394)
	383655200	3.57 (0.1406)
	383665200	3.60 (0.1417)
	383675200	3.63 (0.1429)
	383685200	3.66 (0.1441)
Side gear backlash	0.10 — 0.20 mm (0.0039 — 0.0079 in)	
Side gear thrust washer	Part No.	Thickness mm (in)
	383445201	0.75 — 0.8 (0.0295 — 0.0315)
	383445202	0.8 — 0.85 (0.0315 — 0.0335)
	383445203	0.85 — 0.9 (0.0335 — 0.0354)
Side bearing standard width	20.00 (0.7874)	
Side bearing retainer shim	Part No.	Thickness mm (in)
	383475201	0.20 (0.0079)
	383475202	0.25 (0.0098 in)
	383475203	0.30 (0.0118)
	383475204	0.40 mm (0.0157)
	383475205	0.50 (0.0197)
Crown gear to drive pinion backlash	Limit	0.10 — 0.20 mm (0.0039 — 0.0079 in)
Crown gear runout on its back surface		0.05 mm (0.0020 in)
Oil capacity		0.8 ℓ (0.8 US qt, 0.7 Imp qt)

3. REAR DIFFERENTIAL GEAR OIL

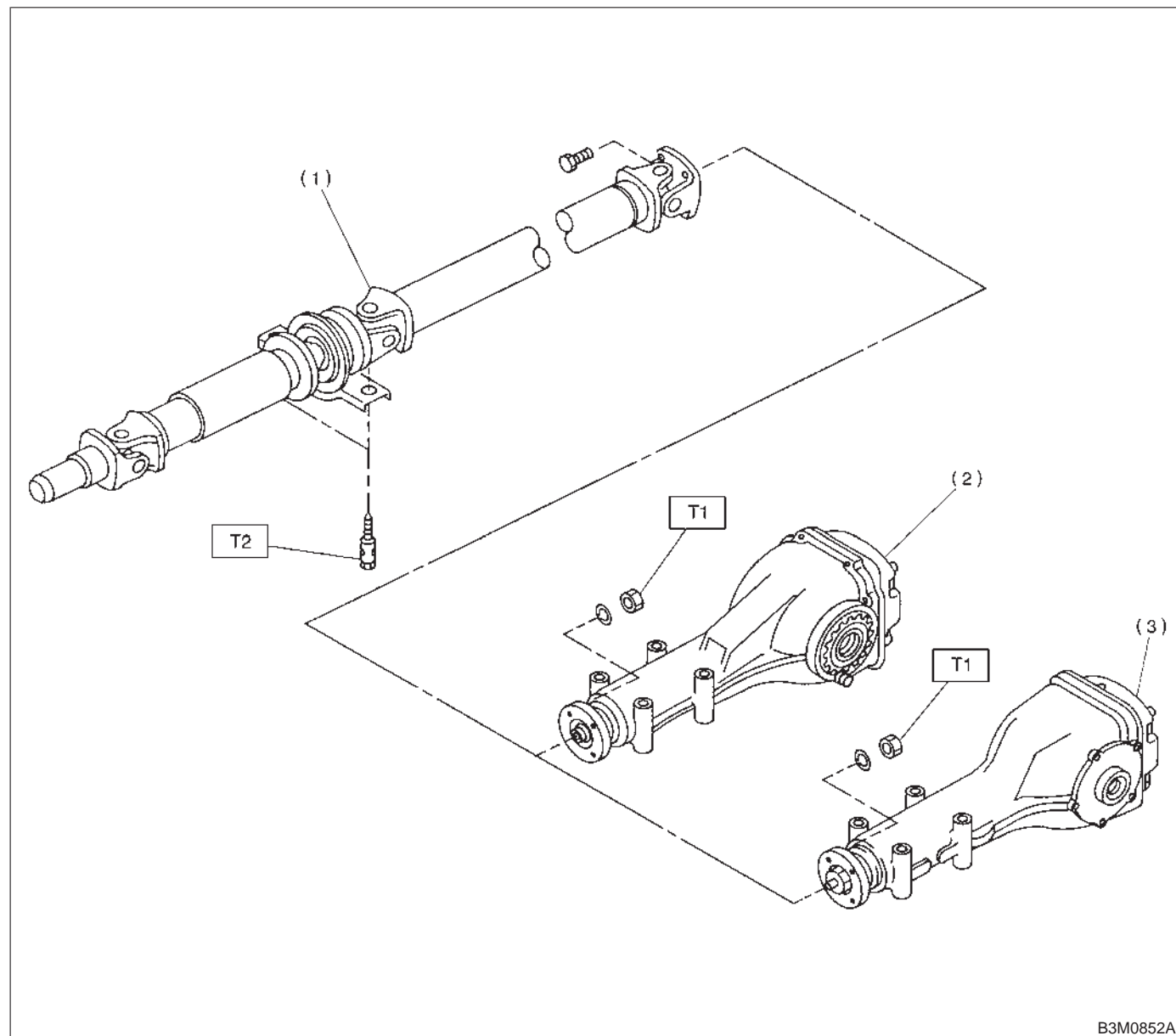
- Recommended oil

CAUTION:

Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.



1. Propeller Shaft



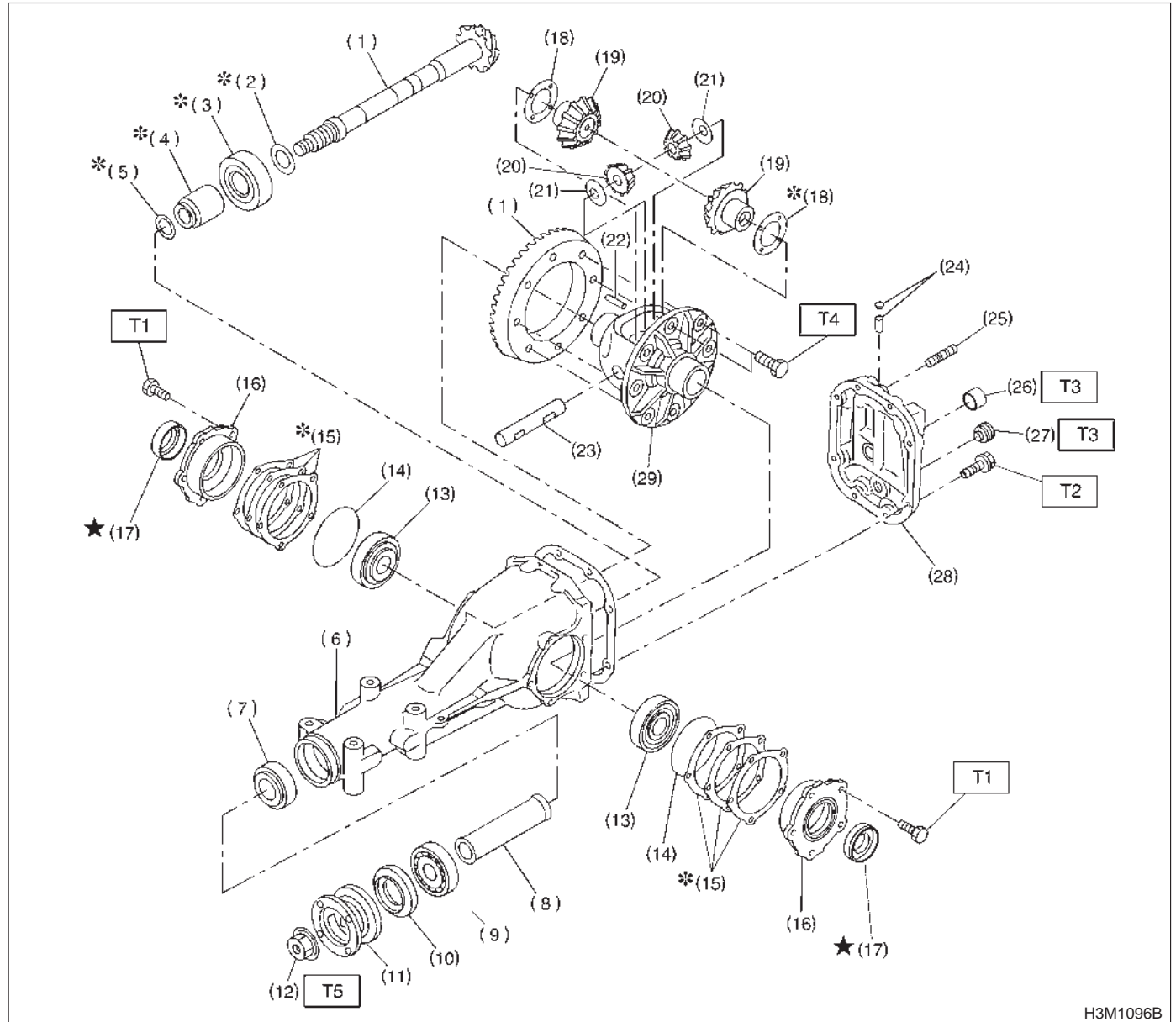
- (1) Propeller shaft
- (2) Rear differential (VA-type)
- (3) Rear differential (T-type)

Tightening torque: N-m (kg-m, ft-lb)

T1: 31±8 (3.2±0.8, 23.1±5.8)

T2: 52±5 (5.3±0.5, 38.3±3.6)

B: T-TYPE



H3M1096B

- | | |
|--------------------------------------|---------------------------------|
| (1) Pinion crown gear set | (14) O-ring |
| (2) Pinion height adjusting washer | (15) Side bearing retainer shim |
| (3) Rear bearing | (16) Side bearing retainer |
| (4) Bearing preload adjusting spacer | (17) Side oil seal |
| (5) Bearing preload adjusting washer | (18) Side gear thrust washer |
| (6) Differential carrier | (19) Side gear |
| (7) Front bearing | (20) Pinion mate gear |
| (8) Spacer | (21) Pinion mate gear washer |
| (9) Pilot bearing | (22) Pinion shaft lock pin |
| (10) Front oil seal | (23) Pinion mate shaft |
| (11) Companion flange | (24) Air breather cap |
| (12) Self-locking nut | (25) Stud bolt |
| (13) Side bearing | (26) Oil filler plug |
| | (27) Oil drain plug |

- (28) Rear cover
(29) Differential case

Tightening torque: N-m (kg-m, ft-lb)

T1: 10.3±1.5 (1.05±0.15, 7.6±1.1)

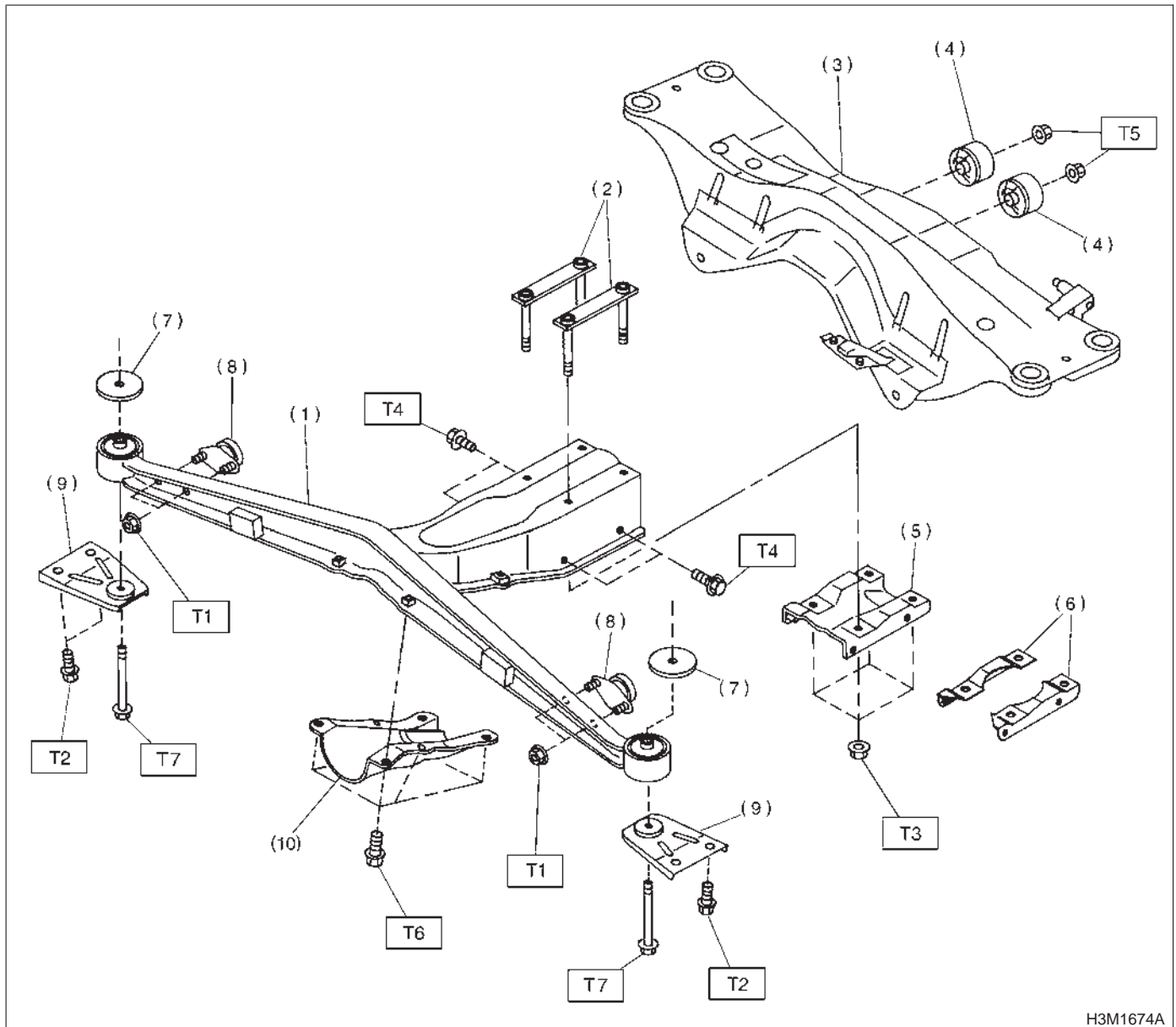
T2: 29.4±4.9 (3.00±0.50, 21.7±3.6)

T3: 44.1±3.9 (4.50±0.40, 32.5±2.9)

T4: 103.0±9.8 (10.50±1.00, 75.9±7.2)

T5: 181.4±14.7 (18.50±1.50, 133.8±10.8)

3. Rear Differential Mounting System



H3M1674A

- | | |
|---|-------------------------------------|
| (1) Differential front member | (7) Stopper |
| (2) Plate | (8) Dynamic damper |
| (3) Crossmember | (9) Differential mount bracket |
| (4) Rear bushing | (10) Differential mount front cover |
| (5) Differential mount lower bracket
(2500 cc model) | |
| (6) Differential mount lower bracket
(2200 cc model) | |

Tightening torque: N·m (kg·m, ft·lb)

T1: 20±5 (2.0±0.5, 14.5±3.6)

T2: 32±8 (3.3±0.8, 23.9±5.8)

T3: 64±8 (6.5±0.8, 47.0±5.8)

T4: 69⁺¹³/₋₈ (7.0^{+1.3}/_{-0.8}, 50.6^{+9.4}/_{-5.8})

T5: 69±10 (7.0±1.0, 51.0±7.2)

T6: 88±10 (9.0±1.0, 65.0±7.2)

T7: 98±10 (10.0±1.0, 72.0±7.2)

1. Propeller Shaft

A: ON-CAR SERVICE

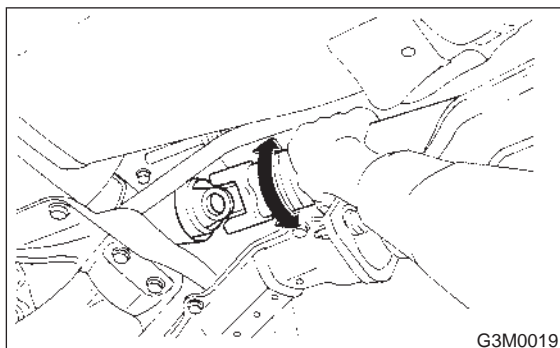
Check the following points with propeller shaft installed in vehicle.

1) Joints and connections

Check for any looseness of yoke flange connecting bolts and center bearing retaining bolts.

2) Splines and bearing locations

Turn propeller shaft by hand to see if abnormal free play exists at splines. Also move yokes to see if abnormal free play exists at spiders and bearings.



3) Runout of propeller shaft

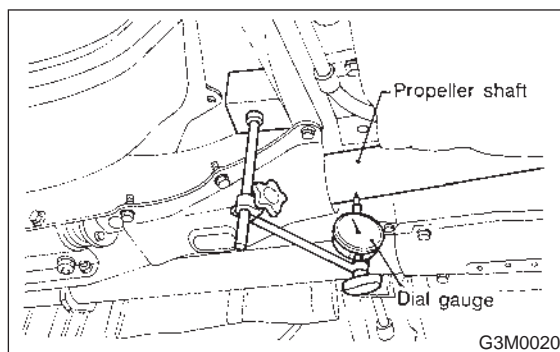
Turn rear wheels by hand to check for "runout" of propeller shaft.

NOTE:

Measure runout with a dial gauge at the center of front and rear propeller shaft tubes.

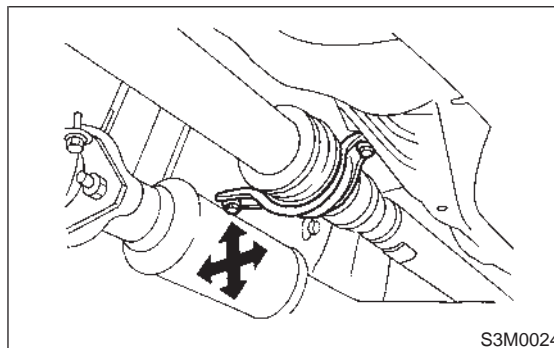
Runout:

Limit 0.6 mm (0.024 in)



4) Center bearing free play

While holding propeller shaft near center bearing with your hand, move it up and down, and left and right to check for any abnormal bearing free play.

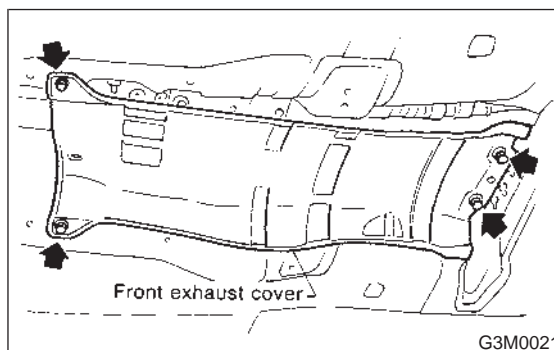


B: REMOVAL

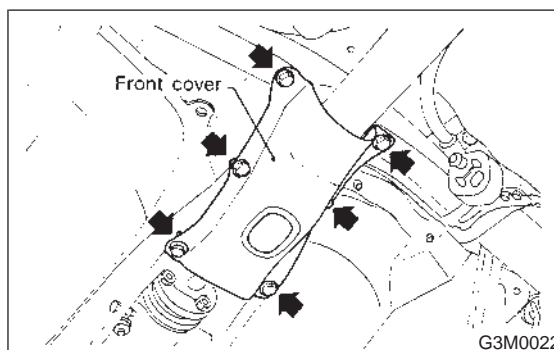
NOTE:

Before removing propeller shaft, wrap metal parts with a cloth or rubber material.

- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Jack-up vehicle and support it with sturdy racks.
- 5) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W3A0].> and <Ref. to 2-9 [W2A0].>
- 6) Remove front exhaust cover.



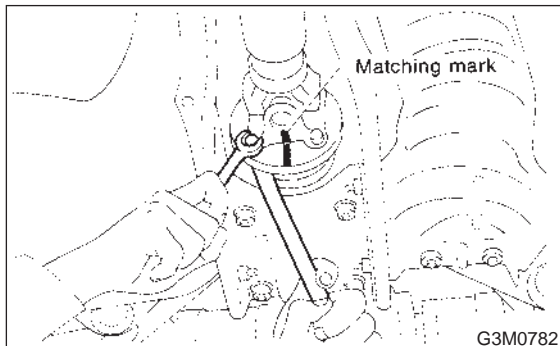
7) Remove differential mount front cover.



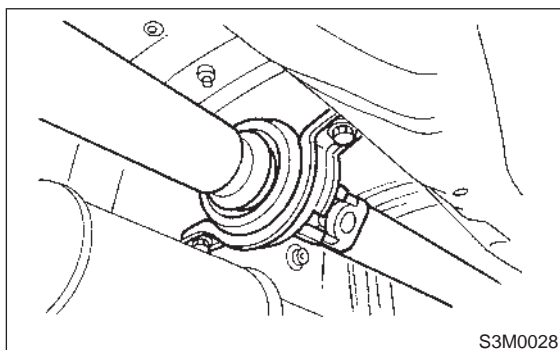
8) Remove the four bolts which hold propeller shaft to rear differential.

NOTE:

- Put matching mark on affected parts before removal.
- Remove all but one bolt.



9) Remove the two bolts which hold center bearing to vehicle body.



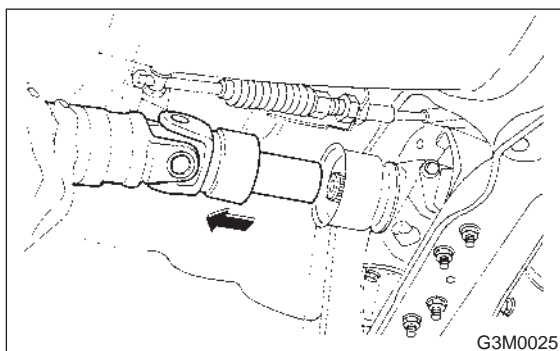
10) Remove propeller shaft from transmission.

CAUTION:

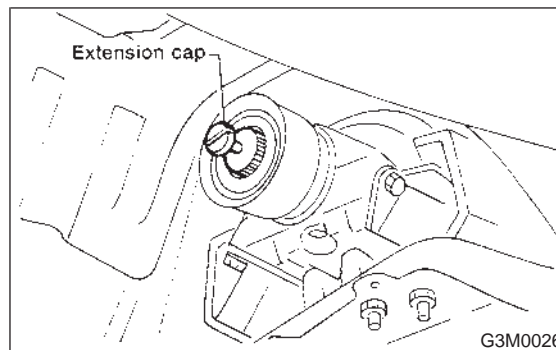
Be sure not to damage oil seals and the frictional surface of sleeve yoke.

NOTE:

- Be sure to use an empty oil can to catch oil flowing out when removing propeller shaft.
- Be sure to plug the opening in transmission after removal of propeller shaft.



11) Install the extension cap to transmission.



C: DISASSEMBLY

NOTE:

Do not disassemble propeller shaft. It is a single unit.

D: INSPECTION

NOTE:

Do not disassemble propeller shaft. Check the following and replace if necessary.

- 1) Tube surfaces for dents or cracks
- 2) Splines for deformation or abnormal wear
- 3) Joints for non-smooth operation or abnormal noise
- 4) Center bearing for free play, noise or non-smooth operation
- 5) Oil seals for abnormal wear or damage
- 6) Center bearing for breakage

E: ASSEMBLY

NOTE:

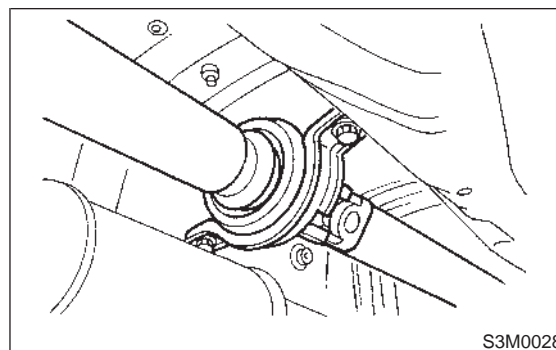
Do not disassemble propeller shaft. It is a single unit.

F: INSTALLATION

- 1) Insert sleeve yoke into transmission and attach center bearing to vehicle body.

Tightening torque:

52±5 N·m (5.3±0.5 kg-m, 38.3±3.6 ft-lb)

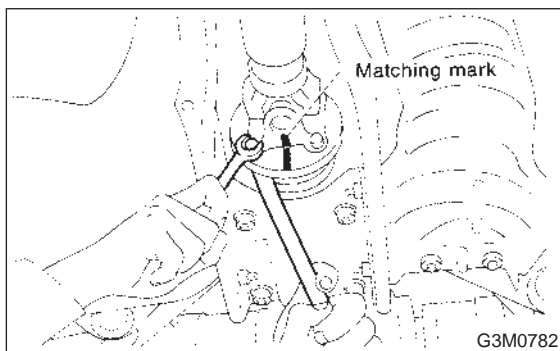


2. Rear Differential (VA-Type)

- 2) Align matching marks and connect flange yoke and rear differential.

Tightening torque:

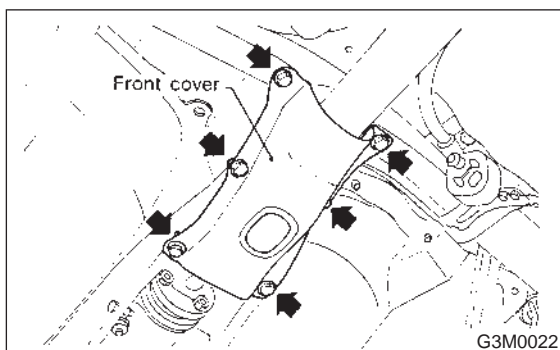
$31 \pm 8 \text{ N-m}$ ($3.2 \pm 0.8 \text{ kg-m}$, $23.1 \pm 5.8 \text{ ft-lb}$)



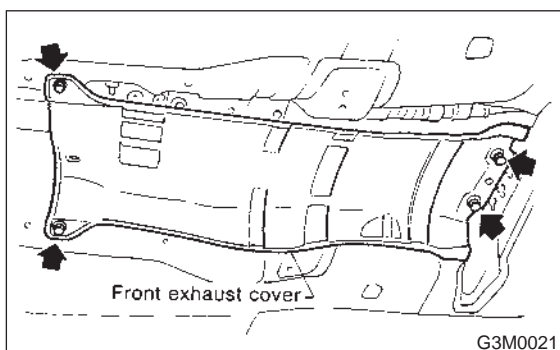
- 3) Install differential mount front cover.

Tightening torque:

$88 \pm 10 \text{ N-m}$ ($9.0 \pm 1.0 \text{ kg-m}$, $65 \pm 7 \text{ ft-lb}$)



- 4) Install front exhaust cover.

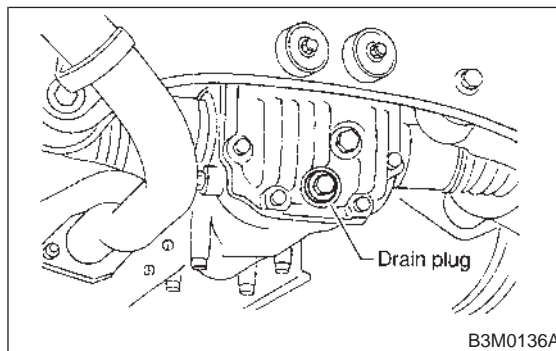


- 5) Install rear exhaust pipe and muffler.

2. Rear Differential (VA-Type)

A: ON-CAR SERVICE**1. FRONT OIL SEAL**

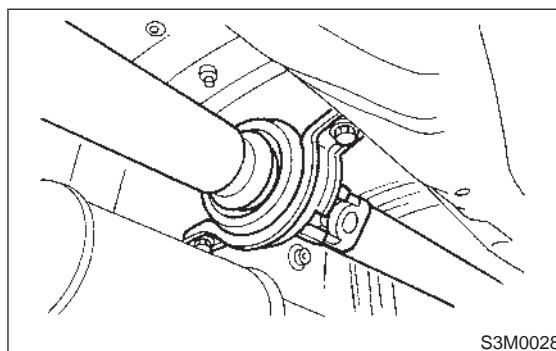
- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Remove oil drain plug, and drain gear oil.



- 5) Jack-up rear wheels and support the vehicle body with sturdy racks.
- 6) Remove propeller shaft from body. <Ref. to 3-4 [W1B0].>

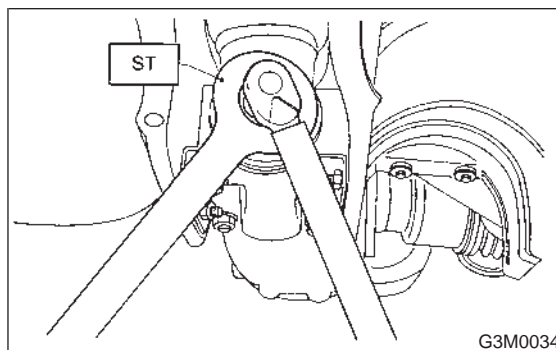
CAUTION:

Wrap metal parts with a cloth or rubber material to prevent damage from adjacent metal parts.

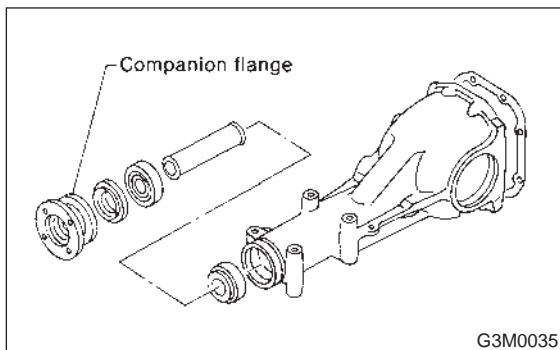


- 7) Remove self-locking nut while holding companion flange with ST.

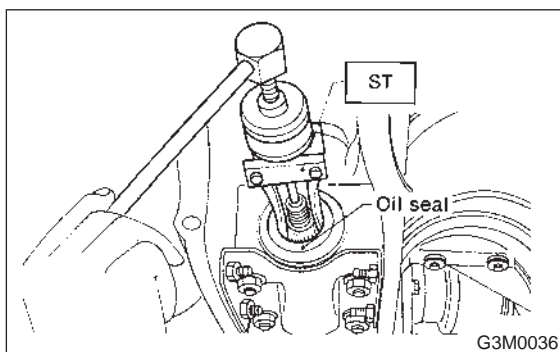
ST 498427200 FLANGE WRENCH



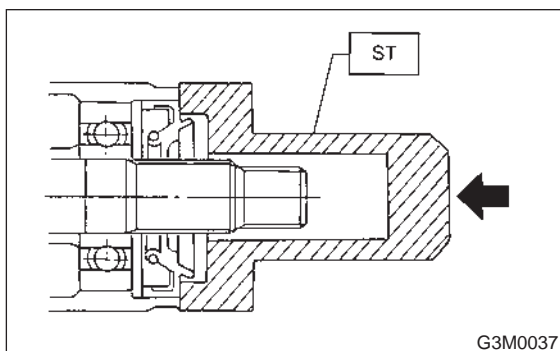
- 8) Extract companion flange with a puller.



- 9) Remove oil seal using ST.
ST 398527700 PULLER ASSY



- 10) Fit a new oil seal using ST.
ST 498447120 OIL SEAL INSTALLER



- 11) Install companion flange.

- 12) Tighten self-locking nut within the specified torque range so that the turning resistance of companion flange becomes the same as that before replacing oil seal.

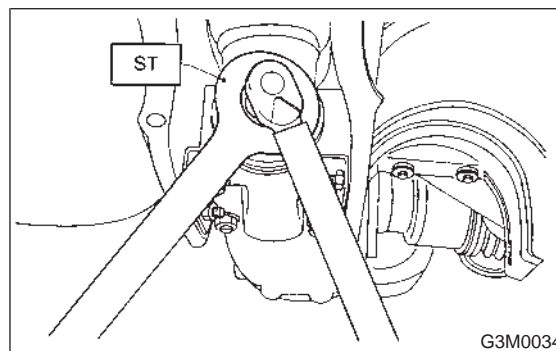
ST 498427200 FLANGE WRENCH

CAUTION:

Use a new self-locking nut.

Tightening torque:

188±26 N·m (19.2±2.7 kg-m, 139±20 ft-lb)

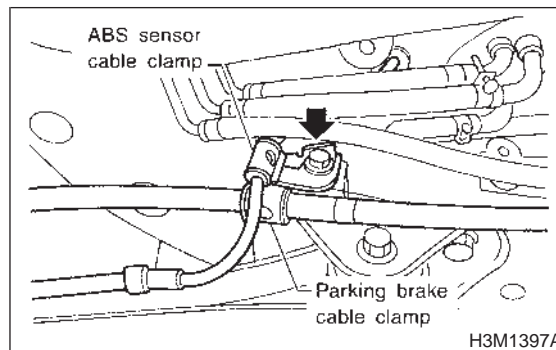


- 13) Reassembling procedure hereafter is the reverse of the disassembling.

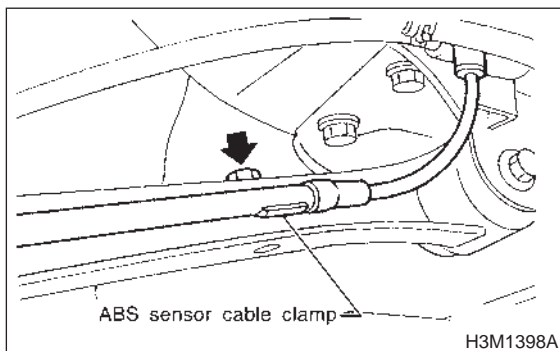
2. SIDE OIL SEAL

- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Loosen both wheel nuts.
- 5) Jack-up the vehicle and support it with rigid racks.
- 6) Remove wheels.
- 7) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W3A0].> and <Ref. to 2-9 [W2A0].>
- 8) Remove the DOJ of rear drive shaft from rear differential.

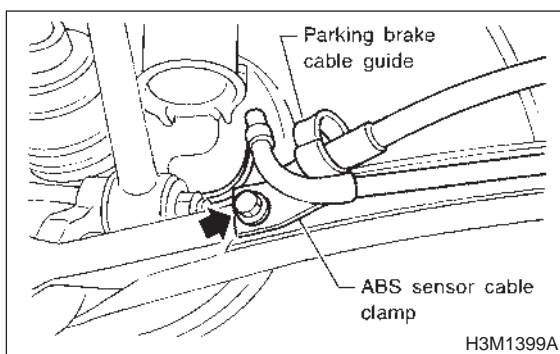
- (1) Remove the ABS sensor cable clamp and parking brake cable clamp from bracket.



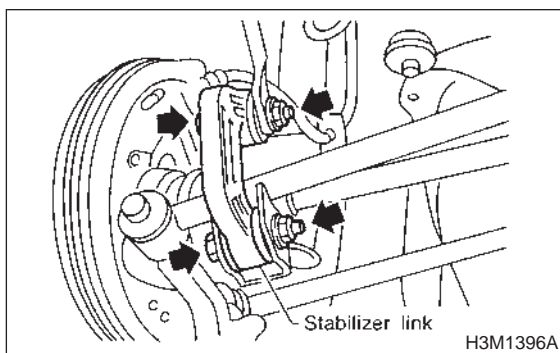
- (2) Remove the ABS sensor cable clamp from the trailing link.



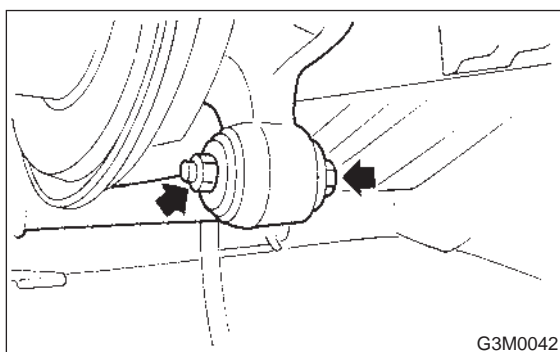
- (3) Remove the ABS sensor cable clamp and parking brake cable guide from the trailing link.



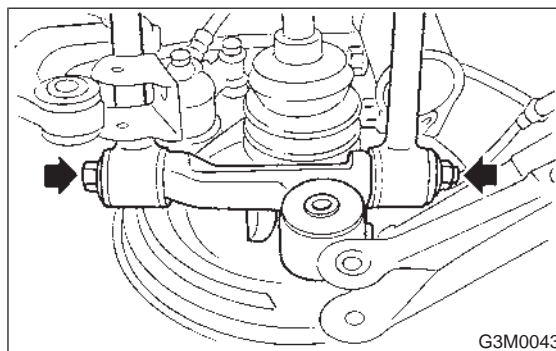
- (4) Remove the rear stabilizer link.



- (5) Remove the bolts which secure the trailing link to the rear housing.



- (6) Remove the bolts which secure the front and rear lateral link to the rear housing.



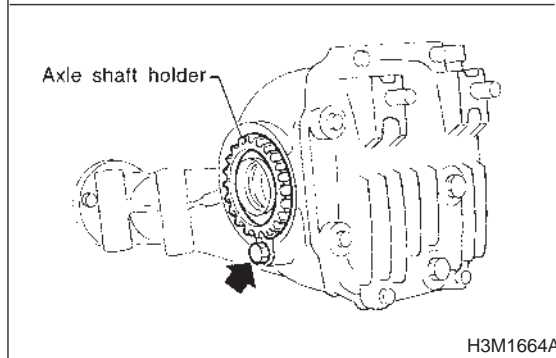
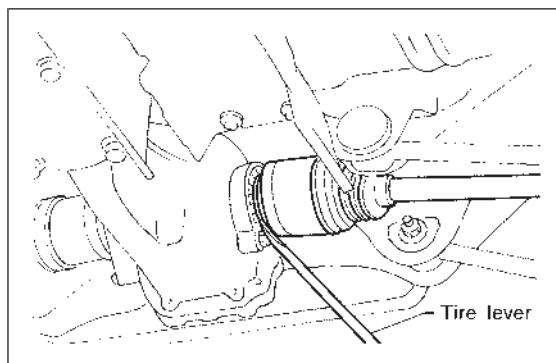
- (7) Remove the DOJ from the rear differential with tire lever.

CAUTION:

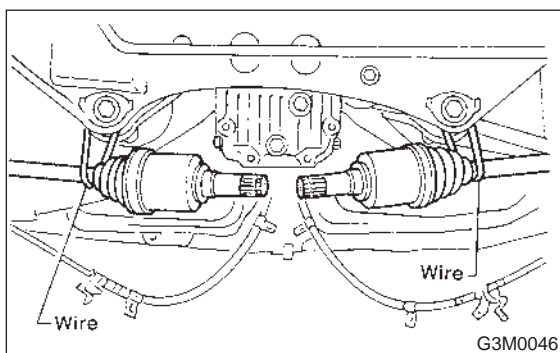
When removing the DOJ from the rear differential, fit tire lever to the bolt as shown in figure so as not to damage the axle shaft holder.

NOTE:

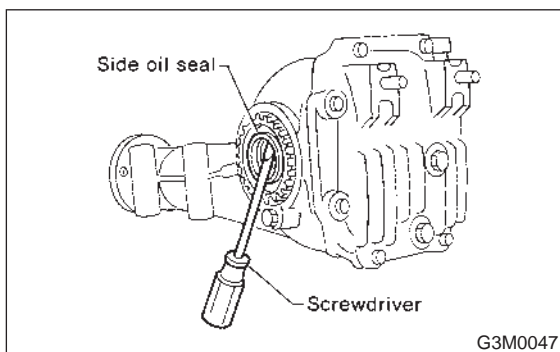
The side spline shaft circlip comes out together with the shaft.



- 9) Secure rear drive shaft to rear crossmember using wire.



- 10) Remove oil seal with screwdriver.

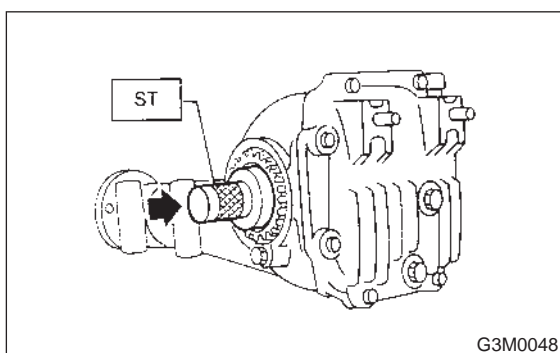


- 11) Drive in a new side oil seal with ST.

CAUTION:

Apply chassis grease between the oil seal lips.

ST 498447100 OIL SEAL INSTALLER

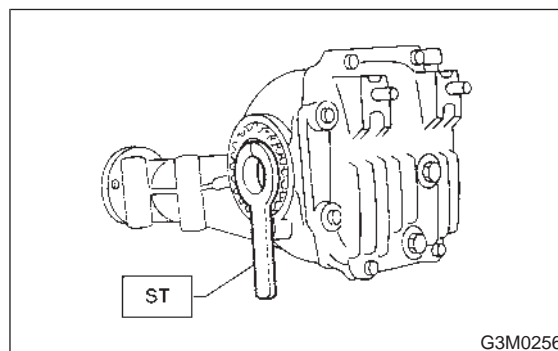


- 12) Insert the DOJ into rear differential.

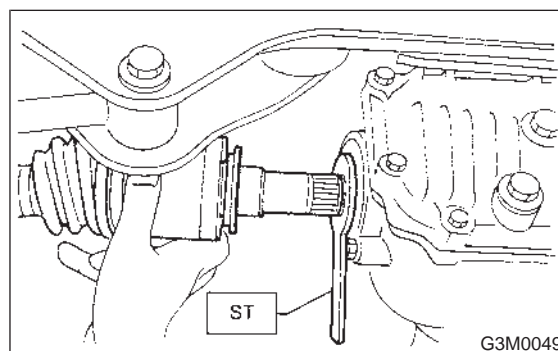
CAUTION:

Before inserting, replace the circlip at the end of the spline shaft with a new one.

- (1) Install ST to rear differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



- (2) Insert the spline shaft until the spline portion is inside the side oil seal.

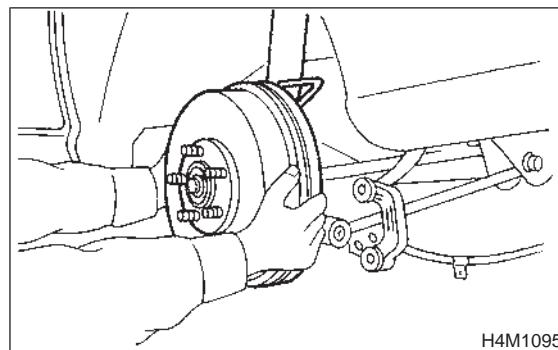


- (3) Remove ST.
ST 28099PA090 SIDE OIL SEAL PROTECTOR

- (4) Completely insert DOJ into rear differential by pressing rear housing.

NOTE:

Make sure that oil seal lip is not folded over inward.

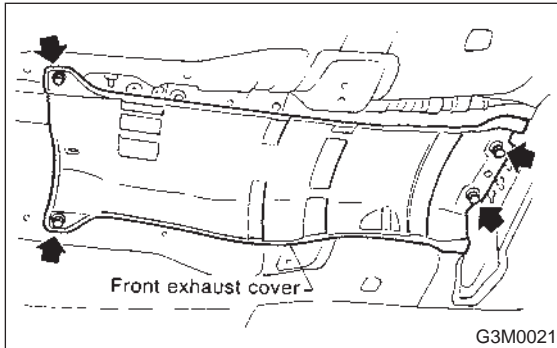


- 13) Hereafter, re-assemble in reverse order of disassembly.

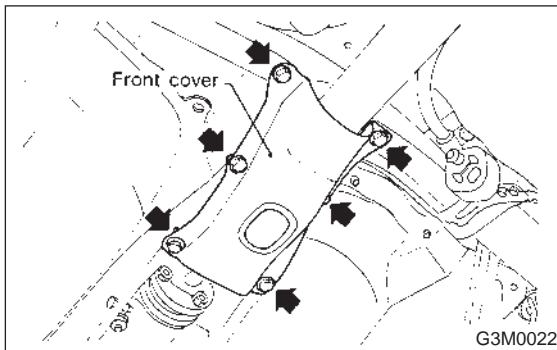
B: REMOVAL

- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Loosen wheel nuts.

- 5) Jack-up vehicle and support it with sturdy racks.
- 6) Remove wheels.
- 7) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W3A0].> and <Ref. to 2-9 [W2A0].>
- 8) Remove front exhaust cover.



- 9) Remove front cover of rear differential mount.



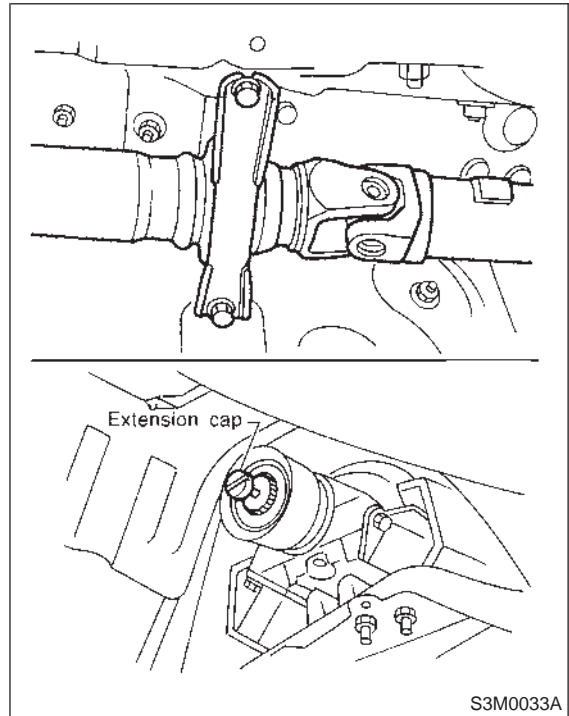
- 10) Remove propeller shaft.

CAUTION:

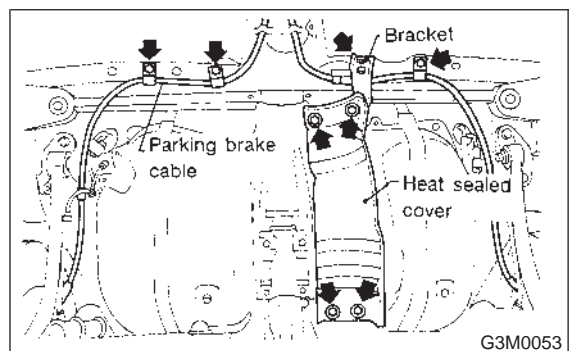
When removing propeller shaft, pay attention not to damage the sliding surfaces of rear drive shaft (extension) spline, oil seal and sleeve yoke.

NOTE:

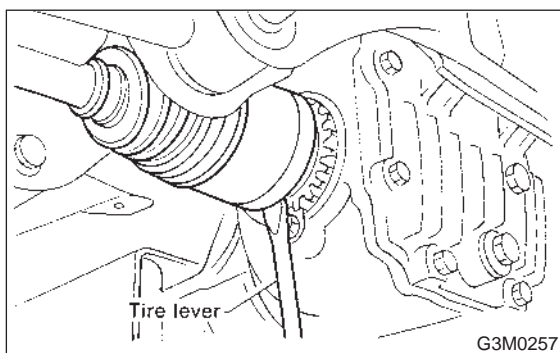
- Prepare an oil can and cap since the transmission oil flows out from the extension at removing propeller shaft.
- Insert the cap into the extension to prevent transmission oil from flowing out immediately after removing the propeller shaft.



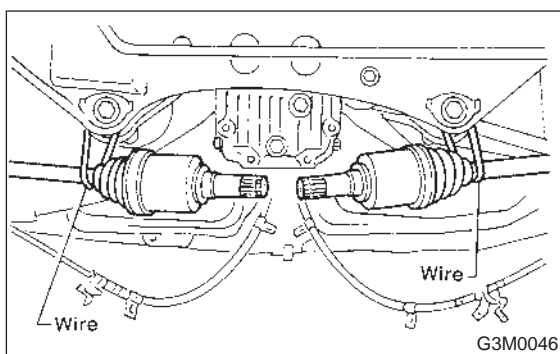
- 11) Remove heat sealed cover.
- 12) Remove clamps and bracket of parking brake cable.



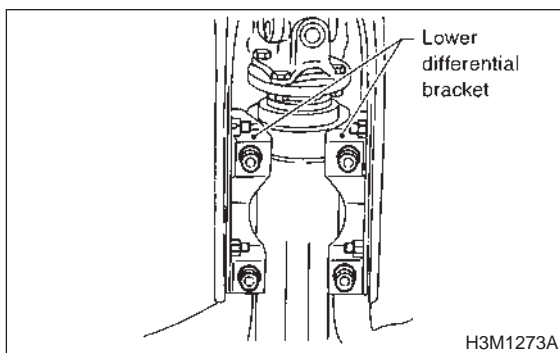
13) Remove DOJ of rear drive shaft from rear differential. <Ref. to 3-4 [W2A2].>



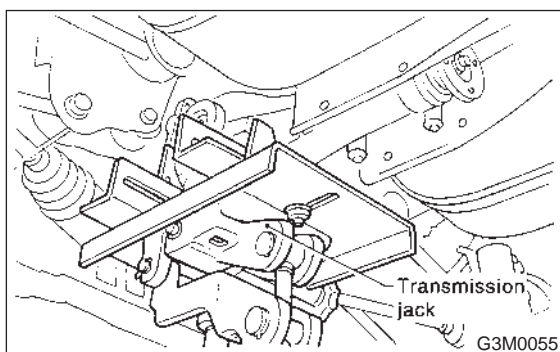
14) Secure rear drive shaft to rear crossmember using wire.



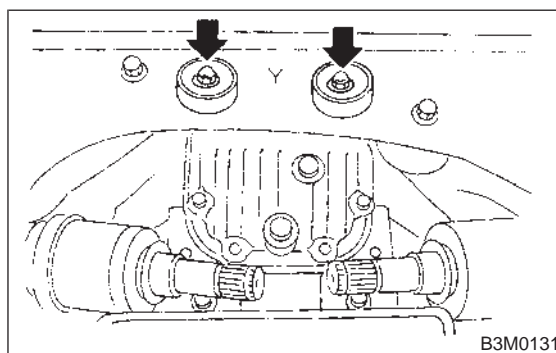
15) Remove lower differential bracket.



16) Support rear differential with transmission jack.



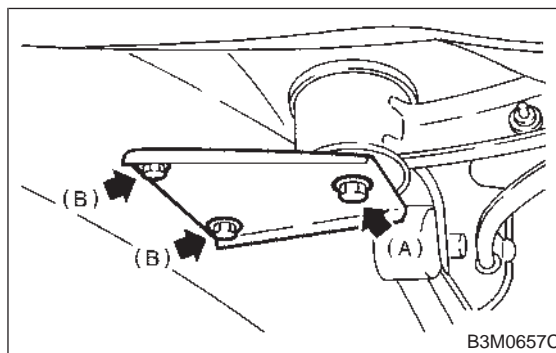
17) Remove self-locking nuts connecting rear differential to rear crossmember.



18) Remove bolts which secure rear differential front member to body. Loosen bolt A first, then removal bolts B.

NOTE:

Support front member with the use of a helper to prevent it from dropping.

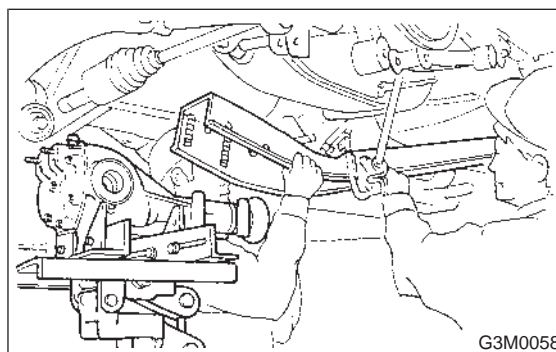


(A) Bolt A
(B) Bolt B

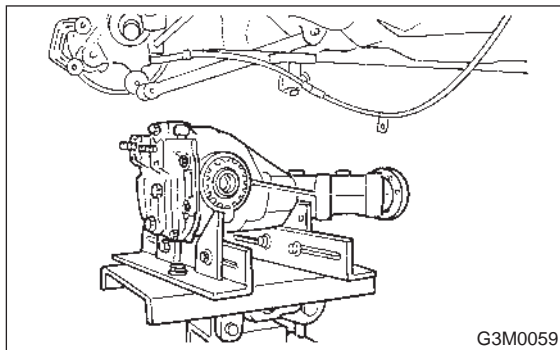
19) Remove bolt A.

20) While slowly lowering transmission jack, move rear differential forward and remove bolts from rear crossmember.

21) Remove front member from body.



22) Remove rear differential from body.

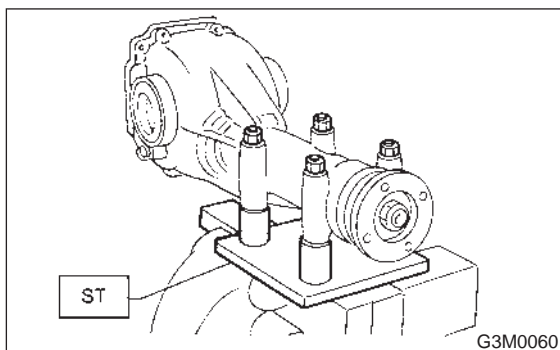


C: DISASSEMBLY

To detect real cause of trouble, inspect the following items before disassembling.

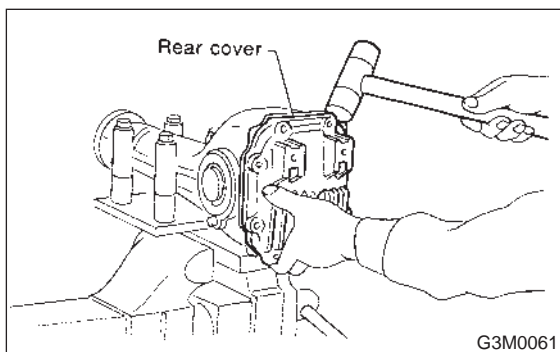
- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

1) Set ST on vise and install the differential assembly to ST.



ST 398217700 ATTACHMENT

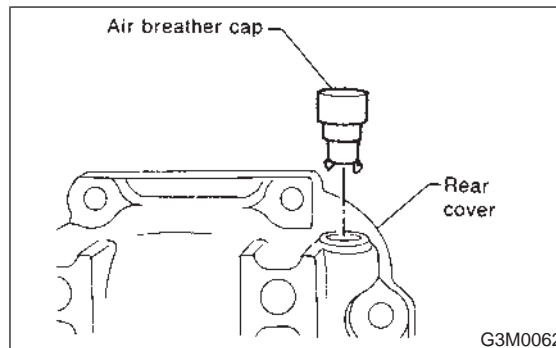
- 2) Drain gear oil by removing plug.
- 3) Remove rear cover by loosening retaining bolts.



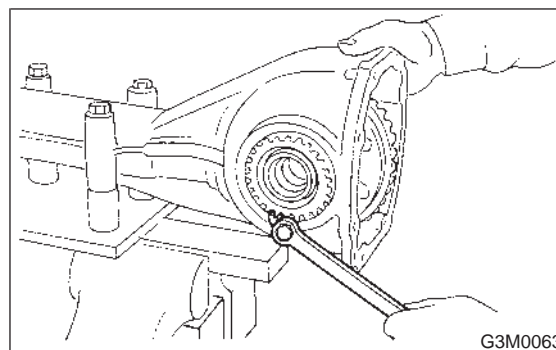
4) Replace air breather cap.

NOTE:

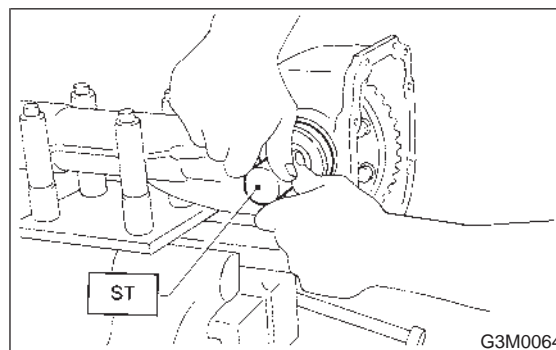
Do not attempt to replace the air breather cap unless necessary.



5) Remove right and left lock plates.



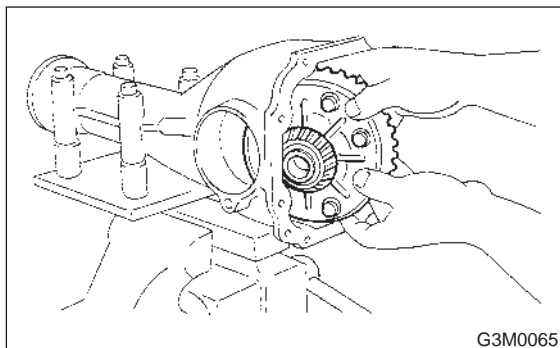
6) Remove right and left holders with ST.
ST 399780111 WRENCH



7) Pull out differential assembly from differential carrier.

CAUTION:

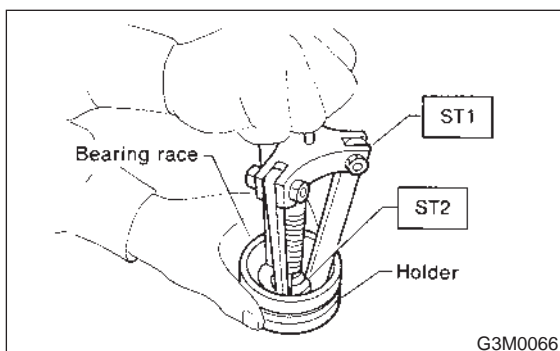
Be careful not to hit the teeth against the case.



8) Remove bearing race from right and left holders with ST1 and ST2.

ST1 499705401 BEARING OUTER RACE PULLER ASSY

ST2 499705404 OUTER RACE PULLER SEAT

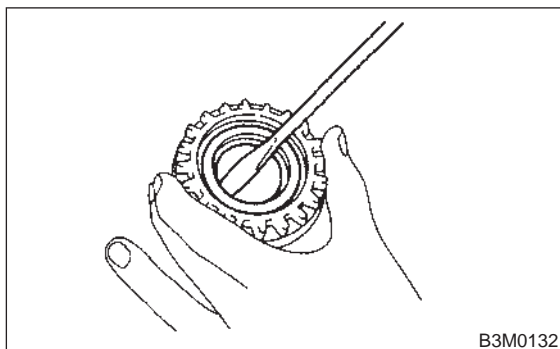


9) Remove oil seal from right and left holders with screwdriver.

CAUTION:

Perform this operation only when changing oil seal.

ST 899580100 INSTALLER



10) Extract bearing cone with ST.

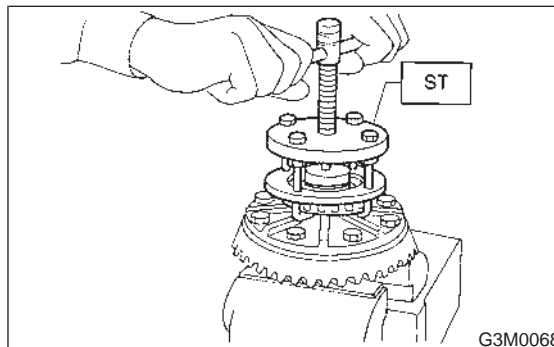
CAUTION:

Do not attempt to disassemble the parts unless necessary.

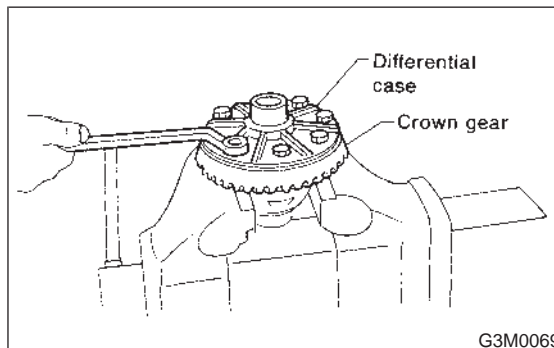
NOTE:

- Set Puller so that its claws catch the edge of the bearing cone.
- Never mix up the right and left hand bearing cups and cones.

ST 899524100 PULLER SET



11) Remove crown gear by loosening crown gear bolts.

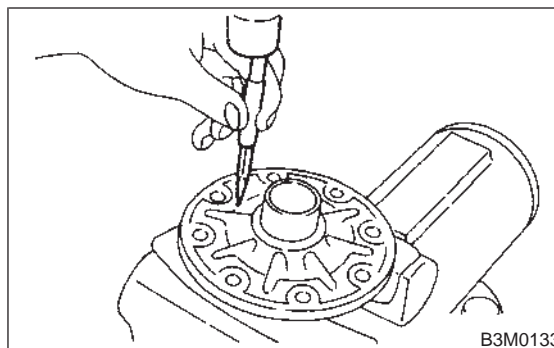


12) Drive out pinion shaft lock pin from crown gear side.

NOTE:

The lock pin is staked at the pin hole end on the differential carrier; do not drive it out forcibly before unstaking it.

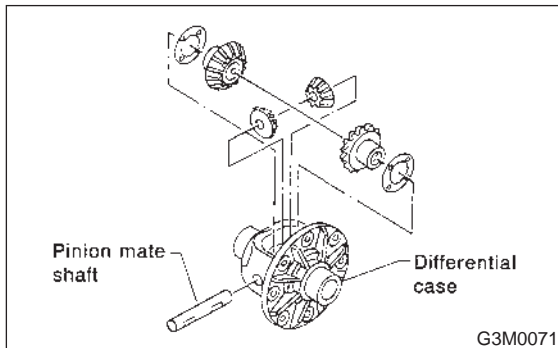
ST 899904100 STRAIGHT PIN REMOVER



13) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

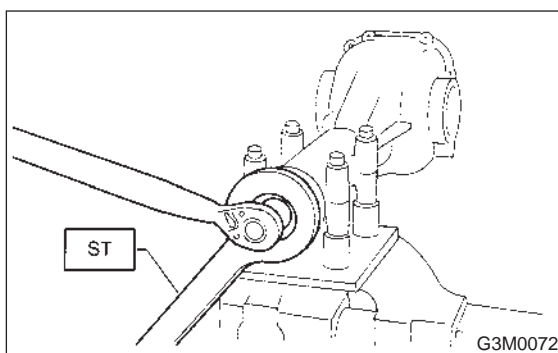
NOTE:

The gears as well as thrust washers should be marked or kept separated left and right, and front and rear.

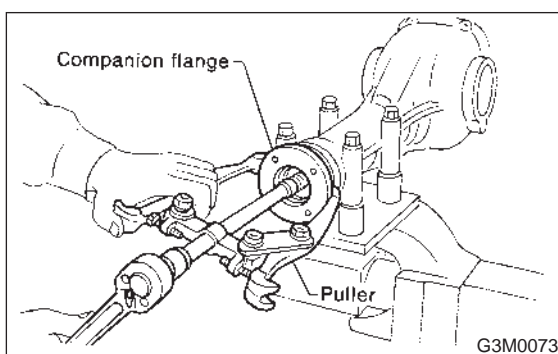


14) Hold companion flange with ST and remove drive pinion nut.

ST 498427200 FLANGE WRENCH



15) Extract the companion flange with a puller.

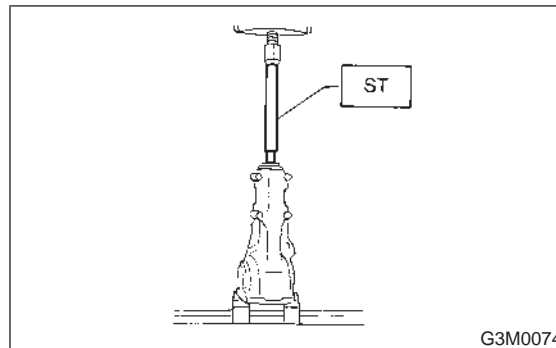


16) Press the end of drive pinion shaft and extract it together with rear bearing cone, preload adjusting spacer and washer.

NOTE:

Hold the drive pinion so as not to drop it.

ST 398467700 DRIFT

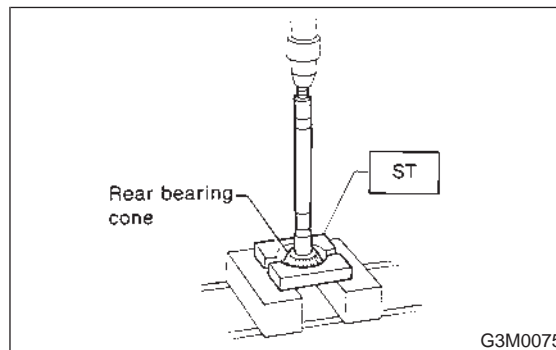


17) Remove rear bearing cone from drive pinion by supporting cone with ST.

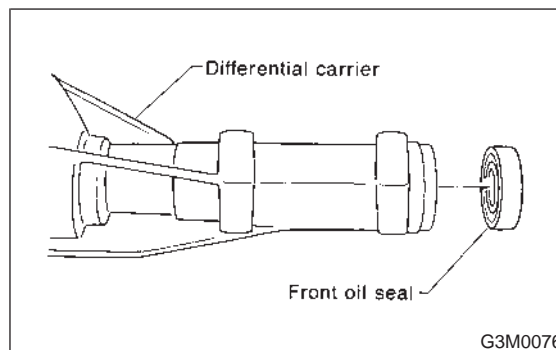
NOTE:

Place the replacer so that its center-recessed side faces the pinion gear.

ST 498515500 REPLACER

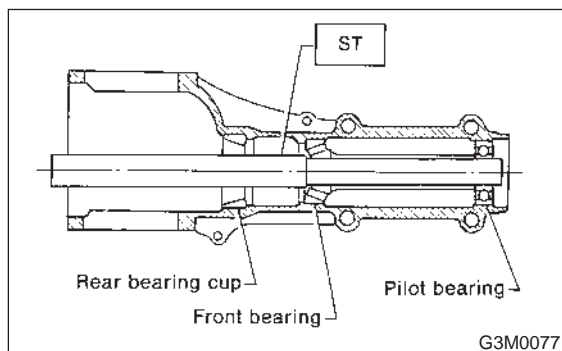


18) Remove front oil seal from differential carrier.

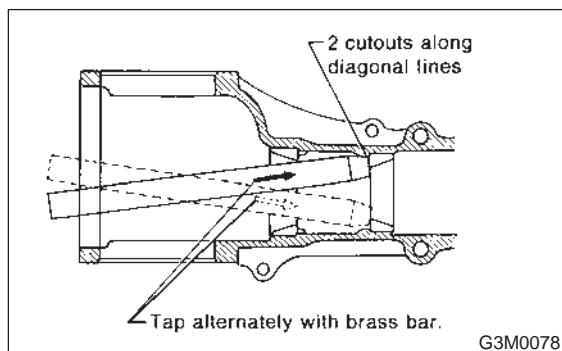


19) Remove pilot bearing together with front bearing cone using ST.

ST 398467700 DRIFT



20) When replacing bearings, tap front bearing cup and rear bearing cup in this order out of case by using a brass bar.



D: INSPECTION

Wash all the disassembled parts clean, and examine them for wear, damage, or other defects. Repair or replace defective parts as necessary.

1) Crown gear and drive pinion

- If abnormal tooth contact is evident, find out the cause and adjust to give correct tooth contact at assembly. Replace the gear if excessively worn or incapable of adjustment.

- If crack, score, or seizure is evident, replace as a set. Slight damage of tooth can be corrected by oil stone or the like.

2) Side gear and pinion mate gear

- Replace if crack, score, or other defects are evident on tooth surface.

- Replace if thrust washer contacting surface is worn or seized. Slight damage of the surface can be corrected by oil stone or the like.

3) Bearing

Replace if seizure, peeling, wear, rust, dragging during rotation, abnormal noise or other defect is evident.

4) Thrust washers of side gear and pinion mate gear Replace if seizure, flaw, abnormal wear or other defect is evident.

5) Oil seal

Replace if deformed or damaged, and at every disassembling.

6) Differential carrier

Replace if the bearing bores are worn or damaged.

7) Differential case

Replace if its sliding surfaces are worn or cracked.

8) Companion flange

Replace if the oil seal lip contacting surfaces have flaws.

E: ASSEMBLY

1) Precautions for assembling

- Assemble in the reverse order of disassembling.
- Check and adjust each part during assembly.

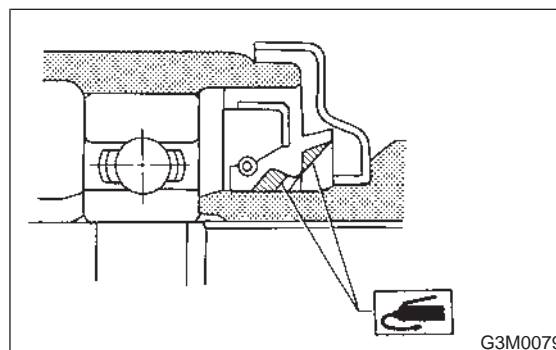
- Keep the shims and washers in order, so that they are not misinstalled.

- Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.

- Apply gear oil when installing the bearings and thrust washers.

- Be careful not to mix up the right and left hand cups of the bearings.

- Replace the oil seal with new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.



2) Adjust preload for front and rear bearings.

Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting washer are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.

(1) Press rear bearing race into differential carrier with ST1 and ST2.

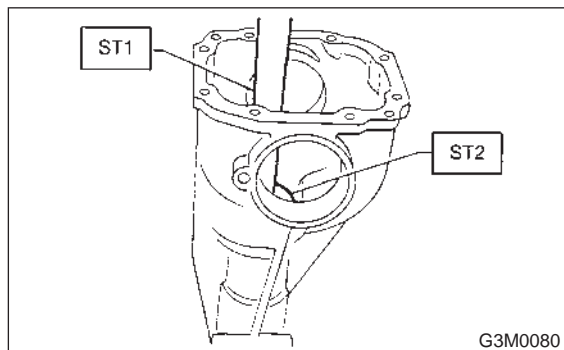
ST1 398477701 HANDLE

ST2 398477702 DRIFT

(2) Press front bearing race into differential carrier with ST1 and ST2.

ST1 398477701 HANDLE

ST2 498447110 DRIFT



(3) Insert front bearing cone.

CAUTION:

Use a new front bearing cone.

(4) Insert ST into case with pinion height adjusting shim and rear bearing cone fitted onto it.

CAUTION:

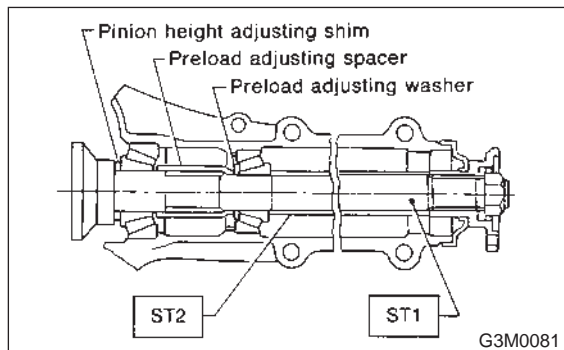
- Re-use the used washer if not deformed.
- Use a new rear bearing cone.

ST 498447150 DUMMY SHAFT

(5) Then install preload adjusting spacer and washer, front bearing cone, ST2, companion flange, and washer and drive pinion nut.

ST1 498447150 DUMMY SHAFT

ST2 32285AA000 DUMMY COLLAR



(6) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque with ST2.

CAUTION:

Use a new lock nut.

NOTE:

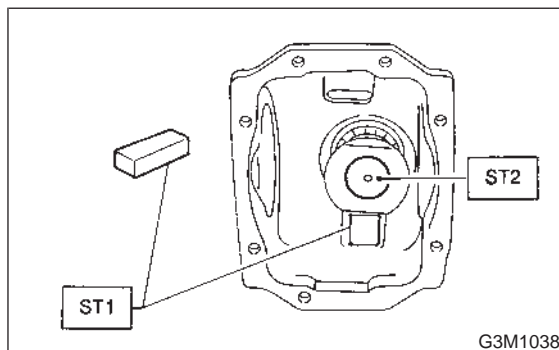
- Be careful not to give excessive preload.
- When tightening the drive pinion nut, lock ST1 with ST2.

ST1 398507704 BLOCK

ST2 498447150 DUMMY SHAFT

Tightening torque:

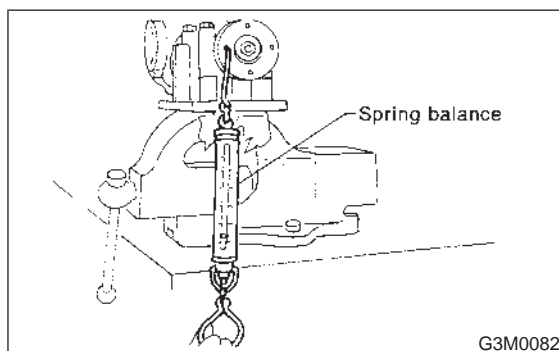
188±26 N·m (19.2±2.7 kg-m, 139±20 ft-lb)



Front and rear bearing preload

For new bearing:

12.7 — 32.4 N (1.3 — 3.3 kg, 2.9 — 7.3 lb)
at companion flange bolt hole



	Part No.	Thickness mm (in)
	38336AA000	1.500 (0.0591)
● Preload adjusting washer	38336AA120	1.513 (0.0596)
	38336AA010	1.525 (0.0600)
	38336AA130	1.538 (0.0606)
	38336AA020	1.550 (0.0610)
	38336AA140	1.563 (0.0615)
	38336AA030	1.575 (0.0620)
	38336AA150	1.588 (0.0625)
	38336AA040	1.600 (0.0630)
	38336AA160	1.613 (0.0635)
	38336AA050	1.625 (0.0640)
	38336AA170	1.638 (0.0645)
	38336AA060	1.650 (0.0650)
	38336AA180	1.663 (0.0655)
	38336AA070	1.675 (0.0659)
	38336AA190	1.688 (0.0665)
	38336AA080	1.700 (0.0669)
	38336AA200	1.713 (0.0674)
	38336AA090	1.725 (0.0679)
	38336AA210	1.738 (0.0684)
	38336AA100	1.750 (0.0689)
	38336AA220	1.763 (0.0694)
	38336AA110	1.775 (0.0699)
	Part No.	Length mm (in)
	32288AA040	52.3 (2.059)
● Preload adjusting spacer	32288AA050	52.5 (2.067)
	31454AA100	52.6 (2.071)
	32288AA060	52.7 (2.075)
	31454AA110	52.8 (2.079)
	32288AA070	52.9 (2.083)
	31454AA120	53.0 (2.087)
	32288AA080	53.1 (2.091)
	32288AA090	53.3 (2.098)

3) Adjusting drive pinion height Adjust drive pinion height with shim installed between rear bearing cone and the back of pinion gear.

(1) Install ST1, ST2 and ST3, as shown in the figure, and apply the specified preload on the bearings.

Front and rear bearing preload

For new bearing:

12.7 — 32.4 N (1.3 — 3.3 kg, 2.9 — 7.3 lb)

at companion flange bolt hole

Adjust preload for front and rear bearings.

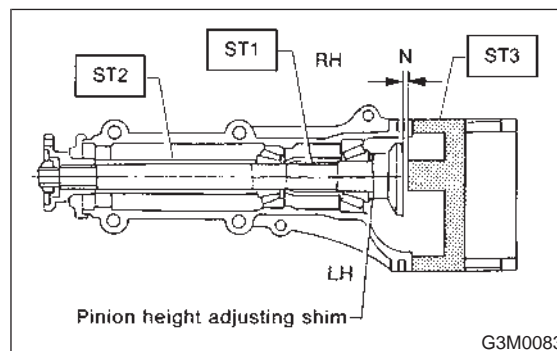
NOTE:

At this time, install an original pinion height adjusting shim.

ST1 498447150 DUMMY SHAFT

ST2 32285AA000 DUMMY COLLAR

ST3 498505501 DIFFERENTIAL CARRIER GAUGE



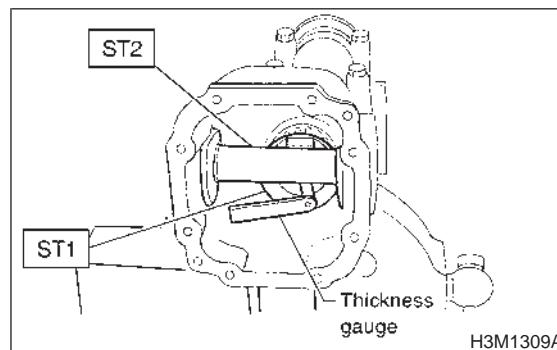
(2) Measure the clearance N between the end of ST2 and the end surface of ST1 by using a thickness gauge.

NOTE:

Make sure there is no clearance between ST2 and ST1.

ST1 498447150 DUMMY SHAFT

ST2 498505501 DIFFERENTIAL CARRIER GAUGE



(3) Obtain the thickness of pinion height adjusting washer to be inserted from the following formula, and replace the temporarily installed shim with this one.

NOTE:

Use 1 to 3 shims as required for adjustment.

$$T = T_o + N - 0.05 \text{ (mm)}$$

where

T = Thickness of pinion height adjusting shim (mm)

T_o = Thickness of shim originally installed (mm)

N = Reading of thickness gauge (mm)

(Example of calculation)

T_o = 0.15 mm

N = 0.1 mm

T = 0.15 + 0.1 - 0.05 = 0.2 mm

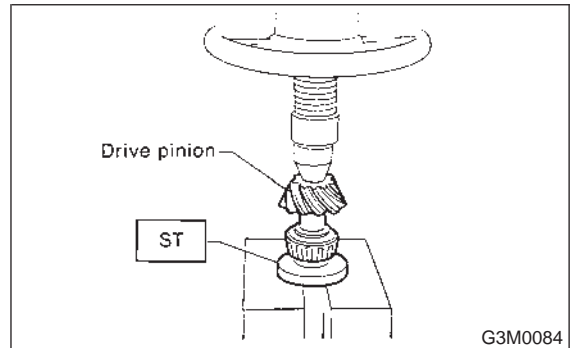
Result: Thickness = 0.2 mm

Therefore use the 32295AA220.

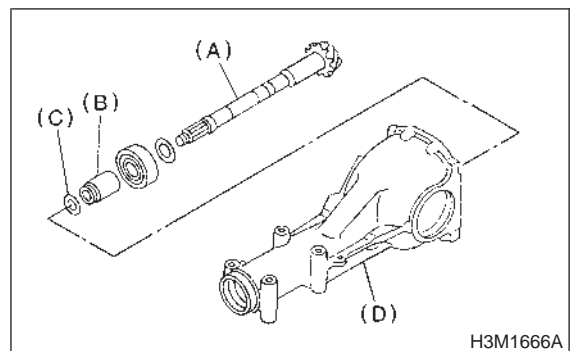
Pinion height adjusting shim	
Part No.	Thickness mm (in)
32295AA200	0.150 (0.0059)
32295AA210	0.175 (0.0069)
32295AA220	0.200 (0.0079)
32295AA230	0.225 (0.0089)
32295AA240	0.250 (0.0098)
32295AA250	0.275 (0.0108)

- Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.

ST 498175500 INSTALLER



- Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.



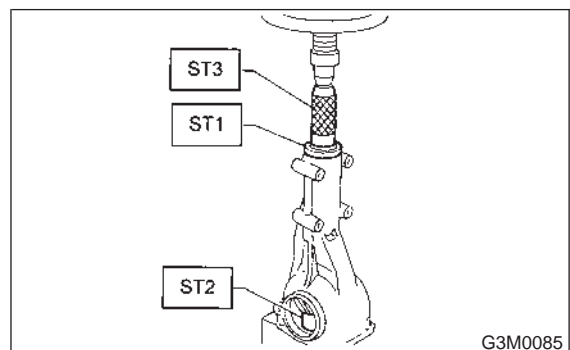
- (A) Drive pinion
- (B) Adjusting spacer
- (C) Washer
- (D) Differential carrier

- Press-fit front bearing cone into case with ST1, ST2 and ST3.

ST1 32285AA000 DUMMY COLLAR

ST2 399780104 WEIGHT

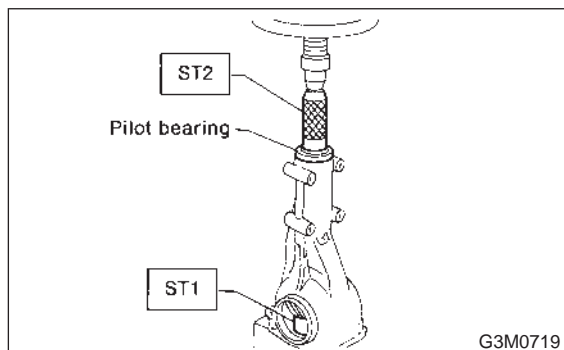
ST3 899580100 INSTALLER



7) Insert spacer, then press-fit pilot bearing with ST1 and ST2.

ST1 399780104 WEIGHT

ST2 899580100 INSTALLER

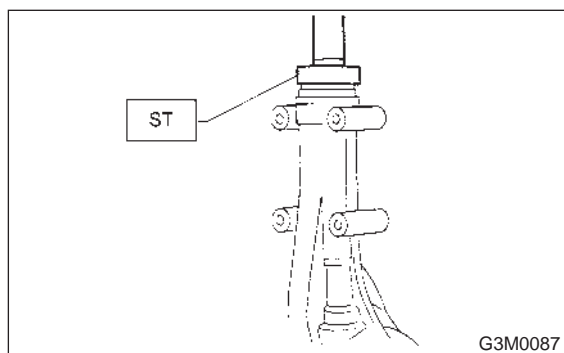


8) Fit a new oil seal with ST.

NOTE:

- Press-fit until end of oil seal is 1 mm (0.04 in) inward from end of carrier.
- Apply grease between the oil seal lips.

ST 498447120 OIL SEAL INSTALLER



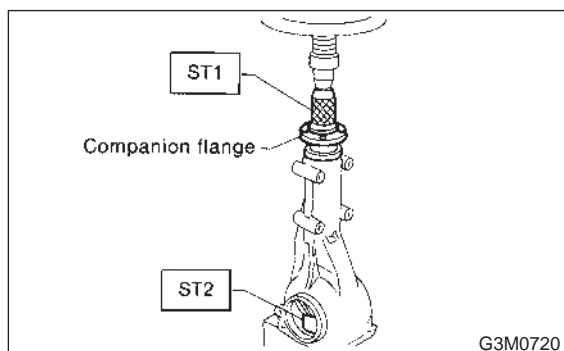
9) Press-fit companion flange with ST1 and ST2.

CAUTION:

Be careful not to damage bearing.

ST1 899874100 INSTALLER

ST2 399780104 WEIGHT

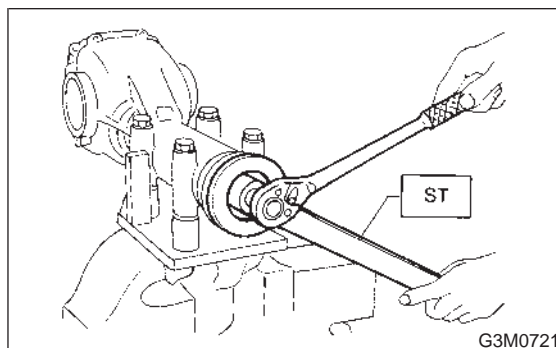


10) Install self-locking nut. Then tighten self-locking nut with ST.

ST 398427700 FLANGE WRENCH

Tightening torque:

188±26 N·m (19.2±2.7 kg-m, 139±20 ft-lb)

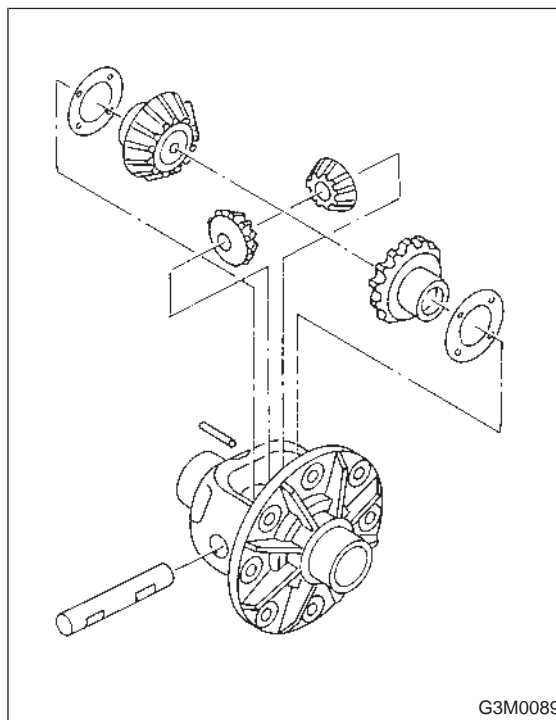


11) Assembling differential case

(1) Install side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case.

NOTE:

- Apply gear oil on both sides of the washer and on the side gear shaft before installing.
- Insert the pinion mate shaft into the differential case by aligning the lock pin holes.



- (2) Measure the clearance between differential case and the back of side gear.
- (3) Adjust the clearance as specified by selecting side gear thrust washer.

Side gear backlash:

0.05 — 0.15 mm (0.0020 — 0.0059 in)

Side gear thrust washer	
Part No.	Thickness mm (in)
803135011	0.925 — 0.950 (0.0364 — 0.0374)
803135012	0.950 — 0.975 (0.0374 — 0.0384)
803135013	0.975 — 1.000 (0.0384 — 0.0394)
803135014	1.000 — 1.025 (0.0394 — 0.0404)
803135015	1.025 — 1.050 (0.0404 — 0.0413)

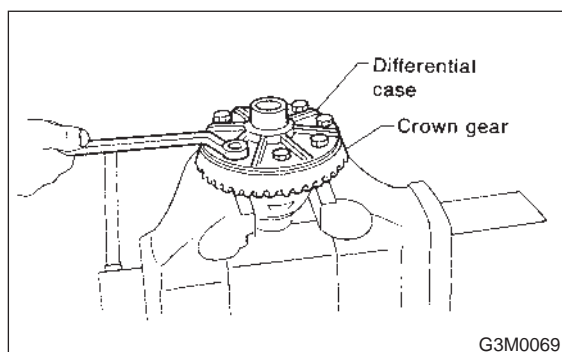
- (4) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.
- (5) After driving in pinion shaft lock pin, stake the both sides of the hole to prevent pin from falling off.
- (6) Install crown gear on differential case.

NOTE:

Tighten diagonally while tapping the bolt heads.

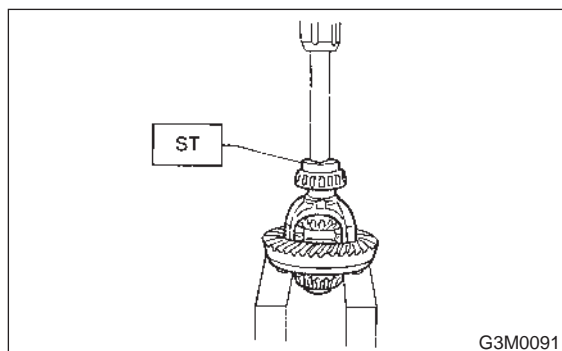
Tightening torque:

62±5 N·m (6.3±0.5 kg·m, 45.6±3.6 ft·lb)



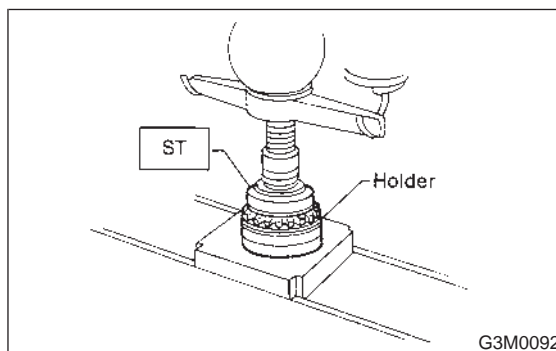
- 12) Press side bearing cone onto differential case with ST.

ST 498485400 DRIFT



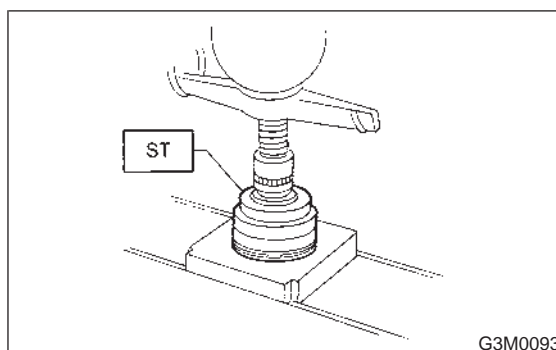
- 13) Assemble holders.

- (1) Install oil seal into right and left holders.
ST 498447100 AXLE SHAFT OIL SEAL INSTALLER

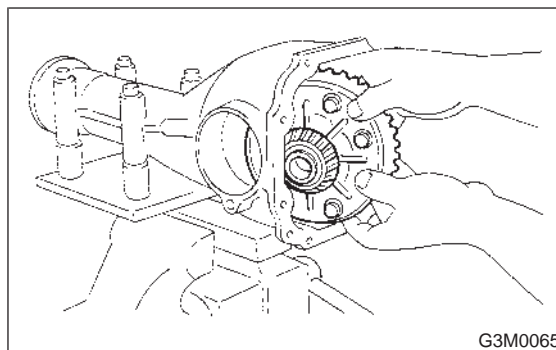


- (2) Install bearing race into right and left holders.

ST 398477702 BEARING OUTER RACE DRIFT



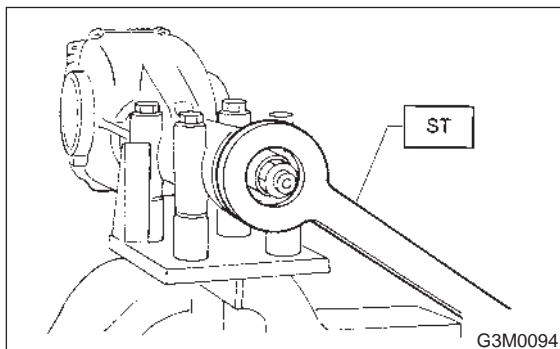
- (3) Install the differential case assembly into differential carrier in the reverse order of disassembly.



- 14) Perform adjustment of backlash of pinion crown gear set and adjustment of preload of differential side bearing.

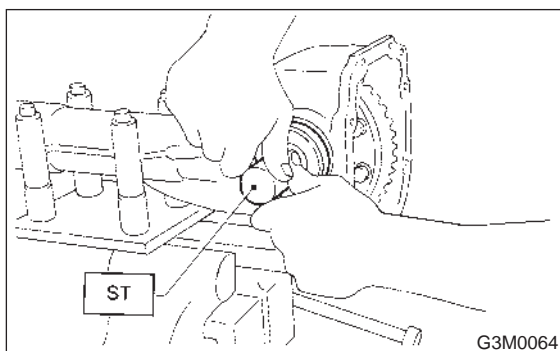
- (1) Turn drive pinion with ST for better fitting of differential side bearing.

ST 498427200 FLANGE WRENCH



- (2) Screw in left-side holder until light contact is made with ST.

ST 399780111 WRENCH



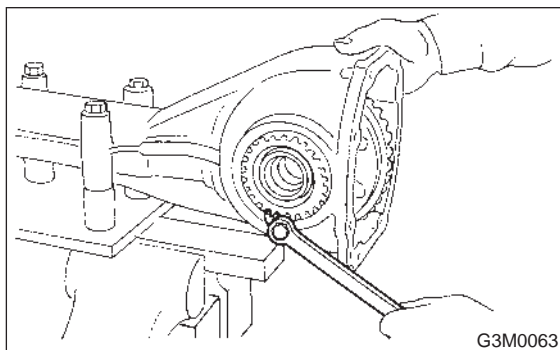
- (3) Back off side (left-side) holder approximately 1 1/2 teeth of holder, and tighten left-side holder by approximately 2 teeth (approximately 1 1/2 + 1/2 teeth). [Back off amount of side (left-side) holder + 1/2 tooth].

This + 1/2 tooth gives preload.

- (4) Temporarily tighten lock plate.

NOTE:

Turn over lock plate to displace holder 1/2 tooth.



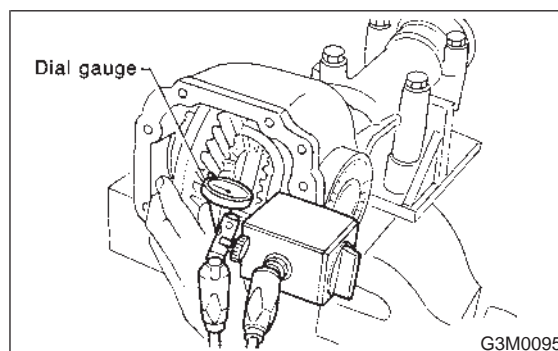
- (5) Measure the crown gear-to-drive pinion backlash. Set magnet base on differential carrier. Align contact point of dial gauge with tooth face of crown gear, and move crown gear while holding drive pinion still. Read value indicated on dial gauge.

NOTE:

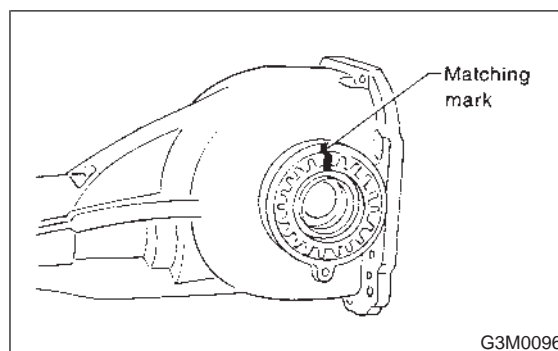
If measured backlash is not within specified range, repeat procedures for pinion crown gear set backlash adjustment and differential side bearing preload adjustment.

Backlash:

0.10 — 0.15 mm (0.0039 — 0.0059 in)



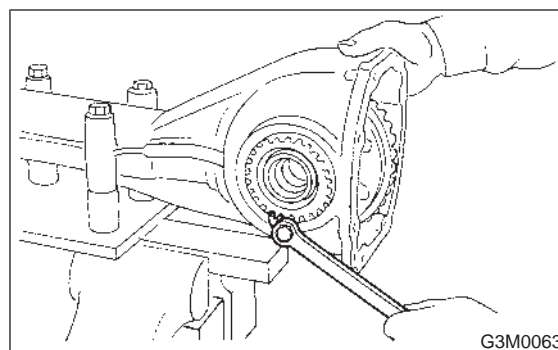
- 15) Draw a matching mark on both differential carrier and holder. Remove holder one side at a time. Replace in the original position after inserting an O-ring and applying grease to threaded portion.



- 16) Tighten bolt of lock plate to specified torque.

Tightening torque:

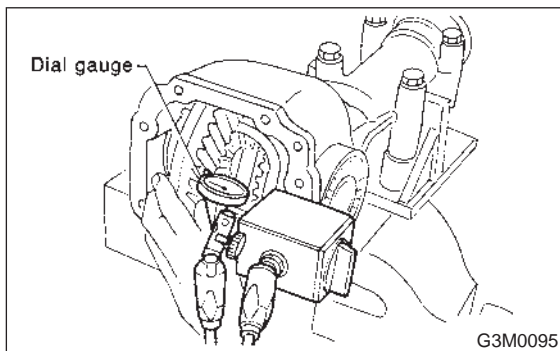
25±3 N·m (2.5±0.3 kg·m, 18.1±2.2 ft·lb)



17) Re-check crown gear-to-pinion backlash.

Backlash:

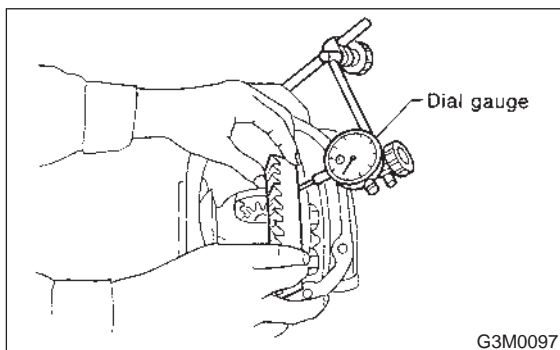
0.10 — 0.15 mm (0.0039 — 0.0059 in)



18) Check the crown gear runout on its back surface, and make sure pinion and crown gear rotate smoothly.

Limit of runout:

0.05 mm (0.0020 in)



19) Checking and adjusting tooth contact of crown gear.

(1) Apply an even coat of red lead on both sides of three or four teeth on the crown gear. Check the contact pattern after rotating crown gear several revolutions back and forth until a definite contact pattern appears on the crown gear.

(2) When the contact pattern is incorrect, readjust according to the instructions given in "Tooth contact pattern".

NOTE:

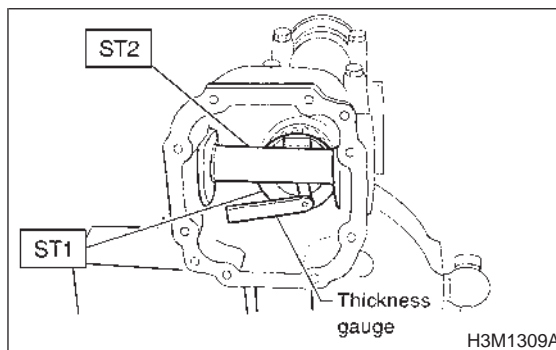
Be sure to wipe off red lead completely after adjustment is completed.

20) If proper tooth contact is not obtained, once again adjust the drive pinion height and the differential side bearing preload (mentioned above) and the hypoid gear backlash.

(1) Drive pinion height

ST1 498447150 DUMMY SHAFT

ST2 498505501 DIFFERENTIAL CARRIER GAUGE



$$T = T_o + N - 0.05 \text{ (mm)}$$

where

T = Thickness of pinion height adjusting shim (mm)

T_o = Thickness of shim originally installed (mm)

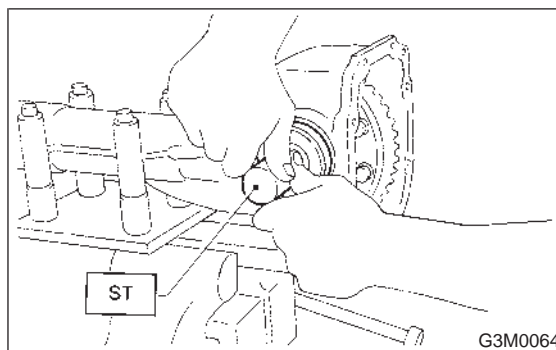
N = Reading of thickness gauge (mm)

(2) Differential side bearing preload

Back off side (left-side) holder approximately 1 1/2 teeth of holder, and tighten left-side holder by approximately 2 teeth (approximately 1 1/2 + 1/2 teeth). [Back off amount of side (left-side) holder + 1/2 tooth].

This + 1/2 tooth gives preload.

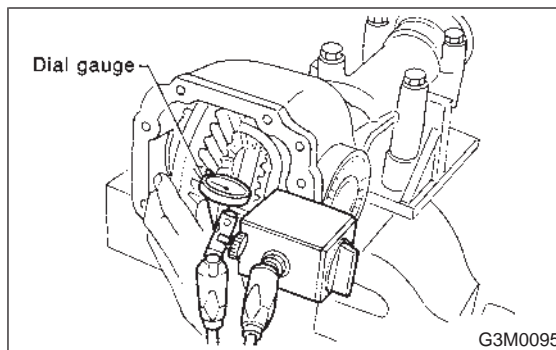
ST 399780111 WRENCH



(3) Hypoid gear backlash

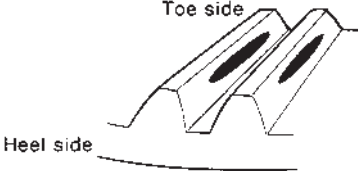
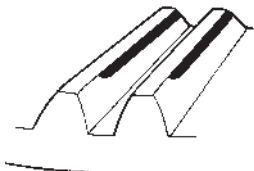
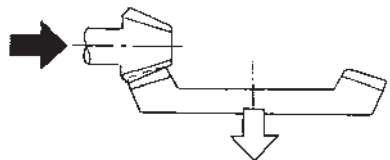
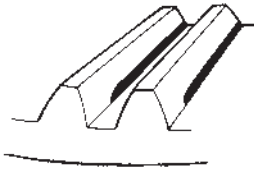
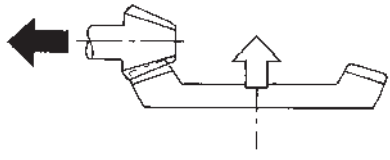
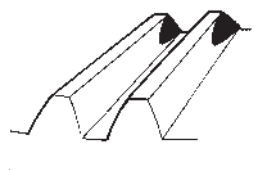
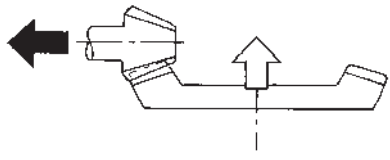
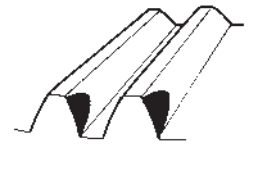
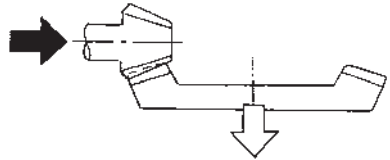
Backlash:

0.10 — 0.15 mm (0.0039 — 0.0059 in)



➡ Adjusting direction of drive pinion

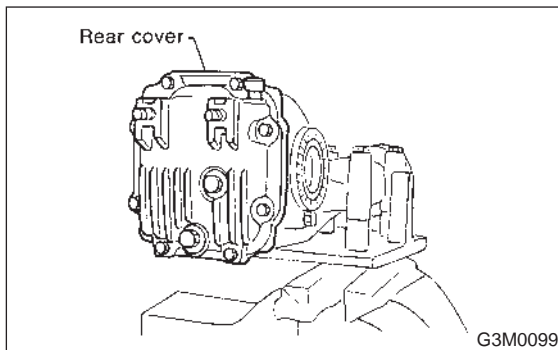
⇒ Adjusting direction of crown gear

TOOTH CONTACT PATTERN		
Condition	Contact pattern	Adjustment
<p>Correct tooth contact</p> <p>Tooth contact pattern slightly shifted towards toe under no load rotation. (When loaded, contact pattern moves toward heel.)</p>	 <p>G3M0098A</p>	
<p>Face contact</p> <p>Backlash is too large.</p>	<p>This may cause noise and chipping at tooth ends.</p>  <p>G3M0098B</p>	<p>Increase thickness of drive pinion height adjusting washer in order to bring drive pinion closer to crown gear center.</p>  <p>G3M0098F</p>
<p>Flank contact</p> <p>Backlash is too small.</p>	<p>This may cause noise and stepped wear on surfaces.</p>  <p>G3M0098C</p>	<p>Reduce thickness of drive pinion height adjusting washer in order to move drive pinion away from crown gear.</p>  <p>G3M0098G</p>
<p>Toe contact</p>	<p>Contact area is small. This may cause chipping at toe ends.</p>  <p>G3M0098D</p>	<p>Adjust as for flank contact.</p>  <p>G3M0098G</p>
<p>Heel contact</p>	<p>Contact area is small. This may cause chipping at heel ends.</p>  <p>G3M0098E</p>	<p>Adjust as for face contact</p>  <p>G3M0098F</p>

21) Install rear cover and tighten bolts to specified torque.

Tightening torque:

$25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)



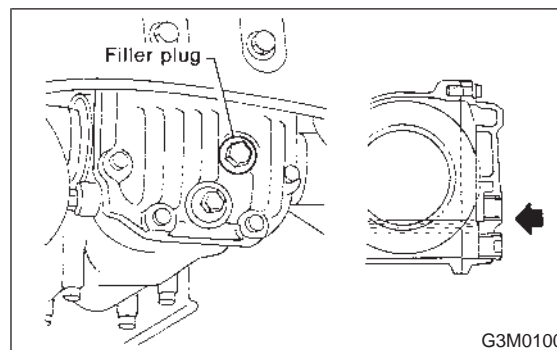
4) After installation, fill differential carrier with gear oil to the upper plug level.

CAUTION:

Use a new aluminum gasket when installing the plug.

Oil capacity:

0.8 l (0.8 US qt , 0.7 Imp qt)



F: INSTALLATION

To install, reverse the removal sequence.

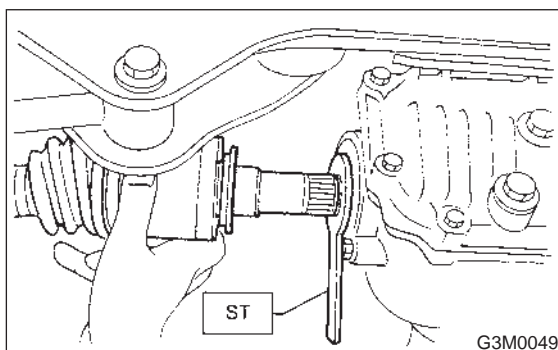
1) Position front member on body by passing it under parking brake cable and securing to rear differential.

NOTE:

When installing rear differential front member, do not confuse the installation sequence of the upper and lower stoppers.

2) Install DOJ of rear drive shaft into rear differential. <Ref. to 3-4 [W2A2].>

ST 28099PA090 SIDE OIL SEAL PROTECTOR



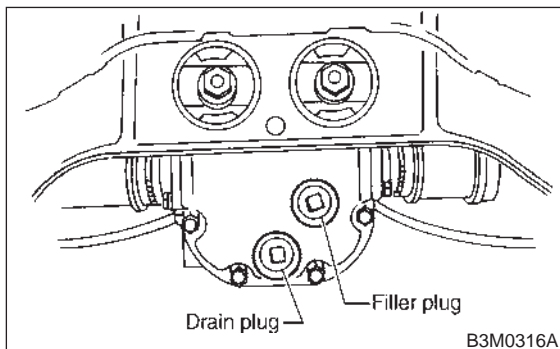
3) Installing procedure hereafter is in the reverse order of removal.

3. Rear Differential (T-Type)

A: ON-CAR SERVICE

1. FRONT OIL SEAL

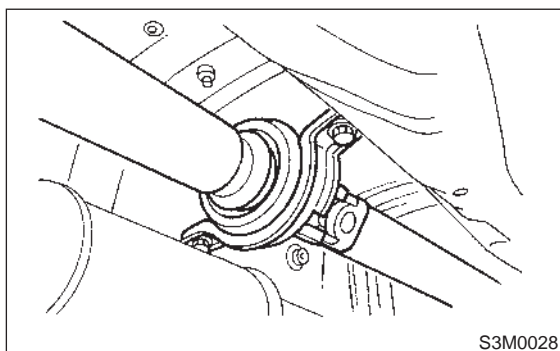
- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Remove oil drain plug, and drain gear oil.



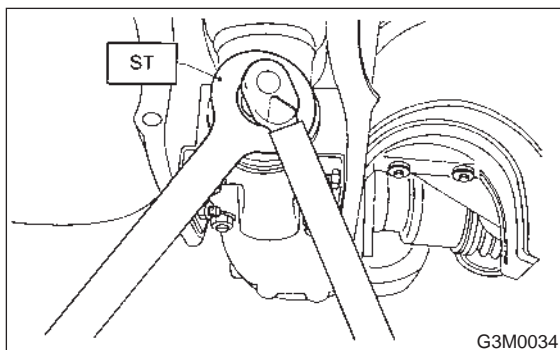
- 5) Jack-up rear wheels and support the vehicle body with sturdy racks.
- 6) Remove propeller shaft from body. <Ref. to 3-4 [W1B0].>

CAUTION:

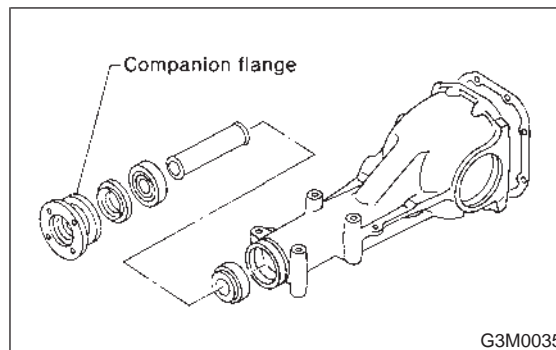
Wrap metal parts with a cloth or rubber material to prevent damage from adjacent metal parts.



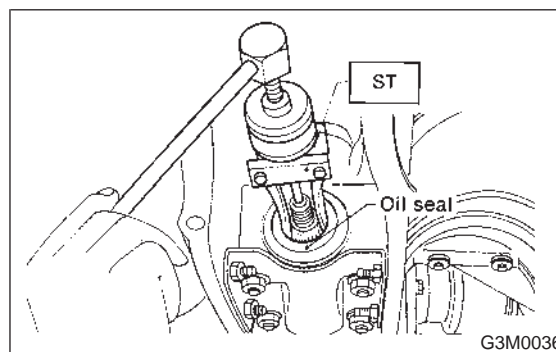
- 7) Remove self-locking nut while holding companion flange with ST.
- ST 498427200 FLANGE WRENCH



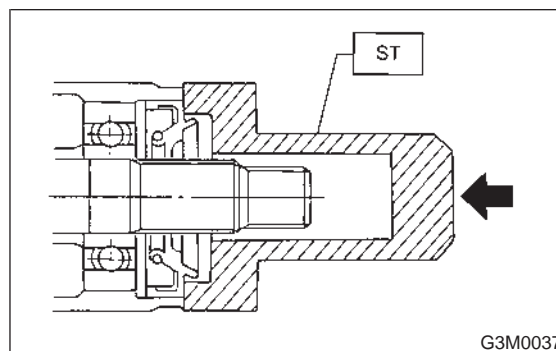
- 8) Extract companion flange with a puller.



- 9) Remove oil seal using ST.
- ST 499705401 PULLER ASSY



- 10) Fit a new oil seal using ST.
- ST 498447120 OIL SEAL INSTALLER



- 11) Install companion flange.

12) Tighten self-locking nut within the specified torque range so that the turning resistance of companion flange becomes the same as that before replacing oil seal.

CAUTION:

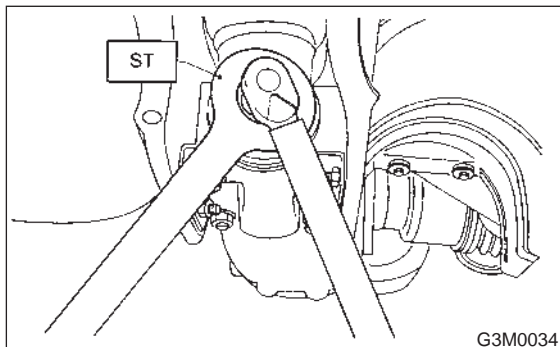
Use a new self-locking nut.

ST 498427200 FLANGE WRENCH

Tightening torque:

$181.4 \pm 14.7 \text{ N}\cdot\text{m}$ ($18.50 \pm 1.50 \text{ kg}\cdot\text{m}$,

$133.8 \pm 10.8 \text{ ft}\cdot\text{lb}$)

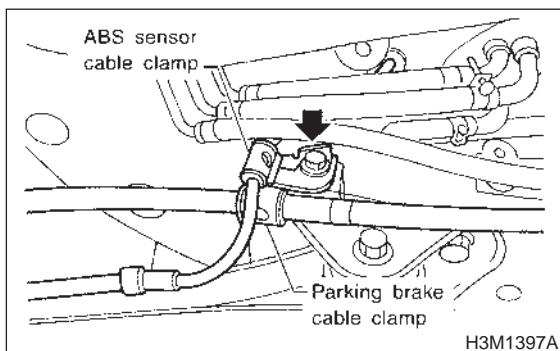


13) Reassembling procedure hereafter is the reverse of the disassembling.

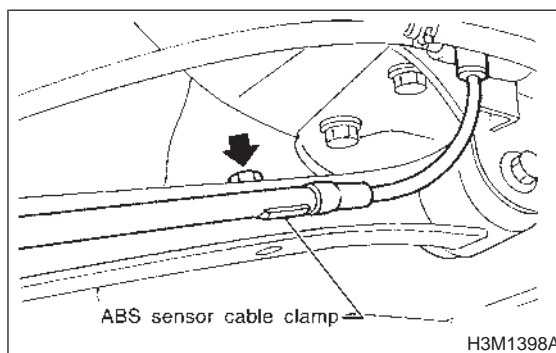
2. SIDE OIL SEAL

- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Loosen both wheel nuts.
- 5) Jack-up the vehicle and support it with rigid racks.
- 6) Remove wheels.
- 7) Remove rear exhaust pipe and muffler.
- <Ref. to 2-9 [W3A0].> and <Ref. to 2-9 [W2A0].>
- 8) Remove the DOJ of rear drive shaft from rear differential.

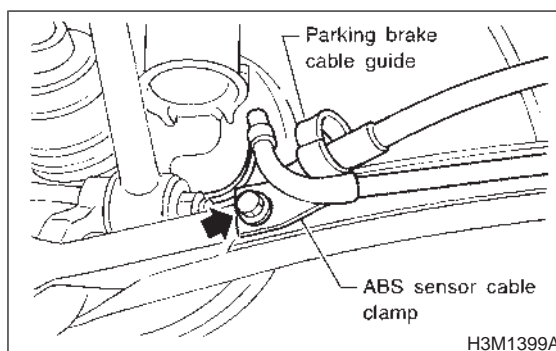
- (1) Remove the ABS sensor cable clamp and parking brake cable clamp from bracket.



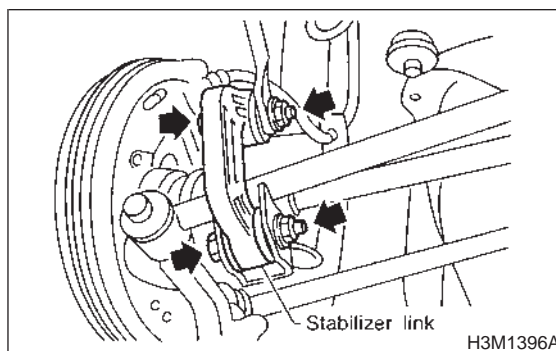
- (2) Remove the ABS sensor cable clamp from the trailing link.



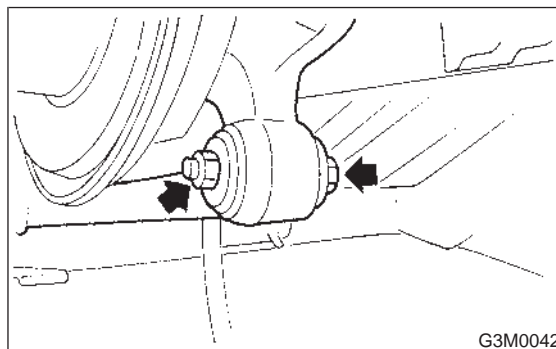
- (3) Remove the ABS sensor cable clamp and parking brake cable guide from the trailing link.



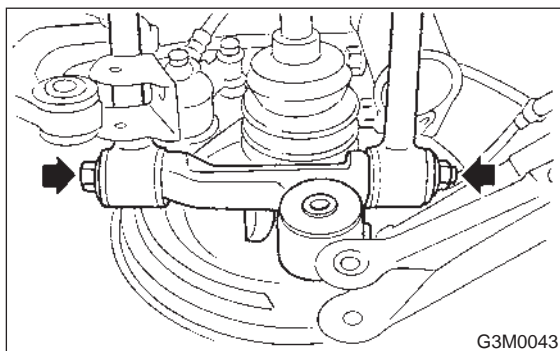
- (4) Remove the rear stabilizer link.



- (5) Remove the bolts which secure the trailing link to the rear housing.



- (6) Remove the bolts which secure the front and rear lateral link to the rear housing.

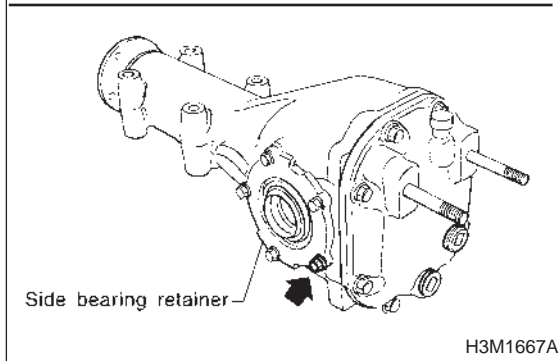
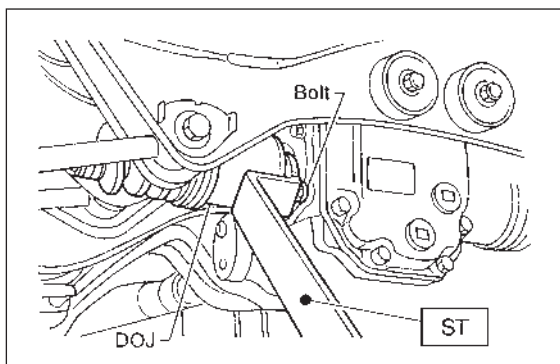


- (7) Remove the DOJ from the rear differential by using ST.

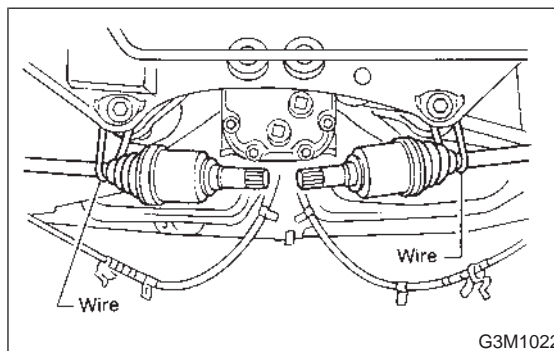
CAUTION:

When removing the DOJ from the rear differential, fit ST to the bolt as shown in figure so as not to damage the side bearing retainer.

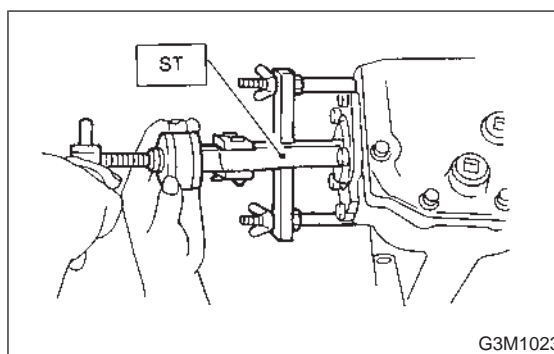
ST 208099PA100 DRIVE SHAFT REMOVER



- 9) Secure rear drive shaft to rear crossmember using wire.



- 10) Remove side oil seal with ST.
ST 398527700 PULLER ASSY

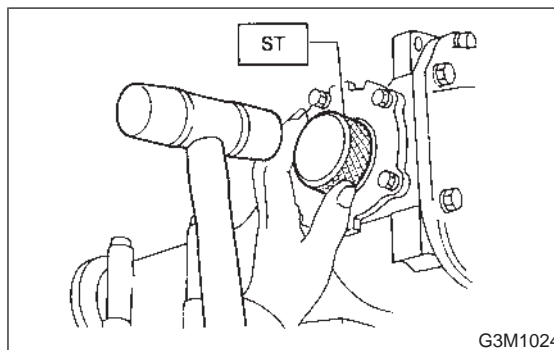


- 11) Drive in a new side oil seal with ST.

CAUTION:

Apply chassis grease between the oil seal lips.

ST 398437700 DRIFT

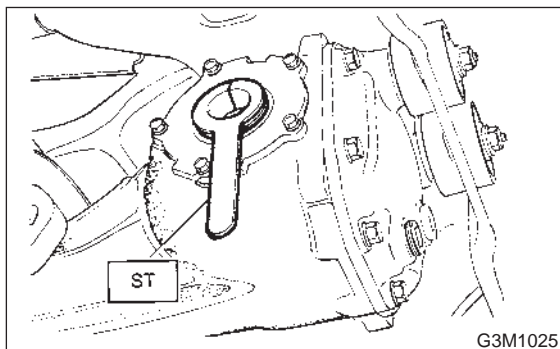


- 12) Insert the DOJ into rear differential.

3. Rear Differential (T-Type)

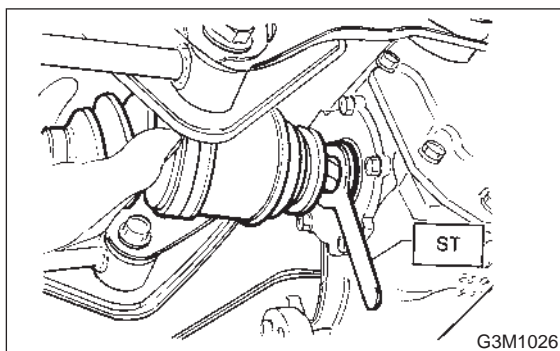
(1) Install ST to rear differential.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



(2) Insert the spline shaft until the spline portion is inside the side oil seal using ST.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



(3) Remove ST.

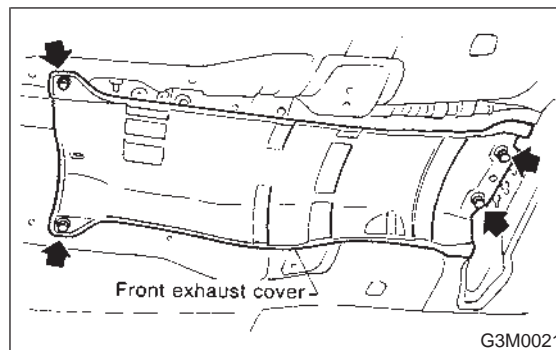
ST 28099PA090 SIDE OIL SEAL PROTECTOR

13) Hereafter, re-assemble in reverse order of disassembly.

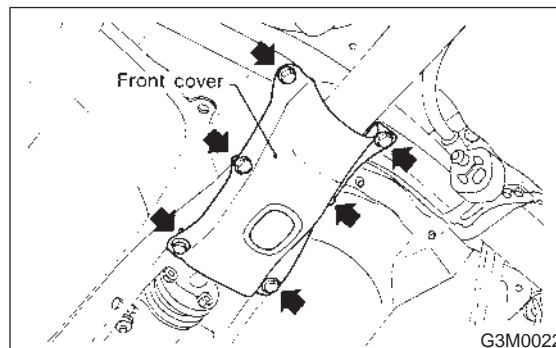
B: REMOVAL

- 1) Disconnect ground cable from battery.
 - 2) Move selector lever or gear shift lever to "N".
 - 3) Release the parking brake.
 - 4) Loosen wheel nuts.
 - 5) Jack-up vehicle and support it with sturdy racks.
 - 6) Remove wheels.
 - 7) Remove rear exhaust pipe and muffler.
- <Ref. to 2-9 [W3A0].> and <Ref. to 2-9 [W2A0].>

8) Remove front exhaust cover.



9) Remove front cover of rear differential mount.



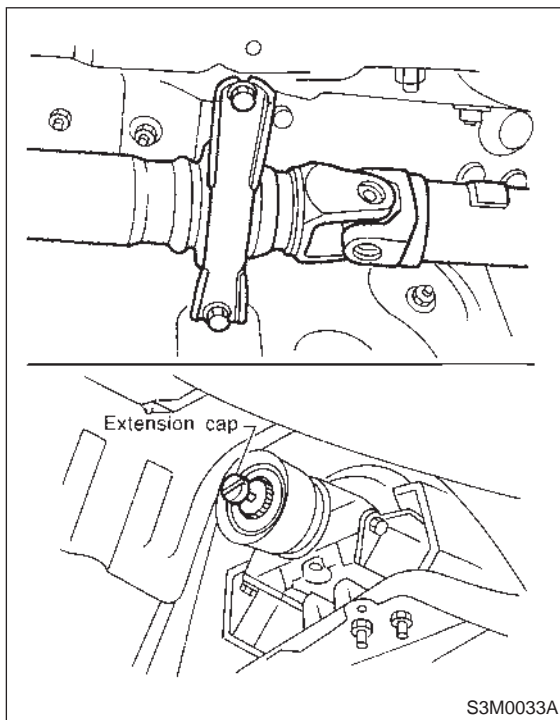
10) Remove propeller shaft.

CAUTION:

When removing propeller shaft, pay attention not to damage the sliding surfaces of rear drive shaft (extension) spline, oil seal and sleeve yoke.

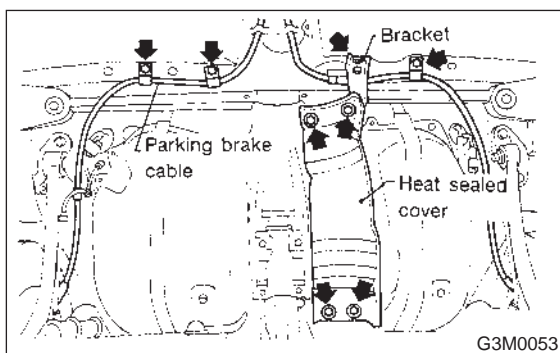
NOTE:

- Prepare an oil can and cap since the transmission oil flows out from the extension at removing propeller shaft.
- Insert the cap into the extension to prevent transmission oil from flowing out immediately after removing the propeller shaft.



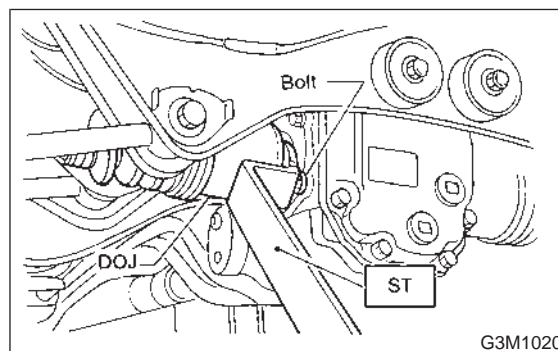
11) Remove heat sealed cover.

12) Remove clamps and bracket of parking brake cable.

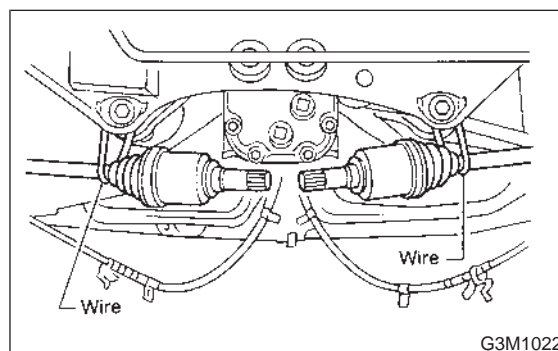


13) Remove DOJ of rear drive shaft from rear differential using ST. <Ref. to 3-4 [W3A2].>

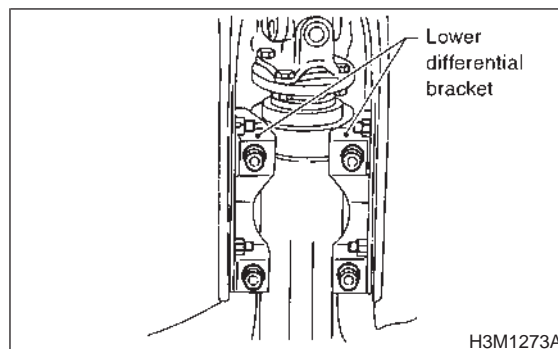
ST 28099PA100 DRIVE SHAFT REMOVER



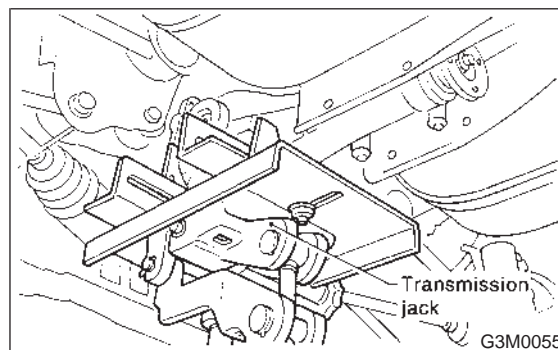
14) Secure rear drive shaft to rear crossmember using wire.



15) Remove lower differential bracket.

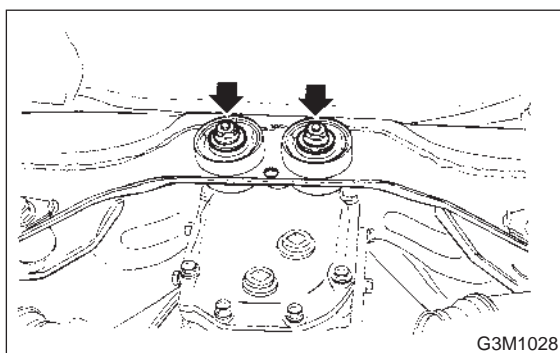


16) Support rear differential with transmission jack.



3. Rear Differential (T-Type)

17) Remove self-locking nuts connecting rear differential to rear crossmember.

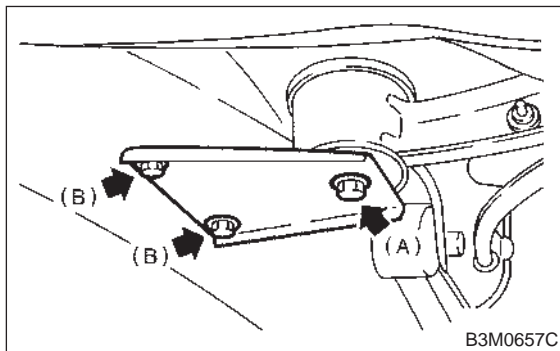


18) Remove bolts which secure rear differential front member to body.

Loosen bolt A first, then remove bolts B.

NOTE:

Support front member with the use of a helper to prevent it from dropping.

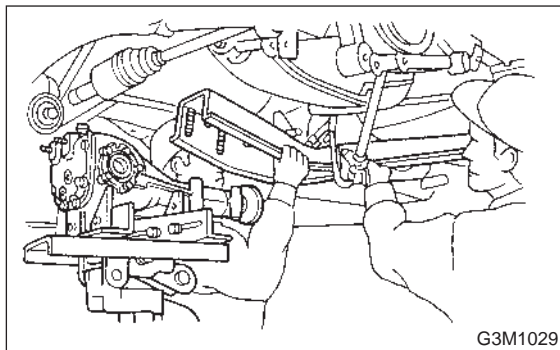


(A) Bolt A

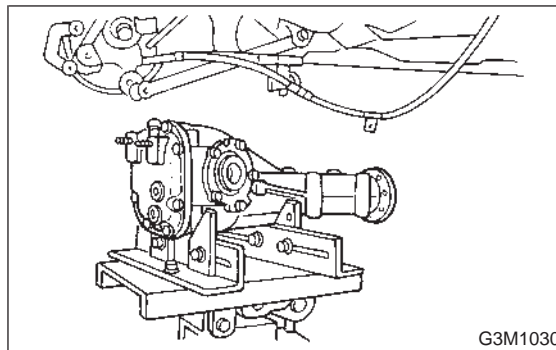
(B) Bolt B

19) Remove bolt A.

20) While slowly lowering transmission jack, move rear differential forward and remove front member and rear differential from body.



21) Remove rear differential from front member.

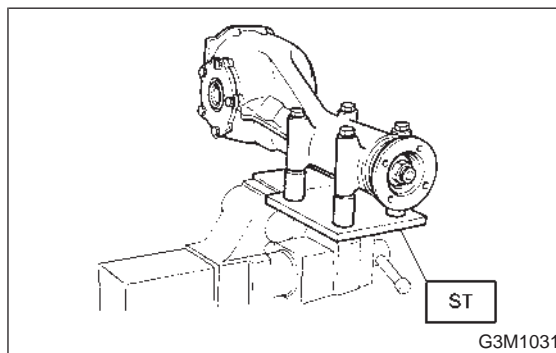
**C: DISASSEMBLY**

To detect real cause of trouble, inspect the following items before disassembling.

- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

1) Set ST on vise and install the differential assembly to ST.

ST 398217700 ATTACHMENT

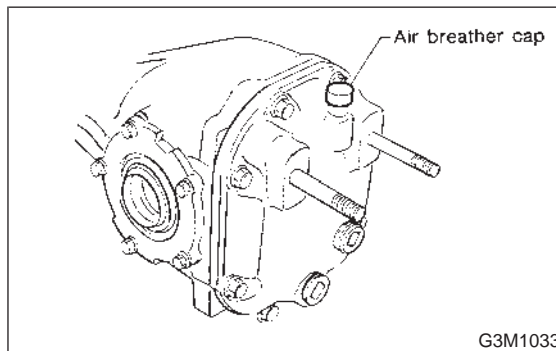


2) Drain gear oil by removing plug.

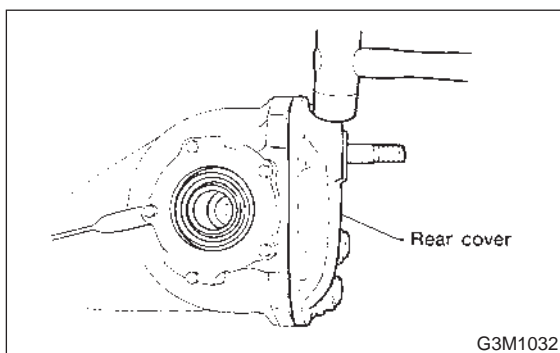
3) Remove the air breather cap.

NOTE:

Do not attempt to replace the air breather cap unless necessary.



4) Remove rear cover by loosening retaining bolts.

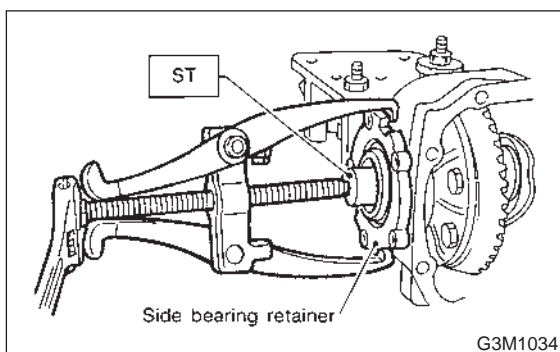


5) Make right and left side bearing retainers in order to identify them at reassembly. Remove side bearing retainer attaching bolts, set ST to differential case, and extract right and left side bearing retainers with a puller.

CAUTION:

Each shim, which is installed to adjust the side bearing preload, should be kept together with its mating retainer.

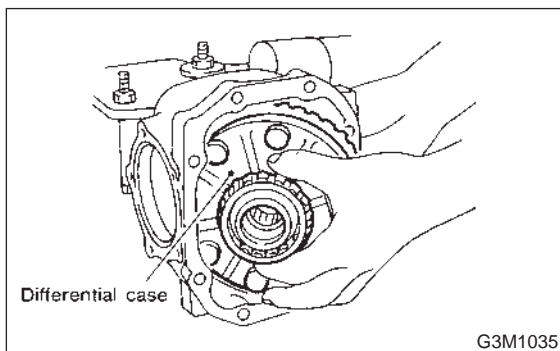
ST 398457700 ATTACHMENT



6) Pull out differential assembly from differential carrier.

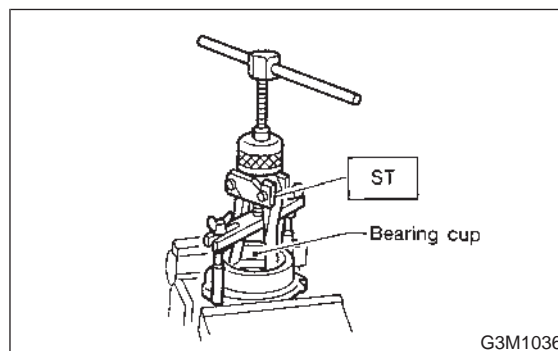
CAUTION:

Be careful not to hit the teeth against the case.



7) When replacing side bearing, pull bearing cup from side bearing retainer using ST.

ST 398527700 PULLER ASSY



8) Extract bearing cone with ST.

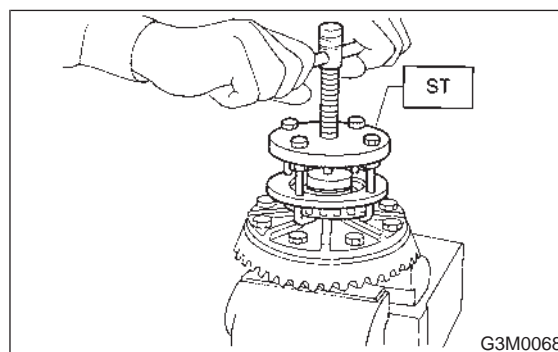
CAUTION:

Do not attempt to disassemble the parts unless necessary.

NOTE:

- Set puller so that its claw catch the edge of the bearing cone.
- Never mix up the right and left hand bearing cups and cones.

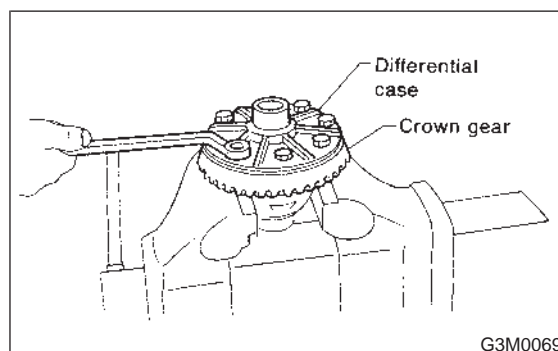
ST 399527700 PULLER SET



9) Remove crown gear by loosening crown gear bolts.

CAUTION:

Further disassembling is not allowed.



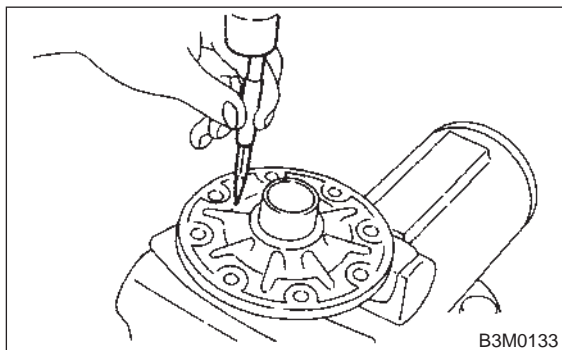
3. Rear Differential (T-Type)

10) Drive out pinion shaft lock pin from crown gear side.

NOTE:

The lock pin is staked at the pin hole end on the differential carrier; do not drive it out forcibly before unstaking it.

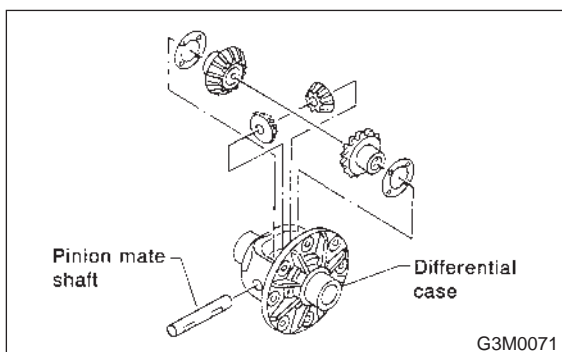
ST 899904100 STRAIGHT PIN REMOVER



11) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

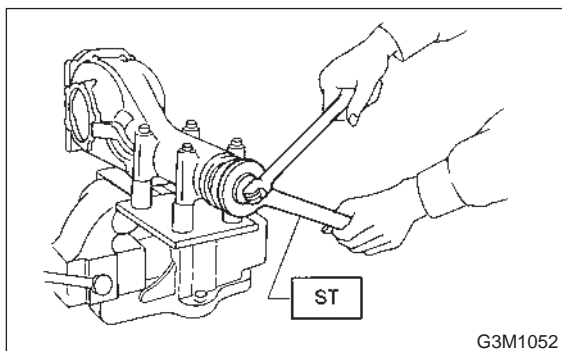
NOTE:

The gears as well as thrust washers should be marked or kept separated left and right, and front and rear.

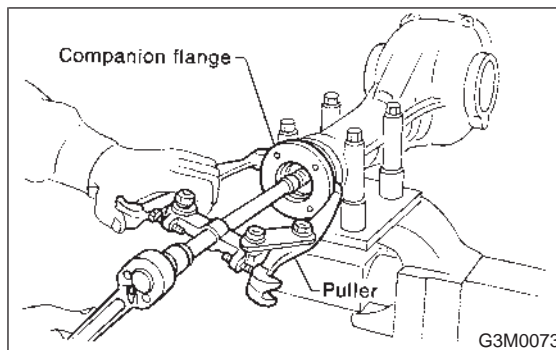


12) Hold companion flange with ST and remove drive pinion nut.

ST 498427200 FLANGE WRENCH



13) Extract the companion flange with a puller.

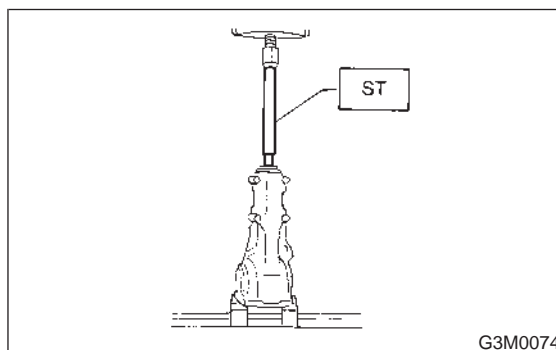


14) Press the end of drive pinion shaft and extract it together with rear bearing cone, preload adjusting spacer and washer.

NOTE:

Hold the drive pinion so as not to drop it.

ST 398467700 DRIFT

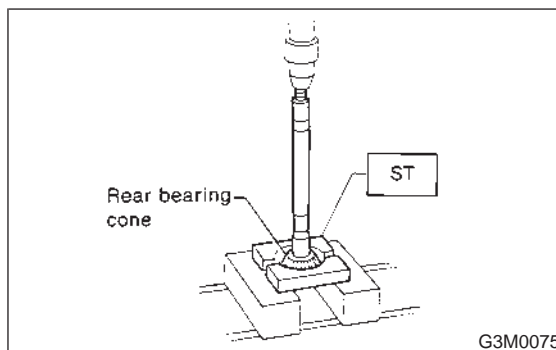


15) Remove rear bearing cone from drive pinion by supporting cone with ST.

NOTE:

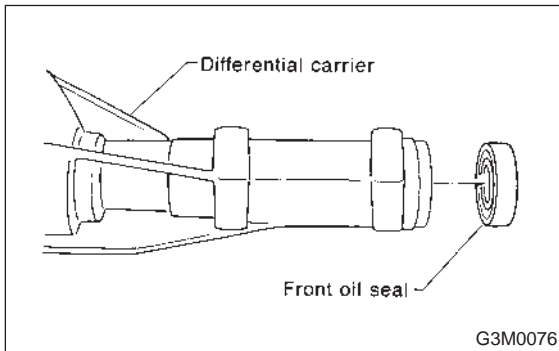
Place the replacer so that its center-recessed side faces the pinion gear.

ST 498515500 REPLACER



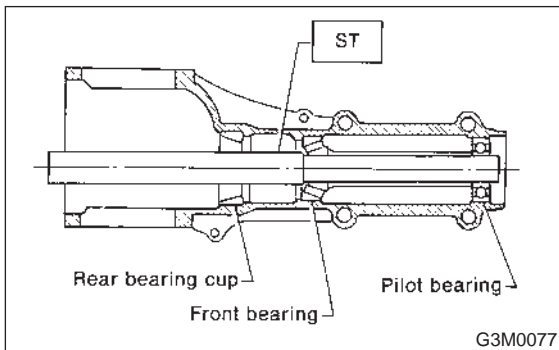
16) Remove front oil seal from differential carrier using ST.

ST 398527700 PULLER ASSY

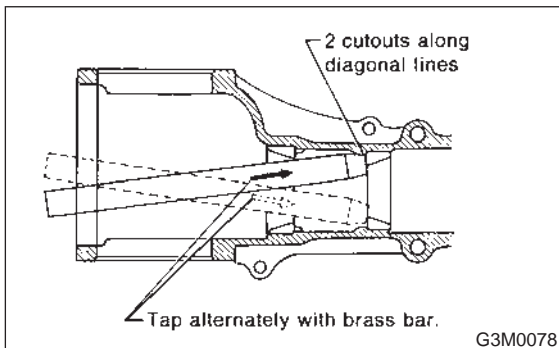


17) Remove pilot bearing together with front bearing cone using ST.

ST 398467700 DRIFT



18) When replacing bearings, tap front bearing cup and rear bearing cup in this order out of case by using a brass bar.



D: INSPECTION

Wash all the disassembled parts clean, and examine them for wear, damage, or other defects. Repair or replace defective parts as necessary.

1) Crown gear and drive pinion

- If abnormal tooth contact is evident, find out the cause and adjust to give correct tooth contact at assembly. Replace the gear if excessively worn or incapable of adjustment.

- If crack, score, or seizure is evident, replace as a set. Slight damage of tooth can be corrected by oil stone or the like.

2) Side gear and pinion mate gear

- Replace if crack, score, or other defects are evident on tooth surface.

- Replace if thrust washer contacting surface is worn or seized. Slight damage of the surface can be corrected by oil stone or the like.

3) Bearing

Replace if seizure, peeling, wear, rust, dragging during rotation, abnormal noise or other defect is evident.

4) Thrust washers of side gear and pinion mate gear Replace if seizure, flaw, abnormal wear or other defect is evident.

5) Oil seal

Replace if deformed or damaged, and at every disassembling.

6) Differential carrier

Replace if the bearing bores are worn or damaged.

7) Differential case

Replace if its sliding surfaces are worn or cracked.

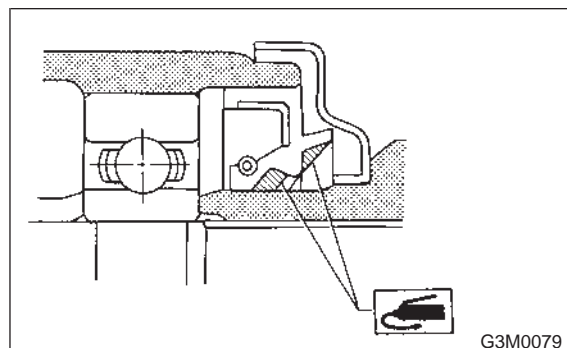
8) Companion flange

Replace if the oil seal lip contacting surfaces have flaws.

E: ASSEMBLY

1) Precautions for assembling

- Assemble in the reverse order of disassembling.
- Check and adjust each part during assembly.
- Keep the shims and washers in order, so that they are not misinstalled.
- Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
- Apply gear oil when installing the bearings and thrust washers.
- Be careful not to mix up the right and left hand cups of the bearings.
- Replace the oil seal with new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.

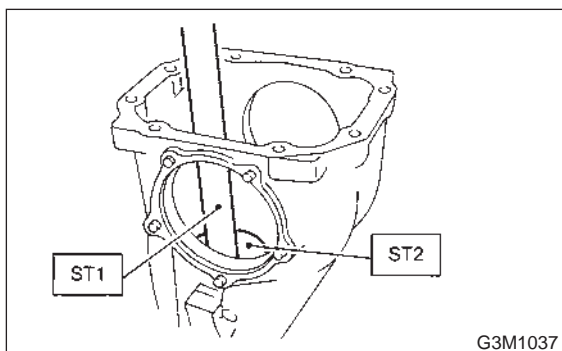


2) Adjusting preload for front and rear bearings
Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting washer are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.

(1) Press rear bearing race into differential carrier with ST1 and ST2.

ST1 398477701 HANDLE

ST2 398427703 DRIFT 2



(2) Insert ST into case with pinion height adjusting washer and rear bearing cone fitted onto it.

CAUTION:

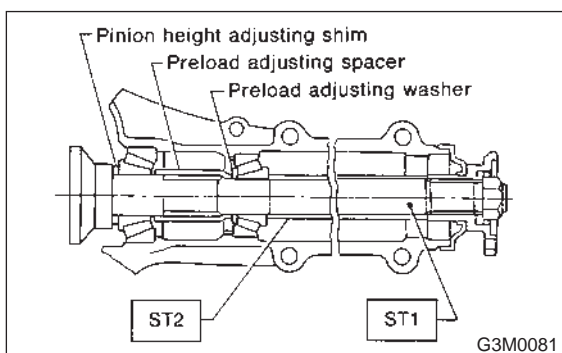
- Re-use the used washer if not deformed.
- Use a new rear bearing cone.

ST 398507702 DUMMY SHAFT

(3) Then install preload adjusting spacer and washer, front bearing cone, ST2, companion flange, and washer and drive pinion nut.

ST1 398507702 DUMMY SHAFT

ST2 398507703 DUMMY COLLAR



(4) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque with ST2.

CAUTION:

Use a new lock nut.

NOTE:

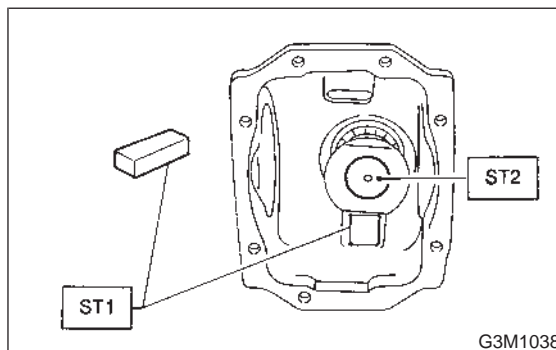
- Be careful not to give excessive preload.
- When tightening the drive pinion nut, lock ST1 with ST2.

ST1 398507704 BLOCK

ST2 398507702 DUMMY SHAFT

Tightening torque:

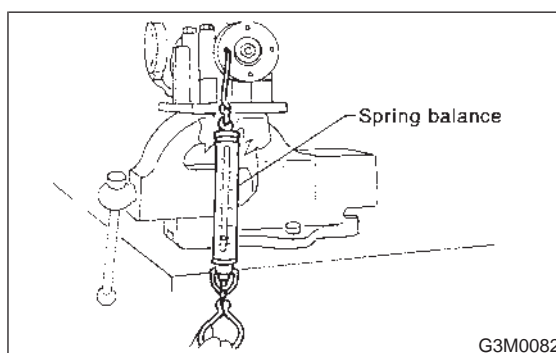
$181 \pm 15 \text{ N}\cdot\text{m}$ ($18.5 \pm 1.5 \text{ kg}\cdot\text{m}$, $134 \pm 11 \text{ ft}\cdot\text{lb}$)



Front and rear bearing preload

For new bearing:

19.6 — 28.4 N (2.0 — 2.9 kg, 4.4 — 6.4 lb)
at companion flange bolt hole



● Preload adjusting washer	Part No.	Thickness mm (in)
	383715200	2.59 (0.1020)
	383725200	2.57 (0.1012)
	383735200	2.55 (0.1004)
	383745200	2.53 (0.0996)
	383755200	2.51 (0.0988)
	383765200	2.49 (0.0980)
	383775200	2.47 (0.0972)
	383785200	2.45 (0.0965)
	383795200	2.43 (0.0957)
	383805200	2.41 (0.0949)
	383815200	2.39 (0.0941)
	383825200	2.37 (0.0933)
	383835200	2.35 (0.0925)
	383845200	2.33 (0.0917)
	38385200	2.31 (0.0909)
● Preload adjusting spacer	Part No.	Length mm (in)
	383695201	56.2 (2.213)
	383695202	56.4 (2.220)
	383695203	56.6 (2.228)
	383695204	56.8 (2.236)
	383695205	57.0 (2.244)
	383695206	57.2 (2.252)

3) Adjusting drive pinion height

Adjust drive pinion height with shim installed between rear bearing cone and the back of pinion gear.

(1) Install ST1, ST2 and ST3, as shown in the figure, and apply the specified preload on the bearings.

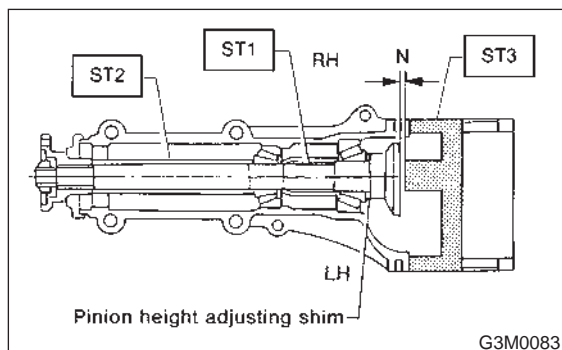
Front and rear bearing preload
For new bearing:
19.6 — 28.4 N (2.0 — 2.9 kg, 4.4 — 6.4 lb)
at companion flange bolt hole

Adjust preload for front and rear bearings.

NOTE:

At this time, install a pinion height adjusting shim which is temporarily selected or the same as that used before.

ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR
ST3 398507701 DIFFERENTIAL CARRIER GAUGE

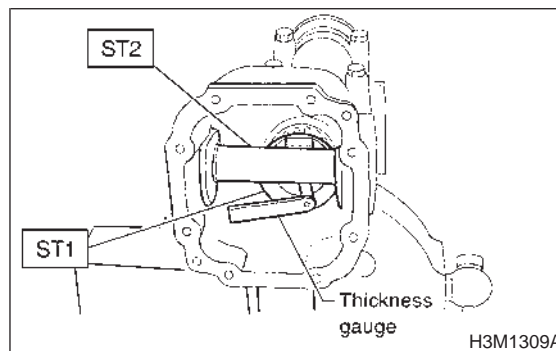


(2) Measure the clearance between the end of ST2 and the end surface of ST1 by using a thickness gauge.

NOTE:

Make sure there is no clearance between ST2 and ST1.

ST1 398507702 DUMMY SHAFT
ST2 398507701 DIFFERENTIAL CARRIER GAUGE



(3) Obtain the thickness of pinion height adjusting shim to be inserted from the following formula, and replace the temporarily installed shim with this one.

$$T = T_o + N - (H \times 0.01) - 0.20 \text{ (mm)}$$

where

T = Thickness of pinion height adjusting shim (mm)

T_o = Thickness of shim temporarily inserted (mm)

N = Reading of thickness gauge (mm)

H = Figure marked on drive pinion head

(Example of calculation)

$$T_o = 2.20 + 1.20 = 3.40 \text{ mm}$$

$$N = 0.23 \text{ mm } H = + 1,$$

$$T = 3.40 + 0.23 - 0.01 - 0.20 = 3.42$$

Result: Thickness = 3.42 mm

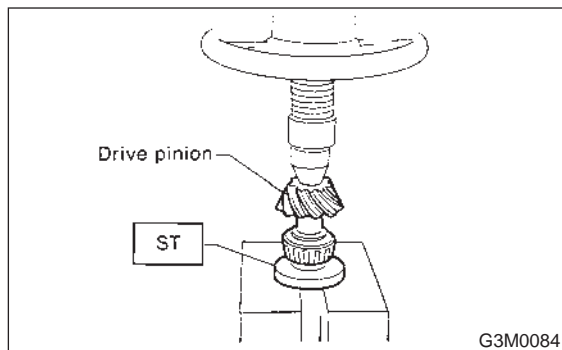
Therefore use the shim 383605200.

3. Rear Differential (T-Type)

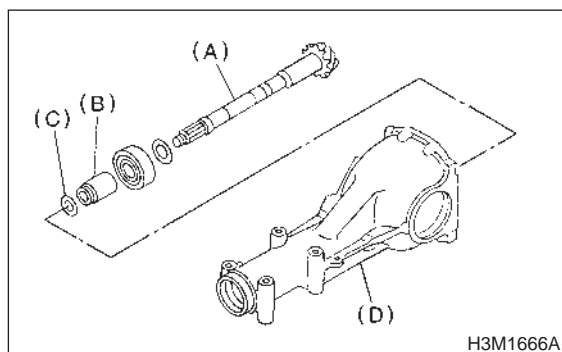
Pinion height adjusting shim	
Part No.	Thickness mm (in)
383495200	3.09 (0.1217)
383505200	3.12 (0.1228)
383515200	3.15 (0.1240)
383525200	3.18 (0.1252)
383535200	3.21 (0.1264)
383545200	3.24 (0.1276)
383555200	3.27 (0.1287)
383565200	3.30 (0.1299)
383575200	3.33 (0.1311)
383585200	3.36 (0.1323)
383595200	3.39 (0.1335)
383605200	3.42 (0.1346)
383615200	3.45 (0.1358)
383625200	3.48 (0.1370)
383635200	3.51 (0.1382)
383645200	3.54 (0.1394)
383655200	3.57 (0.1406)
383665200	3.60 (0.1417)
383675200	3.63 (0.1429)
383685200	3.66 (0.1441)

4) Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.

ST 398177700 INSTALLER



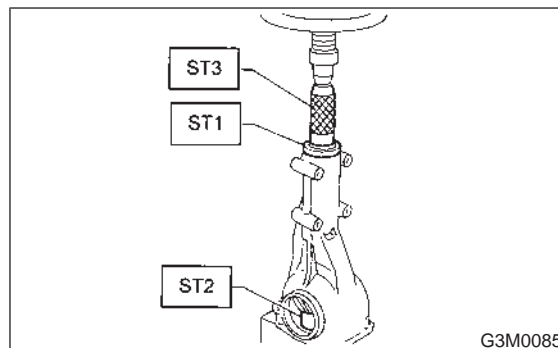
5) Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.



- (A) Drive pinion
- (B) Bearing preload adjusting spacer
- (C) Washer
- (D) Differential carrier

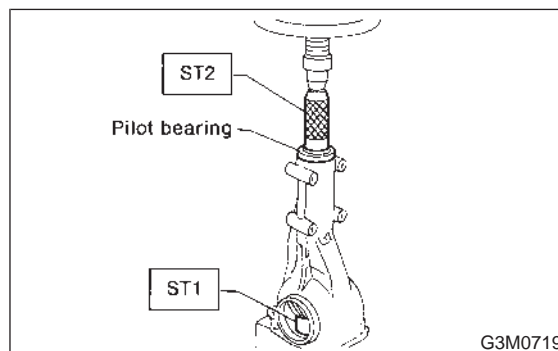
6) Press-fit front bearing cone into case with ST1, ST2 and ST3.

ST1 398507703 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER



7) Insert spacer, then press-fit pilot bearing with ST1 and ST2.

ST1 399780104 WEIGHT
ST2 899580100 INSTALLER

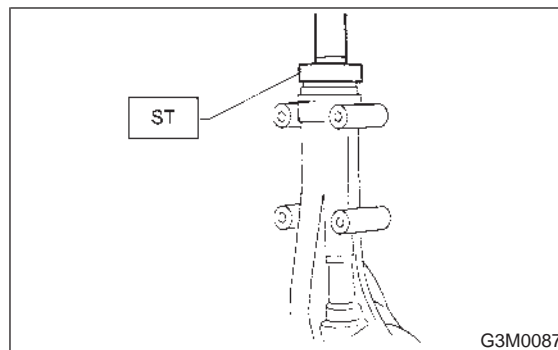


8) Fit a new oil seal with ST.

NOTE:

- Press-fit until end of oil seal is 1 mm (0.04 in) inward from end of carrier.
- Apply grease between the oil seal lips.

ST 498447120 OIL SEAL INSTALLER



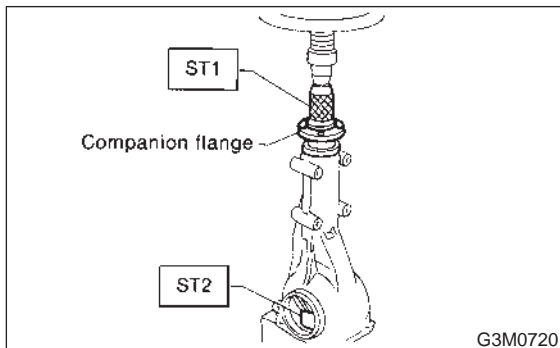
9) Press-fit companion flange with ST1 and ST2.

CAUTION:

Be careful not to damage bearing.

ST1 899874100 INSTALLER

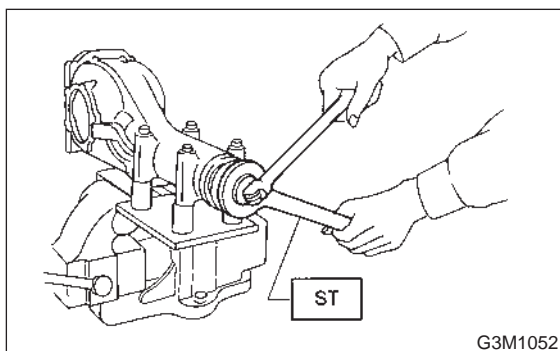
ST2 399780104 WEIGHT



10) Install self-locking nut. Then tighten it with ST.
ST 498427200 FLANGE WRENCH

Tightening torque:

181±15 N·m (18.5±1.5 kg·m, 134±11 ft·lb)

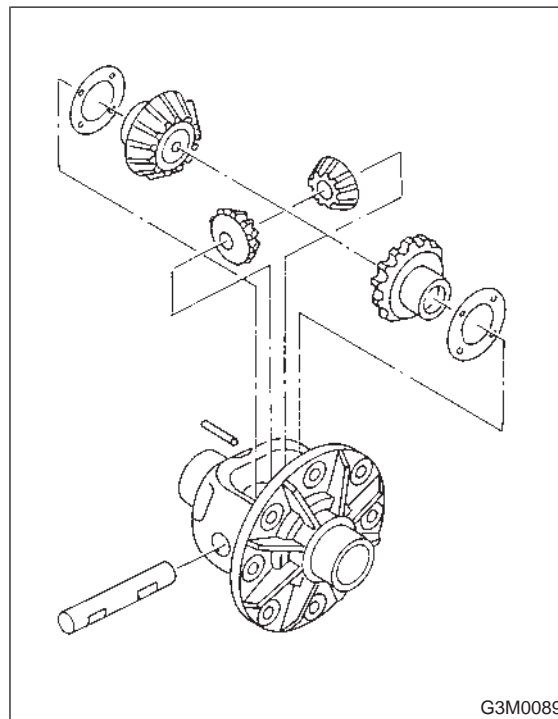


11) Assembling differential case

(1) Install side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case.

NOTE:

- Apply gear oil on both sides of the washer and on the side gear shaft before installing.
- Insert the pinion mate shaft into the differential case by aligning the lock pin holes.



(2) Measure the clearance between differential case and the back of side gear.

(3) Adjust the clearance as specified by selecting side gear thrust washer.

Side gear backlash:

0.10 — 0.20 mm (0.0039 — 0.0079 in)

Side gear thrust washer	
Part No.	Thickness mm (in)
383445201	0.75 — 0.8 (0.0295 — 0.0315)
383445202	0.8 — 0.85 (0.0315 — 0.0335)
383445203	0.85 — 0.9 (0.0335 — 0.0345)

(4) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.

(5) After driving in pinion shaft lock pin, stake the both sides of the hole to prevent pin from falling off.

3. Rear Differential (T-Type)

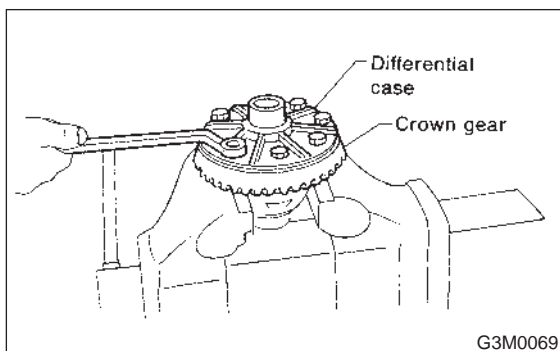
12) Install crown gear on differential case.

NOTE:

Tighten diagonally while tapping the bolt heads.

Tightening torque:

103±10 N·m (10.5±1.0 kg·m, 76±7 ft·lb)



13) Before installing side bearing, measure the bearing width by using a dial gauge, ST1 and ST2.

NOTE:

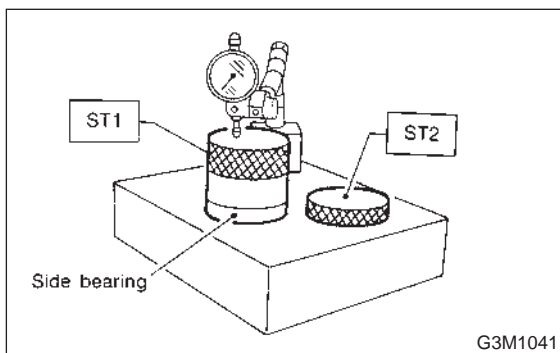
Set the dial gauge needle to zero, using a standard bearing or block of specified height in advance.

ST1 398227700 WEIGHT

ST2 398237700 GAUGE

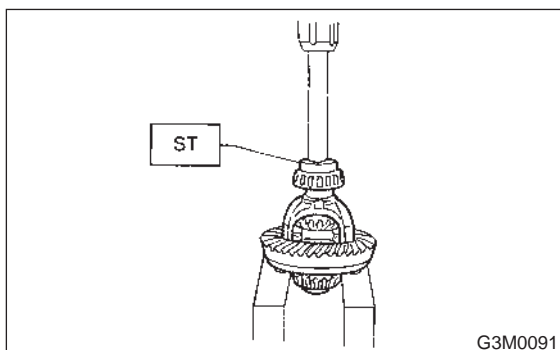
Standard bearing width:

20.00 mm (0.7874 in)



14) Press side bearing cone onto differential case with ST1.

ST1 398487700 DRIFT



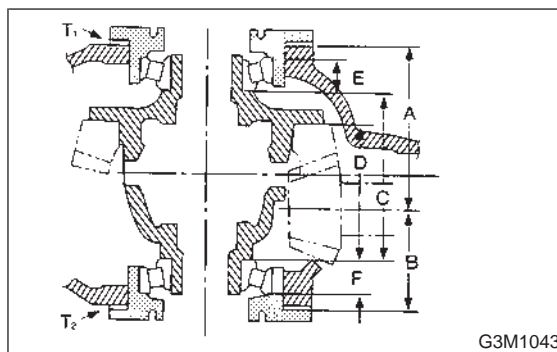
15) Adjusting side bearing retainer shims

(1) The drive gear backlash and side bearing preload can be determined by the side bearing retainer shim thickness.

(2) When replacing differential case, differential carrier, side bearing and side bearing retainer, obtain the right and left retainer shim thickness from the following formulas.

$$T_1 \text{ (Left)} = (A + C + G_1 - D) \times 0.01 + 0.76 - E \text{ (mm)}$$

$$T_2 \text{ (Right)} = (B + D + G_2) \times 0.01 + 0.76 - F \text{ (mm)}$$



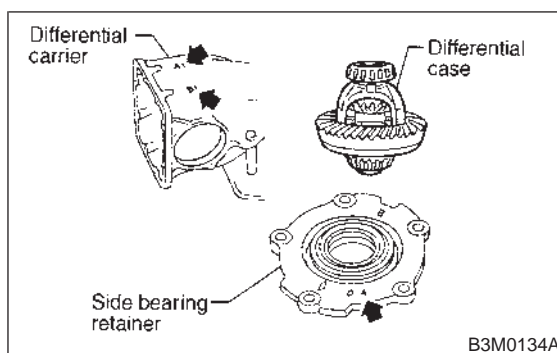
T_1 & T_2 : Thickness of left and right side bearing retainer shim (mm)

A & B : Number marked on differential carrier

C & D : Number marked on differential case

E & F : Difference of width of left and right side bearing from standard width 20.0 mm, expressed in a unit of 0.01 mm. For example, if the bearing measured width is 19.89 mm, value of E or F is as follows. $20.00 - 19.89 = 0.11$ (E or F)

G_1 & G_2 : Number marked on side bearing retainer
If a number is not marked, regard it as zero.



NOTE:

Use several shims to obtain the calculated thickness.

Side bearing retainer shim	
Part No.	Thickness mm (in)
383475201	0.20 (0.0079)
383475202	0.25 (0.0098)
383475203	0.30 (0.0118)
383475204	0.40 (0.0157)
383475205	0.50 (0.0197)

Example of calculation

Ex. 1

A = 5, B = 5, C = 3, D = 3, G₁ = 4, G₂ = 1, E = 0.10 mm, F = 0.15 mm

Left side

$$\begin{aligned}
 T_1 &= (A + C + G_1 - D) \times 0.01 + 0.76 - E \\
 &= (5 + 3 + 4 - 3) \times 0.01 + 0.76 - 0.10 \\
 &= 0.09 + 0.76 - 0.10 = 0.75 \text{ mm}
 \end{aligned}$$

The correct shims are as follows:

Thickness Q'ty

$$0.25 \times 1 = 0.25$$

$$0.50 \times 1 = 0.50$$

$$\text{Total shim thickness} = 0.75 \text{ mm}$$

Right side

$$\begin{aligned}
 T_2 &= (B + D + G_2) \times 0.01 + 0.76 - F \\
 &= (5 + 3 + 1) \times 0.01 + 0.76 - 0.15 \\
 &= 0.09 + 0.76 - 0.15 \\
 &= 0.70 \text{ mm}
 \end{aligned}$$

The correct shims are as follows:

Thickness Q'ty

$$0.20 \times 1 = 0.20$$

$$0.50 \times 1 = 0.50$$

$$\text{Total shim thickness} = 0.70 \text{ mm}$$

Ex. 2

A = 2, B = 3, C = 0, D = 3, G₁ = 2, G₂ = 3, E = 0.22 mm, F = 0.10 mm

Left side

$$\begin{aligned}
 T_1 &= (A + C + G_1 - D) \times 0.01 + 0.76 - E \\
 &= (2 + 0 + 2 - 3) \times 0.01 + 0.76 - 0.22 \\
 &= 0.01 + 0.76 - 0.22 \\
 &= 0.55 \text{ mm}
 \end{aligned}$$

The correct shims are as follows:

Thickness Q'ty

$$0.25 \times 1 = 0.25$$

$$0.30 \times 1 = 0.30$$

$$\text{Total shim thickness} = 0.55 \text{ mm}$$

Right side

$$\begin{aligned}
 T_2 &= (B + D + G_2) \times 0.01 + 0.76 - F \\
 &= (3 + 3 + 3) \times 0.01 + 0.76 - 0.10 \\
 &= 0.09 + 0.76 - 0.10 \\
 &= 0.75 \text{ mm}
 \end{aligned}$$

The correct shims are as follows:

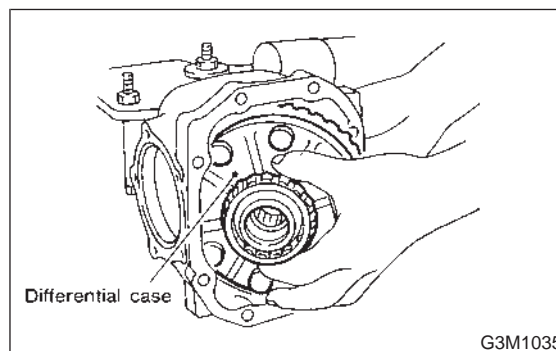
Thickness Q'ty

$$0.25 \times 1 = 0.25$$

$$0.50 \times 1 = 0.50$$

$$\text{Total shim thickness} = 0.75 \text{ mm}$$

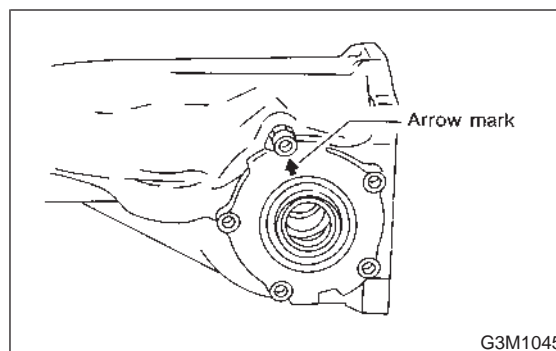
(3) Install the differential case assembly into differential carrier in the reverse order of disassembly.



(4) Fit the selected shims and O-ring on side bearing retainer and install them on differential carrier with the arrow mark on the retainer directed as shown in figure.

CAUTION:

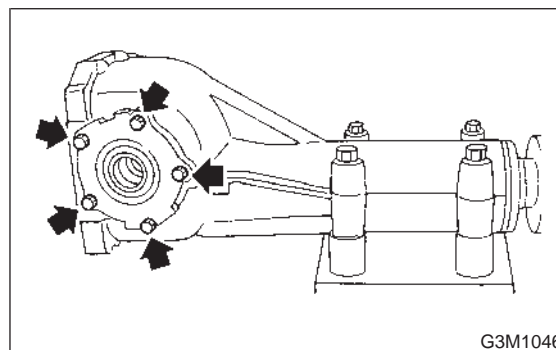
Be careful that side bearing cup is not damaged by bearing roller.



(5) Tighten side bearing retainer bolts.

Tightening torque:

10.3±1.5 N·m (1.05±0.15 kg-m, 7.6±1.1 ft-lb)

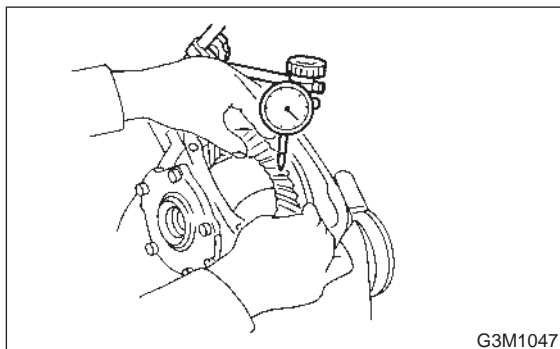


3. Rear Differential (T-Type)

(6) Measure the crown gear-to-drive pinion backlash. Set magnet base on differential carrier. Align contact point of dial gauge with tooth face of crown gear, and move crown gear while holding drive pinion still. Read value indicated on dial gauge.

Backlash:

0.10 — 0.20 mm (0.0039 — 0.0079 in)



(7) At the same time, measure the turning resistance of drive pinion. Compared with the resistance when differential case is not installed, if the increase of the resistance is not within the specified range, readjust side bearing retainer shims.

NOTE:

If measured backlash is not within specified range, repeat procedure for side bearing retainer shims adjustment.

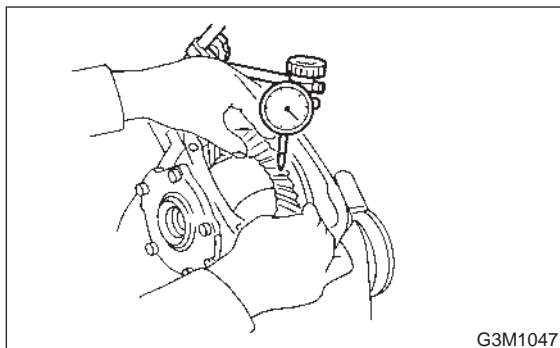
Turning resistance increase:

0.1 — 0.6 N·m (0.01 — 0.06 kg·m, 0.07 — 0.43 ft·lb)

16) Re-check crown gear-to-pinion backlash.

Backlash:

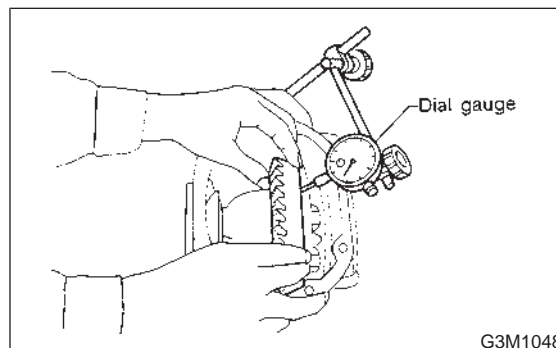
0.10 — 0.20 mm (0.0039 — 0.0079 in)



17) Check the crown gear runout on its back surface, and make sure pinion and crown gear rotate smoothly.

Limit of runout:

0.05 mm (0.0020 in)



18) Checking and adjusting tooth contact of crown gear

(1) Apply an even coat of red lead on both sides of three or four teeth on the crown gear. Check the contact pattern after rotating crown gear several revolutions back and forth until a definite contact pattern appears on the crown gear.

(2) When the contact pattern is incorrect, readjust according to the instructions given in "Tooth contact pattern".

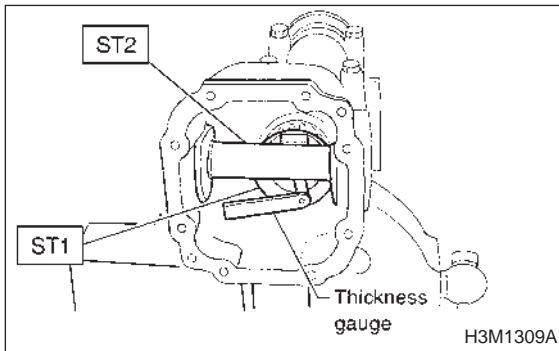
NOTE:

Be sure to wipe off red lead completely after adjustment is completed.

19) If proper tooth contact is not obtained, once again adjust the drive pinion height, changing RH and LH side bearing retainer shims and the hypoid gear backlash.

(1) Drive pinion height

ST1 398507702 DUMMY SHAFT
ST2 398507701 DIFFERENTIAL CARRIER GAUGE



$$T = T_o + N - (H \times 0.01) - 0.20 \text{ (mm)}$$

Where:

T = Thickness of pinion height adjusting shim (mm)

T_o = Thickness of shim temporarily inserted (mm)

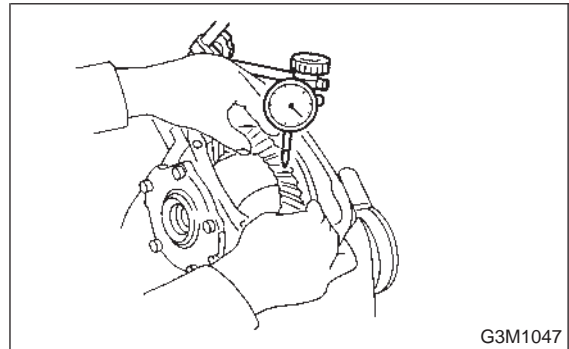
N = Reading of thickness gauge (mm)

H = Figure marked on drive pinion head

(2) Hypoid gear backlash

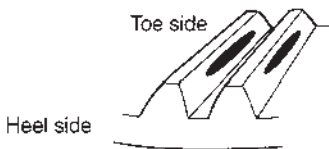

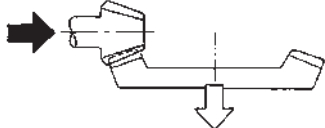

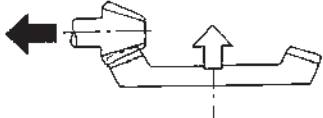

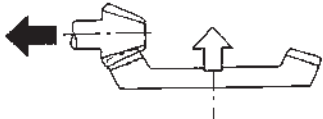

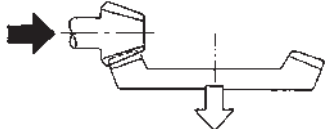
Backlash:

0.10 — 0.20 mm (0.0039 — 0.0079 in)



➡ Adjusting direction of drive pinion

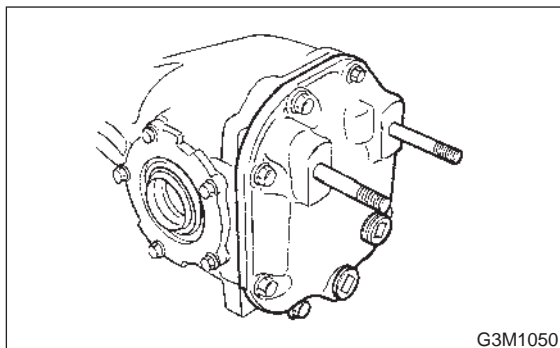
⇒ Adjusting direction of crown gear

TOOTH CONTACT PATTERN		
Condition	Contact pattern	Adjustment
Correct tooth contact Tooth contact pattern slightly shifted towards toe under no load rotation. (When loaded, contact pattern moves toward heel.)	 B3M0317A	
Face contact Backlash is too large.	This may cause noise and chipping at tooth ends.  B3M0319	Increase thickness of drive pinion height adjusting shim in order to bring drive pinion closer to crown gear center.  B3M0323
Flank contact Backlash is too small.	This may cause noise and stepped wear on surfaces.  B3M0320	Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.  B3M0324
Toe contact Contact area is small.	This may cause chipping at toe ends.  B3M0321	Adjust as for flank contact.  B3M0324
Heel contact Contact area is small.	This may cause chipping at heel ends.  B3M0322	Adjust as for face contact.  B3M0323

20) Install rear cover and tighten bolts to specified torque.

Tightening torque:

29±5 N·m (3.0±0.5 kg-m, 21.7±3.6 ft-lb)



5) After installation, fill differential carrier with gear oil to the upper plug level.

CAUTION:

Apply fluid packing to plug.

Fluid packing:

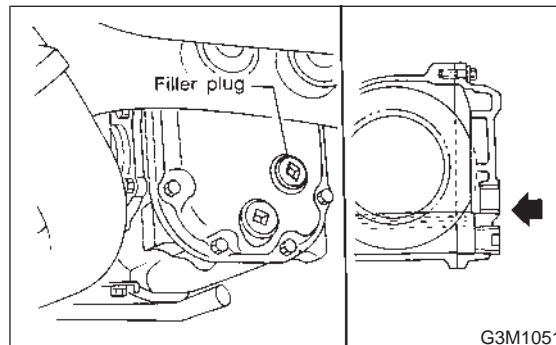
THREE BOND 1105 or equivalent

Oil capacity:

0.8 l (0.8 US qt, 0.7 Imp qt)

Tightening torque:

44±4 N·m (4.5±0.4 kg-m, 32.5±2.9 ft-lb)



F: INSTALLATION

To install, reverse the removal sequence.

1) Install the air breather cap tapping with a plastic hammer.

CAUTION:

Be sure to install new air breather cap.

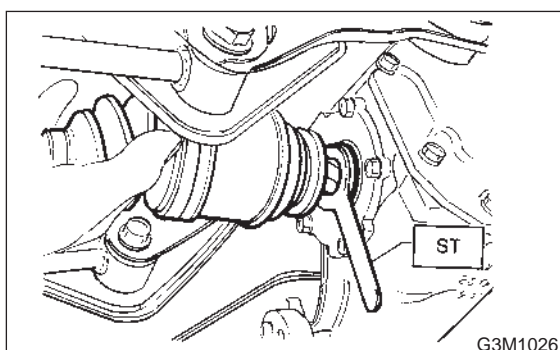
2) Position front member on body by passing it under parking brake cable and securing to rear differential.

NOTE:

When installing rear differential front member, do not confuse the installation sequence of the upper and lower stoppers.

3) Install DOJ of rear drive shaft into rear differential. <Ref. to 3-4 [W3A2].>

ST 28099PA090 SIDE OIL SEAL PROTECTOR



4) Installing procedure hereafter is in the reverse order of removal.

4. Rear Differential Front Member

A: REMOVAL

1. VA-TYPE

- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Loosen wheel nuts.
- 5) Jack-up vehicle and support it with sturdy racks.
- 6) Remove wheels.
- 7) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W3A0].> and <Ref. to 2-9 [W2A0].>
- 8) Remove rear differential front member.

NOTE:

When removing rear differential front member, work the removal procedure as rear differential.
<Ref. to 3-4 [W2B0].>

2. T-TYPE

- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Loosen wheel nuts.
- 5) Jack-up vehicle and support it with sturdy racks.
- 6) Remove wheels.
- 7) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W3A0].> and <Ref. to 2-9 [W2A0].>
- 8) Remove rear differential front member.

NOTE:

When removing rear differential front member, work the removal procedure as rear differential.
<Ref. to 3-4 [W3B0].>

B: INSTALLATION

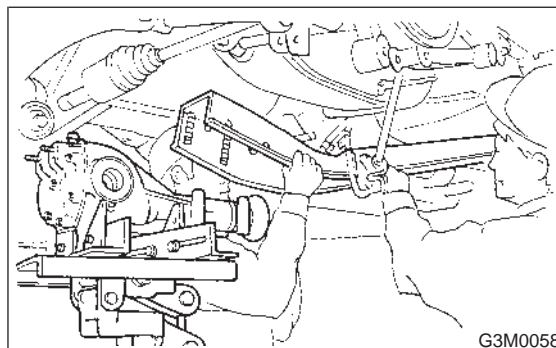
1. VA-TYPE

To install, reverse the removal sequence.

- 1) Position front member on body by passing it under parking brake cable and securing to rear differential.

NOTE:

When installing rear differential front member, do not confuse the installation sequence of the stopper.

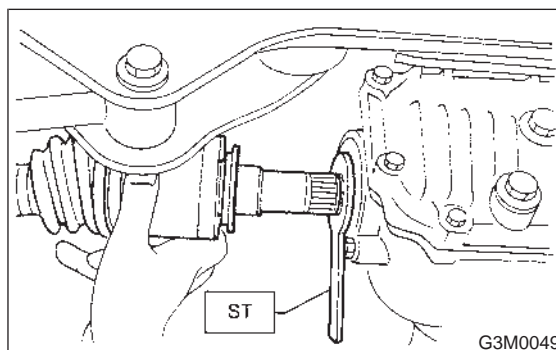


- 2) Insert DOJ of rear drive shaft into rear differential.
<Ref. to 3-4 [W2A2].>

CAUTION:

Before inserting, replace the differential side oil seal with a new one.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



- 3) Installing procedure hereafter is in the reverse order of removal.

2. T-TYPE

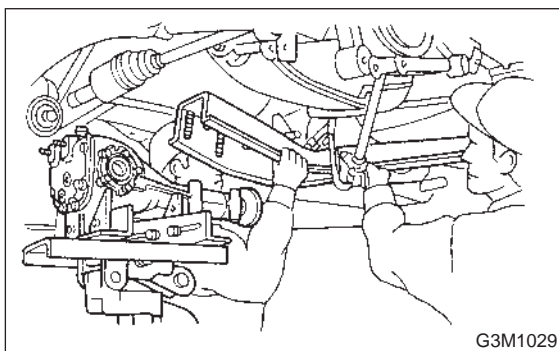
To install, reverse the removal sequence.

1) Position front member on body by passing it under parking brake cable and securing to rear differential.

NOTE:

When installing rear differential front member, do not confuse the installation sequence of the stopper.

3) Installing procedure hereafter is in the reverse order of removal.



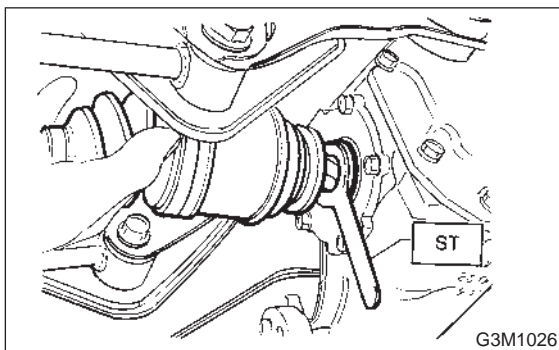
2) Insert DOJ of rear drive shaft into rear differential.

<Ref. to 3-4 [W3A2].>

CAUTION:

Before inserting, replace the differential side oil seal with a new one.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



1. Propeller Shaft

NOTE:

Vibration while cruising may be caused by an unbalanced tire, improper tire inflation pressure, improper wheel alignment, etc.

Symptom and possible cause	Remedy
1. Vibration of propeller shaft Vibration is caused by propeller shaft during operation and is transferred to vehicle body. Generally vibration increase in proportion to vehicle speed.	
(1) Worn or damaged universal joint.	Replace.
(2) Unbalanced propeller shaft due to bend or dent.	Replace.
(3) Loose installation of propeller shaft.	Retighten.
(4) Worn or damaged center bearing and damaged center mounting rubber.	Replace.
2. Tapping when starting and noise while cruising, caused by propeller shaft.	
(1) Worn or damaged universal joint.	Replace.
(2) Worn spline of sleeve yoke.	Replace.
(3) Loose installation of propeller shaft.	Retighten.
(4) Loose installation of joint.	Replace.
(5) Worn or damaged center bearing and damaged center mounting rubber.	Replace.

2. Rear Differential

Symptom and possible cause	Remedy
1. Oil leakage	
(1) Worn, scratched, or incorrectly seated front or side oil seal. Scored, battered, or excessively worn sliding surface of companion flange.	Repair or replace.
(2) Clogged or damaged air breather.	Clean, repair or replace.
(3) Loose bolts on differential spindle or side retainer, or incorrectly fitted O-ring.	Tighten bolts to specified torque. Replace O-ring.
(4) Loose rear cover attaching bolts or damaged gasket. Tighten bolts to specified torque.	Replace gasket and apply liquid packing.
(5) Loose oil filler or drain plug.	Retighten and apply liquid packing.
(6) Wear, damage or incorrectly fitting for spindle, side retainer and oil seal.	Repair or replace.
2. Seizure Seized or damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	
(1) Insufficient backlash for hypoid gear.	Readjust or replace.
(2) Excessive preload for side, rear, or front bearing.	Readjust or replace.
(3) Insufficient or improper oil used.	Replace seized part and fill with specified oil to specified level.
3. Damage Damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	
(1) Improper backlash for hypoid gear.	Replace.
(2) Insufficient or excessive preload for side, rear, or front bearing.	Readjust or replace.
(3) Excessive backlash for differential gear.	Replace gear or thrust washer.
(4) Loose bolts and nuts such as crown gear bolt.	Retighten.
(5) Damage due to overloading.	Replace.

Symptom and possible cause	Remedy
4. Noises when starting or shifting gears Noises may be caused by differential assembly, universal joint, wheel bearing, etc. Find out what is actually making noise before disassembly.	
(1) Excessive backlash for hypoid gear.	Readjust.
(2) Excessive backlash for differential gear.	Replace gear or thrust washer.
(3) Insufficient preload for front or rear bearing.	Readjust.
(4) Loose drive pinion nut.	Tighten to specified torque.
(5) Loose bolts and nuts such as side bearing retainer attaching bolt.	Tighten to specified torque.
5. Noises when cornering	
(1) Damaged differential gear.	Replace.
(2) Excessive wear or damage of thrust washer.	Replace.
(3) Broken pinion mate shaft.	Replace.
(4) Seized or damaged side bearing.	Replace.
6. Gear noises Since noises from engine, muffler, transmission, propeller shaft, wheel bearings, tires, and body are sometimes mistaken for noises from differential assembly, be careful in checking them. Inspection methods to locate noises include coasting, accelerating, cruising, and jacking-up all four wheels. Perform these inspections according to condition of trouble. When listening to noises, shift gears into four wheel drive and fourth speed position, trying to pick up only differential noise.	
(1) Improper tooth contact of hypoid gear.	Readjust or replace hypoid gear set.
(2) Improper backlash for hypoid gear.	Readjust.
(3) Scored or chipped teeth of hypoid gear.	Replace hypoid gear set.
(4) Seized hypoid gear.	Replace hypoid gear set.
(5) Improper preload for front or rear bearings.	Readjust.
(6) Seized, scored, or chipped front or rear bearing.	Replace.
(7) Seized, scored, or chipped side bearing.	Replace.
(8) Vibrating differential carrier.	Replace.

MEMO:

SUSPENSION 4-1

	Page
S SPECIFICATION AND SERVICE DATA	2
1. Stabilizer.....	2
2. Wheel Alignment	2
C COMPONENT PARTS	4
1. Front Suspension	4
2. Rear Suspension.....	6
W SERVICE PROCEDURE	7
1. On-car Services.....	7
2. Front Transverse Link	14
3. Front Ball Joint	16
4. Front Strut	18
5. Front Stabilizer	22
6. Front Crossmember	23
7. Rear Trailing Link	25
8. Lateral Link.....	29
9. Rear Strut.....	33
10. Rear Crossmember.....	35
11. Rear Stabilizer.....	37
K DIAGNOSTICS	39
1. Suspension.....	39

1. Stabilizer

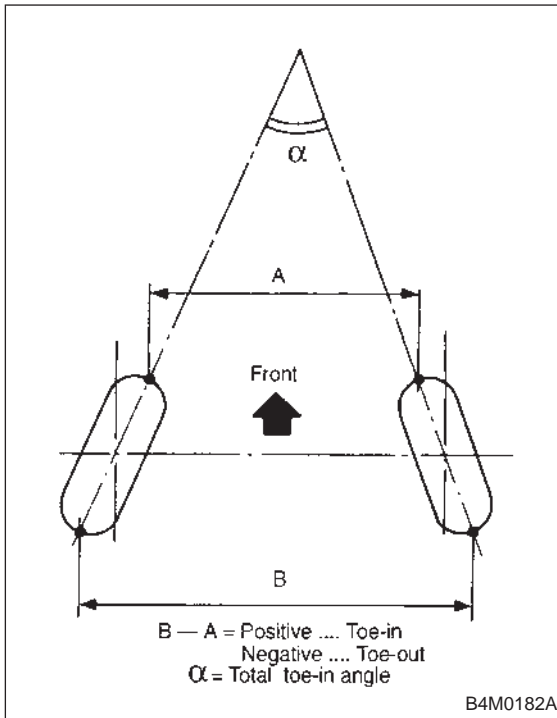
Model		Bar dia. mm (in)	
		Front	Rear
COUPE	AWD	19 (0.75)	13 (0.51)
SEDAN	AWD	19 (0.75)	13 (0.51)
WAGON	AWD	19 (0.75)	13 (0.51)
OUTBACK	AWD	19 (0.75)	13 (0.51)

2. Wheel Alignment

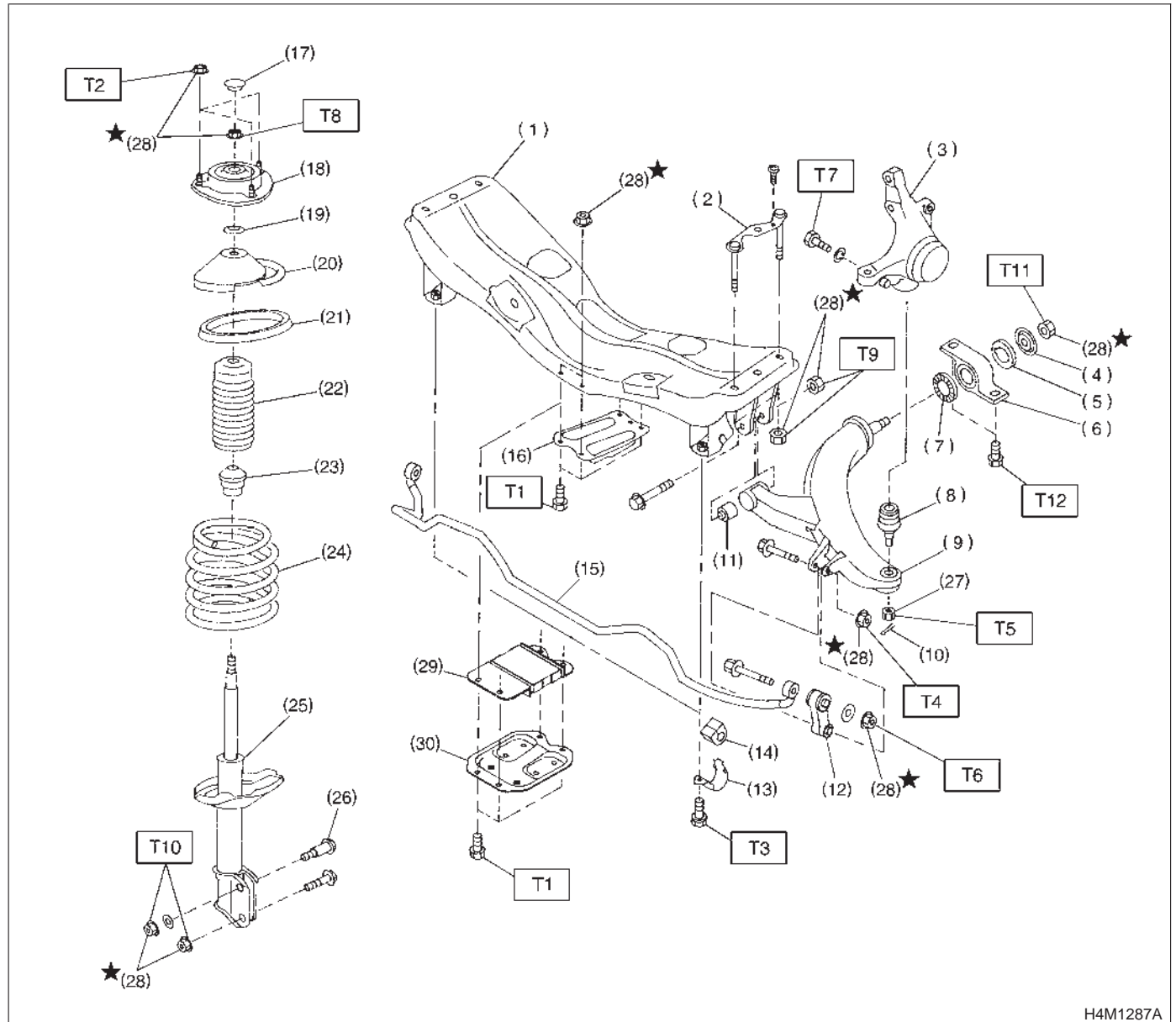
		2200 cc			2500 cc
		Sedan, Coupe	Wagon	OUTBACK	Coupe
		AWD	AWD	AWD	AWD
Front	Camber (tolerance: $\pm 0^{\circ}30'$)	0°	0°	0°	-0°25'
	Caster (common difference: $\pm 1^{\circ}$)	3°	3°	3°	3°05'
	Toe-in mm (in)	0 ± 3 (0 ± 0.12) Toe-in angle: $-0^{\circ}09'$ [when toe-in is -3 (-0.12)] Toe-out angle: $0^{\circ}09'$ [when toe-out is 3 (0.12)]			
	Kingpin angle	14°	14°	14°	14°
	Wheel arch height [tolerance: $+12/-24$ mm ($+0.47/-0.94$ in)]	391 (15.39)	391 (15.39)	394 (15.51)	371 (14.61)
Rear	Camber (tolerance: $\pm 0^{\circ}45'$)	-0°55'	-0°55'	-0°55'	-1°10'
	Toe-in mm (in)	0 ± 3 (0 ± 0.12) Total toe angle: $0^{\circ} \pm 18'$			
	Wheel arch height [tolerance: $+12/-24$ mm ($+0.47/-0.94$ in)]	379 (14.92)	379 (14.92)	386 (15.20)	368 (14.49)
	Thrust angle (tolerance: $0^{\circ} \pm 20'$)	0°	0°	0°	0°

NOTE:

- Front and rear toe-ins and front camber can be adjusted. If toe-in or camber tolerance exceeds specifications, adjust toe-in and camber to the specification.
- The other items indicated in the specification table cannot be adjusted. If the other items exceeds specifications, check suspension parts and connections for deformities; and replace with new ones as required.



1. Front Suspension

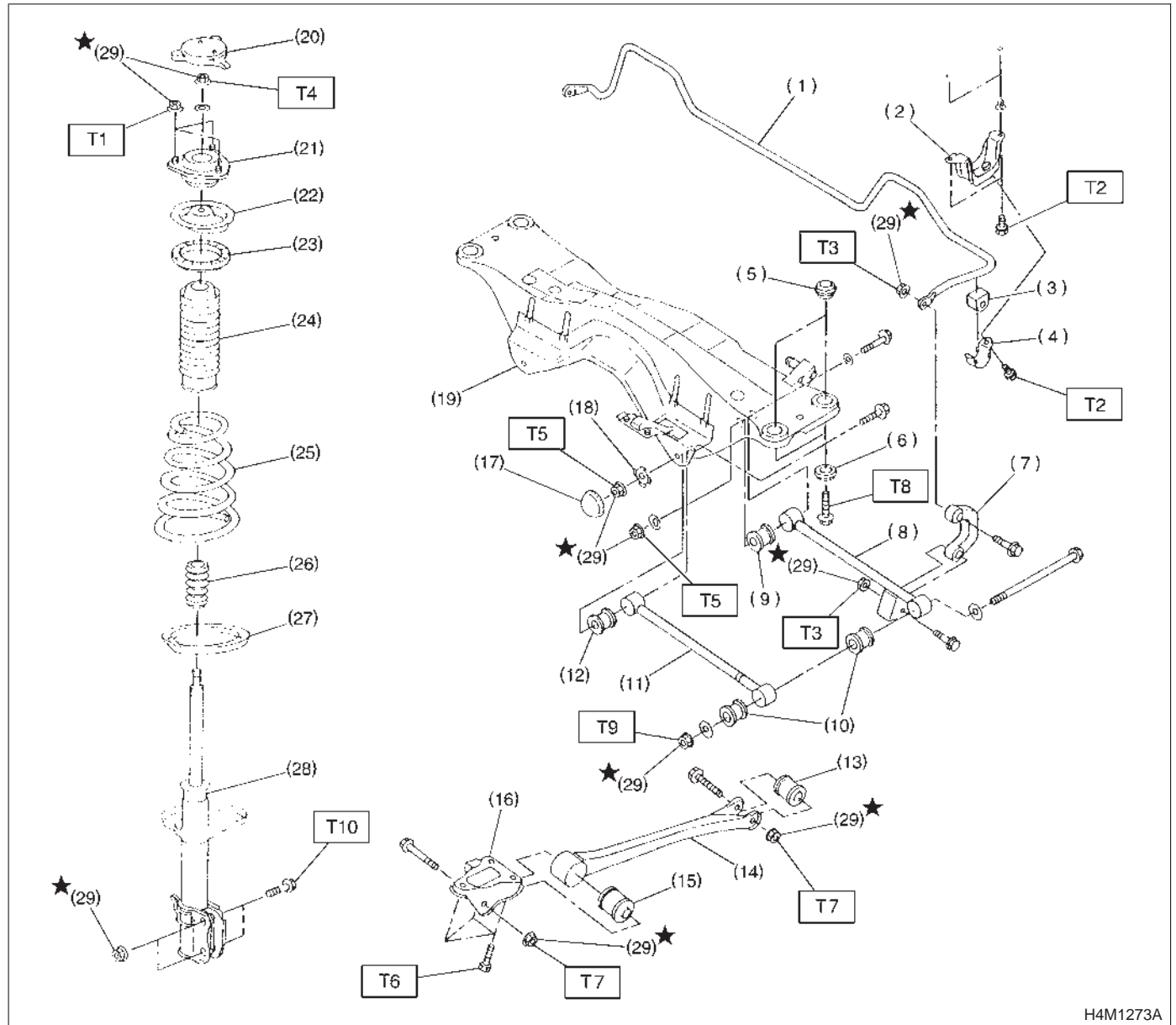


H4M1287A

- | | | |
|-------------------------|--|---------------------------------------|
| (1) Crossmember | (16) Jack-up plate (Except 2500 cc MT model) | (30) Jack-up plate (2500 cc MT model) |
| (2) Bolt ASSY | (17) Dust seal | |
| (3) Housing | (18) Strut mount | |
| (4) Washer | (19) Spacer | |
| (5) Stop rubber (Rear) | (20) Upper spring seat | |
| (6) Rear bushing | (21) Rubber seat | |
| (7) Stop rubber (Front) | (22) Dust cover | |
| (8) Ball joint | (23) Helper | |
| (9) Transverse link | (24) Coil spring | |
| (10) Cotter pin | (25) Damper strut | |
| (11) Front bushing | (26) Adjusting bolt | |
| (12) Stabilizer link | (27) Castle nut | |
| (13) Clamp | (28) Self-locking nut | |
| (14) Bushing | (29) Dynamic damper (2500 cc MT model) | |
| (15) Stabilizer | | |

Tightening torque: N·m (kg-m, ft-lb)**T1: 18±5 (1.8±0.5, 13.0±3.6)****T2: 20±6 (2.0±0.6, 14.5±4.3)****T3: 25±4 (2.5±0.4, 18.1±2.9)****T4: 29±5 (3.0±0.5, 21.7±3.6)****T5: 39 (4, 29)****T6: 44±6 (4.5±0.6, 32.5±4.3)****T7: 49±10 (5.0±1.0, 36±7)****T8: 54±5 (5.5±0.5, 39.8±3.6)****T9: 98±15 (10.0±1.5, 72±11)****T10: 152±20 (15.5±2.0, 112±14)****T11: 186±10 (19.0±1.0, 137±7)****T12: 245±49 (25.0±5.0, 181±36)**

2. Rear Suspension



H4M1273A

- | | |
|----------------------------------|----------------------------|
| (1) Stabilizer | (16) Trailing link bracket |
| (2) Stabilizer bracket | (17) Cap |
| (3) Stabilizer bushing | (18) Washer |
| (4) Clamp | (19) Crossmember |
| (5) Floating bushing | (20) Cap |
| (6) Stopper | (21) Strut mount |
| (7) Stabilizer link | (22) Spring seat |
| (8) Rear lateral link | (23) Rubber seat upper |
| (9) Bushing (C) | (24) Dust cover |
| (10) Bushing (A) | (25) Coil spring |
| (11) Front lateral link | (26) Helper |
| (12) Bushing (B) | (27) Rubber seat lower |
| (13) Trailing link rear bushing | (28) Damper strut |
| (14) Trailing link | (29) Self-locking nut |
| (15) Trailing link front bushing | |

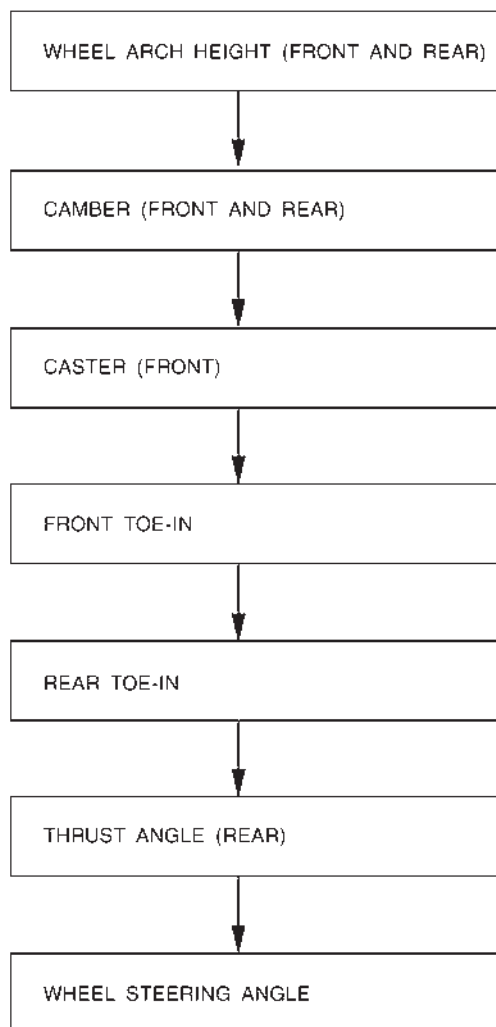
Tightening torque: N·m (kg·m, ft·lb)

- T1: 20±6 (2.0±0.6, 14.5±4.3)**
T2: 25±7 (2.5±0.7, 18.1±5.1)
T3: 44±6 (4.5±0.6, 32.5±4.3)
T4: 59±10 (6.0±1.0, 43±7)
T5: 98±15 (10.0±1.5, 72±11)
T6: 98±20 (10.0±2.0, 72±14)
T7: 113±15 (11.5±1.5, 83±11)
T8: 127±20 (13.0±2.0, 94±14)
T9: 137±20 (14.0±2.0, 101±14)
T10: 196⁺³⁹/₋₁₀ (20.0^{+4.0}/_{-1.0}, 145⁺²⁹/₋₇)

1. On-car Services

A: WHEEL ALIGNMENT PROCEDURES

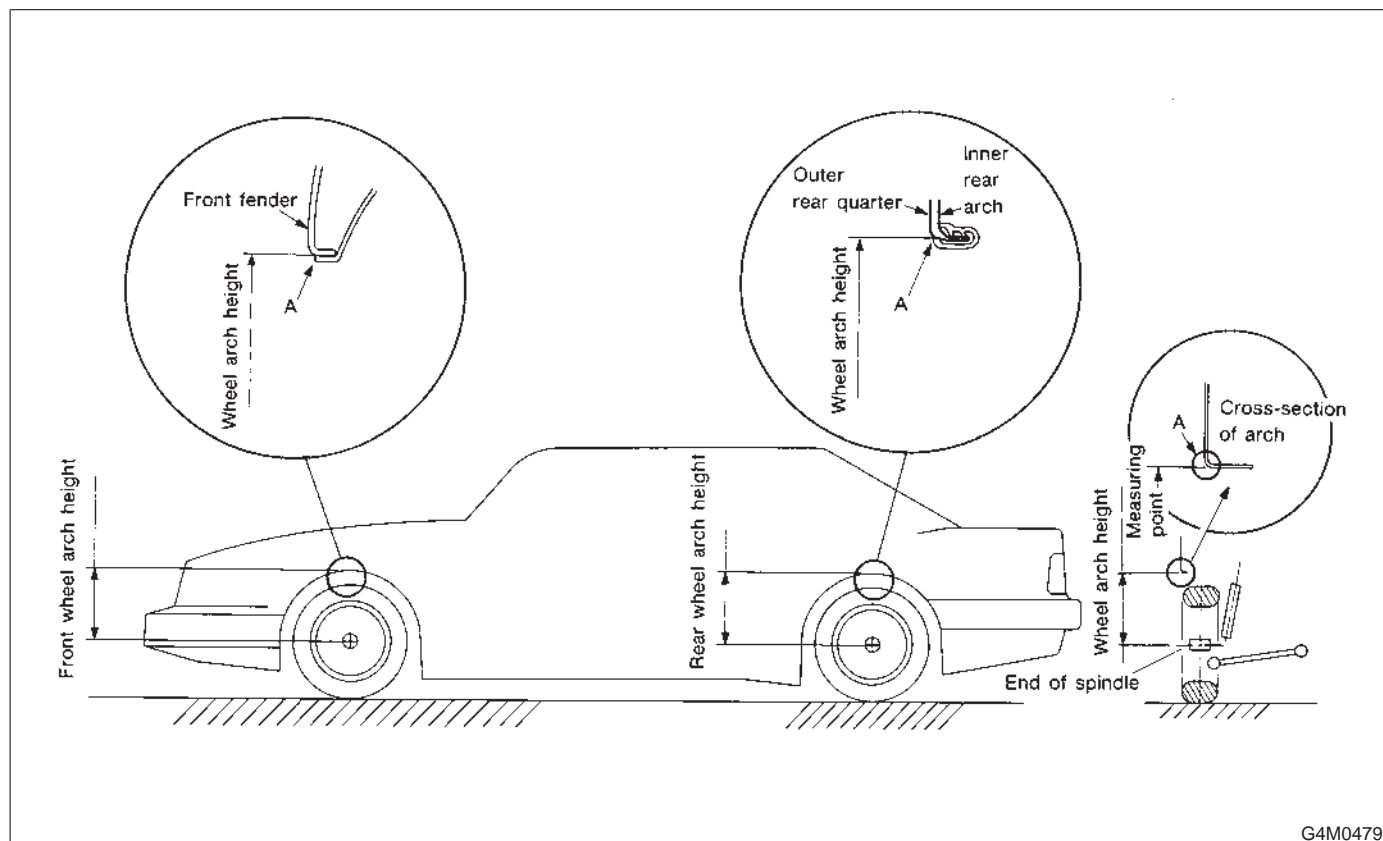
Check, adjust and/or measure wheel alignment in accordance with procedures indicated in figure.



B4M1088A

B: INSPECTION AND ADJUSTMENT**1. WHEEL ARCH HEIGHT (FRONT AND REAR)**

- 1) Adjust tire pressure to specifications.
- 2) Set vehicle under "curb weight" conditions. (Empty luggage compartment, install spare tire, jack, service tools, and top up fuel tank.)
- 3) Set steering wheel in a wheel-forward position.
- 4) Suspend thread from wheel arch (point "A" in figure) to determine a point directly above center of spindle.
- 5) Measure distance between measuring point "A" and center of spindle.



G4M0479

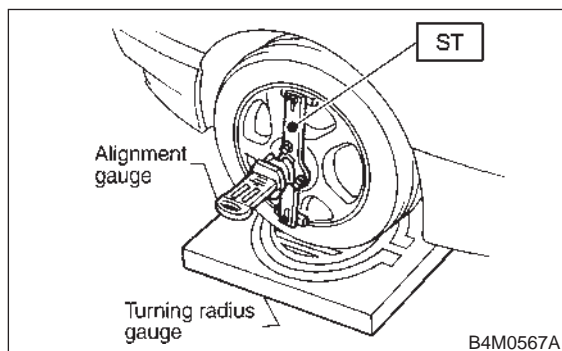
Vehicles		Specified wheel arch height mm (in)	
		Front	Rear
2200 cc	Coupe, Sedan	391^{+12}_{-24} (15.39 ^{+0.47} / _{-0.94})	379^{+12}_{-24} (14.92 ^{+0.47} / _{-0.94})
	Wagon	391^{+12}_{-24} (15.39 ^{+0.47} / _{-0.94})	379^{+12}_{-24} (14.92 ^{+0.47} / _{-0.94})
	OUTBACK	394^{+12}_{-24} (15.51 ^{+0.47} / _{-0.94})	386^{+12}_{-24} (15.20 ^{+0.47} / _{-0.94})
2500 cc	Coupe	371^{+12}_{-24} (14.61 ^{+0.47} / _{-0.94})	368^{+12}_{-24} (14.49 ^{+0.47} / _{-0.94})

2. CAMBER (FRONT AND REAR)**● Inspection**

- 1) Place front wheel on turning radius gauge. Make sure ground contacting surfaces of front and rear wheels are set at the same height.

- 2) Set ST into the center of the wheel, and then install the wheel alignment gauge.

ST 927380000 ADAPTER



NOTE:

Refer to the "SPECIFICATIONS AND SERVICE DATA" for the camber values. <Ref. to 4-1 [S200].>

● Front camber adjustment

- 1) Loosen two self-locking nuts located at lower front portion of strut.

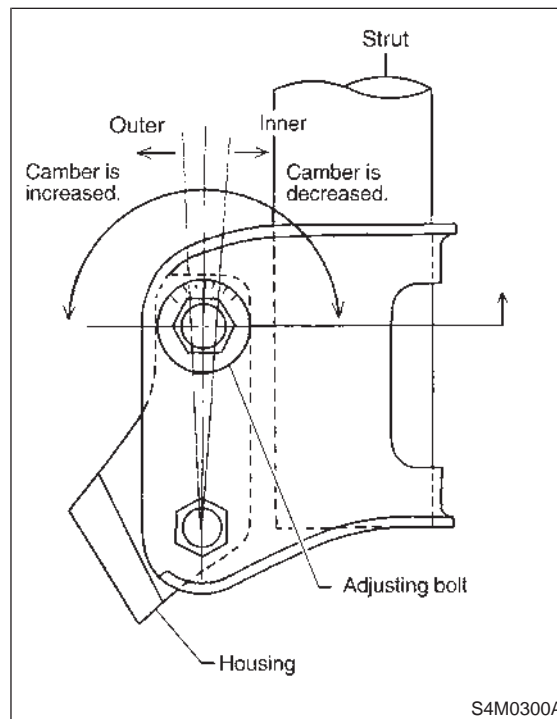
CAUTION:

- When adjusting bolt needs to be loosened or tightened, hold its head with a wrench and turn self-locking nut.
- Discard loosened self-locking nut and replace with a new one.

- 2) Turn camber adjusting bolt so that camber is set at the specification.

NOTE:

Moving the adjusting bolt by one scale graduation changes camber by approximately $0^{\circ}10'$.



	Left side		Right side	
Camber is increased.		Rotate counterclockwise.		Rotate clockwise.
Camber is decreased.		Rotate clockwise.		Rotate counterclockwise.

- 3) Tighten the two self-locking nuts.

Tightening torque:

152 ± 20 N·m (15.5 ± 2.0 kg·m, 112 ± 14 ft·lb)

3. CASTER (FRONT)

● Inspection

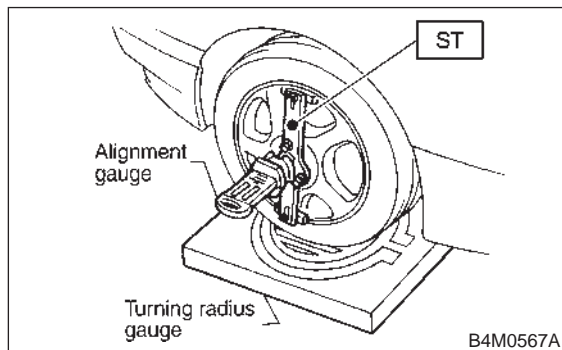
1) Place front wheel on turning radius gauge. Make sure ground contacting surfaces of front and rear wheels are set at the same height.

2) Set ST into the center of the wheel, and then install the wheel alignment gauge.

ST 927380000 ADAPTER

NOTE:

Refer to the "SPECIFICATIONS AND SERVICE DATA" for the caster value. <Ref. to 4-1 [S200].>



4. FRONT WHEEL TOE-IN

● Inspection

1) Using a toe gauge, measure front wheel toe-in.

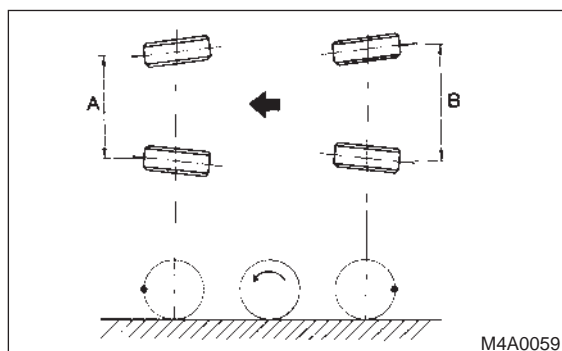
Toe-in: $0 \pm 3 \text{ mm}$ ($0 \pm 0.12 \text{ in}$)

2) Mark rear sides of left and right tires at height corresponding to center of spindles and measure distance "B" between marks.

3) Move vehicle forward so that marks line up with front sides at height corresponding to center of spindles.

4) Measure distance "A" between left and right marks. Toe-in can then be obtained by the following equation:

$$B - A = \text{Toe-in}$$



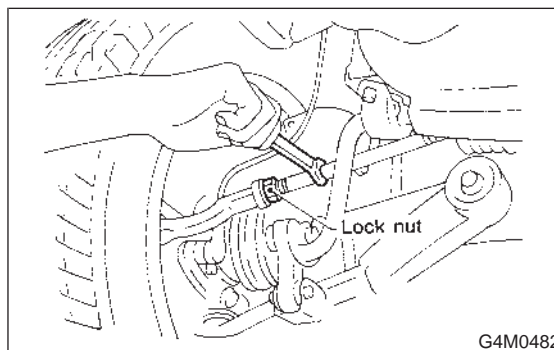
● Adjustment

1) Loosen the left and right side steering tie-rods lock nuts.

2) Turn the left and right tie rods equal amounts until the toe-in is at the specification.

Both the left and right tie-rods are right-hand threaded. To increase toe-in, turn both tie-rods clockwise equal amounts (as viewed from the inside of the vehicle).

3) Tighten tie-rod lock nut.



Tightening torque:

$83 \pm 5 \text{ N}\cdot\text{m}$ ($8.5 \pm 0.5 \text{ kg}\cdot\text{m}$, $61.5 \pm 3.6 \text{ ft}\cdot\text{lb}$)

CAUTION:

Correct tie-rod boot, if it is twisted.

NOTE:

Check the left and right wheel steering angle is within specifications.

5. REAR WHEEL TOE-IN

● Inspection

1) Using a toe-in gauge, measure rear wheel toe-in.

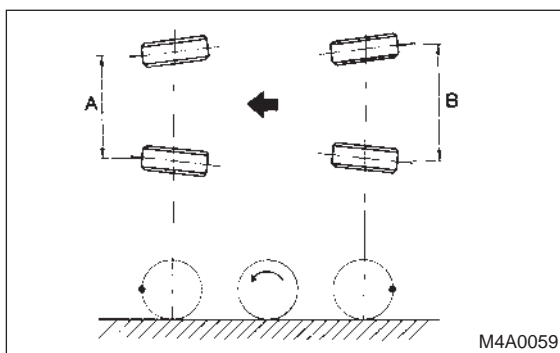
Toe-in: 0 ± 3 mm (0 ± 0.12 in)

2) Mark rear sides of left and right tires at height corresponding to center of spindles and measure distance "B" between marks.

3) Move vehicle forward so that marks line up with front sides at height corresponding to center of spindles.

4) Measure distance "A" between left and right marks. Toe-in can then be obtained by the following equation:

$$B - A = \text{Toe-in}$$



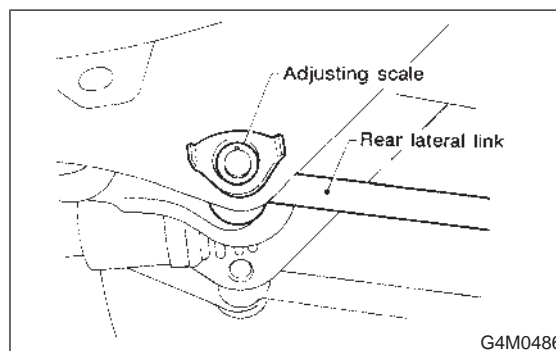
● Adjustment

1) Loosen self-locking nut on inner side of rear lateral link.

CAUTION:

● When loosening or tightening adjusting bolt, hold bolt head and turn self-locking nut.


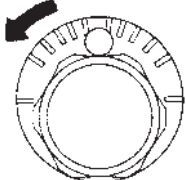

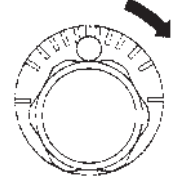
● Discard loosened self-locking nut and replace with a new one.



2) Turn adjusting bolt head until toe-in is at the specification.

NOTE:

When left and right wheels are adjusted for toe-in at the same time, the movement of one scale graduation changes toe-in by approximately 3 mm (0.12 in).

	Left side		Right side	
Toe-in is increased.		Rotate clockwise.		Rotate counterclockwise.
	B4M0192		B4M0352	
Toe-in is decreased.		Rotate counterclockwise.		Rotate clockwise.
	B4M0352		B4M0192	

3) Tighten self-locking nut.

Tightening torque:

98 ± 15 N·m (10 ± 1.5 kg·m, 72 ± 11 ft·lb)

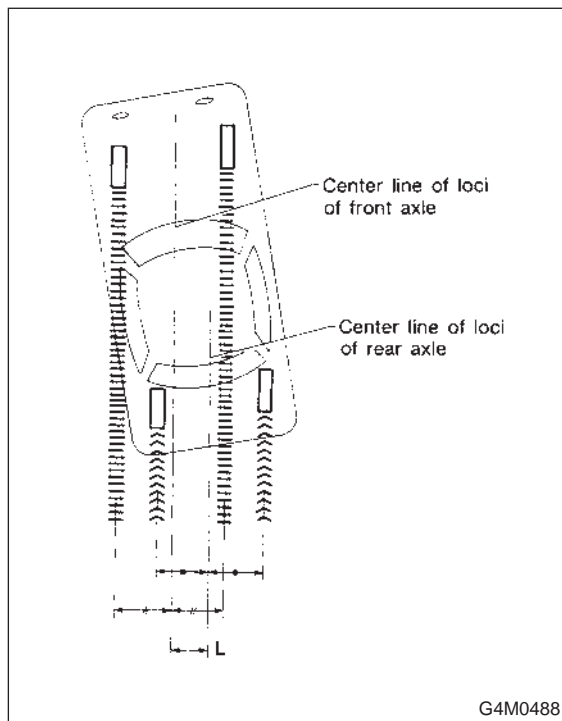
6. THRUST ANGLE

● Inspection

- 1) Position vehicle on a level surface.
- 2) Move vehicle 3 to 4 meters directly forward.
- 3) Determine locus of both front and rear axles.
- 4) Measure distance "L" between center line of loci of the axles.

Thrust angle:

Less than 20' when "L" is equal to or less than 15 mm (0.59 in).



● Adjustment

- 1) Make thrust angle adjustments by turning toe-in adjusting bolts of rear suspension equally in the same direction.

NOTE:

On FWD models, turn adjusting wheels one by one, by the same amount in the opposite direction of the adjusting bolts.

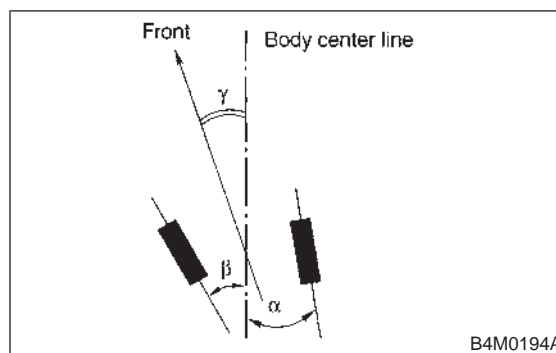
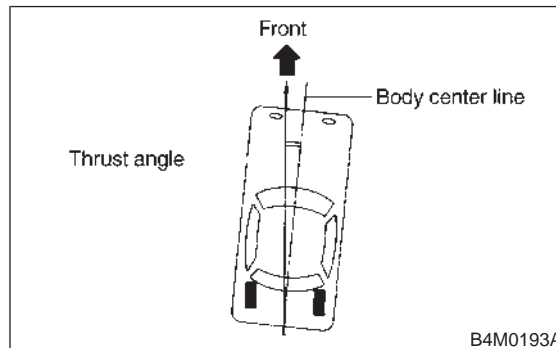
- 2) When one rear wheel is adjusted in a toe-in direction, adjust the other rear wheel equally in toe-out direction, in order to make thrust angle adjustment.
- 3) When left and right adjusting bolts are turned incrementally by one graduation in the same direction, the thrust angle of the AWD model will change approximately 10' ["L" is almost equal to 7.5 mm (0.295 in)].

Thrust angle:

0°±20'

NOTE:

Thrust angle refers to a mean value of left and right rear wheel toe angles in relation to vehicle body center line. Vehicle is driven straight in the thrust angle direction while swinging in the oblique direction depending on the degree of the mean thrust angle.



Thrust angle: r

$$r = (\alpha - \beta) / 2$$

α: Right rear wheel toe angle

β: Left rear wheel toe angle

NOTE:

Here, use only positive toe-in values from each wheel to substitute for α and β in the equation.

7. STEERING ANGLE

● Inspection

- 1) Place vehicle on a turning radius gauge.
- 2) While depressing brake pedal, turn steering wheel fully to the left and right. With steering wheel held at each fully turned position, measure both the inner and outer wheel steering angle.

Steering angle:

Inner wheel 37.4°±1.5°

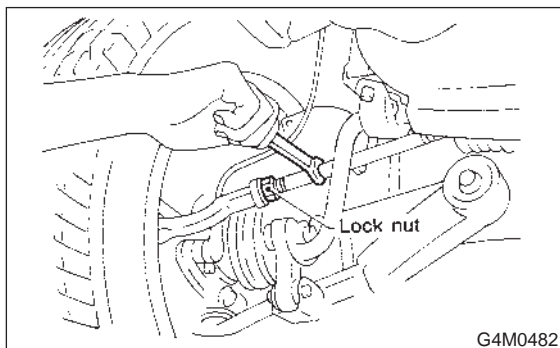
Outer wheel 32.5°±1.5°

- **Adjustment**

Turn tie-rod to adjust steering angle of both inner and outer wheels.

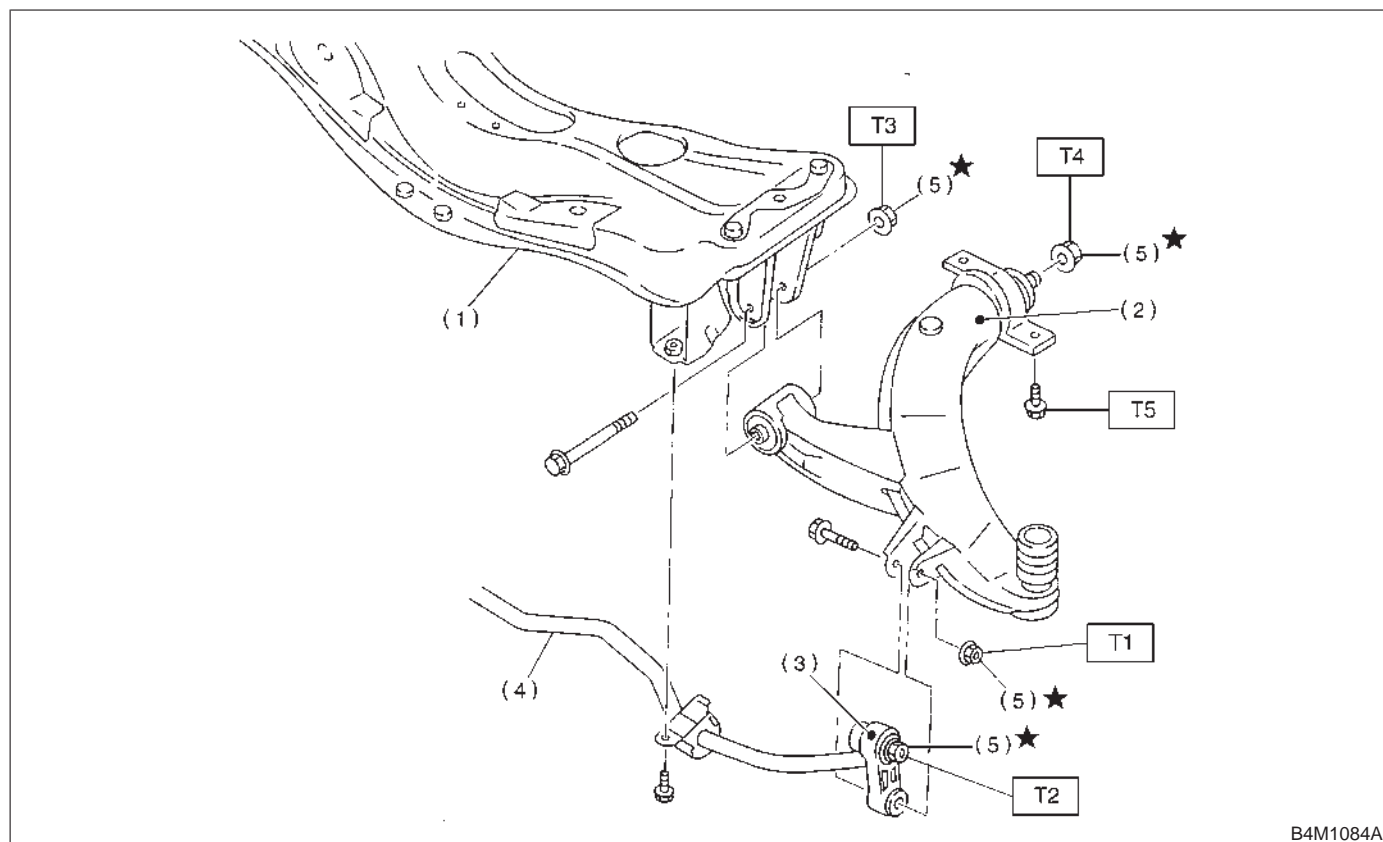
CAUTION:

- Check toe-in.
- Correct boot if it is twisted.



2. Front Transverse Link

A: REMOVAL



B4M1084A

- (1) Front crossmember
- (2) Transverse link
- (3) Stabilizer link
- (4) Front stabilizer
- (5) Self-locking nut

Tightening torque: N·m (kg·m, ft·lb)

T1: 29±5 (3.0±0.5, 21.7±3.6)

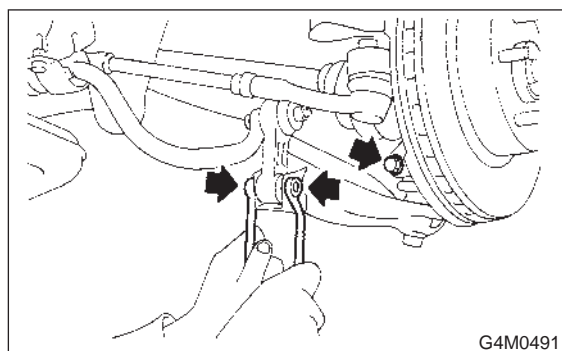
T2: 44±6 (4.5±0.6, 32.5±4.3)

T3: 98±15 (10.0±1.5, 72±11)

T4: 196±25 (20.0±2.5, 145±18)

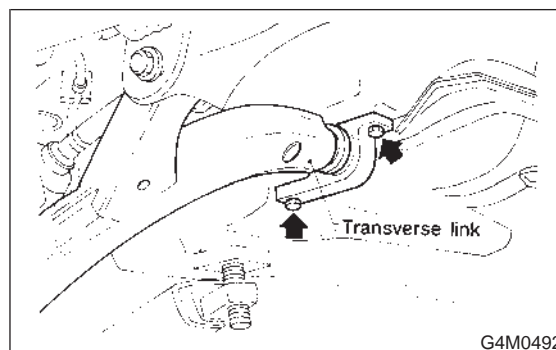
T5: 245±49 (25.0±5.0, 181±36)

- 1) Disconnect stabilizer link from transverse link.
- 2) Remove bolt securing ball joint of transverse link to housing.



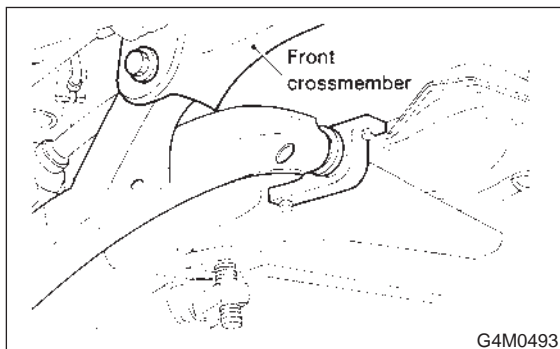
- 3) Remove nuts (do not remove bolts.) securing transverse link to crossmember.

- 4) Remove two bolts securing bushing bracket of transverse link to car body at rear bushing location.



- 5) Extract ball joint from housing.

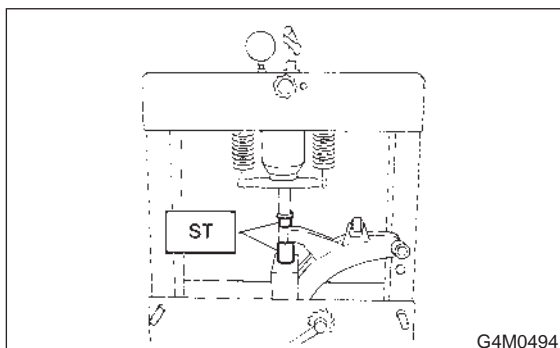
- 6) Remove bolts securing transverse link to crossmember and extract transverse link from crossmember.



B: DISASSEMBLY

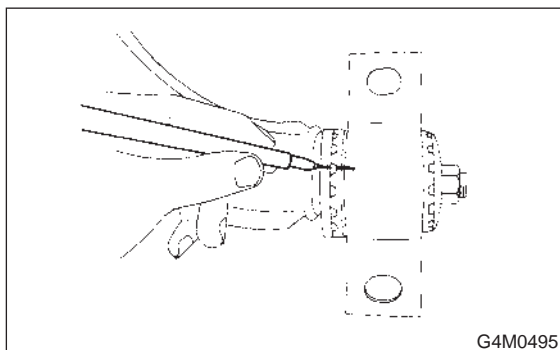
1. FRONT BUSHING

Using ST, press front bushing out of place.
ST 927680000 INSTALLER & REMOVER SET



2. REAR BUSHING

- 1) Scribe an aligning mark on transverse link and rear bushing.



- 2) Loosen nut and remove rear bushing.

C: INSPECTION

- 1) Check transverse link for wear, damage and cracks, and correct or replace if defective.
- 2) Check bushings for cracks, fatigue or damage.
- 3) Check rear bushing for oil leaks.

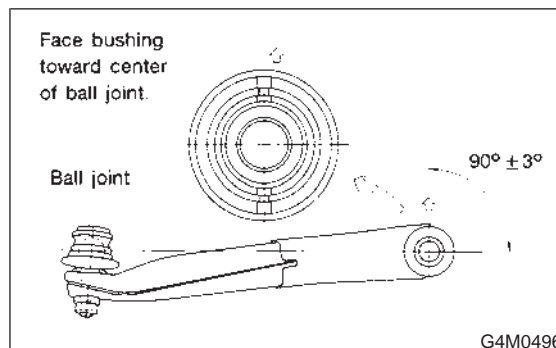
D: ASSEMBLY

1. FRONT BUSHING

To reassemble, reverse disassembly procedures.

CAUTION:

Install front bushing in correct direction, as shown in figure.



2. REAR BUSHING

- 1) Install rear bushing to transverse link and align aligning marks scribed on the two.
- 2) Tighten self-locking nut.

CAUTION:

- Discard loosened self-locking nut and replace with a new one.
- While holding rear bushing so as not to change position of aligning marks, tighten self-locking nut.

Tightening torque:

196±25 N·m (20.0±2.5 kg·m, 145±18 ft·lb)

E: INSTALLATION

- 1) Temporarily tighten the two bolts used to secure rear bushing of the transverse link to body.

NOTE:

These bolts should be tightened to such an extent that they can still move back and forth in the oblong shaped hole in the bracket (which holds the bushing).

- 2) Install bolts used to connect transverse link to crossmember and temporarily tighten with nuts.

CAUTION:

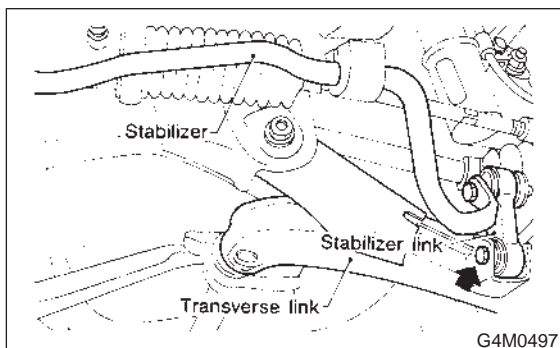
Discard loosened self-locking nut and replace with a new one.

- 3) Insert ball joint into housing.

4) Connect stabilizer link to transverse link, and temporarily tighten bolts.

CAUTION:

Discard loosened self-locking nut and replace with a new one.



5) Tighten the following points in the order shown afterward when wheels are in full contact with the ground and vehicle is curb weight.

(1) Transverse link and stabilizer

Tightening torque:

$29 \pm 5 \text{ N}\cdot\text{m}$ ($3.0 \pm 0.5 \text{ kg}\cdot\text{m}$, $21.7 \pm 3.6 \text{ ft}\cdot\text{lb}$)

(2) Transverse link and crossmember

Tightening torque:

$98 \pm 15 \text{ N}\cdot\text{m}$ ($10.0 \pm 1.5 \text{ kg}\cdot\text{m}$, $72 \pm 11 \text{ ft}\cdot\text{lb}$)

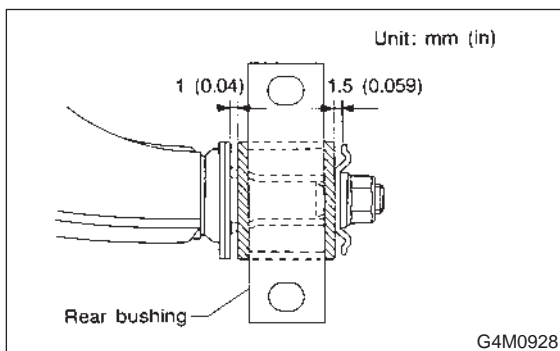
(3) Transverse link rear bushing and body

Tightening torque:

$245 \pm 49 \text{ N}\cdot\text{m}$ ($25 \pm 5 \text{ kg}\cdot\text{m}$, $181 \pm 36 \text{ ft}\cdot\text{lb}$)

NOTE:

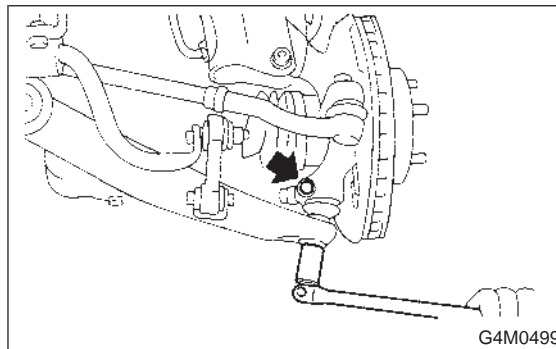
- Move rear bushing back and forth until transverse link- to-rear bushing clearance is established (as indicated in figure.) before tightening.
- Check wheel alignment and adjust if necessary.



3. Front Ball Joint

A: REMOVAL

- 1) Remove the wheels.
- 2) Pull out the cotter pin from the ball stud, remove the castle nut, and extract the ball stud from the transverse link.
- 3) Remove the bolt securing the ball joint to the housing.

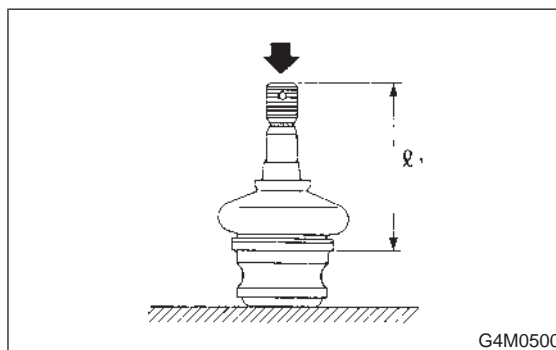


- 4) Extract the ball joint from the housing.

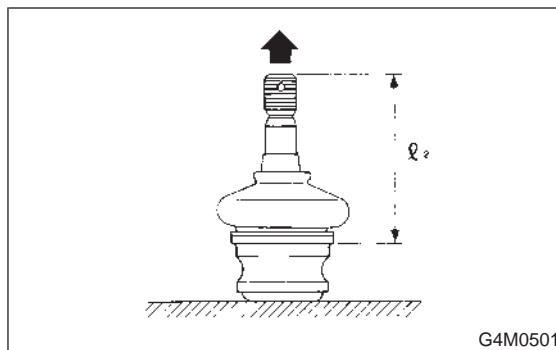
B: INSPECTION

1) Measure play of ball joint by the following procedures. Replace with a new one when the play exceeds the specified value.

- (1) With 686 N (70 kg, 154 lb) loaded in the direction shown in the figure, measure dimension ℓ_1 .



- (2) With 686 N (70 kg, 154 lb) loaded in the opposite direction shown in the figure, measure dimension ℓ_2 .



(3) Calculate plays from the following formula.

$$S = \ell_2 - \ell_1$$

(4) When plays is larger than the following value, replace with a new one.

FRONT BALL JOINT

Specified play for replacement: S

Less than 0.3 mm (0.012 in)

2) When play is smaller than the specified value, visually inspect the dust cover.

3) The ball joint and cover that have been removed must be checked for wear, damage or cracks, and any defective part must be replaced.

4) If the dust cover is damaged, replace with the new ball joint.

C: INSTALLATION

1) Install ball joint onto housing.

Torque (Bolt):

49 N·m (5.0 kg-m, 36 ft-lb)

CAUTION:

Do not apply grease to tapered portion of ball stud.

2) Connect ball joint to transverse link.

Torque (Castle nut):

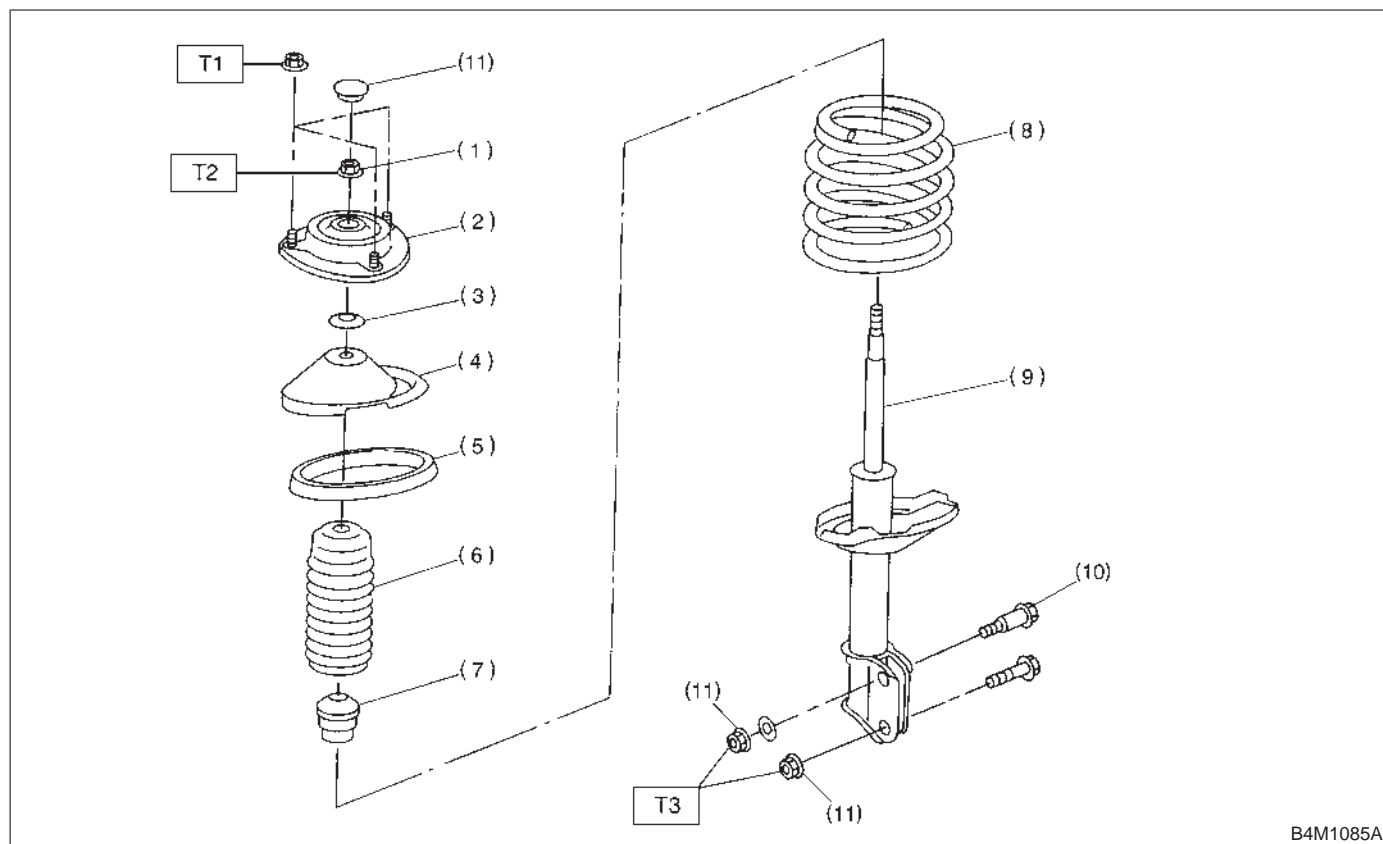
39 N·m (4.0 kg-m, 29 ft-lb)

3) Retighten castle nut further within 60° until a slot in castle nut is aligned with the hole in ball stud end, then insert new cotter pin and bend it around castle nut.

4) Install front wheels.

4. Front Strut

A: REMOVAL



- | | |
|-----------------------|-----------------------|
| (1) Dust seal | (7) Helper |
| (2) Strut mount | (8) Coil spring |
| (3) Spacer | (9) Damper strut |
| (4) Upper spring seat | (10) Adjusting bolt |
| (5) Rubber seat | (11) Self-locking nut |
| (6) Dust cover | |

Tightening torque: N·m (kg·m, ft·lb)

T1: 20±6 (2.0±0.6, 14.5±4.3)

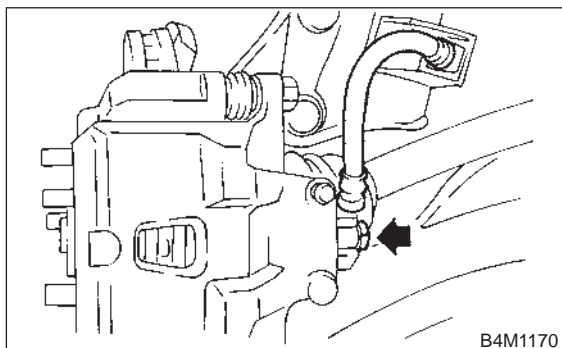
T2: 49⁺¹⁰/₋₀ (5.0^{+1.0}/₋₀, 36⁺⁷/₋₀)

T3: 152±20 (15.5±2.0, 112±14)

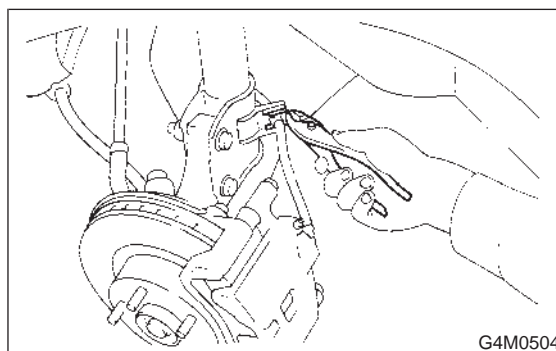
- 1) Remove wheel.
- 2) Depress brake pedal and hold it down using a wooden block etc.
- 3) Remove union bolts from caliper.

CAUTION:

Use brake hose cap to prevent brake fluid from escaping.



- 4) Remove brake hose clamp and disconnect brake hose from strut. Attach brake hose to body using gum tape.



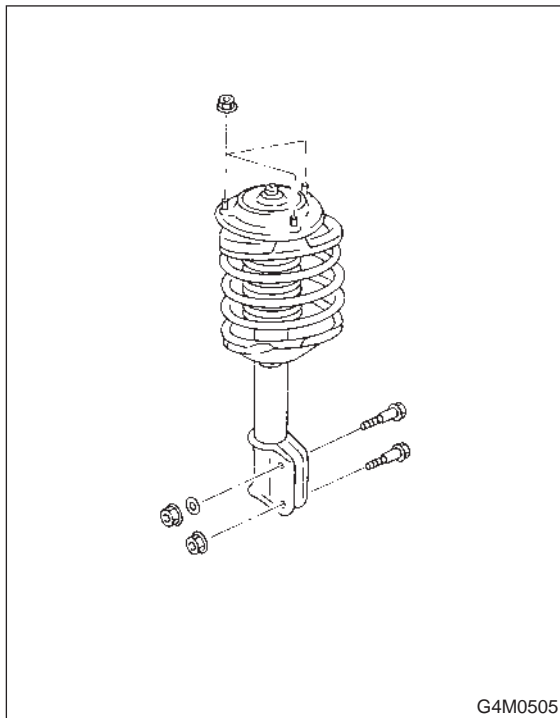
- 5) Scribe an alignment mark on the camber adjusting bolt which secures strut to housing.
- 6) Remove bolt securing the ABS sensor harness on models equipped with ABS.

7) Remove two bolts securing housing to strut.

CAUTION:

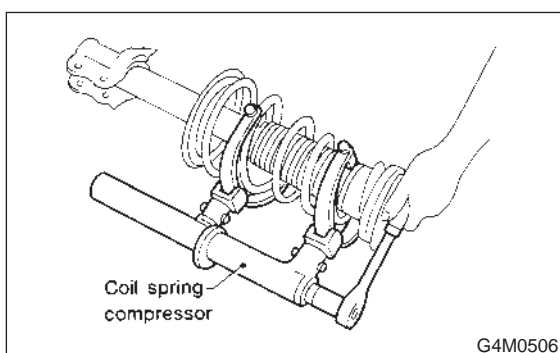
While holding head of adjusting bolt, loosen self-locking nut.

8) Remove the three nuts securing strut mount to body.



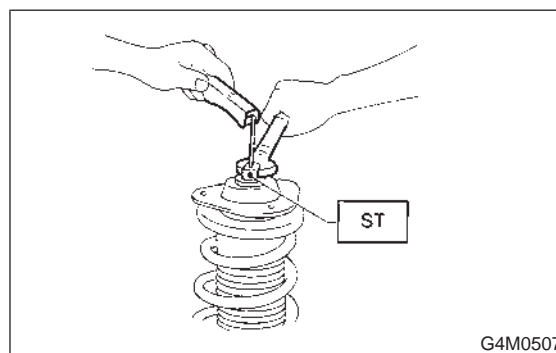
B: DISASSEMBLY

1) Using a coil spring compressor, compress coil spring.



2) Using ST, remove self-locking nut.

ST 927760000 STRUT MOUNT SOCKET



3) Remove strut mount, upper spring seat and rubber seat from strut.

4) Gradually decreasing compression force, and remove coil spring.

5) Remove dust cover and helper spring.

C: INSPECTION

Check the disassembled parts for cracks, damage and wear, and replace with new parts if defective.

1. DAMPER STRUT

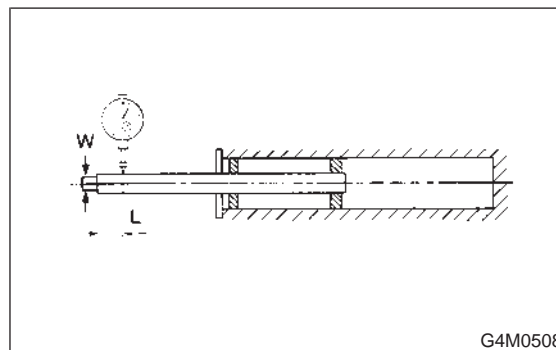
1) Check for oil leakage.

2) Move the piston rod up and down to check its operates smoothly without any binding.

3) Play of piston rod

● Measure the play as follows:

Fix outer shell and fully extend the rod. Set a dial gauge at the end of the rod: L [10 mm (0.39 in)], then apply a force of: W [± 20 N (± 2 kg, ± 4 lb)] to threaded portion. With the force of ± 20 N (± 2 kg, ± 4 lb) applied, read both dial gauge readings, P_1 and P_2 .



The free play is determined by the following equation:

Limit of play:

Less than 0.8 mm (0.031 in)

If the play is greater, replace the strut.

2. STRUT MOUNT

Check rubber part for creep, cracks and deterioration, and replace it with new one if defective.

3. DUST COVER

If any cracks or damage are found, replace it with a new one.

4. COIL SPRING

One having permanent strain should be replaced with a new one. When vehicle posture is uneven, although there are no considerable reasons like tire puncture, uneven loading, etc., check coil spring for its free length, cracks, etc., referring to specifications, and replace it with a new one if defective.

5. HELPER

Replace it with new one if cracked or damaged.

D: ASSEMBLY

1) Before installing coil spring, strut mount, etc., on the strut, check for the presence of air in the dampening force generating mechanism of the strut since air prevents proper dampening force from being produced.

2) Checking for the presence of air

(1) Place the strut vertically with the piston rod facing up.

(2) Move the piston rod to the center of its entire stroke.

(3) While holding the piston rod end with fingertips, move the rod up and down.

(4) If the piston rod moves at least 10 mm (0.39 in) in step (3), purge air from the strut.

3) Air purging procedure

(1) Place the strut vertically with the piston rod facing up.

(2) Fully extend the piston rod.

(3) With the piston rod fully extended, place the piston rod side down. The strut must stand vertically.

(4) Fully contract the piston rod.

(5) Repeat the former four steps, 3 or 4 times.

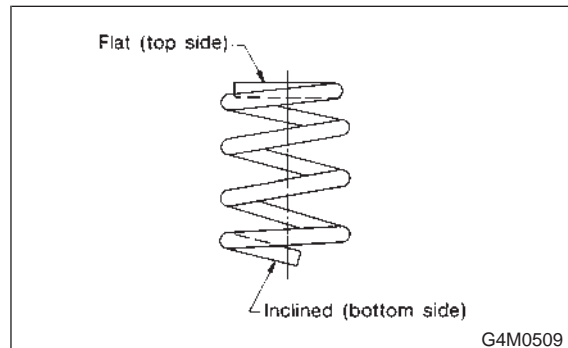
NOTE:

After completely purging air from the strut, be sure to place the strut with the piston rod facing up. If it is laid down, check for entry of air in the strut as outlined under "Checking for the presence of air".

4) Using a coil spring compressor, compress the coil spring.

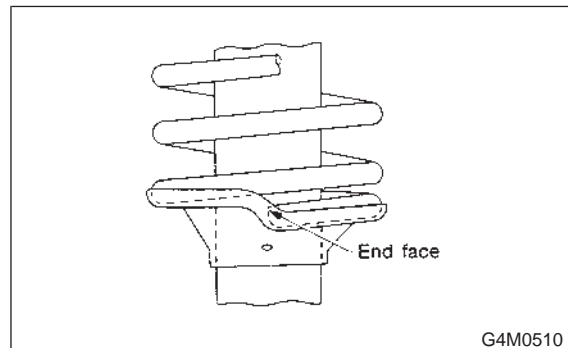
NOTE:

Make sure that the vertical installing direction of coil spring is as shown in figure.



5) Set the coil spring correctly so that its end face fits well into the spring seat as shown.

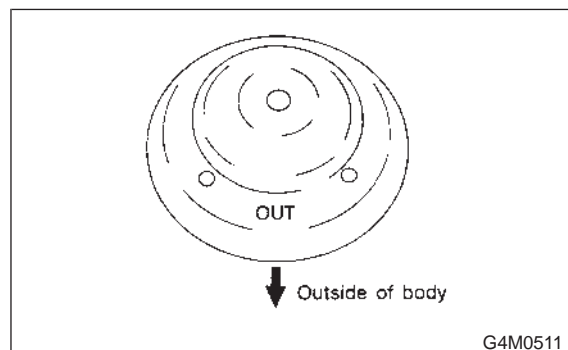
6) Install helper and dust cover to the piston rod.



7) Pull the piston rod fully upward, and install rubber seat and spring seat.

NOTE:

Ensure that upper spring seat is positioned with "OUT" mark facing outward.



8) Install strut mount to the piston rod, and tighten the self-locking nut temporarily.

CAUTION:

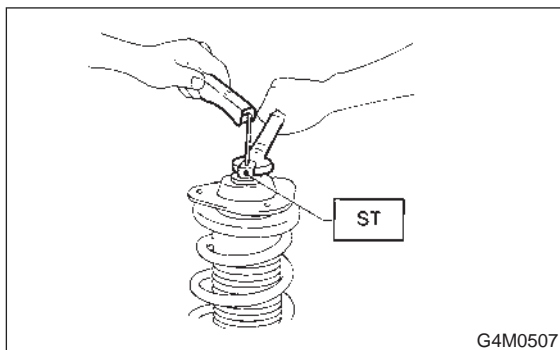
Be sure to use a new self-locking nut.

- 9) Using hexagon wrench to prevent strut rod from turning, tighten self-locking nut with ST.

Tightening torque:

49^{+10}_{-0} N·m ($5.0^{+1.0}_{-0}$ kg·m, 36^{+7}_{-0} ft·lb)

ST 927760000 STRUT MOUNT SOCKET



- 10) Loosen the coil spring carefully.

E: INSTALLATION

- 1) Install upper strut mount at upper side of strut to body and tighten with nuts.

Tightening torque:

20 ± 6 N·m (2.0 ± 0.6 kg·m, 14.5 ± 4.3 ft·lb)

- 2) Install ABS sensor harness to strut. (ABS equipped models)

Tightening torque:

152 ± 20 N·m (15.5 ± 2.0 kg·m, 112 ± 14 ft·lb)

- 3) Position aligning mark on camber adjustment bolt with aligning mark on lower side of strut.

CAUTION:

- While holding head of adjusting bolt, tighten self-locking nut.
- Be sure to use new self-locking nut.

Tightening torque:

152 ± 20 N·m (15.5 ± 2.0 kg·m, 112 ± 14 ft·lb)

- 4) Install brake hose at lower side of strut with clamp.
5) Install union bolts which secure brake caliper to brake hose.

Tightening torque:

18 ± 3 N·m (1.8 ± 0.3 kg·m, 13.0 ± 2.2 ft·lb)

CAUTION:

Be sure to bleed air from brake system.

- 6) Install wheels.

NOTE:

Check wheel alignment and adjust if necessary.

F: DISPOSAL PROCEDURES FOR GAS FILLED STRUT

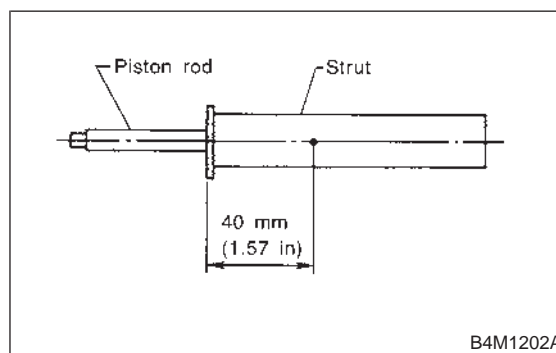
CAUTION:

- On struts which have "GAS FILLED" marked on outer housing under spring seat, completely discharge gas before disposing, following the methods below.
- Do not disassemble strut damper or place into a fire.
- Drill holes before disposing of gas filled struts.
- Before handling gas filled struts, be sure to wear goggles to protect eyes from gas, oil and/or filings.

**GAS FILLED
DO NOT OPEN
DO NOT HEAT**

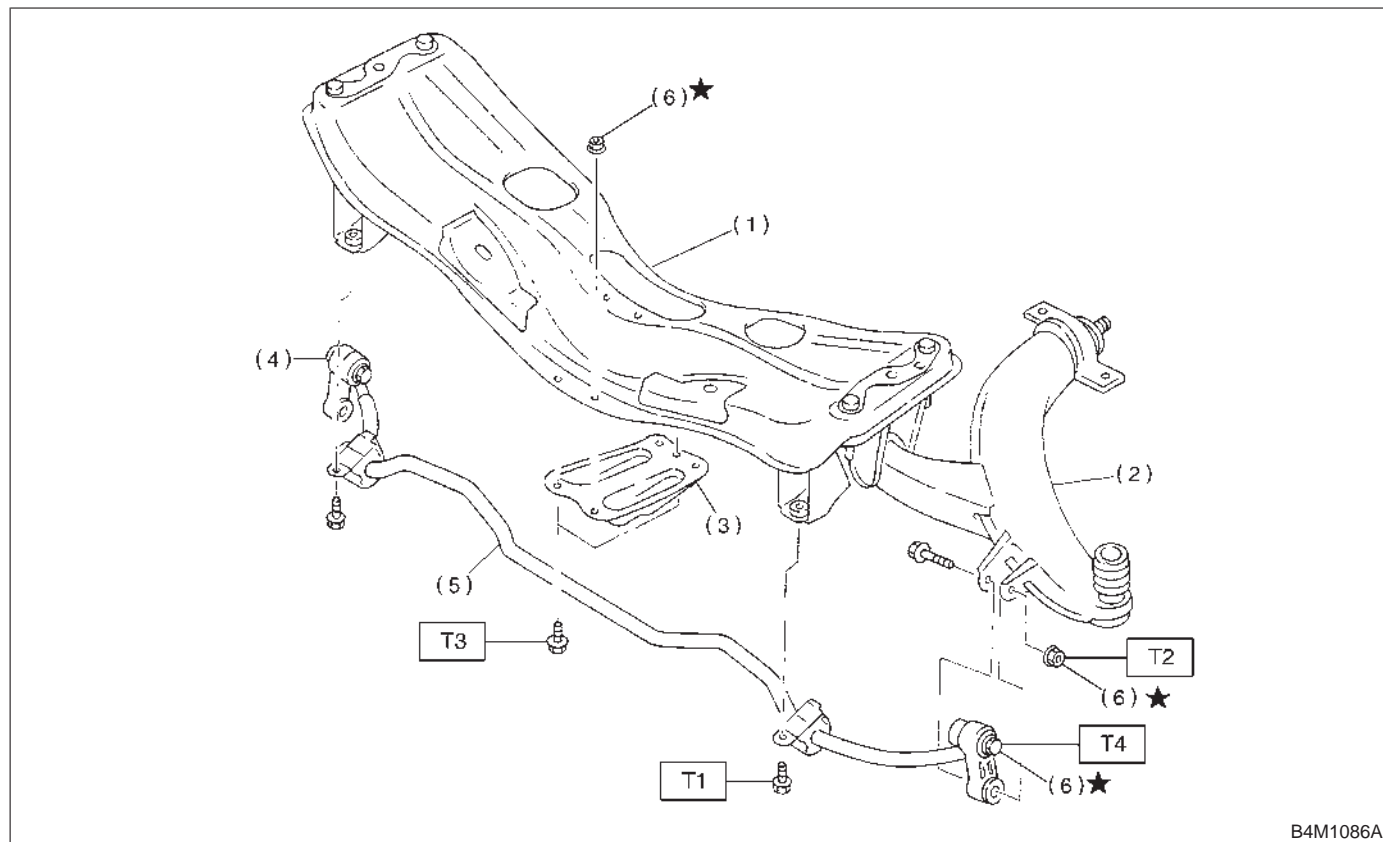
B4M1201

- 1) Place gas filled strut on a flat and level surface with piston rod fully extended.
2) Using a 2 to 3 mm (0.08 to 0.12 in) dia. drill, make holes in areas shown in the figure.



5. Front Stabilizer

A: REMOVAL



B4M1086A

- | | |
|-----------------------|----------------------|
| (1) Front crossmember | (6) Self-locking nut |
| (2) Transverse link | |
| (3) Jack-up plate | |
| (4) Stabilizer link | |
| (5) Front stabilizer | |

Tightening torque: N-m (kg-m, ft-lb)

T1: 25±4 (2.5±0.4, 18.1±2.9)

T2: 29±5 (3.0±0.5, 21.7±3.6)

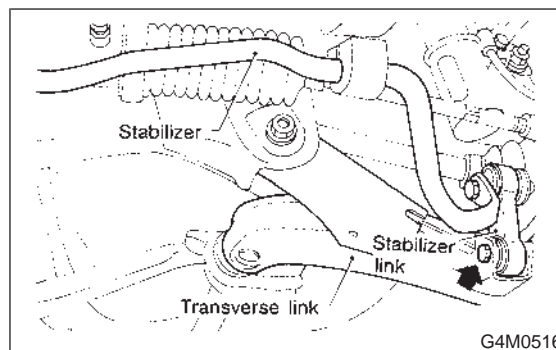
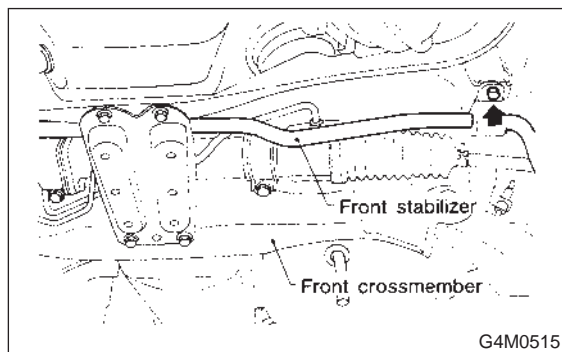
T3: 32±10 (3.3±1.0, 24±7)

T4: 44±6 (4.5±0.6, 32.5±4.3)

1) Jack-up the front part of the vehicle, support it with safety stands (rigid racks).

2) Remove bolts which secure stabilizer to crossmember.

3) Remove bolts which secure stabilizer link to front transverse link.



4) Remove jack-up plate from lower part of crossmember.

B: INSPECTION

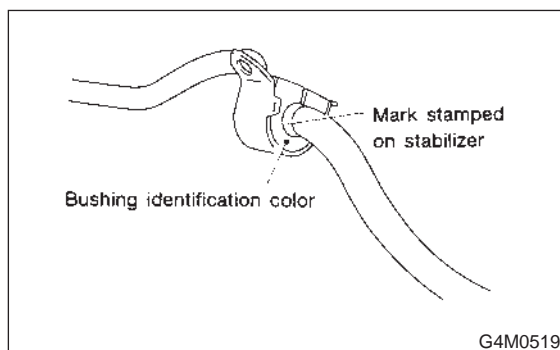
- 1) Check bushing for cracks, fatigue or damage.
- 2) Check stabilizer links for deformities, cracks, or damage, and bushing for protrusions from the hole of stabilizer link.

C: INSTALLATION

- 1) To install, reverse the removal procedure.

NOTE:

- Install bushing (on front crossmember side) while aligning it with paint mark on stabilizer.
- Ensure that bushing and stabilizer have the same identification colors when installing.



- 2) Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is curb weight.

Tightening torque:**Jack-up plate to crossmember:**

32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

Stabilizer link to front transverse link:

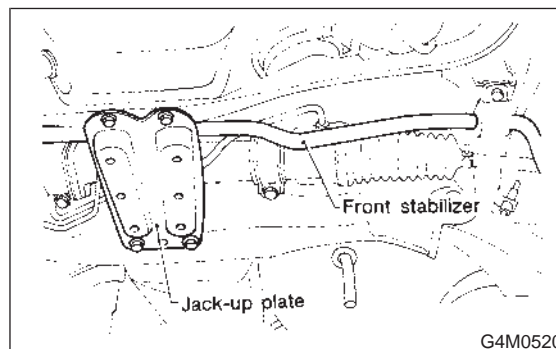
29±5 N·m (3.0±0.5 kg-m, 21.7±3.6 ft-lb)

Stabilizer to crossmember:

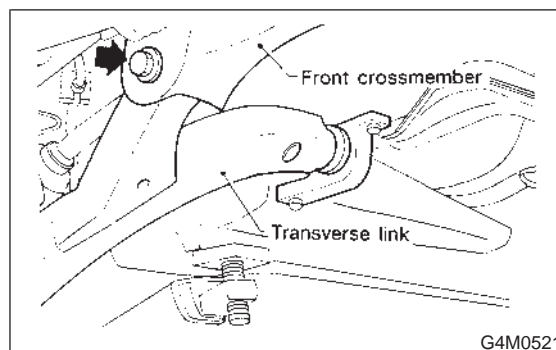
25±4 N·m (2.5±0.4 kg-m, 18.1±2.9 ft-lb)

6. Front Crossmember**A: REMOVAL**

- 1) Disconnect ground cable from battery.
- 2) Loosen front wheel nuts.
- 3) Jack-up vehicle, support it with safety stands (rigid racks), and remove front tires and wheels.
- 4) Remove both stabilizer and jack-up plate.



- 5) Disconnect tie-rod end from housing.
- 6) Remove front exhaust pipe.
- 7) Remove front transverse link from front crossmember and body.



- 8) Remove nuts attaching engine mount cushion rubber to crossmember.
- 9) Remove self-locking nuts connecting steering U/J and pinion shaft.
- 10) Lift engine by approx. 10 mm (0.39 in) by using chain block.
- 11) Support crossmember with a jack, remove nuts securing crossmember to body and lower crossmember gradually along with steering gear-box.

CAUTION:

When removing crossmember downward, be careful that tie-rod end does not interfere with DOJ boot.

B: INSTALLATION

- 1) Installation is in the reverse order of removal procedures.

CAUTION:

Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is curb weight.

Tightening torque:

Transverse link bushing to crossmember:

98±15 N·m (10.0±1.5 kg-m, 72±11 ft-lb)

Stabilizer to bush:

25±4 N·m (2.5±0.4 kg-m, 18.1±2.9 ft-lb)

Tie-rod end to housing:

27.0±2.5 N·m (2.75±0.25 kg-m, 19.9±1.8 ft-lb)

Front cushion rubber to crossmember:

69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)

Universal joint to pinion shaft:

24±3 N·m (2.4±0.3 kg-m, 17.4±2.2 ft-lb)

Crossmember to body:

98±15 N·m (10.0±1.5 kg-m, 72±11 ft-lb)

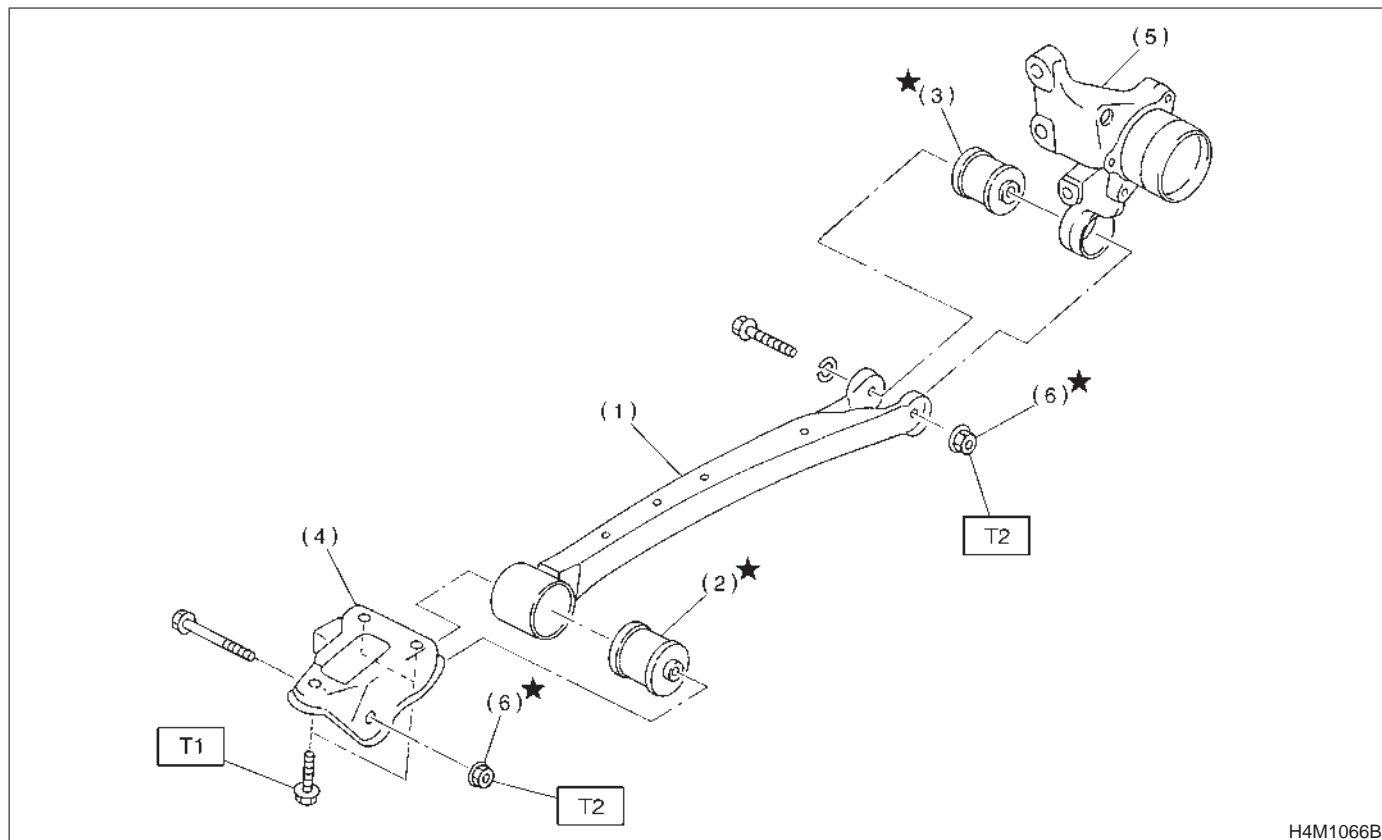
2) Purge air from power steering system.

NOTE:

Check wheel alignment and adjust if necessary.

7. Rear Trailing Link

A: REMOVAL



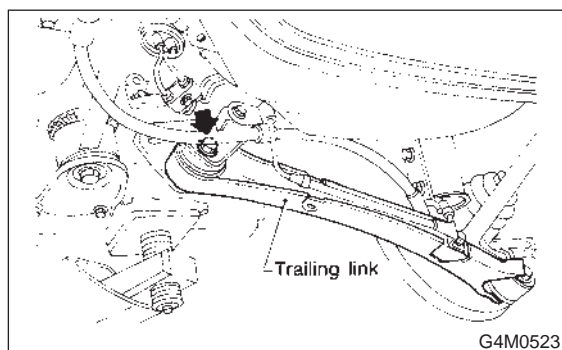
- | | |
|-------------------|----------------------|
| (1) Trailing link | (5) Housing |
| (2) Front bushing | (6) Self-locking nut |
| (3) Rear bushing | |
| (4) Bracket | |

Tightening torque: N-m (kg-m, ft-lb)

T1: 98±20 (10.0±2.0, 72±14)

T2: 113±15 (11.5±1.5, 83±11)

- 1) Loosen rear wheel nuts.
- 2) Jack-up vehicle, support it with safety stands (rigid racks) and remove rear wheels.
- 3) Remove both rear parking brake clamp and ABS sensor harness. (only vehicle equipped with ABS)
- 4) Remove bolt which secure trailing link to trailing link bracket.

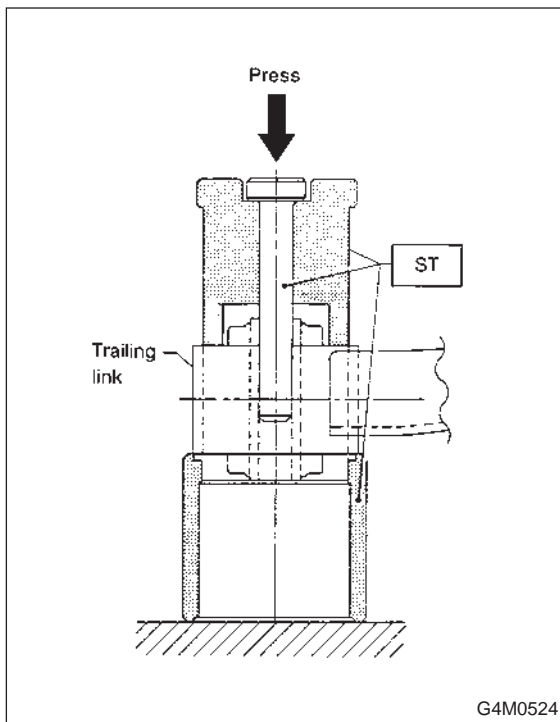


- 5) Remove bolt which secure trailing link to rear housing.

B: DISASSEMBLY

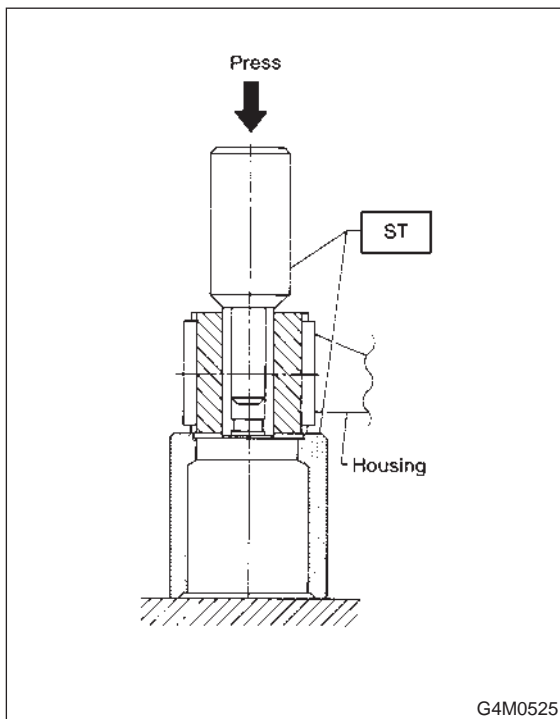
1. FRONT BUSHING

Using ST, press front bushing out of place.
ST 927720000 INSTALLER & REMOVER SET



2. REAR BUSHING

- 1) Remove housing. <Ref. to 4-2 [W2A0].>
- 2) Using ST, press rear bushing out of place.
ST 927730000 INSTALLER & REMOVER SET



C: INSPECTION

Check trailing links for bends, corrosion or damage.

D: ASSEMBLY

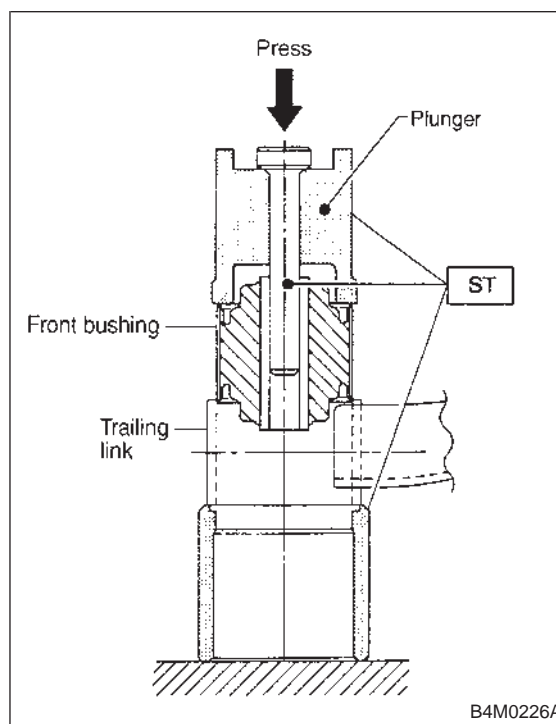
To assemble, reverse the disassembly procedures.

1. FRONT BUSHING

Using ST, press bushing into trailing link.
ST 927720000 INSTALLER & REMOVER SET

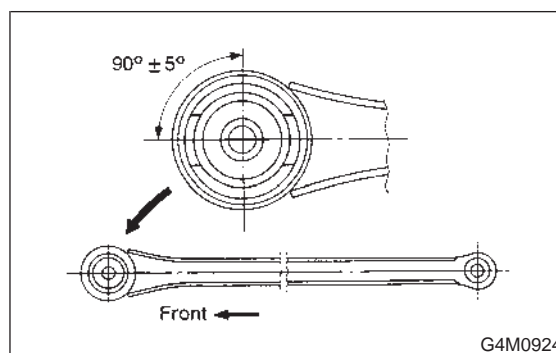
CAUTION:

When installing bushing, turn ST plunger upside down and press it until the plunger end surface contacts the trailing link end surface.



CAUTION:

Install front bushing in the proper direction, as shown in figure.



2. REAR BUSHING

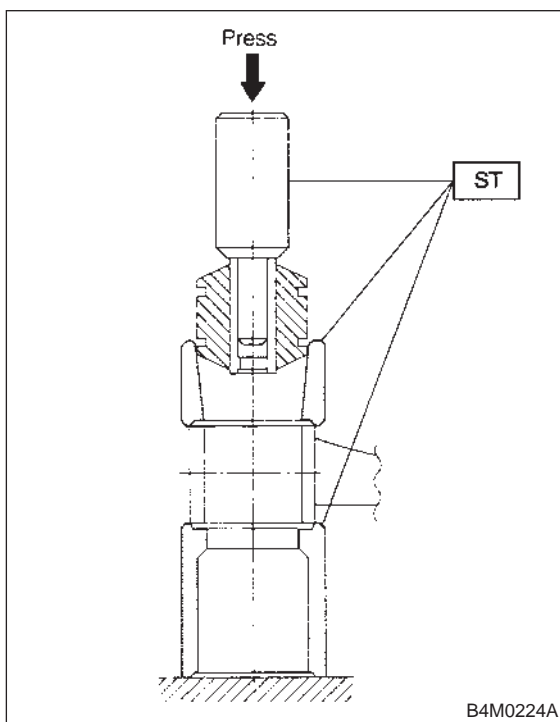
- 1) Using ST, press bushing into trailing link.
ST 927730000 INSTALLER & REMOVER SET

NOTE:

If it is difficult to press bushing into trailing link, apply water-diluted TIRE LUBE to the inner surface of ST as a lubricant.

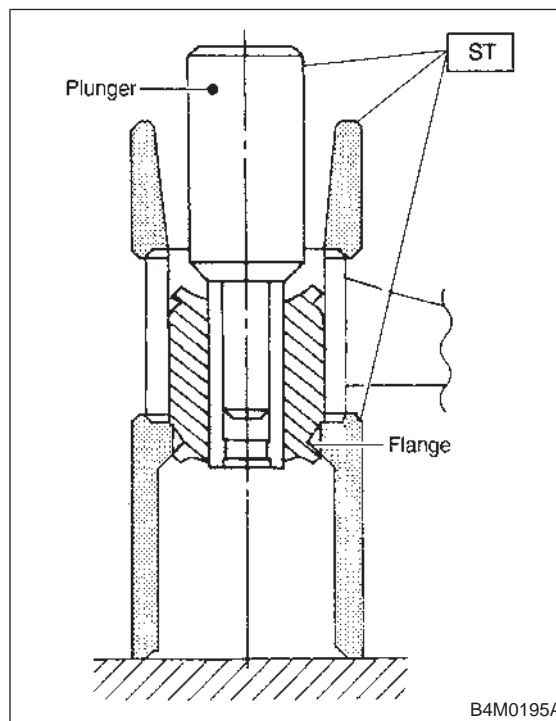
Specified lubricant:

TIRE LUBE : water = 1 : 3



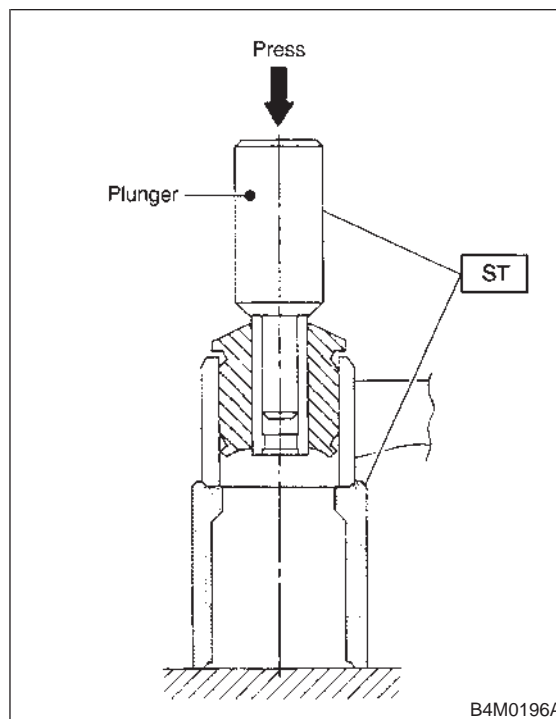
- 2) Press ST plunger until bushing flange protrudes beyond trailing link.

ST 927730000 INSTALLER & REMOVER SET



- 3) Turn trailing link upside down. Press ST plunger in the direction opposite that outlined in the former procedure until bushing is correctly positioned in trailing link.

ST 927730000 INSTALLER & REMOVER SET



E: INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

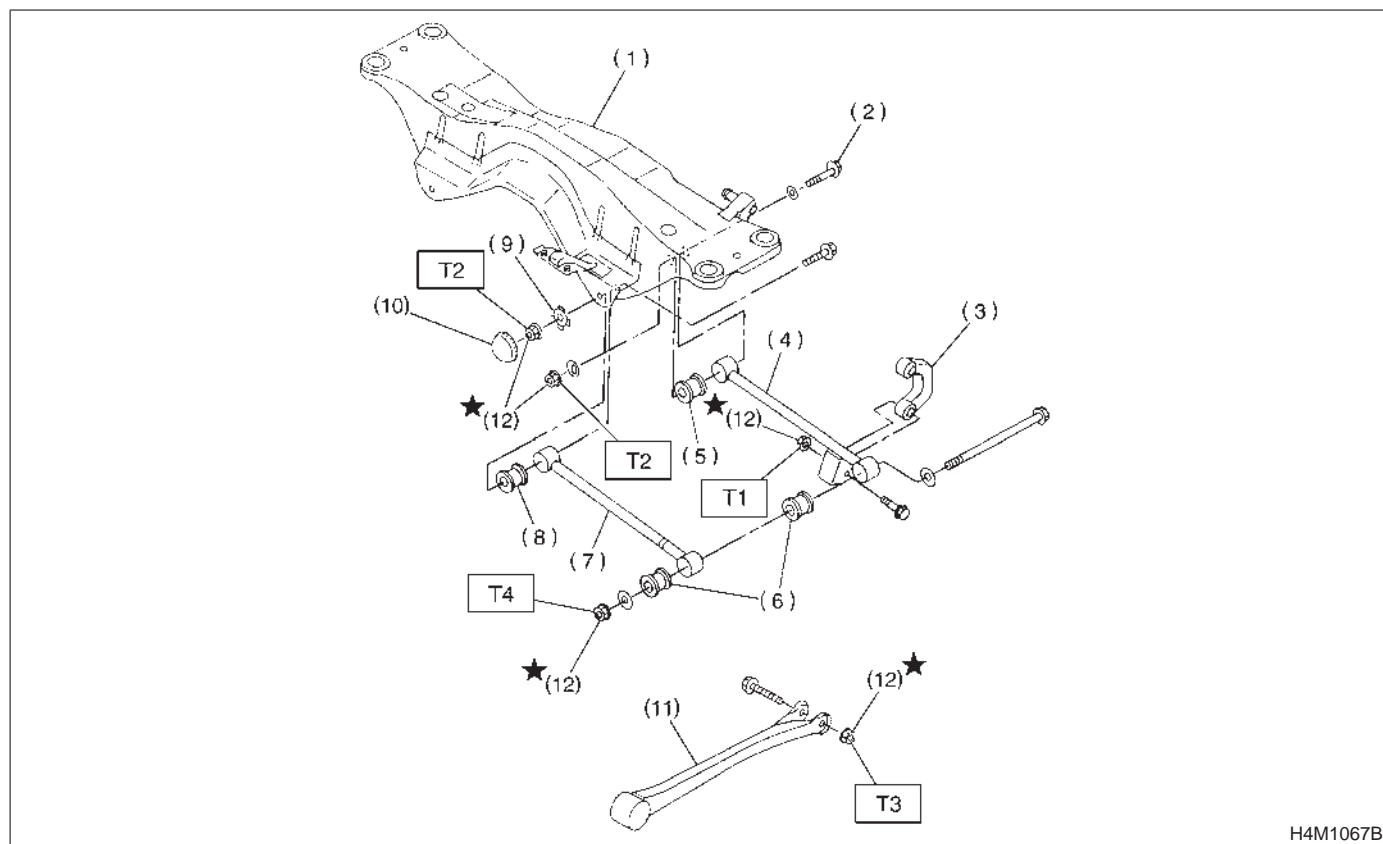
Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is at curb weight condition.

NOTE:

Check wheel alignment and adjust if necessary.

8. Lateral Link

A: REMOVAL



H4M1067B

- | | |
|------------------------|-----------------------|
| (1) Crossmember | (8) Bushing (B) |
| (2) Adjusting bolt | (9) Washer |
| (3) Stabilizer link | (10) Cap |
| (4) Rear lateral link | (11) Trailing link |
| (5) Bushing (C) | (12) Self-locking nut |
| (6) Bushing (A) | |
| (7) Front lateral link | |

Tightening torque: N-m (kg-m, ft-lb)**T1: 44±6 (4.5±0.6, 32.5±4.3)****T2: 98±15 (10.0±1.5, 72±11)****T3: 113±15 (11.5±1.5, 83±11)****T4: 137±20 (14.0±2.0, 101±14)**

1) Loosen wheel nuts. Jack-up vehicle and remove wheel.

2) Remove stabilizers.

3) (Models equipped with ABS)

Remove ABS sensor harness from trailing link.

4) Remove bolts which secure lateral link assembly to rear housing.

CAUTION:

Discard old self-locking nut. Replace with a new one.

5) Remove bolts which secure trailing link assembly to rear housing.

CAUTION:

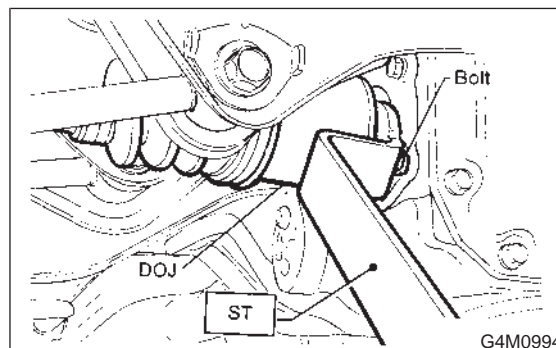
Discard old self-locking nut. Replace with a new one.

6) Remove DOJ from rear differential using ST. (2200 cc MT model)

ST 28099PA100 DRIVE SHAFT REMOVER

CAUTION:

Do not remove circlip attached to inside of differential.

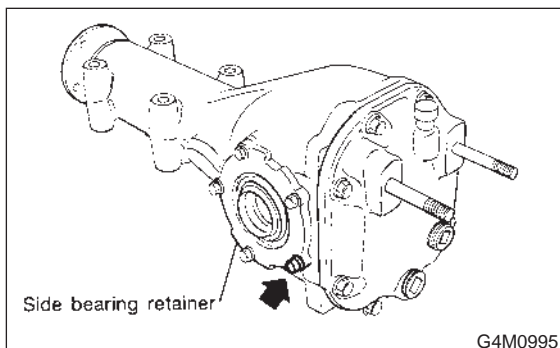


G4M0994

CAUTION:

Be careful not to damage side bearing retainer. Always use bolt as shown in figure, as supporting point for ST during removal.

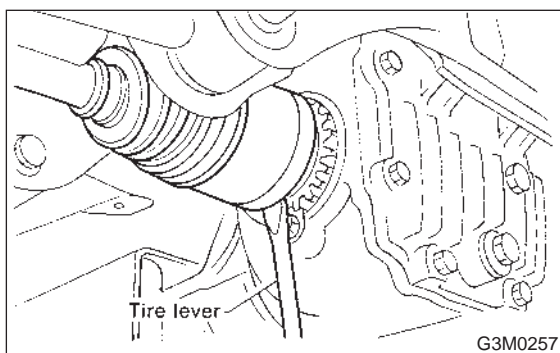
ST 28099PA100 DRIVE SHAFT REMOVER



7) Remove DOJ from rear differential using tire lever. (Except 2200 cc MT model)

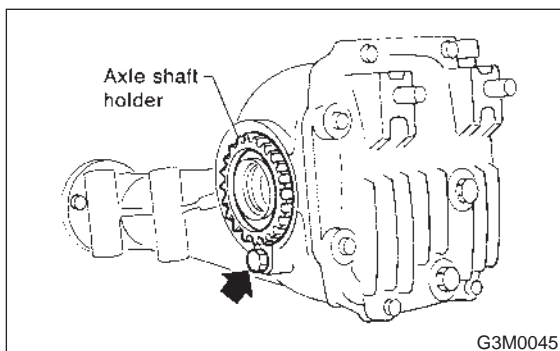
NOTE:

The side spline shaft circlip comes out together with the shaft.



CAUTION:

When removing the DOJ from the rear differential, fit tire lever to the bolt as shown in figure so as not to damage the axle shaft holder.



8) Scribe an alignment mark on rear lateral link adjusting bolt and crossmember.

9) Remove outer lateral link bolt securing lateral link to housing.

10) Remove bolts securing front and rear lateral links to crossmember, detach lateral links.

CAUTION:

To loosen adjusting bolt, always loosen nut while holding the head of adjusting bolt.

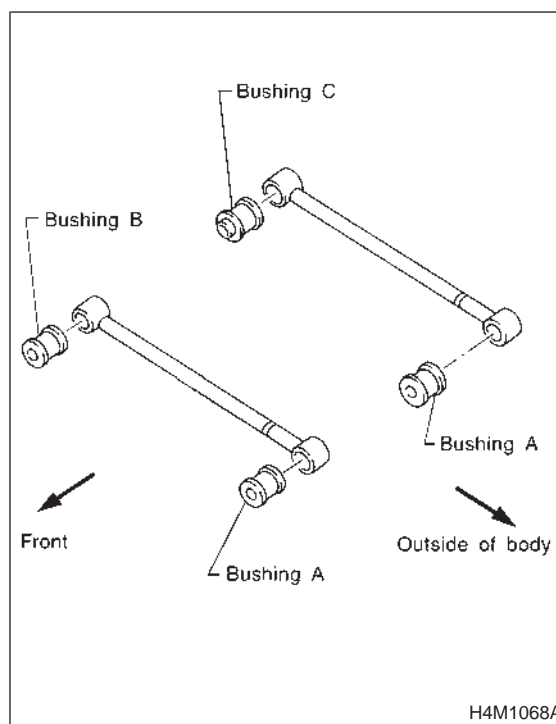
B: DISASSEMBLY

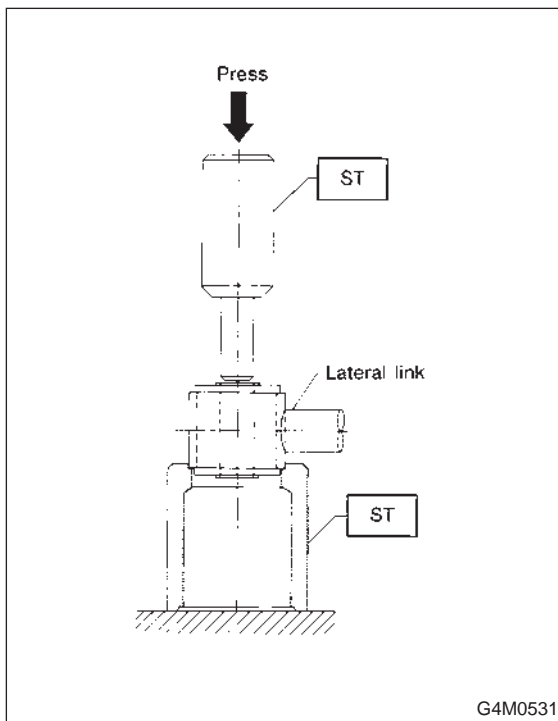
Using ST, press bushing out of place.

NOTE:

- Using the following figure as a guide, verify the type of bushings.
- Select ST according to the type of bushings used.

Bushing	INSTALLER & REMOVER SET
Bushing A	927700000
Bushing B	927690000
Bushing C	927700000





C: INSPECTION

Visually check lateral links for damage or bends.

D: ASSEMBLY

1) Using ST, press bushing into place.

CAUTION:

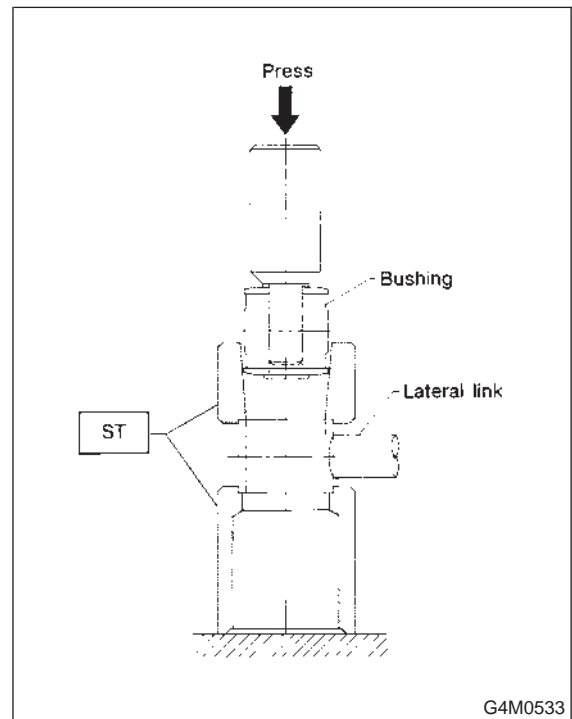
Select ST according to the type of bushings used.

NOTE:

- Use the same ST as that used during disassembly.
- If it is difficult to press bushing into trailing link, apply water-diluted TIRE LUBE to the inner surface of ST as a lubricant.

Specified lubricant:

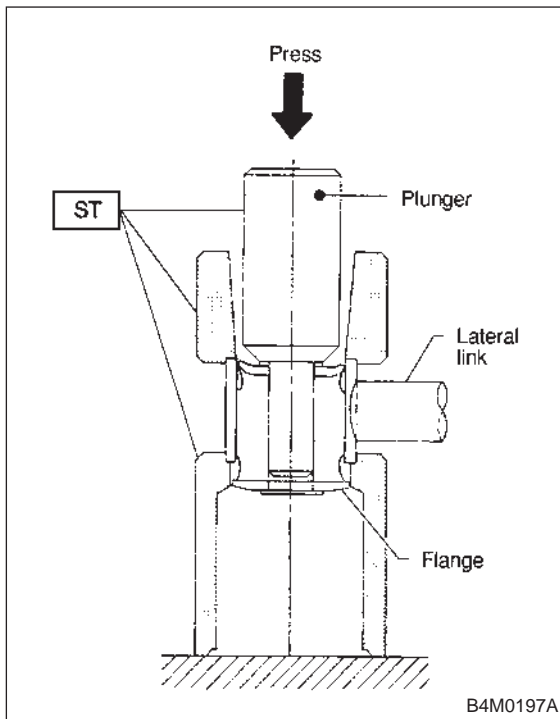
TIRE LUBE : water = 1 : 3



2) Press ST plunger until bushing flange protrudes beyond lateral link.

NOTE:

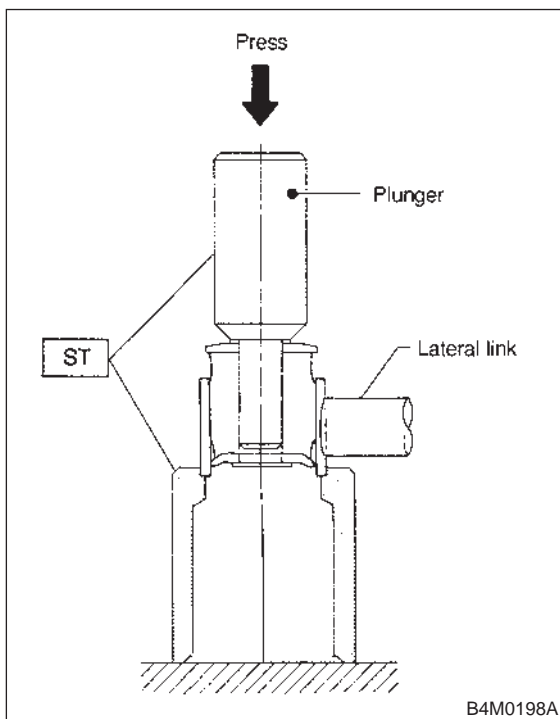
Use the same ST as that used during disassembly.



3) Turn lateral link upside down. Press ST plunger in the opposite direction that outlined in the former procedure until bushing is correctly positioned in trailing link.

NOTE:

Use the same ST as that used during disassembly.



E: INSTALLATION

To install, reverse removal procedures, observing the following instructions.

- Installation of DOJ to differential: <Ref. to 4-2 [W3E2].>

CAUTION:

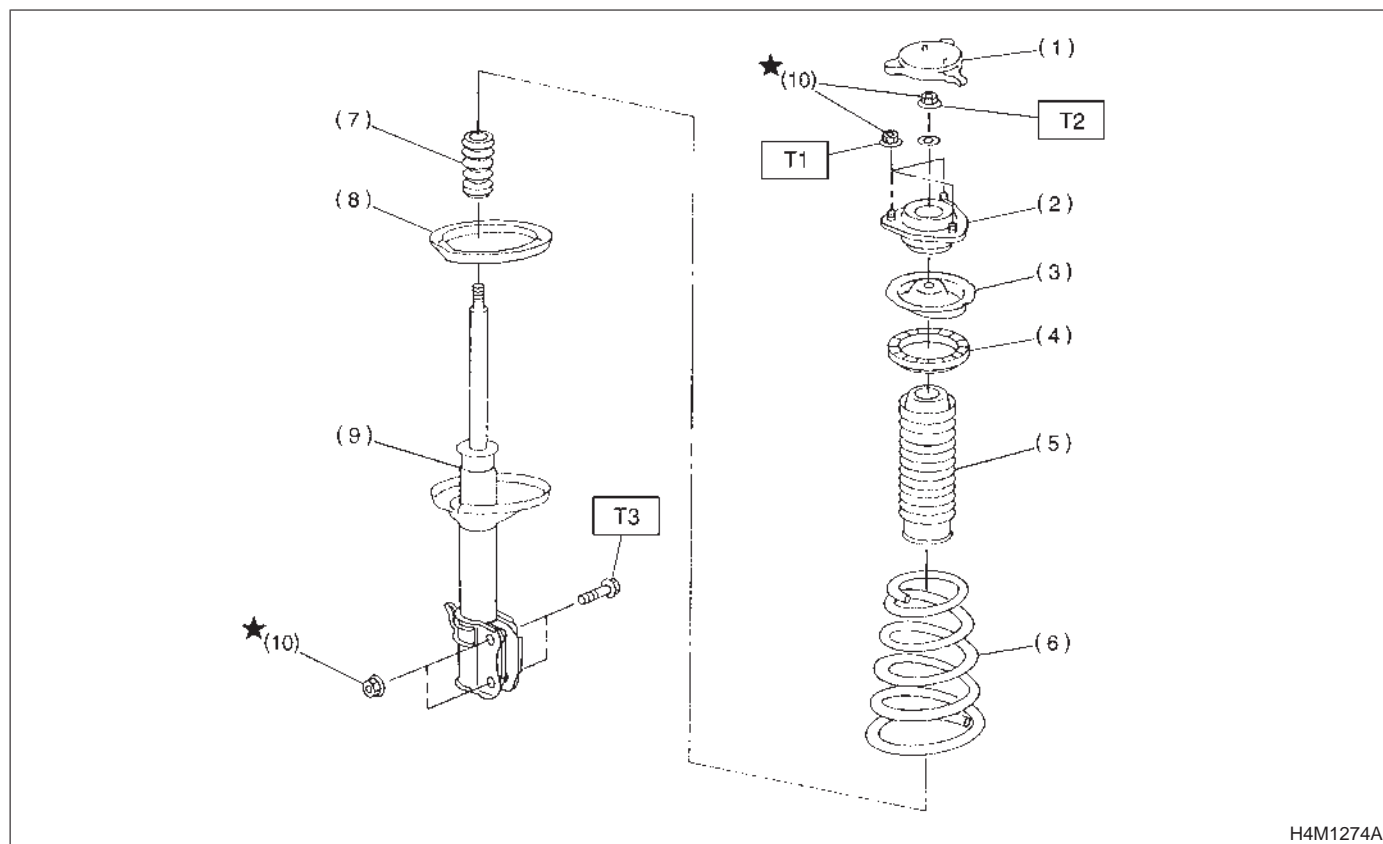
- Do not allow DOJ splines to damage side oil seal.
- Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is curb weight.
- Tighten nut when installing adjusting bolt.
- Replace self-locking nut and DOJ circlip with new ones.

NOTE:

- Lateral link washers for AWD model can be identified by the following color: Gold (AWD model)
- Check wheel alignment and adjust if necessary.

9. Rear Strut

A: REMOVAL



H4M1274A

- | | |
|----------------------------|-----------------------|
| (1) Cap (Only Wagon model) | (7) Helper |
| (2) Strut mount | (8) Rubber seat lower |
| (3) Spring seat | (9) Damper strut |
| (4) Rubber seat upper | (10) Self-locking nut |
| (5) Dust cover | |
| (6) Coil spring | |

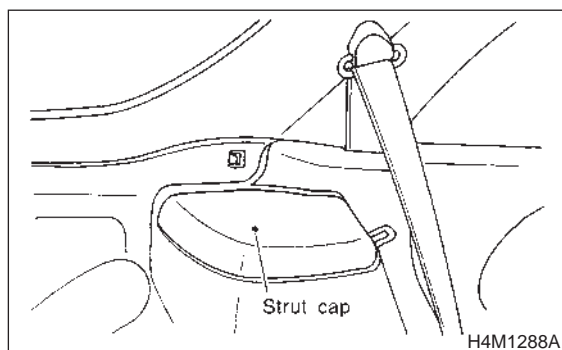
Tightening torque: N-m (kg-m, ft-lb)

T1: 20 ± 6 (2.0 ± 0.6 , 14.5 ± 4.3)

T2: 59 ± 10 (6.0 ± 1.0 , 43 ± 7)

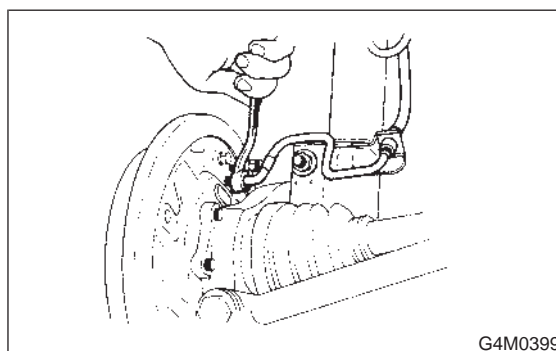
T3: 196^{+39}_{-10} ($20.0^{+4.0}_{-1.0}$, 145^{+29}_{-7})

- 1) Depress brake pedal and secure it in that position using a wooden block, etc.
- 2) Remove rear seat cushion and backrest. (Sedan model)
- 3) Remove strut cap of quarter trim. (Wagon model)



H4M1288A

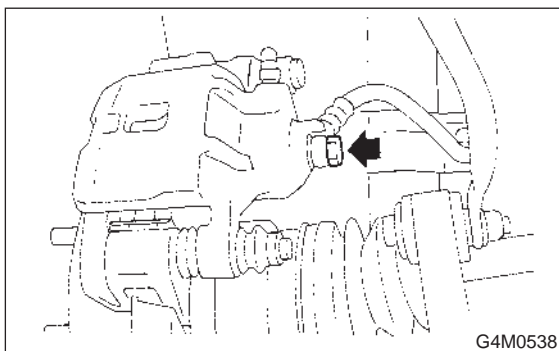
- 6) Jack-up vehicle, support it with safety stands (rigid racks) and remove rear wheels.
- 7) Remove brake hose clip.
- 8) Models equipped with rear drum brakes: Disconnect brake hose from brake pipe from strut, and disconnect brake pipe from drum brake.



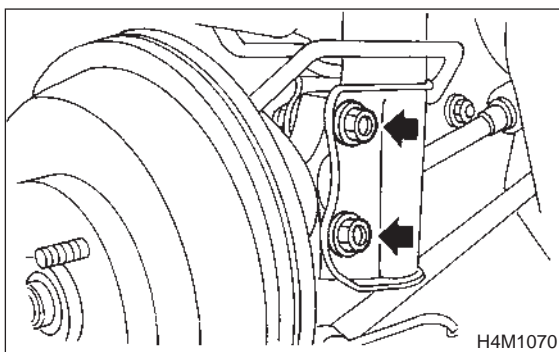
G4M0399

- 4) Remove strut mount cap. (Only Wagon model)
- 5) Loosen rear wheel nuts.

- 9) Models equipped with rear disc brakes:
Remove union bolt from brake caliper.



- 10) Remove bolts which secure rear strut to housing.



- 11) Remove nuts securing strut mount to body.

B: DISASSEMBLY

For disassembly of rear strut, refer to procedures outlined under front strut as a guide. <Ref. to 4-1 [W4B0].>

C: INSPECTION

Refer to Front Strut as a guide for inspection procedures. <Ref. to 4-1 [W4C0].>

D: ASSEMBLY

Refer to Front Strut as a guide for assembly procedures. <Ref. to 4-1 [W4D0].>

E: INSTALLATION

- 1) Tighten self-locking nut used to secure strut mount to car body.

CAUTION:

Discard loosened self-locking nut, and replace with a new one.

Tightening torque:

20 ± 6 N·m (2.0 ± 0.6 kg-m, 14.5 ± 4.3 ft-lb)

- 2) Tighten bolts which secure rear strut to housing.

Tightening torque:

**196^{+39}_{-10} N·m
($20.0^{+4.0}_{-1.0}$ kg-m, 145^{+29}_{-7} ft-lb)**

CAUTION:

Discard loosened self-locking nut, and replace with a new one.

- 3) Models with rear disc brakes:
Tighten brake hose union bolt on brake caliper.

Tightening torque:

18 ± 3 N·m (1.8 ± 0.3 kg-m, 13.0 ± 2.2 ft-lb)

Models with rear drum brakes:
Connect brake hose to brake pipe.

Tightening torque:

**15^{+3}_{-2} N·m
($1.5^{+0.3}_{-0.2}$ kg-m, $10.8^{+2.2}_{-1.4}$ ft-lb)**

- 4) Insert brake hose clip between brake hose and lower side of strut.

CAUTION:

- Check that hose clip is positioned properly.
- Check brake hose for twisting, or excessive tension.
- (Model equipped with ABS)
Do not subject ABS sensor harness to excessive tension.

- 5) Be sure to bleed air from brake system.
6) Lower vehicle and tighten wheel nut.

Tightening torque:

88 ± 10 N·m (9 ± 1 kg-m, 65 ± 7 ft-lb)

- 7) Install strut mount cap.
8) (Sedan model)
Install rear seat backrest and rear seat cushion.
(Wagon model)
Install strut cap to rear quarter trim.

NOTE:

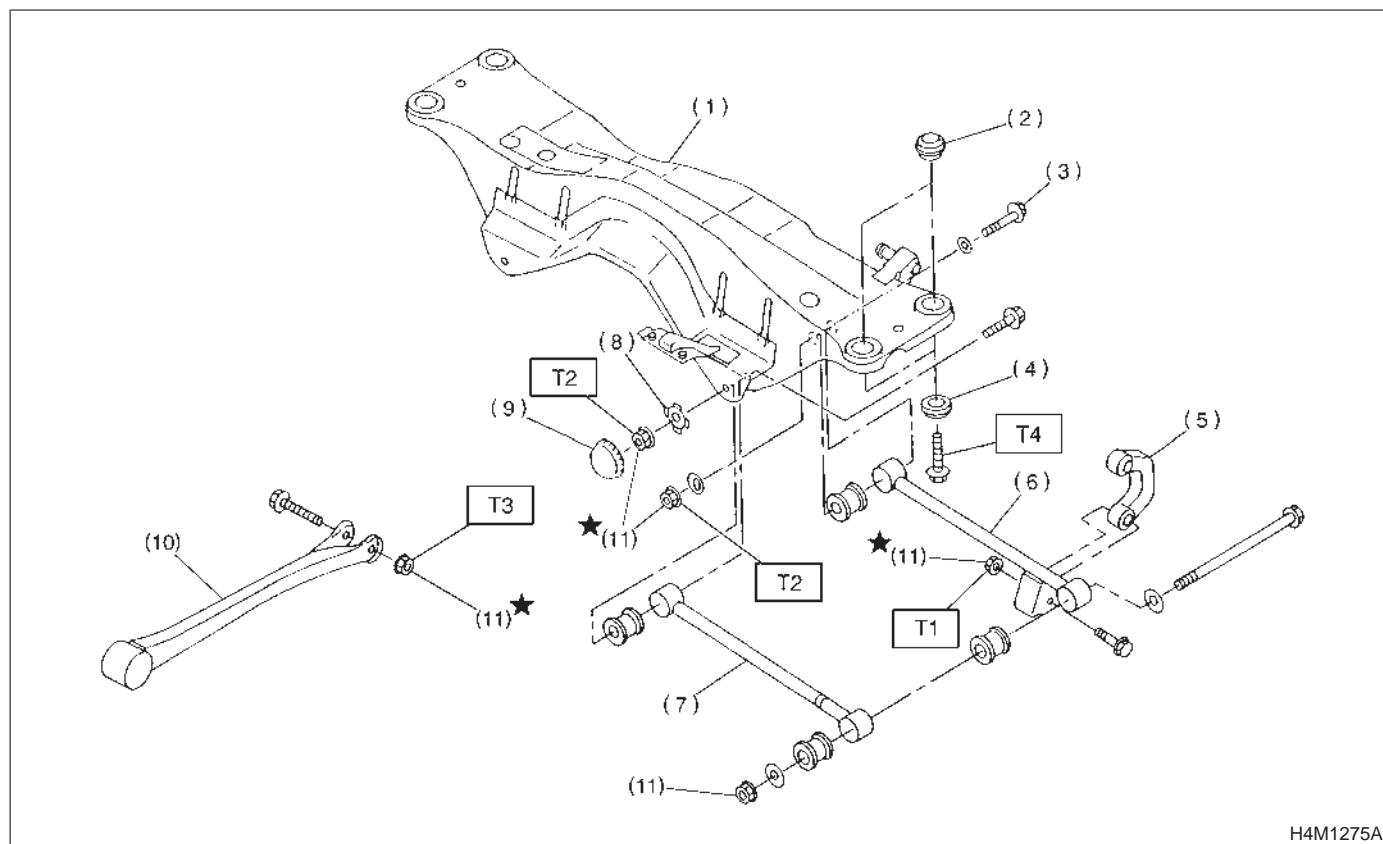
Check wheel alignment and adjust if necessary.

F: DISPOSAL PROCEDURES FOR GAS FILLED STRUT

Refer to 4. Front Strut as a guide for disposal procedures. <Ref. to 4-1 [W4F0].>

10. Rear Crossmember

A: REMOVAL



H4M1275A

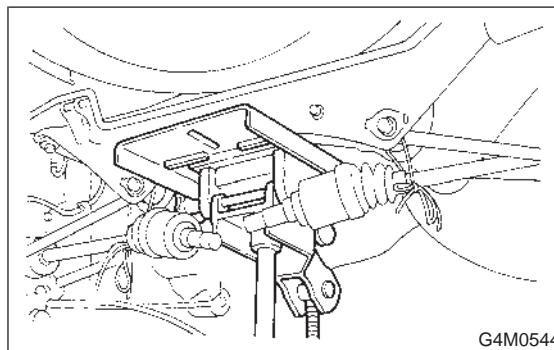
- | | |
|-----------------------|------------------------|
| (1) Crossmember | (7) Front lateral link |
| (2) Floating bushing | (8) Washer |
| (3) Adjusting bolt | (9) Cap |
| (4) Stopper | (10) Trailing link |
| (5) Stabilizer link | (11) Self-locking nut |
| (6) Rear lateral link | |

Tightening torque: N-m (kg-m, ft-lb)
T1: 44±6 (4.5±0.6, 32.5±4.3)
T2: 98±15 (10.0±1.5, 72±11)
T3: 113±15 (11.5±1.5, 83±11)
T4: 127±20 (13.0±2.0, 94±14)
CAUTION:

Do not subject ABS sensor harness to excessive tension (if equipped).

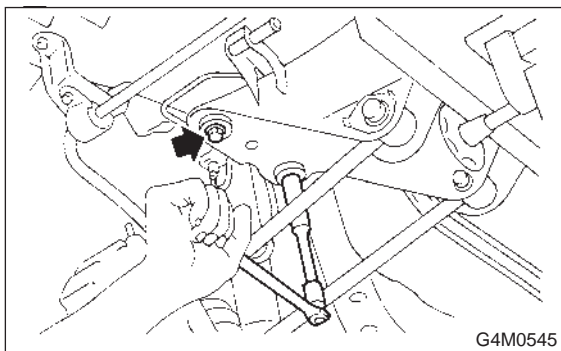
- 1) Separate front exhaust pipe and rear exhaust pipe.
- 2) Remove rear exhaust pipe and muffler.
- 3) Remove rear differential. <Ref. to 3-4 [W2B0].> or <Ref. to 3-4 [W3B0].>

- 4) Place transmission jack under rear crossmember.



G4M0544

- 5) Remove bolts securing crossmember to car body, and remove crossmember.



- 6) Scribe an alignment mark on rear lateral link cam bolt and crossmember.
7) Remove front and rear lateral links by loosening nuts.

B: INSPECTION

Check removed parts for wear, damage and cracks, and correct or replace if defective.

C: INSTALLATION

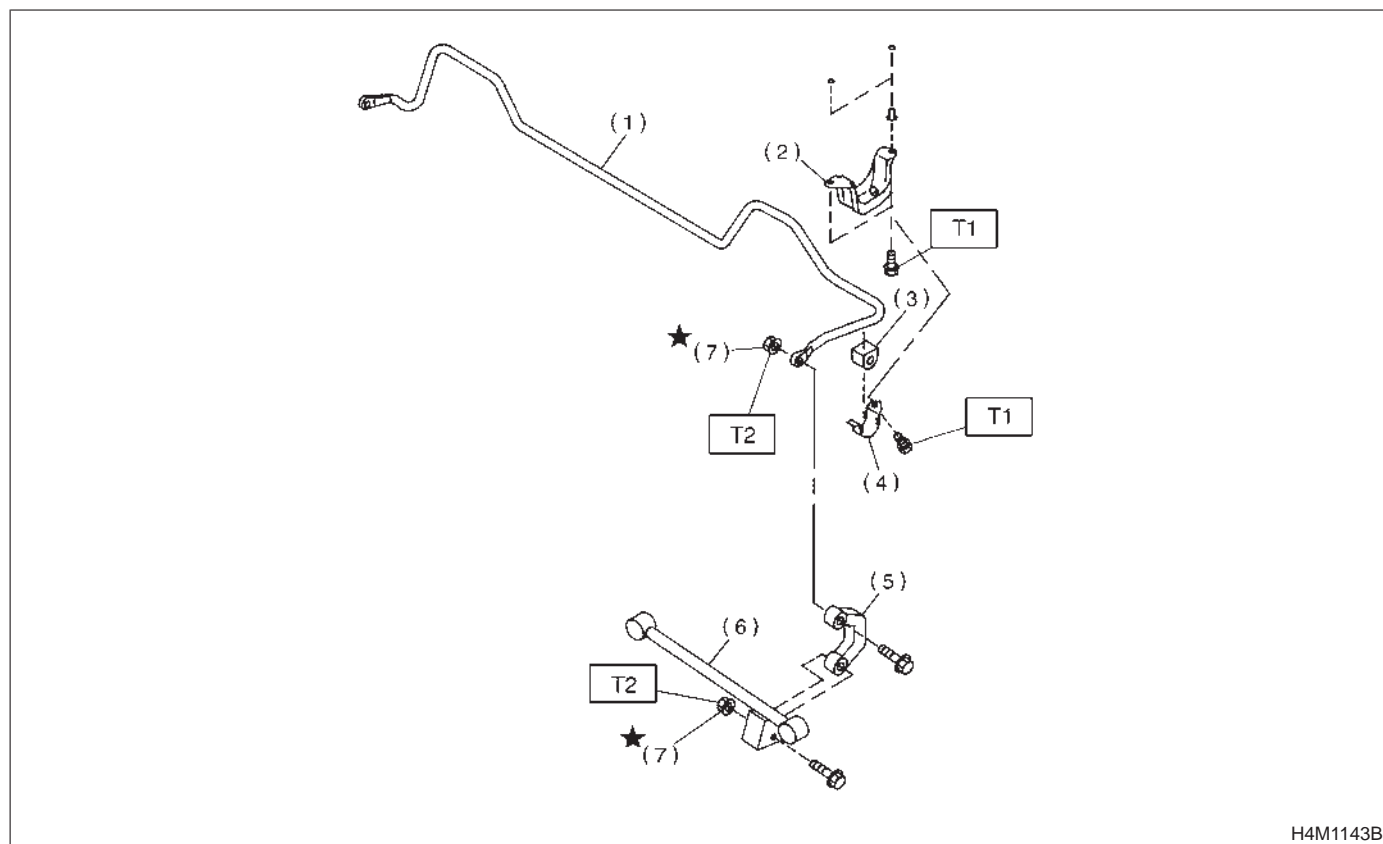
- 1) Install in reverse order of removal.
- 2) Install rear differential. <Ref. to 3-4 [W2F0].> or <Ref. to 3-4 [W3F0].>
- 3) Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is curb weight.

NOTE:

Check wheel alignment and adjust if necessary.

11. Rear Stabilizer

A: REMOVAL



H4M1143B

- | | |
|------------------------|-----------------------|
| (1) Rear stabilizer | (5) Stabilizer link |
| (2) Stabilizer bracket | (6) Rear lateral link |
| (3) Stabilizer bushing | (7) Self-locking nut |
| (4) Clamp | |

Tightening torque: N-m (kg-m, ft-lb)**T1: 25±7 (2.5±0.7, 18.1±5.1)****T2: 44±6 (4.5±0.6, 32.5±4.3)**

- 1) Jack-up the rear part of the vehicle, support it with safety stands (rigid racks).
- 2) Remove bolts which secure stabilizer link to rear lateral link.
- 3) Remove bolts which secure stabilizer to stabilizer bracket.

B: INSPECTION

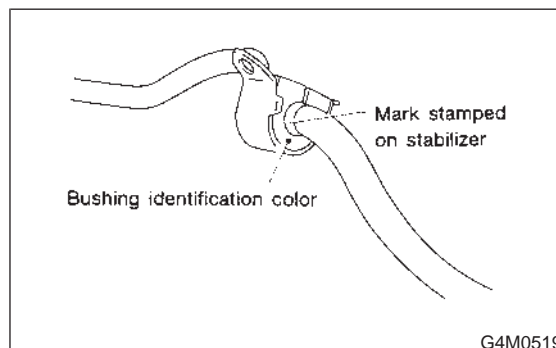
- 1) Check bushing for cracks, fatigue or damage.
- 2) Check stabilizer links for deformities, cracks, or damage, and bushing for protrusions from the hole of stabilizer link.

C: INSTALLATION

- 1) To install, reverse the removal procedure.

NOTE:

- Install bushing while aligning it with paint mark on stabilizer.
- Ensure that bushing and stabilizer have the same identification colors when installing.



G4M0519

2) Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is curb weight.

Tightening torque:

Stabilizer link to rear lateral link:

44±6 N·m (4.5±0.6 kg-m, 32.5±4.3 ft-lb)

Stabilizer to stabilizer bracket:

25±7 N·m (2.5±0.7 kg-m, 18.1±5.1 ft-lb)

1. Suspension

A: IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT

Possible causes	Countermeasures
(1) Permanent distortion or breakage of coil spring	Replace.
(2) Unsmooth operation of damper strut	Replace.
(3) Installation of wrong strut	Replace with proper parts.
(4) Installation of wrong coil spring	Replace with proper parts.

B: POOR RIDE COMFORT

- 1) Large rebound shock
- 2) Rocking of vehicle continues too long after running over bump and/or hump.
- 3) Large shock in bumping

Possible causes	Countermeasures
(1) Breakage of coil spring	Replace.
(2) Overinflation pressure of tire	Adjust.
(3) Improper wheel arch height	Adjust or replace coil springs with new ones.
(4) Fault in operation of damper strut	Replace.
(5) Damage or deformation of strut mount	Replace.
(6) Unsuitability of maximum and/or minimum length of damper strut	Replace with proper parts.
(7) Deformation or loss of bushing	Replace.
(8) Deformation or damage of helper in strut assembly	Replace.

C: NOISE

Possible causes	Countermeasures
(1) Wear or damage of damper strut component parts	Replace.
(2) Loosening of suspension link installing bolt	Retighten to the specified torque.
(3) Deformation or loss of bushing	Replace.
(4) Unsuitability of maximum and/or minimum length of damper strut	Replace with proper parts.
(5) Breakage of coil spring	Replace.
(6) Wear or damage of ball joint	Replace.

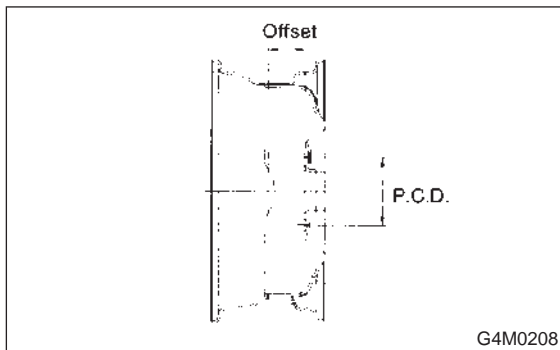
MEMO:

WHEELS AND AXLES

4-2

	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Tire and Wheel Size.....	2
2. Tire Inflation Pressure.....	2
3. Front Drive Shaft Assembly.....	3
4. Rear Drive Shaft Assembly.....	3
5. Application Table.....	4
6. Wheel Balance.....	4
C COMPONENT PARTS	5
1. Front Axle.....	5
2. Rear Axle.....	6
W SERVICE PROCEDURE	7
1. Front Axle.....	7
2. Rear Axle.....	12
3. Front and Rear Drive Shafts.....	20
4. Full Wheel Cap.....	30
5. Steel Wheel and Tire.....	31
6. Wheel Balancing.....	32
7. Installation of Wheel Assembly to Vehicle.....	32
8. Tire Rotation.....	33
9. "T-type" Tire.....	33
10. Aluminum Wheel.....	34

1. Tire and Wheel Size



Model		Front and Rear				Spare		
		Tire size	Rim size	Rim offset mm (in)	P.C.D. mm (in)	Tire size	Rim size	Rim offset mm (in)
2200 cc	COUPE SEDAN WAGON	P195/60R15 87H	15 × 6JJ	55 (2.17)	100 (3.94) dia.	T135/70D16	16 × 4T	50 (1.97)
	OUT- BACK	P205/60R15 90S P205/60R15 90H						
2500 cc	COUPE	P205/55R16 87V	16 × 7JJ	53 (2.09)	100 (3.94) dia.			

NOTE: "T-type" tire for temporary use is supplied as a spare tire.

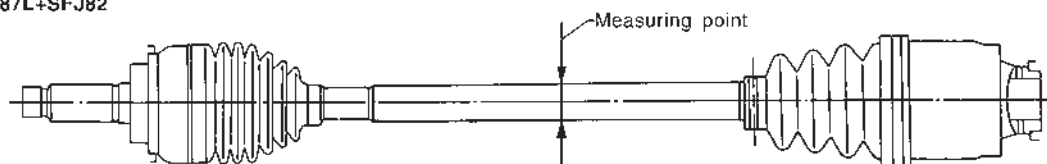
2. Tire Inflation Pressure

Tire size	Tire inflation pressure kPa (kg/cm ² , psi)	
	Light load	Full load
P195/60R15 87H P205/60R15 90S P205/60R15 90H P205/55R16 87V	Ft: 220 (2.2, 31) Rr: 200 (2.0, 25)	
T135/70D16	412 (4.2, 60)	

3. Front Drive Shaft Assembly

Model	Type of drive shaft assembly	SHAFT
		Shaft diameter
All models	BJ87L+SFJ82	26 mm (1.02 in)

• BJ87L+SFJ82



S4M0230B

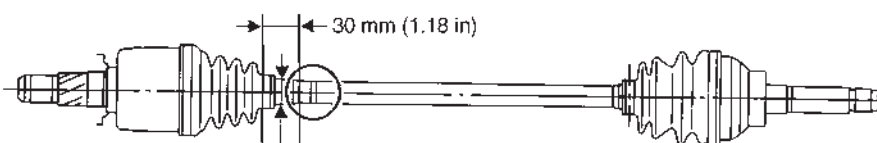
4. Rear Drive Shaft Assembly

Type of axle shaft assembly	SHAFT
	No. of identification paddings on shaft
79AC	None
79AC-RH	1 (One)
79AC-LH	1 (One)

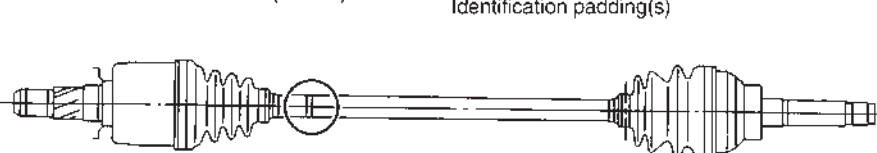
• 79AC



• 79AC-RH



• 79AC-LH



Identification padding(s)

B4M0049B

5. Application Table

Model	Power unit	Front drive shaft	Rear drive shaft	
			5MT	4AT
AWD	2200 cc	BJ87L + SFJ82	79AC-RH 79AC-LH	79AC
AWD	2500 cc	BJ87L + SFJ82	79AC-RH 79AC-LH	79AC-RH 79AC-LH

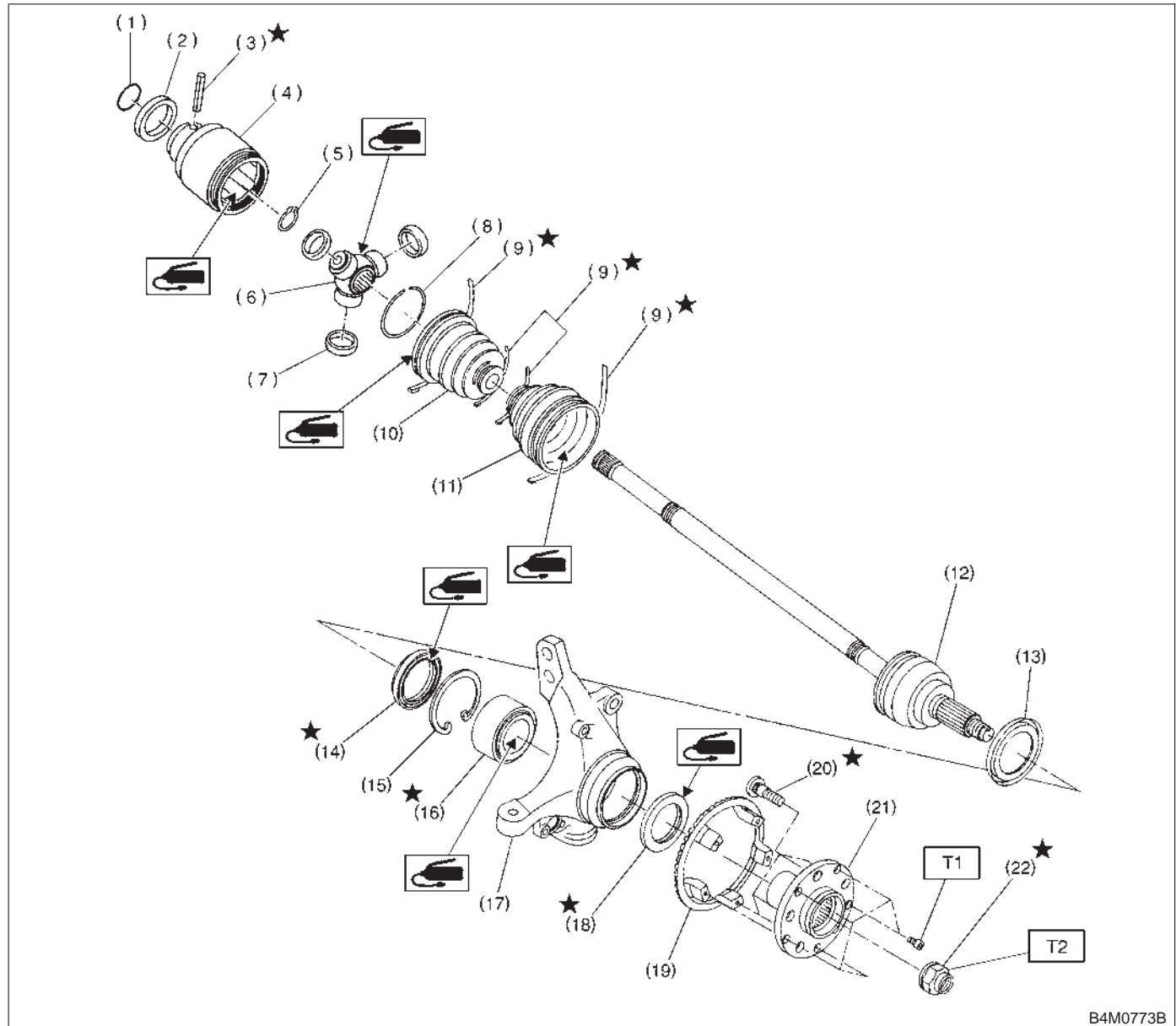
6. Wheel Balance

Wheel balancing	Standard	Service limit
Dynamic unbalance	Less than 5 g (0.18 oz)	

Balance weight part number (For steel wheel)	Weight g (oz)
28101AA001	5 (0.18)
28101AA011	10 (0.35)
28101AA021	15 (0.53)
28101AA031	20 (0.71)
28101AA041	25 (0.88)
28101AA051	30 (1.06)
28101AA061	35 (1.23)
28101AA071	40 (1.41)
28101AA081	45 (1.59)
28101AA091	50 (1.76)
28101AA101	55 (1.94)
28101AA111	60 (2.12)

Balance weight part number (For aluminum wheel)	Weight g (oz)
23141GA462	5 (0.18)
23141GA472	10 (0.35)
23141GA482	15 (0.53)
23141GA492	20 (0.71)
23141GA502	25 (0.88)
23141GA512	30 (1.06)
23141GA522	35 (1.23)
23141GA532	40 (1.41)
23141GA542	45 (1.59)
23141GA552	50 (1.76)
—	55 (1.94)
23141GA572	60 (2.12)

1. Front Axle



- (1) O-ring
- (2) Baffle plate (SFJ)
- (3) Spring pin
- (4) Outer race (SFJ)
- (5) Snap ring
- (6) Trunnion
- (7) Free ring
- (8) Circlip
- (9) Boot band

- (10) Boot band
- (11) Boot (BJ)
- (12) BJ ASSY
- (13) Baffle plate
- (14) Oil seal (IN)
- (15) Snap ring
- (16) Bearing
- (17) Housing
- (18) Oil seal (OUT)

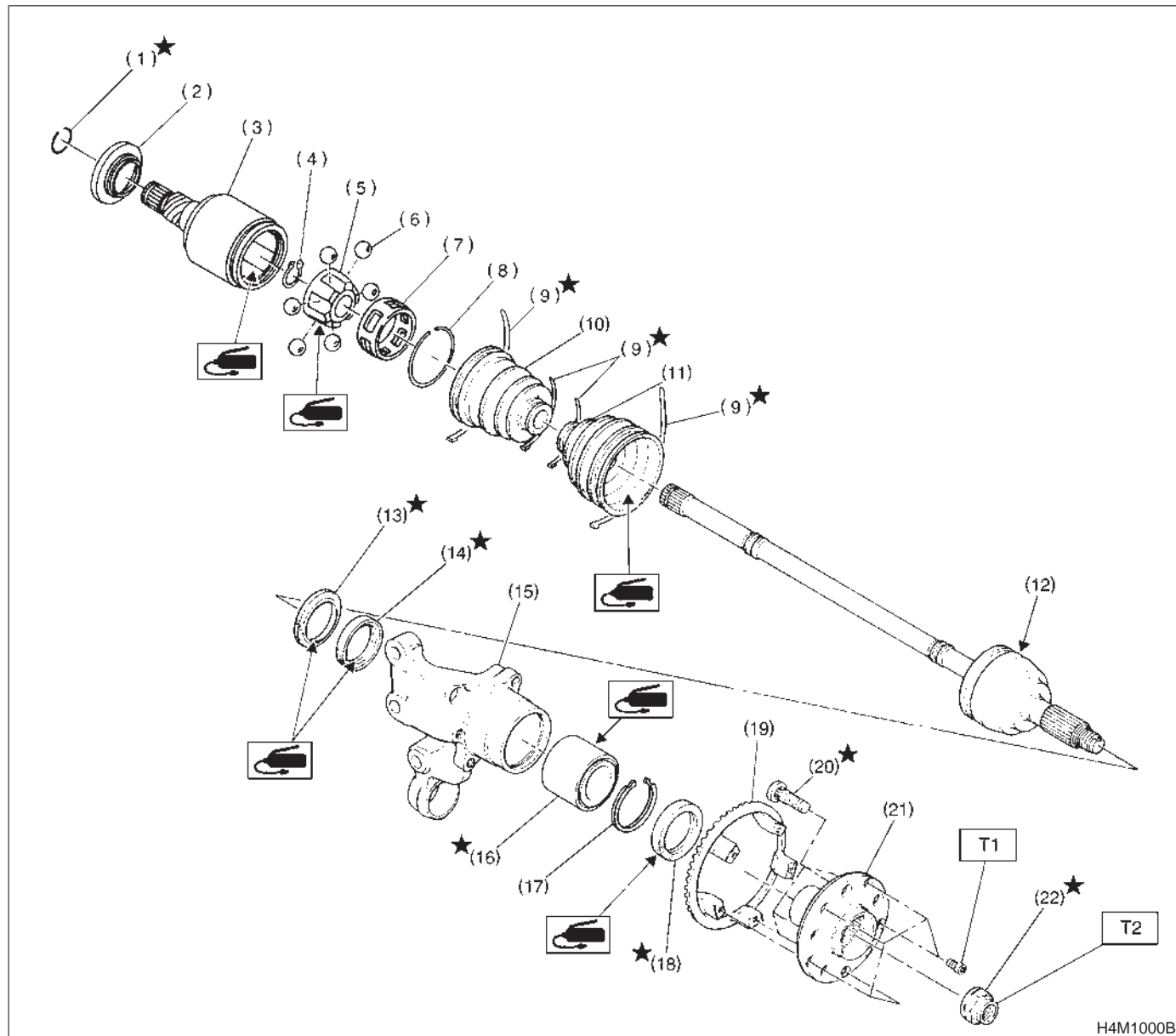
- (19) Tone wheel
- (20) Hub bolt
- (21) Hub
- (22) Axle nut

Tightening torque: N-m (kg-m, ft-lb)

T1: 13±3 (1.3±0.3, 9.4±2.2)

T2: 186±20 (19±2, 137±14)

2. Rear Axle



- (1) Circlip (2200 cc AT model)
- (2) Baffle plate (DOJ)
- (3) Outer race (DOJ)
- (4) Snap ring
- (5) Inner race
- (6) Ball
- (7) Cage
- (8) Circlip
- (9) Boot band

- (10) Boot (DOJ)
- (11) Boot (BJ)
- (12) BJ ASSY
- (13) Oil seal (IN. No. 2)
- (14) Oil seal (IN. No. 3)
- (15) Housing
- (16) Bearing
- (17) Snap ring
- (18) Oil seal (OUT)

- (19) Tone wheel
- (20) Hub bolt
- (21) Hub
- (22) Axle nut

Tightening torque: N-m (kg-m, ft-lb)

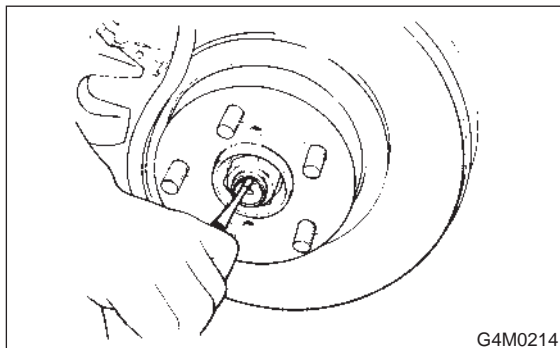
T1: 13±3 (1.3±0.3, 9.4±2.2)

T2: 186±20 (19±2, 137±14)

1. Front Axle

A: REMOVAL

- 1) Disconnect ground cable from battery.
- 2) Jack-up vehicle, support it with safety stands, and remove front wheels.
- 3) Unlock axle nut.

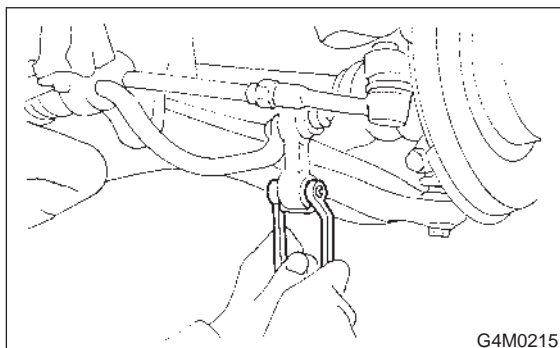


- 4) Remove axle nut using a socket wrench.

CAUTION:

Be sure to loose and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

- 5) Remove stabilizer link.



- 6) Remove disc brake caliper from housing, and suspend it from strut using a wire.

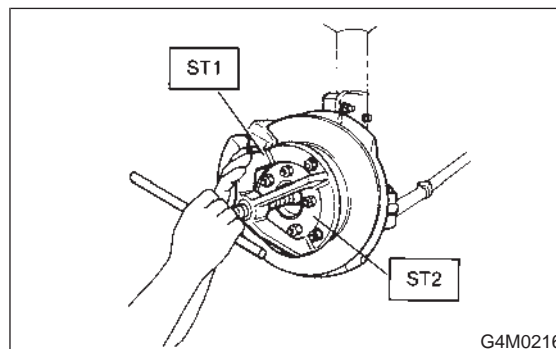
- 7) Remove front drive shaft assembly from hub. If it is hard to remove, use STs.

ST1 926470000 AXLE SHAFT PULLER

ST2 927140000 PLATE

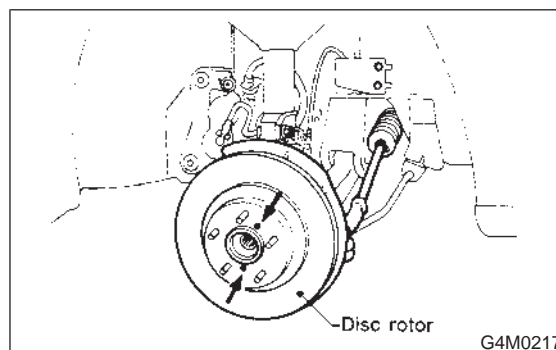
CAUTION:

- Be careful not to damage oil seal lip when removing front drive shaft.
- When replacing front drive shaft, also replace inner oil seal.

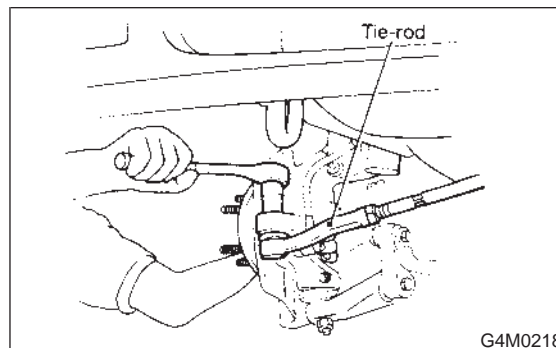


- 8) Remove disc rotor from hub.

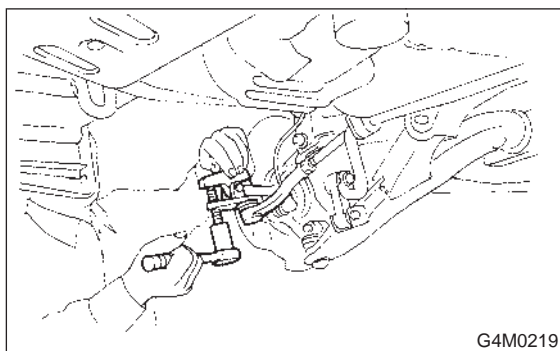
If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in screw hole on the rotor.



- 9) Remove cotter pin and castle nut which secure tie-rod end to housing knuckle arm.

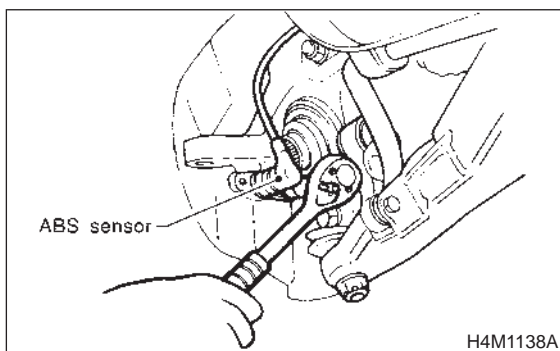


10) Using a puller, remove tie rod ball joint from knuckle arm.



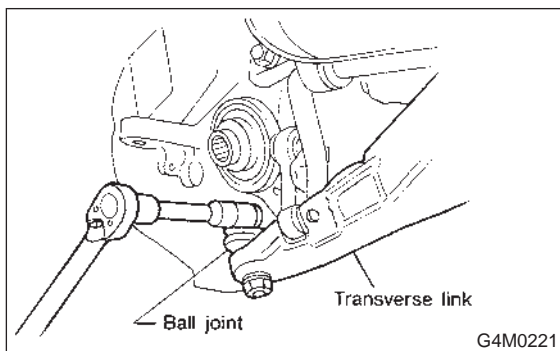
G4M0219

11) On ABS equipped models, remove ABS sensor assembly and harness in advance.



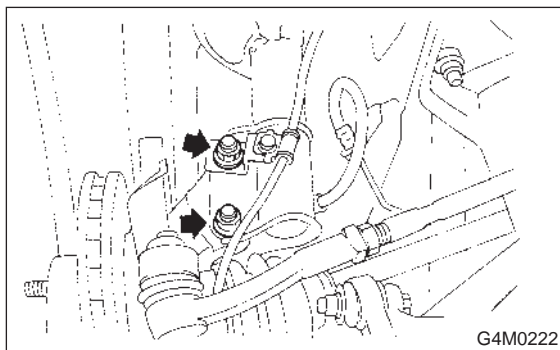
H4M1138A

12) Remove transverse link ball joint from housing.



G4M0221

13) After scribing an alignment mark on camber adjusting bolt head, remove bolts which connect housing and strut, and disconnect housing from strut.



G4M0222

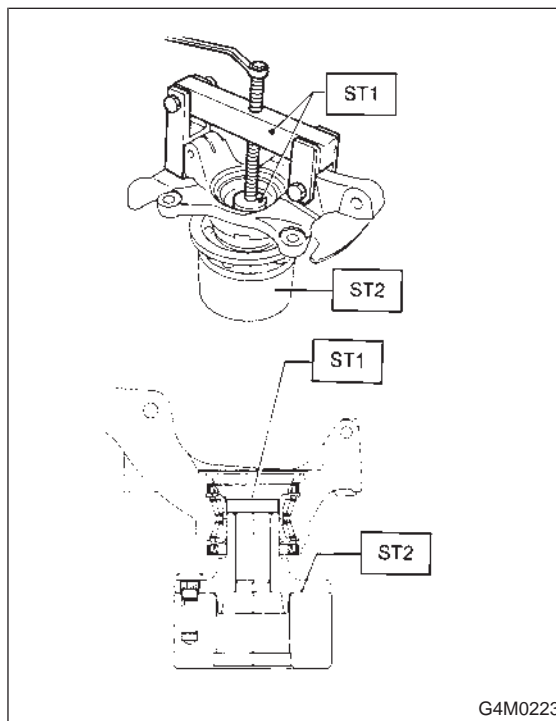
B: DISASSEMBLY

1) Using ST1, support housing and hub securely.

2) Attach ST2 to housing and drive hub out.

ST1 927060000 HUB REMOVER

ST2 927080000 HUB STAND

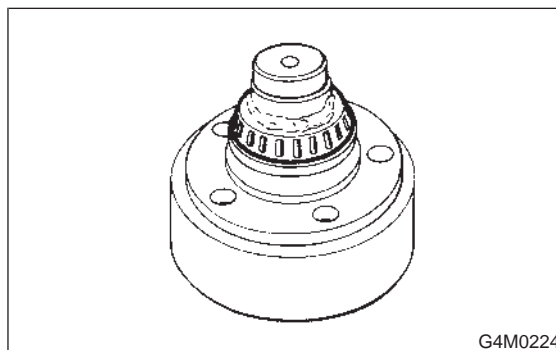


G4M0223

If inner bearing race remains in the hub, remove it with a suitable tool (commercially available).

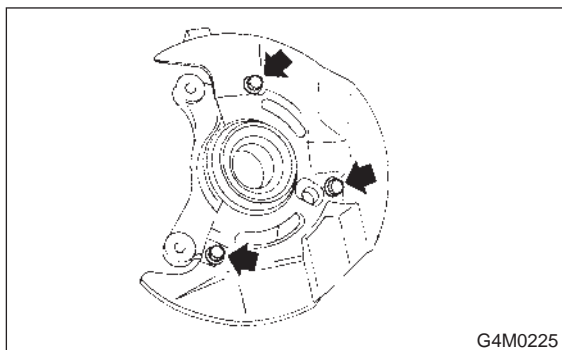
CAUTION:

- Be careful not to scratch polished area of hub.
- Be sure to install inner race on the side of outer race from which it was removed.



G4M0224

- 3) Remove disc cover from housing.

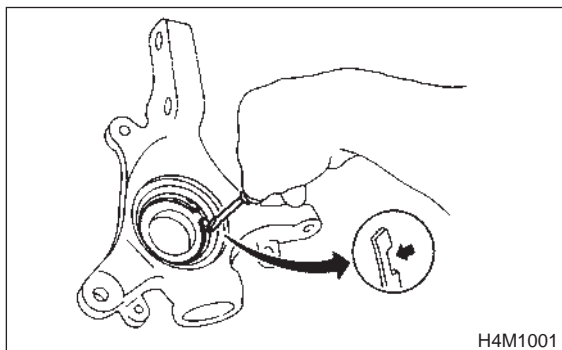


- 4) Using a standard screwdriver, remove outer and inner oil seals.

CAUTION:

Do not use old oil seals.

- 5) Using flat bladed screwdriver, remove snap ring.



- 6) Using ST1, support housing securely.

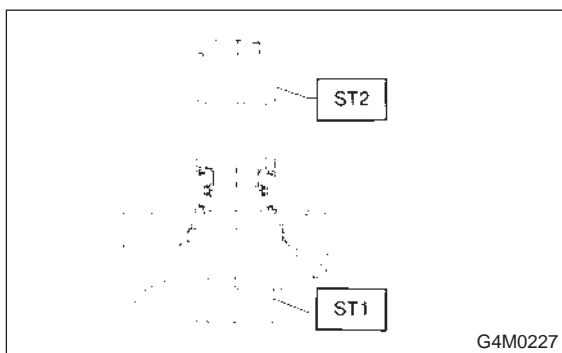
- 7) Using ST2, press inner race to drive out outer bearing.

ST1 927400000 HOUSING STAND

ST2 927100000 BEARING REMOVER

CAUTION:

- Do not remove outer race unless it is faulty.
- Discard outer race after removal.
- Do not replace inner or outer race separately; always replace as a unit.



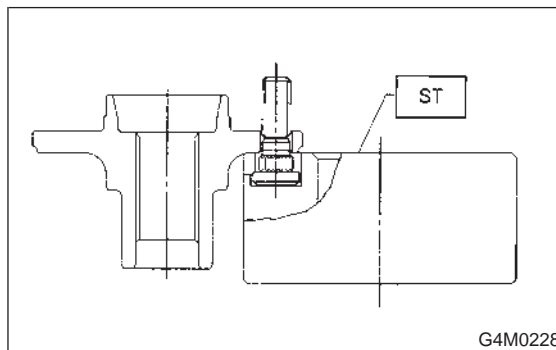
- 8) Loosen bolts which secure tone wheel to hub. Remove tone wheel (only vehicle equipped with ABS).

- 9) Using ST and a hydraulic press, drive hub bolts out.

ST 927080000 HUB STAND

CAUTION:

Be careful not to hammer hub bolts. This may deform hub.

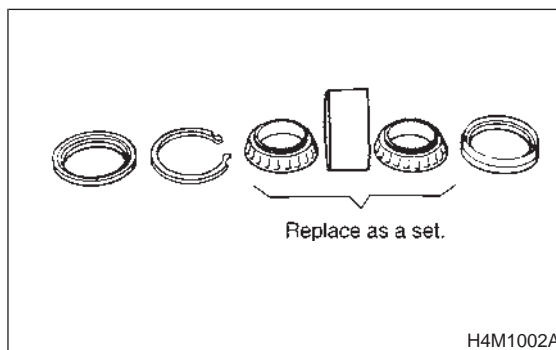


C: INSPECTION

Check the removed parts for wear and damage. If defective, replace with a new one.

CAUTION:

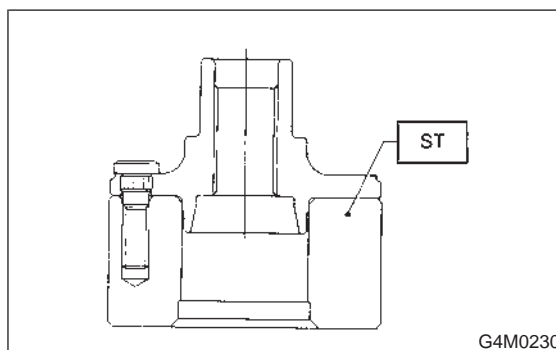
- If bearing is faulty, replace it as the bearing set.
- Be sure to replace oil seal at every overhaul.



D: ASSEMBLY

- 1) Attach hub to ST securely.

ST 927080000 HUB STAND



- 2) Using a hydraulic press, press new hub bolts into place.

CAUTION:

Be sure to press hub bolts until their seating surfaces contact the hub.

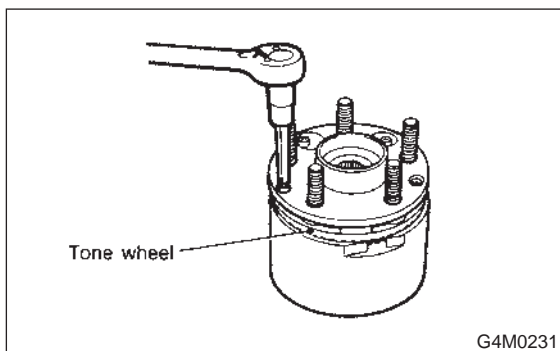
NOTE:

Use 12 mm (0.47 in) dia. holes in HUB STAND to prevent bolts from tilting.

3) Remove foreign particles (dust, rust, etc.) from mating surfaces of hub and tone wheel, and install tone wheel to hub (only vehicle equipped with ABS).

CAUTION:

- Be careful not to damage tone wheel teeth.
- Ensure tone wheel closely contacts hub.



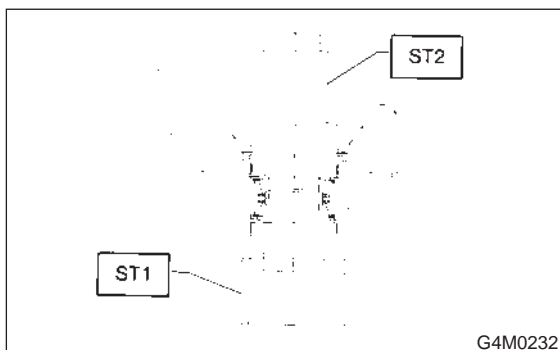
4) Clean dust or foreign particles from inside the housing.

5) Using ST1 and ST2, press a new bearing into place.

ST1 927400000 HOUSING STAND
ST2 927100000 BEARING REMOVER

CAUTION:

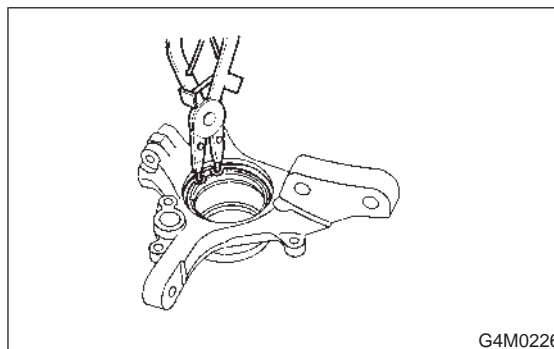
- Always press outer race when installing bearing.
- Be careful not to remove plastic lock from inner race when installing bearing.
- Charge bearing with new grease when outer race is not removed.



6) Using pliers, install snap ring in its groove.

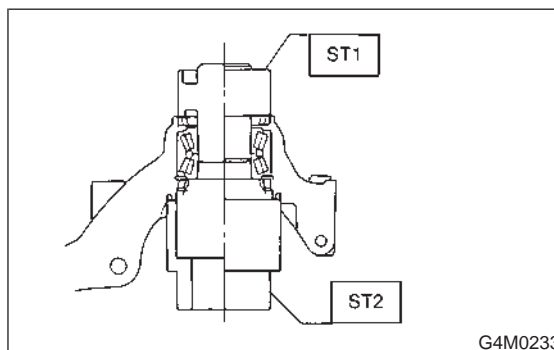
CAUTION:

Make sure to install it firmly to groove.



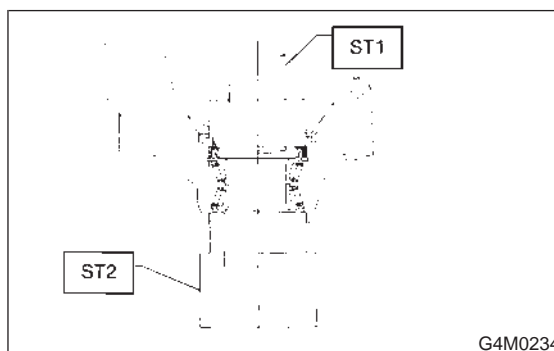
7) Using ST1 and ST2, press outer oil seal until it contacts the bottom of housing.

ST1 927410000 OIL SEAL INSTALLER
ST2 927400000 HOUSING STAND



8) Using ST1 and ST2, press inner oil seal until it contacts circlip.

ST1 927410000 OIL SEAL INSTALLER
ST2 927400000 HOUSING STAND



9) Invert ST and housing.

ST 927400000 HOUSING STAND

10) Apply sufficient grease to oil seal lip.

Specified grease

SHELL 6459N

CAUTION:

- If specified grease is not available, remove bearing grease and apply Auto Rex A instead.
- Do not mix different types of grease.

11) Install disc cover to housing the three bolts.

Tightening torque:

$14 \pm 4 \text{ N}\cdot\text{m}$ ($1.4 \pm 0.4 \text{ kg}\cdot\text{m}$, $10.1 \pm 2.9 \text{ ft}\cdot\text{lb}$)

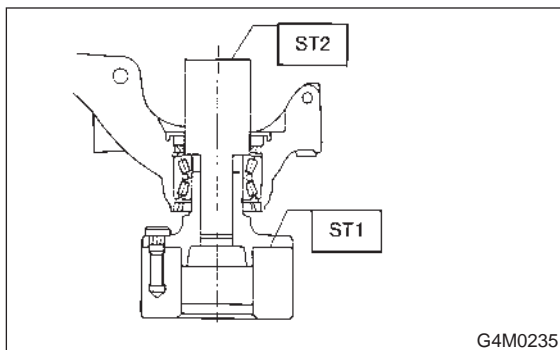
12) Attach hub to ST1 securely.

13) Clean dust or foreign particles from the polished surface of hub.

14) Using ST2, press bearing into hub by driving inner race.

ST1 927080000 HUB STAND

ST2 927120000 HUB INSTALLER



E: INSTALLATION

1) Install transverse link ball joint to housing.

Tightening torque:

$44 \pm 6 \text{ N}\cdot\text{m}$ ($4.5 \pm 0.6 \text{ kg}\cdot\text{m}$, $32.5 \pm 4.3 \text{ ft}\cdot\text{lb}$)

2) While aligning alignment mark on camber adjusting bolt head, connect housing and strut.

CAUTION:

Use a new self-locking nut.

Tightening torque:

$147 \pm 15 \text{ N}\cdot\text{m}$ ($15 \pm 1.5 \text{ kg}\cdot\text{m}$, $108 \pm 11 \text{ ft}\cdot\text{lb}$)

3) Install speed sensor and harness on housing (only vehicle equipped with ABS).

4) Install disc rotor on hub.

5) Install disc brake caliper on housing.

Tightening torque:

$59 \pm 10 \text{ N}\cdot\text{m}$ ($6 \pm 1 \text{ kg}\cdot\text{m}$, $43 \pm 7 \text{ ft}\cdot\text{lb}$)

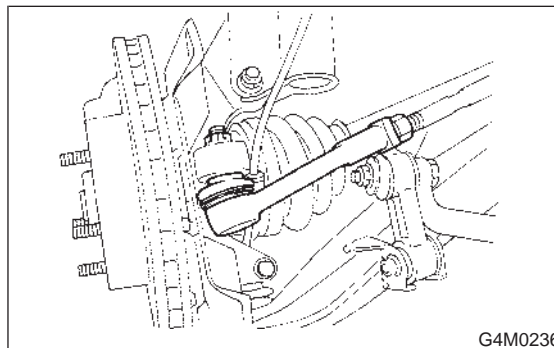
6) Install front drive shaft. <Ref. to 4-2 [W3E1].>

7) Connect stabilizer link.

8) Install tie-rod end ball joint on housing knuckle arm.

Tightening torque:

$27.0 \pm 2.5 \text{ N}\cdot\text{m}$ ($2.75 \pm 0.25 \text{ kg}\cdot\text{m}$, $19.9 \pm 1.8 \text{ ft}\cdot\text{lb}$)



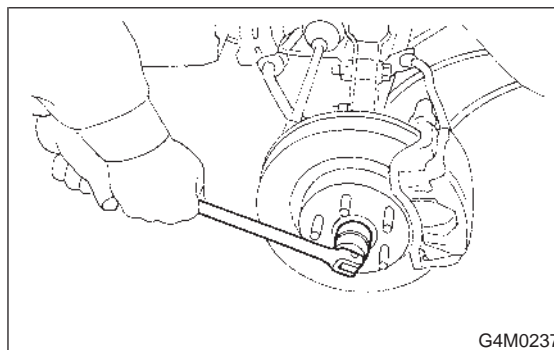
9) While depressing brake pedal, tighten axle nut and lock it securely.

CAUTION:

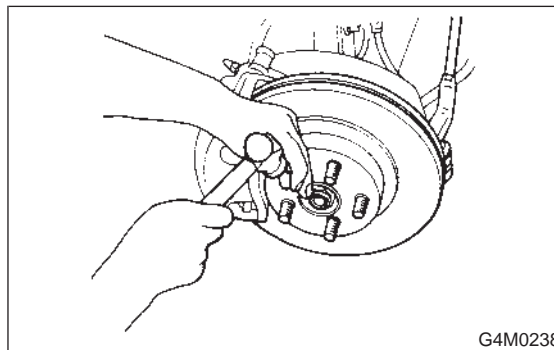
- Use a new axle nut.
- Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
- Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

Tightening torque:

$186 \pm 20 \text{ N}\cdot\text{m}$ ($19 \pm 2 \text{ kg}\cdot\text{m}$, $137 \pm 14 \text{ ft}\cdot\text{lb}$)



10) After tightening axle nut, lock it securely.



11) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:

$88 \pm 10 \text{ N}\cdot\text{m}$ ($9 \pm 1 \text{ kg}\cdot\text{m}$, $65 \pm 7 \text{ ft}\cdot\text{lb}$)

2. Rear Axle

A: REMOVAL

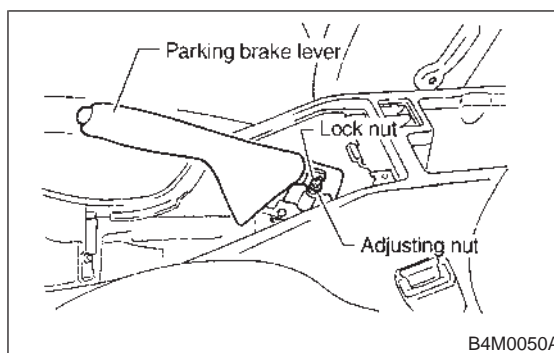
1. DISC BRAKE

- 1) Disconnect ground cable from battery.
- 2) Jack-up vehicle, and remove rear wheel cap and wheels.

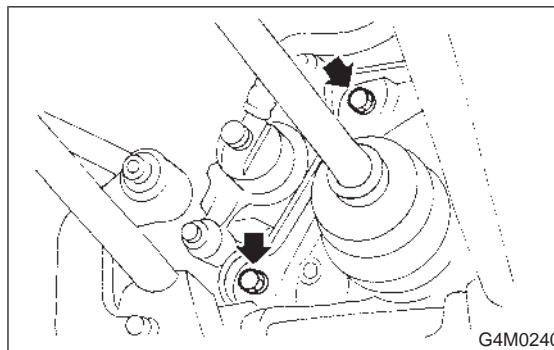
CAUTION:

Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

- 3) Unlock axle nut.
- 4) Remove axle nut using a socket wrench.
- 5) Return parking brake lever and loosen adjusting nut.



- 6) Remove disc brake caliper from back plate, and suspend it from strut using a piece of wire.

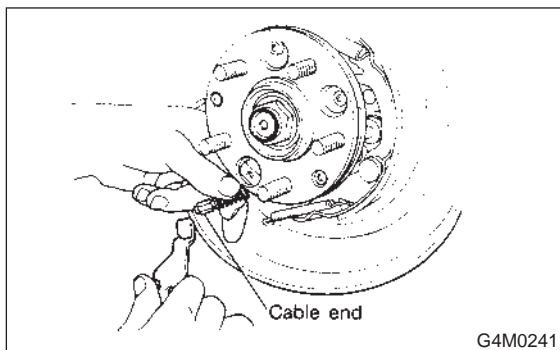


- 7) Remove disc rotor from hub.

NOTE:

If disc rotor seizes up within hub, drive it out by installing an 8-mm bolt into bolt hole in disc rotor.

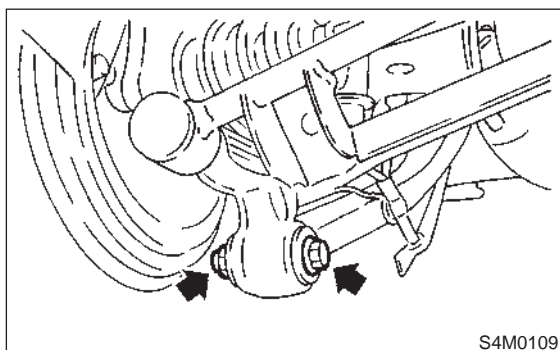
- 8) Disconnect parking brake cable end.



- 9) Disconnect rear stabilizer from rear lateral link.
10) Remove bolts which secure trailing link assembly to rear housing.

CAUTION:

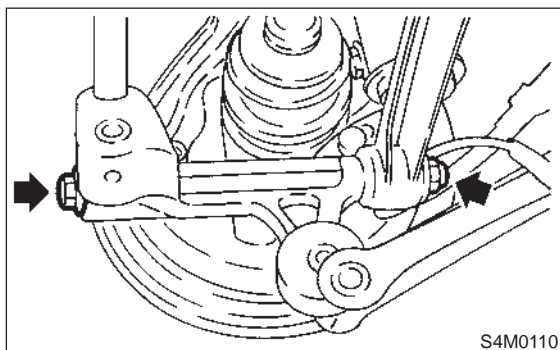
Discard old self-locking nut. Replace with a new one.



- 11) Remove bolts which secure lateral link assembly to rear housing.

CAUTION:

Discard old self-locking nut. Replace with a new one.



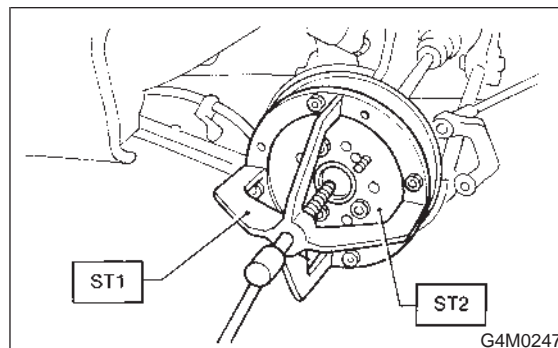
- 12) Disengage BJ from housing splines, and remove rear drive shaft assembly. If it is hard to remove, use STs.

ST1 926470000 AXLE SHAFT PULLER

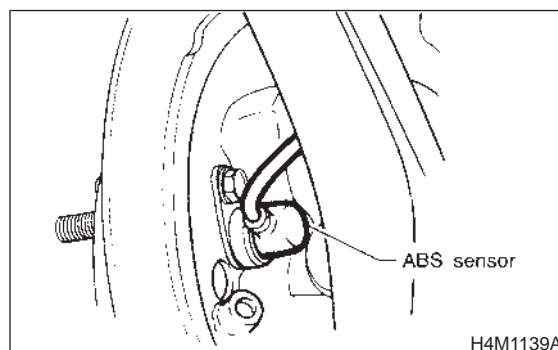
ST2 927140000 PLATE

CAUTION:

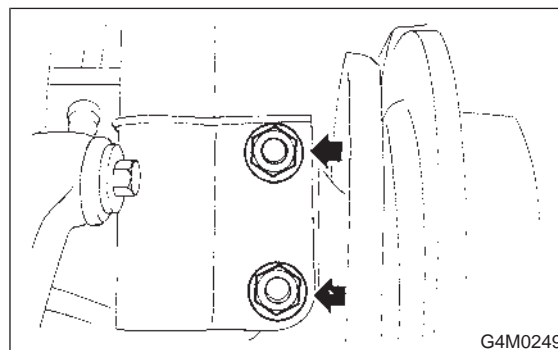
- Be careful not to damage oil seal lip when removing rear drive shaft.
- When rear drive shaft is to be replaced, also replace inner oil seal with a new one.



- 13) Remove rear ABS sensor from back plate (only vehicle equipped with ABS).



- 14) Remove bolts which secure rear housing to strut, and separate the two.



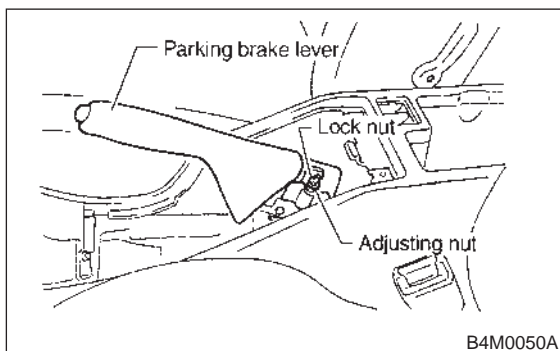
2. DRUM BRAKE

- 1) Disconnect ground cable from battery.
- 2) Jack-up vehicle, and remove rear wheel cap and wheels.

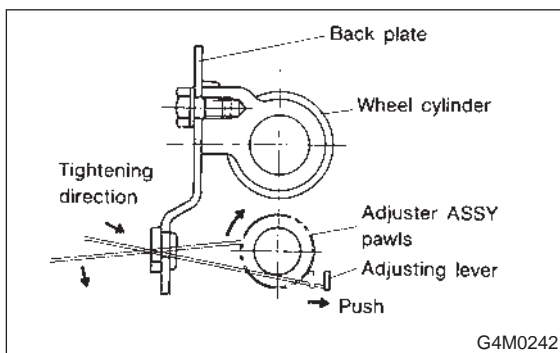
CAUTION:

Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

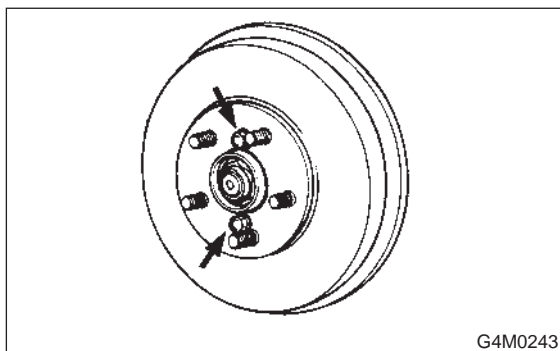
- 3) Unlock axle nut.
- 4) Remove axle nut using a socket wrench.
- 5) Return parking brake lever and loosen adjusting nut.



- 6) Remove brake drum from hub.
- 7) If it is difficult to remove brake drum, remove adjusting hole cover from back plate, and then turn adjusting screw using a slot-type screwdriver until brake shoe separates from the drum.

**NOTE:**

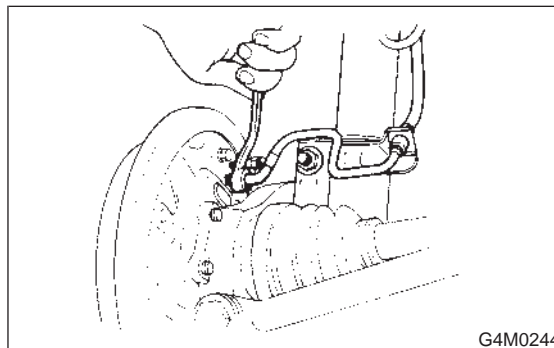
If brake drum is difficult to remove, drive it out by installing an 8-mm bolt into bolt hole in brake drum.



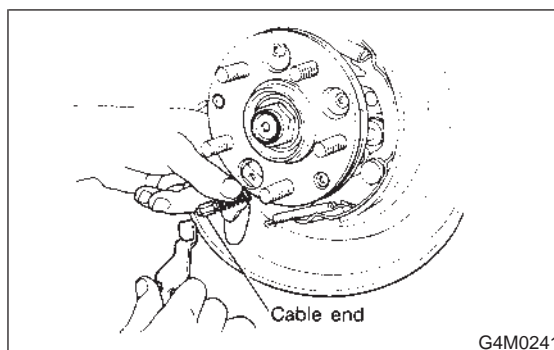
- 8) Using a flare-nut wrench, disconnect brake pipe from wheel cylinder.

CAUTION:

Cover open end of wheel cylinder to prevent entry of foreign particles.



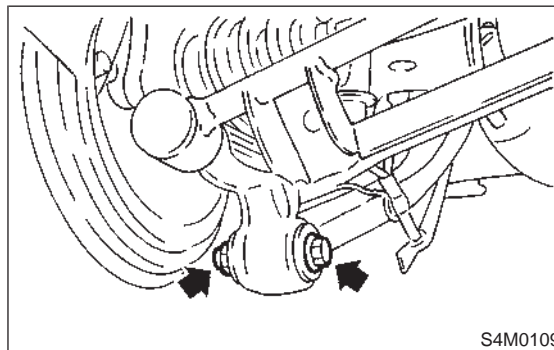
- 9) Disconnect parking brake cable end.



- 10) Disconnect rear stabilizer from rear lateral link.
- 11) Remove bolts which secure trailing link assembly to rear housing.

CAUTION:

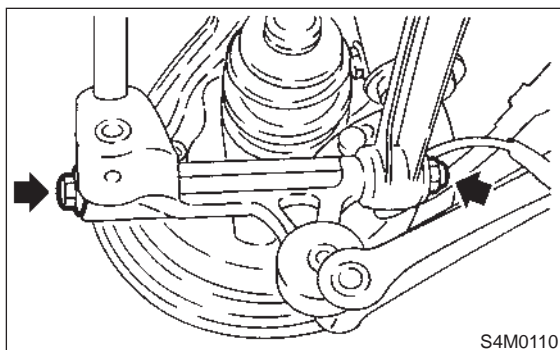
Discard old self-locking nut. Replace with a new one.



12) Remove bolts which secure lateral link assembly to rear housing.

CAUTION:

Discard old self-locking nut. Replace with a new one.



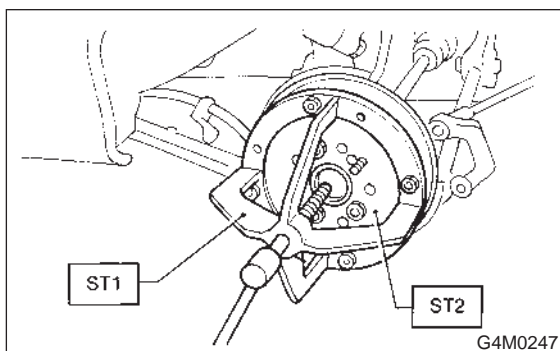
13) Disengage BJ from housing splines, and remove rear drive shaft assembly. If it is hard to remove, use STs.

ST1 926470000 AXLE SHAFT PULLER

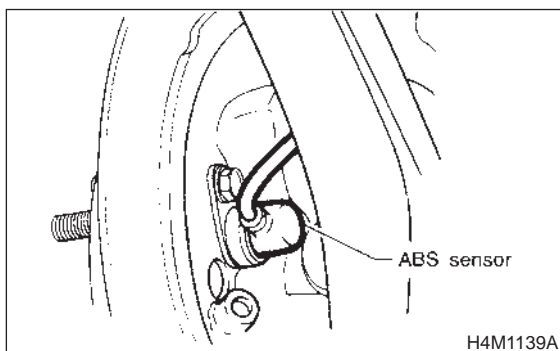
ST2 927140000 PLATE

CAUTION:

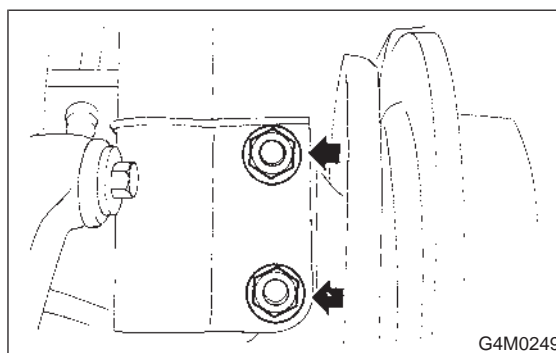
- Be careful not to damage oil seal lip when removing rear drive shaft.
- When rear drive shaft is to be replaced, also replace inner oil seal with a new one.



14) Remove rear ABS sensor from back plate (only vehicle equipped with ABS).



15) Remove bolts which secure rear housing to strut, and separate the two.

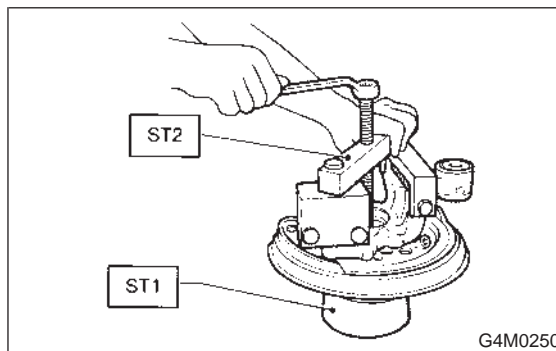


B: DISASSEMBLY

1) Using ST1 and ST2, remove hub from rear housing.

ST1 927080000 HUB STAND

ST2 927420000 HUB REMOVER



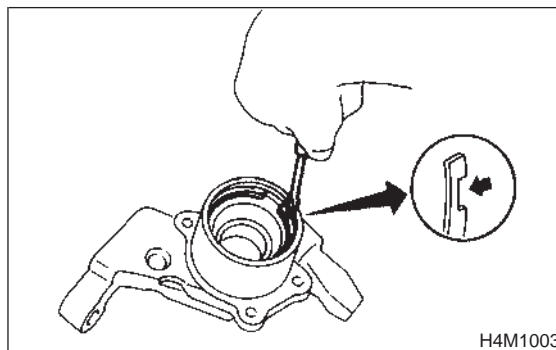
2) Remove back plate from rear housing.

3) Using a standard screwdriver, remove outer and inner oil seals.

CAUTION:

Use new oil seals.

4) Using flat bladed screwdriver, remove snap ring.



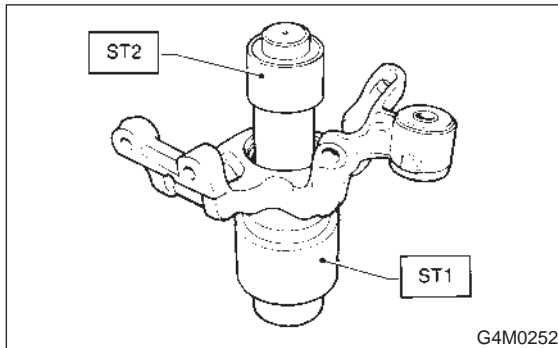
5) Using ST1 and ST2, remove bearing by pressing inner race.

ST1 927430000 HOUSING STAND

ST2 927440000 BEARING REMOVER

CAUTION:

- Do not remove bearing unless damaged.
- Do not re-use bearing after removal.



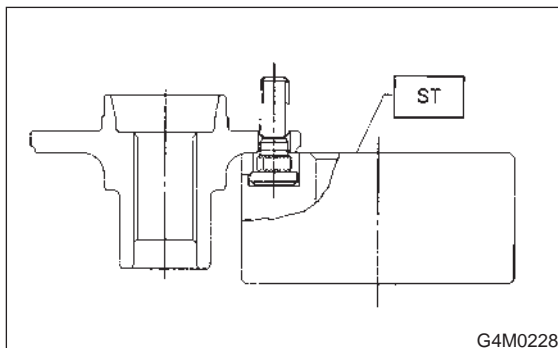
6) Remove tone wheel bolts and remove tone wheel from hub (only vehicle equipped with ABS).

7) Using ST, press hub bolt out.

ST 927080000 HUB STAND

CAUTION:

Be careful not to hammer hub bolts. This may deform hub.

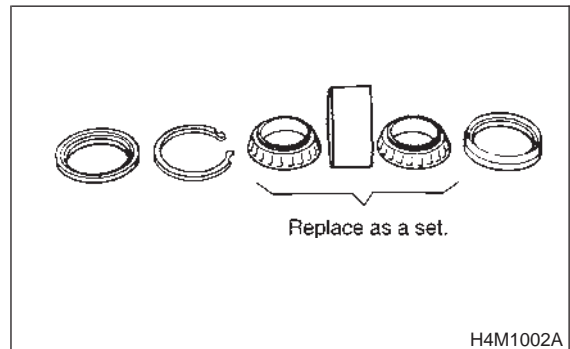


C: INSPECTION

Check the removed parts for wear and damage. If defective, replace with a new one.

CAUTION:

- If a bearing is faulty, replace it as the bearing set.
- Be sure to replace oil seal at every overhaul.



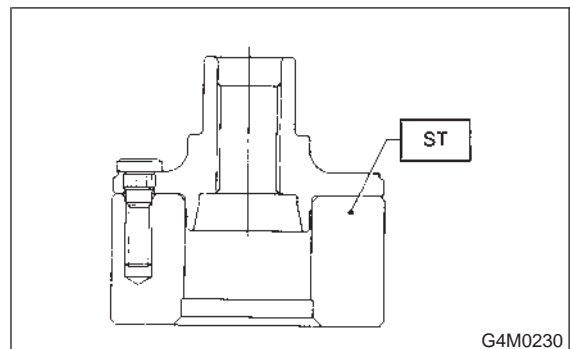
D: ASSEMBLY

1) Using ST, press new hub bolt into place.

CAUTION:

- Ensure hub bolt closely contacts hub.
- Use a 12 mm (0.47 in) hole in the ST to prevent hub bolt from tilting during installation.

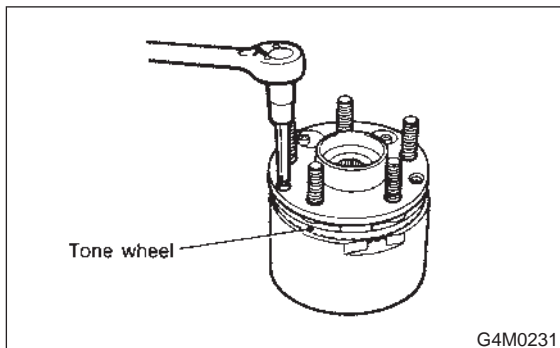
ST 927080000 HUB STAND



2) Remove foreign particles (dust, rust, etc.) from mating surfaces of hub and tone wheel, and install tone wheel to hub (only vehicle equipped with ABS).

CAUTION:

- Ensure tone wheel closely contacts hub.
- Be careful not to damage tone wheel teeth.



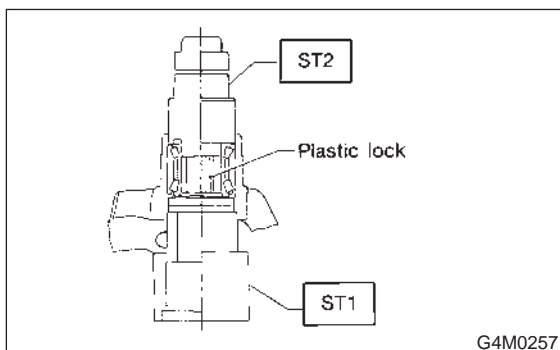
3) Clean housing interior completely. Using ST1 and ST2, press bearing into housing.

ST1 927430000 HOUSING STAND

ST2 927440000 BEARING REMOVER

CAUTION:

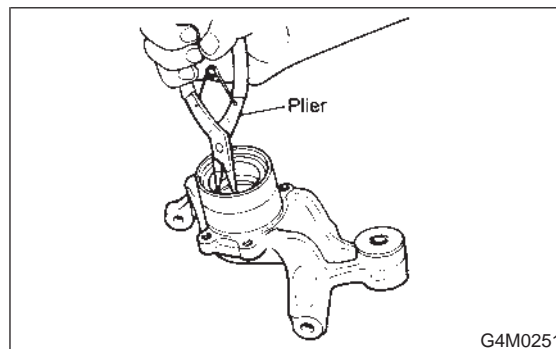
- Always press outer race when installing bearing.
- Be careful not to remove plastic lock from inner race when installing bearing.
- Charge bearing with new grease when outer race is not removed.



4) Using plier, install snap ring.

CAUTION:

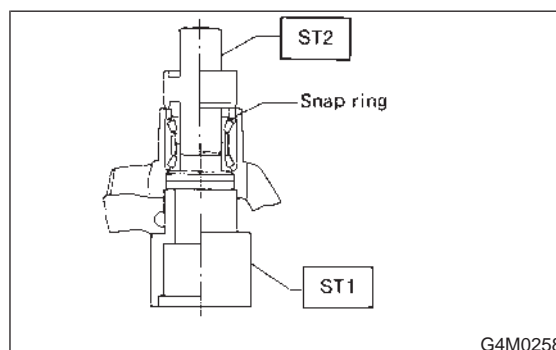
Ensure snap ring fits in groove properly.



5) Using ST1 and ST2, press outer oil seal until it comes in contact with snap ring.

ST1 927430000 HOUSING STAND

ST2 927460000 OIL SEAL INSTALLER

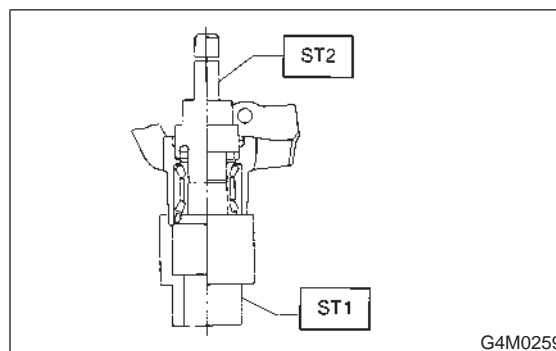


6) Invert both ST1 and housing.

7) Using ST2, press inner oil seal into housing until it touches bottom.

ST1 927430000 HOUSING STAND

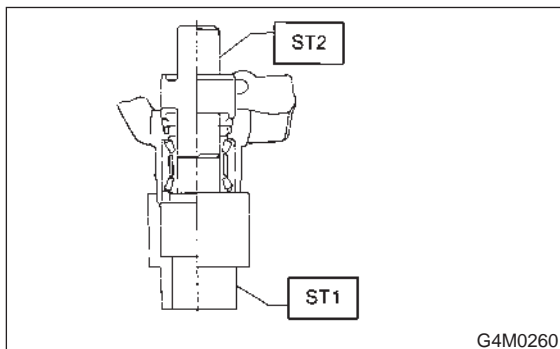
ST2 927460000 OIL SEAL INSTALLER



8) Using ST1 and ST2, press sub seal into place.

ST1 927430000 HOUSING STAND

ST2 927460000 OIL SEAL INSTALLER



9) Apply sufficient grease to oil seal lip.

Specified grease:

SHELL 6459N

CAUTION:

- If specified grease is not available, remove bearing grease and apply Auto Rex A instead.
- Do not mix different types of grease.

10) Install back plate to rear housing.

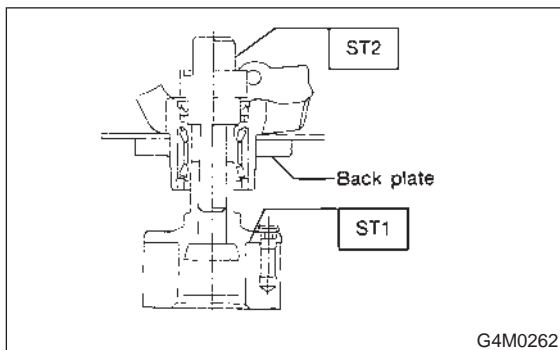
Tightening torque:

$52 \pm 6 \text{ N-m}$ ($5.3 \pm 0.6 \text{ kg-m}$, $38.3 \pm 4.3 \text{ ft-lb}$)

11) Using ST1 and ST2, press bearing into hub.

ST1 927080000 HUB STAND

ST2 927450000 HUB INSTALLER



E: INSTALLATION

1. DISC BRAKE

1) Connect rear housing assembly and strut assembly.

CAUTION:

Use a new self-locking nut.

Tightening torque:

$147 \pm 15 \text{ N-m}$ ($15 \pm 1.5 \text{ kg-m}$, $108 \pm 11 \text{ ft-lb}$)

2) Fit BJ (bell joint) to rear housing splines.

CAUTION:

Be careful not to damage inner oil seal lip.

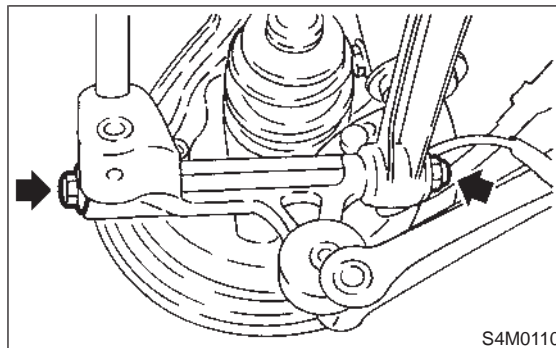
3) Connect rear housing assembly to lateral link assembly.

CAUTION:

Use a new self-locking nut.

Tightening torque:

$137 \pm 20 \text{ N-m}$ ($14 \pm 2 \text{ kg-m}$, $101 \pm 14 \text{ ft-lb}$)



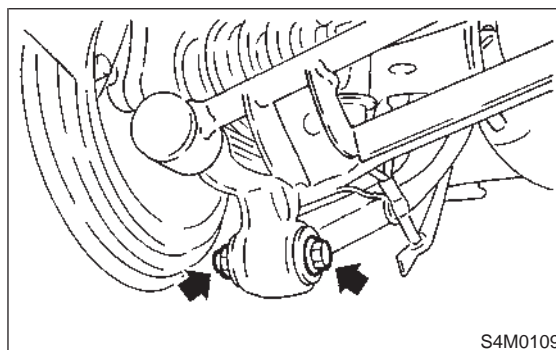
4) Connect rear housing assembly to trailing link assembly.

CAUTION:

Use a new self-locking nut.

Tightening torque:

$98 - 127 \text{ N-m}$ ($10 - 13 \text{ kg-m}$, $72 - 94 \text{ ft-lb}$)



5) Connect rear stabilizer to rear lateral link.

CAUTION:

Use a new self-locking nut.

Tightening torque:

$44 \pm 6 \text{ N-m}$ ($4.5 \pm 0.6 \text{ kg-m}$, $32.5 \pm 4.3 \text{ ft-lb}$)

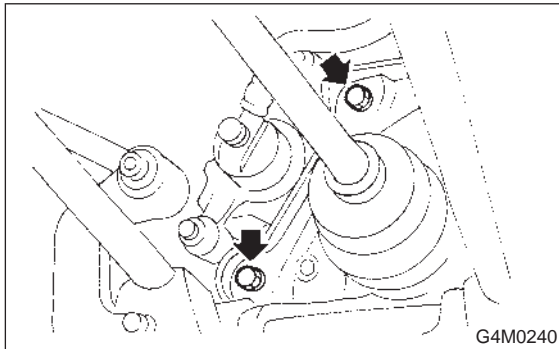
6) Connect parking brake cable to parking brake.

7) Install disc rotor on rear housing assembly.

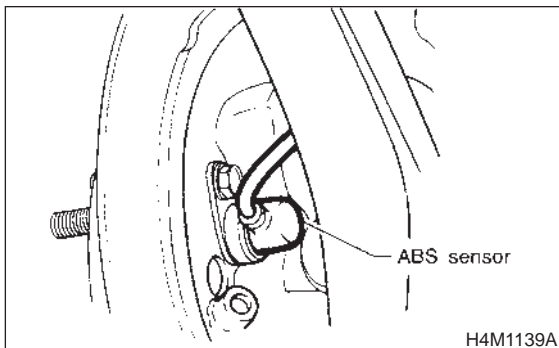
8) Install disc brake caliper on back plate.

Tightening torque:

$52 \pm 6 \text{ N-m}$ ($5.3 \pm 0.6 \text{ kg-m}$, $38.3 \pm 4.3 \text{ ft-lb}$)



9) Install rear ABS sensor to back plate (only vehicle equipped with ABS).



10) Bleed air from brake system. <Ref. to 4-4 [W10B0].>

11) Adjust parking brake lever stroke by turning adjuster.

12) Move brake lever back to apply brakes. While depressing brake pedal, tighten axle nut using a socket wrench. Lock axle nut after tightening.

Tightening torque:

$186 \pm 20 \text{ N-m}$ ($19 \pm 2 \text{ kg-m}$, $137 \pm 14 \text{ ft-lb}$)

CAUTION:

- Use a new axle nut.
- Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
- Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

13) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:

$88 \pm 10 \text{ N-m}$ ($9 \pm 1 \text{ kg-m}$, $65 \pm 7 \text{ ft-lb}$)

2. DRUM BRAKE

1) Connect rear housing assembly and strut assembly.

CAUTION:

Use a new self-locking nut.

Tightening torque:

$147 \pm 15 \text{ N-m}$ ($15 \pm 1.5 \text{ kg-m}$, $108 \pm 11 \text{ ft-lb}$)

2) Fit BJ (bell joint) to rear housing splines.

CAUTION:

Be careful not to damage inner oil seal lip.

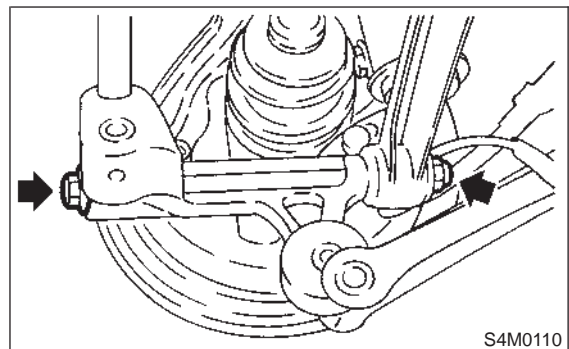
3) Connect rear housing assembly to lateral link assembly.

CAUTION:

Use a new self-locking nut.

Tightening torque:

$137 \pm 20 \text{ N-m}$ ($14 \pm 2 \text{ kg-m}$, $101 \pm 14 \text{ ft-lb}$)



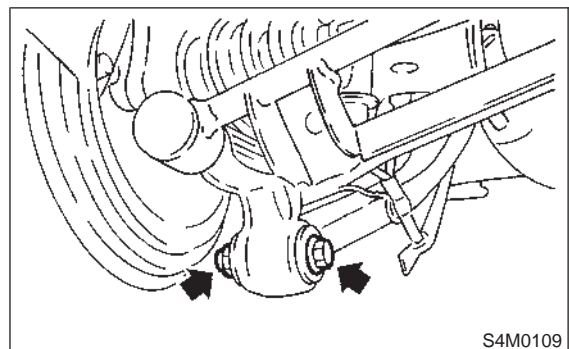
4) Connect rear housing assembly to trailing link assembly.

CAUTION:

Use a new self-locking nut.

Tightening torque:

$98 - 127 \text{ N-m}$ ($10 - 13 \text{ kg-m}$, $72 - 94 \text{ ft-lb}$)



5) Connect rear stabilizer to rear lateral link.

CAUTION:

Use a new self-locking nut.

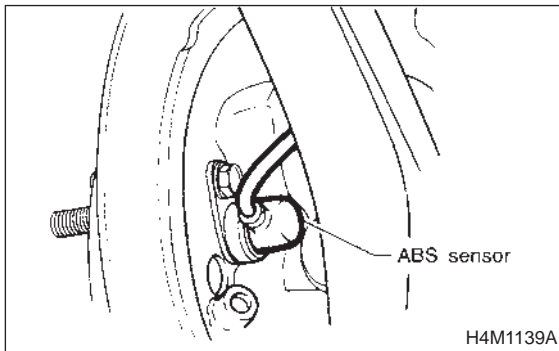
Tightening torque:

$44 \pm 6 \text{ N-m}$ ($4.5 \pm 0.6 \text{ kg-m}$, $32.5 \pm 4.3 \text{ ft-lb}$)

6) Connect parking brake cable to parking brake.

7) Clean brake pipe connection. Using a flare-nut wrench, connect brake pipe to wheel cylinder.

8) Connect rear ABS sensor to back plate (only vehicle equipped with ABS).



- 9) Connect parking brake cable to lever.
- 10) Install brake drum on rear housing assembly.
- 11) Bleed air from brake system. <Ref. to 4-4 [W10B0].>
- 12) Adjust parking brake lever stroke by turning adjuster.
- 13) Move brake lever back to apply brakes. While depressing brake pedal, tighten axle nut using a socket wrench. Lock axle nut after tightening.

Tightening torque:

$186 \pm 20 \text{ N}\cdot\text{m}$ ($19 \pm 2 \text{ kg}\cdot\text{m}$, $137 \pm 14 \text{ ft}\cdot\text{lb}$)

CAUTION:

- Use a new axle nut.
- Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
- Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

- 14) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:

$88 \pm 10 \text{ N}\cdot\text{m}$ ($9 \pm 1 \text{ kg}\cdot\text{m}$, $65 \pm 7 \text{ ft}\cdot\text{lb}$)

3. Front and Rear Drive Shafts

A: REMOVAL

1. FRONT DRIVE SHAFT

- 1) Disconnect ground cable from battery.
- 2) Jack-up vehicle, support it with safety stands (rigid rocks), and remove front wheel cap and wheels.
- 3) Unlock axle nut.
- 4) Remove axle nut using a socket wrench.

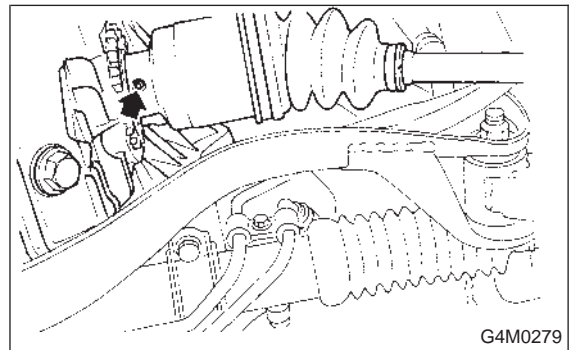
CAUTION:

Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

- 5) Disconnect transverse link from housing.
- 6) Remove spring pin which secures transmission spindle to SFJ.

CAUTION:

Use a new spring pin.



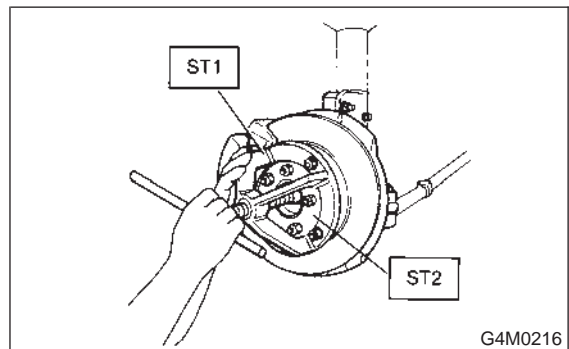
- 7) Remove front drive shaft assembly. If it is hard to remove, use ST1 and ST2.

ST1 926470000 AXLE SHAFT PULLER

ST2 927140000 PLATE

CAUTION:

- Be careful not to damage oil seal lip when removing front drive shaft.
- When front drive shaft is to be replaced, also replace inner oil seal.



2. REAR DRIVE SHAFT

- 1) Disconnect ground cable from battery.
- 2) Lift-up vehicle, and remove rear wheel cap and wheels.

CAUTION:

Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

- 3) Unlock axle nut.
- 4) Loosen axle nut using a socket wrench.

CAUTION:

Do not remove axle nut.

- 5) Remove ABS sensor clamps and parking brake cable bracket.
- 6) Remove bolts which secure lateral link assembly to rear housing.

CAUTION:

Discard old self-locking nut. Replace with a new one.

- 7) Remove bolts which secure trailing link assembly to rear housing.

CAUTION:

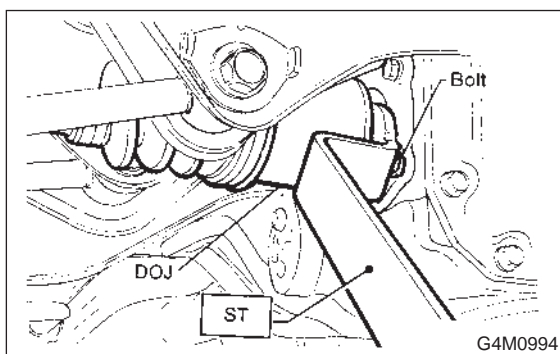
Discard old self-locking nut. Replace with a new one.

- 8) Remove DOJ from rear differential using ST. (Except 2200 cc AT vehicles)

ST 28099PA100 DRIVE SHAFT REMOVER

CAUTION:

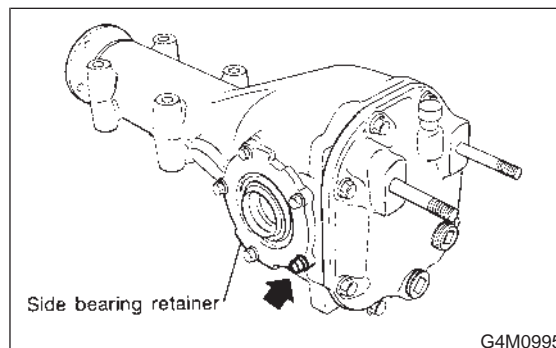
Do not remove circlip attached to inside of differential.



CAUTION:

Be careful not to damage side bearing retainer. Always use bolt as shown in figure, as supporting point for ST during removal.

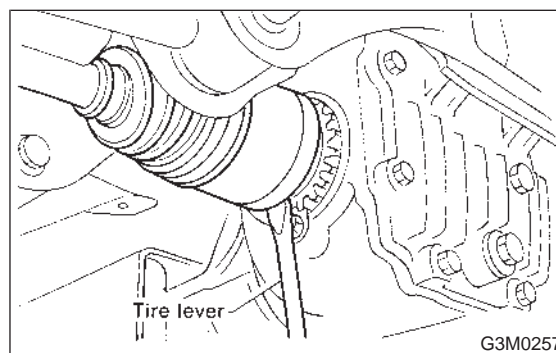
ST 28099PA100 DRIVE SHAFT REMOVER



- 9) Remove DOJ from rear differential using tire lever. (2200 cc AT vehicles)

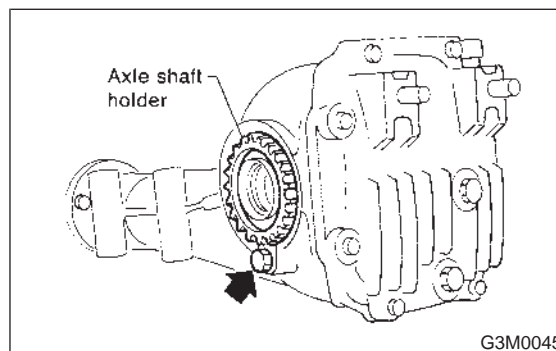
NOTE:

The side spline shaft circlip comes out together with the shaft.



CAUTION:

When removing the DOJ from the rear differential, fit tire lever to the bolt as shown in figure so as not to damage the axle shaft holder.



3. Front and Rear Drive Shafts

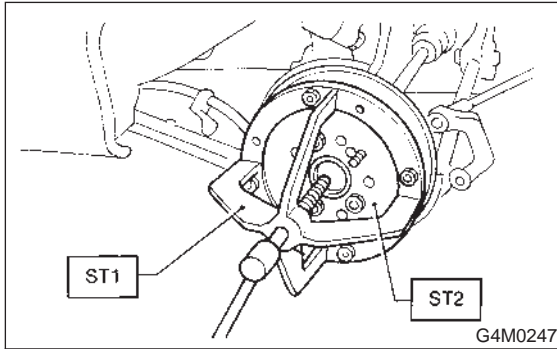
10) Remove axle nut and drive shaft. If it is hard to remove, use ST1 and ST2.

ST1 926470000 AXLE SHAFT PULLER

ST2 927140000 PLATE

CAUTION:

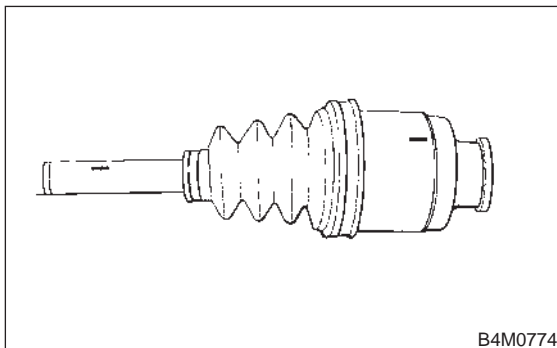
- Be careful not to damage oil seal lip when removing rear drive shaft.
- When rear drive shaft is to be replaced, also replace inner oil seal with a new one.



B: DISASSEMBLY

1. FRONT DRIVE SHAFT

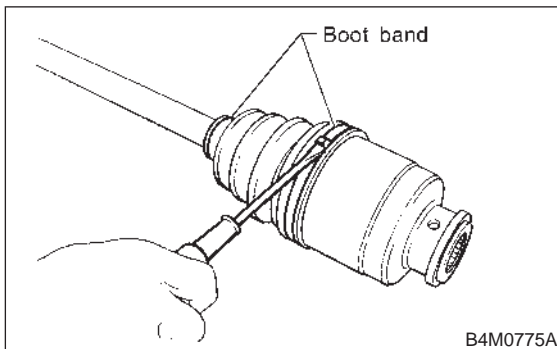
1) Place alignment marks on shaft and outer race.



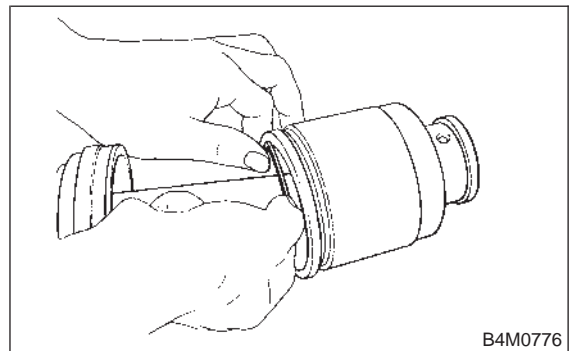
2) Remove SFJ boot band and boot.

CAUTION:

Be careful not to damage boot.



3) Remove circlip from SFJ outer race using screwdriver.



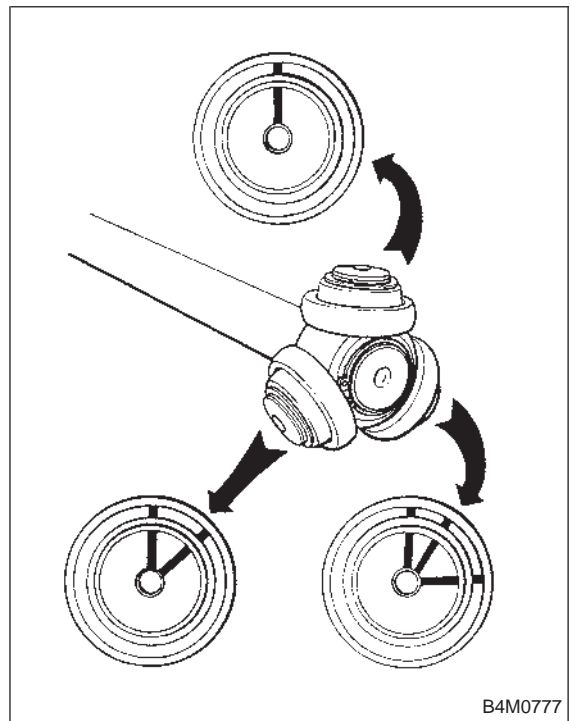
4) Remove SFJ outer race from shaft assembly.

5) Wipe off grease.

CAUTION:

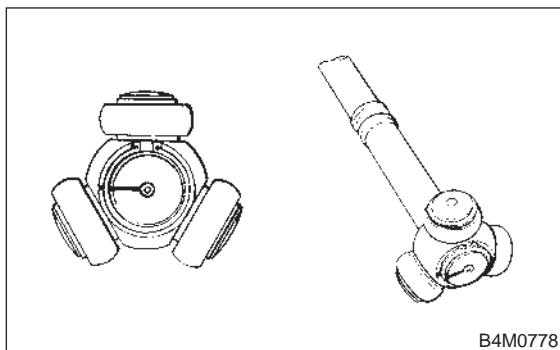
The grease is a special grease. Do not confuse with other greases.

6) Place alignment mark on free ring and trunnion.

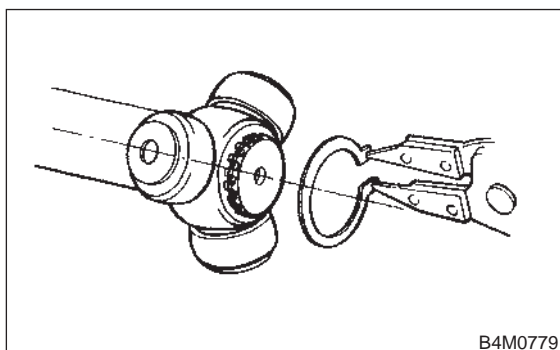


7) Remove free ring from trunnion.

- 8) Place alignment mark on trunnion and shaft.



- 9) Remove snap ring and trunnion.



CAUTION:

Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

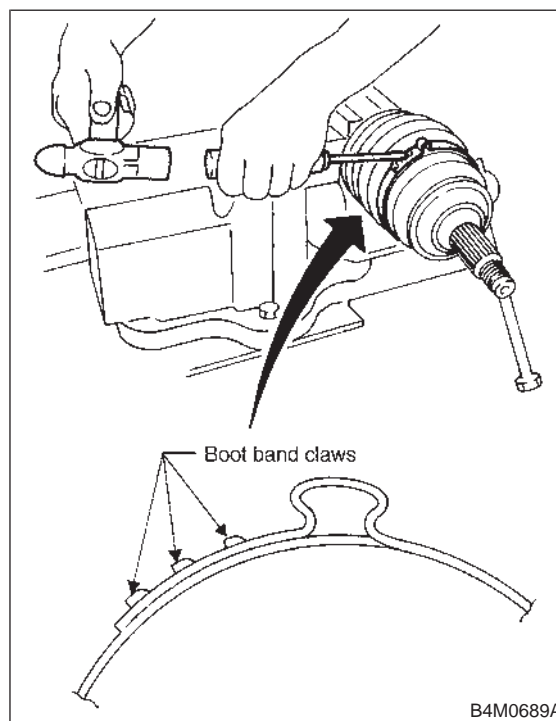
- 10) Remove SFJ boot.

- 11) Place drive shaft in a vise between wooden blocks.

CAUTION:

Do not place drive shaft directly in the vise; use wooden block.

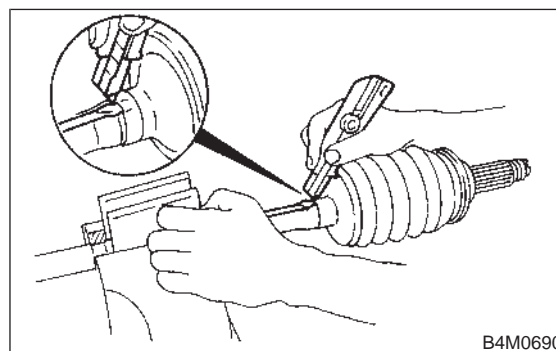
- 12) Raise boot band claws by means of screwdriver and hammer.



- 13) Cut and remove the boot.

CAUTION:

The boot must be replaced with a new one whenever it is removed.

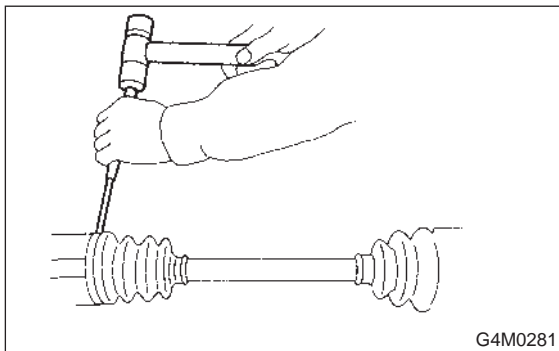


- 14) Thus, disassembly of axle is completed, but BJ cannot be disassembled.

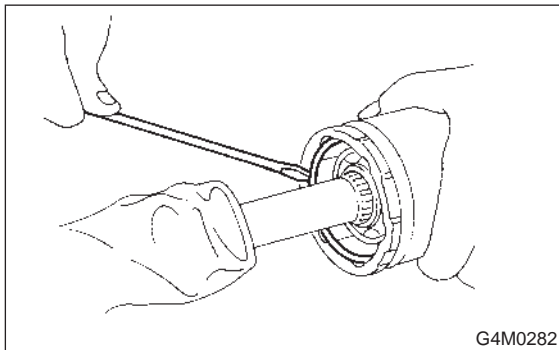
2. REAR DRIVE SHAFT

- 1) Straighten bent claw of larger end of DOJ boot.

- 2) Loosen band by means of screwdriver or pliers with care of not damaging boot.



- 3) Remove boot band on the small end of DOJ boot in the same manner.
 4) Remove the larger end of DOJ boot from DOJ outer race.
 5) Pry and remove round circlip located at the neck of DOJ outer race with a screwdriver.



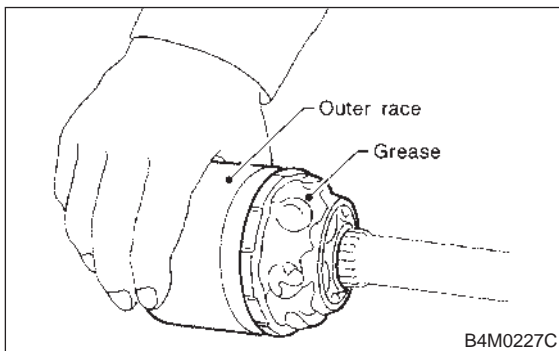
- 6) Take out DOJ outer race from shaft assembly.
 7) Wipe off grease and take out balls.

CAUTION:

The grease is a special grease (grease for constant velocity joint). Do not confuse with other greases.

NOTE:

Disassemble exercising care not to lose balls (6 pcs).



- 8) To remove the cage from the inner race, turn the cage by a half pitch to the track groove of the inner race and shift the cage.

- 9) Remove snap ring, which fixes inner race to shaft, by using pliers.
 10) Take out DOJ inner race.
 11) Take off DOJ cage from shaft and remove DOJ boot.

CAUTION:

Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

- 12) Remove BJ boot in the same procedure as DOJ boot.
 13) Thus, disassembly of axle is completed, but BJ is unable to be disassembled.

C: INSPECTION

Check the removed parts for damage, wear, corrosion etc. If faulty, repair or replace.

- 1) DOJ (Double Offset Joint)

Check seizure, corrosion, damage, wear and excessive play.

- 2) SFJ (Shudder-less Freering tripod Joint)

Check seizure, corrosion, damage and excessive play.

- 3) Shaft

Check excessive bending, twisting, damage and wear.

- 4) BJ (Bell Joint)

Check seizure, corrosion, damage and excessive play.

- 5) Boot

Check for wear, warping, breakage or scratches.

- 6) Grease

Check for discoloration or fluidity.

D: ASSEMBLY

1. FRONT DRIVE SHAFT

CAUTION:

Use specified grease.

BJ side:

NTG2218 (Part No. 28093AA020)

SFJ side:

SSG-6003 (Part No. 28093TA000)

- 1) Place BJ boot and small boot band on BJ side of shaft.

CAUTION:

Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

- 2) Place drive shaft in a vise.

CAUTION:

Do not place drive shaft directly in the vise; use wooden blocks.

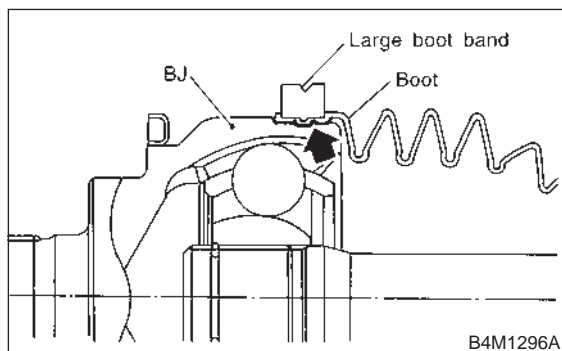
- 3) Apply a coat of specified grease [60 to 70 g (2.12 to 2.47 oz)] to BJ.

- 4) Apply an even coat of specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to shaft.

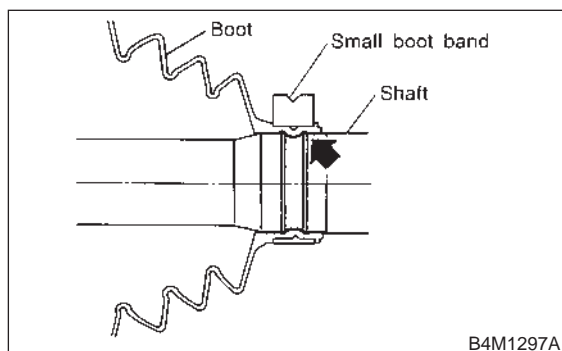
NOTE:

The inside of the larger end of BJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.

- 5) Install boot projecting portion to BJ groove.

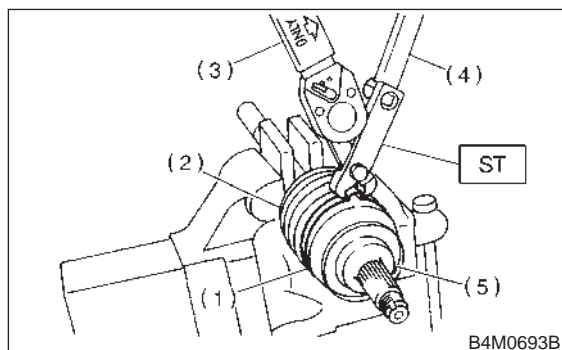


- 6) Set large boot band in place.
- 7) Install boot projecting portion to shaft groove.



- 8) Tighten boot bands using ST, torque wrench and socket flex handle.

ST 28099AC000 BOOT BAND PLIER



- (1) Large boot band
- (2) Boot
- (3) Torque wrench
- (4) Socket flex handle
- (5) BJ

Tightening torque:

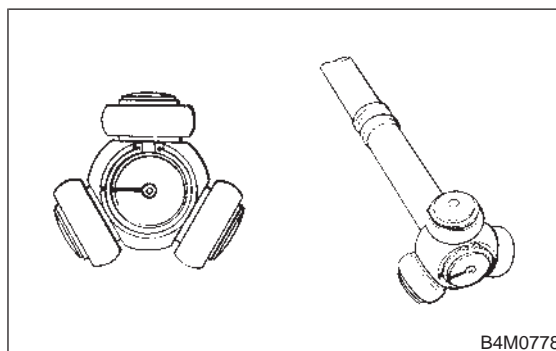
Large boot band

157 N·m (16.0 kg-m, 116 ft-lb) or more

Small boot band

133 N·m (13.6 kg-m, 98 ft-lb) or more

- 9) Place SFJ boot at the center of shaft.
- 10) Align alignment marks and install trunnion on shaft.

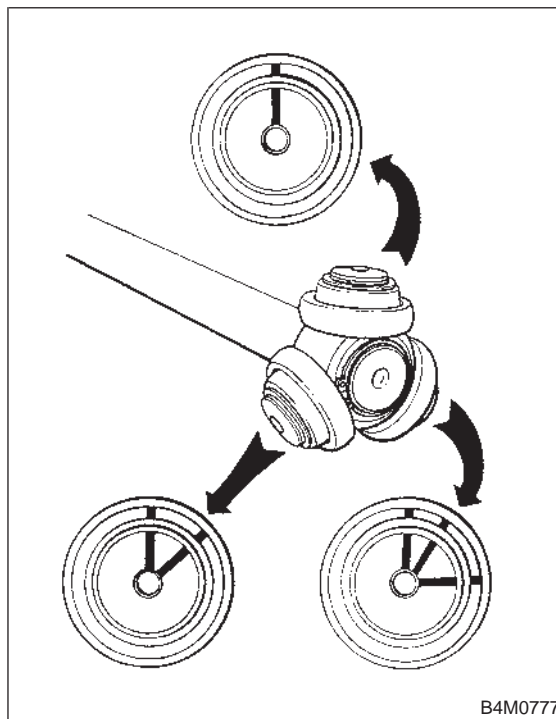


- 11) Install snap ring to shaft.

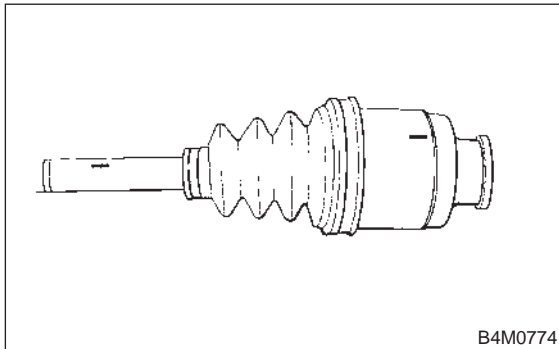
CAUTION:

Confirm that the snap ring is completely fitted in the shaft groove.

- 12) Fill 100 to 110 g (3.53 to 3.88 oz) of specified grease into the interior of SFJ outer race.
- 13) Apply a coat of specified grease to free ring and trunnion.
- 14) Align alignment marks on free ring and trunnion and install free ring.



- 15) Align alignment marks on shaft and outer race, and install outer race.



- 16) Install circlip in the groove on SFJ outer race.

CAUTION:

Pull the shaft lightly and assure that the circlip is completely fitted in the groove.

- 17) Apply an even coat of the specified grease 30 to 40 g (1.06 to 1.41 oz) to the entire inner surface of boot.

- 18) Install SFJ boot taking care not to twist it.

CAUTION:

- The inside of the larger end of SFJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.
- When installing SFJ boot, position outer race of SFJ at center of its travel.

- 19) Put a band through the clip and wind twice in alignment with band groove of boot.

CAUTION:

Use a new band.

- 20) Pinch the end of band with pliers. Hold the clip and tighten securely.

NOTE:

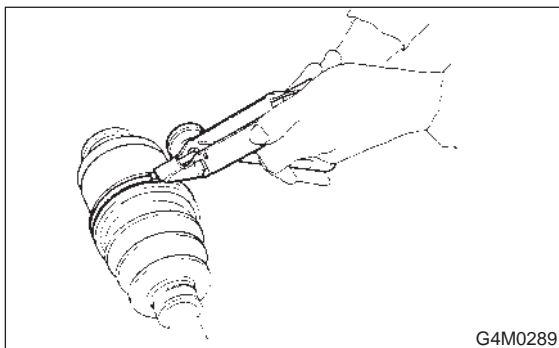
When tightening boot, exercise care so that the air within the boot is appropriate.

- 21) Tighten band by using ST.

ST 925091000 BAND TIGHTENING TOOL

NOTE:

Tighten band until it cannot be moved by hand.

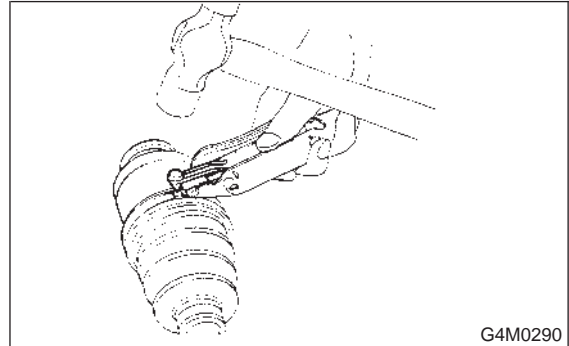


- 22) Tap on the clip with the punch provided at the end of ST.

ST 925091000 BAND TIGHTENING TOOL

CAUTION:

Tap to an extent that the boot underneath is not damaged.



- 23) Cut off band with an allowance of about 10 mm (0.39 in) left from the clip and bend this allowance over the clip.

CAUTION:

Be careful so that the end of the band is in close contact with clip.

- 24) Fix up boot on BJ in the same manner.

NOTE:

Extend and retract SFJ to provide equal grease coating.

2. REAR DRIVE SHAFT

CAUTION:

Use specified grease.

BJ side:

Molylex No. 2 (Part No. 723223010) or Sunlight TB2-A

DOJ side:

VU-3A702 (Yellow) (Part No. 23223GA050)

- 1) Install BJ boot in specified position, and fill it with 60 to 70 g (2.12 to 2.47 oz) of specified grease.

- 2) Place DOJ boot at the center of shaft.

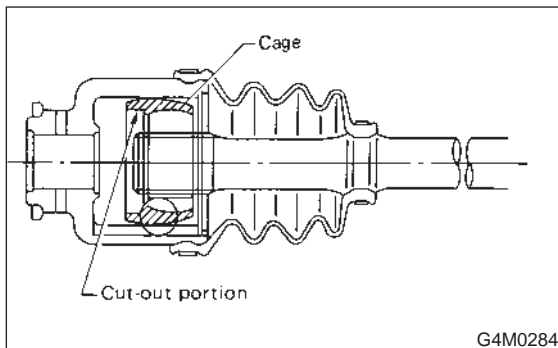
CAUTION:

Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

3) Insert DOJ cage onto shaft.

NOTE:

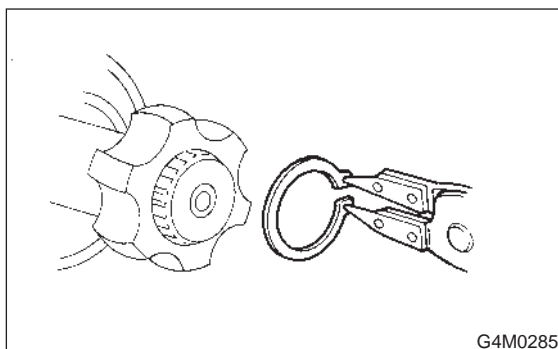
Insert the cage with the cut-out portion facing the shaft end, since the cage has an orientation.



4) Install DOJ inner race on shaft and fit snap ring with pliers.

NOTE:

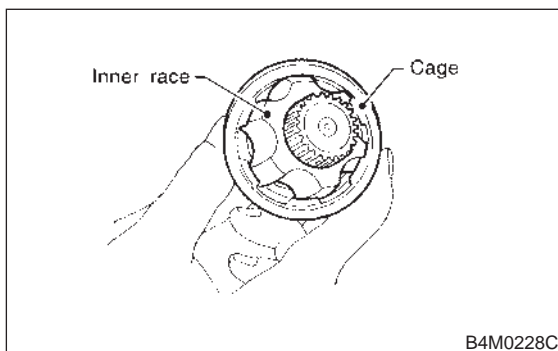
Confirm that the snap ring is completely fitted in the shaft groove.



5) Install cage, which was previously fitted, to inner race fixed upon shaft.

NOTE:

Fit the cage with the protruded part aligned with the track on the inner race and then turn by a half pitch.

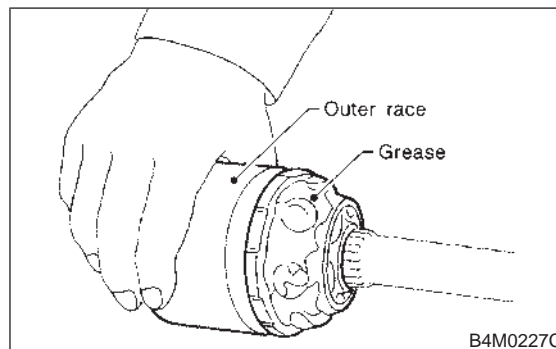


6) Fill 80 to 90 g (2.82 to 3.17 oz) of specified grease into the interior of DOJ outer race.

7) Apply a coat of specified grease to the cage pocket and six balls.

8) Insert six balls into the cage pocket.

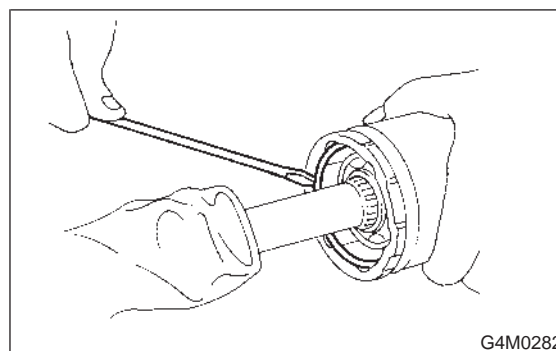
9) Align the outer race track and ball positions and place in the part where shaft, inner race, cage and balls are previously installed, and then fit outer race.



10) Install circlip in the groove on DOJ outer race.

NOTE:

- Assure that the balls, cage and inner race are completely fitted in the outer race of DOJ.
- Exercise care not to place the matched position of circlip in the ball groove of outer race.
- Pull the shaft lightly and assure that the circlip is completely fitted in the groove.



11) Apply an even coat of the specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to shaft.

12) Install DOJ boot taking care not to twist it.

NOTE:

- The inside of the larger end of DOJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.
- When installing DOJ boot, position outer race of DOJ at center of its travel.

13) Put a band through the clip and wind twice in alignment with band groove of boot.

CAUTION:

Use a new band.

3. Front and Rear Drive Shafts

14) Pinch the end of band with pliers. Hold the clip and tighten securely.

NOTE:

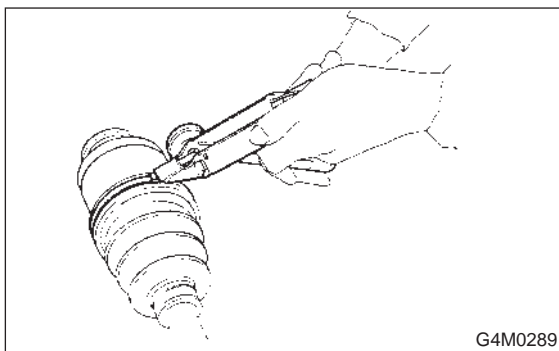
When tightening boot, exercise care so that the air within the boot is appropriate.

15) Tighten band by using ST.

ST 925091000 BAND TIGHTENING TOOL

NOTE:

Tighten band until it cannot be moved by hand.

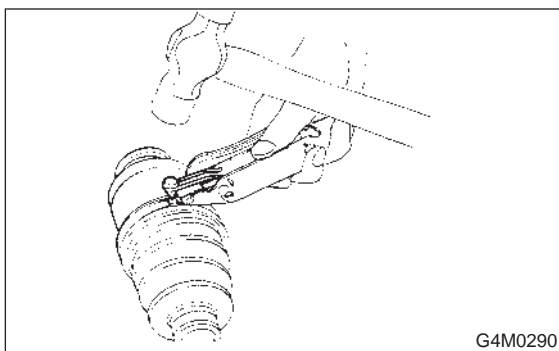


16) Tap on the clip with the punch provided at the end of ST.

ST 925091000 BAND TIGHTENING TOOL

CAUTION:

Tap to an extent that the boot underneath is not damaged.



17) Cut off band with an allowance of about 10 mm (0.39 in) left from the clip and bend this allowance over the clip.

CAUTION:

Be careful so that the end of the band is in close contact with clip.

18) Fix up boot on BJ in the same manner.

NOTE:

Extend and retract DOJ to provide equal grease coating.

E: INSTALLATION**1. FRONT DRIVE SHAFT**

1) Insert BJ into hub splines.

CAUTION:

Be careful not to damage inner oil seal lip.

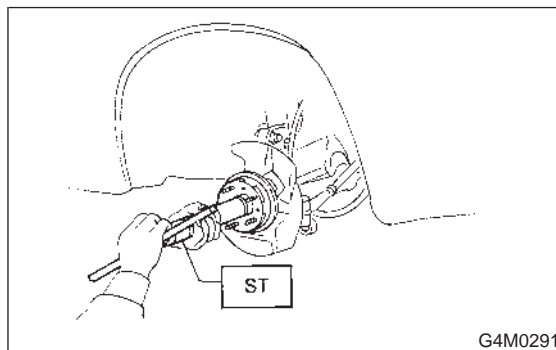
2) Using ST1 and ST2, pull drive shaft into place.

ST1 922431000 AXLE SHAFT INSTALLER

ST2 927390000 ADAPTER

CAUTION:

Do not hammer drive shaft when installing it.

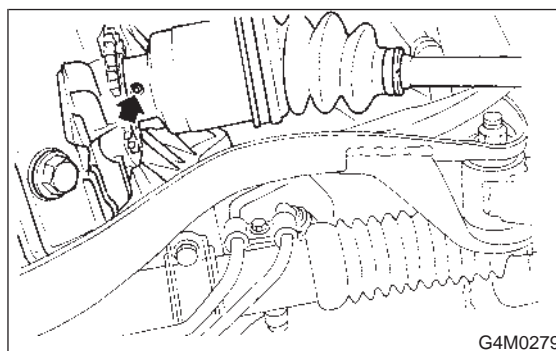


3) Tighten axle nut temporarily.

4) Install SFJ on transmission spindle and drive spring pin into place.

CAUTION:

Always use a new spring pin.



5) Connect transverse link to housing.

Torque (self-locking nut):

49 ± 10 N-m (5.0 ± 1.0 kg-m, 36 ± 7 ft-lb)

CAUTION:

Use a new self-locking nut.

6) Install stabilizer bracket.

7) While depressing brake pedal, tighten axle nut to the specified torque.

Tightening torque:

186 ± 20 N-m (19 ± 2 kg-m, 137 ± 14 ft-lb)

CAUTION:

- Use a new axle nut.
- Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
- Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

8) After tightening axle nut, lock it securely.

2. REAR DRIVE SHAFT

1) Insert BJ into rear housing splines.

CAUTION:

Be careful not to damage inner oil seal lip.

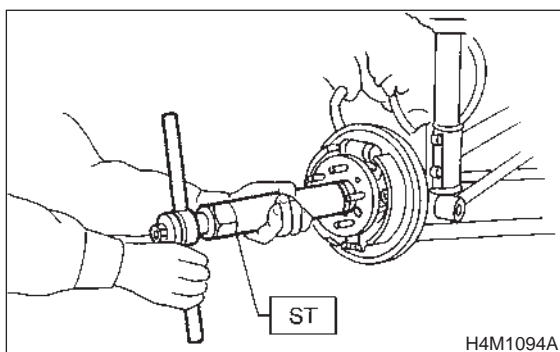
2) Using ST1 and ST2, pull drive shaft into place.

ST1 922431000 AXLE SHAFT INSTALLER

ST2 927390000 ADAPTER

CAUTION:

Do not hammer drive shaft when installing it.

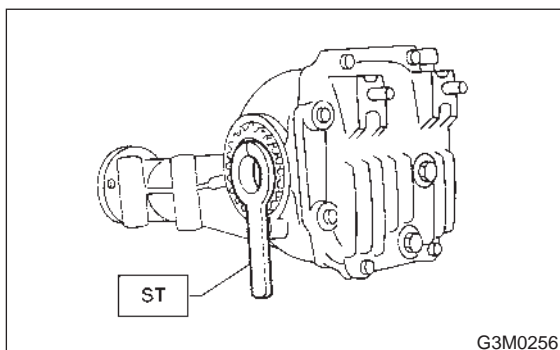


3) Tighten axle nut temporarily.

4) Replace circlips from DOJ spline with new one. (2200 cc AT model only)

5) Using ST, install DOJ into differential.

ST 28099PA090 SIDE OIL SEAL PROTECTOR

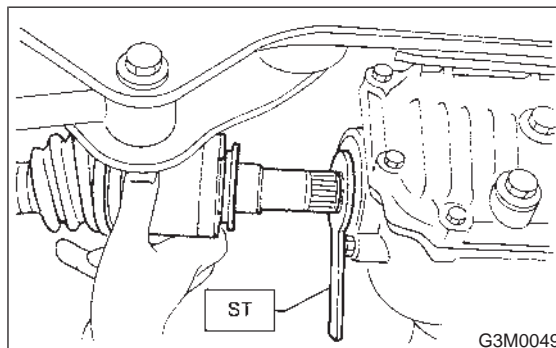


6) Insert DOJ spline end into bore of side oil seal, and remove ST.

CAUTION:

Do not allow DOJ splines to damage side oil seal.

ST 28099PA090 SIDE OIL SEAL PROTECTOR

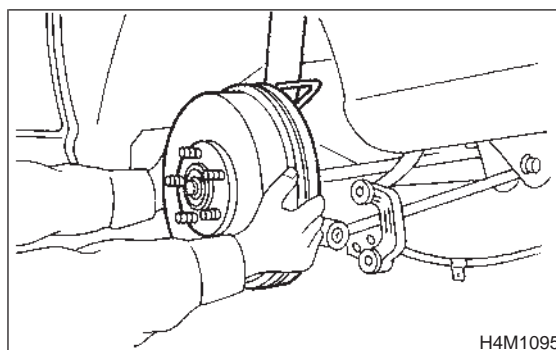


7) Align DOJ and differential splines.

8) Push housing to insert DOJ into differential.

NOTE:

Make sure DOJ is inserted properly.



9) Connect rear housing assembly to trailing link assembly, and tighten self-locking nut.

Tightening torque:

113±15 N·m (11.5±1.5 kg·m, 83±11 ft·lb)

10) Connect rear housing assembly to lateral link assembly, and tighten self-locking nut.

Tightening torque:

137±20 N·m (14±2 kg·m, 101±14 ft·lb)

11) Install stabilizer bracket.

12) While depressing brake pedal, tighten axle nut using a socket wrench.

Tightening torque:

186±20 N·m (19±2 kg·m, 137±14 ft·lb)

CAUTION:

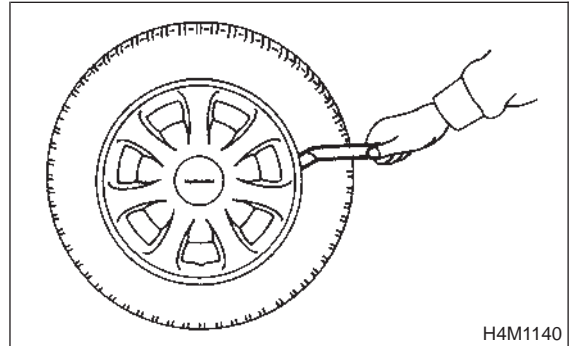
- Use a new axle nut.
- Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
- Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

13) After tightening axle nut, lock it securely.

4. Full Wheel Cap

A: REMOVAL

Pry off the full wheel cap with a wheel cap remover inserted between openings in the cap.



B: INSTALLATION

Align the valve hole in the wheel cap with the valve on the wheel and secure the wheel cap by tapping four points by hand.

5. Steel Wheel and Tire

A: INSPECTION

1) Deformation or damage on the rim can cause air leakage. Check the rim flange for deformation, crack, or damage, and repair or replace as necessary.

2) Take stone, glass, nail etc. off the tread groove.

3) Replace tire:

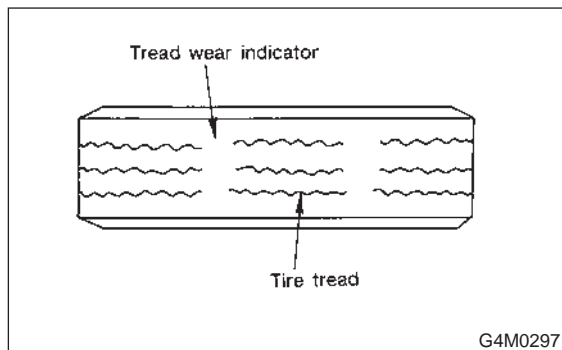
CAUTION:

● When replacing a tire, make sure to use only the same size, construction and load range as originally installed.

● Avoid mixing radial, belted bias or bias tires on the vehicle.

(1) when large crack on side wall, damage or crack on tread is found.

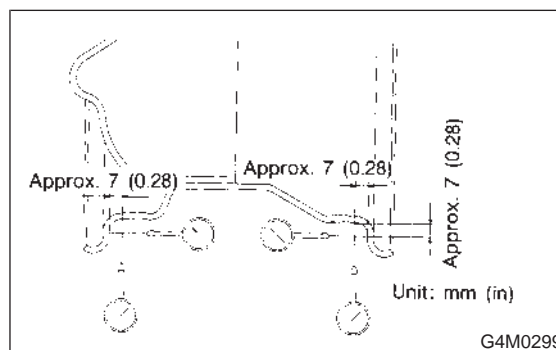
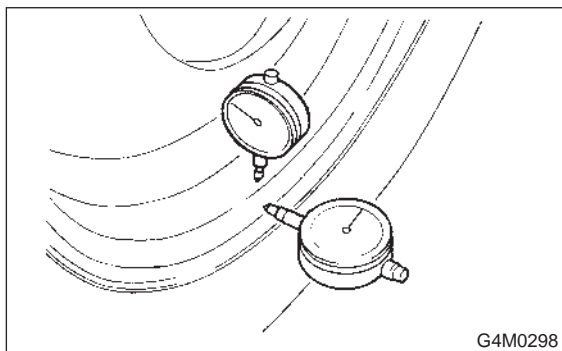
(2) when the "tread wear indicator" appears as a solid band across the tread.



1. INSPECTION OF WHEEL RUNOUT

1) Jack-up vehicle until wheels clear the floor.

2) Slowly rotate wheel to check rim "runout" using a dial gauge.



3) If rim runout exceeds specifications, remove tire from rim and check runout while attaching dial gauge to positions shown in figure.

4) If measured runout still exceeds specifications, replace the wheel.

	Axial runout limit	Radial runout limit
Steel wheel	1.5 mm (0.059 in)	
Aluminum wheel	1.0 mm (0.039 in)	

6. Wheel Balancing

- 1) Proper wheel balance may be lost if the tire is repaired or if it wears. Check the tire for dynamic balance, and repair as necessary.
- 2) To check for dynamic balance, use a dynamic balancer. Drive in the balance weight on both the top and rear sides of the rim.
- 3) Some types of balancer can cause damage to the wheel. Use an appropriate balancer when adjusting the wheel balance.
- 4) Use genuine balance weights.

CAUTION:

- 55 g (1.94 oz) weight used with aluminum wheel is not available.
- Balance weights are available for use with any of 14- to 16-inch wheels.

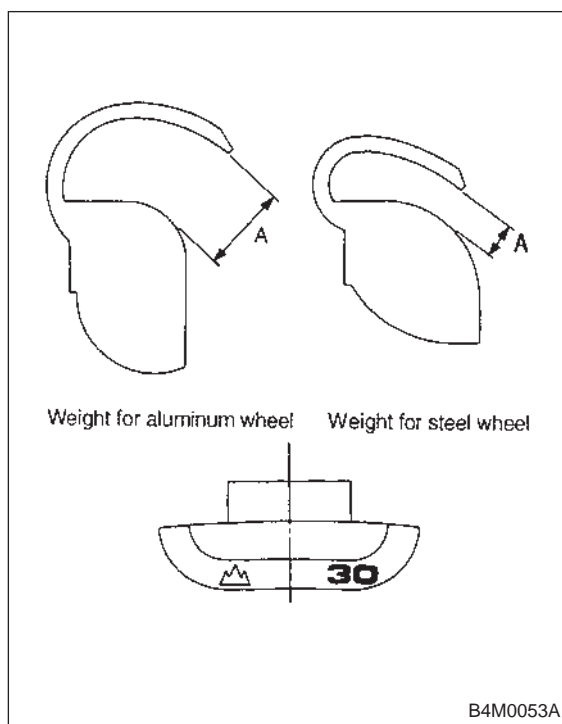
Service limit: A

Weight for steel wheel;

1.6 — 2.0 mm (0.063 — 0.079 in)

Weight for aluminum wheel;

4.6 — 5.4 mm (0.181 — 0.213 in)



7. Installation of Wheel Assembly to Vehicle

- 1) Attach the wheel to the hub by aligning the wheel bolt hole with the hub bolt.
- 2) Temporarily attach the wheel nuts to the hub bolts. (In the case of aluminum wheel, use SUBARU genuine wheel nut for aluminum wheel.)
- 3) Manually tighten the nuts making sure the wheel hub hole is aligned correctly to the guide portion of hub.
- 4) Tighten the wheel nuts in a diagonal selection to the specified torque. Use a wheel nut wrench.

Wheel nut tightening torque:

$88 \pm 10 \text{ N}\cdot\text{m}$ ($9 \pm 1 \text{ kg}\cdot\text{m}$, $65 \pm 7 \text{ ft}\cdot\text{lb}$)

CAUTION:

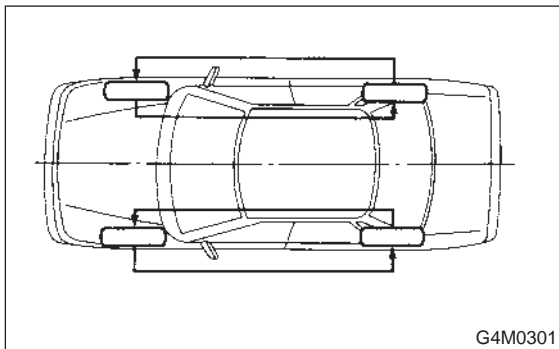
- Tighten the wheel nuts in two or three steps by gradually increasing the torque and working diagonally, until the specified torque is reached. For drum brake models, excess tightening of wheel nuts may cause wheels to “judder”.
 - Do not depress the wrench with a foot; Always use both hands when tightening.
 - Make sure the bolt, nut and the nut seating surface of the wheel are free from oils.
- 5) If a wheel is removed for replacement or for repair of a puncture, retighten the wheel nuts to the specified torque after running 1,000 km (600 miles).

8. Tire Rotation

If tires are maintained at the same positions for a long period of time, uneven wear results. Therefore, they should be periodically rotated. This lengthens service life of tires.

CAUTION:

When rotating tires, replace unevenly worn or damaged tires with new ones.



9. "T-type" Tire

"T-type" tire for temporary use is prepared as a spare tire.

CAUTION:

- Keep the inflation pressure at 412 kPa (4.2 kg/cm², 60 psi) at all times.
- When the wear indicator appears on the tread surface, replace the tire with a new one.
- Do not use a tire chain with the "T-type" tire. Because of the smaller tire size, a tire chain will not fit properly and will result in damage to the vehicle and the tire.
- Do not drive at a speed greater than 80 km/h (50 MPH).
- Drive as slowly as possible and avoid passing over bumps.
- Replace with a conventional tire as soon as possible since this "T-type" tire is only for temporary use.

10. Aluminum Wheel

A: INSPECTION

Inspection for aluminum wheels is basically the same as the one for steel wheels. However, check the rim flange for cracks or damage, and replace (not repair) aluminum wheel if air leakage is found.

B: PRECAUTIONS

Aluminum wheels are easily scratched. To maintain their appearance and safety, do the following:

- 1) Do not damage aluminum wheels during removal, disassembly, installation, wheel balancing, etc. After removing aluminum wheels, place them on a rubber mat, etc.
- 2) While vehicle is being driven, be careful not to ride over sharp obstacles or allow aluminum wheels to contact the shoulder of the road.
- 3) When installing tire chain, be sure to install it properly not to have a slack; otherwise it may hit wheel while driving.
- 4) When washing aluminum wheel, use neutral synthetic detergent and water. Avoid using the cleanser including abrasive, hard brushes or an automatic car washer.

Wheel Bearing Installation Guide



MSA5P0401C

Replaces MSA5TT0001 and MSA5TT0201

© Copyright 2004

Subaru of America, Inc.

All rights reserved. This book may not be reproduced in whole or in part without the express permission of Subaru of America, Inc.

Subaru of America, Inc. reserves the right at any time to make changes or modifications to systems, procedures, descriptions, and illustrations contained in this book without necessarily updating this document. Information contained herein is considered current as of February 2004.

Wheel Bearing Installation Guide

This reference book is to be used when servicing rear wheel bearings on the vehicles described in Service Bulletin 03-50-02. (Below)

The Front wheel bearing servicing is described beginning with page 22.

APPLICABILITY: 1998 - 2008 Forester
1993 - 2007 Impreza (excluding WRX)
1990 - 1999 Legacy

NUMBER: 03-50-02R
DATE: 11/06/08

SUBJECT: New Procedure for Replacing Rear
Wheel Bearings

INFORMATION

Ongoing studies of vehicle repairs and service procedures have helped us identify a new rear wheel bearing replacement procedure for the vehicles described above. Additionally, several design changes have been made to increase the durability of the original equipment caged ball bearings in all types of operating conditions.

The installation of secondary dust shields to the axle (August 2000 vehicle production), and changes to the wheel bearing itself represent some of the results of continued study. The most recent production changes were:

1. Material change of the grease.
2. Treatment changes to the rear ball bearing & inner race.
3. Initial preload applied in production changed.

These changes took place effective August 21, 2001, starting with the following VIN's:

Impreza	Sedan	2*517136
	Wagon	2*817579
Forester		2*735724

To reduce the possibility of repeat premature failures, Subaru is introducing a new procedure to service the rear wheel bearings of the models listed above that entails replacing the rear wheel bearing on the vehicle.

This new procedure will eliminate the heavy forces needed to service the rear wheel bearings that occur in using a hydraulic press. This smooth, low force installation eliminates the chances of deforming the wheel bearing housing and increases the efficiency of repair.

Effective January 2, 2003, this new approved procedure must be used when replacing rear wheel bearings for any repair submitted to Subaru of America, Inc. for reimbursement.

Continued on page 4

In addition, this repair procedure is required on retail repairs to be eligible for any Subaru Replacement Parts Warranty.

A new special tool kit has been developed (supplied by Kent Moore, J-45697) to perform this procedure on the vehicle. The new tools are designed to work only with tapered roller bearing. ~~The repair procedure is not listed in this bulletin but can be found in Subaru Service Publication Booklet Number MSA5TT0201. This supersedes the old booklet of MSA5TT0001.~~ ***(This booklet supersedes the previous books, MSA5TT0201 and MSA5TT0001.)***

Subaru is also authorizing the installation of a taper roller type bearing, part number 28016AA030, as the replacement part on the applicable Impreza & Forester models. This taper bearing is the same bearing that is applicable to 99 model year & prior Legacy models.

If you have diagnosed a failed rear wheel bearing, repair it with the new procedure and check the condition of the remaining side. Replace only if needed.

The new genuine Subaru rear wheel bearings are not to be packed with grease of any kind. The bearing is ready to install out of the box.

The labor operation numbers for the replacement of the rear wheel bearing and its effective parts will not be changed, however, the new time for one side replacement will be .8 hour and 1.5 for both sides.



**CAUTION: VEHICLE SERVICING PERFORMED BY UNTRAINED PERSONS COULD
RESULT IN SERIOUS INJURY TO THOSE PERSONS OR TO OTHERS.**

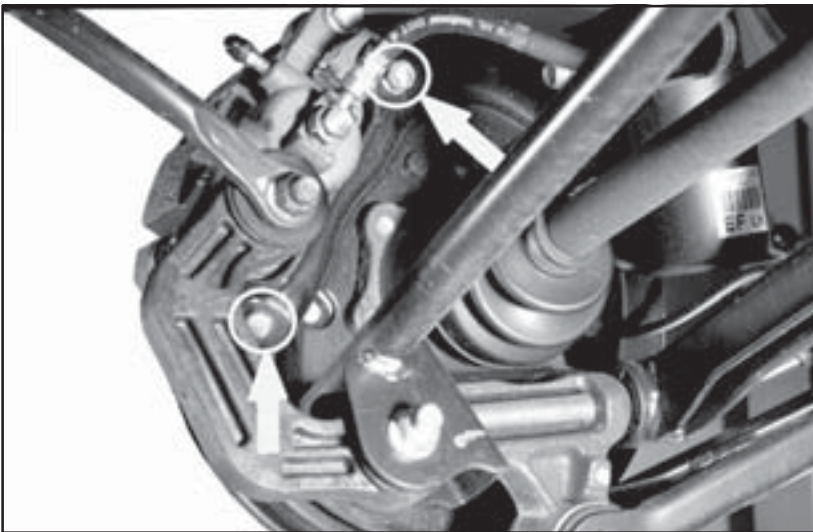
Subaru Service Bulletins are intended for use by professional technicians ONLY. They are written to inform those technicians of conditions that may occur in some vehicles, or to provide information that could assist in the proper servicing of the vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do the job correctly and safely. If a condition is described, DO NOT assume that this Service Bulletin applies to your vehicle, or that your vehicle will have that condition.



1. Remove the wheel.



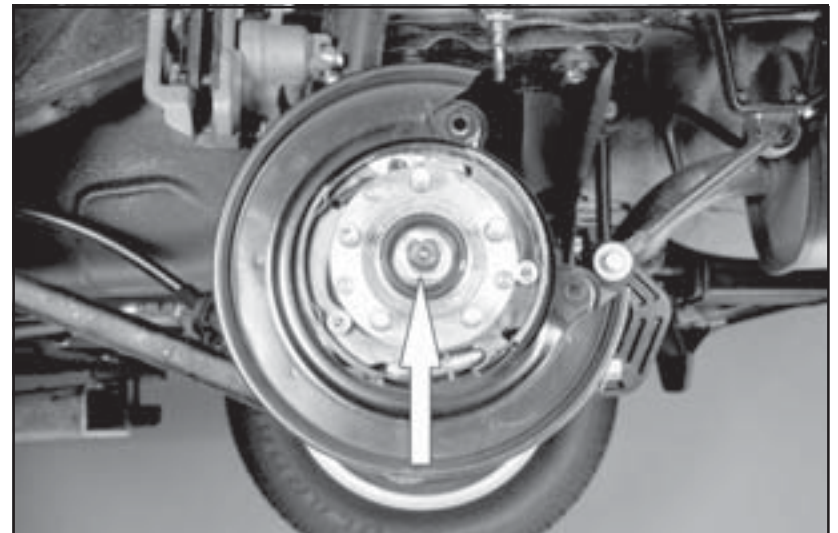
2. Remove the caliper mounting bolts.



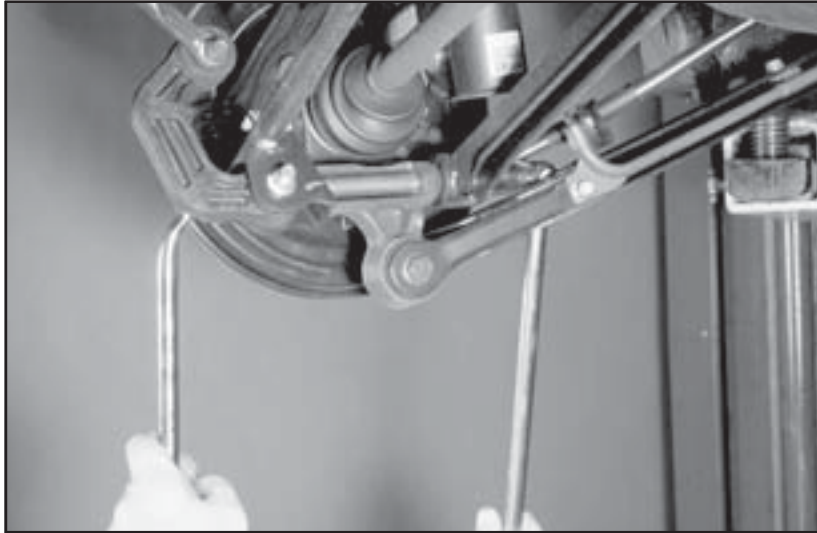
3. Secure the caliper. Place a mark on the hub and rotor so that they can be reassembled the same way they came apart.



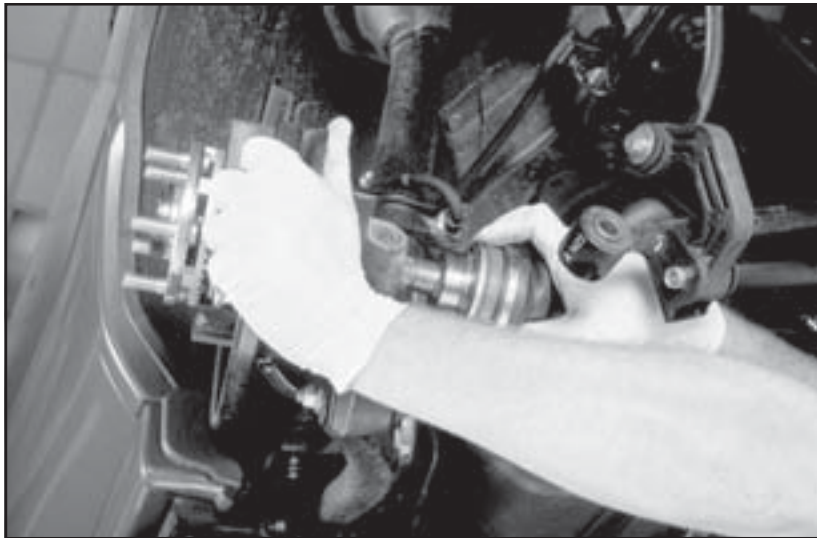
4. Remove the rotor.
5. Unstake and remove the axle nut.



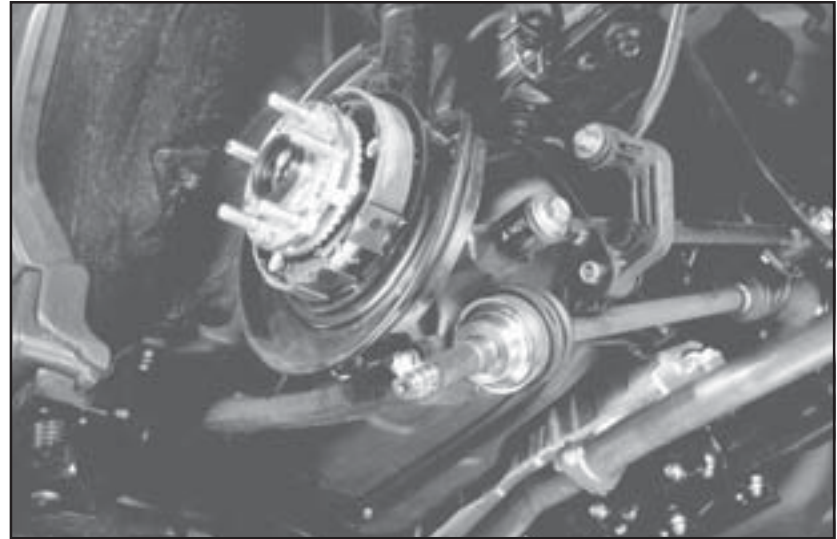
6. Remove the lateral link bolt.



7. Push the bearing housing outward and slide the axle out.



8. Set the axle below the lateral link bolt and reinstall the lateral link bolt.

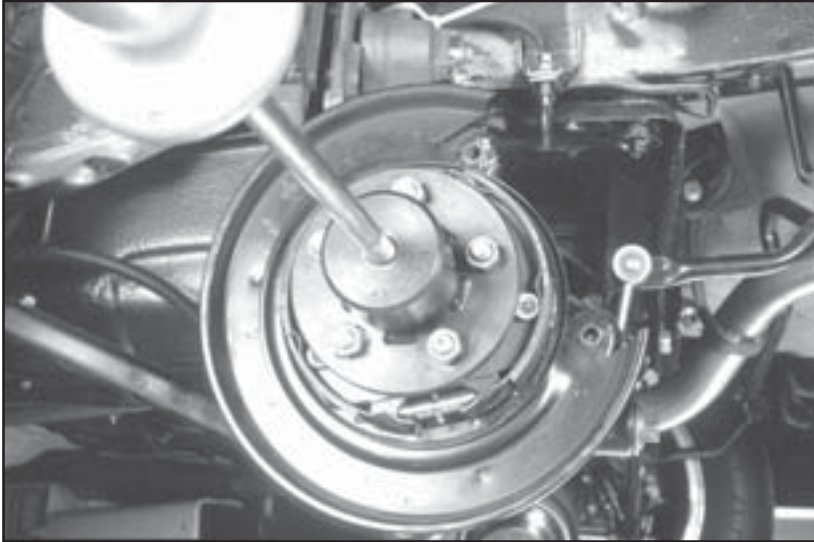


(Inspect the axle for any deep scratches, pitting and damage to the dust shield. Replace if necessary.)

9. Connect the slide hammer to the wheel-bearing hub. Do not use the original wheel lug nuts. Note: After threading on the 5 lug adapter to the slide hammer, thread on the nut and tighten the adapter to the nut.

Notes:

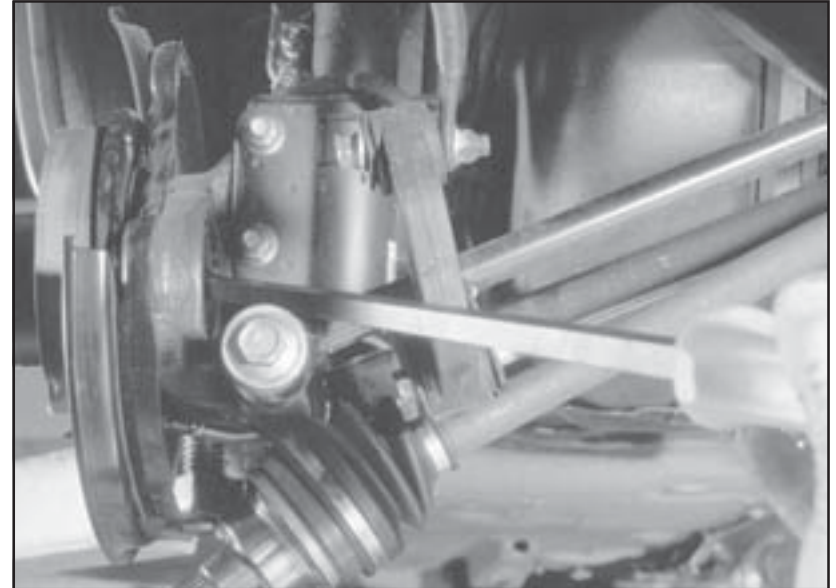
10. Carefully thrust the slide outward until the wheel bearing hub is removed.



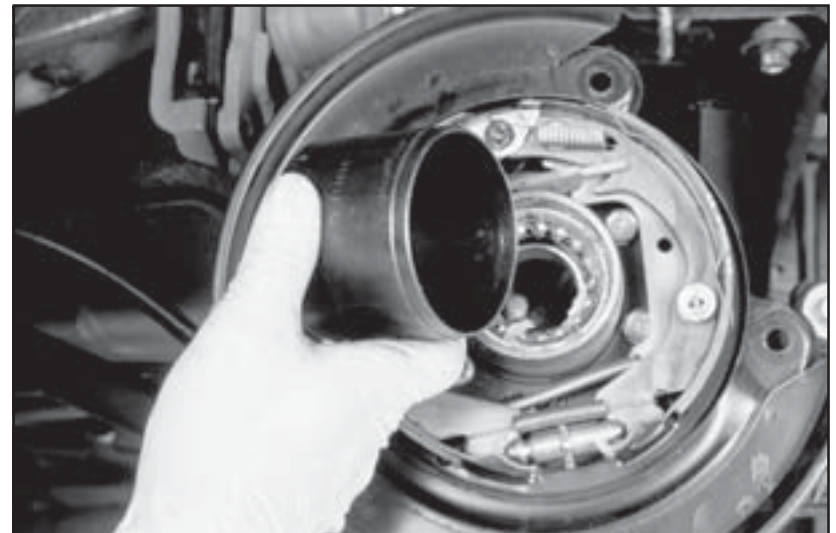
11. Remove the snap ring.



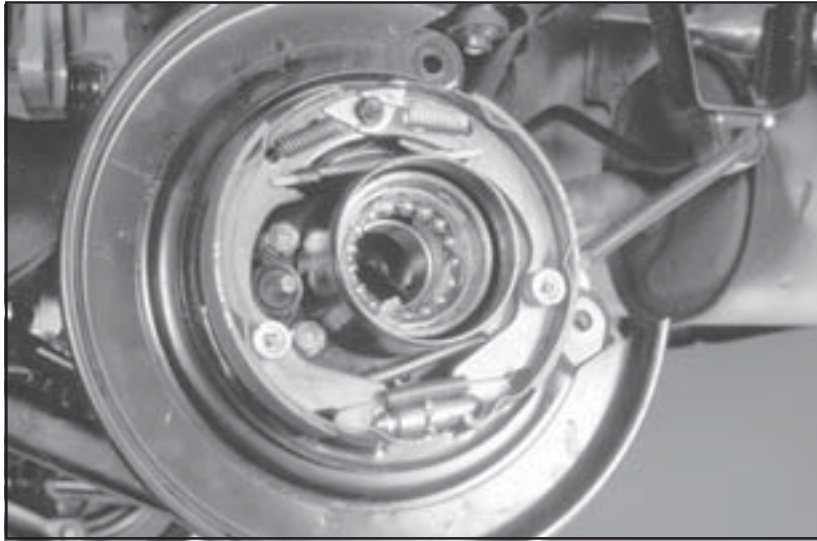
12. Remove the inner seals from the bearing housing.



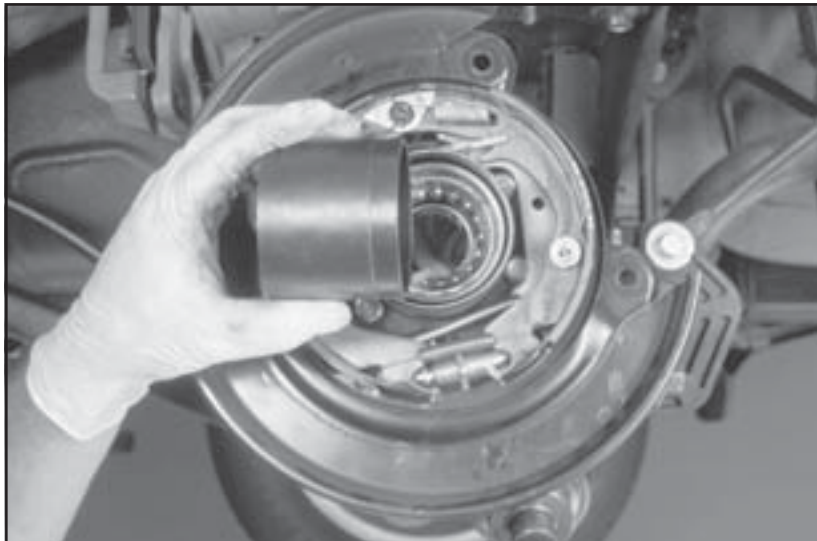
13. Place OTC 311882 over the bearing housing. The groove must face outward.



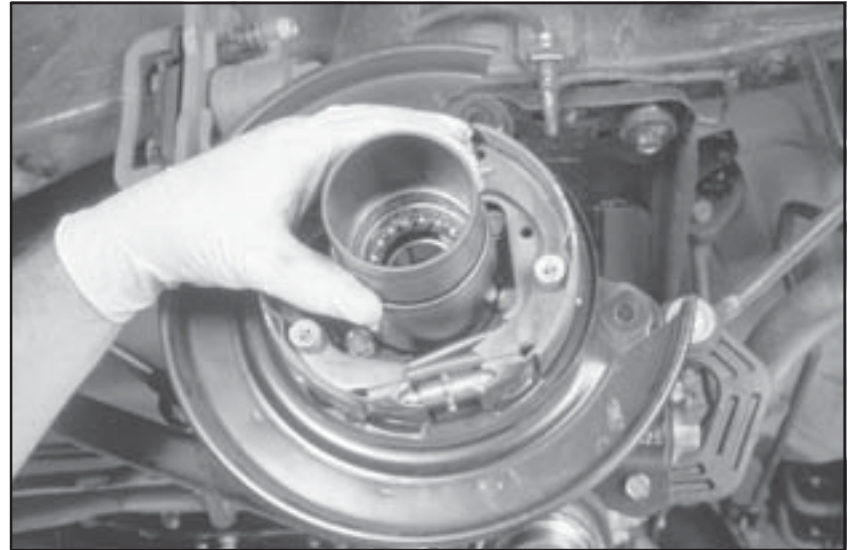
14. Rotate the OTC 311882 as it is installed and make sure it is making full contact with the backing plate.



15. Place the OTC 311883 into the OTC 311882.

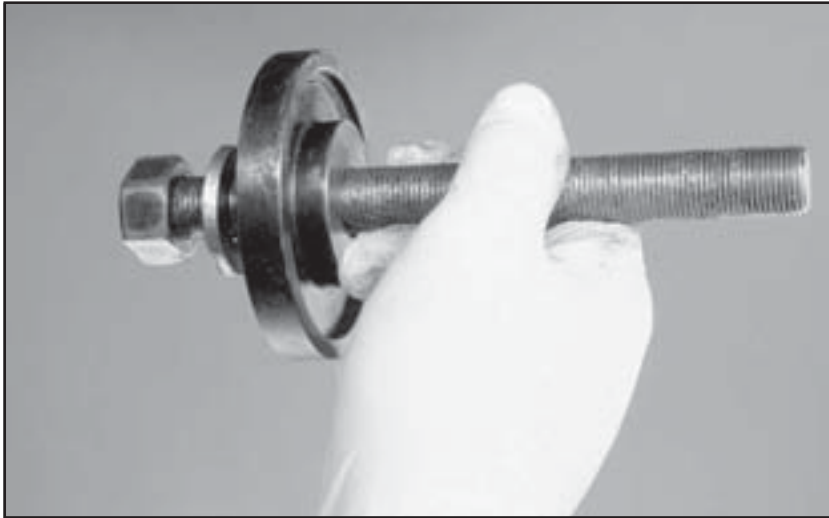


16. Make sure the groove is outward.



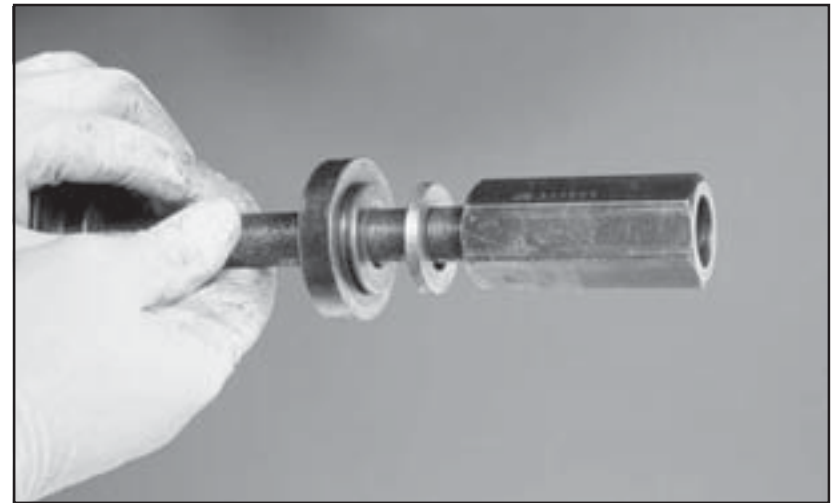
Notes:

17. Place the OTC 314308 with a washer onto the puller bolt. This will be placed into the bearing housing. Apply the included special grease to the puller bolt, once during disassembly and again during reassembly.



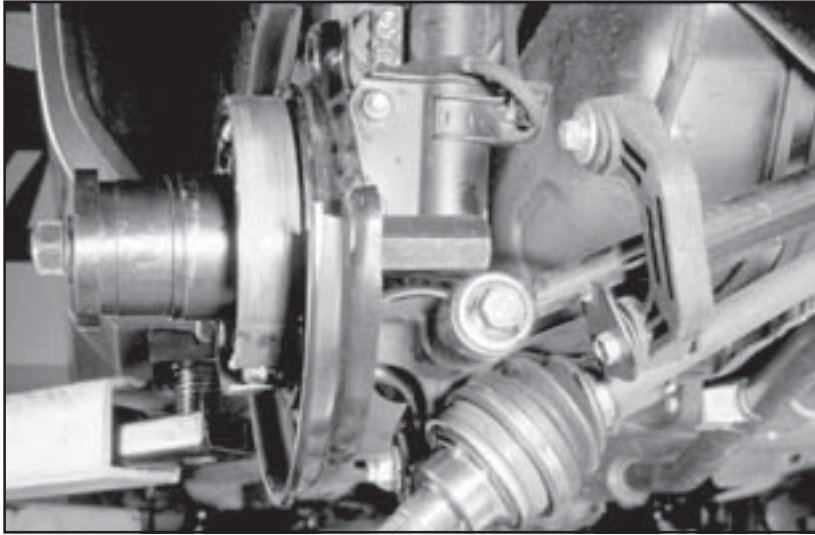
Notes:

18. The OTC 311887 with washer and nut will be placed onto the opposite end of the puller bolt after it has been inserted into the bearing housing. If the wrong side of OTC 311887 is placed against the bearing the tool will become jammed into the inner race.

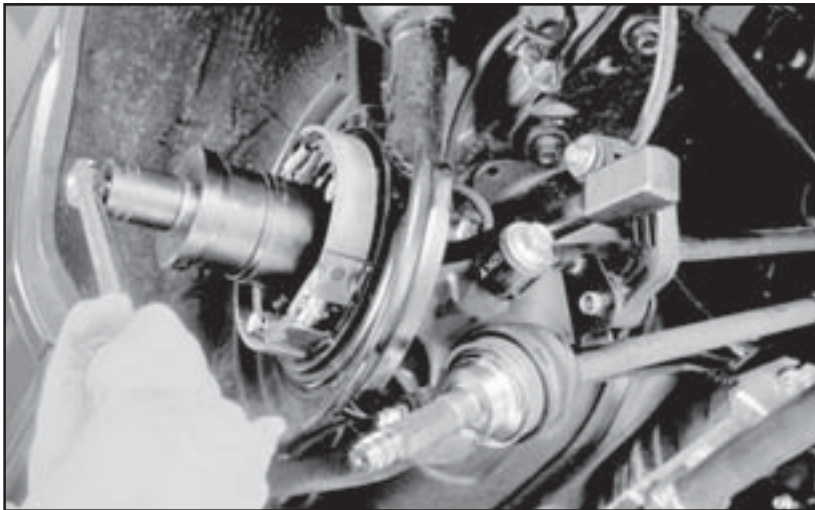


Notes:

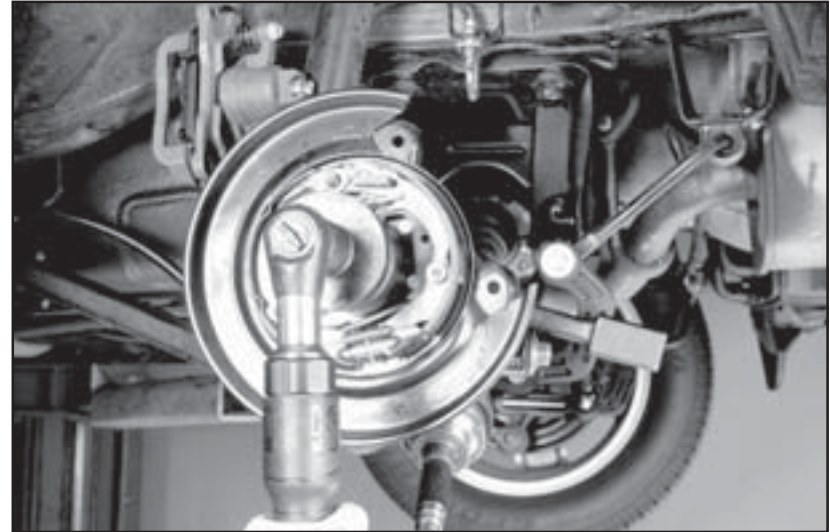
19. Tools positioned for bearing removal.



20. Secure a wrench on the nut located on the backside of the bearing housing. Using a breaker bar begin tightening the puller bolt.



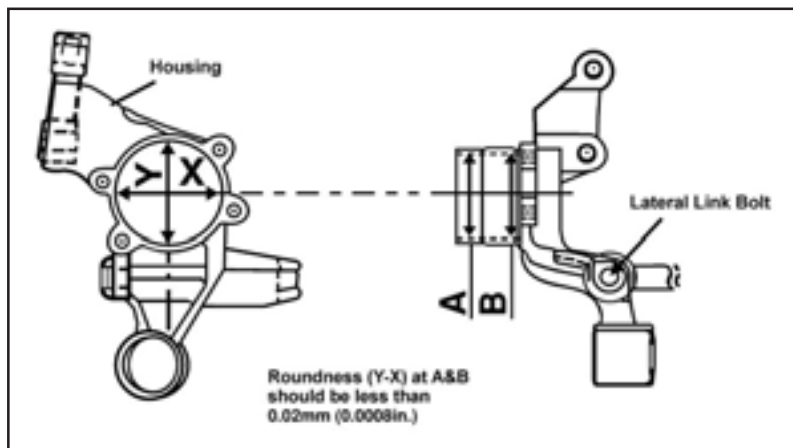
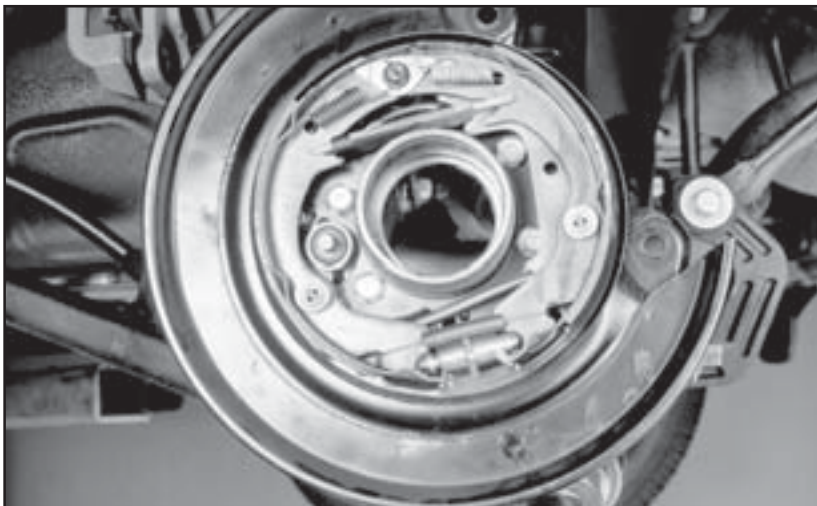
21. Switch to the air ratchet after the initial tension of the bearing has been overcome.



22. Remove the bearing and tools from the outside of the bearing housing.



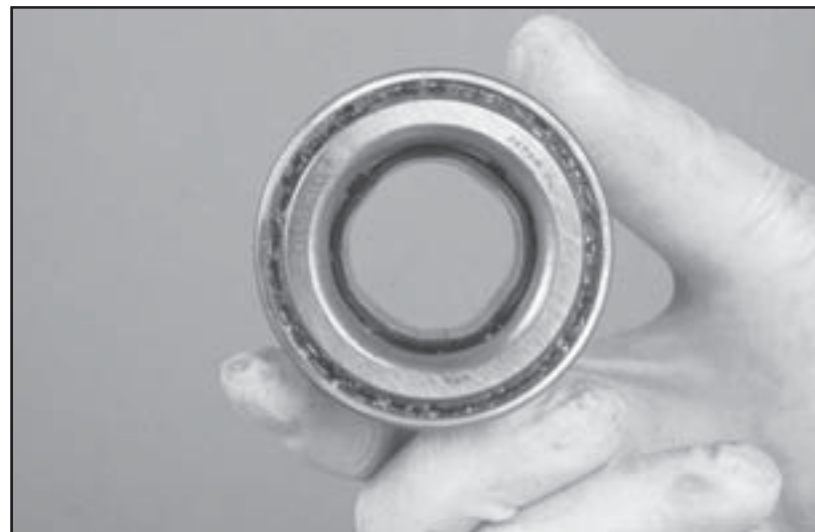
23. Clean and inspect the bearing housing for damage. Use the test outlined below to check for out of roundness condition. Replace bearing housing if out of round.



Note: Measure the roundness of the housing where the bearing is installed as follows.

- Measure inner diameter “X” and “Y” at both “A” and “B” positions by using cylinder bore gauge.
- If difference of the measurement between “X” and “Y” is more than .020mm, replace the housing with a new one.

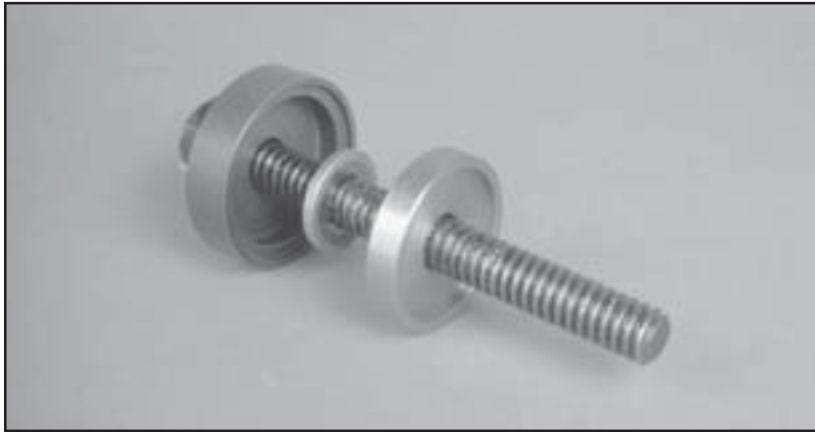
24. Prepare the new tapered roller bearing for installation. Do not remove the bearing stay (plastic piece inside the bearing) at this time. **Do not disassemble the bearing. Do not add any grease to the bearing.**



Notes:

25. Set the bearing assembly into the bearing housing.
26. Assemble the tools for wheel bearing installation. Place a washer on the bolt followed by OTC 311888 (open end facing toward the wheel bearing housing). Place another washer on the bolt followed by J45697-9. Apply the included grease to the puller bolt.

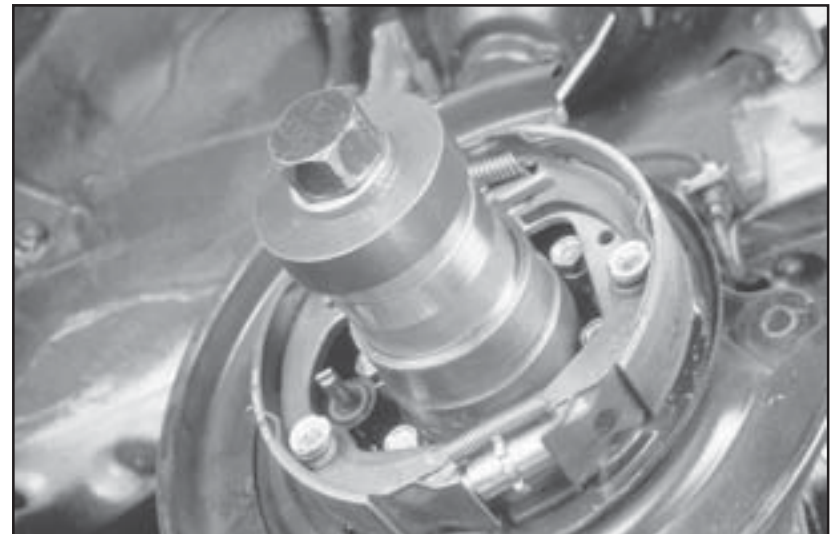
NOTE: All three included washers are the same thickness



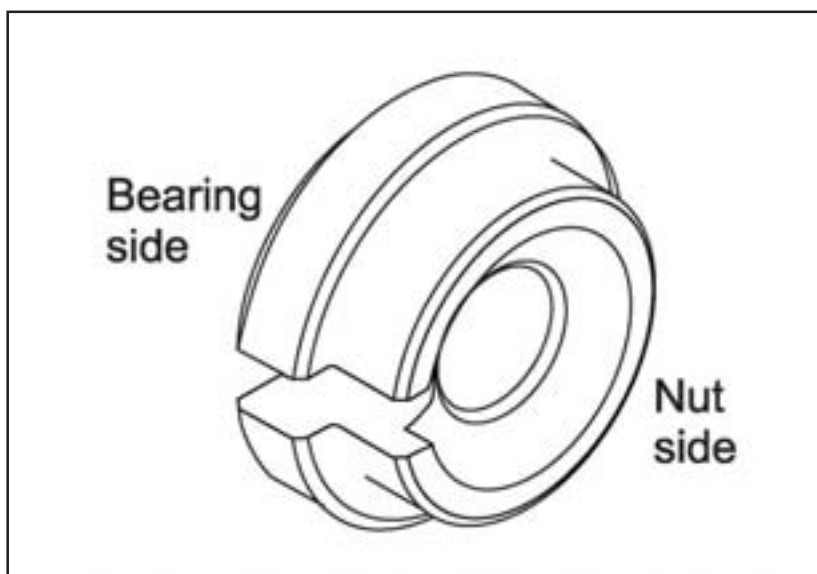
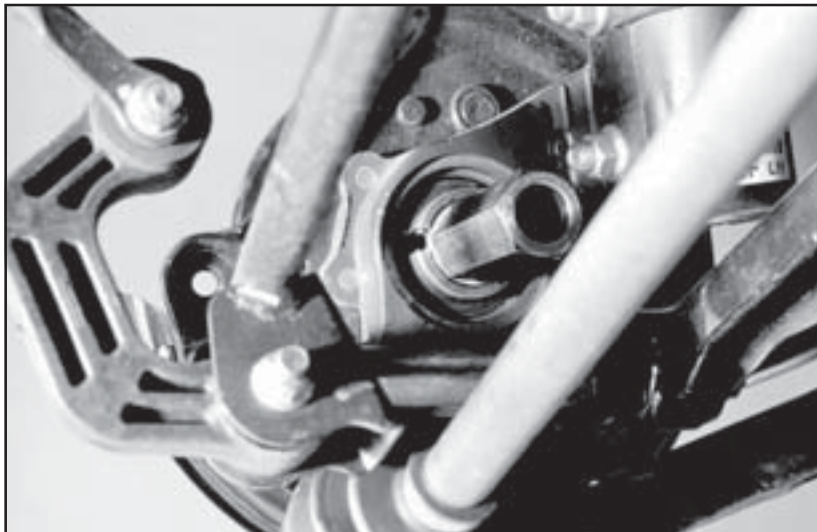
27. The J45697-1 larger diameter surface will face the wheel bearing housing on the inner side after the puller bolt has been inserted into the bearing housing.



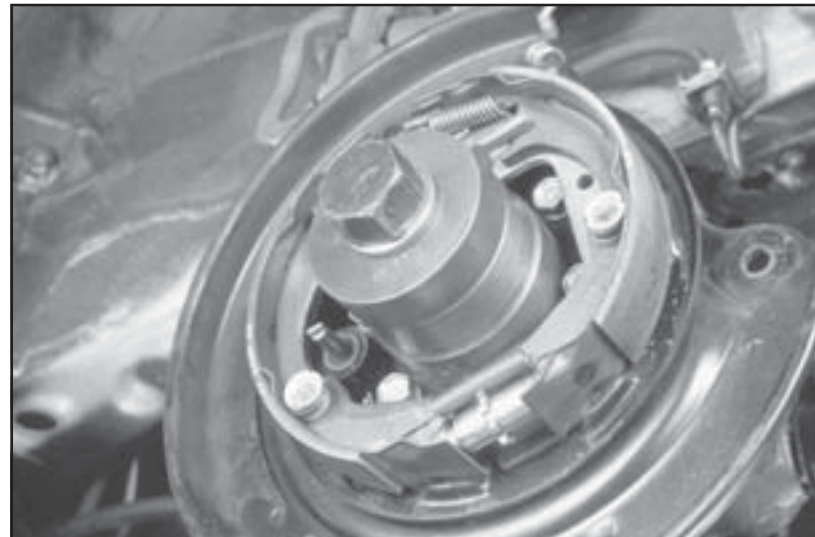
28. Front side of bearing housing with tools positioned for installation.



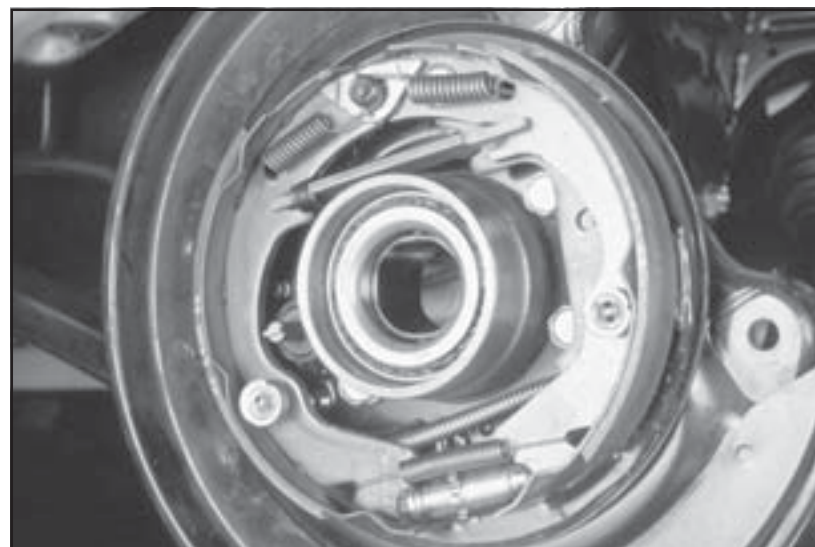
29. Back side of bearing housing positioned for bearing installation.



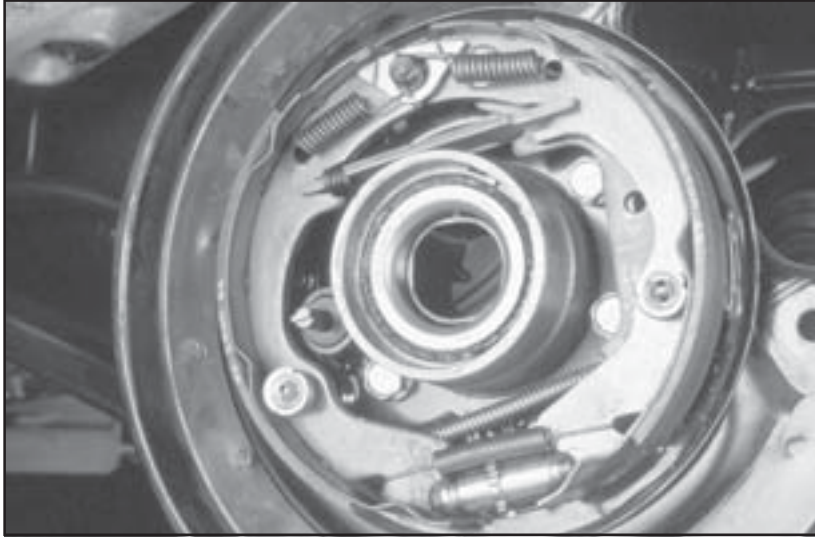
30. Secure the nut on the inner side with a wrench and begin tightening the bolt with an air ratchet.



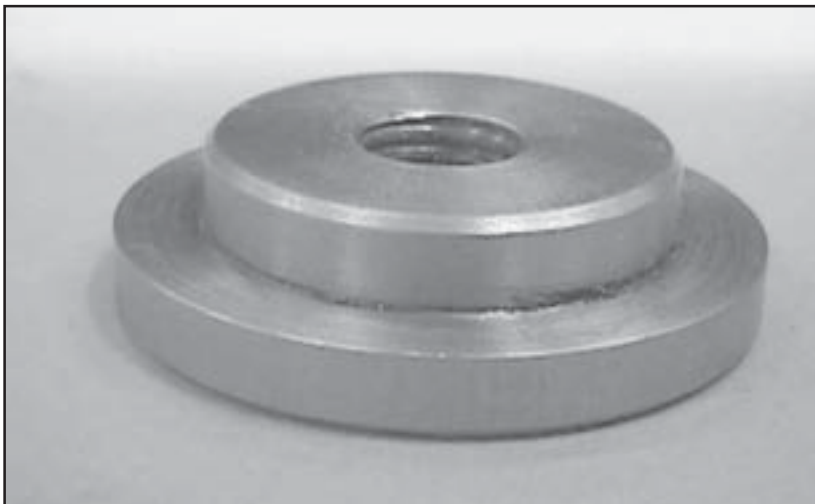
31. Tighten the last few turns with the breaker bar if necessary. Installation is complete when OTC 311888 makes contact with the bearing housing.
32. Remove the tools.



33. Insert the snap ring. If the snap ring will not seat properly the bearing is not fully installed.



34. Thread seal installer J45697-11 with the smaller diameter facing outward onto driver handle J8092.

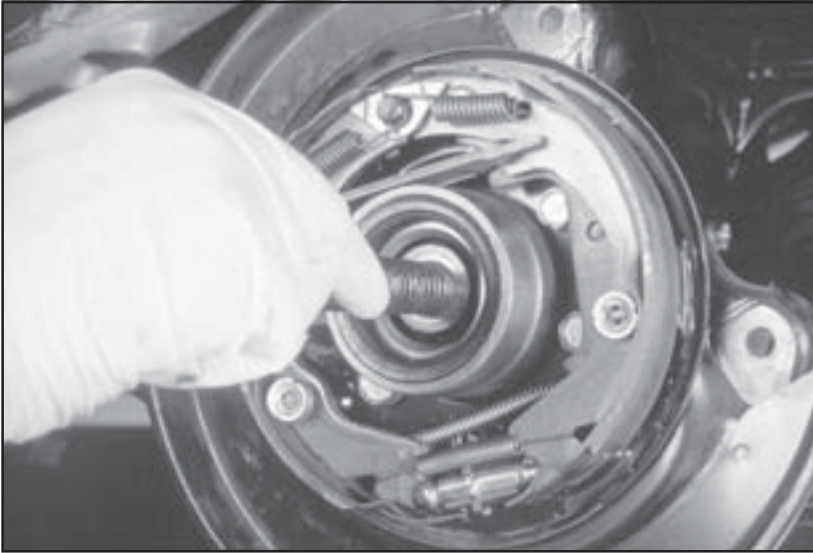


35. Install the outer seal.

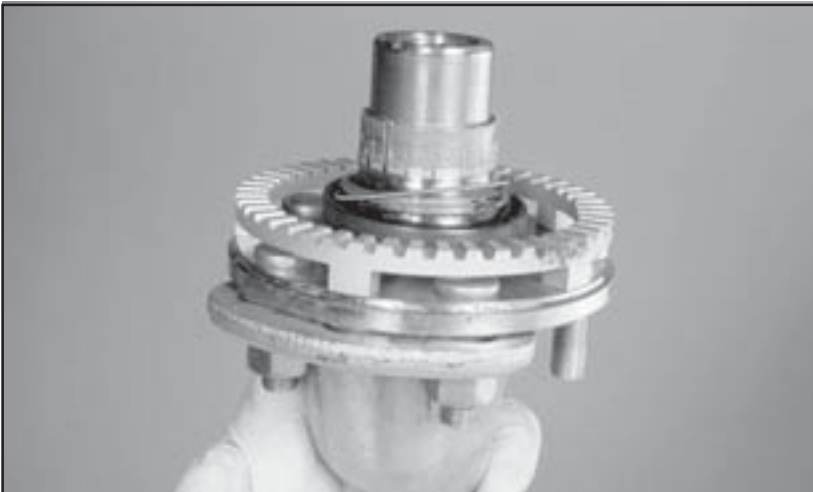


36. Remove all tools from the puller bolt. Push out the bearing stay from the center of the installed bearing using the head of the bolt.

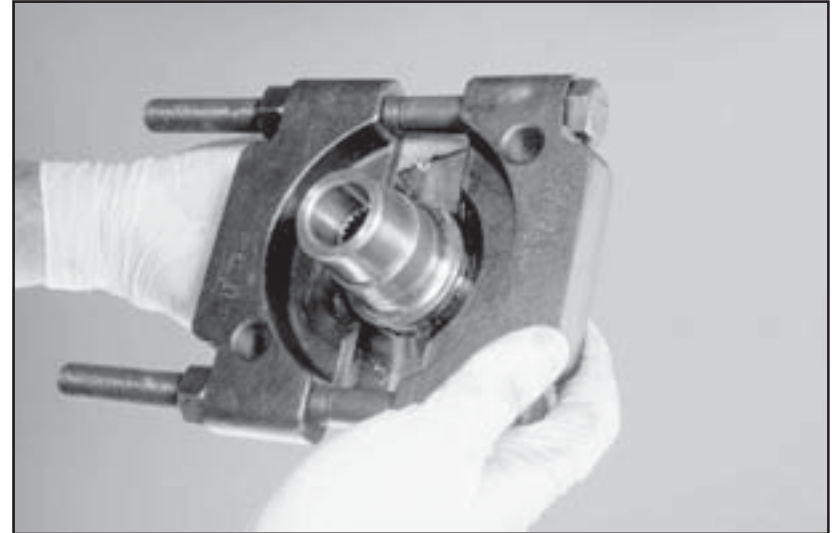




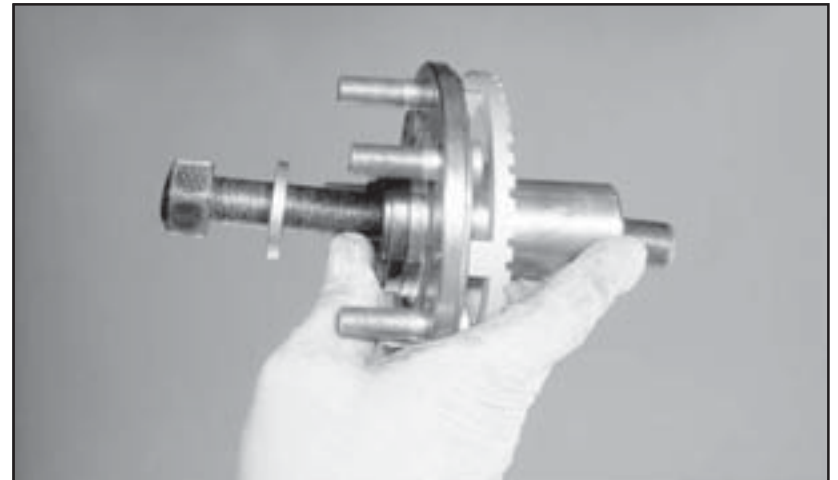
37. Prepare the hub for installation. Remove the old outer seal from the hub.



38. Remove the tone wheel if equipped.



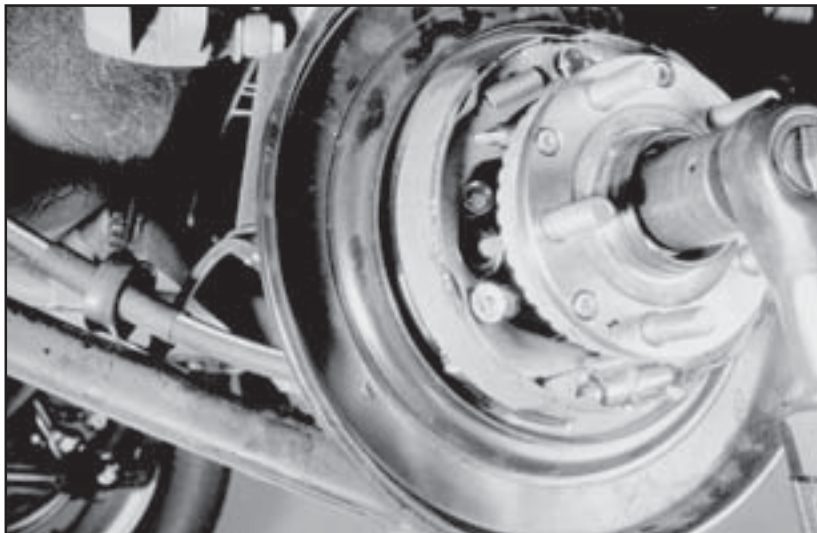
39. Install a set of press plates below the old inner race and remove with appropriate press and press tools.
40. Reinstall the tone wheel (5.4 ft-lb) if equipped. Insert the puller bolt with washer into the hub.



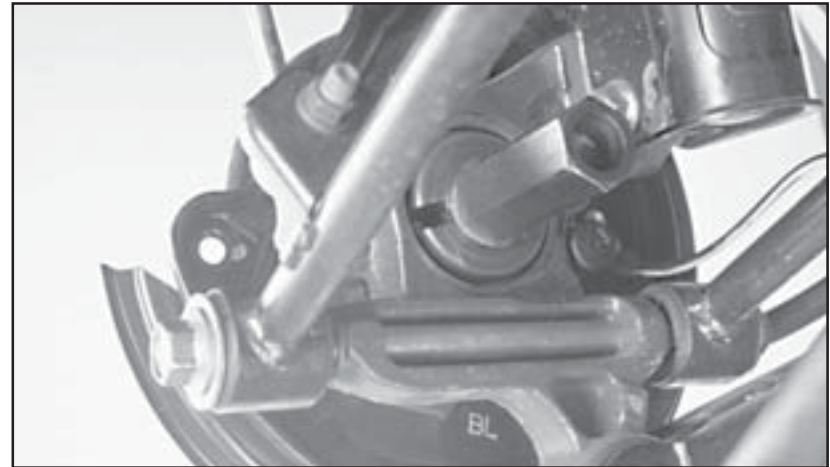
41. Place the J45697-1 with the **smaller** diameter surface facing inward onto the puller bolt after it has been inserted through the bearing housing.



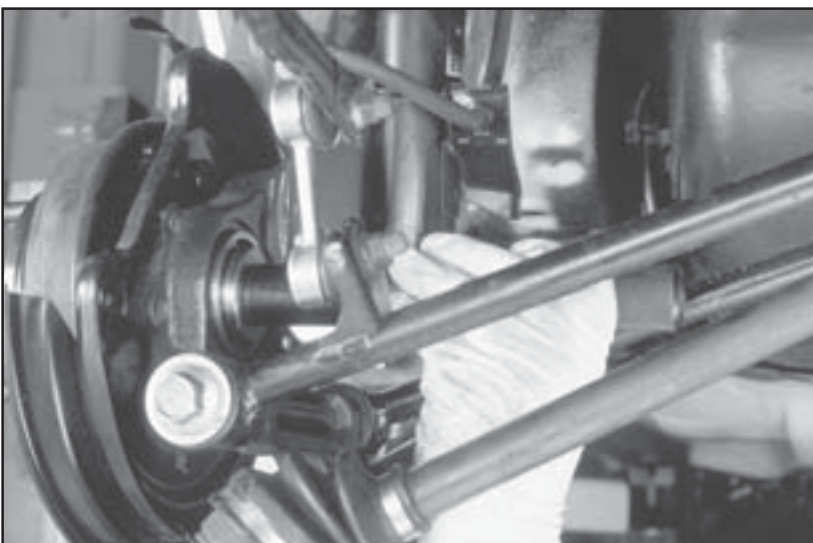
42. The slot will be used to insert a depth gauge.
43. Secure a wrench on the nut and begin tightening the puller bolt with the air ratchet. Finish the installation with the breaker bar.



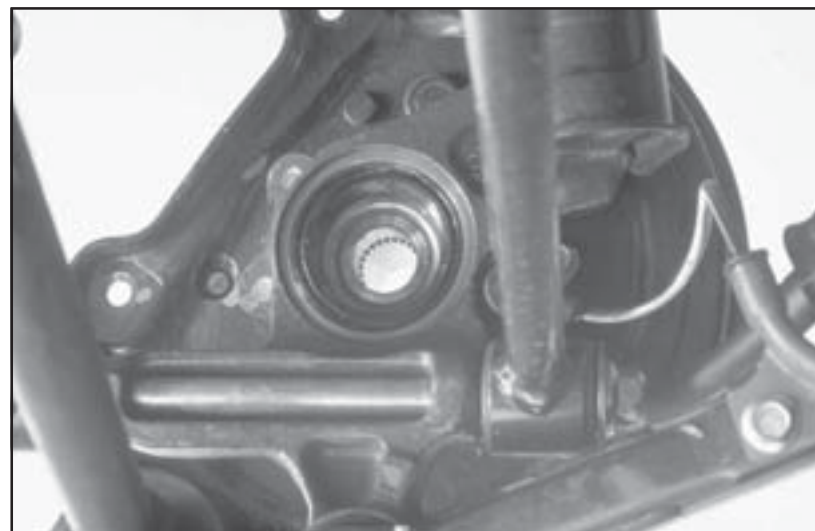
44. Check the installed depth of the hub with the following procedure. Measure through the provided slot on J45697-1. (Remove the washer if necessary and reinstall nut) Using an appropriate depth gauge measure from the top of J-45697-1 to the top flat edge of the wheel bearing. This will represent "A". Measure again to the top flat of the hub. This will represent "B". Use the following formula: $B-A=C$ "C" should equal 2.0 ± 0.3 mm, the correct installed depth of the wheel bearing hub.



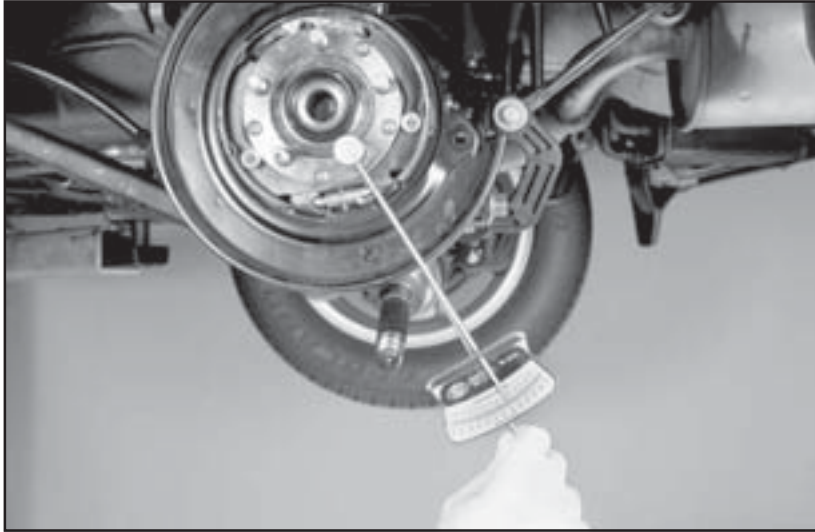
45. Thread seal installer J 45697-10 onto driver handle J 8092 with the pictured surface facing outward. Place the inner number one seal on the tool and install the seal. The tool will make contact with the bearing housing when the seal is fully installed.



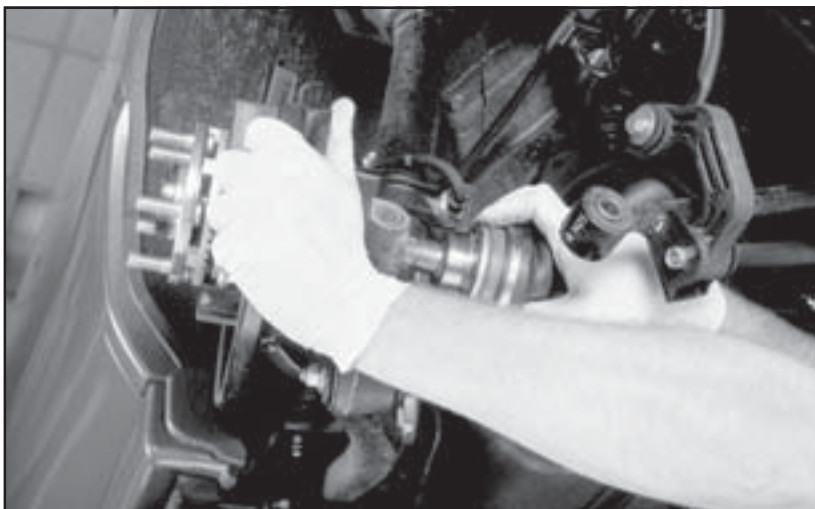
46. Reverse the J 45697-10 on the driver handle J 8092. Place the inner number two seal on the tool and install the seal. **The seal is fully installed when the seal is flush with the bearing housing.**



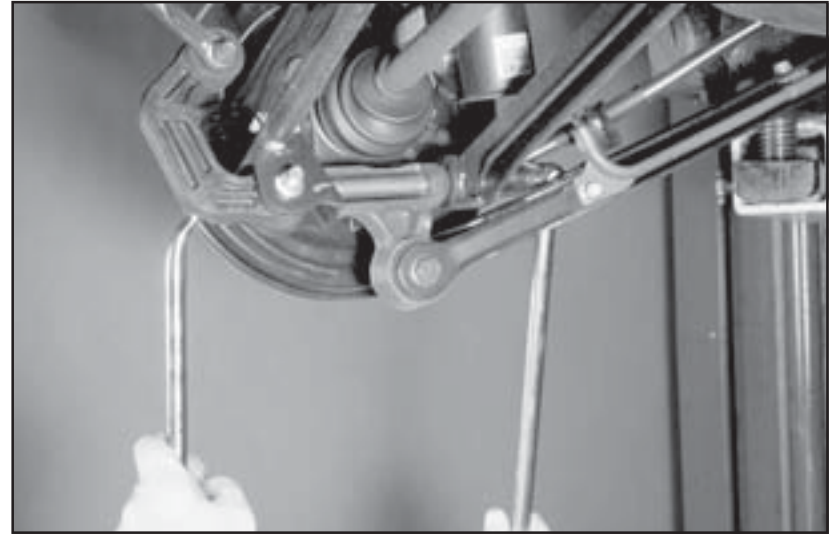
47. Check the rolling resistance of the hub with the supplied torque wrench. The hub should turn smoothly. (Starting force should be 7 to 17 inch pounds.)



48. Remove the lateral link bolt.
49. Push the bearing housing outward and slide the axle in.



50. Install and torque the lateral link bolt. Use new self locking nut. **DO NOT USE IMPACT GUN.**
Legacy 87-116 ft-lb
Impreza and Forester 101 ± 14 ft-lb

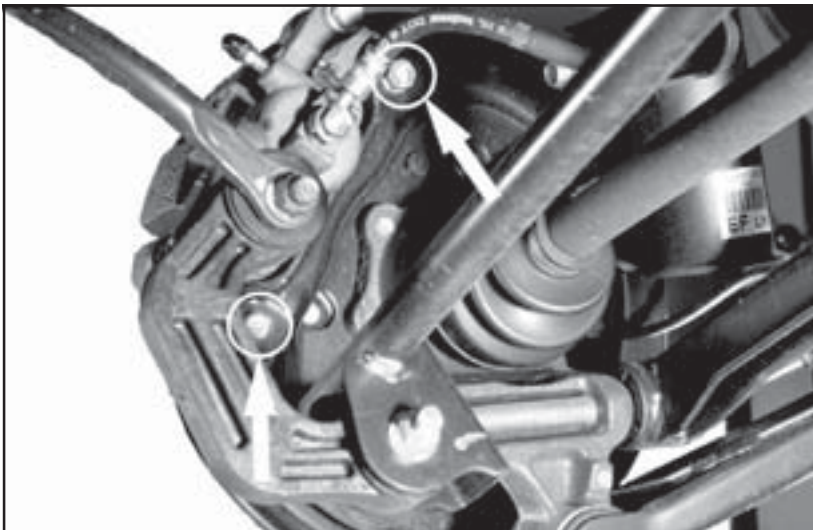


Notes:

51. Install the brake rotor. Match the marks made during dissassembly. Install and torque new axle nut. Legacy, Impreza and Forester 137 ± 14 ft-lb



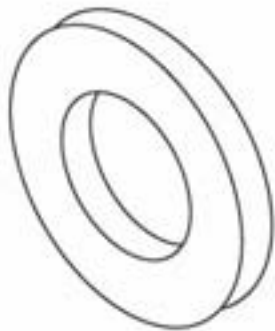
52. Stake Axle Nut. Then install the brake caliper mount and torque the bolts. Legacy, Impreza and Forester 38 ± 4 ft-lb



53. Install the wheel and torque the lug nuts. Legacy, Impreza and Forester steel wheels 65.7 ft-lb



54. Pump the brake pedal before moving the vehicle.



219646
Washer



OTC 311883



OTC 311882



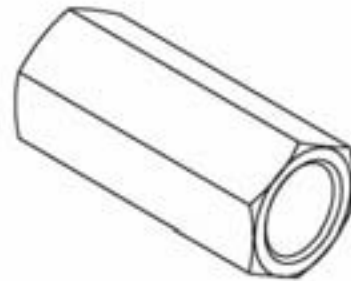
OTC 311886



OTC 314308



OTC 311887



510155
Nut



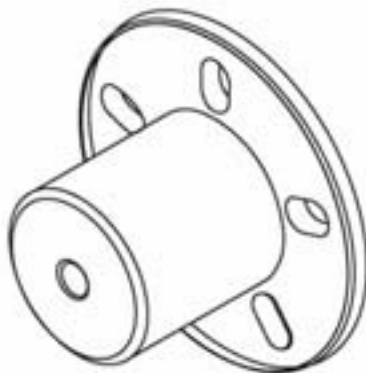
J-45697-10



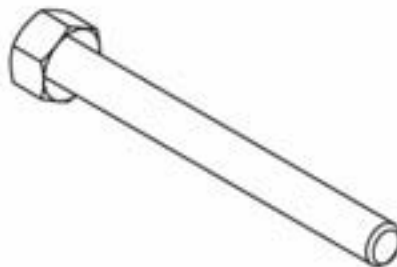
J-45697-1



J-45697-11



J-45697-8
5 Lug Adapter



516362
Puller Bolt

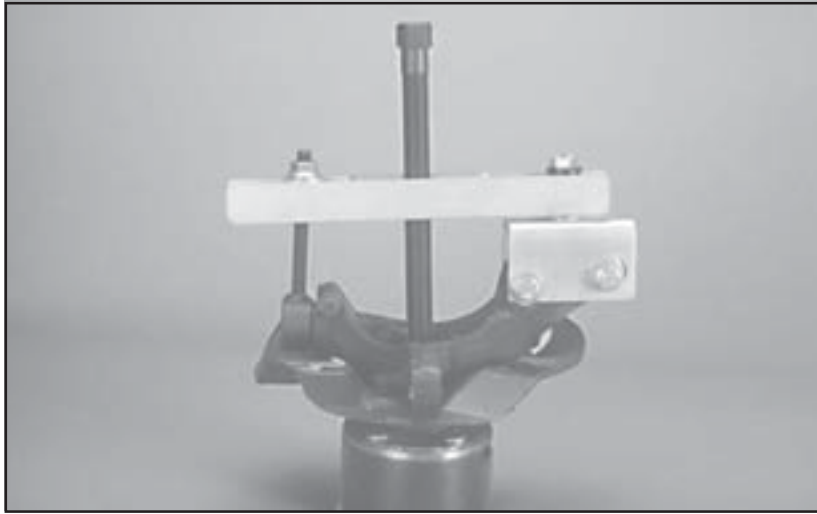


J-45697-9

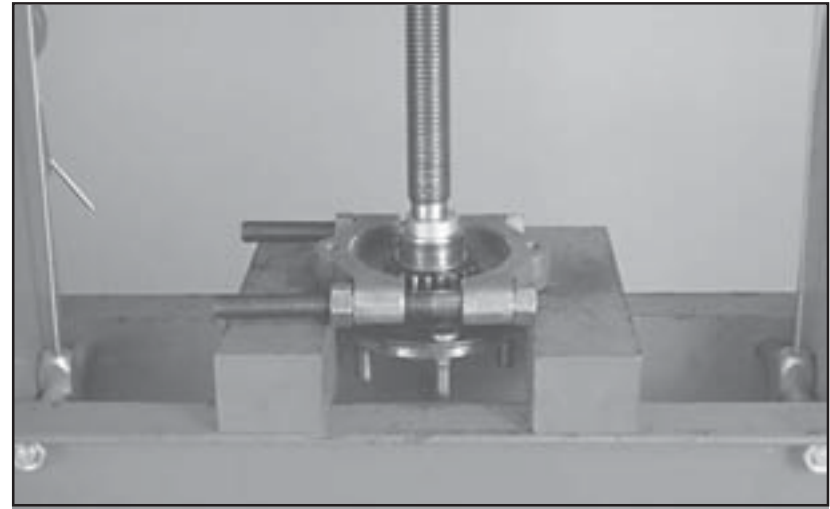
[illegible]

Front Wheel Bearing

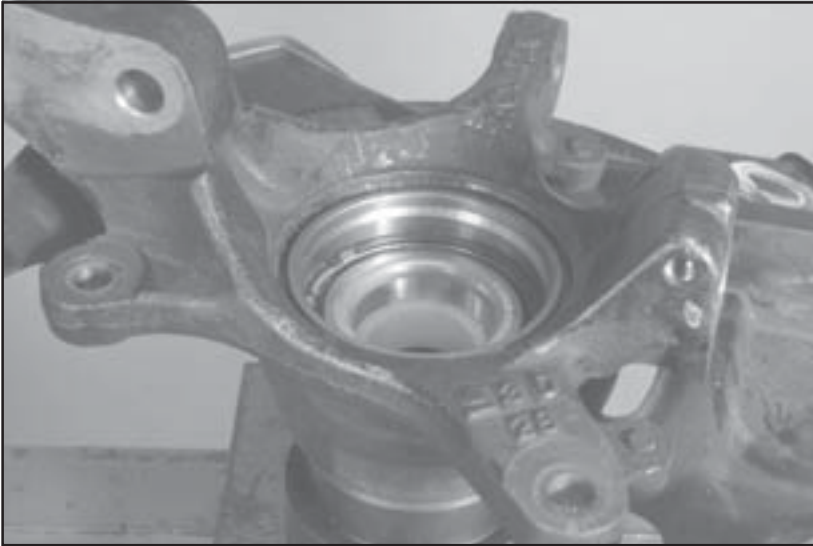
This procedure begins with the front wheel bearing housing removed from the vehicle



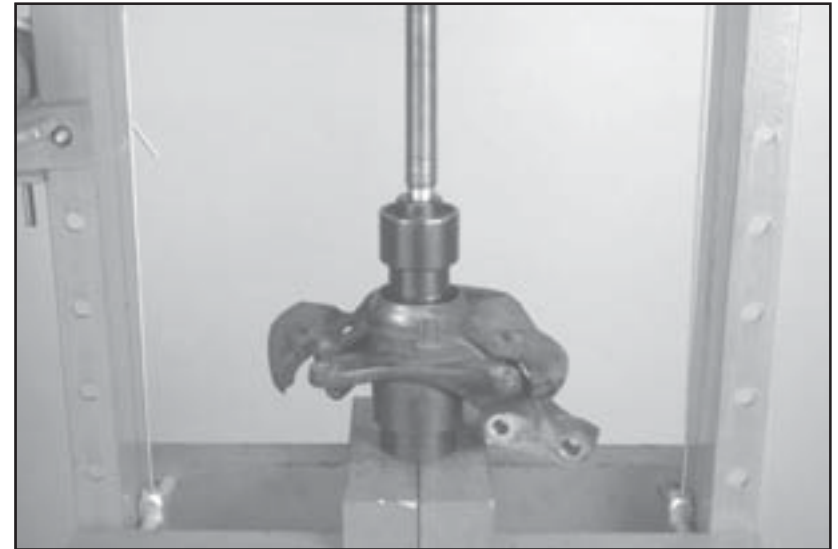
- (1) Assemble 28099PA040-1, 208099PA040-2 (**With short adapter sleeve and shorter bolt**) 28099PA040-5, and J5356-4 puller bolt onto the front hub. Insert 28099PA040-6 into the bearing assembly. Turn puller bolt to remove bearing. Remove tone wheel if equipped.



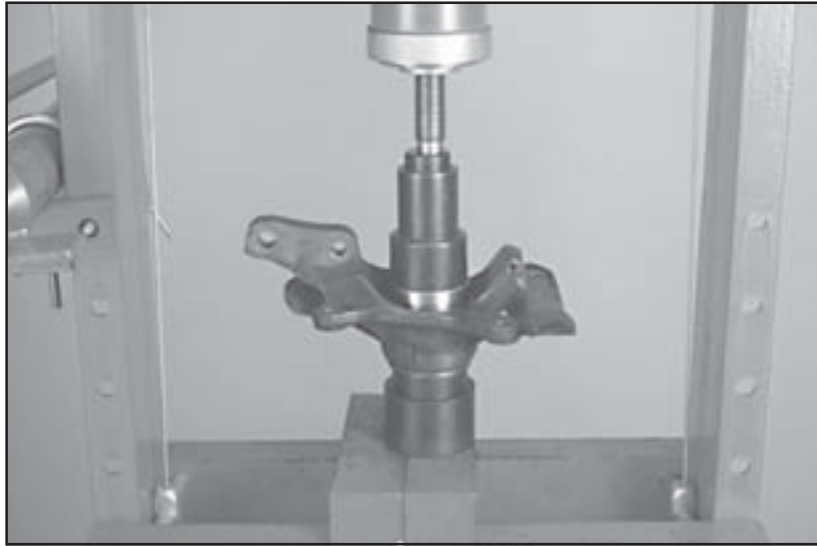
- (2) Place the hub into the press with press plates that will provide support to the under side of the inner race of the tapered roller bearing. Insert 28099PA040-6 onto the top of the hub. Apply pressure with the press until the hub is removed. Align press plate bolts so they are supported along the length of the bolt.



- (3) Support the bearing housing (Wheel side down) with 927430000 (small end up). Remove the inner seal, snap-ring and bearing.

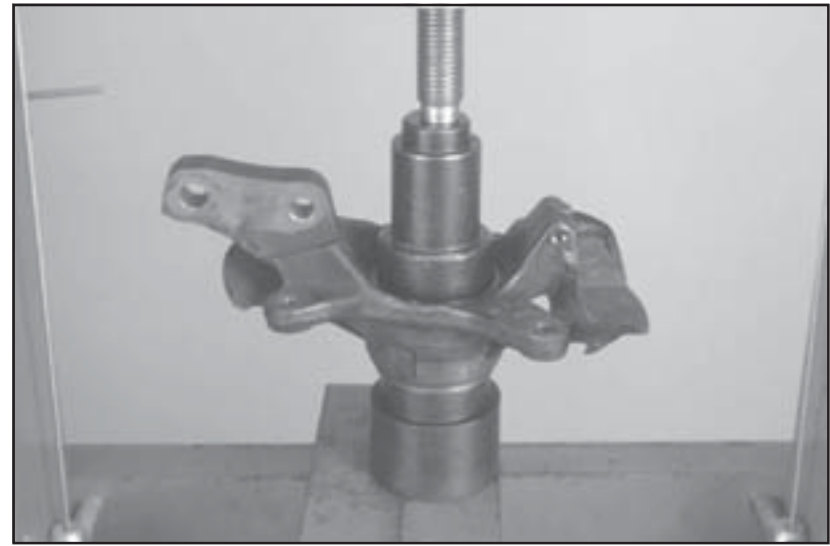


- (4) Invert the stand and bearing housing. Insert 927440000 into the bearing housing as shown. Apply pressure until the bearing race is removed. [If servicing SVX wheel bearing use 28099PA010. Use the small end only].

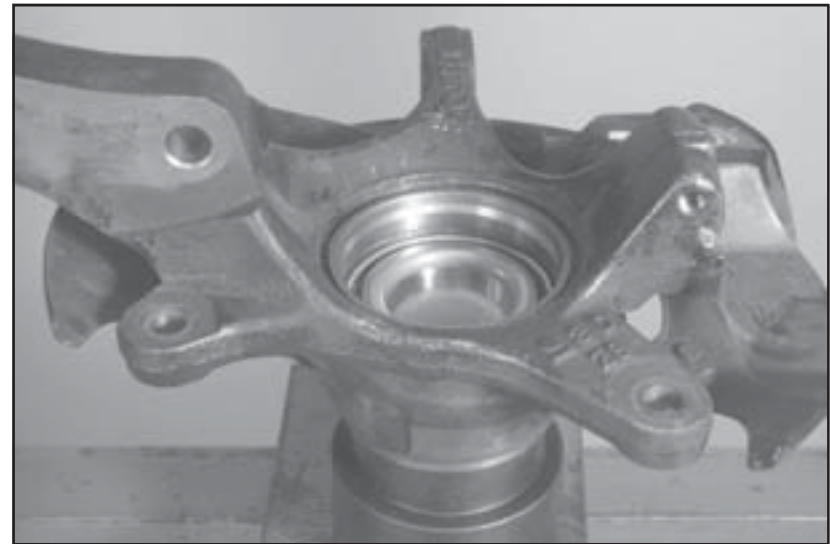


- (5) Clean bearing housing before installing new bearing. Support the bearing housing with 927430000 and position the bearing assembly over the opening. Using 927440000 begin applying pressure to the bearing.

Note: Do not add additional grease to bearing.



- (6) Move the bearing housing back and forth while applying pressure. The bearing will bottom out against a ridge machined into the bearing housing.



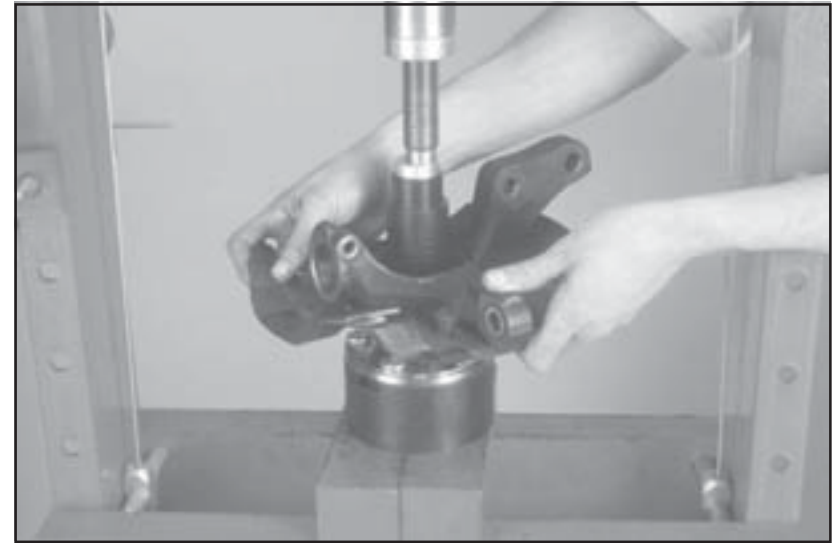
- (7) Insert the snap ring



- (8) Insert the inner seal using 28099PA070-1. Spring side faces bearing.

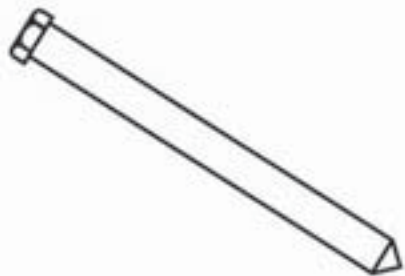


- (9) Invert the stand and the bearing housing. Install the outer seal using 28099PA070-1. (Install tone wheel to hub if equipped)

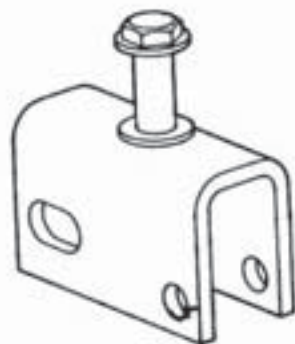


- (10) Invert the stand and the bearing housing. Position the hub onto 927080000. Align the bearing housing over the hub. Using 498415600 apply pressure to the bearing inner race as the hub is forced into the bearing housing the bearing stay will be squeezed into 498415600.





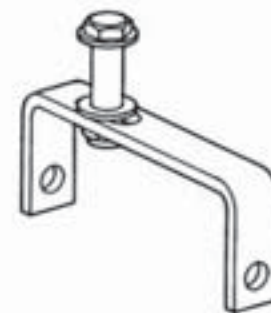
J 5356-4



28099PA040-2



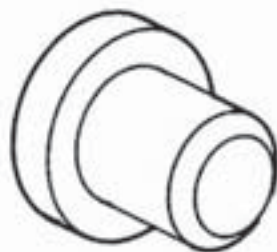
28099PA040-3



28099PA040-4



28099PA040-5

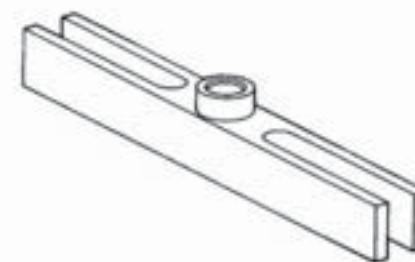


28099PA040-6



Short Sleeve Adapter
(Doesn't have a part number)

Long Sleeve Adapter
28099PA040-7



28099PA040-1

Created by
Subaru of America, Inc.
Service Department
Technical Publications
Issued February 2004
All rights reserved.

MSA5P0401C

Replaces MSA5TT0001 and MSA5TT0201



STEERING SYSTEM

4-3

	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Steering System.....	2
C COMPONENT PARTS	4
1. Steering Wheel and Column (Tilt).....	4
2. Power Steering System.....	5
3. Power Steering Oil Pump.....	7
W SERVICE PROCEDURE	8
1. Supplement Restraint System "Airbag" AIRBAG	8
2. Tilt Steering Column.....	8
3. Steering Gearbox (Power Steering System).....	12
4. Control Valve (Power Steering Gearbox).....	22
5. Pipe Assembly (Power Steering System)	29
6. Oil Pump (Power Steering System)	33
7. Power Steering Fluid.....	41
K DIAGNOSTICS	42
1. Power Steering.....	42

1. Steering System

A: SPECIFICATIONS

Whole system	Minimum turning radius		m (ft)	5.1 (16.7)
	Steering angle (Inside-Outside)			37.4°±1.5° — 32.5°±1.5°
	Steering wheel diameter		mm (in)	385 (15.16)
	Overall gear ratio (Turns, lock to lock)			16.5 (3.2)
Gearbox	Type			Rack and pinion, Integral
	Backlash			0 (Automatically adjustable)
	Valve (Power steering system)			Rotary valve
Pump (Power steering system)	Type			Vane pump
	Oil tank			Installed on pump
	Output		cm ³ (cu in)/rev.	7.2 (0.439)
	Relief pressure		kPa (kg/cm ² , psi)	7,355 (75, 1,067)
	Hydraulic fluid control			Dropping in response to increased engine revolutions
	Hydraulic fluid		ℓ (US qt, Imp qt)	1,000 rpm: 7 (7.4, 6.2) 3,000 rpm: 5 (5.3, 4.4)
	Range of revolution		rpm	500 — 7,500
	Revolving direction			Clockwise
Working fluid (Power steering system)	Name			ATF DEXRON II, IIE or III
	Capacity	Oil tank	ℓ (US qt, Imp qt)	0.3 (0.3, 0.3)
		Total	ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)

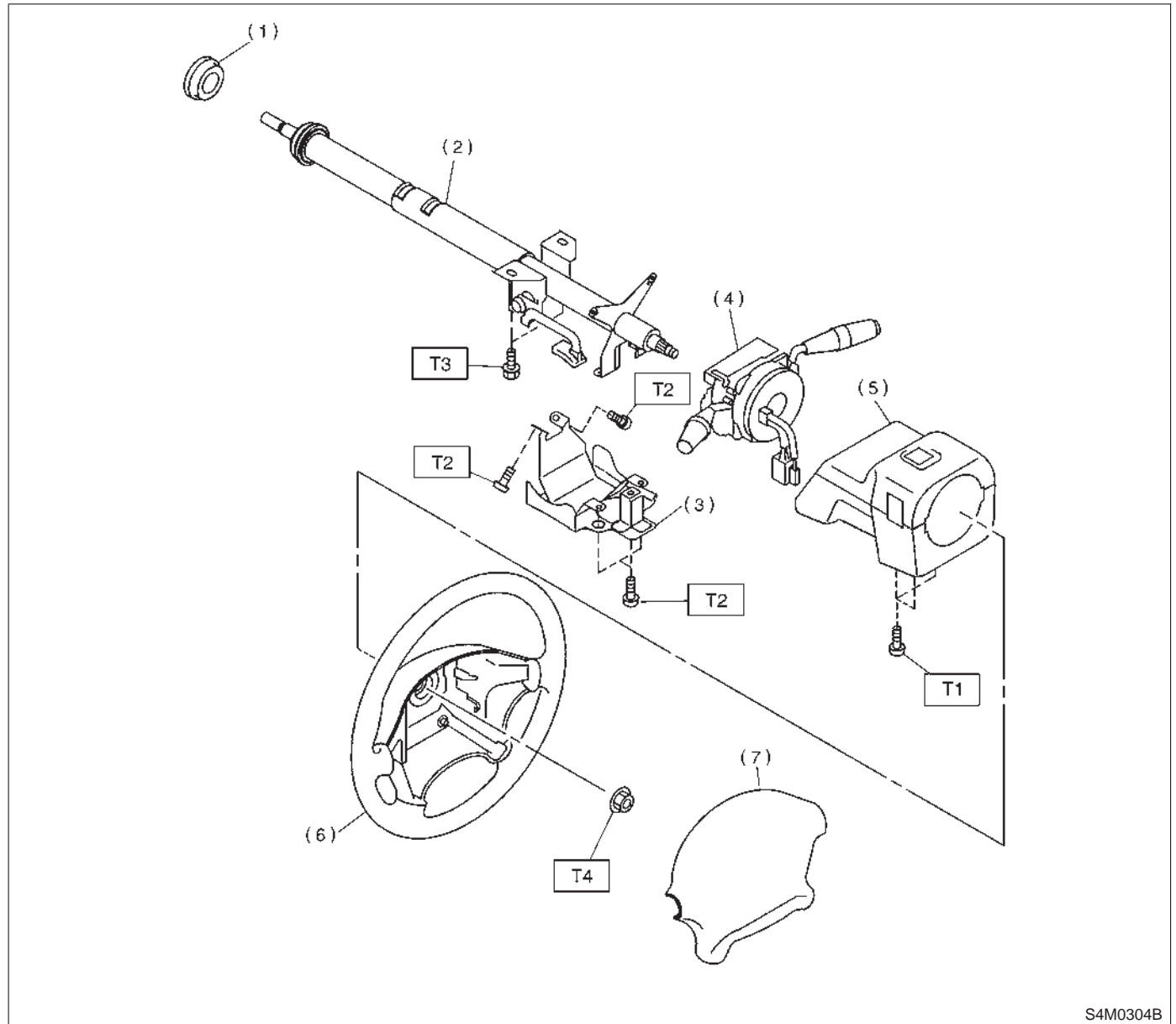
B: SERVICE DATA

Steering wheel	Free play		mm (in)	17 (0.67)
Turning angle	Inner tire & wheel			37.4°±1.5°
	Outer tire & wheel			32.5°±1.5°
Steering shaft	Clearance between steering wheel and column cover		mm (in)	3.0 (0.118)
Steering gearbox (Power steering system)	Sliding resistance		N (kg, lb)	304 (31.0, 68.4) or less
	Rack shaft play in radial direction	Right-turn steering	mm (in)	0.15 (0.0059) or less
		Left-turn steering	mm (in)	Horizontal movement: 0.15 (0.0059) or less Vertical movement: 0.15 (0.0059) or less
	Input shaft play	In radial direction	mm (in)	0.18 (0.0071) or less
		In axial direction	mm (in)	0.1 (0.004) or less
	Turning resistance		N (kg, lb)	Within 30 mm (1.18 in) from rack center in straight ahead position: Less than 11.18 (1.14, 2.51) Maximum allowable value: 12.7 (1.3, 2.9)
Oil pump (Power steering system)	Pulley shaft	Radial play	mm (in)	0.4 (0.016) or less
		Axial play	mm (in)	0.9 (0.035) or less
	Pulley	Ditch deflection	mm (in)	1.0 (0.039) or less
		Resistance to rotation	N (kg, lb)	9.22 (0.94, 2.07) or less
	Regular pressure		kPa (kg/cm ² , psi)	981 (10, 142) or less
	Relief pressure		kPa (kg/cm ² , psi)	7,355 (75, 1,067)
Steering wheel effort (Power steering system)	At standstill with engine idling on a concrete road		N (kg, lb)	31.4 (3.2, 7.1) or less
	At standstill with engine stalled on a concrete road		N (kg, lb)	147 (15, 33) or less

**C: RECOMMENDED POWER
STEERING FLUID**

Recommended power steering fluid	Manufacturer
ATF DEXRON IIE or III	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TEXACO

1. Steering Wheel and Column (Tilt)



- (1) Bushing
- (2) Steering shaft
- (3) Knee protector
- (4) Steering roll connector
- (5) Column cover

- (6) Steering wheel
- (7) Airbag module

Tightening torque: N·m (kg·m, ft·lb)

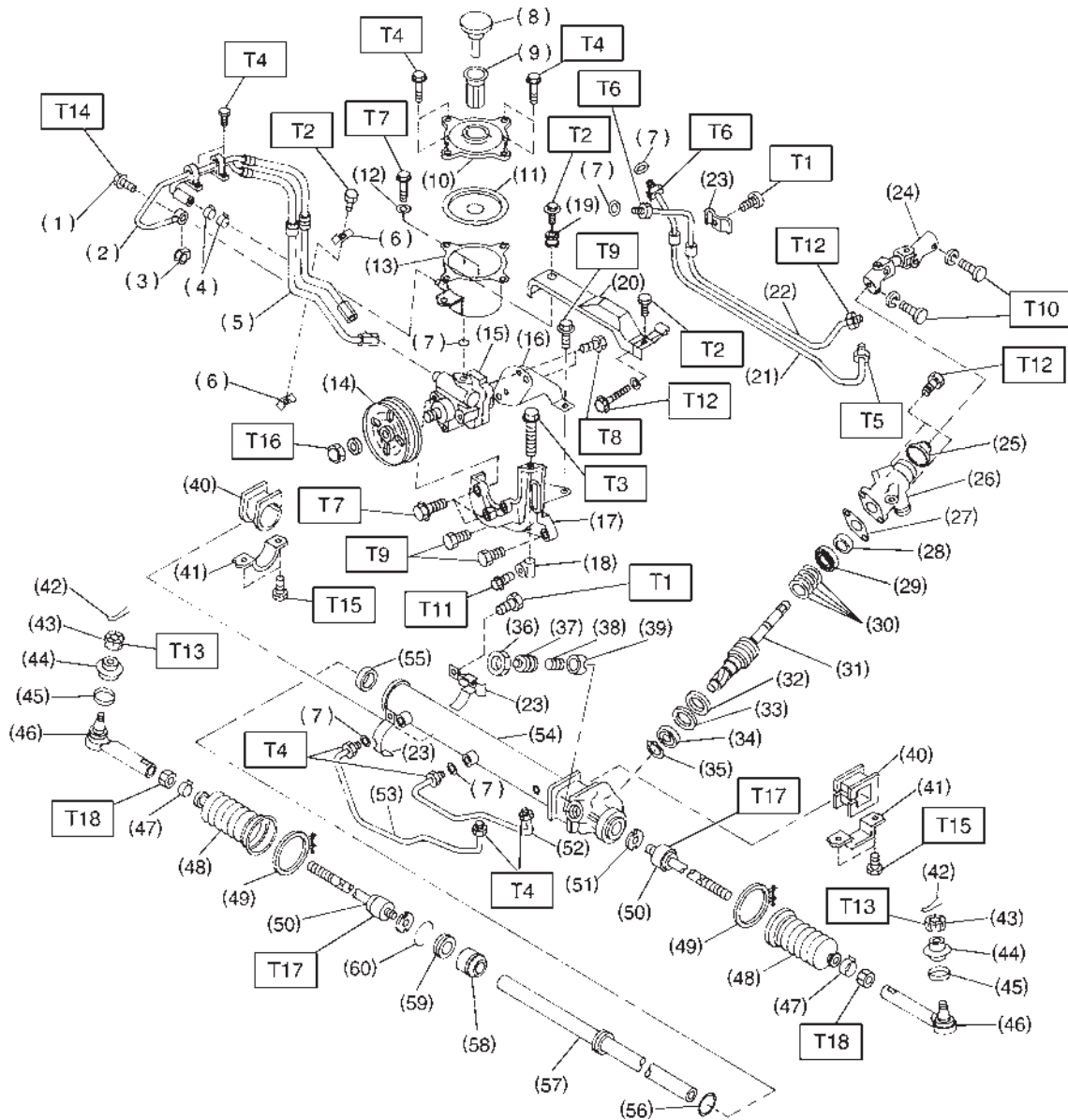
T1: 1.2±0.2 (0.12±0.02, 0.9±0.1)

T2: 3.4±1.0 (0.35±0.1, 2.5±0.7)

T3: 25±5 (2.5±0.5, 18.1±3.6)

T4: 44±6 (4.5±0.6, 32.5±4.3)

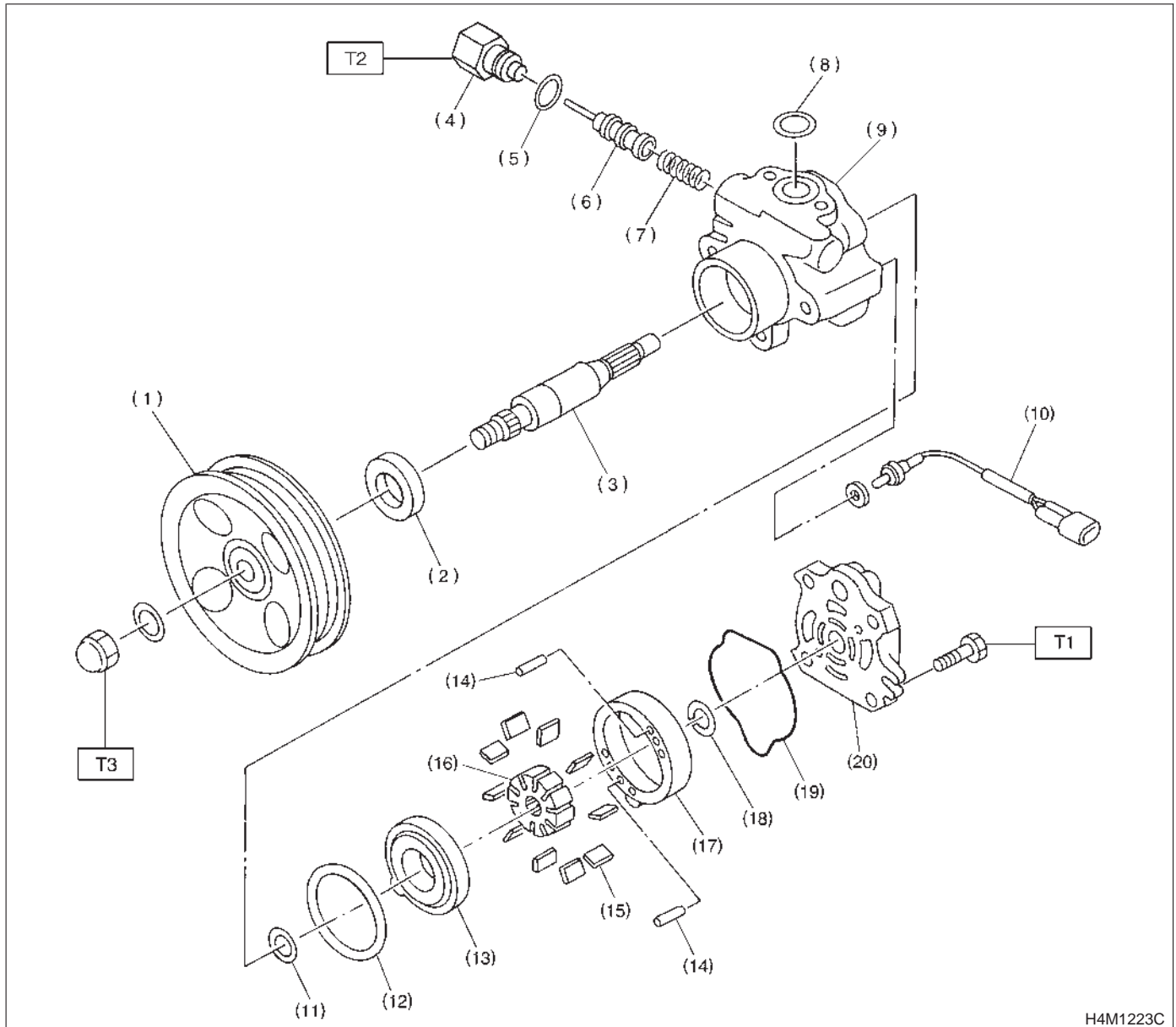
2. Power Steering System



H4M1289A

(1) Eye bolt	(29) Special bearing	(57) Rack
(2) Pipe C	(30) Seal ring	(58) Rack bushing
(3) Gasket	(31) Pinion and valve ASSY	(59) Rack stopper
(4) Clip	(32) Oil seal	(60) Circlip
(5) Pipe D	(33) Back-up washer	
(6) Clamp E	(34) Ball bearing	Tightening torque: N·m (kg-m, ft-lb)
(7) O-ring	(35) Snap ring	T1: 6±1 (0.6±0.1, 4.3±0.7)
(8) Cap	(36) Lock nut	T2: 7.4±2.0 (0.75±0.20, 5.4±1.4)
(9) Strainer	(37) Adjusting screw	T3: 8±2 (0.8±0.2, 5.8±1.4)
(10) Shell upper	(38) Spring	T4: 13±3 (1.3±0.3, 9.4±2.2)
(11) Baffle	(39) Sleeve	T5: 15±3 (1.5±0.3, 10.8±2.2)
(12) Seal washer	(40) Adapter	T6: 15±5 (1.5±0.5, 10.8±3.6)
(13) Shell lower	(41) Clamp	T7: 18⁺⁵/₀ (1.8^{+0.5}/₀, 13.0^{+3.6}/₀)
(14) Pulley	(42) Cotter pin	T8: 20.1±2.5 (2.05±0.25, 14.8±1.8)
(15) Oil pump	(43) Castle nut	T9: 22±2 (2.2±0.2, 15.9±1.4)
(16) Stiffener	(44) Dust seal	T10: 24±3 (2.4±0.3, 17.4±2.2)
(17) Bracket	(45) Clip	T11: 25±2 (2.5±0.2, 18.1±1.4)
(18) Belt tension nut	(46) Tie-rod end	T12: 25±5 (2.5±0.5, 18.1±3.6)
(19) Bush	(47) Clip	T13: 27.0±2.5 (2.75±0.25, 19.9±1.8)
(20) Belt cover	(48) Boot	T14: 39±5 (4.0±0.5, 28.9±3.6)
(21) Pipe E	(49) Band	T15: 59±12 (6.0±1.2, 43±9)
(22) Pipe F	(50) Tie-rod	T16: 61±7 (6.2±0.7, 44.8±5.1)
(23) Clamp plate	(51) Lock washer	T17: 78±10 (8.0±1.0, 58±7)
(24) Universal joint	(52) Pipe B	T18: 83±5 (8.5±0.5, 61.5±3.6)
(25) Dust cover	(53) Pipe A	
(26) Valve housing	(54) Steering body	
(27) Gasket	(55) Oil seal	
(28) Oil seal	(56) Piston ring	

3. Power Steering Oil Pump



- | | |
|------------------|----------------------|
| (1) Pulley | (10) Pressure switch |
| (2) Oil seal | (11) O-ring |
| (3) Shaft | (12) O-ring |
| (4) Connector | (13) Pressure plate |
| (5) O-ring | (14) Straight pin |
| (6) Spool valve | (15) Vane |
| (7) Spring | (16) Rotor |
| (8) O-ring | (17) Cam ring |
| (9) Front casing | (18) Retaining ring |

- | |
|-----------------|
| (19) O-ring |
| (20) Rear cover |

Tightening torque: N-m (kg-m, ft-lb)

T1: 21±3.4 (2.14±0.35, 15.5±2.5)

T2: 49±5 (5.0±0.5, 36.2±3.6)

T3: 52±10 (5.3±1.0, 38±7)

1. Supplement Restraint System "Airbag" **AIRBAG**

A: PRECAUTION

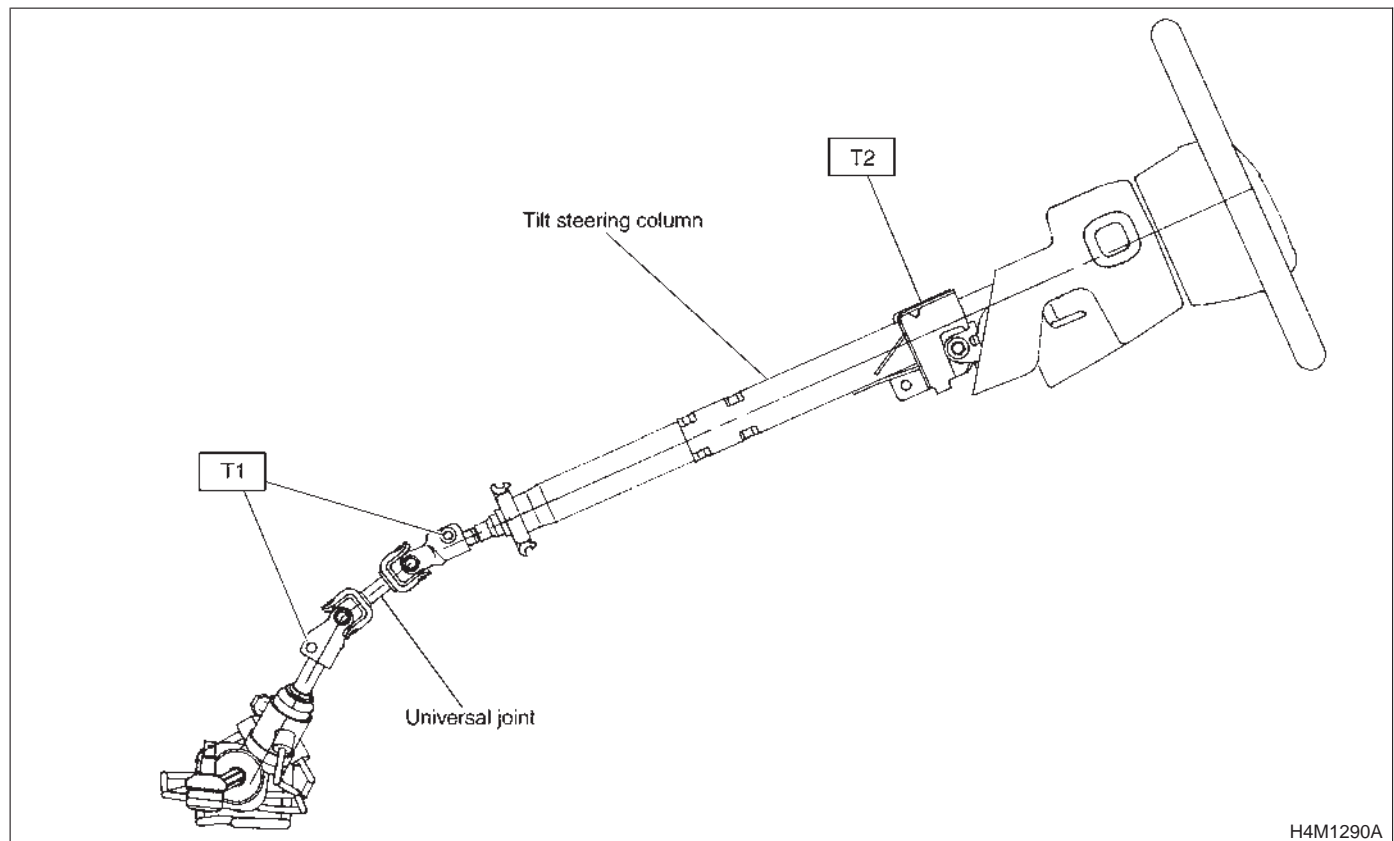
Airbag system wiring harness is routed near the steering wheel, steering shaft and column.

WARNING:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage Airbag system wiring harness when servicing the steering wheel, steering shaft and column.

2. Tilt Steering Column

A: REMOVAL



H4M1290A

Tightening torque: N·m (kg·m, ft·lb)

T1: 24±3 (2.4±0.3, 17.4±2.2)

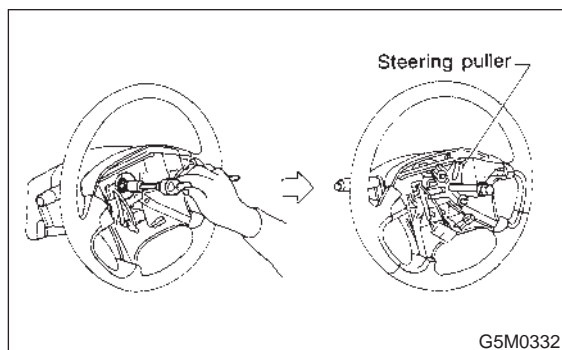
T2: 25±5 (2.5±0.5, 18.1±3.6)

- 1) Disconnect battery minus terminal.
- 2) Lift-up vehicle.
- 3) Remove airbag module. (with airbag model)
<Ref. to 5-5 [W3A1].>

WARNING:

Always refer to "5-5 Supplemental Restraint System" before performing airbag module service (if so equipped). <Ref. to 5-5 [W1A0].>

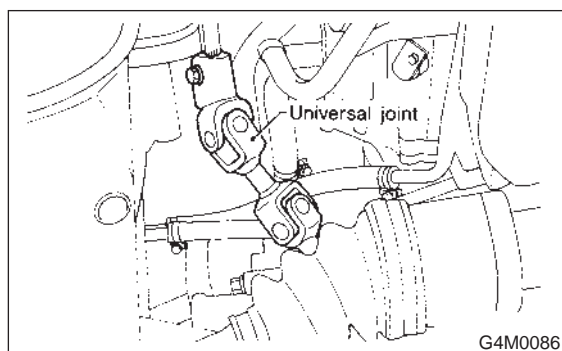
- 4) Remove steering wheel nut, then draw out steering wheel from shaft using steering puller.



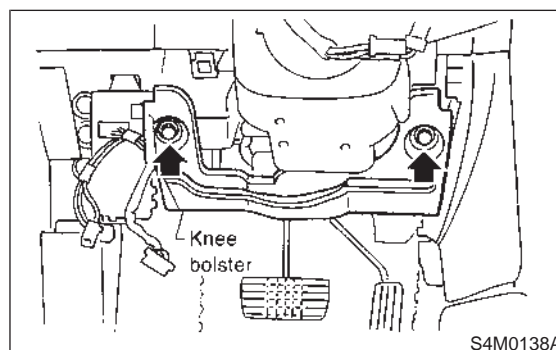
- 5) Remove universal joint bolts and then remove universal joint.

CAUTION:

Scribe alignment marks on universal joint so that it can be reassembled at the original seration.

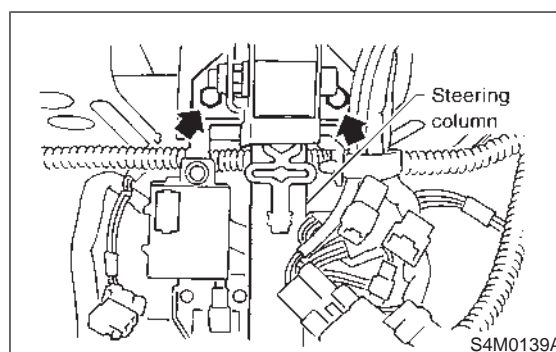


- 6) Remove trim panel under instrument panel.
- 7) Remove knee bolster.



- 8) Disconnect connectors for ignition switch and combination switch wiring harness under instrument panel.

- 9) Remove the two bolts under instrument panel securing steering column.



- 10) Pull out steering shaft assembly from hole on toe board.

CAUTION:

Be sure to remove universal joint before removing steering shaft assembly installing bolts when removing steering shaft assembly or when lowering it for servicing of other parts.

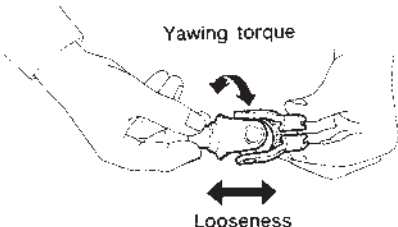
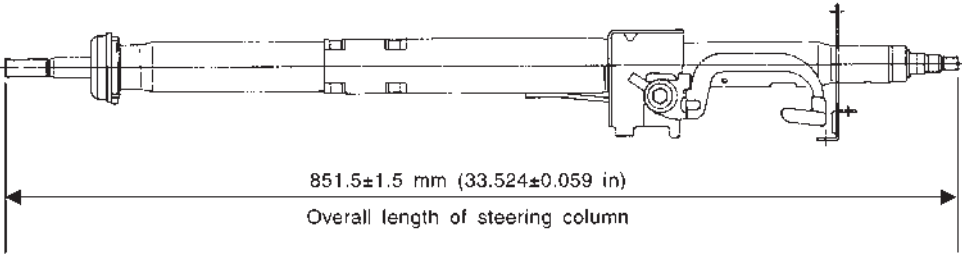
B: DISASSEMBLY

- 1) Remove the three screws securing upper and lower steering column covers, and the two screws securing combination switch, then remove related parts.

C: INSPECTION

1. BASIC INSPECTION

Clean the disassembled parts with a cloth, and check for wear, damage, or any other faults. If necessary, repair or replace faulty parts.

Part name	Inspection	Corrective action
Universal joint	<ul style="list-style-type: none"> • Free play • Swinging torque Yawing torque Looseness  <p style="text-align: right;">G4M0089</p> <p>Standard value of universal joint free play: 0 mm (0 in) Max. value of universal joint swinging torque: 0.3 N·m (0.03 kg·m, 0.2 ft·lb)</p>	Replace if faulty.
Steering column	<ul style="list-style-type: none"> • Overall length of steering column <p>Measure overall length of steering column. Standard overall length of steering column:</p>  <p style="text-align: center;">851.5±1.5 mm (33.524±0.059 in) Overall length of steering column</p> <p style="text-align: right;">H4M1309A</p>	Replace steering column assembly.

2. AIRBAG MODEL INSPECTION

WARNING:

For airbag model inspection procedures, refer to 5-5 Supplemental Restraint System. <Ref. to 5-5 [W2F0].>

D: ASSEMBLY

1) Insert combination switch to upper column shaft, and install lower column cover with tilt lever held in the lowered position. Then route ignition key harness and combination switch harness between column cover mounting bosses.

2) Fit upper column cover to lower column cover, and tighten combination switch and column cover.

Tightening torque:

$1.2 \pm 0.2 \text{ N-m}$ ($0.12 \pm 0.02 \text{ kg-m}$, $0.9 \pm 0.1 \text{ ft-lb}$)

CAUTION:

Don't overtorque screw.

E: INSTALLATION

1) Insert end of steering shaft into toeboard grommet.

2) Tighten steering shaft mounting bolts under instrument panel.

Tightening torque:

$25 \pm 5 \text{ N-m}$ ($2.5 \pm 0.5 \text{ kg-m}$, $18.1 \pm 3.6 \text{ ft-lb}$)

3) Connect ignition and combination switch connectors under instrument panel.

4) Connect airbag system connector at harness spool.

NOTE:

Make sure to apply double lock.

5) Install universal joint.

(1) Align bolt hole on the long yoke side of universal joint with the cutout at the serrated section of shaft end, and insert universal joint.

(2) Align bolt hole on the short yoke side of universal joint with the cutout at the serrated section of gearbox assembly. Lower universal joint completely.

(3) Temporarily tighten bolt on the short yoke side. Raise universal joint to make sure the bolt is properly passing through the cutout at the serrated section.

(4) Tighten bolt on the long yoke side, then that on the short yoke side.

Tightening torque:

$24 \pm 3 \text{ N-m}$ ($2.4 \pm 0.3 \text{ kg-m}$, $17.4 \pm 2.2 \text{ ft-lb}$)

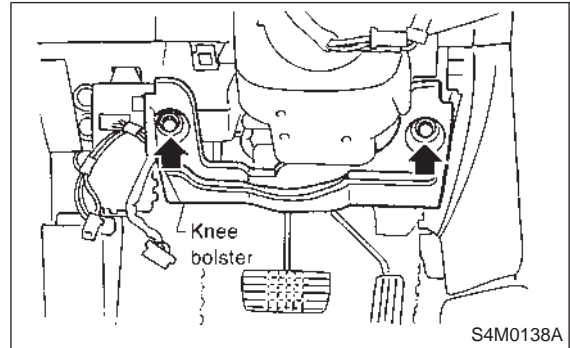
CAUTION:

- Make sure that universal joint bolts is tightened through notch in shaft serration.
- Excessively large tightening torque of universal joint bolts may lead to heavy steering wheel operation.

Standard clearance between gearbox to DOJ:

Over 15 mm (0.59 in)

6) Install knee bolster.



7) Align center of roll connector. (with airbag model) <Ref. to 5-5 [W6B1].>

CAUTION:

Ensure that front wheels are set in straight forward direction.

8) Set steering wheel to neutral and install it onto steering shaft.

Tightening torque:

$34 \pm 5 \text{ N-m}$ ($3.5 \pm 0.5 \text{ kg-m}$, $25.3 \pm 3.6 \text{ ft-lb}$)

Column cover-to-steering wheel clearance:

2 — 4 mm (0.08 — 0.16 in)

CAUTION:

Insert roll connector guide pin into guide hole on lower end of surface of steering wheel to prevent damage. Draw out airbag system connector, horn connector and cruise control connectors from guide hole of steering wheel lower end. (with airbag model)

9) Install airbag module to steering wheel. (with airbag model)

WARNING:

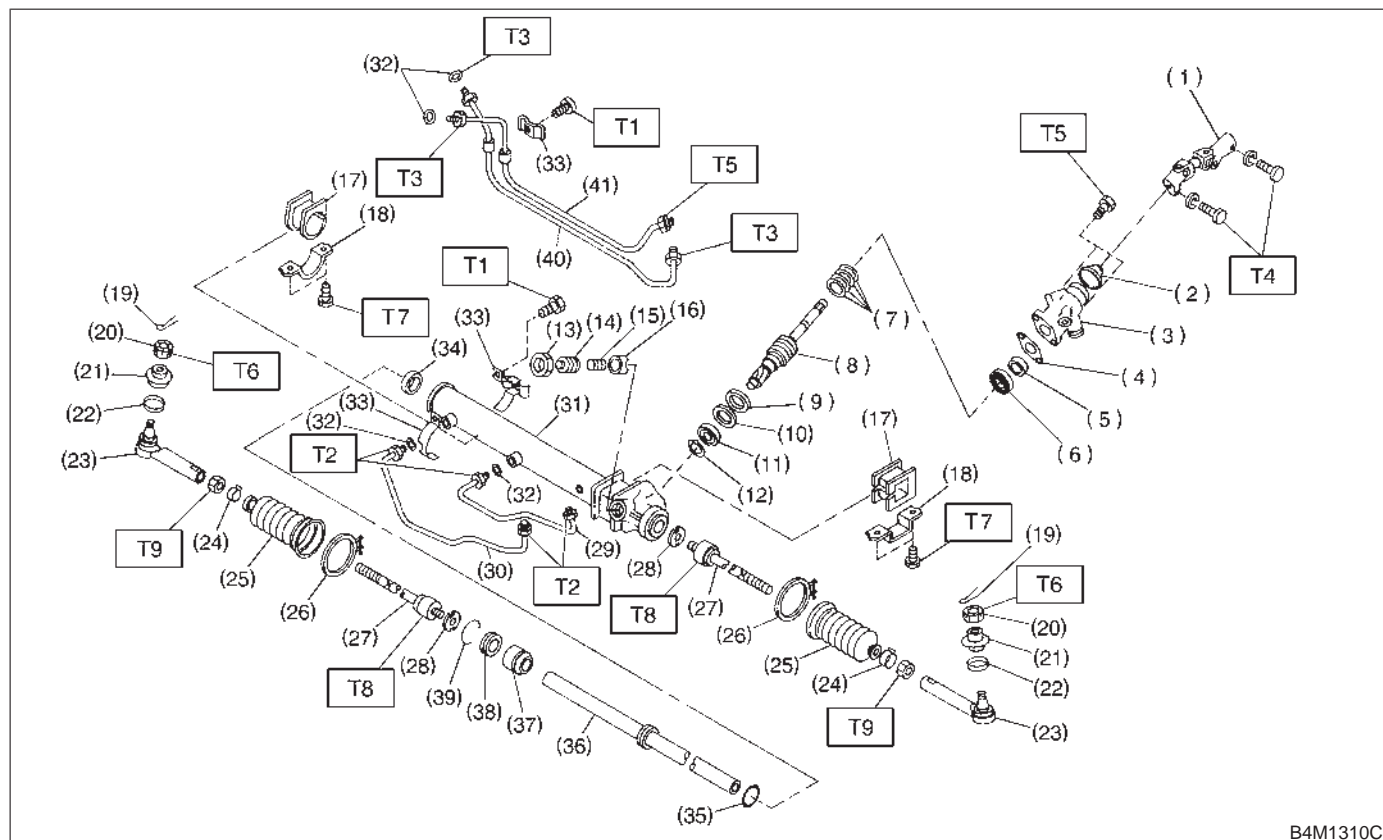
Always refer to 5-5 Supplemental Restraint System before performing the service operation. <Ref. to 5-5 [W3A0].>

3. Steering Gearbox (Power Steering System)

A: REMOVAL

NOTE:

For disassembly and assembly of gearbox unit, refer to section Control Valve (Power Steering Gearbox.)
<Ref. to 4-3 [W4B0].> and <Ref. to 4-3 [W4D0].>



B4M1310C

- (1) Universal joint
- (2) Dust cover
- (3) Valve housing
- (4) Gasket
- (5) Oil seal
- (6) Special bearing
- (7) Seal ring
- (8) Pinion and valve ASSY
- (9) Oil seal
- (10) Back-up washer
- (11) Ball bearing
- (12) Snap ring
- (13) Lock nut
- (14) Adjusting screw
- (15) Spring
- (16) Sleeve
- (17) Adapter
- (18) Clamp

- (19) Cotter pin
- (20) Castle nut
- (21) Dust cover
- (22) Clip
- (23) Tie-rod end
- (24) Clip
- (25) Boot
- (26) Band
- (27) Tie-rod
- (28) Lock washer
- (29) Pipe B
- (30) Pipe A
- (31) Steering body
- (32) O-ring
- (33) Clamp
- (34) Oil seal
- (35) Piston ring
- (36) Rack

- (37) Rack bushing
- (38) Rack stopper
- (39) Circlip
- (40) Pipe E
- (41) Pipe F

Tightening torque: N·m (kg·m, ft·lb)

T1: 6±1 (0.6±0.1, 4.3±0.7)

T2: 13±3 (1.3±0.3, 9.4±2.2)

T3: 15±5 (1.5±0.5, 10.8±3.6)

T4: 24±3 (2.4±0.3, 17.4±2.2)

T5: 25±5 (2.5±0.5, 18.1±3.6)

T6: 27.0±2.5 (2.75±0.25, 19.9±1.8)

T7: 59±12 (6.0±1.2, 43±9)

T8: 78±10 (8.0±1.0, 58±7)

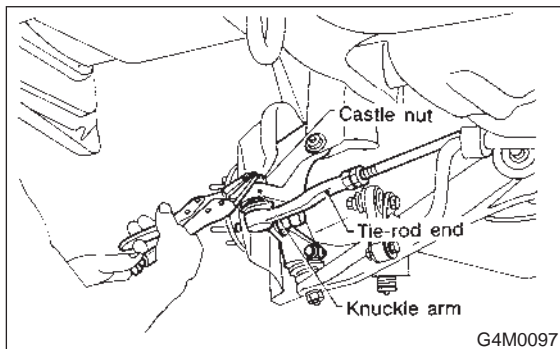
T9: 83±5 (8.5±0.5, 61.5±3.6)

- 1) Disconnect battery minus terminal.
- 2) Loosen front wheel nut.
- 3) Lift vehicle and remove front wheels.
- 4) Remove front exhaust pipe assembly.

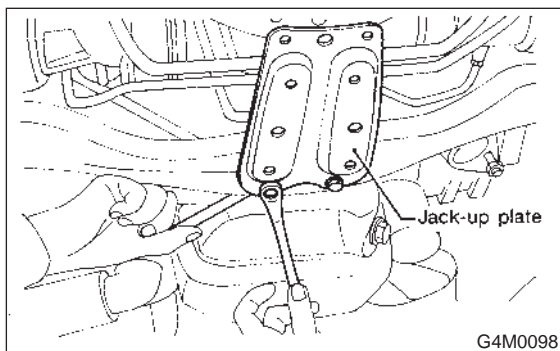
WARNING:

Be careful, exhaust pipe is hot.

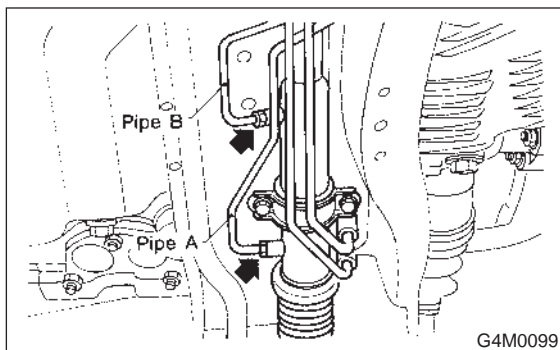
- 5) Using a puller, remove tie-rod end from knuckle arm after pulling off cotter pin and removing castle nut.



- 6) Remove jack-up plate and front stabilizer.



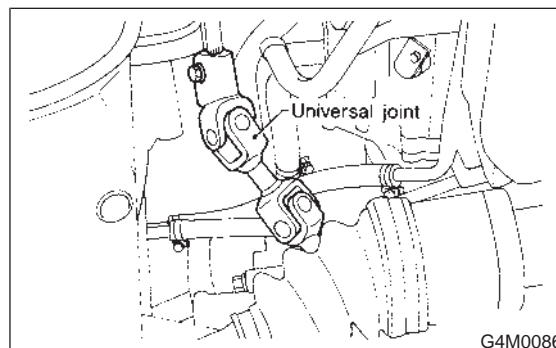
- 7) Remove one pipe joint at the center of gearbox, and connect vinyl hose to pipe and joint. Discharge fluid by turning steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.



- 8) Remove lower side bolt of universal joint, then remove upper side bolt and lift the joint upward.

NOTE:

Place a mark on the joint and mating serration so that they can be re-installed at the original position.



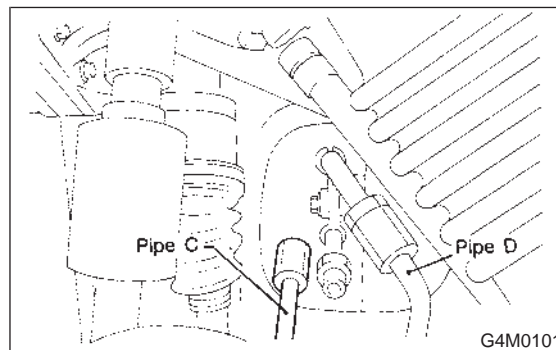
- 9) Disconnect pipes C and D from pipe of gear-box.

CAUTION:

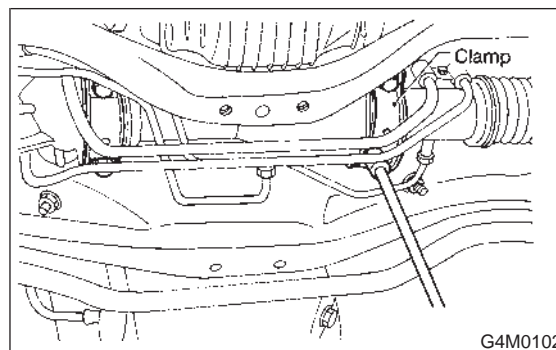
Be careful not to damage these pipes.

NOTE:

Disconnect upper pipe D first, and lower pipe C second.



- 10) Remove clamp bolts securing gearbox to crossmember, and remove gearbox.



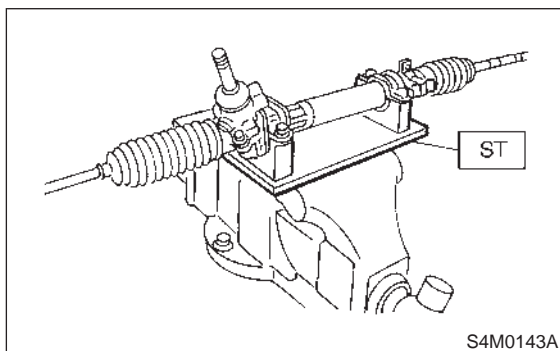
B: DISASSEMBLY

- 1) Disconnect four pipes from gearbox.
- 2) Secure gearbox removed from vehicle in vice using ST.

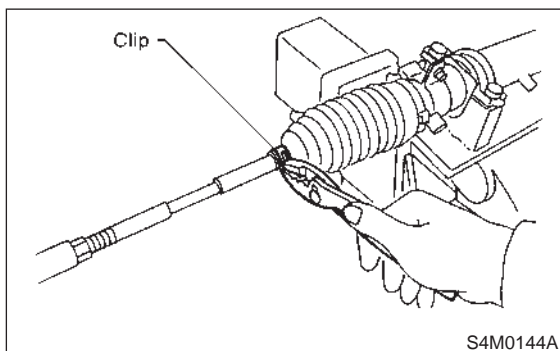
ST 926200000 STAND

CAUTION:

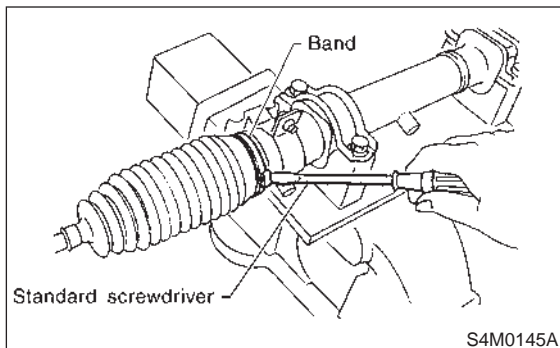
Secure the gearbox in a vice using the ST as shown. Do not attempt to secure it without this ST.



- 3) Remove tie-rod end and lock nut from gearbox.
- 4) Remove small clip from boot using pliers, and move boot to tie-rod end side.



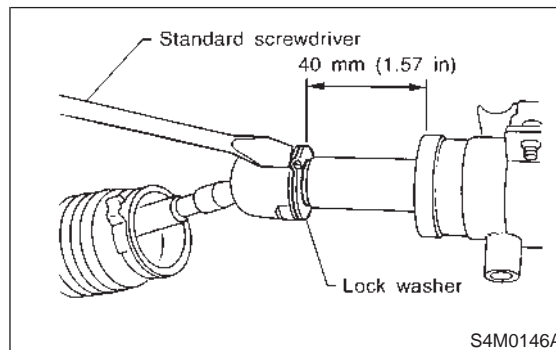
- 5) Using standard screwdriver, remove band from boot.



- 6) Extend rack approximately 40 mm (1.57 in) out. Unlock lock wire at lock washer on each side of tie-rod end using a standard screwdriver.

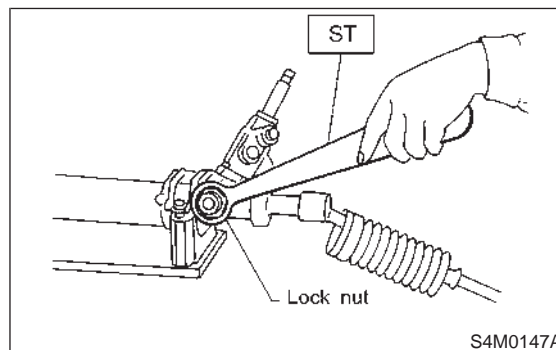
CAUTION:

Be careful not to scratch rack surface as oil leaks may result.

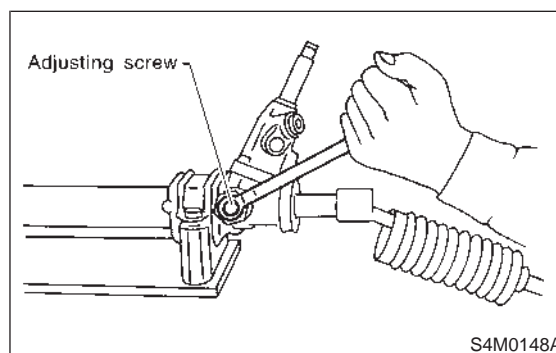


- 7) Using ST, loosen lock nut.

ST 926230000 SPANNER



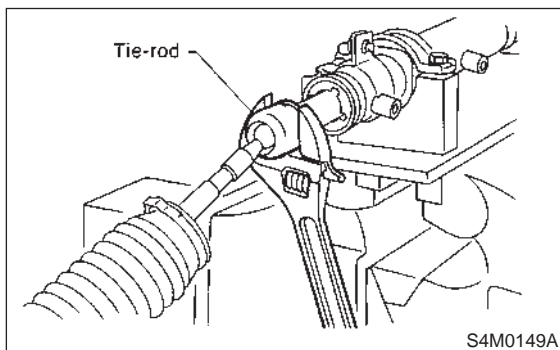
- 8) Tighten adjusting screw until it no longer tightens.



9) Using a wrench [32 mm (1.26 in) width across flats] or adjustable wrench, remove tie-rod.

CAUTION:

- Check ball joint for free play, and tie-rod for bends. Replace if necessary.
- Check dust seals used with tie-rod end ball joint for damage or deterioration. Replace if necessary.



10) Loosen adjusting screw and remove spring and sleeve.

CAUTION:

Replace spring and/or sleeve if damaged.

C: INSPECTION

- 1) Clean all disassembled parts, and check for wear, damage, or any other faults, then repair or replace as necessary.
- 2) When disassembling, check inside of gearbox for water. If any water is found, carefully check boot for damage, input shaft dust seal, adjusting screw and boot clips for poor sealing. If faulty, replace with new parts.

No.	Parts	Inspection	Corrective action
1	Input shaft	(1) Bend of input shaft (2) Damage on serration	If bend or damage is excessive, replace entire gearbox.
2	Dust seal	(1) Crack or damage (2) Wear	If outer wall slips, lip is worn out or damage is found, replace it with new one.
3	Rack and pinion	Poor mating of rack with pinion	(1) Adjust backlash properly. By measuring turning torque of gearbox and sliding resistance of rack, check if rack and pinion engage uniformly and smoothly with each other. (Refer to "Service limit".) (2) Keeping rack pulled out all the way so that all teeth emerge, check teeth for damage. Even if abnormality is found in either (1) or (2), replace entire gearbox.
4	Gearbox unit	(1) Bend of rack shaft (2) Bend of cylinder portion (3) Crack or damage on cast iron portion	Replace gearbox with new one.
		(4) Wear or damage on rack bush	If free play of rack shaft in radial direction is out of the specified range, replace gearbox with new one. (Refer to "Service limit".)
		(5) Wear on input shaft bearing	If free plays of input shaft in radial and axial directions are out of the specified ranges, replace gearbox with new one. (Refer to "Service limit".)
5	Boot	Crack, damage or deterioration	Replace.
6	Tie-rod	(1) Looseness of ball joint (2) Bend of tie-rod	Replace.
7	Tie-rod end	Damage or deterioration on dust seal	Replace.
8	Adjusting screw spring	Deterioration	Replace.
9	Boot clip	Deterioration	Replace.
10	Sleeve	Damage	Replace.
11	Pipes	(1) Damage to flared surface (2) Damage to flare nut (3) Damage to pipe	Replace.

1. SERVICE LIMIT

Make a measurement as follows. If it exceeds the specified service limit, adjust or replace.

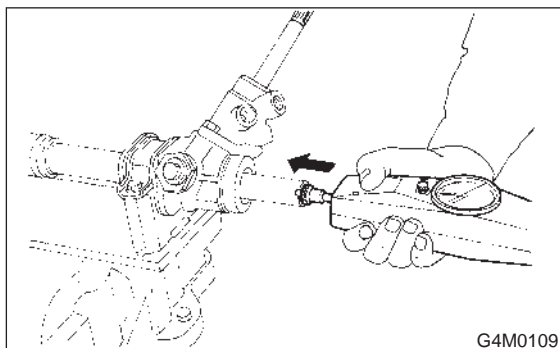
NOTE:

When making a measurement, vise gearbox by using ST. Never vise gearbox by inserting aluminum plates, etc. between vise and gearbox.

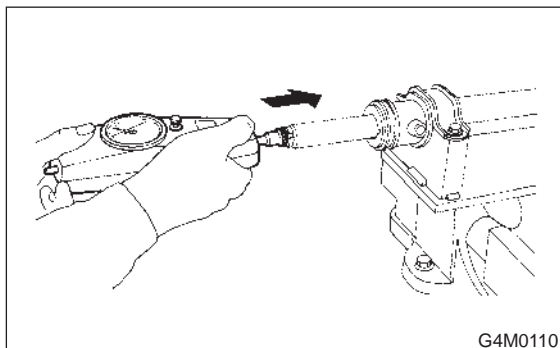
ST 926200000 STAND

Sliding resistance of rack shaft:
Service limit

304.0 N (31.0 kg, 68.4 lb) or less



G4M0109



G4M0110

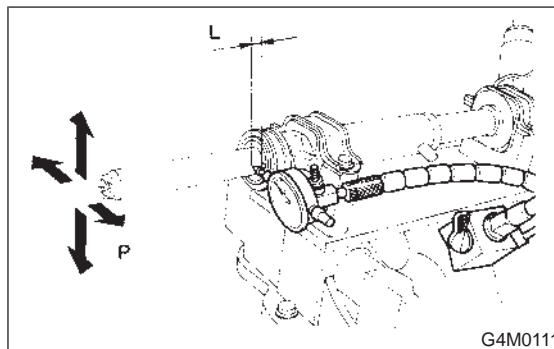
2. RACK SHAFT PLAY IN RADIAL DIRECTION
Right-turn steering:
Service limit

0.15 mm (0.0059 in) or less

On condition

L: 5 mm (0.20 in)

P: 98 N (10 kg, 22 lb)



G4M0111

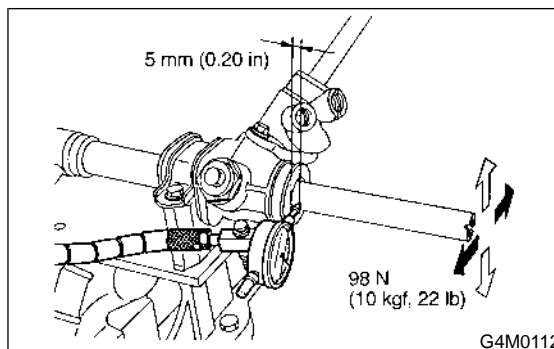
Left-turn steering:
Service limit

Direction  

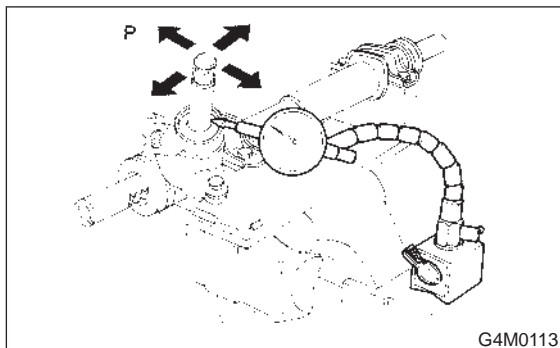
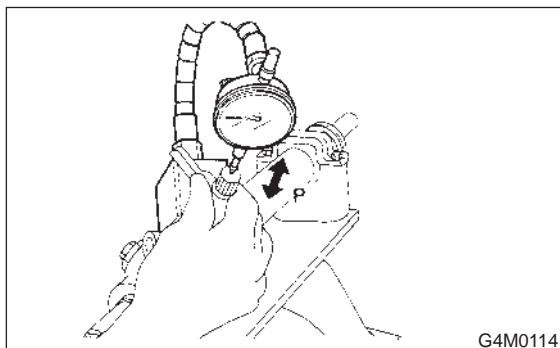
0.15 mm (0.0059 in) or less

Direction  

0.15 mm (0.0059 in) or less

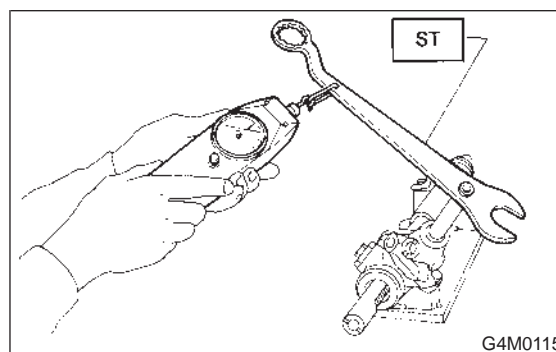


G4M0112

3. INPUT SHAFT PLAY*In radial direction:***Service limit****0.18 mm (0.0071 in) or less***On condition***P: 98 N (10 kg, 22 lb)***In axial direction:***Service limit****0.1 mm (0.004 in) or less***On condition***P: 20 — 49 N (2 — 5 kg, 4 — 11 lb)****4. TURNING RESISTANCE OF GEARBOX**

Using ST, measure gearbox turning resistance.

ST 926230000 SPANNER

Service limit:**Straight-ahead position within 30 mm (1.18 in) from rack center****Less than 11.18 N (1.14 kg, 2.51 lb)****Maximum allowable resistance****12.7 N (1.3 kg, 2.9 lb)****D: ASSEMBLY****CAUTION:**

Use only SUBARU genuine grease for gearbox.

Grease:**VALIANT GREASE M2****[Part No. 003608001, net 0.5 kg (1.1 lb)]**

- 1) Clean all parts and tools before reassembling.
- 2) Apply grease to teeth of rack so that grease applied is about as high as teeth, and also apply a thin film of grease to sliding portion of rack shaft.

CAUTION:

- When moving rack to stroke end without tie-rod attached, prevent shocks from being applied at the end.
- Do not apply grease to threaded portion at end of rack shaft.
- Move rack shaft to stroke end two (2) or three (3) times to squeeze grease which accumulates on both ends. Remove grease to prevent it from choking air passage hole.

- 3) Apply grease to sleeve insertion hole.

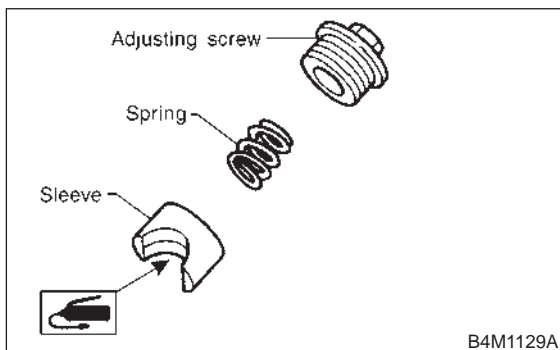
- 4) Apply grease to dust seal insertion hole.

CAUTION:

Apply clean grease with clean hands. If material having a sharp edge is used for applying grease, oil seal at the inside might be damaged.

3. Steering Gearbox (Power Steering System)

5) Apply grease to sliding surface of sleeve and spring seat, then insert sleeve into pinion housing. Fit spring into sleeve screw, pack grease inside of screw, then install the screw.



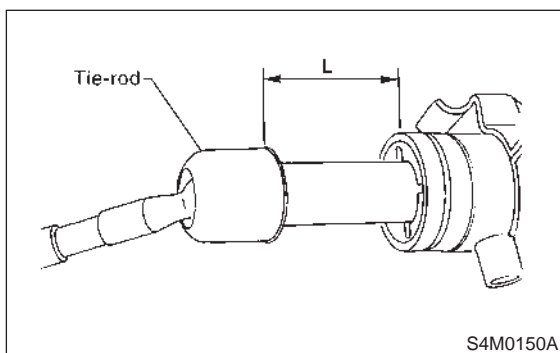
6) Install lock washers and tighten left and right tie-rods into rack ends.

On condition

L: Approximately 40 mm (1.57 in)

Tightening torque:

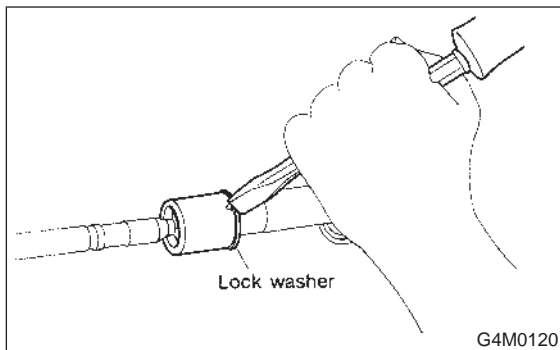
$78 \pm 10 \text{ N}\cdot\text{m}$ ($8.0 \pm 1.0 \text{ kg}\cdot\text{m}$, $58 \pm 7 \text{ ft}\cdot\text{lb}$)



7) Bend lock washer using a chisel.

CAUTION:

Be careful not to scratch rack when bending lock washer.

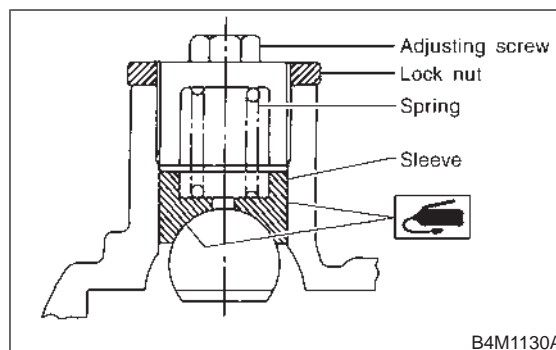


8) Rack and pinion backlash adjustment

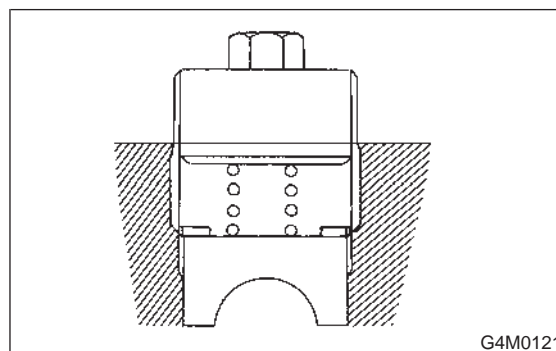
(1) Loosen adjusting screw.

(2) Rotate input shaft so that rack is in the straight ahead direction.

(3) Apply grease to sleeve.



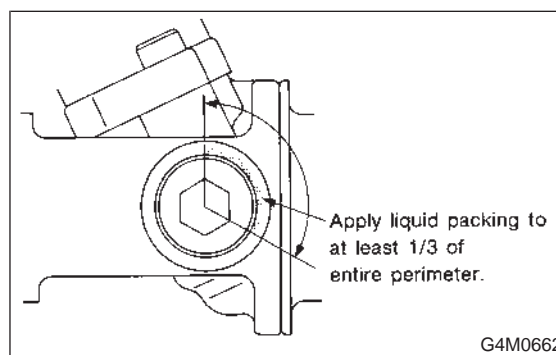
(4) Tighten adjusting screw by two threads.



(5) Apply liquid packing to at least 1/3 of entire perimeter of adjusting screw thread.

Liquid packing:

THREE BOND 1141



(6) Tighten adjusting screw to $7.4 \text{ N}\cdot\text{m}$ ($0.75 \text{ kg}\cdot\text{m}$, $5.4 \text{ ft}\cdot\text{lb}$) and back off 25° .

(7) Install lock nut. While holding adjusting screw with a wrench, tighten lock nut using ST. ST 926230000 SPANNER

Tightening torque (Lock nut):

$39 \pm 10 \text{ N}\cdot\text{m}$ ($4.0 \pm 1.0 \text{ kg}\cdot\text{m}$, $29 \pm 7 \text{ ft}\cdot\text{lb}$)

NOTE:

- Hold adjusting screw with a wrench to prevent it from turning while tightening lock nut.
- Make adjustment so that steering wheel can be rotated fully from lock to lock without binding.

9) Check for service limit as per article of "Service limit". <Ref. to 4-3 [W3C1].> Make replacement and adjustment if necessary.

10) Install boot to housing.

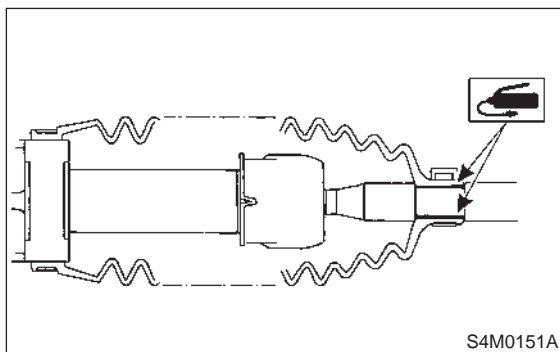
NOTE:

- Before installing boot, be sure to apply grease to the groove of tie-rod.
- Install fitting portions of boots to the following portions in both sides of assembled steering gearbox.

The groove on gearbox

The groove on the rod

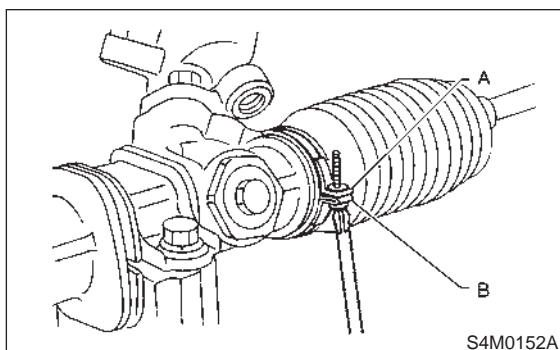
- Make sure that boot is installed without unusual inflation or deflation.



11) Using a screwdriver, tighten the screw until the ends "A" and "B" of the band come into contact with each other.

NOTE:

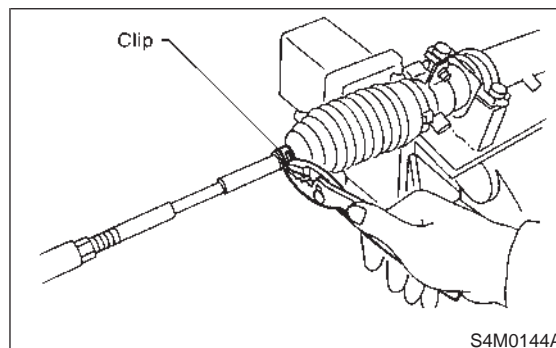
Always tighten the band from the underside of the gear box.



12) Fix boot end with clip (small).

CAUTION:

After installing, check boot end is positioned into groove on tie-rod.

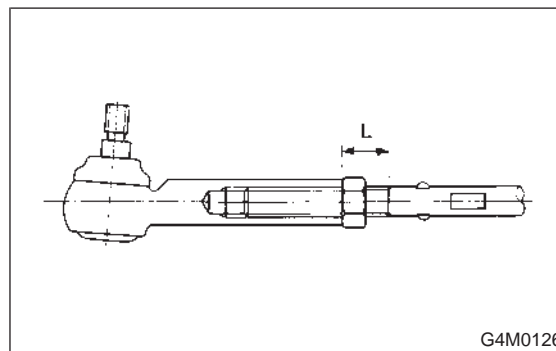


13) If tie-rod end was removed, screw in lock nut and tie-rod end to screwed portion of tie-rod, and tighten lock nut temporarily in a position as shown in figure.

Installed tie-rod length: L
15 mm (0.59 in)

NOTE:

Pay attention to difference between right and left tie-rod ends.

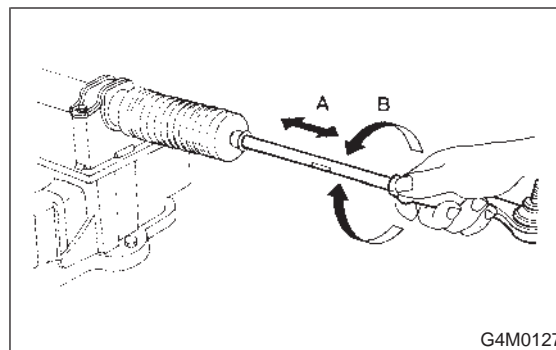


14) Inspect gearbox as follows:

"A" Holding tie-rod end, repeat lock to lock two or three times as quickly as possible.

"B" Holding tie-rod end, turn it slowly at a radius one or two times as large as possible.

After all, make sure that boot is installed in the specified position without deflation.



3. Steering Gearbox (Power Steering System)

15) Remove gearbox from ST.

ST 926200000 STAND

16) Install four pipes on gearbox.

(1) Connect pipes A and B to four pipe joints of gearbox. Connect upper pipe B first, and lower pipe A.

Tightening torque:

13±3 N·m (1.3±0.3 kg-m, 9.4±2.2 ft-lb)

(2) Connect pipes C and D to gearbox.

Connect lower pipe C first, and upper pipe D second.

Tightening torque:

15±5 N·m (1.5±0.5 kg-m, 10.8±3.6 ft-lb)

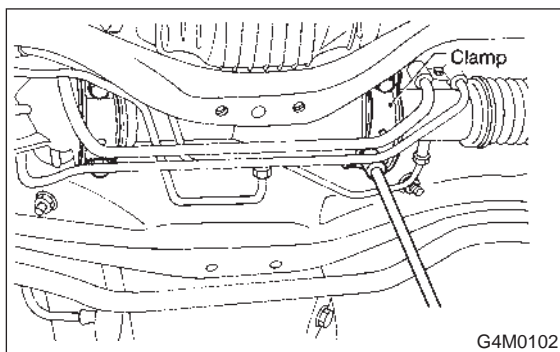
E: INSTALLATION

1) Insert gearbox into crossmember, being careful not to damage gearbox boot.

2) Tighten gearbox to crossmember bracket via clamp with bolt to the specified torque.

Tightening torque:

59±12 N·m (6.0±1.2 kg-m, 43±9 ft-lb)



3) How to install the joint.

(1) Push the long yoke of the joint, all the way into the serrated portion of the steering shaft, setting the bolt hole in the cutout.

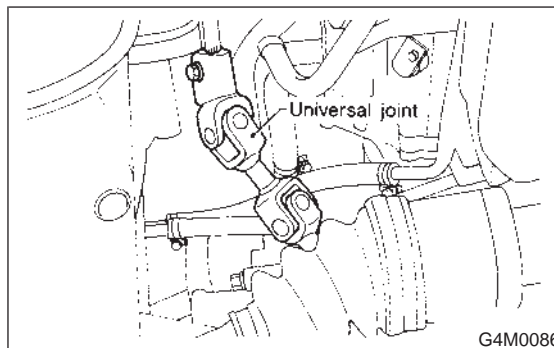
(2) Then pull the short yoke all way out of the serrated portion of the gear box, setting the bolt hole in the cutout.

(3) Insert the bolt through the short yoke, pull the joint and confirm that the bolt is on cutout of the gearbox.

(4) Fasten the short yoke side with a spring washer and bolt, then fasten the long yoke side.

Tightening torque:

24±3 N·m (2.4±0.3 kg-m, 17.4±2.2 ft-lb)



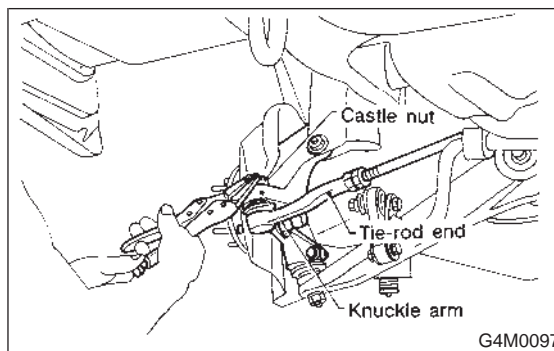
4) Connect tie-rod end and knuckle arm, and tighten with castle nut. Fit cotter pin into the nut and bend the pin to lock.

Castle nut tightening torque:

Tighten to 27.0±2.5 N·m (2.75±0.25 kg-m, 19.9±1.8 ft-lb), and tighten further within 60° until cotter pin hole is aligned with a slot in the nut.

CAUTION:

When connecting, do not hit cap at the bottom of tie-rod end with hammer.



5) Install front stabilizer to vehicle.

6) Install front exhaust pipe assembly.

<Ref. to 2-9 [W1B0].>

7) Install tires.

8) Tighten wheel nuts to the specified torque.

Tightening torque:

88±10 N·m (9.0±1.0 kg-m, 65±7 ft-lb)

9) Connect ground cable to battery.

10) Pour fluid into oil tank, and bleed air.

<Ref. to 4-3 [W7A0].>

11) Check for fluid leaks.

12) Install jack-up plate.

WARNING:

Be careful, exhaust manifold is hot.

13) Lower vehicle.

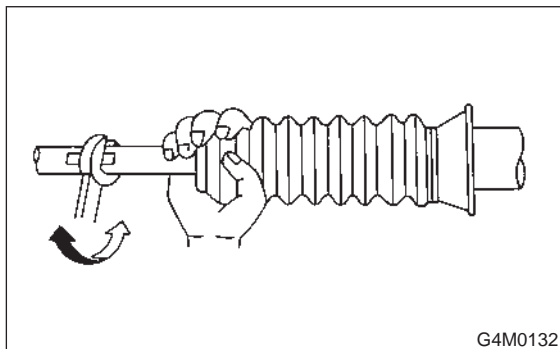
- 14) Check fluid level in oil tank.
- 15) After adjusting toe-in and steering angle, tighten lock nut on tie-rod end.

Tightening torque:

$83 \pm 5 \text{ N}\cdot\text{m}$ ($8.5 \pm 0.5 \text{ kg}\cdot\text{m}$, $61.5 \pm 3.6 \text{ ft}\cdot\text{lb}$)

CAUTION:

When adjusting toe-in, hold boot as shown to prevent it from being rotated or twisted. If twisted, straighten it.



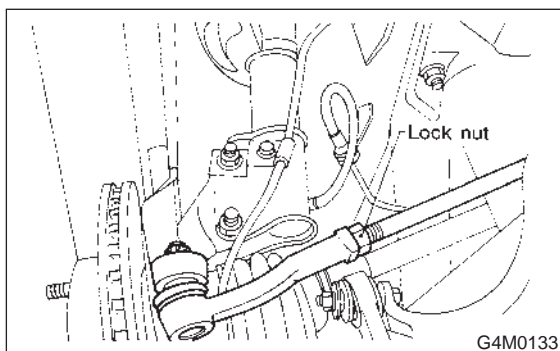
G4M0132

F: ADJUSTMENT

- 1) Adjust front toe.

Standard of front toe:

IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)



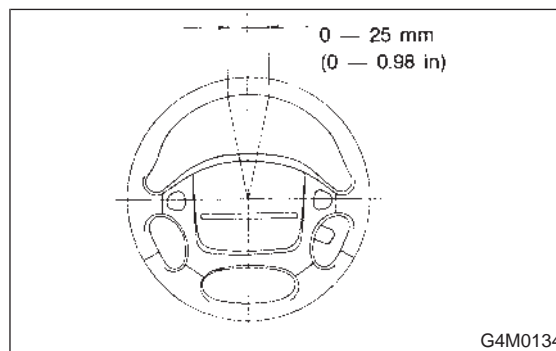
G4M0133

- 2) Adjust steering angle of wheels.

Inner wheel: $37.4 \pm 1.5^\circ$

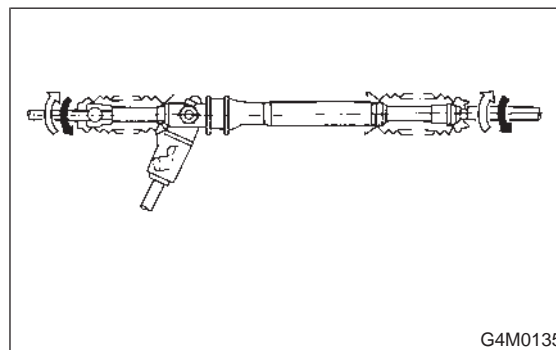
Outer wheel: $32.5 \pm 1.5^\circ$

- 3) If steering wheel spokes are not horizontal when wheels are set in the straight ahead position, and error is more than 5° on the periphery of steering wheel, correctly re-install the steering wheel.



G4M0134

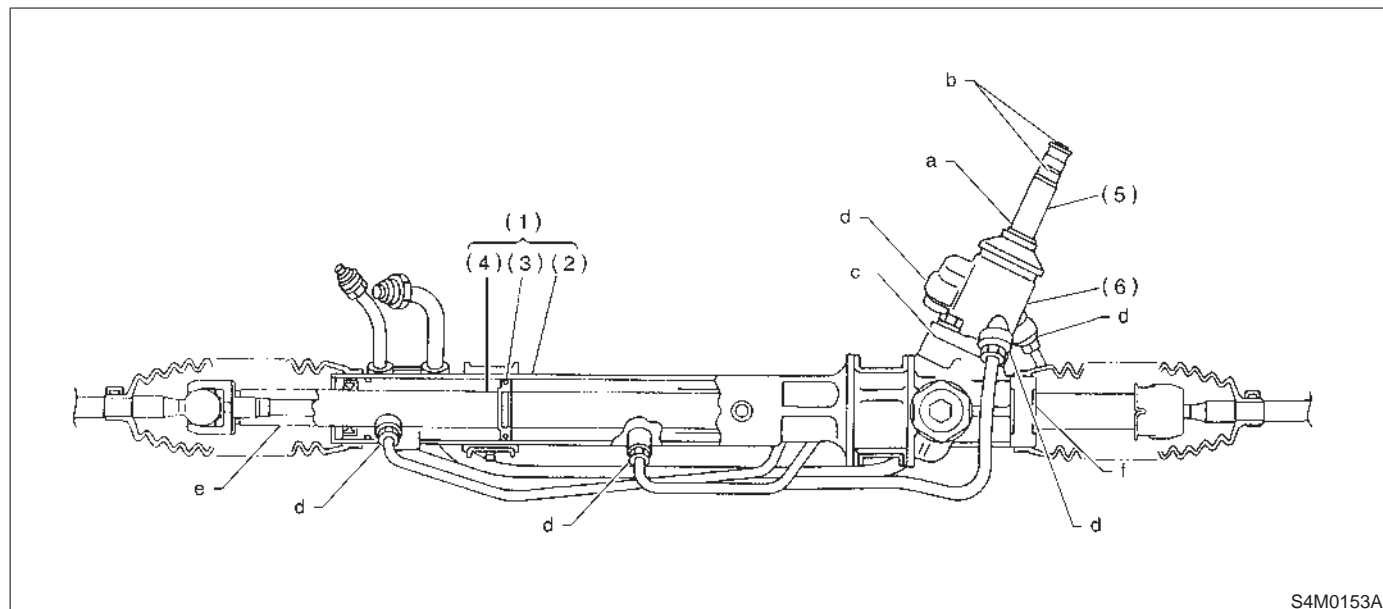
- 4) If steering wheel spokes are not horizontal with vehicle set in the straight ahead position after this adjustment, correct it by turning the right and left tie-rods in the same direction by the same turns.



G4M0135

4. Control Valve (Power Steering Gearbox)

A: CHECKING OIL LEAKING POINTS



S4M0153A

- (1) Power cylinder
(2) Cylinder

- (3) Rack piston
(4) Rack axle

- (5) Input shaft
(6) Valve housing

1. OIL LEAKING POINTS

1) If leak point is other than a, b, c, or d, perform the 5th step in "OIL LEAK CHECK PROCEDURE AND REPLACEMENT PARTS" before dismounting gearbox from vehicle. <Ref. to 4-3 [W4A2].> If gearbox is dismounted without confirming where the leak is, it must be mounted again to locate the leak point.

2) Even if the location of the leak can be easily found by observing the leaking condition, it is necessary to thoroughly remove the oil from the suspected portion and turn the steering wheel from lock to lock about 30 to 40 times with engine running, then make comparison of the suspected portion between immediately after and several hours after this operation.

3) Before starting oil leak repair work, be sure to clean the gearbox, hoses, pipes, and surrounding parts. After completing repair work, clean these areas again.

2. OIL LEAK CHECK PROCEDURE AND REPLACEMENT PARTS

NOTE:

Parts requiring replacement are described in the smallest unit of spare parts including damaged parts and spare parts damaged. In actual disassembly work, accidental damage as well as inevitable damage to some related parts must be taken into account, and spare parts for them must also

be prepared. However, it is essential to pinpoint the cause of trouble, and limit the number of replacement parts as much as possible.

1) Leakage from "a"

The oil seal is damaged. Replace valve assembly with a new one.

2) Leakage from "b"

The torsion bar O-ring is damaged. Replace valve assembly with a new one.

3) Leakage from "c"

The oil seal is damaged. Replace valve assembly or oil seal with a new one.

4) Leakage from "d"

The pipe is damaged. Replace the faulty pipe or O-ring.

5) If leak is other than a, b, c, or d, and if oil is leaking from the gearbox, move the right and left boots toward tie-rod end side, respectively, with the gearbox mounted to the vehicle, and remove oil from the surrounding portions. Then, turn the steering wheel from lock to lock 30 to 40 times with the engine running, then make comparison of the leaked portion immediately after and several hours after this operation.

(1) Leakage from "e"

The cylinder seal is damaged. Replace rack bush with a new one.

(2) Leakage from "f"

There are two possible causes. Take following step first. Remove the pipe assembly B from the valve housing, and close the circuit with ST.

ST 926420000 PLUG

Turn the steering wheel from lock to lock 30 to 40 times with the engine running, then make comparison of the leaked portion between immediately after and several hours after this operation.

CAUTION:

- If leakage from "f" is noted again:

The oil seal of pinion and valve assembly is damaged. Replace pinion and valve assembly with a new one. Or replace the oil seal and the parts that are damaged during disassembly with new ones.

- If oil stops leaking from "f":

The oil seal of rack housing is damaged. Replace the oil seal and the parts that are damaged during disassembly with new ones.

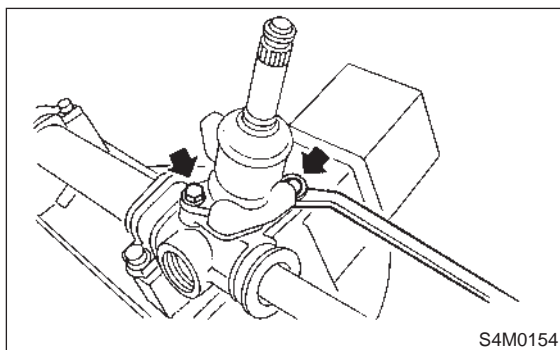
B: DISASSEMBLY

NOTE:

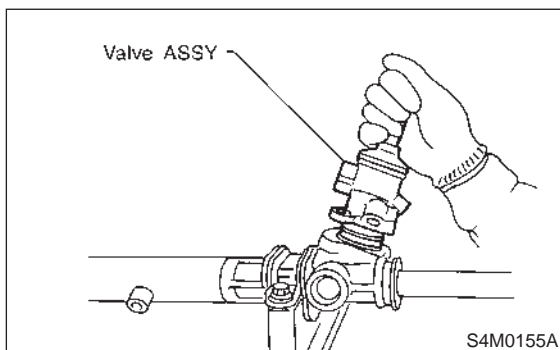
This section focuses on the disassembly and reassembly of control valve. For the inspection and adjustment and the service procedures for associated parts, refer to "Steering Gearbox" <Ref. to 4-3 [W3A0].>

1. VALVE ASSEMBLY

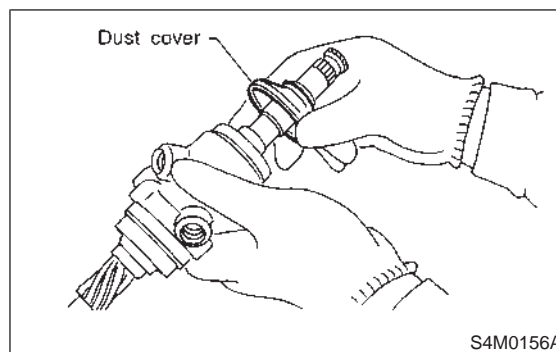
- 1) Remove two bolts securing valve assembly.



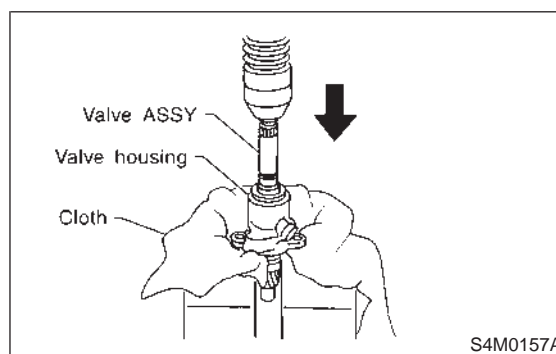
- 2) Carefully draw out input shaft and remove valve assembly.



- 3) Slide dust cover out.

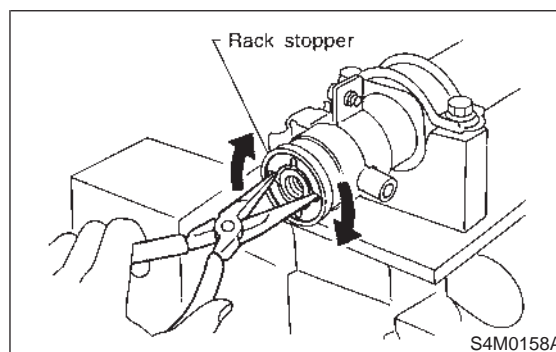


- 4) Using a press remove pinion and valve assembly from valve housing.



2. RACK ASSEMBLY

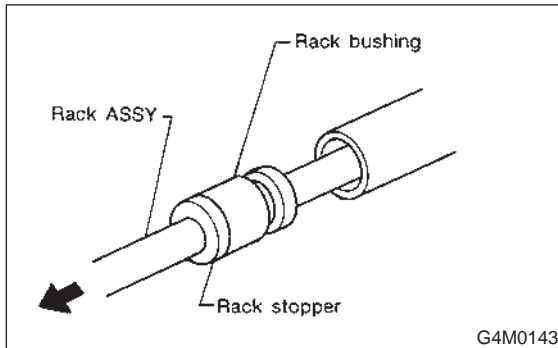
- 1) Using a sharp pointed pliers, rotate the rack stopper in the direction of the arrow until the end of the circlip comes out of the stopper. Rotate the circlip in the opposite direction and pull it out.



2) Pull rack assembly from cylinder side, and draw out rack bushing and rack stopper together with rack assembly.

CAUTION:

Be careful not to contact rack to inner wall of cylinder when drawing out. Any scratch on cylinder inner wall will cause oil leakage.



3) Remove rack bushing and rack stopper from rack assembly.

CAUTION:

Do not reuse removed rack bushing and circlip.

C: REPLACEMENT OF SEAL AND PACKING

1. VALVE HOUSING OIL SEAL

Specified steering grease:

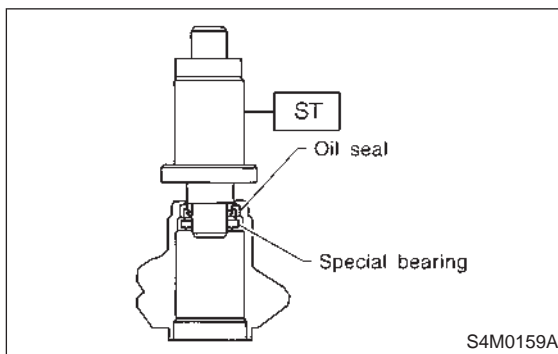
VALIANT GREASE M2 (Part No. 003608001)

1) Using ST and press, remove dust seal, oil seal and special bearing from valve housing.

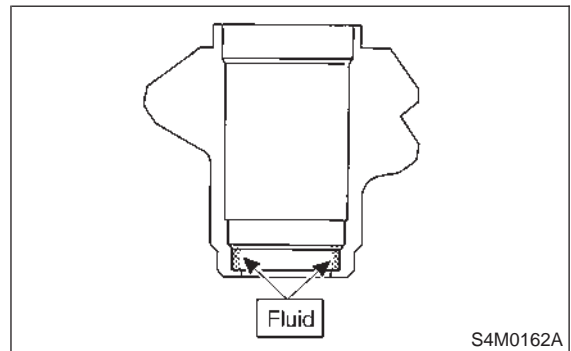
ST 34099FA120 INSTALLER & REMOVER SEAL

CAUTION:

- Do not apply a force to end surface of valve housing.
- Do not reuse oil seal after removal.



2) Apply a coat of specified power steering fluid to inner wall of valve housing.



3) Attach ST2 to ST1, and press oil seal into place using a press.

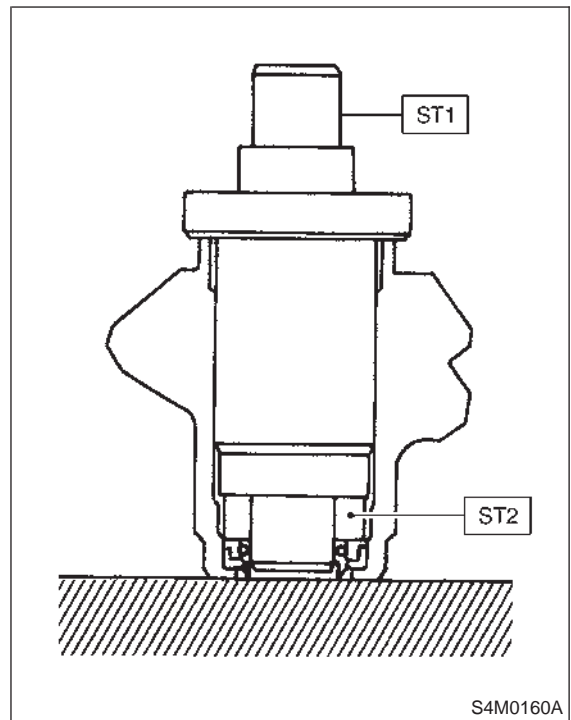
ST1 34099FA120 INSTALLER & REMOVER SEAL

ST2 34099FA130 INSTALLER SEAL

(1) Face oil seal in the direction shown in figure when installing.

(2) To avoid scratching oil seal, apply a coat of grease to contact surface of installer and oil seal.

(3) To facilitate installation, attach oil seal to installer and position in valve housing before pressing into place.

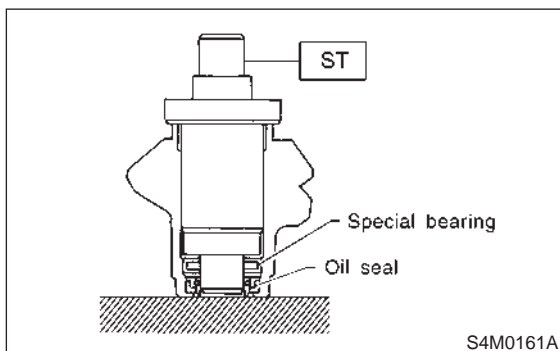


4) Using ST and press, install special bearing in valve housing.

ST 34099FA120 INSTALLER & REMOVER SEAL

NOTE:

To facilitate installation, attach ball bearing to remover and position in valve housing before pressing it into place.

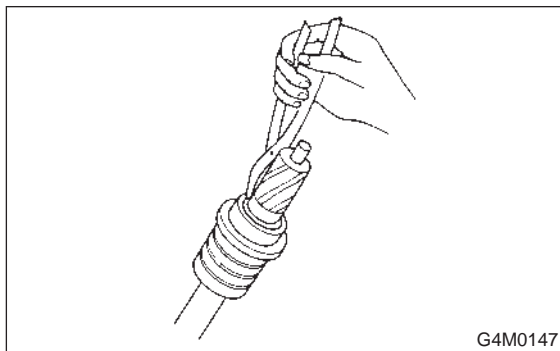


2. PINION AND VALVE ASSEMBLY

1) Remove snap ring using snap ring pliers.

CAUTION:

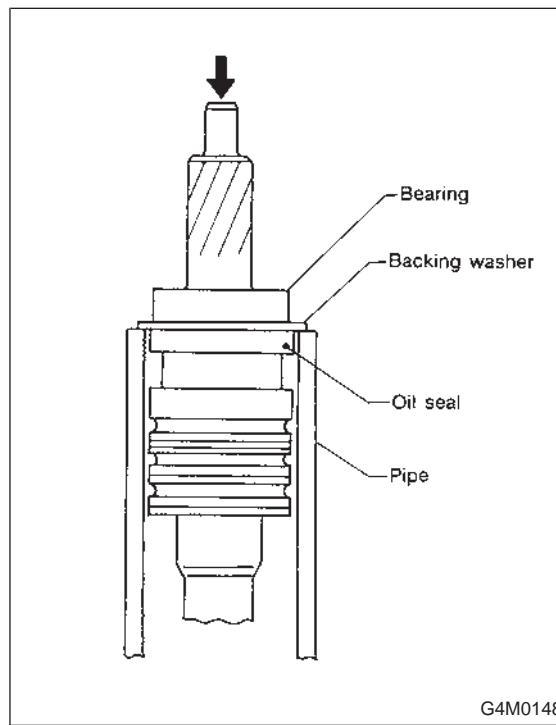
- Do not reuse removed snap ring.
- Be careful not to scratch pinion and valve assembly.



2) Press out bearing together with backing washer using pipe of I.D. 38.5 to 39.5 mm (1.516 to 1.555 in) and press.

CAUTION:

Do not reuse removed bearing.



3) Remove oil seal.

CAUTION:

Do not reuse removed oil seal.

4) Put vinyl tape around pinion shaft splines to protect oil seal from damage.

5) Fit pinion and valve assembly into valve housing.

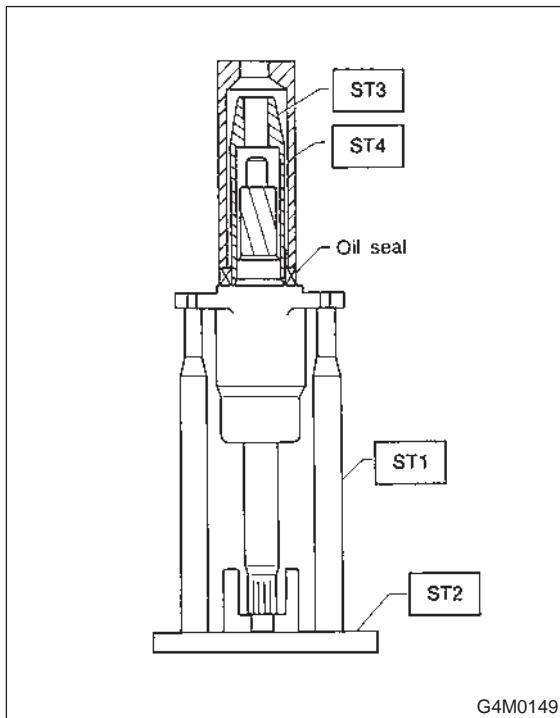
NOTE:

Apply specified power steering fluid to outer diameter surface of input shaft and outer surface of valve body seal ring, and pay special attention not to damage seal when inserting pinion and valve assembly.

4. Control Valve (Power Steering Gearbox)

- 6) Secure valve assembly to ST1 and ST2.
- 7) Put ST3 over pinion, and insert oil seal, then force-fit oil seal into housing using ST4.

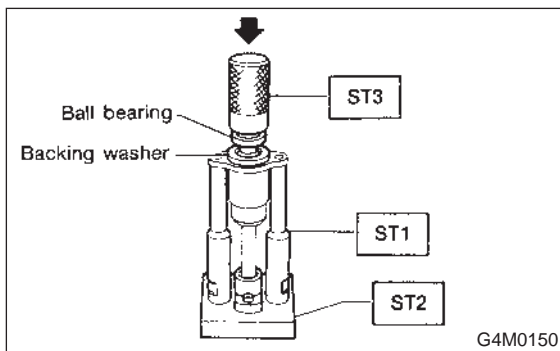
ST1 926370000 INSTALLER A
 ST2 34099FA100 STAND BASE
 ST3 926360000 INSTALLER A
 ST4 927620000 INSTALLER B


NOTE:

- Apply specified power steering fluid to oil seal and ST3, being careful not to damage oil seal lip.
- Push oil seal until ST3 contacts housing end face.

- 8) Remove ST3, and fit backing washer.
- 9) Force-fit ball bearing using ST3.

ST1 926370000 INSTALLER A
 ST2 34099FA100 STAND BASE
 ST3 927640000 INSTALLER B


NOTE:

Be careful not to tilt ball bearing during installation.

- 10) Install snap ring using snap ring pliers.

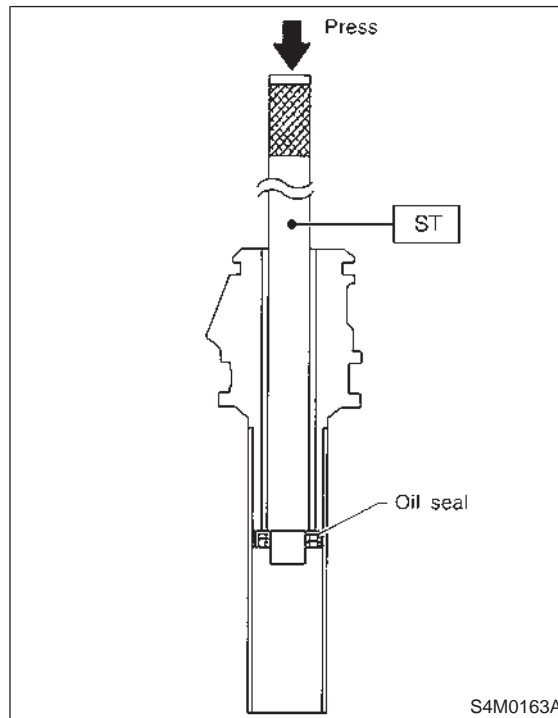
NOTE:

Rotate snap ring to check for proper installation.

3. RACK HOUSING OIL SEAL

- 1) Insert ST from pinion housing side and remove oil seal using a press.

ST 34099FA140 REMOVER OIL SEAL


NOTE:

Discard removed oil seal.

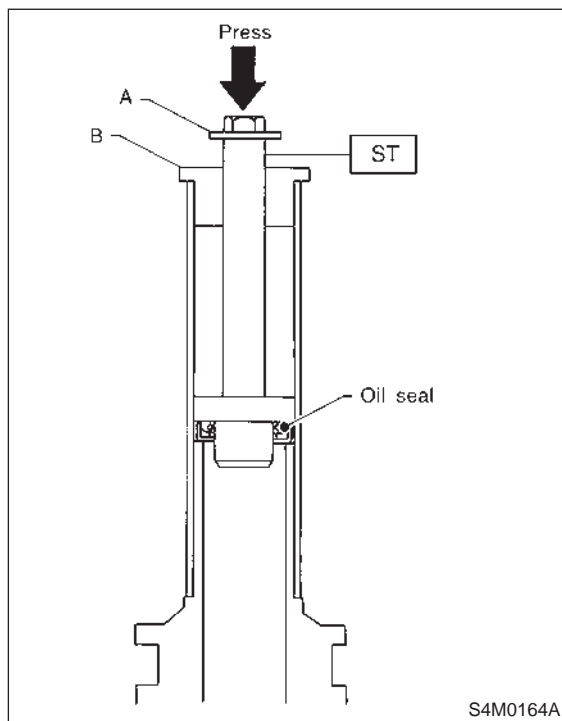
- 2) Force-fit oil seal using ST.
ST 34099FA110 INSTALLER

CAUTION:

Be careful not to damage or scratch cylinder inner wall.

NOTE:

- Apply specified power steering fluid to oil seal.
- Pay special attention not to install oil seal in wrong direction.
- Push oil seal until the stepped portion of A contacts end face of B.

**D: ASSEMBLY****1. RACK ASSEMBLY****CAUTION:**

Use only SUBARU genuine grease for gearbox.

Specified grease for gearbox:

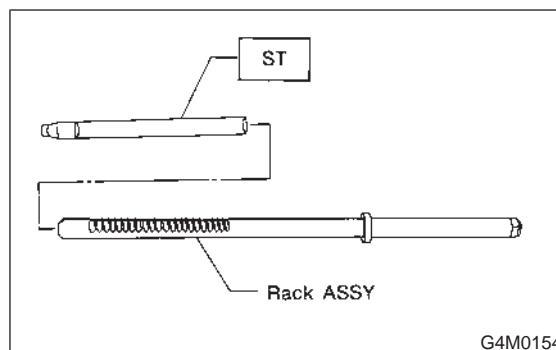
VALIANT GREASE M2 (Part No. 003608001)

- 1) Fixing rack housing
Fix rack housing in vice using ST.
ST 926200000 STAND

CAUTION:

- When fixing rack housing in vice, be sure to use this special tool. Do not fix rack housing in vice using pad such as aluminum plates, etc.
- When using old rack housing, be sure to clean and remove rust before assembling. Check pinion housing bushing carefully.

- 2) Fit ST over toothed portion of rack assembly, and check for binding or unsmooth insertion. If any deformation is noted on flats at the end of rack, shape by using file, and wash with cleaning fluid.
ST 926390001 COVER and REMOVER



- 3) Apply genuine grease to teeth of thoroughly washed rack assembly, and fit ST over the toothed portion.

CAUTION:

- Be careful not to block air passage with grease. Remove excessive grease.
- After fitting cover, check air passage hole for clogging. If clogged, open by removing grease from the hole.
- Check rack shaft for damage.
- Apply specified power steering fluid to this ST and surface of piston ring to prevent seal from being damaged.

- 4) Insert rack assembly into rack housing from cylinder side, and remove ST after it has passed completely through oil seal.

NOTE:

Before inserting rack assembly, apply a coat of specified power steering fluid to surfaces of ST and rack piston.

ST 926390001 COVER AND REMOVER

4. Control Valve (Power Steering Gearbox)

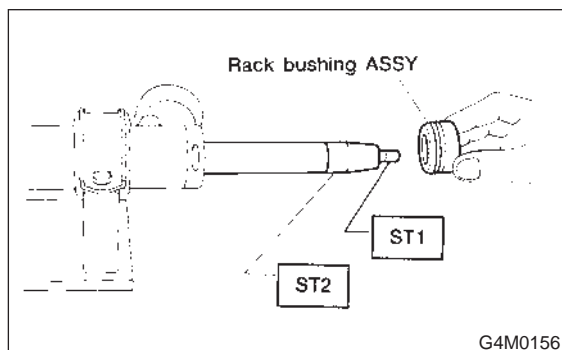
5) Fit ST1 and ST2 over the end of rack, and install rack bushing.

ST1 926400000 GUIDE

ST2 927660000 GUIDE

CAUTION:

- If burrs, or nicks are found on this guide and rack shaft portion, remove by filing.
- Dip rack bushing in specified power steering fluid before installing, and pay attention not to damage O-ring and oil seal.



6) Insert rack stopper into cylinder tube until internal groove (on cylinder side) is aligned with external groove (on rack stopper). Turn rack stopper with ST so that rack stopper hole is seen through cylinder slits.

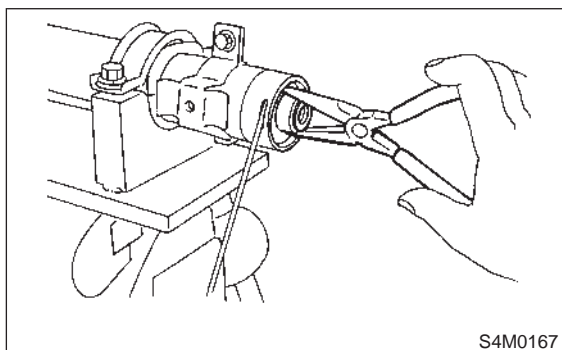
7) Insert rack stopper into rack housing, and wrap circlip using a sharp pointed pliers to secure rack stopper in position.

CAUTION:

Be careful not to scratch rack while winding circlip.

NOTE:

Rotate wrench another 90 to 180° after the end of circlip has been wrapped in.



8) Fit mounting rubber onto rack housing.

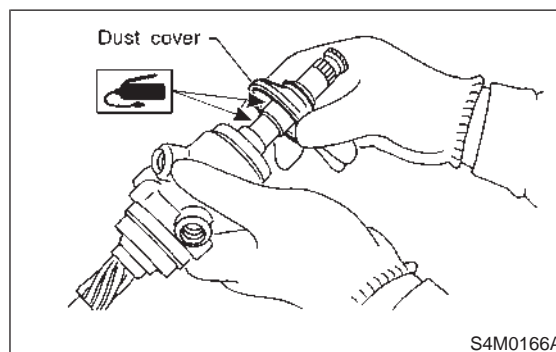
2. VALVE ASSEMBLY**CAUTION:**

Use only SUBARU genuine grease for gearbox.

Specified grease for gearbox:

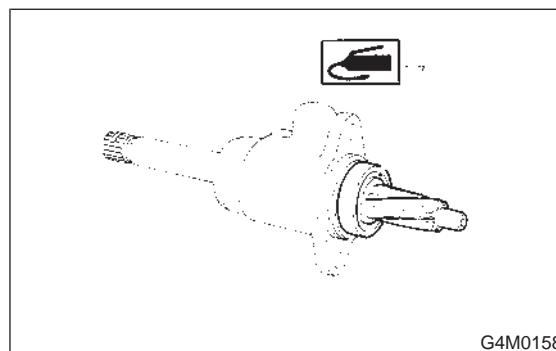
VALIANT GREASE M2 (Part No. 003608001)

1) Apply specified grease to dust cover.



2) Install dust cover on valve assembly.

3) Apply genuine grease to pinion gear and bearing of valve assembly.



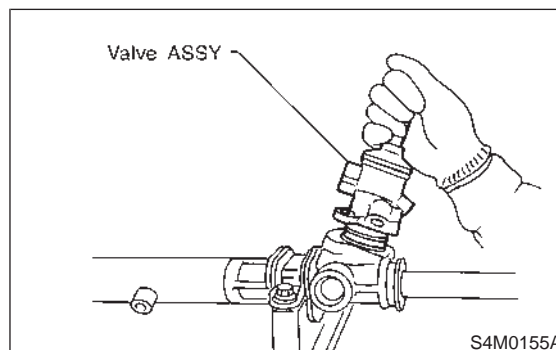
4) Install gasket on valve assembly. Insert valve assembly into place while facing rack teeth toward pinion.

CAUTION:

Be sure to use a new gasket.

NOTE:

Do not allow packing to be caught when installing valve assembly.



5) Tighten bolts alternately to secure valve assembly.

Tightening torque:

$25 \pm 5 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.5 \text{ kg}\cdot\text{m}$, $18.1 \pm 3.6 \text{ ft}\cdot\text{lb}$)

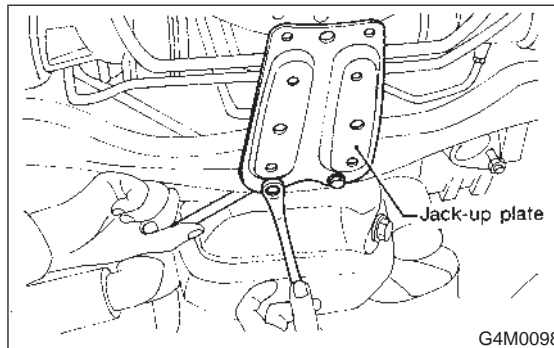
CAUTION:

Be sure to alternately tighten bolts.

5. Pipe Assembly (Power Steering System)

A: REMOVAL

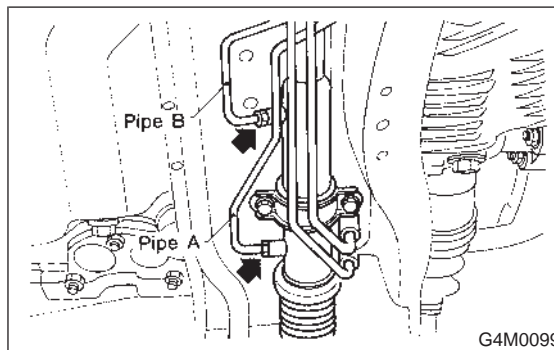
- 1) Disconnect battery minus terminal.
- 2) Lift vehicle and remove jack-up plate.



- 3) Remove one pipe joint at the center of gearbox, and connect vinyl hose to pipe and joint. Discharge fluid by turning steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.

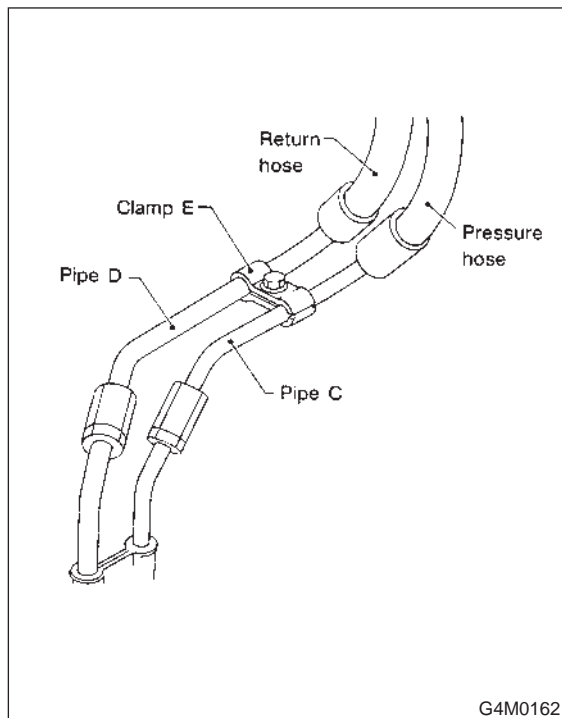
CAUTION:

Improper removal and installation of parts often causes fluid leak trouble. To prevent this, clean the surrounding portions before disassembly and reassembly, and pay special attention to keep dirt and other foreign matter from mating surfaces.



5. Pipe Assembly (Power Steering System)

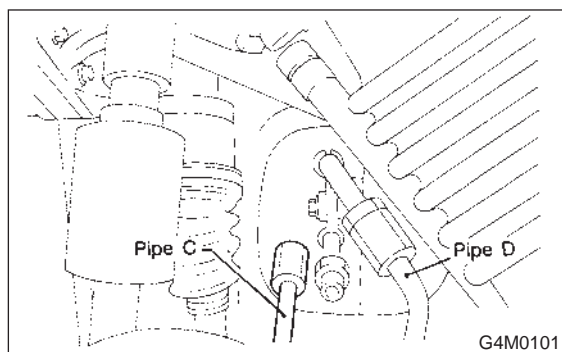
4) Remove clamp E from pipes C and D.



5) Disconnect pipe C from pipe (on the gearbox side).

CAUTION:

- When disconnecting pipe C, use two wrenches to prevent deformities.
- Be careful to keep pipe connections free from foreign matter.

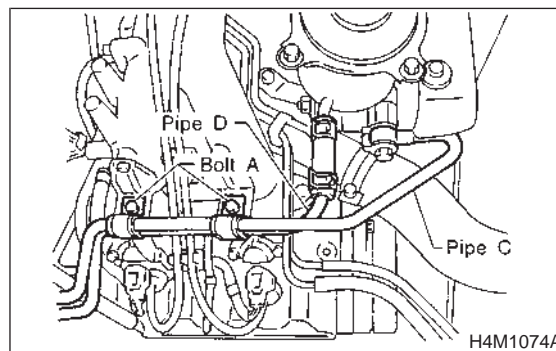


6) Remove bolt A.

Disconnect pipe C from oil pump. Disconnect pipe D from oil tank.

CAUTION:

- Do not allow fluid from the hose end to come into contact with pulley belt.
- To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.


B: CHECK

Check all disassembled parts for wear, damage or other abnormalities. Repair or replace faulty parts as required.

Part name	Inspection	Remedy
Pipe	<ul style="list-style-type: none"> ● O-ring fitting surface for damage ● Nut for damage ● Pipe for damage 	Replace with new one.
Clamp B	<ul style="list-style-type: none"> ● Clamps for weak clamping force 	Replace with new one.
Clamp C		
Clamp E		
Hose	<ul style="list-style-type: none"> ● Flared surface for damage ● Flare nut for damage ● Outer surface for cracks ● Outer surface for wear ● Clip for damage ● End coupling or adapter for degradation 	Replace with new one.

C: INSTALLATION

1) Interconnect pipes C and D.

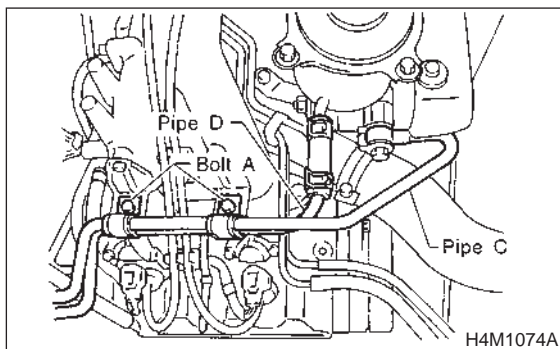
Tightening torque:

Joint nut

15±5 N·m (1.5±0.5 kg-m, 10.8±3.6 ft-lb)

CAUTION:

Visually check that hose between tank and pipe D is free from bending or twisting.

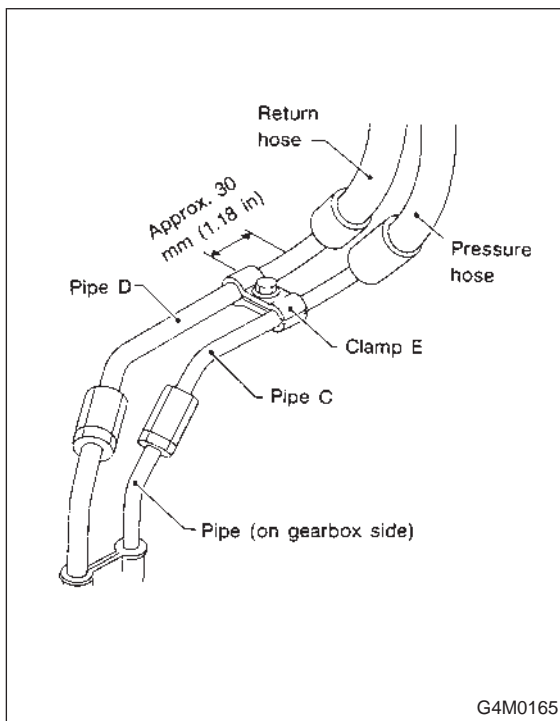


2) Tighten bolt A.

Tightening torque:

13±3 N·m (1.3±0.3 kg-m, 9.4±2.2 ft-lb)

3) Temporarily connect pipes C and D to pipes (on the gearbox side).



4) Temporarily install clamp E on pipes C and D.

CAUTION:

Ensure that the "8" letter side of clamp E is on the pipe C side.

5) Tighten joint nut.

Tightening torque:

15±5 N·m (1.5±0.5 kg-m, 10.8±3.6 ft-lb)

6) Tighten clamp E firmly.

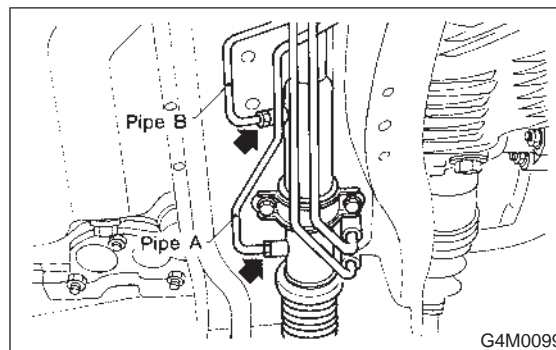
Tightening torque:

5.4±1.5 N·m (0.55±0.15 kg-m, 4.0±1.1 ft-lb)

7) Connect pipes A and B to four pipe joints of gearbox. Connect upper pipe B first, and lower pipe A second.

Tightening torque:

13±3 N·m (1.3±0.3 kg-m, 9.4±2.2 ft-lb)



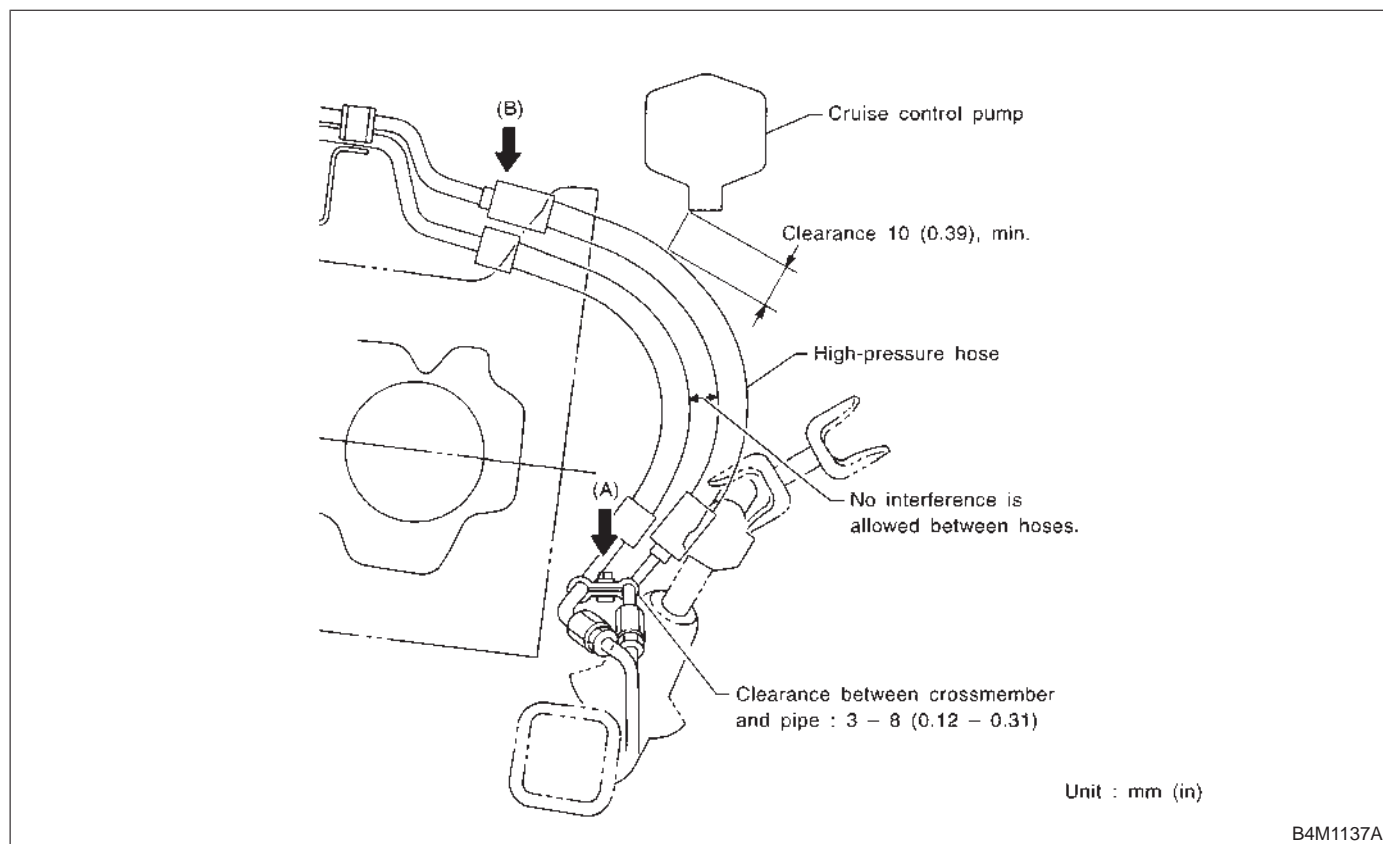
8) Install jack-up plate.

9) Connect battery minus terminal.

10) Feed the specified fluid and discharge air.

CAUTION:

Never start the engine before feeding the fluid; otherwise vane pump might be seized up.



11) Finally check clearance between pipes and/or hoses, as shown.

If clearance between cruise control pump and power steering hose is less than 10 mm (0.39 in), proceed as follows:

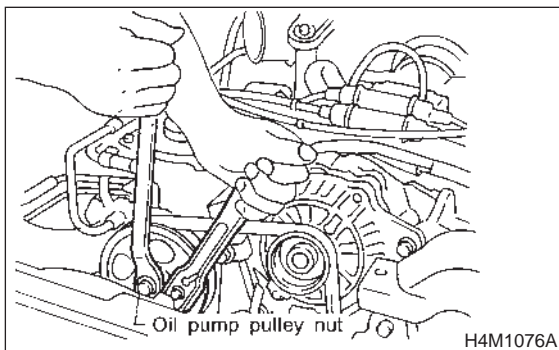
(1) Move clamped section (A) (refer to figure) down to a point where pipe is close to crossmember (pipe-to-crossmember clearance: 10 mm (0.39 in), min.).

(2) Check that clearance between cruise control pump and power steering hose is at least 10 mm (0.39 in). If it is not, bend section (B) down until a clearance of at least 10 mm (0.39 in) is obtained.

6. Oil Pump (Power Steering System)

A: REMOVAL

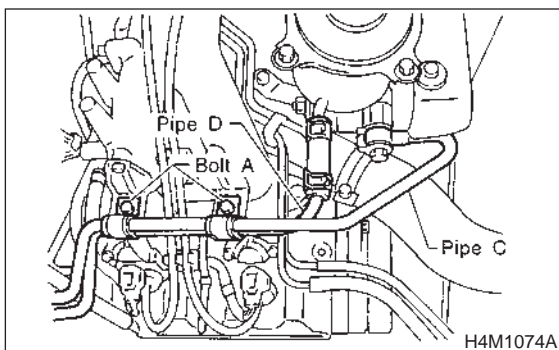
- 1) Remove ground cable from battery.
- 2) Drain the working fluid about 0.3 ℓ (0.3 US qt, 0.3 Imp qt) from oil tank.
- 3) Remove pulley belt cover bracket.
- 4) Loosen oil pump pulley nut, then remove bolts which secure alternator.



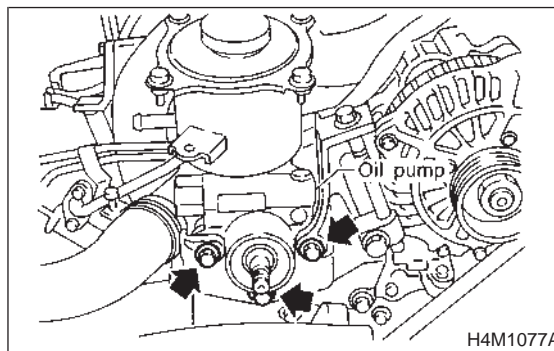
- 5) Loosen pulley belt(s).
- 6) Remove the nut and detach oil pump pulley.
- 7) Disconnect pipe C from oil pump. Disconnect pipe D from oil tank.

CAUTION:

- Do not allow fluid from the hose end to come into contact with pulley belt.
- To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.
- Except when only oil tank needs to be inspected, detach oil tank and oil pump as a unit. Then separate one from the other on a work bench to prevent oil from spilling on any part of the engine.



- 8) Remove three bolts from the front side of oil pump and detach the pump.



- 9) Remove three bolts from the lower side of bracket and detach the bracket.

CAUTION:

The bracket does not need to be removed unless it is damaged.

- 10) Place oil pump in a vise, remove two bolts from the upper side of oil tank and detach oil tank.

CAUTION:

Do not place oil pump directly in the vise; use soft pads and hold oil pump lightly to protect the pump.

B: CHECK

- In accordance with the following table, check all removed parts for wear and damage, and make repair or replacement if necessary.

No.	Parts	Inspection	Corrective action
1	Oil pump (Exterior)	(1) Crack, damage or oil leakage	Replace oil pump with a new one.
		(2) Play of pulley shaft	Measure radial play and axial play. If any of these exceeds the service limit, replace oil pump with a new one. <Ref. to 4-3 [W6B1].>
2	Pulley	(1) Damage	Replace it with a new one.
		(2) Bend	Measure V ditch deflection. If it exceeds the service limit, replace pulley with a new one. <Ref. to 4-3 [W6B1].>
3	Cap	Crack or damage	Replace it with a new one.
4	Strainer	(1) Clogging with dirt	Wash it.
		(2) Breakage	Replace it with a new one.
5	Oil pump (Interior)	(1) Defect or burning of vane pump	Check resistance to rotation of pulley. If it is past the service limit, replace oil pump with a new one. <Ref. to 4-3 [W6B1].>
		(2) Bend in the shaft or damage to bearing	Oil pump emits a noise that is markedly different in tone and loudness from a sound of a new oil pump when turning with a string put around its pulley, replace oil pump with a new one.
6	O-ring	Crack or deterioration	Replace it with a new one.
7	Oil tank	Crack, damage or oil leakage	Replace it with a new one.
8	Bracket	Crack	Replace it with a new one.

1. SERVICE LIMIT

Make a measurement as follows. If it exceeds the specified service limit, replace the parts with new ones.

CAUTION:

- Fix oil pump on a vise to make a measurement. At this time, hold oil pump with the least possible force between two wood pieces.
- Do not set outside of flow control valve or pulley on a vise; otherwise outside or pulley might be deformed. Select properly sized wood pieces.

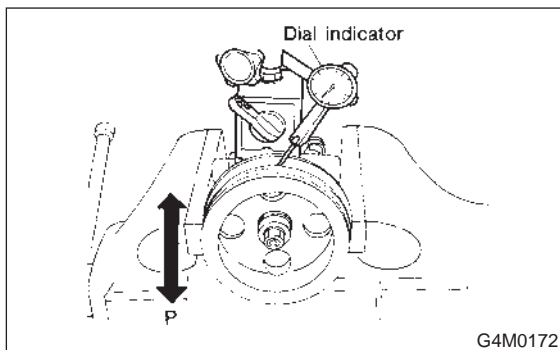
● Play of pulley shaft

On condition:

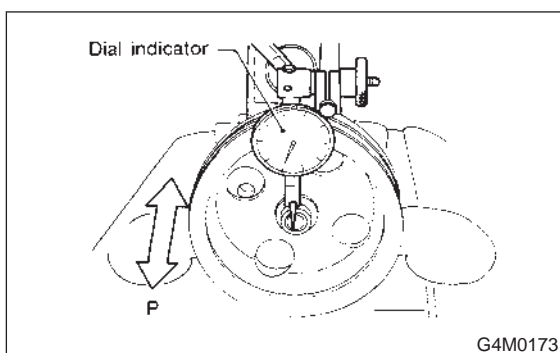
P: 9.8 N (1.0 kg, 2.2 lb)

Service limit:

Radial play (Direction \longleftrightarrow)
0.4 mm (0.016 in) or less



Axial play (Direction \longleftrightarrow)
0.9 mm (0.035 in) or less



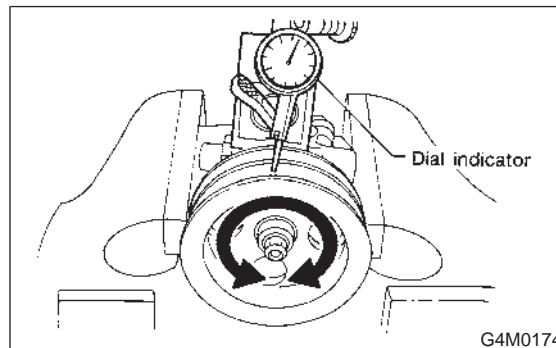
● Ditch deflection of pulley

Service limit:

1.0 mm (0.039 in) or less

NOTE:

Read the value for one surface of V ditch, and then the value for another off the dial.



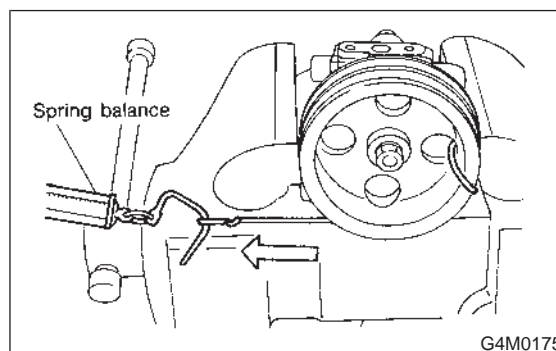
● Resistance to rotation of pulley

Service limit:

Maximum load; 9.22 N (0.94 kg, 2.07 lb) or less

NOTE:

- A rather higher value may be indicated when pulley starts turning.
- Measure the load during rotation and make a judgment.

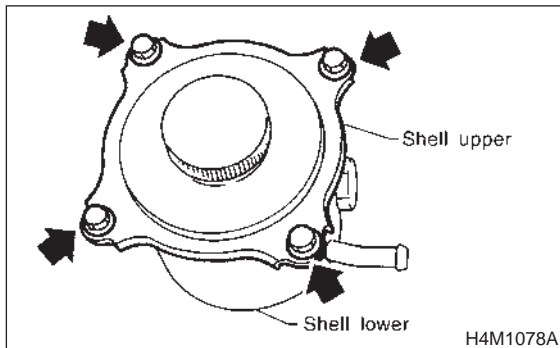


C: DISASSEMBLY

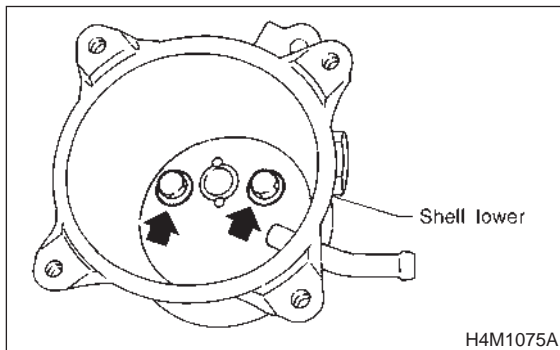
1) Place oil pump in a vise, and remove shell upper and baffle from shell lower.

CAUTION:

Do not clamp oil pump too hard; otherwise oil pump may be dented.

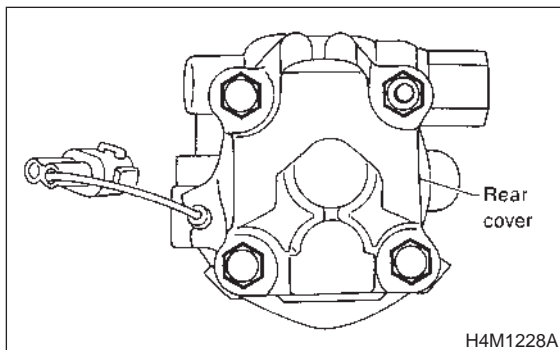


2) Remove shell lower from oil pump.

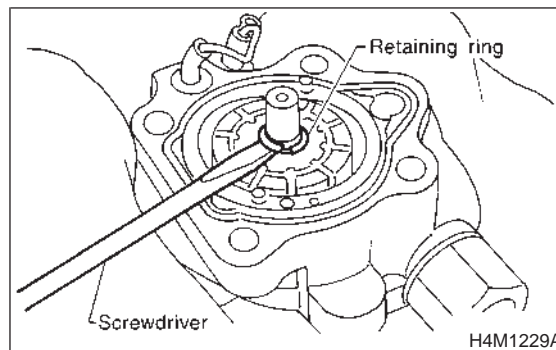


3) Remove stay from oil pump.

4) Remove four bolts which secure rear cover.



5) Using a screwdriver, pry retaining ring off.

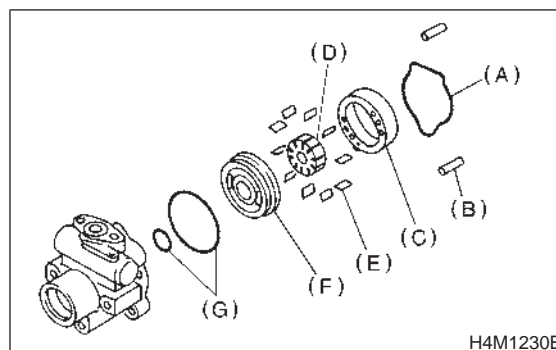


6) Extract shaft from front casing.

7) Remove the following parts from front casing.

CAUTION:

Discard old seal washer; replace with a new one.

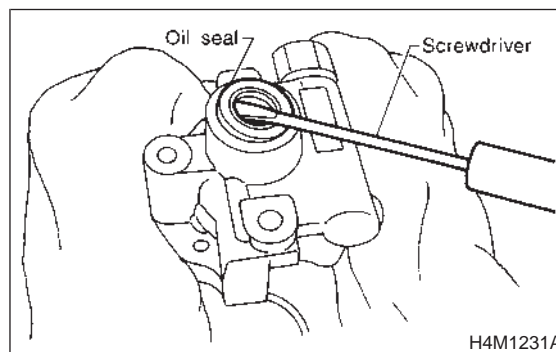


- (A) O-ring
- (B) Straight pin (2 ea.)
- (C) Cam ring
- (D) Rotor
- (E) Vane (10 ea.)
- (F) Pressure plate
- (G) O-ring (2 ea.)

8) Pry oil seal off using a screwdriver.

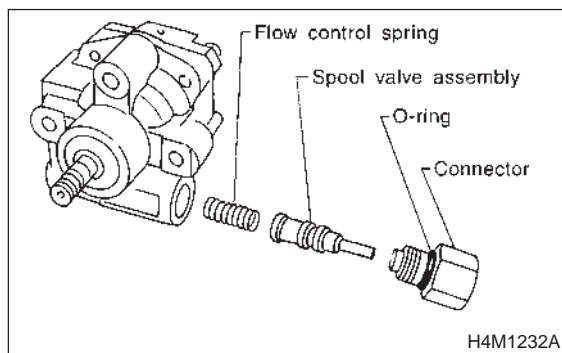
CAUTION:

Be careful not to scratch inner surface of casing.



9) Remove pressure switch.

10) Slightly loosen outlet connector, and remove connector.



D: INSPECTION

Perform the following inspection procedures and repair or replace defective parts.

Part name	Description	Remedy
1. Front casing	1) Damage on body surfaces 2) Excessive wear on hole, into which spool valve is inserted. 3) Wear and damage on cartridge assembly mounting surface 4) Wear and damage on surfaces in contact with shaft and oil seal	Replace with a new one together with spool valve as selective fit is made.
2. Rear cover	1) Damage on body surfaces 2) Wear and damage on sliding surfaces	Replace with a new one.
3. Shaft	1) Shaft bend 2) Wear and damage on surfaces in contact with bushing and oil seal 3) Wear and damage on rotor mounting surfaces 4) Bearing damage	Replace with a new one.
4. Side plate	Wear and damage on sliding surfaces	Replace with a new one.
5. Cam ring	Ridge wear on sliding surfaces	If damage is serious, replace with a new cartridge assembly.
6. Vane	Excessive wear on nose radius and side surfaces	
7. Rotor	1) Wear and damage on sliding surfaces 2) Ridge wear on vane sliding grooves (If light leaks with vane in slit against light source)	Correct with oil stone. If damage is serious, replace with a new cartridge assembly.
	3) Damage resulting from snap ring removal	
8. Spool valve	Damage or burrs on sliding surface periphery	Replace with a new one together with front casing as selective fit is made.
9. Connector	Damage on threads	Replace with a new one.
10. Spring	Damage	Replace with a new one.
11. Bolts and nuts	Damage on threads	Replace with a new one.

E: ASSEMBLY

1) Reassembly precautions

(1) Whenever O-rings, oil seals, and snap rings are removed, they must be replaced with new ones.

(2) Thoroughly wash parts and allow to dry. They must be kept free from cleaning oil and dust.

(3) Reassembly procedure must be performed in clean place. Ensure that parts are kept away from waste threads or other dust particles.

(4) Cleaning oil tends to stay inside the front casing. Remove it completely by blowing compressed air.

(5) Ensure that parts are free from rust. (Use specified hydraulic oil for rust prevention after cleaning and drying.)

(6) Reverse the sequence of disassembly procedures.

2) Apply grease to oil seal and inner surface of front casing (at bearing location).

CAUTION:

Make sure that the front body internal surfaces are free from damage.

3) Press-fit oil seal into front body.

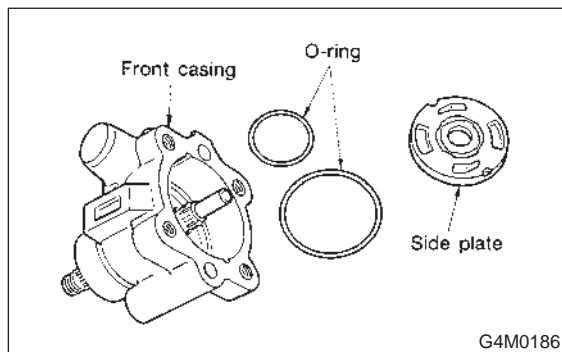
4) Press-fit shaft assembly into front body.

5) Apply specified hydraulic oil to O-rings and fit them into front casing.

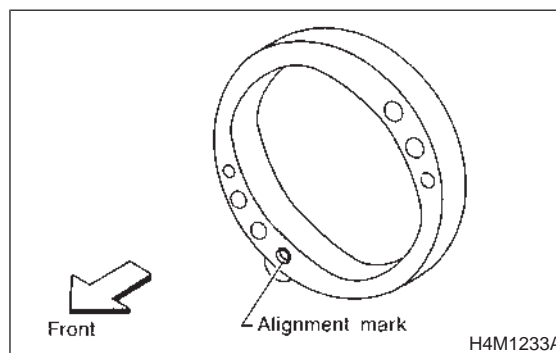
6) Install side plate to front casing.

CAUTION:

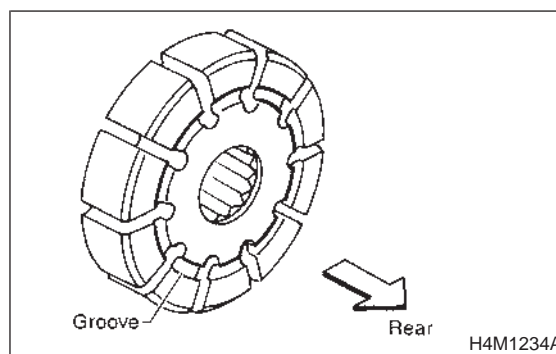
Use care not to let side plate gall.



7) Install cam ring to front casing with alignment mark facing forward.



8) Install rotor to front casing with groove facing rearward.



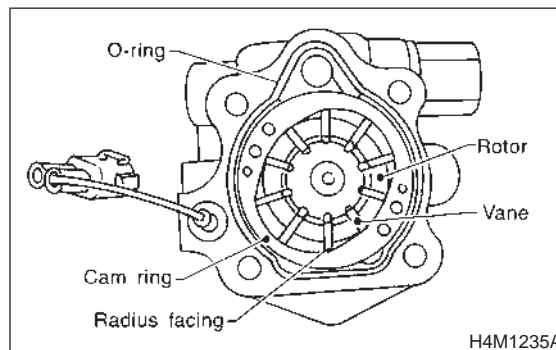
9) Install 10 vanes into rotor with their nose radius facing toward cam ring.

10) Install cam ring to front casing, securing with knock pins.

CAUTION:

Do not use hammer to fit knock pins in position.

11) Mount O-ring on front casing.



12) Using STs, press retaining ring into shaft groove.

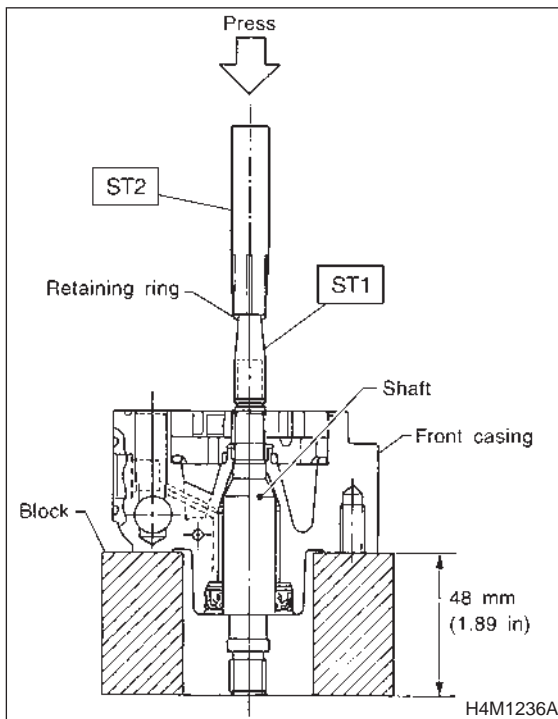
CAUTION:

Discard retaining ring and replace with a new one.

NOTE:

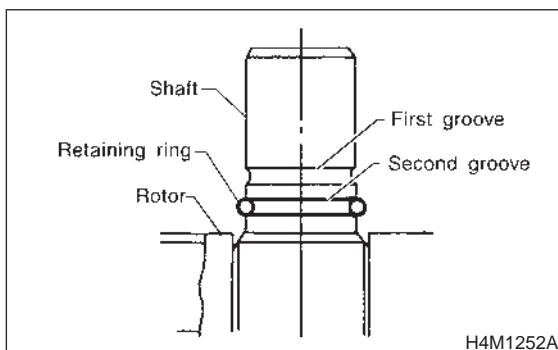
Use ST2, bending its top edge slightly toward the inside.

ST1 34099AC030 INSTALLER RETAINING RING CAP
ST2 34099AC040 INSTALLER RETAINING RING PIPE



CAUTION:

Make sure the retaining ring is fit in the second groove of the shaft.



13) Mount on pressure switch on front casing.

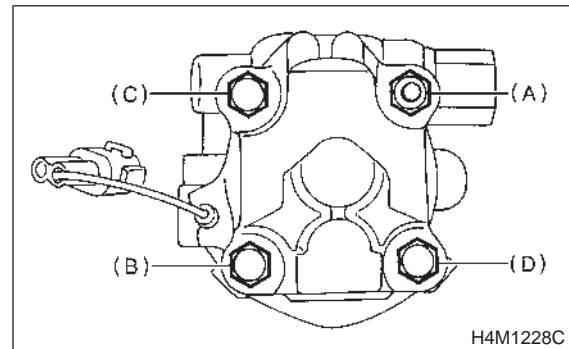
14) With knock pin positions aligned, install rear cover.

CAUTION:

Loosely tighten bolts in the sequence (A), (B), (C), and (D) shown in figure. Then, tighten in the same sequence.

Tightening torque:

$21 \pm 3.4 \text{ N}\cdot\text{m}$ ($2.14 \pm 0.35 \text{ kg}\cdot\text{m}$, $15.5 \pm 2.5 \text{ ft}\cdot\text{lb}$)



15) Install spring into front casing. Then, with spool valve dipped in specified hydraulic oil, install it into the front casing.

16) Using a 5-mm dia. round bar, ensure that valve moves smoothly.

17) Set O-ring, with grease applied to it, onto connector and secure connector to front casing.

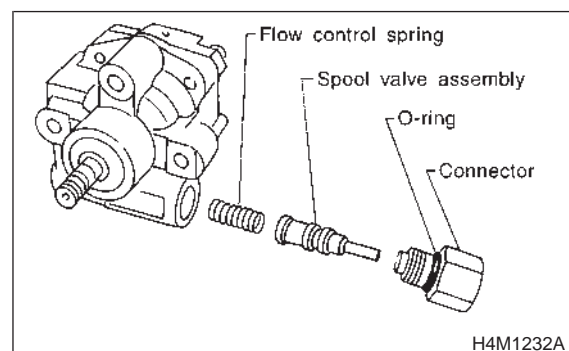
CAUTION:

• Use care to prevent damage to O-ring at installation.

• When tightening connector, ensure that O-ring does not protrude or get caught.

Tightening torque:

$49 \pm 5 \text{ N}\cdot\text{m}$ ($5.0 \pm 0.5 \text{ kg}\cdot\text{m}$, $36.2 \pm 3.6 \text{ ft}\cdot\text{lb}$)



18) When reassembly procedures have been completed, turn shaft by hand to ensure it turns smoothly. If it binds or other unusual conditions are evident, disassemble again and check for foreign matter trapped on sliding surfaces and improper installation. Eliminate the cause of trouble.

19) Check followings by referring to "CHECK" article.

- Excessive play in pulley shaft
- Ditch deflection of pulley
- Resistance to rotation of pulley
- Measurement of generated oil pressure

F: INSTALLATION

1) Install bracket on engine.

Tightening torque:

$22 \pm 2 \text{ N}\cdot\text{m}$ ($2.2 \pm 0.2 \text{ kg}\cdot\text{m}$, $15.9 \pm 1.4 \text{ ft}\cdot\text{lb}$)

2) Install oil pump on oil tank as follows outside the vehicle:

NOTE:

Prior to installation, make sure that all oil is removed from oil pump, oil tank and pipe.

(1) Place oil pump in a vise and install stay to oil pump.

CAUTION:

Do not place oil pump directly in vise; use soft pads and hold oil pump lightly to protect it.

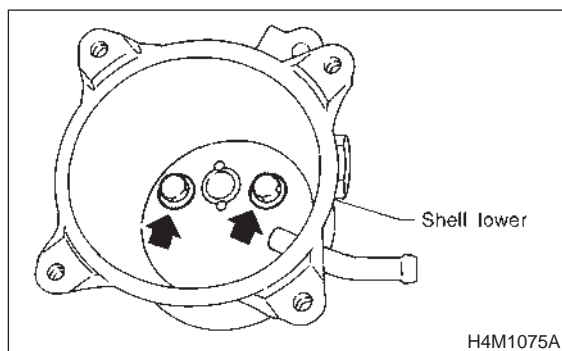
Tightening torque:

$25 \pm 2.5 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.25 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.8 \text{ ft}\cdot\text{lb}$)

(2) Install shell lower to oil pump.

Tightening torque:

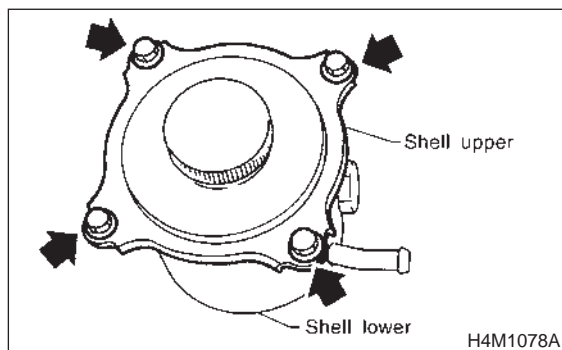
$18^{+5}_{-0} \text{ N}\cdot\text{m}$ ($1.8^{+0.5}_{-0} \text{ kg}\cdot\text{m}$, $13.0^{+3.6}_{-0} \text{ ft}\cdot\text{lb}$)



(3) Install shell upper and baffle to shell lower.

Tightening torque:

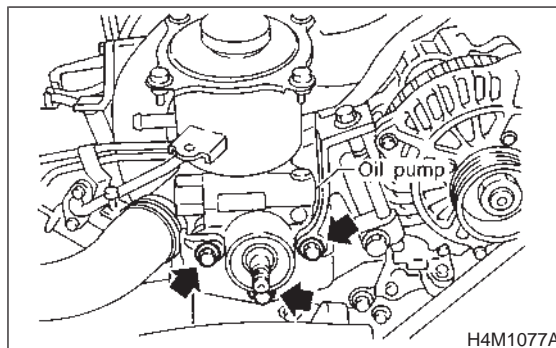
$13 \pm 3 \text{ N}\cdot\text{m}$ ($1.3 \pm 0.3 \text{ kg}\cdot\text{m}$, $9.4 \pm 2.2 \text{ ft}\cdot\text{lb}$)



3) Install oil pump, previously assembled to oil tank, on bracket.

Tightening torque:

$22 \pm 2 \text{ N}\cdot\text{m}$ ($2.2 \pm 0.2 \text{ kg}\cdot\text{m}$, $15.9 \pm 1.4 \text{ ft}\cdot\text{lb}$)



4) Place oil pump pulley and tighten pulley nut temporarily.

5) Interconnect pipes C and D.

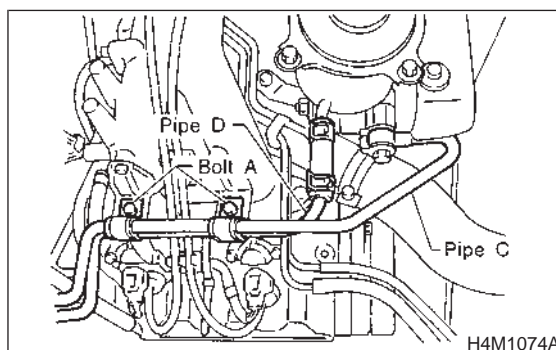
CAUTION:

If a hose is twisted at this step, the hose may come into contact with some other parts.

Tightening torque:

Joint nut

$15 \pm 5 \text{ N}\cdot\text{m}$ ($1.5 \pm 0.5 \text{ kg}\cdot\text{m}$, $10.8 \pm 3.6 \text{ ft}\cdot\text{lb}$)



6) Install pulley belt to oil pump.

7) Tighten oil pump pulley nut to the specified torque.

Tightening torque:

$52 \pm 10 \text{ N}\cdot\text{m}$ ($5.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $38 \pm 7 \text{ ft}\cdot\text{lb}$)

8) Check pulley belt tension. <Ref. to 1-5 [G2A0].>

9) Tighten bolt belt tension.

Tightening torque:

$8 \pm 2 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.2 \text{ kg}\cdot\text{m}$, $5.8 \pm 1.4 \text{ ft}\cdot\text{lb}$)

10) Install pulley belt cover bracket.

11) Connect minus terminal of battery.

12) Feed the specified power steering fluid and discharge air. <Ref. to 4-3 [W7A0].>

CAUTION:

Never start the engine before feeding the fluid; otherwise vane pump might be seized up.

7. Power Steering Fluid

A: RECOMMENDED POWER STEERING FLUID AND AIR BLEEDING

Recommended power steering fluid	Manufacturer
ATF DEXRON II, IIE or III	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TEXACO

- 1) Feed the specified fluid with its level being about 4 cm (1.6 in) lower than the mouth of tank.
- 2) Continue to turn steering wheel slowly from lock to lock until bubbles stop appearing in the tank while keeping the fluid at that level.
- 3) In case air is absorbed to deliver bubbles into piping because the fluid level is lower, leave it about half an hour and then do the step 2) all over again.
- 4) Start, and idle the engine.
- 5) Continue to turn steering wheel slowly from lock to lock again until bubbles stop appearing in the tank while keeping the fluid at that level. It is normal that bubbles stop appearing after three times turning of steering wheel.
- 6) In case bubbles do not stop appearing in the tank, leave it about half an hour and then do the step 5) all over again.
- 7) Stop the engine, and take out safety stands after jacking up vehicle again. Then lower the vehicle, and idle the engine.
- 8) Continue to turn steering wheel from lock to lock until bubbles stop appearing and change of the fluid level is within 3 mm (0.12 in).
- 9) In case the following happens, leave it about half an hour and then do step 8) again.
 - (1) The fluid level changes over 3 mm (0.12 in).
 - (2) Bubbles remain on the upper surface of the fluid.

- (3) Grinding noise is generated from oil pump.
- 10) Check the fluid leakage at flare nuts after turning steering wheel from lock to lock with engine running.

CAUTION:

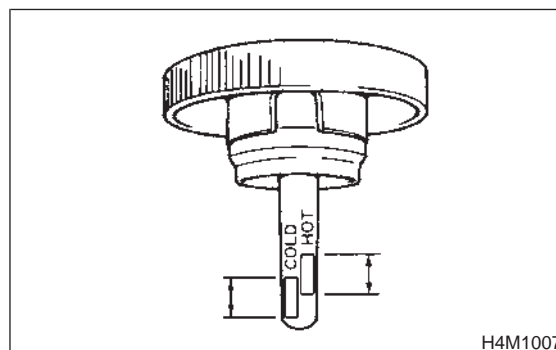
- Before checking, wipe off any fluid on flare nuts and piping.
- In case the fluid leaks from flare nut, it is caused by dust (or the like) and/or damage between flare and tapered seat in piping.
- So remove the flare nut, tighten again it to the specified torque after cleaning flare and tapered seat. If flare or tapered seat is damaged, replace it with a new one.

- 11) Inspect fluid level on flat and level surface with engine "OFF" by indicator of filler cap. If the level is at lower point or below, add fluid to keep the level in the specified range of the indicator. If at upper point or above, drain fluid by using a syringe or the like.

Fluid capacity:

0.7 ℓ (0.7 US qt, 0.6 Imp qt)

- (1) Check at temperature 21°C (70°F) on reservoir surface of oil pump, read the fluid level on the "COLD" side.
- (2) Check at temperature 60°C (140°F) on reservoir surface of oil pump, read the fluid level on the "HOT" side.



H4M1007

1. Power Steering

A: STEERING CONDITION

Trouble	Possible cause	Corrective action
<ul style="list-style-type: none"> ● Heavy steering effort in all ranges ● Heavy steering effort at stand still ● Steering wheel surges when turning. 	1. Pulley belt <ul style="list-style-type: none"> ● Unequal length of pulley belts ● Adhesion of oil and grease ● Loose or damage of pulley belt ● Poor uniformity of pulley belt cross section ● Pulley belt touches to pulley bottom ● Poor revolution of pulleys except oil pump pulley ● Poor revolution of oil pump pulley 	Adjust or replace.
	2. Tire and rim <ul style="list-style-type: none"> ● Improper tires out of specification ● Improper rims out of specification ● Tires not properly inflated*1 	Replace or reinflate.
	3. Fluid <ul style="list-style-type: none"> ● Low fluid level ● Aeration ● Dust mix ● Deterioration of fluid ● Poor warming-up of fluid *2 	Refill, bleed air, replace or instruct customer.
	4. Idling speed <ul style="list-style-type: none"> ● Lower idling speed ● Excessive drop of idling speed at start or at turning steering wheel *3 	Adjust or instruct customer.
	5. Measure hydraulic pressure. <Ref. to 4-3 [K1B0].>	Replace problem parts.
	6. Measure steering effort. <Ref. to 4-3 [K1C0].>	Adjust or replace.
<ul style="list-style-type: none"> ● Vehicle leads to one side or the other. ● Poor return of steering wheel to center ● Steering wheel surges when turning. 	1. Fluid line <ul style="list-style-type: none"> ● Folded hose ● Flattened pipe 	Reform or replace.
	2. Tire and rim <ul style="list-style-type: none"> ● Flat tire ● Mix use of different tires ● Mix use of different rims ● Abnormal wear of tire ● Unbalance of remained grooves ● Unbalance of tire pressure 	Fix or replace.
	3. Front alignment <ul style="list-style-type: none"> ● Improper or unbalance caster ● Improper or unbalance toe-in ● Loose connection of suspension 	Adjust or retighten.
	4. Others <ul style="list-style-type: none"> ● Damaged joint assembly ● Unbalanced height ● One-sided weight 	Replace, adjust or instruct customer.
	5. Measure steering effort. <Ref. to 4-3 [K1C0].>	Adjust or replace.

*1 If tires and/or rims are wider, the load to power steering system is the more. Accordingly, in a condition, for example before fluid warms-up, relief valve may work before maximum turning angle. In this case, steering effort may be heavy. When measured hydraulic pressure is normal, there is no abnormal thing.

*2 In cold weather, steering effort may be heavy due to increased flow resistance of cold fluid. After warming-up engine, turn steering wheel from stop to stop several times to warm-up fluid. Then if steering effort reduces normally, there is no abnormal thing.

*3 In cold weather or with insufficient warm-up of engine, steering effort may be heavy due to excessive drop of idling when turning steering wheel. In this case, it is recommended to start the vehicle with increasing engine speed than usual. Then if steering effort reduces normally, there is no abnormal thing.

B: MEASUREMENT OF HYDRAULIC PRESSURE

CAUTION:

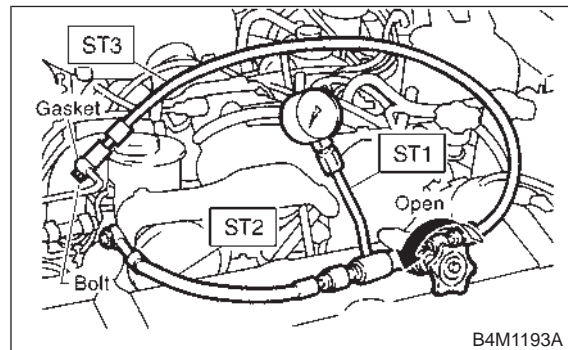
- Be sure to complete all items aforementioned in "STEERING CONDITION", prior to measuring hydraulic pressure. Otherwise, pressure can not be measured correctly. <Ref. to 4-3 [K1A0].>
- Do not leave the valve of pressure gauge closed or hold the steering wheel at stop end for 5 seconds or more in any case, as the oil pump may be damaged due to long keep of these conditions.
- Put cotton cloth waste at a place where fluid drops before pressure gauge is installed. Wipe off split fluid thoroughly after the measurement.

NOTE:

Keep engine idling during the measurement.

1B1 : MEASURE REGULAR PRESSURE.

- 1) Install STs to power steering pump.
 - (1) Drain the power steering fluid about 0.35 ℓ (0.4 US qt, 0.3 Imp qt) from oil tank.
 - (2) Remove two bolts securing power steering pipes to engine.
 - (3) Install ST1, 2 and 3 between power steering pump and pipes using gasket (Part No. 34621AC020) and bolt (Part No. 34620AC010).
- ST1 925711000 PRESSURE GAUGE
 ST2 34099AC020 ADAPTER HOSE B
 ST3 34099AC010 ADAPTER HOSE A



- (4) Replenish power steering fluid up to specified level.
- 2) Open valve, and start the engine.
- 3) Measure regular pressure.

CHECK : **Is pressure 981 kPa (10 kg/cm², 142 psi) or less?**

YES : Go to step 1B2.

NO : Trouble may be due to crushed pipe or hose, leakage from fluid line, foreign particles in fluid line, etc. Replace faulty parts with new ones.

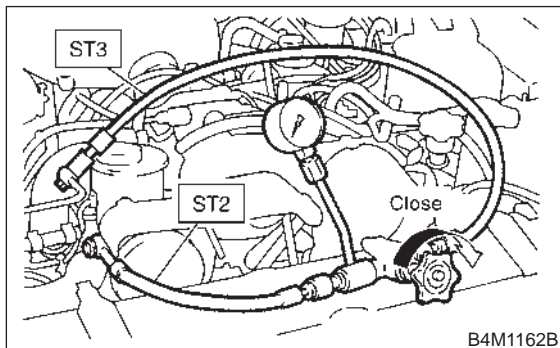
1B2 : MEASURE RELIEF PRESSURE.

1) Using STs, measure relief pressure.

ST1 925711000 PRESSURE GAUGE

ST2 34099AC020 ADAPTER HOSE B

ST3 34099AC010 ADAPTER HOSE A



2) Close valve.

CHECK : **Is pressure 7,159 — 7,748 kPa (73 — 79 kg/cm², 1,038 — 1,123 psi)?**

YES : Go to step 1B3.

NO : Trouble may be due to malfunctioning relief valve, fluid leaking into oil pump interior, abnormal wear of pump vanes, etc. Replace faulty parts with new ones.

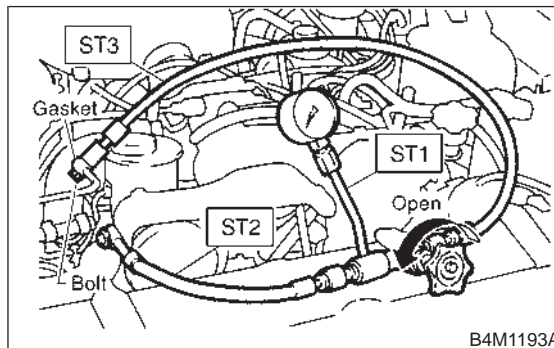
1B3 : MEASURE WORKING PRESSURE.

1) Using STs, measure working pressure.

ST1 925711000 PRESSURE GAUGE

ST2 34099AC020 ADAPTER HOSE B

ST3 34099AC010 ADAPTER HOSE A



2) Open valve.

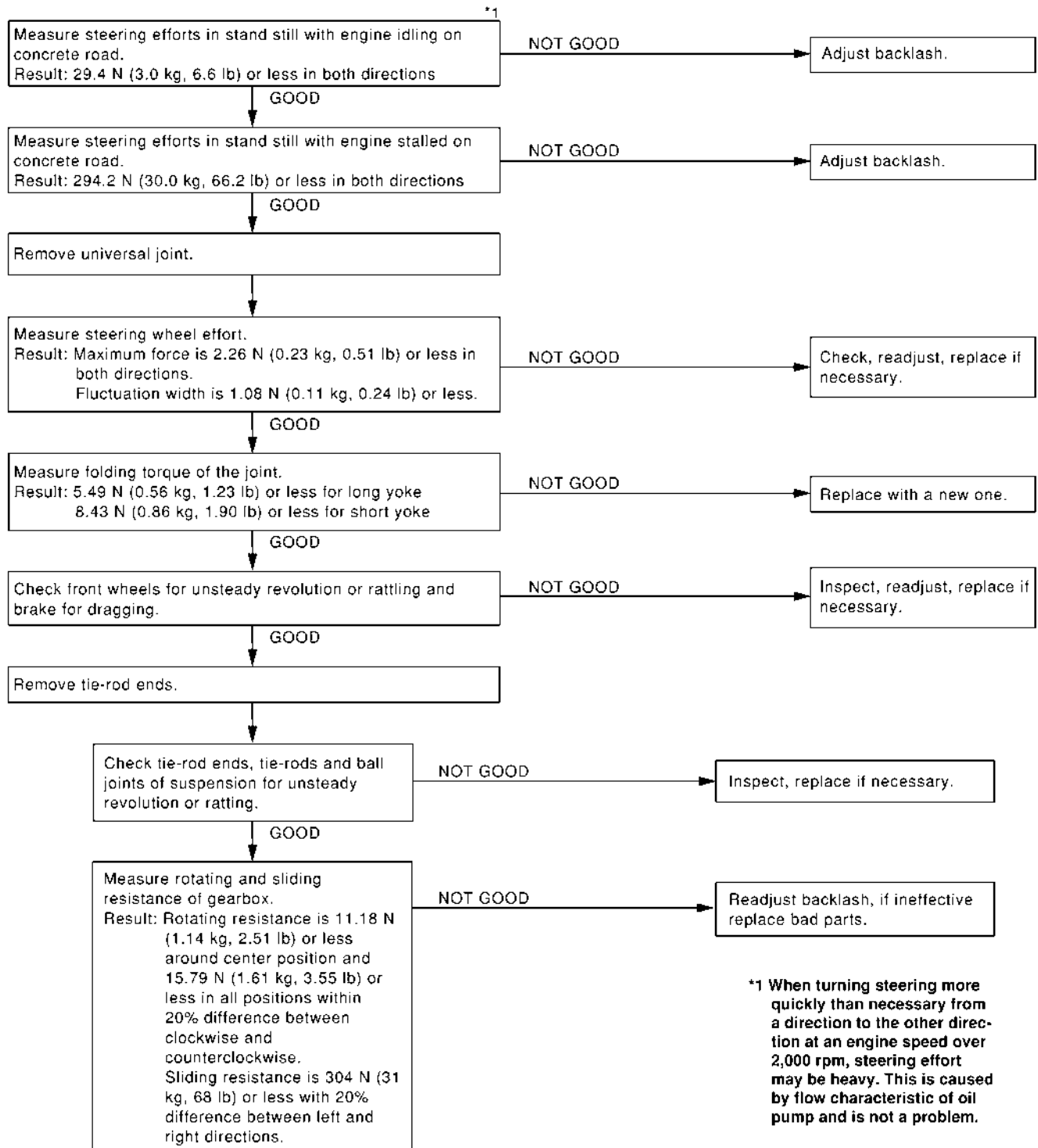
3) Measure working pressure of control valve by turning wheel from stop to stop.

CHECK : **Is pressure 7,159 — 7,748 kPa (73 — 79 kg/cm², 1,038 — 1,123 psi)?**

YES : Measure steering force. <Ref. to 4-3 [K1C0].>

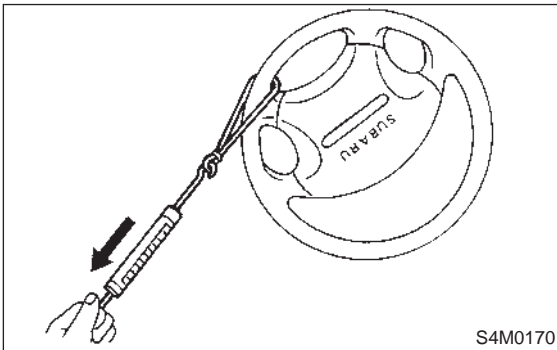
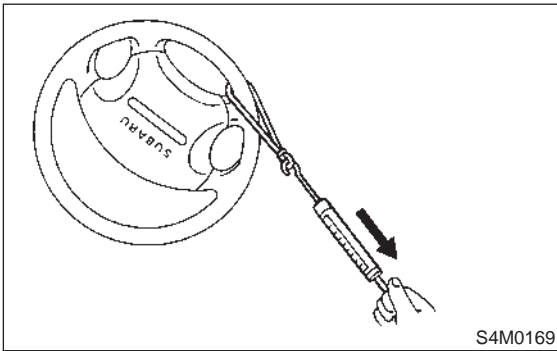
NO : Control valve is inoperative. Replace control valve itself or control valve and pinion as a single unit with new ones.

C: MEASUREMENT OF STEERING EFFORT

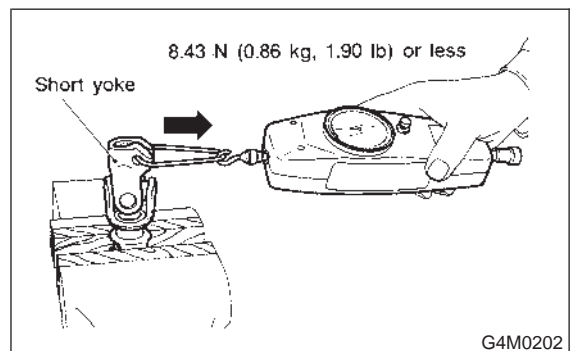
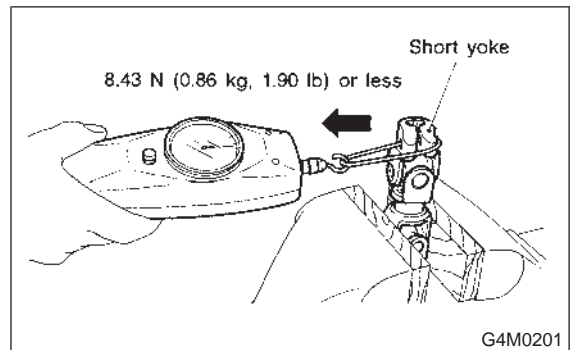
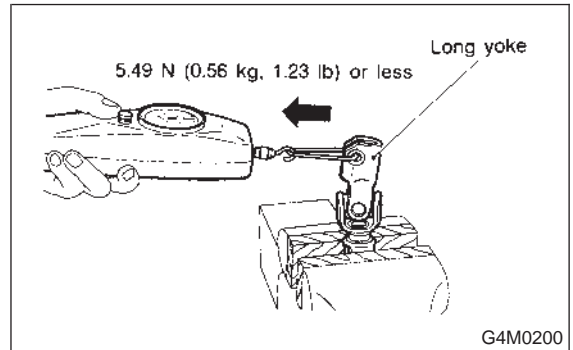
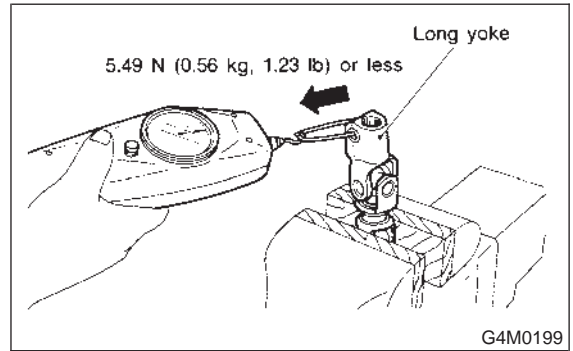


B4M1142A

1) Measurement of steering effort is as shown in the figures.



2) Measurement of folding torque of universal joint is as shown in the figures.



- 3) Using ST, measure resistances of gearbox.
ST 926230000 SPANNER

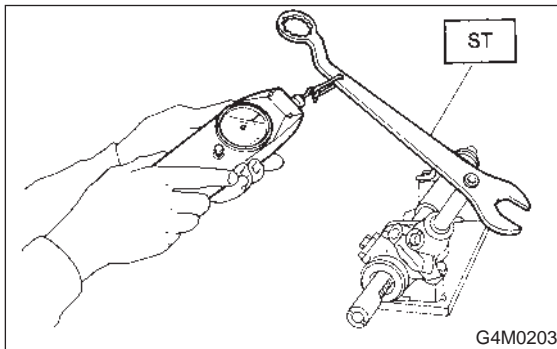
Rotating resistance:

Straight-ahead position within 30 mm (1.18 in) from rack center;

Less than 11.18 N (1.14 kg, 2.51 lb)

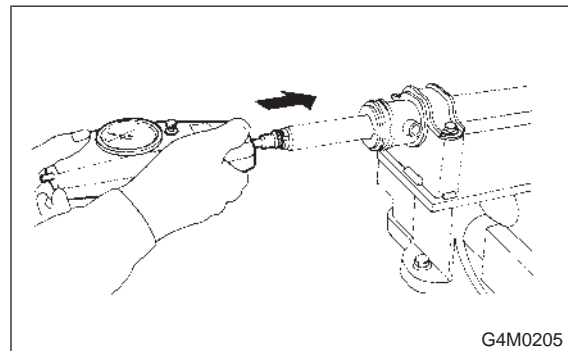
Maximum allowable torque;

12.7 N (1.3 kg, 2.9 lb)



Left-turn steering;

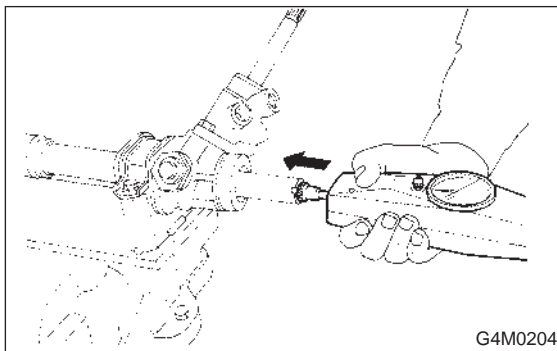
304 N (31 kg, 68 lb) or less



Sliding resistance:

Right-turn steering;

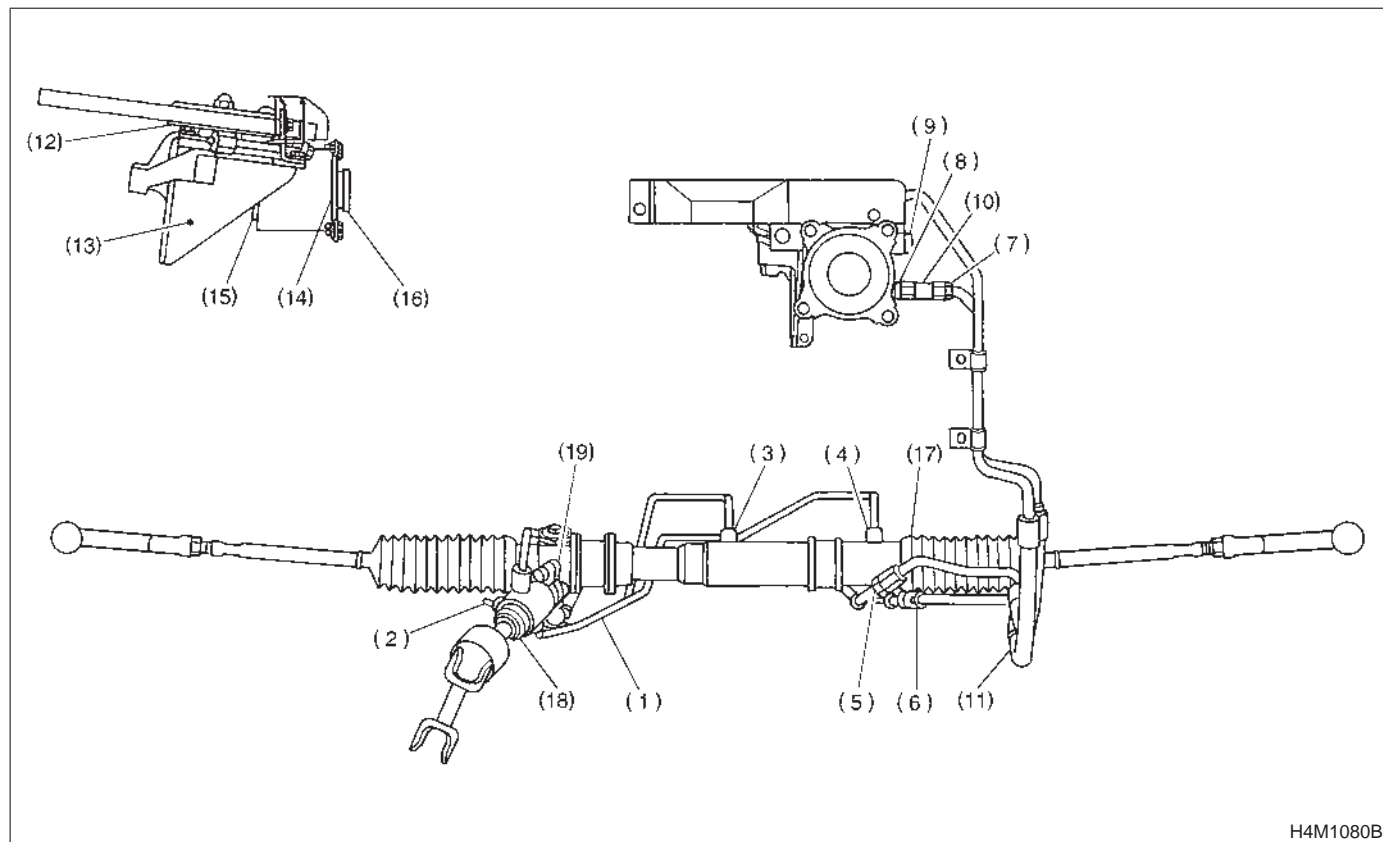
304 N (31 kg, 68 lb) or less



D: FLUID LEAKAGE

CAUTION:

It is likely that although one judges fluid leakage, there is actually no leakage. This is because the fluid spilt during the last maintenance was not completely wiped off. Be sure to wipe off spilt fluid thoroughly after maintenance.



Fluid leaking area	Possible cause	Corrective action
Leakage from connecting portions of pipes and hoses, numbered with (1) through (9) in figure	Insufficient tightening of flare nut, catching dirt or the like, damage to flare or flare nut	Loosen and retighten, if ineffective, replace.
	Poor insertion of hose, poor clamping	Retighten or replace clamp.
	Damaged O-ring	Replace O-ring pipe or hose with new one, if ineffective, replace gearbox also.
Leakage from hose (10) and (11) in figure	Crack or damage in hose	Replace with a new one.
	Crack or damage in hose hardware	Replace with a new one.
Leakage from surrounding of cast iron portion of oil pump (12) and (13) in figure	Damaged O-ring	Replace O-ring.
	Damaged gasket	Replace gasket.
Leakage from oil tank (14) and (15) in figure	Crack in oil tank, (14)	Replace oil tank.
	Damaged O-ring, (15)	Replace O-ring.
Leakage from filler neck (16)	Damaged cap packing	Replace cap.
	Crack in root of filler neck	Replace oil tank.
	High fluid level *1	Adjust fluid level.
Leakage from surrounding of power cylinder of gearbox (17) in figure	Damaged oil seal	Replace oil seal.
Leakage from control valve of gearbox (18) and (19) in figure	Damaged packing or oil seal	Replace problem parts.
	Damage in control valve	Replace control valve.

Fluid level is specified at optimum position (range) for ordinary use. Accordingly, if the vehicle is used often under hard conditions such as on very rough roads or in mountainous areas, fluid may bleed out from cap air vent hole. This is not a problem. If a customer complains strongly and is not likely to be satisfied with the leakage, lower the fluid level to the extent that fluid will not bleed out under the conditions described, and have the customer check the fluid level and its quality more frequency than usual.

E: NOISE AND VIBRATION

CAUTION:

Don't keep the relief valve operated over 5 seconds at any time or inner parts of the oil pump may be damaged due to rapid increase of fluid temperature.

NOTE:

- Grinding noise may be heard immediately after the engine start in extremely cold condition. In this case, if the noise goes off during warm-up there is no abnormal function in the system. This is due to the fluid characteristic in extremely cold condition.
- Oil pump makes whine or growl noise slightly due to its mechanism. Even if the noise can be heard when steering wheel is turned at stand still there is no abnormal function in the system provided that the noise eliminates when the vehicle is running.
- When stopping with service brake and/or parking brake applied, power steering can be operated easily due to its light steering effort. If doing so, the

disk rotates slightly and makes creaking noise. The noise is generated by creaking between the disk and pads. If the noise goes off when the brake is released, there is no abnormal function in the system.

- There may be a little vibration around the steering devices when turning steering wheel at standstill, even though the component parts are properly adjusted and have no defects.

Hydraulic systems are likely to generate this kind of vibration as well as working noise and fluid noise because of combined conditions, i.e., road surface and tire surface, engine speed and turning speed of steering wheel, fluid temperature and braking condition.

This phenomena does not indicate there is some abnormal function in the system.

The vibration can be known when steering wheel is turned repeatedly at various speeds from slow to rapid step by step with parking brake applied on concrete road and in "D" range for automatic transmission vehicle.

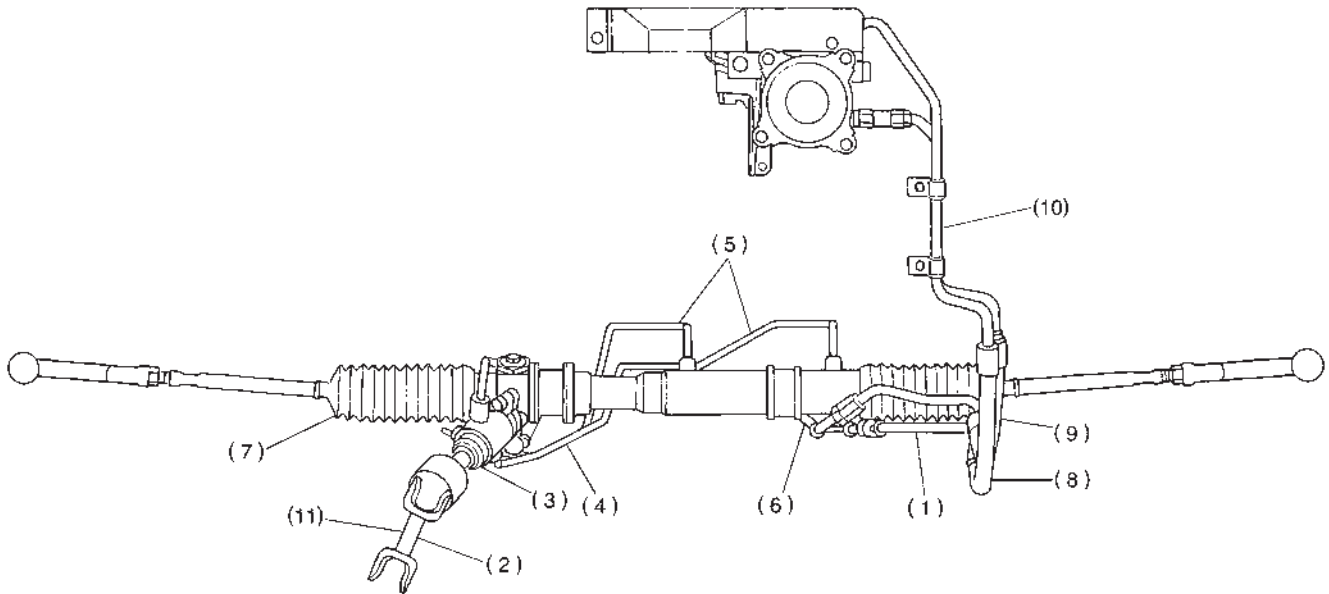
Trouble	Possible cause	Corrective action
Hiss noise (continuous) While engine is running.	Relief valve emits operating sound when steering wheel is completely turned in either direction. (Don't keep this condition over 5 seconds.)	Normal
	Relief valve emits operating sound when steering wheel is not turned. This means that the relief valve is faulty.	Defective Replace oil pump.
Rattling noise (intermittent) While engine is running.	Interference with adjacent parts	Check clearance. Correct if necessary. <Ref. to 4-3 [K1F0].>
	Loosened installation of oil pump, oil tank, pump bracket, gearbox or crossmember	Retighten.
	Loosened installation of oil pump pulley or other pulley(s)	Retighten.
	Loosened linkage or play of steering or suspension Loosened tightening of joint or steering column	Retighten or replace.
	Sound generates from the inside of gearbox or oil pump.	Replace the gearbox or oil pump.
Knocking When turning steering wheel in both direction with small angle repeatedly at engine ON or OFF.	Excessive backlash Loosened lock nut for adjusting backlash	Adjust and retighten.
	Loosened tightening or play of tie-rod, tie-rod end	Retighten or replace.
Grinding noise (continuous) While engine is running.	Vane pump aeration	Inspect and retighten fluid line connection. Refill fluid and vent air.
	Vane pump seizing	Replace oil pump.
	Pulley bearing seizing of oil pump	Replace oil pump.
	Folded hose, flat pipe	Replace.
Squeal, squeak (intermittent or continuous) While engine is running.	Maladjustment of pulley belt Damaged or charged pulley belt Unequal length of pulley belts	Adjust or replace. (Replace two belts as a set.)
	Run out or soilage of V-groove surface of oil pump pulley	Clean or replace.
Sizzling noise (continuous) While engine is running.	Fluid aeration	Fix wrong part causing aeration. Replace fluid and vent air.
	Damaged pipe of gearbox	Replace pipe.
	Abnormal inside of hose or pipe Flat hose or pipe	Rectify or replace.
	Abnormal inside of oil tank	Replace.
	Removed oil tank cap	Install cap.
Whistle (continuous) While engine is running.	Abnormal pipe of gearbox or abnormal inside of hose	Replace bad parts of gearbox or hose.
Whine or growl (continuous or intermittent) While engine is running with/without steering turned.	Loosened installation of oil pump, oil pump bracket	Retighten.
	Abnormal inside of oil pump, hose	Replace oil pump, hose, if the noise can be heard when running as well as stand still.
	Torque converter growl, air conditioner compression growl	Remove power steering pulley belt and confirm.
Creaking noise (intermittent) While engine is running with steering turned.	Abnormal inside of gearbox	Replace bad parts of gearbox.
	Abnormal bearing for steering shaft	Apply grease or replace.
	Generates when turning steering wheel with brake (service or parking) applied.	If the noise goes off when brake is released, it is normal.
Vibration While engine is running with/without steering turned.	Too low engine speed at start	Adjust and instruct customers.
	Vane pump aeration	Fix wrong part. Vent air.
	Damaged valve in oil pump, gearbox	Replace oil pump, bad parts of gearbox.
	Looseness of play of steering, suspension parts	Retighten.

F: CLEARANCE TABLE

CAUTION:

This table lists various clearances that must be correctly adjusted to ensure normal vehicle driving without interfering noise, or any other faults.

Location	Minimum allowance	mm (in)
(1) Crossmember — Pipe	5 (0.20)	
(2) DOJ — Shaft or joint	14 (0.55)	
(3) DOJ — Valve housing	11 (0.43)	
(4) Pipe — Pipe	2 (0.08)	
(5) Stabilizer — Pipe	5 (0.20)	
(6) Exhaust pipe — Pipe	15 (0.59)	
(7) Exhaust pipe — Gearbox bolt	15 (0.59)	
(8) Side frame — Hose A and B	15 (0.59)	
(9) Cruise control pump — Hose A and B	15 (0.59)	
(10) Pipe portion of hose A — Pipe portion of hose B	1.5 (0.059)	
(11) AT cooling hose — Joint	20 (0.79)	



H4M1081B

G: BREAKAGE OF HOSES**CAUTION:**

Although surface layer materials of rubber hoses have excellent weathering resistance, heat resistance and resistance for low temperature brittleness, they are likely to be damaged chemically by brake fluid, battery electrolyte, engine oil and automatic transmission fluid and their service lives are to be very shortened. It is very important to keep the hoses free from before mentioned fluids and to wipe out immediately when the hoses are adhered with the fluids.

Since resistances for heat or low temperature brittleness are gradually declining according to time accumulation of hot or cold conditions for

the hoses and their service lives are shortening accordingly, it is necessary to perform careful inspection frequently when the vehicle is used in hot weather areas, cold weather area and/or a driving condition in which many steering operations are required in short time.

Particularly continuous work of relief valve over 5 seconds causes to reduce service lives of the hoses, the oil pump, the fluid, etc. due to over heat.

So, avoid to keep this kind of condition when servicing as well as driving.

Trouble	Possible cause	Corrective action
Pressure hose burst	Excessive holding time of relief status	Instruct customers.
	Malfunction of relief valve	Replace oil pump.
	Poor cold characteristic of fluid	Replace fluid.
Forced out return hose	Poor connection	Correct.
	Poor holding of clip	Retighten.
	Poor cold characteristic of fluid	Replace fluid.
Fluid bleeding out of hose slightly	Wrong layout, tensioned	Replace hose.
	Excessive play of engine due to deterioration of engine mounting rubber	Replace defective parts.
	Improper stop position of pitching stopper	Replace defective parts.
Crack on hose	Excessive holding time of relief status	Replace. Instruct customer.
	Excessive tightening torque for return hose clip	Replace.
	Power steering fluid, brake fluid, engine oil, electrolyte adhere on the hose surface	Replace. Pay attention on service work.
	Too many times use in extremely cold weather	Replace. Instruct customers.

BRAKES 4-4

	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Brakes	2
C COMPONENT PARTS	5
1. Front Disc Brake	5
2. Rear Disc Brake	7
3. Rear Drum Brake	8
4. Master Cylinder	9
5. Brake Booster	11
6. ABS System	12
7. Parking Brake	14
W SERVICE PROCEDURE	15
1. Front Disc Brake	15
2. Rear Disc Brake	22
3. Rear Drum Brake	27
4. Parking Brake (Rear Disc Brake).....	32
5. Master Cylinder	34
6. Brake Booster.....	36
7. Brake Hose.....	39
8. Parking Brake Lever.....	40
9. Parking Brake Cable	41
10. Air Bleeding	42
11. Brake Fluid	44
12. Proportioning Valve	45
13. ABS Sensor.....	46
14. ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).....	50
15. G Sensor	55
16. Brake Pipe AIRBAG	57
K DIAGNOSTICS	58
1. Entire Brake System	58

1. Brakes

A: SPECIFICATIONS

1. 2200 cc MODEL

	Engine (cc)	2200	
	Driving system	AWD	
		Without ABS	With ABS
Front brake	Type	Disc (Floating type, ventilated)	
	Effective disc diameter	mm (in)	210 (8.27)
	Disc thickness × outer diameter	mm (in)	24 × 260 (0.94 × 10.24)
	Effective cylinder diameter	mm (in)	57.15 (2.2500)
	Pad dimensions (length × width × thickness)	mm (in)	112.4 × 44.3 × 11.0 (4.43 × 1.744 × 0.433)
	Clearance adjustment	Automatic adjustment	
Rear brake	Type	Drum (Leading-trailing type)	
	Effective drum diameter	mm (in)	228.6 (9)
	Effective cylinder diameter	mm (in)	19.05 (0.7500)
	Lining dimensions (length × width × thickness)	mm (in)	218.8 × 35.0 × 4.1 (8.61 × 1.378 × 0.161)
	Clearance adjustment	Automatic adjustment	
Parking brake	Type	Mechanical on rear brake drums	
	Effective drum diameter	mm (in)	228.6 (9)
	Lining dimensions (length × width × thickness)	mm (in)	218.8 × 35.0 × 4.1 (8.61 × 1.378 × 0.161)
	Clearance adjustment	Automatic adjustment	
Master cylinder	Type	Tandem	
	Effective diameter	mm (in)	23.81 (0.9374) 25.40 (1)
	Reservoir type	Sealed type	
	Brake fluid reservoir capacity	cm ³ (cu in)	205 (12.51)
Brake booster	Type	Vacuum suspended	
	Effective diameter	mm (in)	230 (9.06) 180 + 205 (7.09 + 8.07)
Proportioning valve	Split point	kPa (kg/cm ² , psi)	2,942 (30.0, 427)
	Reducing ratio	0.4	
Brake line		Dual circuit system	
ABS		—	STD

2. 2500 cc MODEL

	Engine (cc)	2500
	Driving system	AWD
		With ABS
Front brake	Type	Disc (Floating type, ventilated)
	Effective disc diameter mm (in)	228 (8.98)
	Disc thickness × Outer diameter mm (in)	24 × 277 (0.94 × 10.91)
	Effective cylinder diameter mm (in)	42.8 (1.685) × 2
	Pad dimensions (length × width × thickness) mm (in)	112.3 × 50.0 × 11.0 (4.42 × 1.969 × 0.433)
	Clearance adjustment	Automatic adjustment
Rear brake	Type	Disc (Floating type)
	Effective disc diameter mm (in)	230 (9.06)
	Disc thickness × Outer diameter mm (in)	10 × 266 (0.39 × 10.47)
	Effective cylinder diameter mm (in)	38.1 (1.500)
	Pad dimensions (length × width × thickness) mm (in)	92.4 × 33.7 × 10.0 (3.638 × 1.327 × 0.394)
	Clearance adjustment	Automatic adjustment
Parking brake	Type	Mechanical on rear brakes, drum in disc
	Effective drum diameter mm (in)	170 (6.69)
	Lining dimensions (length × width × thickness) mm (in)	162.6 × 30.0 × 3.2 (6.40 × 1.181 × 0.126)
	Clearance adjustment	Manual adjustment
Master cylinder	Type	Tandem
	Effective diameter mm (in)	25.40 (1)
	Reservoir type	Sealed type
	Brake fluid reservoir capacity cm ³ (cu in)	205 (12.51)
Brake booster	Type	Vacuum suspended
	Effective diameter mm (in)	180 + 205 (7.09 + 8.07)
Proportioning valve	Split point kPa (kg/cm ² , psi)	2,942 (30.0, 427)
	Reducing ratio	0.4
Brake line		Dual circuit system
ABS		STD

B: SERVICE DATA

ITEM		STANDARD	SERVICE LIMIT
Front brake	Pad thickness (including back metal)	17 mm (0.67 in)	7.5 mm (0.295 in)
	Disc thickness	24 mm (0.94 in)	22 mm (0.87 in)
	Disc runout	—	0.075 mm (0.0030 in)
Rear brake (Disc type)	Pad thickness (including back metal)	15 mm (0.59 in)	6.5 mm (0.256 in)
	Disc thickness	10 mm (0.39 in)	8.5 mm (0.335 in)
	Disc runout	—	0.10 mm (0.0039 in)
Rear brake (Drum type)	Inside diameter	228.6 mm (9 in)	230.6 mm (9.08 in)
	Lining thickness	4.1 mm (0.161 in)	1.5 mm (0.059 in)
Rear brake (Disc type parking)	Inside diameter	170 mm (6.69 in)	171 mm (6.73 in)
	Lining thickness	3.2 mm (0.126 in)	1.5 mm (0.059 in)
Parking brake	Lever stroke	7 to 8 notches/196 N (20 kg, 44 lb)	

			Without ABS	With ABS
Brake booster	Brake fluid pressure without engine running	Brake pedal force	Fluid pressure	
		147 N (15 kg, 33 lb)	785 kPa (8 kg/cm ² , 114 psi)	588 kPa (6 kg/cm ² , 85 psi)
	Brake fluid pressure with engine running and vacuum at 66.7 kPa (500 mmHg, 19.69 inHg)	294 N (30 kg, 66 lb)	2,158 kPa (22 kg/cm ² , 313 psi)	1,863 kPa (19 kg/cm ² , 270 psi)
		147 N (15 kg, 33 lb)	5,492 kPa (56 kg/cm ² , 796 psi)	5,394 kPa (55 kg/cm ² , 782 psi)
		294 N (30 kg, 66 lb)	8,434 kPa (86 kg/cm ² , 1,223 psi)	9,219 kPa (94 kg/cm ² , 1,337 psi)

C: RECOMMENDED BRAKE FLUID

FMVSS No. 116, fresh DOT3 or 4 brake fluid

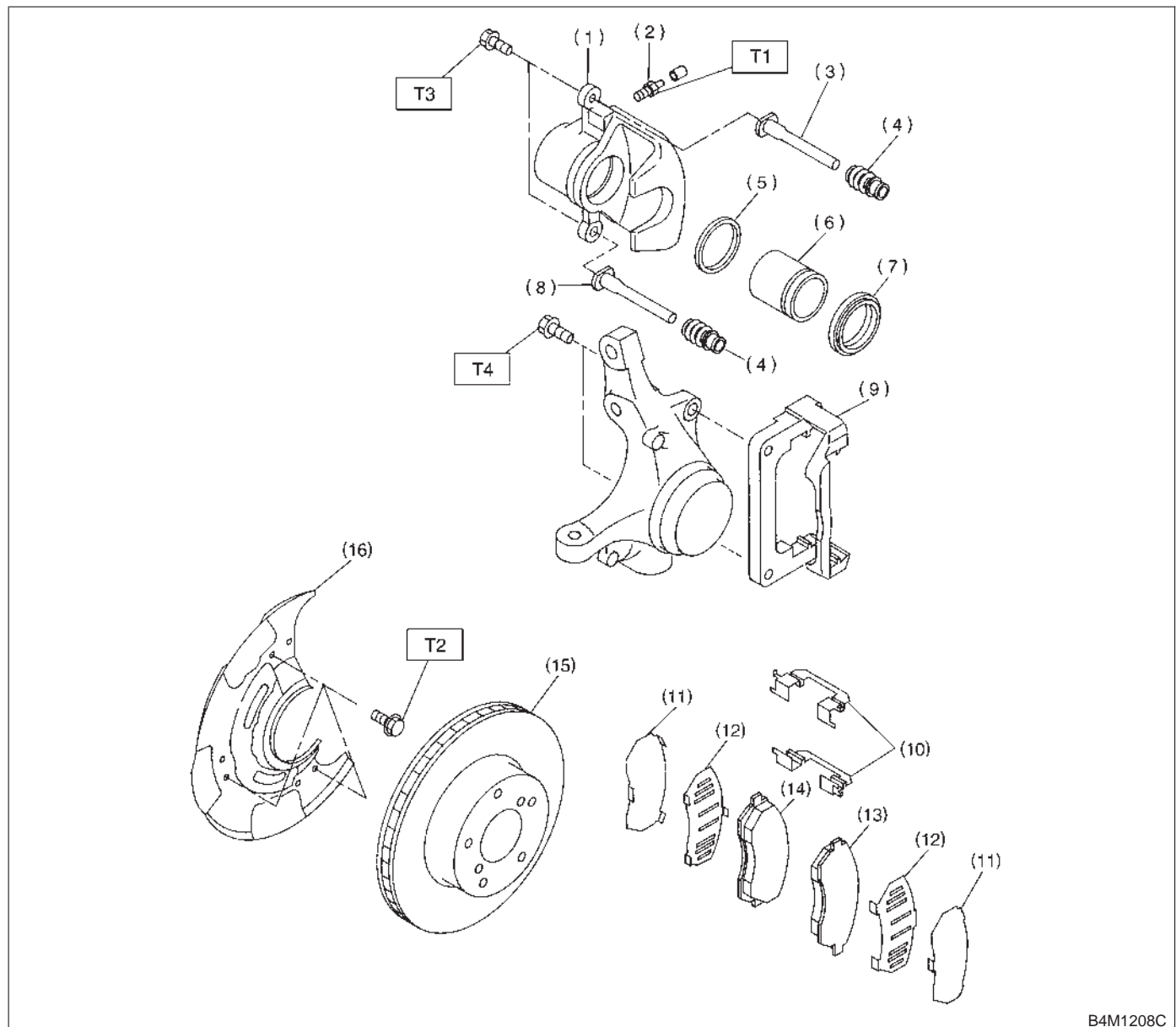
CAUTION:

- Avoid mixing brake fluid of different brands to prevent the fluid performance from degrading.
- When brake fluid is supplemented, be careful not to allow any dust into the reservoir.
- Use fresh DOT3 or 4 brake fluid when replacing or refilling the fluid.

D: BRAKE FLUID LEVEL INDICATOR*Reserve tank with level indicator:**Residual fluid quantity at light ON**Approx. 80 cm³ (80 cc, 4.88 cu in)**Tank capacity**205 cm³ (205 cc, 12.51 cu in)*

1. Front Disc Brake

A: EXCEPT 2500 cc MODEL



B4M1208C

- | | |
|-----------------------|--------------------|
| (1) Caliper body | (9) Support |
| (2) Air bleeder screw | (10) Pad clip |
| (3) Guide pin (Green) | (11) Outer shim |
| (4) Pin boot | (12) Inner shim |
| (5) Piston seal | (13) Pad (Outside) |
| (6) Piston | (14) Pad (Inside) |
| (7) Piston boot | (15) Disc rotor |
| (8) Lock pin (Yellow) | (16) Disc cover |

Tightening torque: N·m (kg-m, ft-lb)

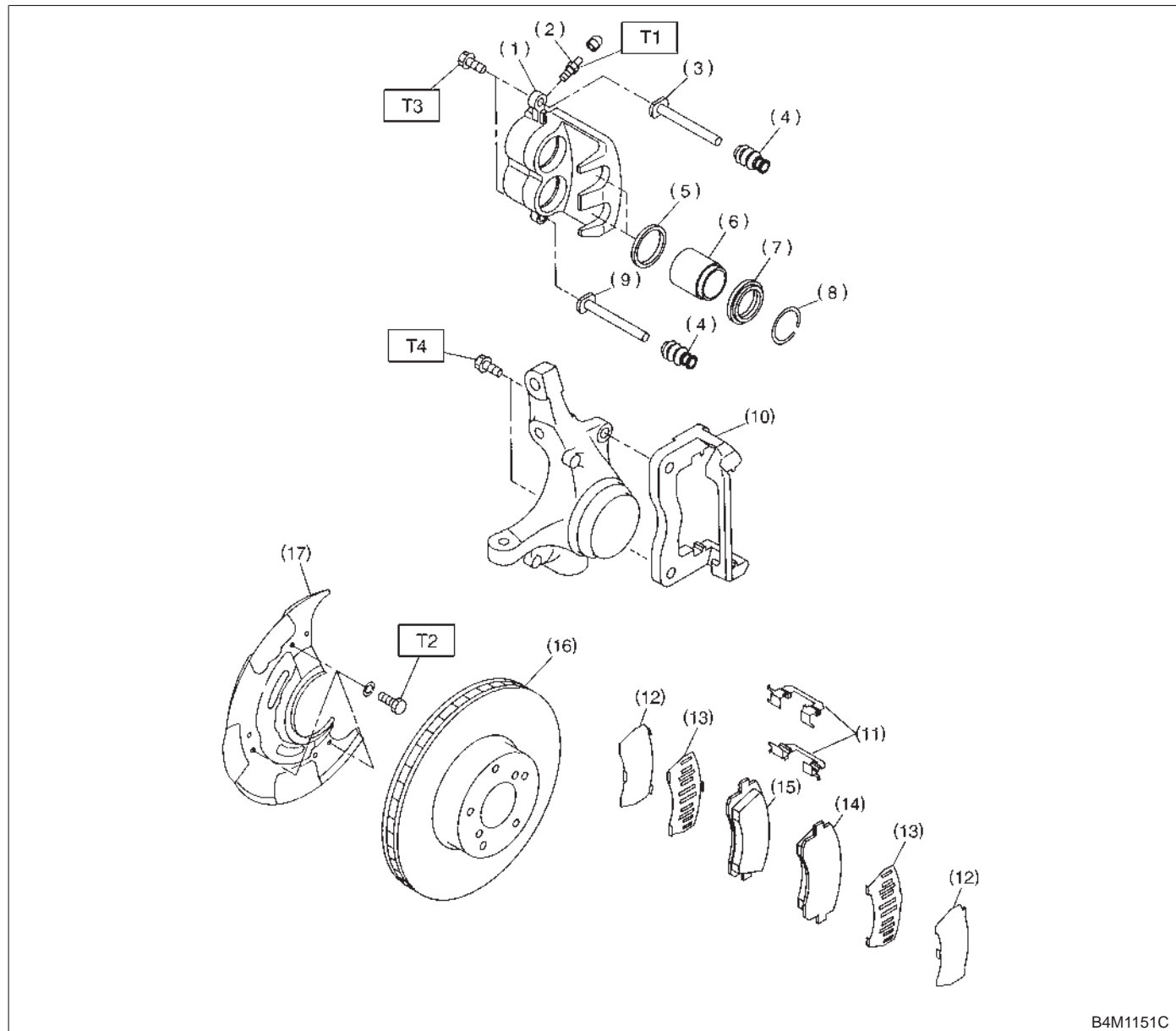
T1: 8±1 (0.8±0.1, 5.8±0.7)

T2: 18±5 (1.8±0.5, 13.0±3.6)

T3: 37±5 (3.8±0.5, 27.5±3.6)

T4: 78±10 (8.0±1.0, 58±7)

B: 2500 cc MODEL



B4M1151C

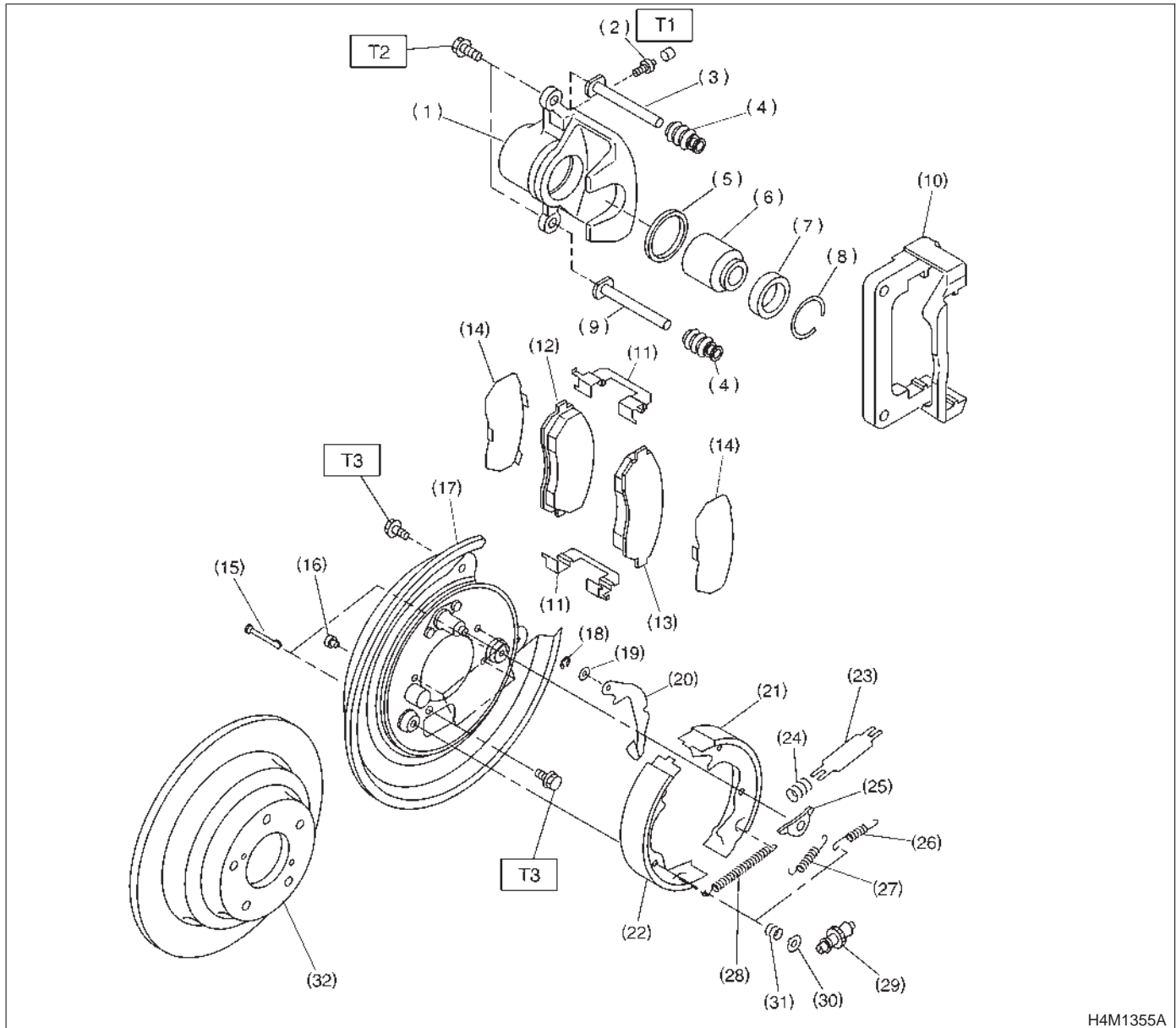
- (1) Caliper body
- (2) Air bleeder screw
- (3) Guide pin (Green)
- (4) Pin boot
- (5) Piston seal
- (6) Piston
- (7) Piston boot
- (8) Boot ring

- (9) Lock pin (Yellow)
- (10) Support
- (11) Pad clip
- (12) Outer shim
- (13) Inner shim
- (14) Pad (Outside)
- (15) Pad (Inside)
- (16) Disc rotor

- (17) Disc cover

Tightening torque: N-m (kg-m, ft-lb)
T1: 8±1 (0.8±0.1, 5.8±0.7)
T2: 18±5 (1.8±0.5, 13.0±3.6)
T3: 37±5 (3.8±0.5, 27.5±3.6)
T4: 78±10 (8.0±1.0, 58±7)

2. Rear Disc Brake



H4M1355A

- | | | |
|-----------------------|-------------------------------------|---------------------------------|
| (1) Caliper body | (14) Shim | (27) Primary shoe return spring |
| (2) Air bleeder screw | (15) Shoe hold-down pin | (28) Adjusting spring |
| (3) Guide pin (Green) | (16) Cover | (29) Adjuster |
| (4) Pin boot | (17) Back plate | (30) Shoe hold-down cup |
| (5) Piston seal | (18) Retainer | (31) Shoe hold-down spring |
| (6) Piston | (19) Spring washer | (32) Disc rotor |
| (7) Piston boot | (20) Parking brake lever | |
| (8) Boot ring | (21) Parking brake shoe (Secondary) | |
| (9) Lock pin (Yellow) | (22) Parking brake shoe (Primary) | |
| (10) Support | (23) Strut | |
| (11) Pad clip | (24) Strut shoe spring | |
| (12) Inner pad | (25) Shoe guide plate | |
| (13) Outer pad | (26) Secondary shoe return spring | |

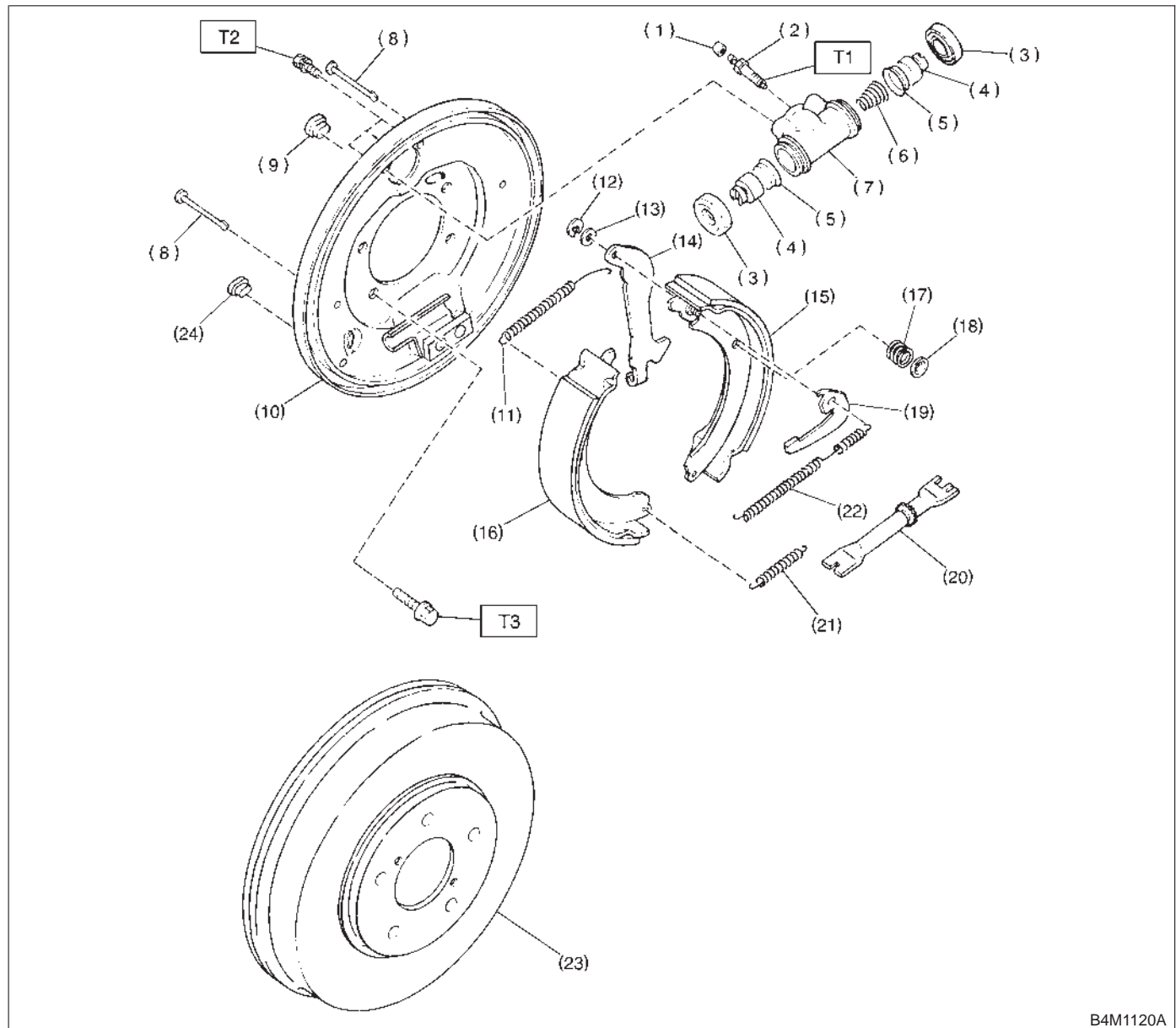
Tightening torque: N·m (kg·m, ft·lb)

T1: 8 ± 1 (0.8 ± 0.1 , 5.8 ± 0.7)

T2: 39 ± 5 (4.0 ± 0.5 , 28.9 ± 3.6)

T3: 52 ± 6 (5.3 ± 0.6 , 38.3 ± 4.3)

3. Rear Drum Brake



B4M1120A

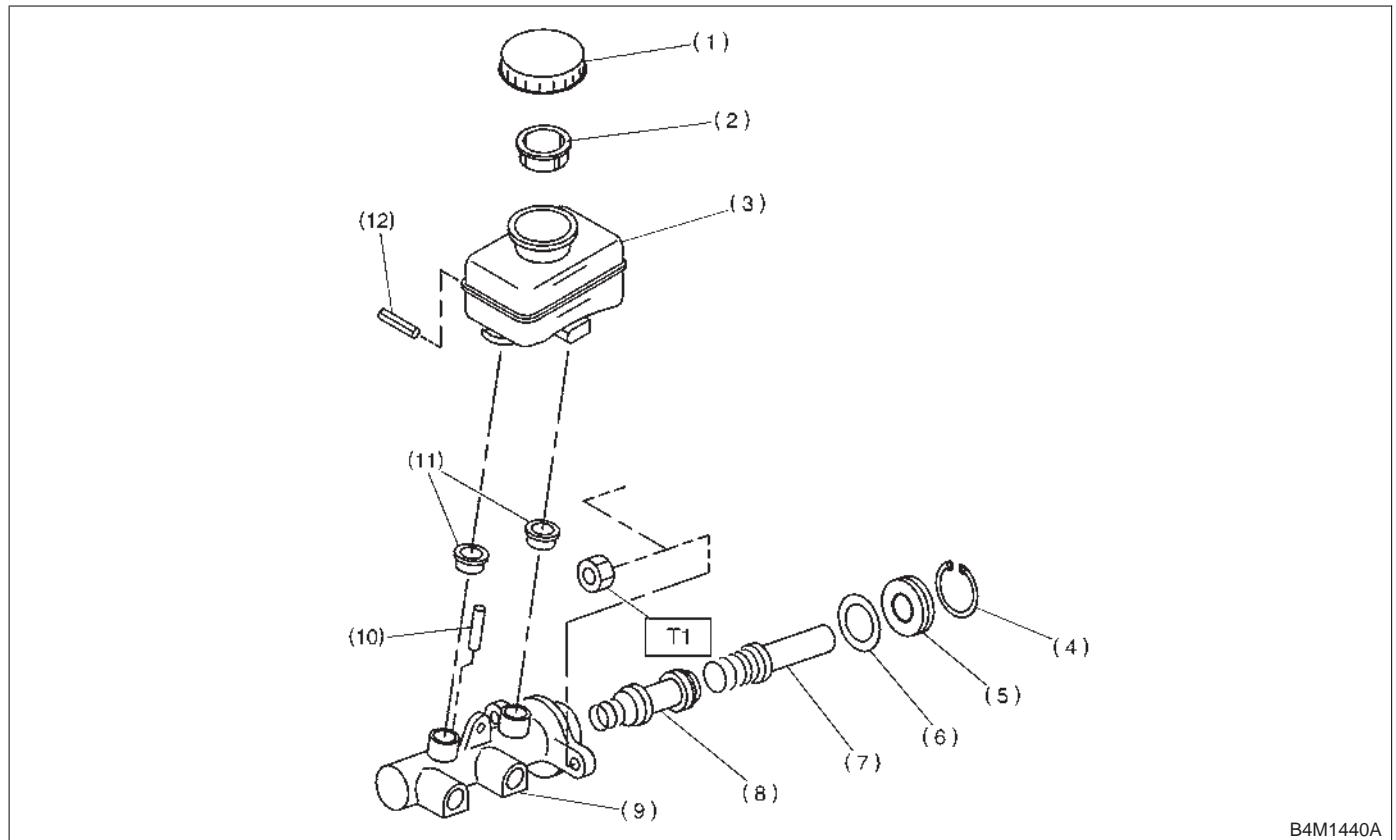
- (1) Air bleeder cap
- (2) Air bleeder screw
- (3) Boot
- (4) Piston
- (5) Cup
- (6) Spring
- (7) Wheel cylinder body
- (8) Pin
- (9) Plug
- (10) Back plate

- (11) Upper shoe return spring
- (12) Retainer
- (13) Washer
- (14) Parking brake lever
- (15) Brake shoe (Trailing)
- (16) Brake shoe (Leading)
- (17) Shoe hold-down spring
- (18) Cup
- (19) Adjusting lever
- (20) Adjuster

- (21) Lower shoe return spring
- (22) Adjusting spring
- (23) Drum
- (24) Plug

Tightening torque: N·m (kg·m, ft·lb)**T1: 8 ± 1 (0.8 ± 0.1 , 5.8 ± 0.7)****T2: 10 ± 2 (1.0 ± 0.2 , 7.2 ± 1.4)****T3: 52 ± 6 (5.3 ± 0.6 , 38.3 ± 4.3)**

4. Master Cylinder A: WITH ABS VEHICLES



B4M1440A

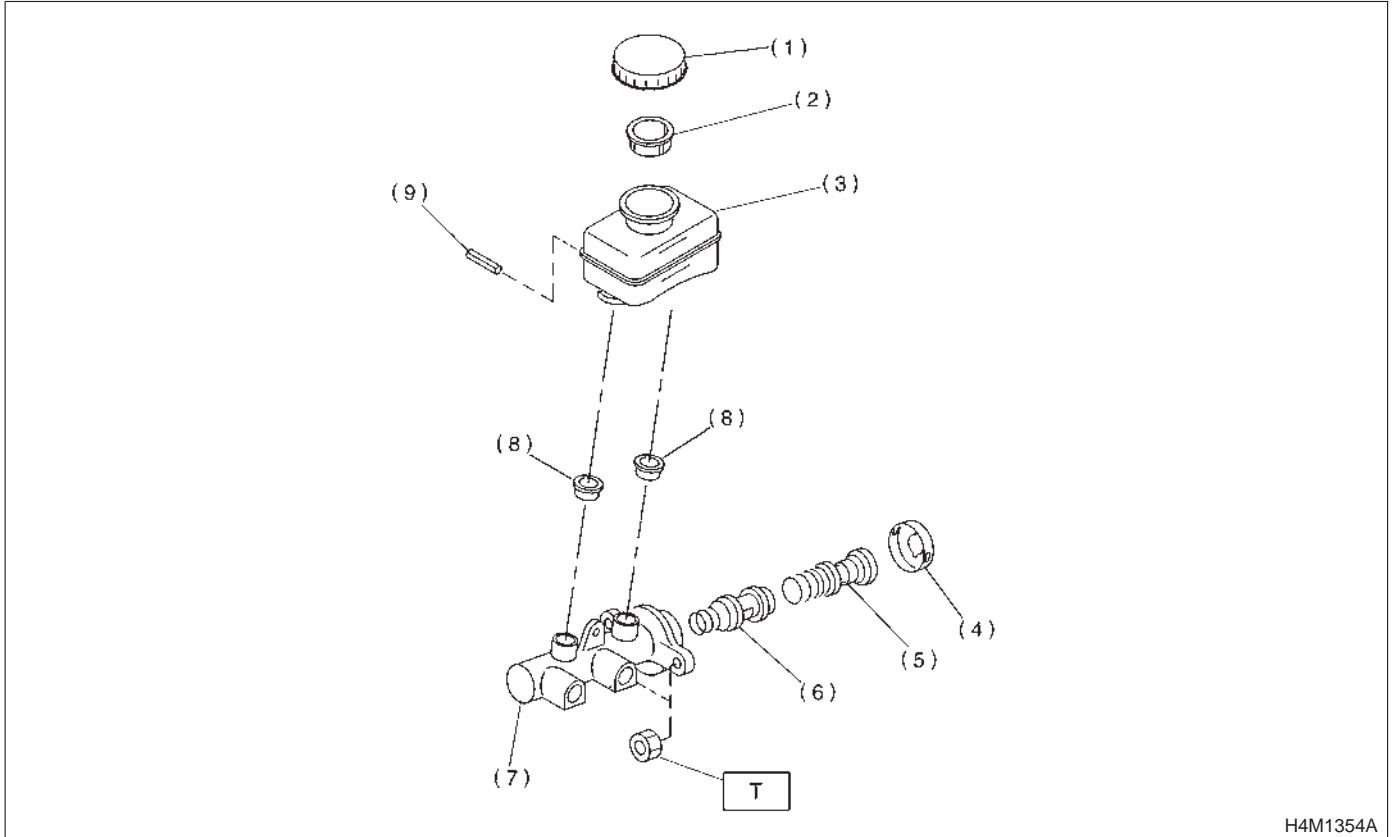
- (1) Cap
- (2) Filter
- (3) Reservoir tank
- (4) C-ring
- (5) Guide ASSY

- (6) Plate
- (7) Primary piston
- (8) Secondary piston
- (9) Cylinder body
- (10) Cylinder pin

- (11) Seal
- (12) Pin

Tightening torque: N-m (kg-m, ft-lb)
T1: 14±4 (1.4±0.4, 10.1±2.9)

B: WITHOUT ABS VEHICLES



- (1) Cap
- (2) Filter
- (3) Reservoir tank
- (4) Piston retainer

- (5) Primary piston
- (6) Secondary piston
- (7) Cylinder body
- (8) Seal

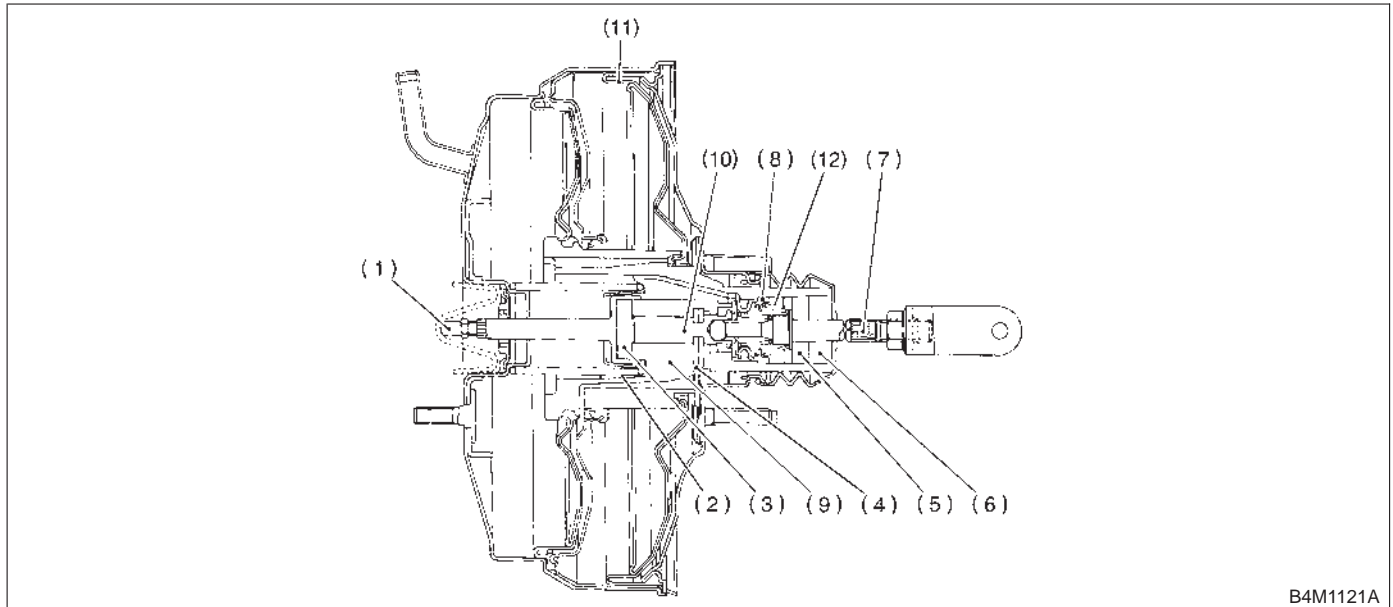
- (9) Pin

Tightening torque: N·m (kg·m, ft·lb)

T1: 14±4 (1.4±0.4, 10.1±2.9)

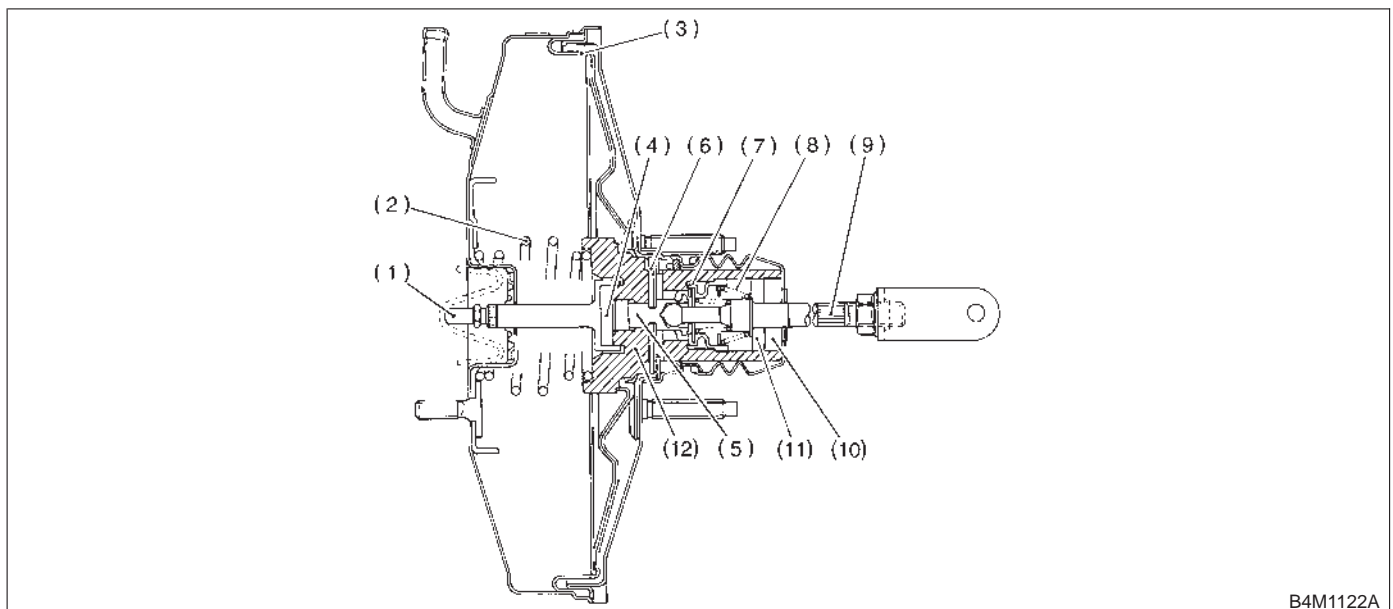
5. Brake Booster

A: MODELS WITH ABS



- | | | |
|-------------------|-------------------|--------------------------|
| (1) Push rod | (5) Filter | (9) Valve body |
| (2) Return spring | (6) Silencer | (10) Plunger valve |
| (3) Reaction disc | (7) Operating rod | (11) Diaphragm plate |
| (4) Key | (8) Poppet valve | (12) Valve return spring |

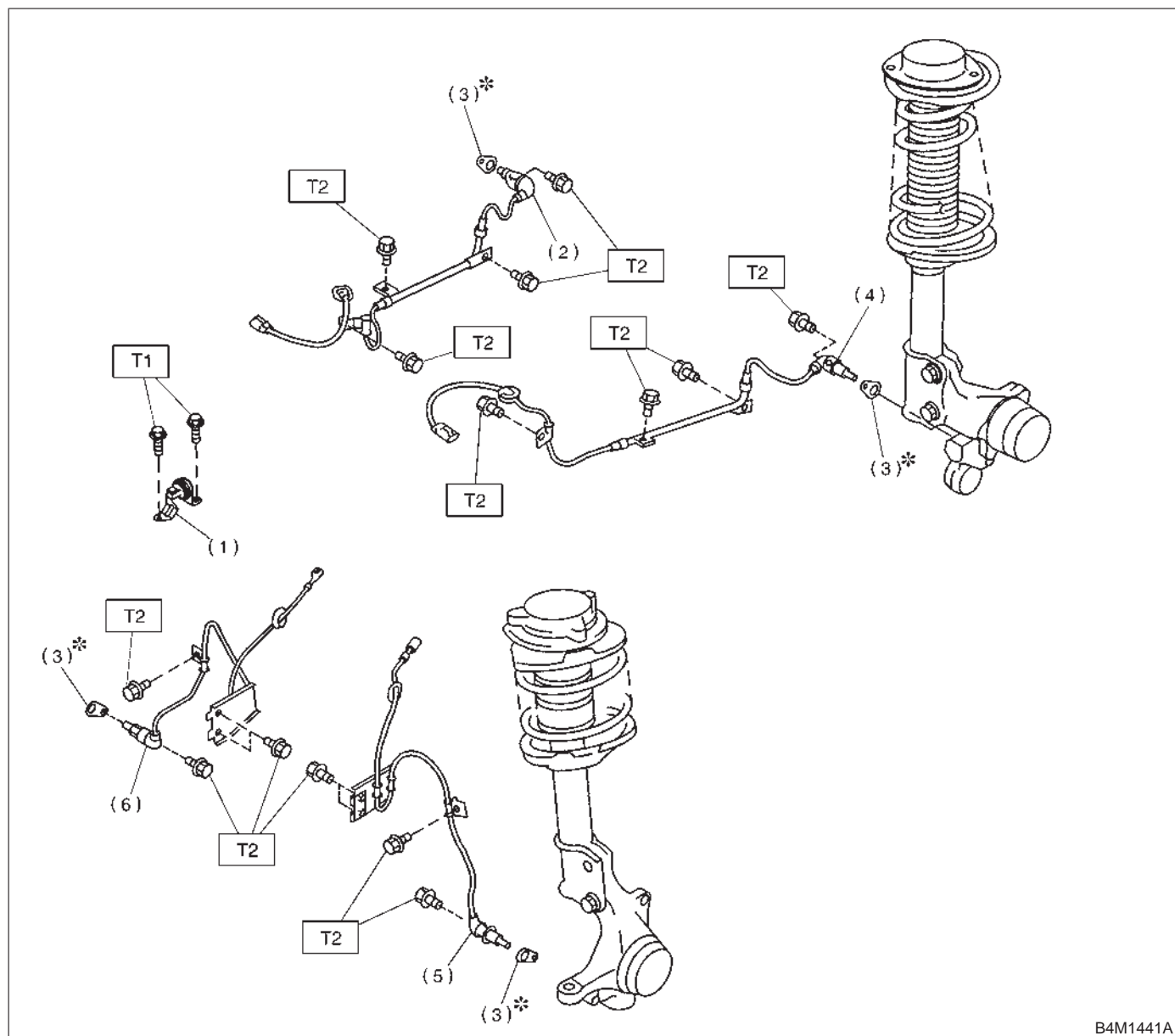
B: MODELS WITHOUT ABS



- | | | |
|---------------------|-------------------------|-------------------|
| (1) Push rod | (5) Plunger valve | (9) Operating rod |
| (2) Return spring | (6) Key | (10) Silencer |
| (3) Diaphragm plate | (7) Poppet valve | (11) Filter |
| (4) Reaction disc | (8) Valve return spring | (12) Valve body |

6. ABS System

A: SENSOR



B4M1441A

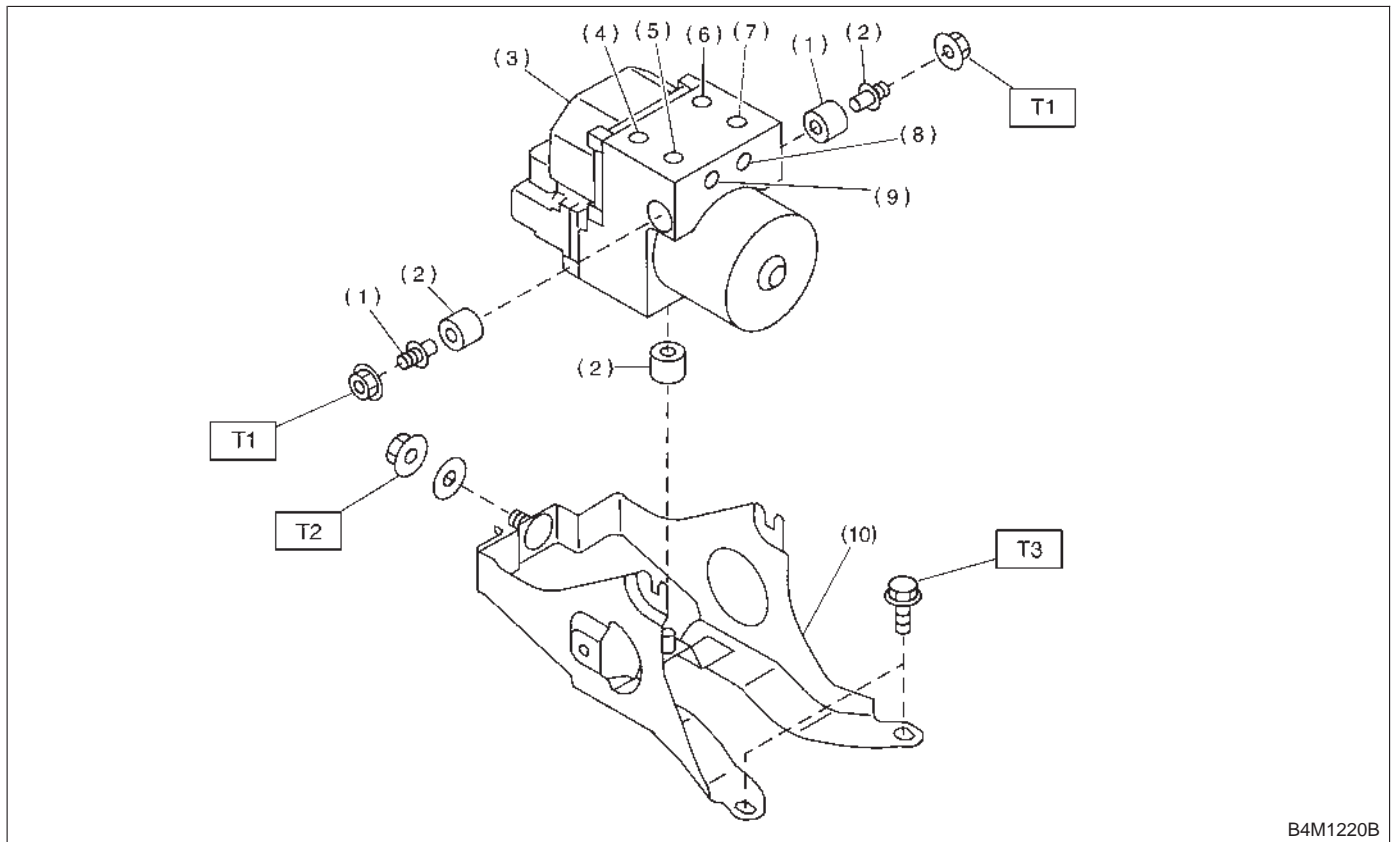
- | | |
|------------------------|-------------------------|
| (1) G sensor | (5) Front ABS sensor LH |
| (2) Rear ABS sensor RH | (6) Front ABS sensor RH |
| (3) ABS spacer | |
| (4) Rear ABS sensor LH | |

Tightening torque: N·m (kg·m, ft·lb)

T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)

T2: 32±10 (3.3±1.0, 24±7)

B: ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U)



B4M1220B

- (1) Stud bolt
- (2) Damper
- (3) ABS control module and hydraulic control unit
- (4) Front-LH outlet
- (5) Secondary inlet

- (6) Front-RH outlet
- (7) Primary inlet
- (8) Rear-LH outlet
- (9) Rear-RH outlet
- (10) Bracket

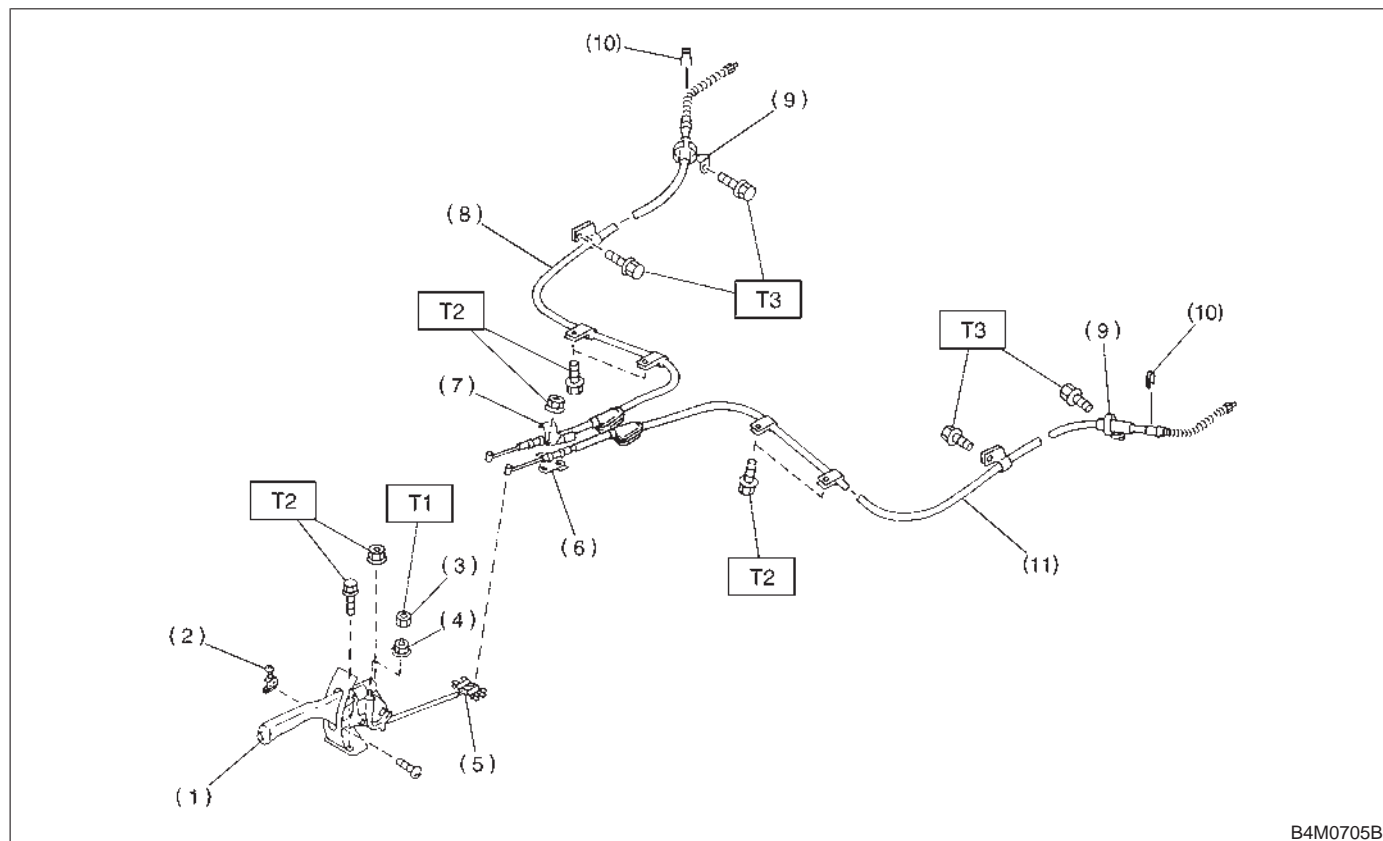
Tightening torque: N·m (kg·m, ft·lb)

T1: 18±5 (1.8±0.5, 13.0±3.6)

T2: 29±7 (3.0±0.7, 21.7±5.1)

T3: 32±10 (3.3±1.0, 24±7)

7. Parking Brake



B4M0705B

- | | |
|--------------------------|---|
| (1) Parking brake lever | (7) Clamp |
| (2) Parking brake switch | (8) Parking brake cable RH |
| (3) Lock nut | (9) Cable guide |
| (4) Adjusting nut | (10) Clamp (Rear disc brake model only) |
| (5) Equalizer | (11) Parking brake cable LH |
| (6) Bracket | |

Tightening torque: N·m (kg·m, ft·lb)

T1: 5.9±1.5 (0.60±0.15, 4.3±1.1)

T2: 18±5 (1.8±0.5, 13.0±3.6)

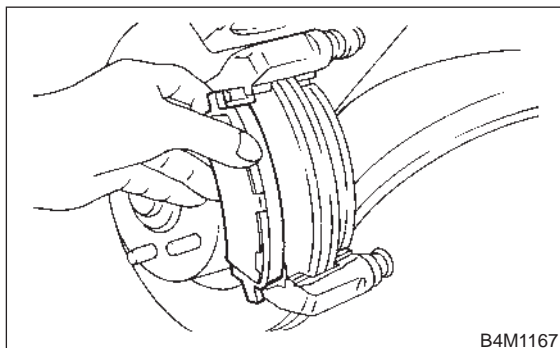
T3: 32±10 (3.3±1.0, 24±7)

1. Front Disc Brake

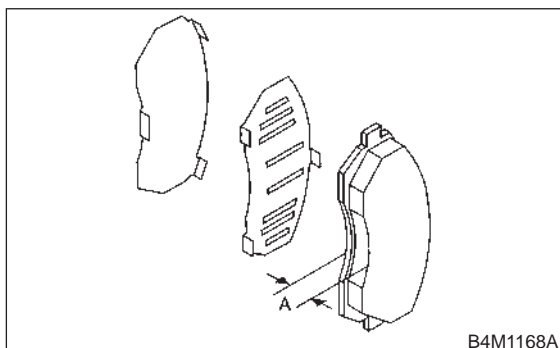
A: ON-CAR SERVICE

1. PAD

- 1) Remove lock pin.
- 2) Raise caliper body.
- 3) Remove pad.



- 4) Check pad thickness A.

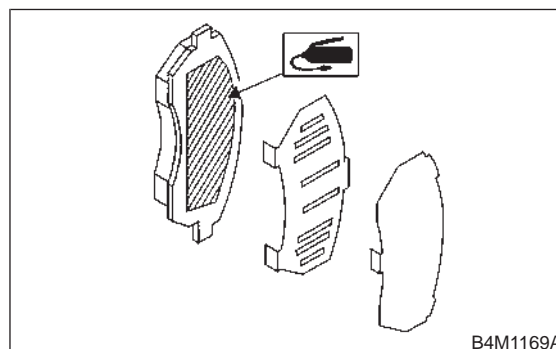


Pad thickness (including back metal)	Standard value	17 mm (0.67 in)
	Wear limit	7.5 mm (0.295 in)

CAUTION:

- Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
- A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
- Replace pad if there is oil or grease on it.

- 5) Apply thin coat of PBC GREASE (Part No. 003607000) to the frictional portion between pad and pad clip.



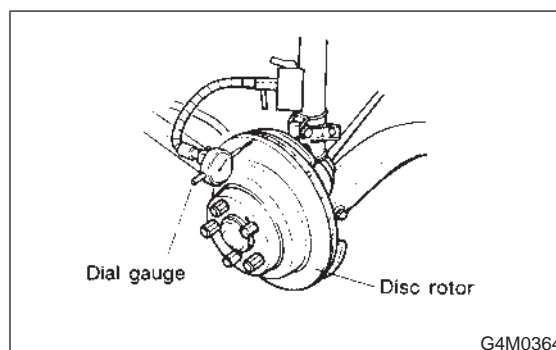
- 6) Install pads on support.
- 7) Install caliper body on support.

NOTE:

If it is difficult to push piston during pad replacement, loosen air bleeder to facilitate work.

2. DISC ROTOR

- 1) Install disc rotor by tightening the five wheel nuts.
- 2) Set a dial gauge on the disc rotor. Turn disc rotor to check runout.



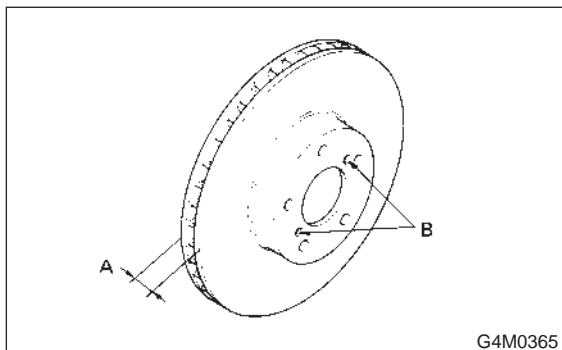
NOTE:

Make sure that dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.

Disc rotor runout limit:
0.075 mm (0.0030 in)

1. Front Disc Brake

3) Measure disc rotor thickness.



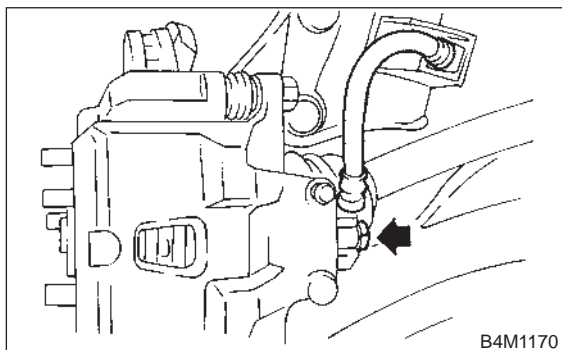
NOTE:

Make sure that micrometer is set 5 mm (0.20 in) inward of rotor outer perimeter.

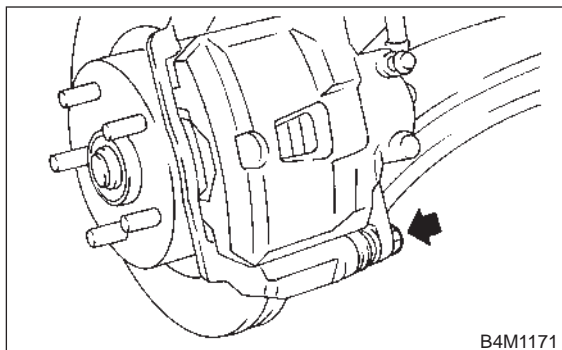
Disc rotor thickness A	Standard value	Service limit
	24.0 mm (0.945 in)	22.0 mm (0.866 in)

B: REMOVAL

1) Remove union bolt and disconnect brake hose from caliper body assembly.



2) Remove bolt securing lock pin to caliper body.

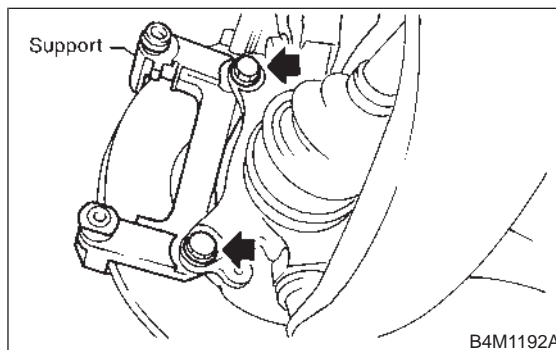


3) Raise caliper body and move it toward vehicle center to separate it from support.

4) Remove support from housing.

NOTE:

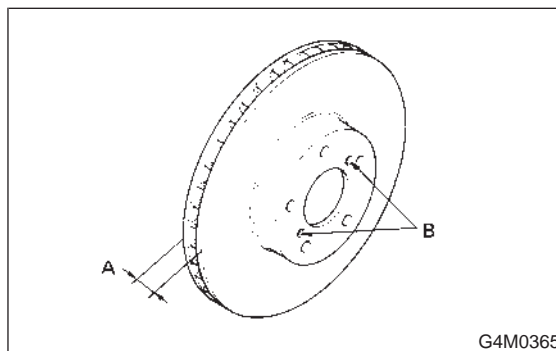
Remove support only when replacing it or the rotor. It need not be removed when servicing caliper body assembly.



5) Remove disc rotor from hub.

NOTE:

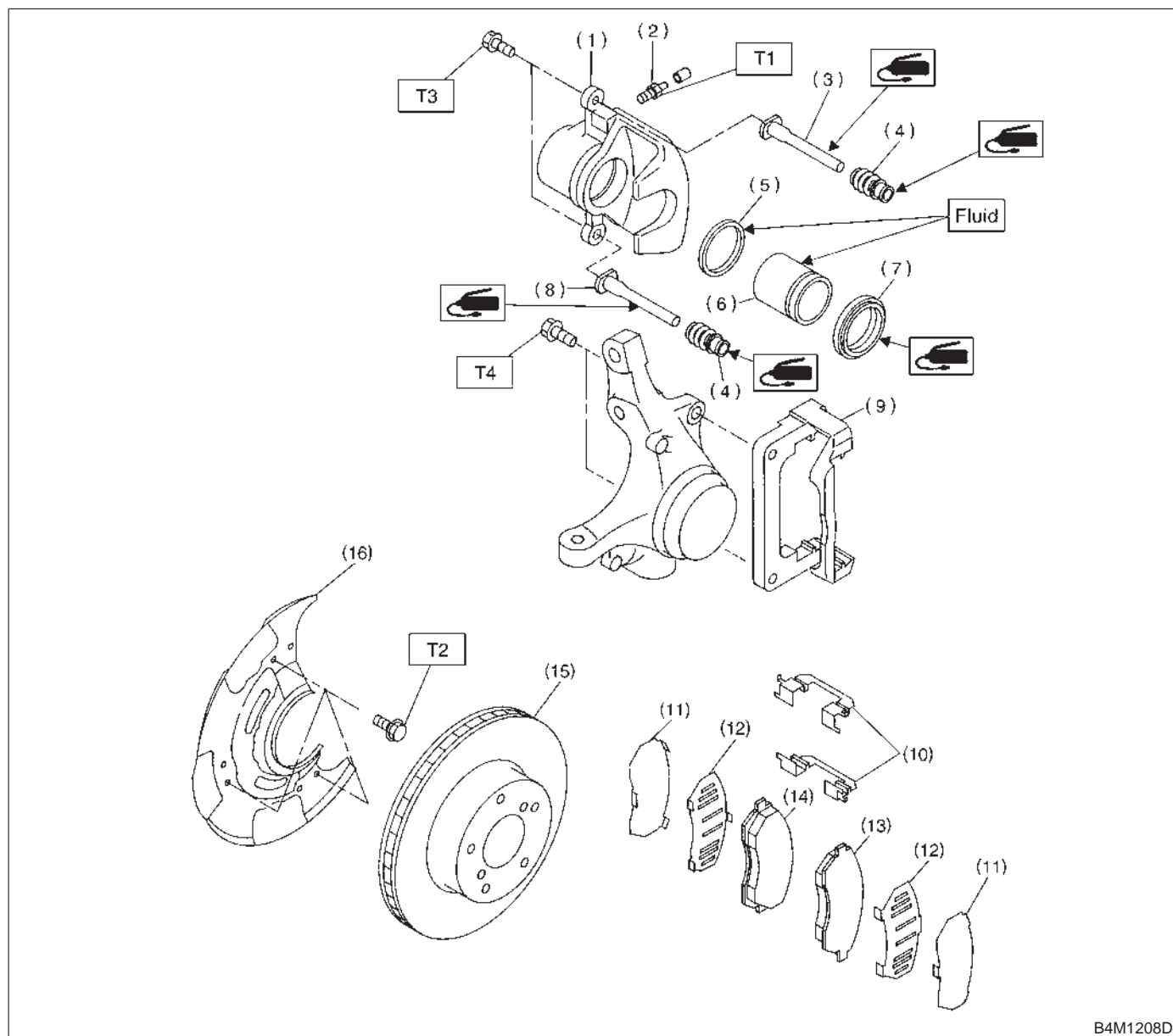
If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in holes B on the rotor.



6) Clean mud and foreign particles from caliper body assembly and support.

C: DISASSEMBLY

1. EXCEPT 2500 cc MODEL



B4M1208D

- | | |
|-----------------------|--------------------|
| (1) Caliper body | (9) Support |
| (2) Air bleeder screw | (10) Pad clip |
| (3) Guide pin (Green) | (11) Outer shim |
| (4) Pin boot | (12) Inner shim |
| (5) Piston seal | (13) Pad (Outside) |
| (6) Piston | (14) Pad (Inside) |
| (7) Piston boot | (15) Disc rotor |
| (8) Lock pin (Yellow) | (16) Disc cover |

Tightening torque: N·m (kg·m, ft·lb)

T1: 8±1 (0.8±0.1, 5.8±0.7)

T2: 18±5 (1.8±0.5, 13.0±3.6)

T3: 37±5 (3.8±0.5, 27.5±3.6)

T4: 78±10 (8.0±1.0, 58±7)

1. Front Disc Brake

1) Clean mud and foreign particles from caliper body assembly and support.

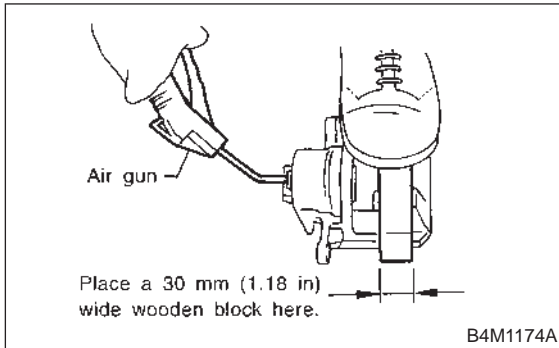
CAUTION:

Be careful not to allow foreign particles to enter inlet (at brake hose connector).

2) Gradually supply compressed air via caliper body brake hose to force piston out.

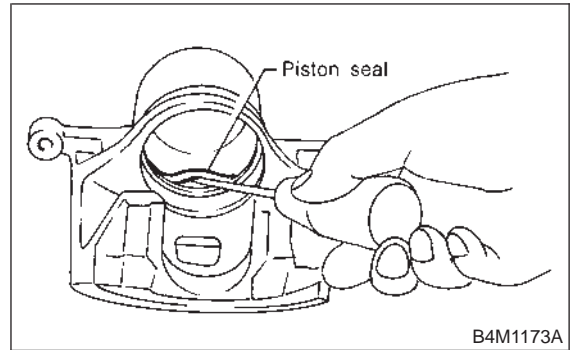
CAUTION:

- Place a wooden block as shown in Figure to prevent damage to piston.
- Do not apply excessively high-pressure.



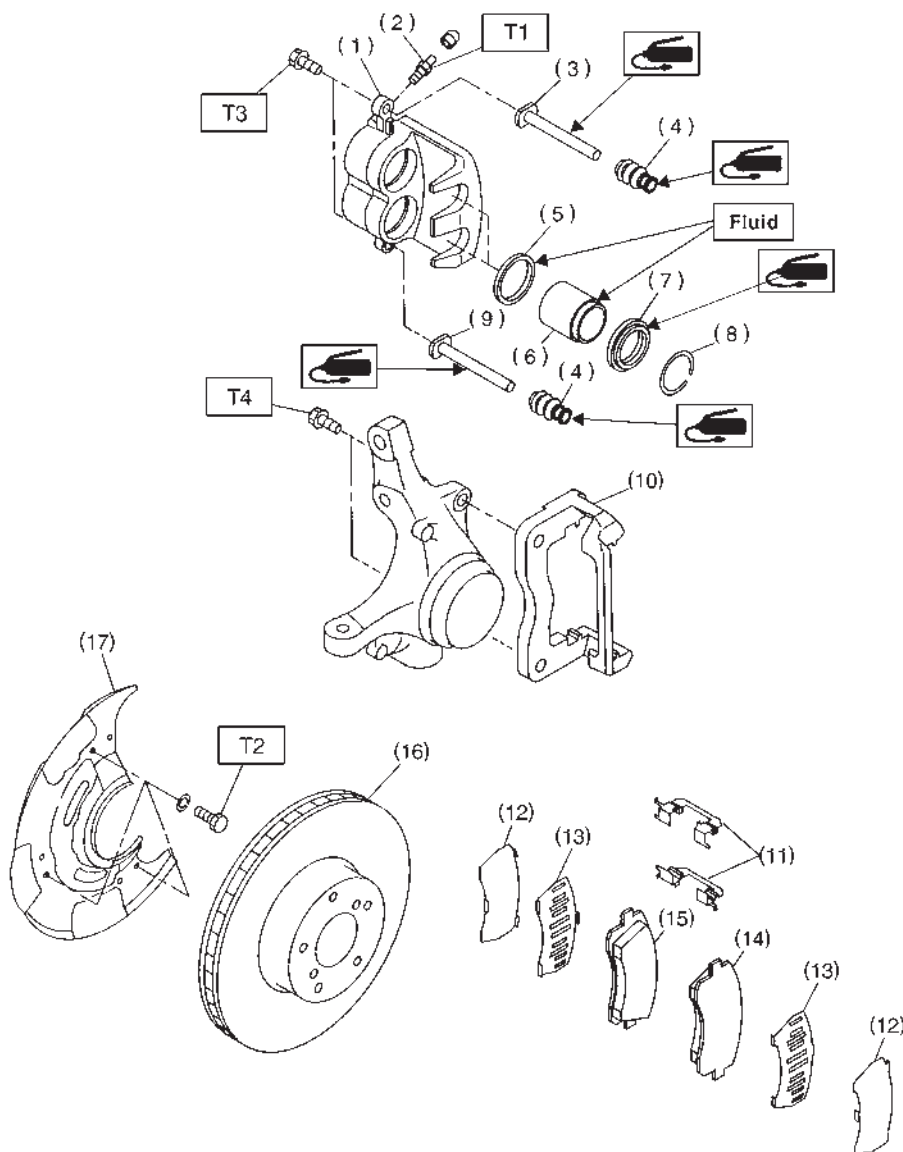
3) Remove piston boot.

4) Remove piston seal from caliper body cylinder.



5) Remove guide pin and boot from caliper body.

2. 2500 cc MODEL



B4M1151D

- (1) Caliper body
- (2) Air bleeder screw
- (3) Guide pin (Green)
- (4) Pin boot
- (5) Piston seal
- (6) Piston
- (7) Piston boot
- (8) Boot ring

- (9) Lock pin (Yellow)
- (10) Support
- (11) Pad clip
- (12) Outer shim
- (13) Inner shim
- (14) Pad (Outside)
- (15) Pad (Inside)
- (16) Disc rotor

- (17) Disc cover

Tightening torque: N-m (kg-m, ft-lb)

T1: 8±1 (0.8±0.1, 5.8±0.7)

T2: 18±5 (1.8±0.5, 13.0±3.6)

T3: 37±5 (3.8±0.5, 27.5±3.6)

T4: 78±10 (8.0±1.0, 58±7)

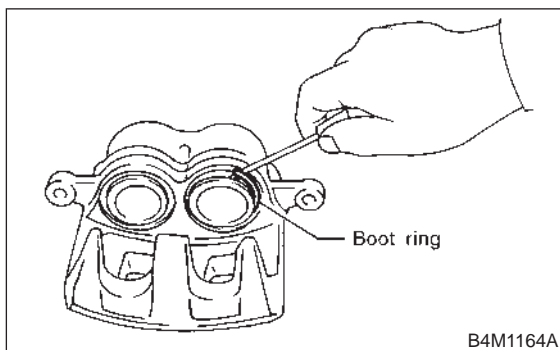
1. Front Disc Brake

1) Clean mud and foreign particles from caliper body assembly and support.

CAUTION:

Be careful not to allow foreign particles to enter inlet (at brake hose connector).

2) Using a standard screwdriver, remove boot ring from piston.

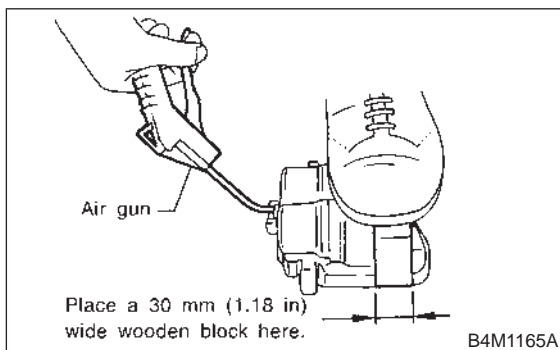


3) Remove boot from piston end.

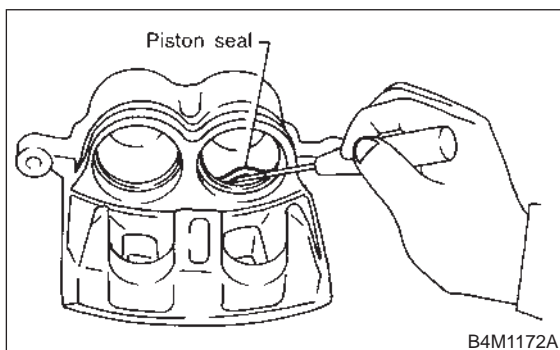
4) Gradually supply compressed air via caliper body brake hose to force piston out.

CAUTION:

Place a wooden block as shown in Figure to prevent damage to piston.



5) Remove piston seal from caliper body cylinder.



6) Remove lock pin boot and guide pin boot.

D: INSPECTION

- 1) Repair or replace faulty parts.
- 2) Check caliper body and piston for uneven wear, damage or rust.
- 3) Check rubber parts for damage or deterioration.

E: ASSEMBLY

1. EXCEPT 2500 cc MODEL

- 1) Clean caliper body interior using brake fluid.
- 2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
- 3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
- 4) Apply a coat of specified grease to boot and fit in groove on ends of cylinder and install piston boot onto cylinder.

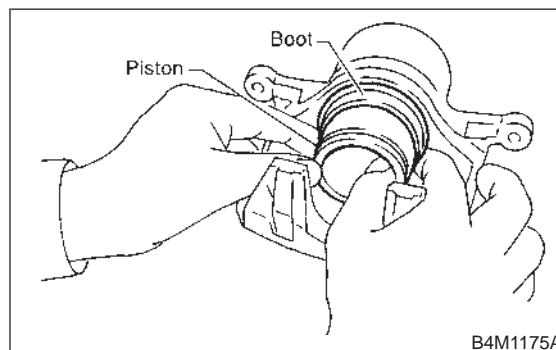
Grease:

NIGLUBE RX-2 (Part No. 003606000)

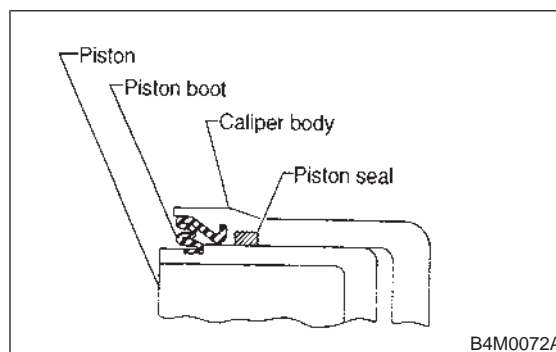
5) Insert piston into cylinder.

CAUTION:

Do not force piston into cylinder.



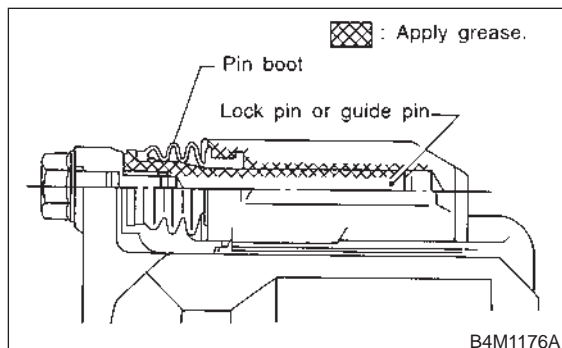
6) Position boot in grooves on cylinder and piston.



7) Apply a coat of specified grease to lock pin and guide pin outer surface, cylinder inner surface, and boot grooves.

Grease:

NIGLUBE RX-2 (Part No. 003606000)



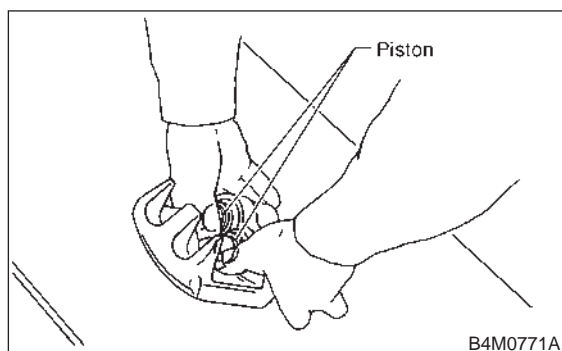
8) Install lock and guide pin boot on support.

2. 2500 cc MODEL

- 1) Clean caliper body interior using brake fluid.
- 2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
- 3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
- 4) Insert piston into cylinder.

CAUTION:

Do not force piston into cylinder.

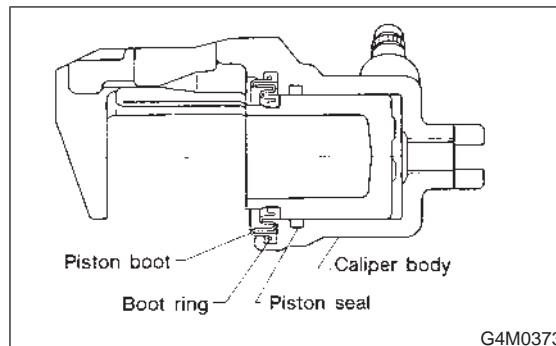


5) Apply a coat of specified grease to boot and fit in groove on ends of cylinder and piston.

Grease:

NIGLUBE RX-2 (Part No. 003606000)

To facilitate installation, fit boot starting with piston end.



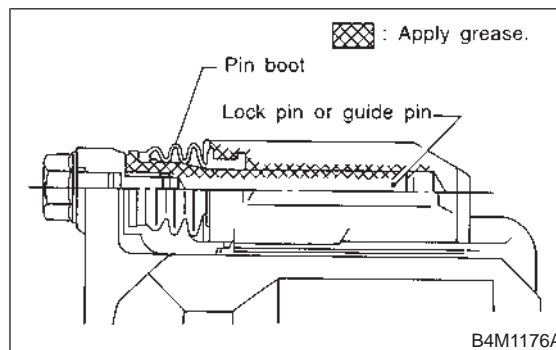
6) Position boot in grooves on cylinder and piston.

7) Install boot ring. Be careful not scratch boot.

8) Apply a coat of specified grease to lock pin and guide pin, outer surface, cylinder inner surface, and boot grooves.

Grease:

NIGLUBE RX-2 (Part No. 003606000)



9) Install lock pin boot and guide pin boot on support.

F: INSTALLATION

- 1) Install disc rotor on hub.
- 2) Install support on housing.

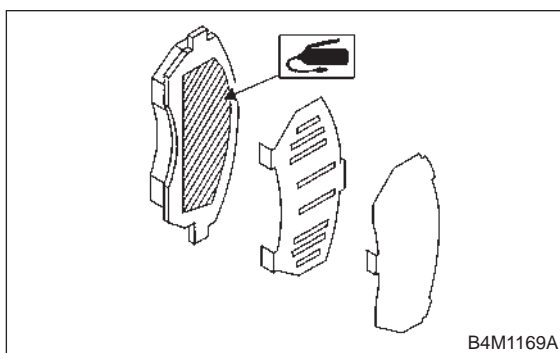
Tightening torque:

$78 \pm 10 \text{ N-m}$ ($8 \pm 1 \text{ kg-m}$, $58 \pm 7 \text{ ft-lb}$)

CAUTION:

- Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
- A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
- When replacing the pad, replace pads of the right and left wheels at the same time.

- 3) Apply thin coat of PBC GREASE (Part No. 003607000) to the frictional portion between pad and pad clip.



- 4) Install pads, rubber coated shim and stainless shim on support.
- 5) Install caliper body on support.

Tightening torque:

$39 \pm 5 \text{ N-m}$ ($4 \pm 0.5 \text{ kg-m}$, $28.9 \pm 3.6 \text{ ft-lb}$)

- 6) Connect brake hose.

Tightening torque:

$18 \pm 3 \text{ N-m}$ ($1.8 \pm 0.3 \text{ kg-m}$, $13.0 \pm 2.2 \text{ ft-lb}$)

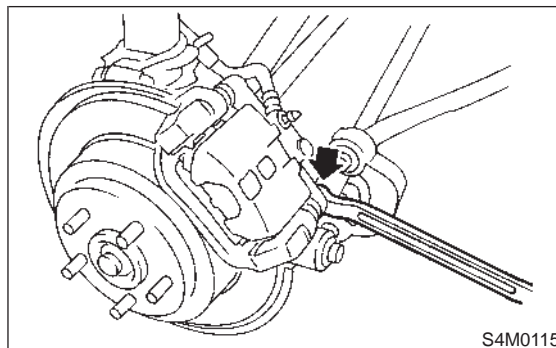
CAUTION:

Replace brake hose gaskets with new ones.

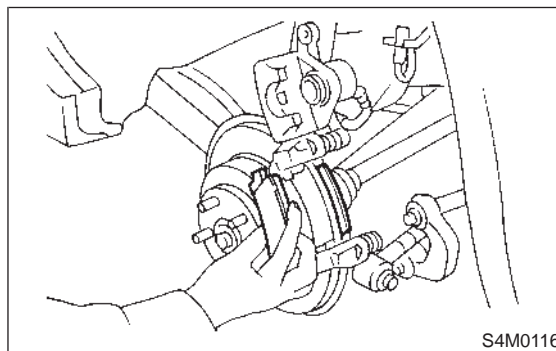
- 7) Bleed air from brake system.

2. Rear Disc Brake**A: ON-CAR SERVICE****1. PAD**

- 1) Remove lock pin.



- 2) Raise caliper body.
- 3) Remove pad from support.



4) Check pad thickness (including back metal).

CAUTION:

- Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
- A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
- Replace pad if there is oil or grease on it.

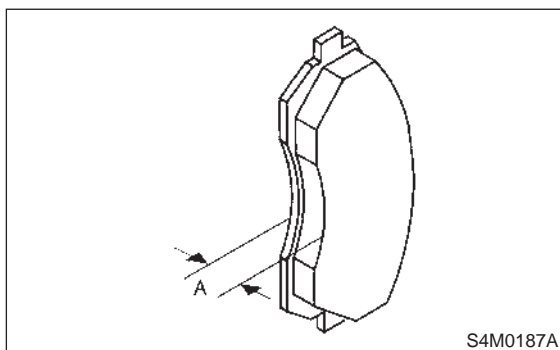
Pad thickness: A

Standard value

15.0 mm (0.591 in)

Wear limit

6.5 mm (0.256 in)



5) Apply thin coat of PBC GREASE (Part No. 03607000) to the frictional portion between pad and pad clip.

6) Install pad on support.

7) Install caliper body on support.

Tightening torque:

$20 \pm 4 \text{ N}\cdot\text{m}$ ($2.0 \pm 0.4 \text{ kg}\cdot\text{m}$, $14.5 \pm 2.9 \text{ ft}\cdot\text{lb}$)

NOTE:

If it is difficult to push piston during pad replacement, loosen air bleeder to facilitate work.

2. DISC ROTOR

1) Install disc rotor by tightening the five wheel nuts.

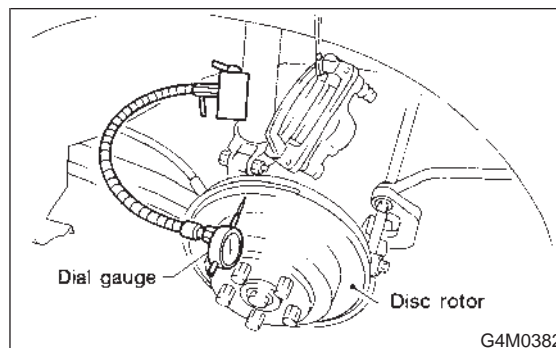
2) Set a dial gauge on the disc rotor. Turn disc rotor to check runout.

NOTE:

Make sure that dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.

Disc rotor runout limit:

0.1 mm (0.004 in)



3) Measure disc rotor thickness.

NOTE:

- Make sure that micrometer is set 5 mm (0.20 in) inward of rotor outer perimeter.

- When removing disc rotor, refer to instructions under Parking Brake. <Ref. to 4-4 [W4A0].>

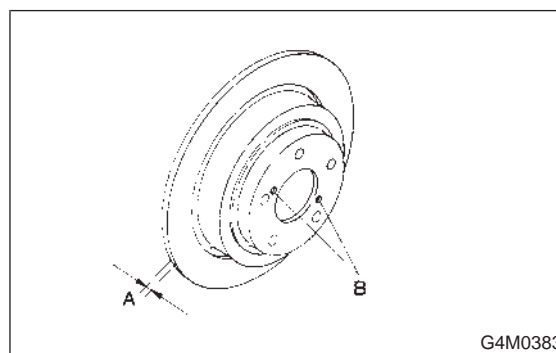
Disc rotor thickness: A

Standard value

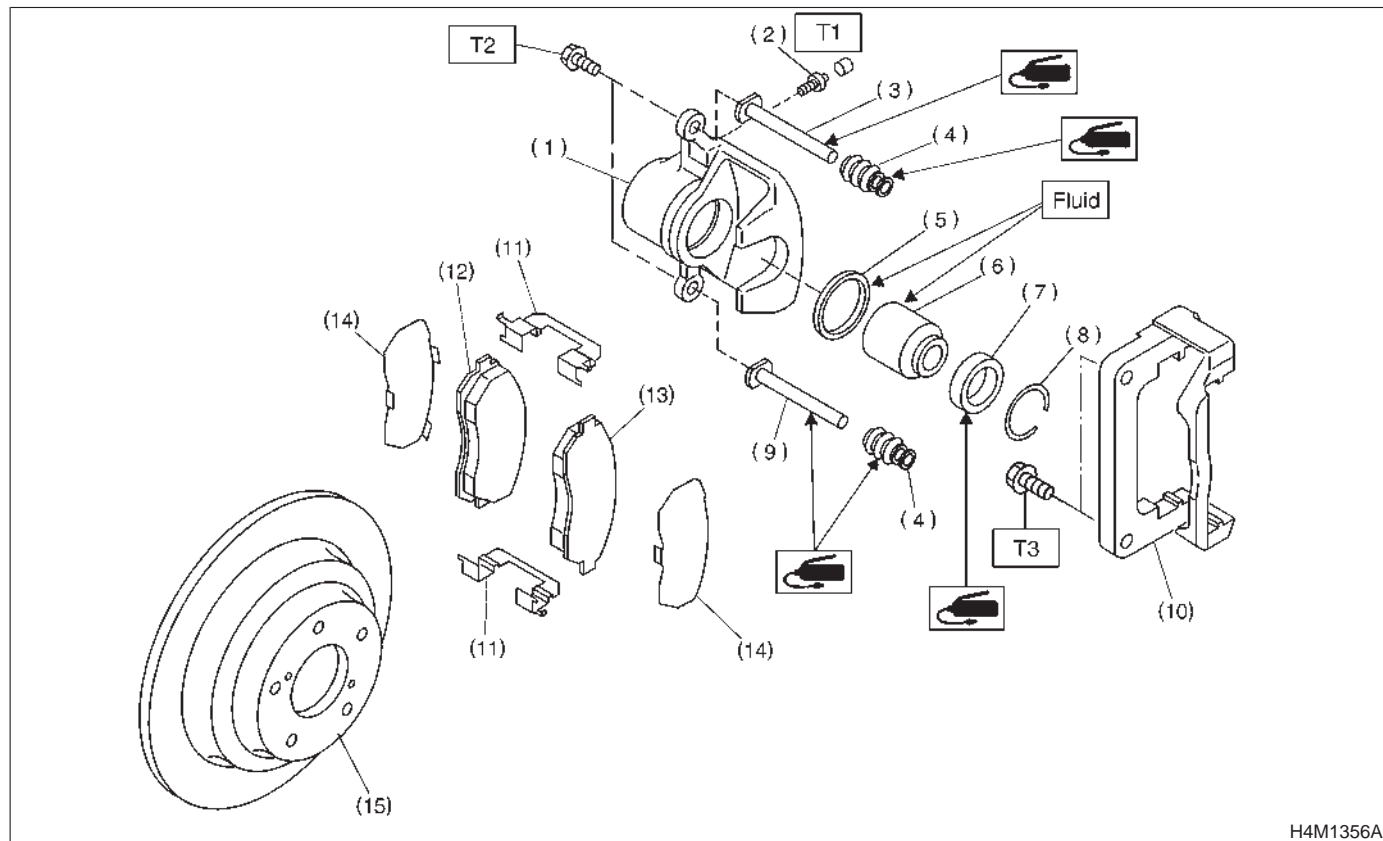
10 mm (0.39 in)

Service limit

8.5 mm (0.335 in)



B: REMOVAL



H4M1356A

- | | |
|-----------------------|-----------------------|
| (1) Caliper body | (8) Boot ring |
| (2) Air bleeder screw | (9) Lock pin (Yellow) |
| (3) Guide pin (Green) | (10) Support |
| (4) Pin boot | (11) Pad clip |
| (5) Piston seal | (12) Inner pad |
| (6) Piston | (13) Outer pad |
| (7) Piston boot | (14) Shim |

- (15) Disc rotor

Tightening torque: N-m (kg-m, ft-lb)

T1: 8 ± 1 (0.8 ± 0.1 , 5.8 ± 0.7)

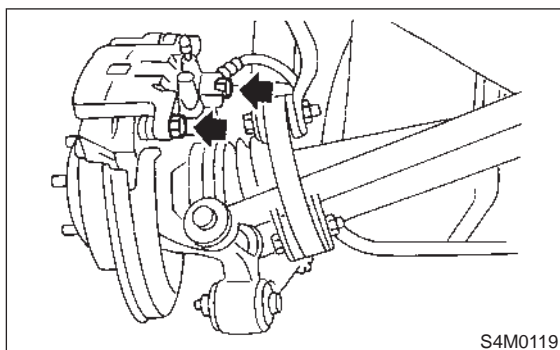
T2: 39 ± 5 (4.0 ± 0.5 , 28.9 ± 3.6)

T3: 52 ± 6 (5.3 ± 0.6 , 38.3 ± 4.3)

- 1) Lift-up vehicle and remove wheels.
- 2) Disconnect brake hose from caliper body assembly.

CAUTION:

Do not allow brake fluid to come in contact with vehicle body; wipe off completely if spilled.



S4M0119

- 3) Remove lock pin.

- 4) Raise caliper body and move it toward vehicle center to separate it from support.
- 5) Remove support from back plate.

NOTE:

Remove support only when replacing it or the rotor. It need not be removed when servicing caliper body assembly.

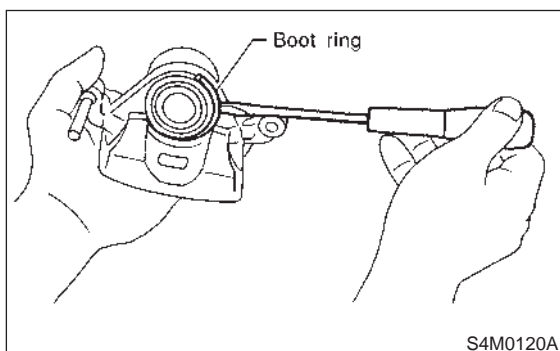
- 6) Clean mud and foreign particles from caliper body assembly and support.

CAUTION:

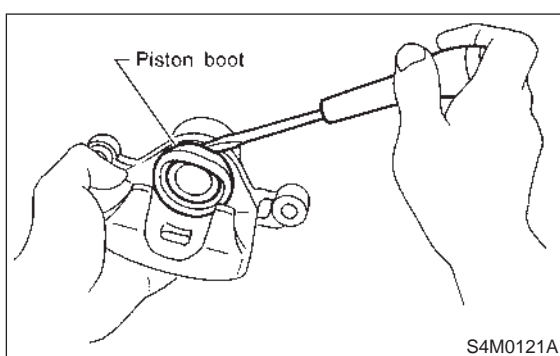
Be careful not to allow foreign particles to enter inlet (at brake hose connector).

C: DISASSEMBLY

- 1) Remove the boot ring.



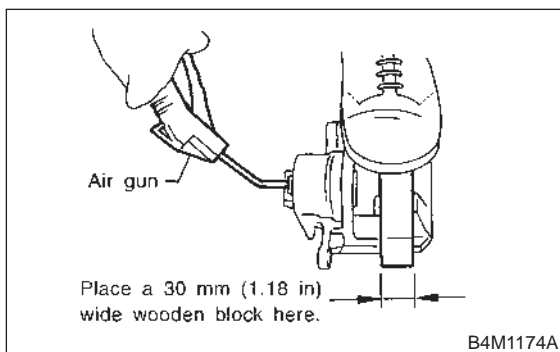
- 2) Remove the piston boot.



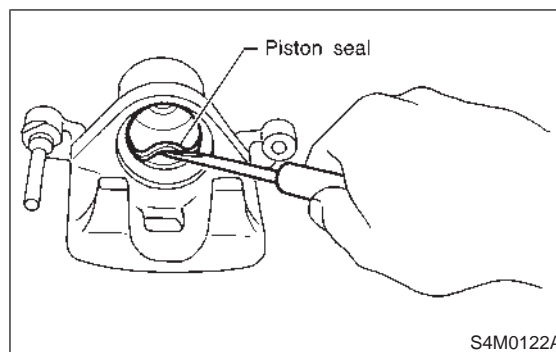
- 3) Gradually supply compressed air via inlet of caliper body to force piston out.

CAUTION:

- Place a wooden block as shown in Figure to prevent damage to piston.
- Do not apply excessively high-pressure.



- 4) Remove piston seal from caliper body cylinder.



- 5) Remove lock pin sleeve and boot from caliper body.
- 6) Remove guide pin boot.

D: INSPECTION

- 1) Repair or replace faulty parts.
- 2) Check caliper body and piston for uneven wear, damage or rust.
- 3) Check rubber parts for damage or deterioration.

E: ASSEMBLY

- 1) Clean caliper body interior using brake fluid.
- 2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
- 3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
- 4) Insert piston into cylinder.

CAUTION:

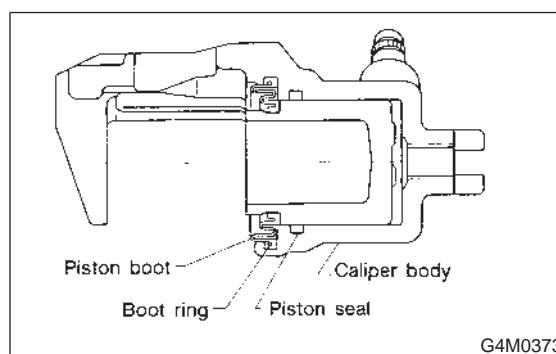
Do not force piston into cylinder.

- 5) Apply a coat of specified grease to boot and fit in groove on ends of cylinder and piston.

Grease

NIGLUBE RX-2 (Part No. 003606000)

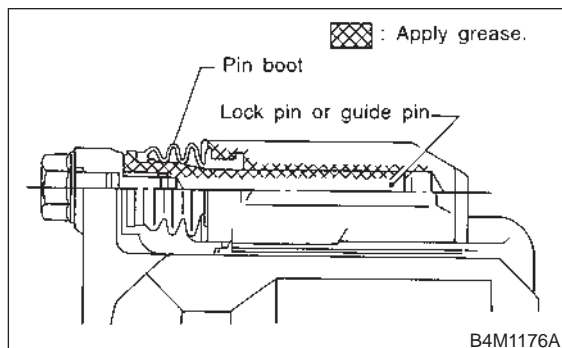
- 6) Install the piston boot to the caliper body, and attach boot ring.



7) Apply a coat of specified grease to guide pin, outer surface, sleeve outer surface, cylinder inner surface, and boot grooves.

Grease

NIGLUBE RX-2 (Part No. 003606000)



- 8) Install guide pin boot on caliper body.
- 9) Install lock pin boot on caliper body and insert lock pin sleeve into place.

F: INSTALLATION

- 1) Install disc rotor on hub.
- 2) Install support on back plate.

Tightening torque:

$52 \pm 6 \text{ N}\cdot\text{m}$ ($5.3 \pm 0.6 \text{ kg}\cdot\text{m}$, $38.3 \pm 4.3 \text{ ft}\cdot\text{lb}$)

CAUTION:

- Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
- A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
- Replace pads if there is oil or grease on them.

- 3) Apply thin coat of PBC GREASE (Part No. 003607000) to the frictional portion between pad and pad clip.
- 4) Install pads on support.
- 5) Install caliper body on support.

Tightening torque:

$20 \pm 4 \text{ N}\cdot\text{m}$ ($2.0 \pm 0.4 \text{ kg}\cdot\text{m}$, $14.5 \pm 2.9 \text{ ft}\cdot\text{lb}$)

- 6) Connect brake hose.

Tightening torque:

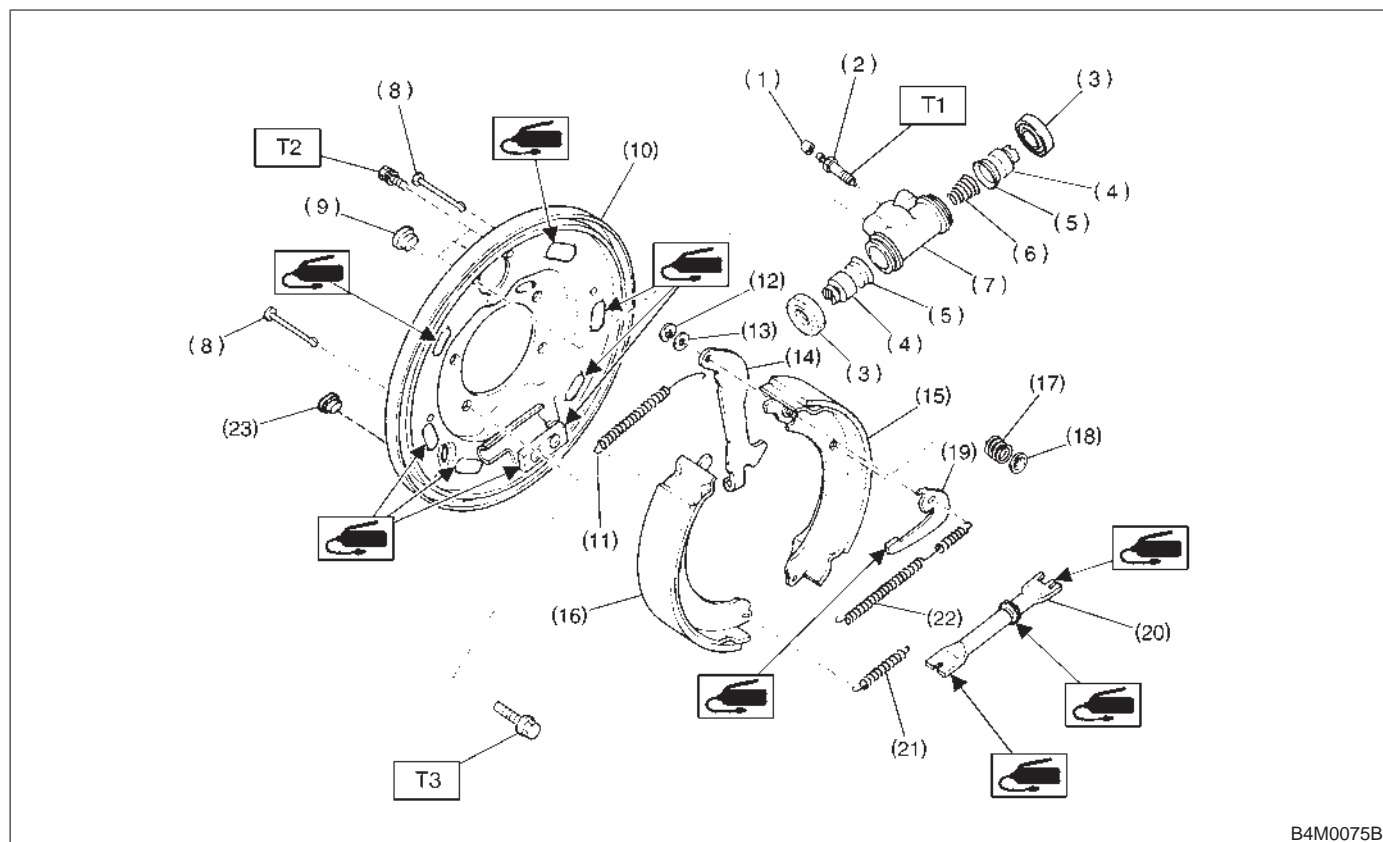
$18 \pm 3 \text{ N}\cdot\text{m}$ ($1.8 \pm 0.3 \text{ kg}\cdot\text{m}$, $13.0 \pm 2.2 \text{ ft}\cdot\text{lb}$)

CAUTION:

- The brake hose must be connected without any twist.
 - Replace brake hose gaskets with new ones.
- 7) Bleed air from brake system.

3. Rear Drum Brake

A: REMOVAL



B4M0075B

- | | |
|-------------------------|-------------------------------|
| (1) Air bleeder cap | (11) Upper shoe return spring |
| (2) Air bleeder screw | (12) Retainer |
| (3) Boot | (13) Washer |
| (4) Piston | (14) Parking brake lever |
| (5) Cup | (15) Brake shoe (Trailing) |
| (6) Spring | (16) Brake shoe (Leading) |
| (7) Wheel cylinder body | (17) Shoe hold-down spring |
| (8) Pin | (18) Cup |
| (9) Plug | (19) Adjusting lever |
| (10) Back plate | (20) Adjuster |

- | |
|-------------------------------|
| (21) Lower shoe return spring |
| (22) Adjusting spring |
| (23) Plug |

Tightening torque: N·m (kg·m, ft·lb)

T1: 8 ± 1 (0.8 ± 0.1 , 5.8 ± 0.7)

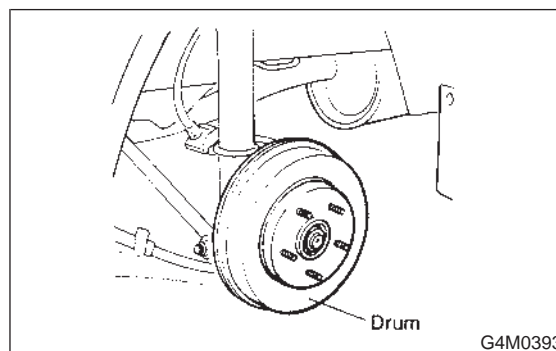
T2: 10 ± 2 (1.0 ± 0.2 , 7.2 ± 1.4)

T3: 52 ± 6 (5.3 ± 0.6 , 38.3 ± 4.3)

1. BRAKE DRUM AND SHOE

- 1) Loosen wheel nuts, jack-up vehicle, support it with rigid racks, and remove wheel.
- 2) Release parking brake.

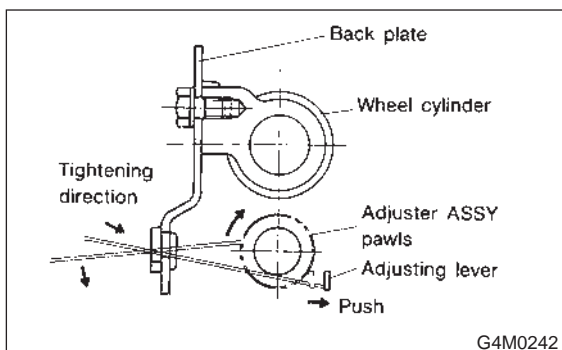
- 3) Remove brake drum from brake assembly.



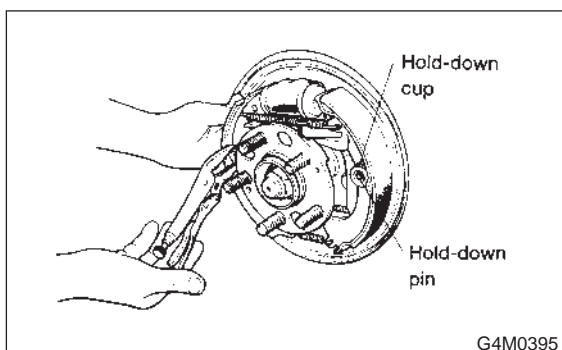
G4M0393

NOTE:

If it is difficult to remove brake drum, remove adjusting hole cover from back plate, and then, turn adjusting screw using a slot-type screwdriver until brake shoe separates from the drum.

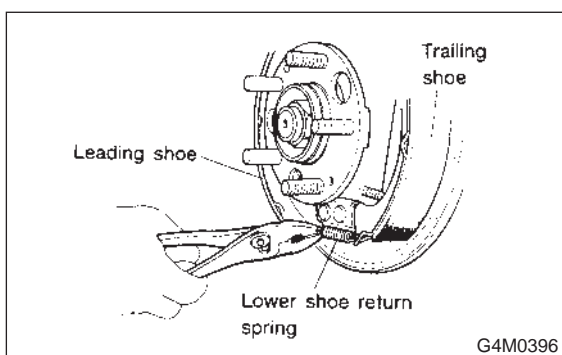


4) Hold hold-down pin by securing rear of back plate with your hand.



5) Disconnect hold-down cup from hold-down pin by rotating hold-down cup.

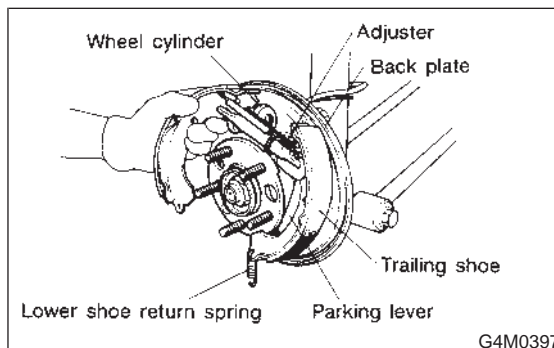
6) Disconnect lower shoe return spring from shoes.



7) Remove shoes one by one from back plate with adjuster.

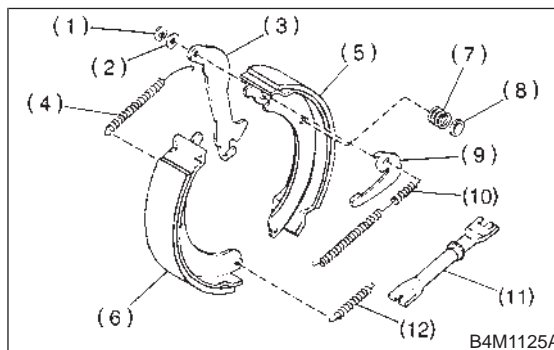
CAUTION:

Be careful not to bend parking brake cable excessively when removing brake shoes.



8) Disconnect parking brake cable from parking lever.

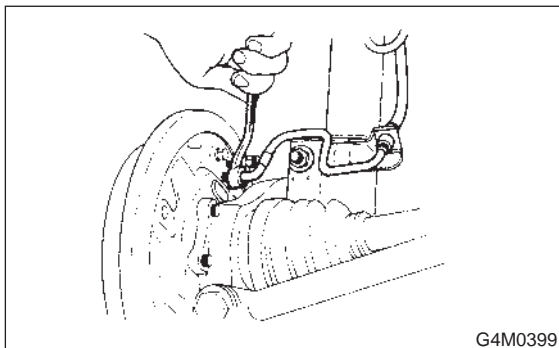
9) Remove the following.



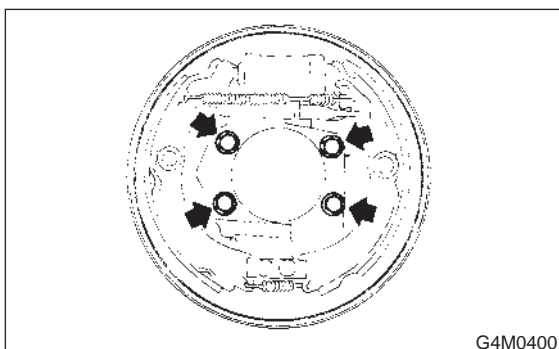
- (1) Retainer
- (2) Washer
- (3) Parking lever
- (4) Upper shoe return spring
- (5) Trailing shoe
- (6) Leading shoe
- (7) Shoe hold-down spring
- (8) Shoe hold-down cup
- (9) Adjusting lever
- (10) Adjuster spring
- (11) Adjuster
- (12) Lower shoe return spring

2. BRAKE ASSEMBLY

- 1) Remove wheel.
- 2) Remove axle nut.
- 3) Remove brake drum
- 4) Unscrew the brake pipe flare nut and disconnect brake pipe.

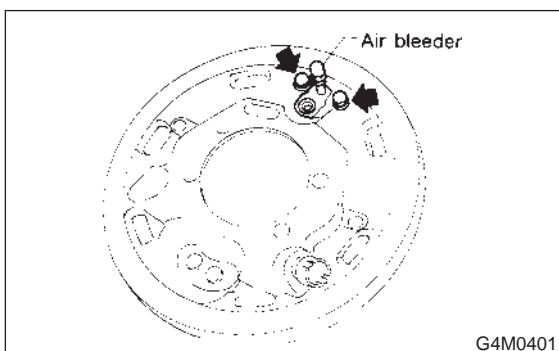


- 5) Remove hub. <Ref. to 4-2 [W2B0].>
- 6) Remove the bolts installing back plate, and then, remove brake assembly.



3. WHEEL CYLINDER

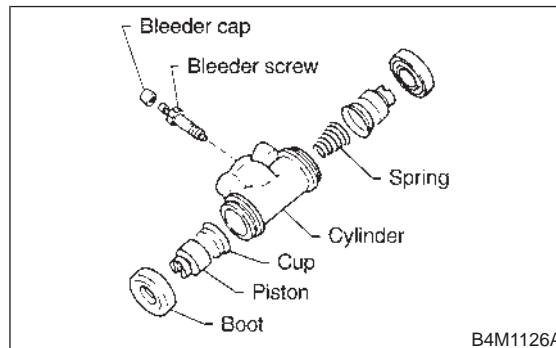
- 1) Remove brake drum and shoes.
- 2) Unscrew brake pipe flare nut; and disconnect brake pipe.
- 3) Remove the bolts installing wheel cylinder on back plate, and remove it.



B: DISASSEMBLY

1. WHEEL CYLINDER

- 1) Remove right and left dust boots from wheel cylinder.
- 2) Remove piston, cup, spring and air bleeder screw and cap.



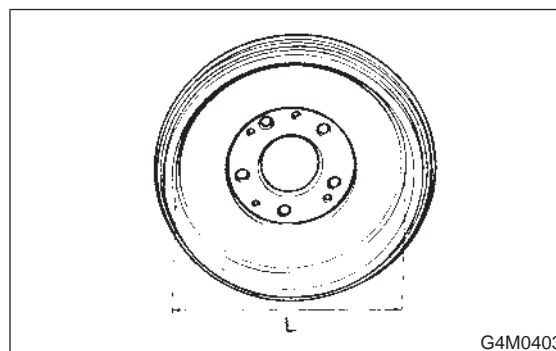
C: INSPECTION

- 1) If the inside surface of brake drum is streaked, correct the surface. And, if it is unevenly worn, taperingly streaked, or the outside surface of brake drum is damaged, correct or replace it.
- 2) Measure the drum inner diameter.

Drum inner diameter: "L"

Standard: 228.6 mm (9 in)

Service limit: 230.6 mm (9.08 in)



- 3) Measure the lining thickness.

Lining thickness:

Standard: 4.1 mm (0.161 in)

Service limit: 1.5 mm (0.059 in)

- 4) If the deformation or wear of back plate, shoe, etc. are notable, replace them.
- 5) When the shoe return spring tension is excessively weakened, replace it, taking care to identify upper and lower springs.

D: ASSEMBLY**1. WHEEL CYLINDER**

1) Clean all parts in brake fluid. Check and replace faulty parts.

- Cup and boot for damage or fatigue
- Cylinder, piston and spring or damage or rust formation

2) Assembly is the reverse order of disassembly.

(1) When installing the cup, use ST, apply brake fluid to the frictional surface for smooth installation and pay attention to cup direction.

(2) STs are available in different sizes.

CAUTION:

- When replacing the repair kit, make sure that the sizes of cylinder and cup are the same as those which were replaced.
- Use only the tool of the correct size.

ST: ADAPTER	
Applicable size	Part No.
19.05 mm (3/4 in)	926460000

CAUTION:

While assembling, be careful to prevent any metal chip, dust or dirt from entering the wheel cylinder.

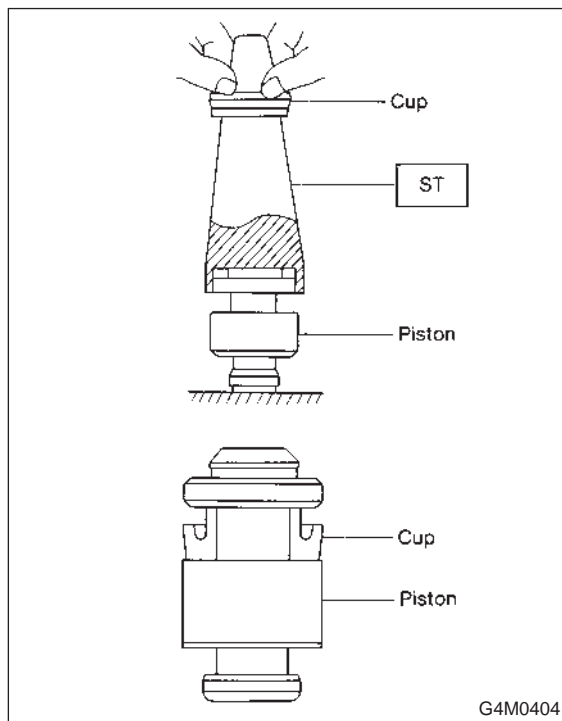
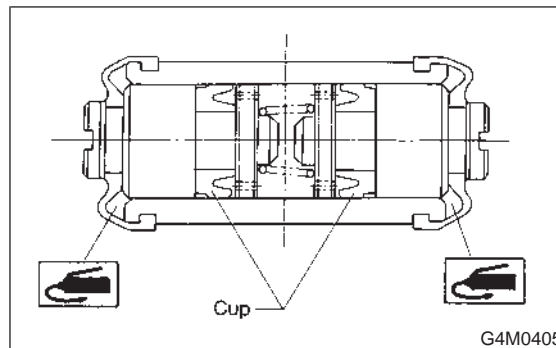
3) Apply rubber grease to the boot inside as shown in Figure.

Grease:

NIGLUBE RX-2 (Part No. 003606000)

CAUTION:

Never use brake grease.



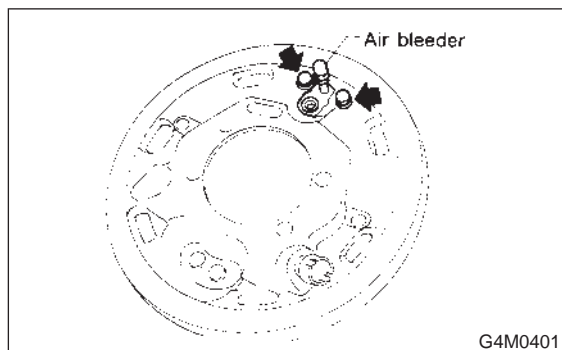
E: INSTALLATION

1. WHEEL CYLINDER

Install wheel cylinder on back plate, and tighten bolts.

Tightening torque:

$10 \pm 2 \text{ N}\cdot\text{m}$ ($1.0 \pm 0.2 \text{ kg}\cdot\text{m}$, $7.2 \pm 1.4 \text{ ft}\cdot\text{lb}$)

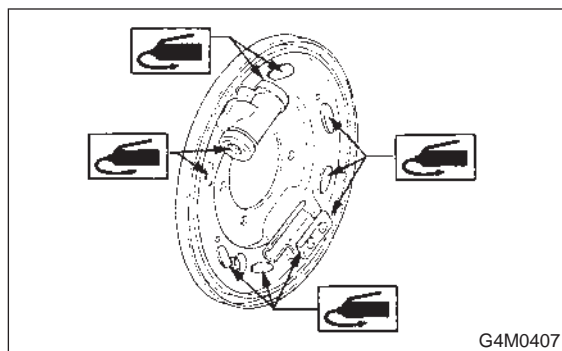


2. BRAKE DRUM AND SHOE

- 1) Clean back plate and wheel cylinder.
- 2) Apply grease to portions indicated by arrows in Figure.

Brake grease:

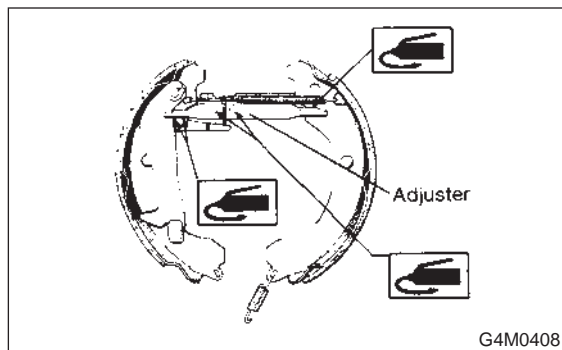
Dow Corning Molykote No. 7439 (Part No. 725191460)



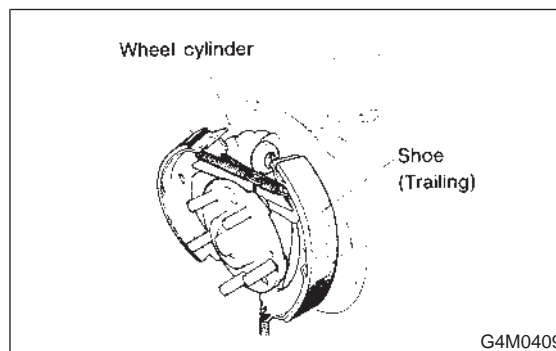
- 3) Apply grease to adjusting screw and both ends of adjuster.

Brake grease:

Dow Corning Molykote No. 7439 (Part No. 725191460)



- 4) Connect upper shoe return spring to shoes.
- 5) While positioning shoes (one at a time) in groove on wheel cylinder, secure shoes.



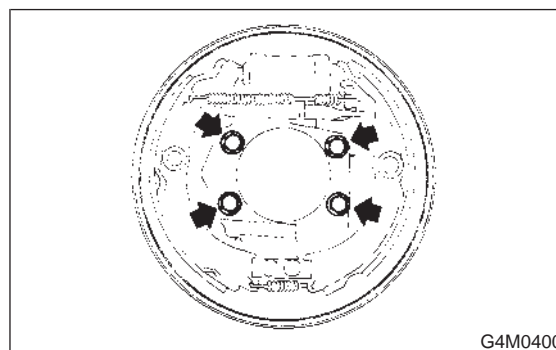
- 6) Connect lower shoe return spring.
- 7) Fix shoes by connecting hold-down cup to hold-down pin.

3. BRAKE ASSEMBLY

- 1) Install brake assembly on housing, and tighten bolts to install back plate.

Tightening torque:

$52 \pm 6 \text{ N}\cdot\text{m}$ ($5.3 \pm 0.6 \text{ kg}\cdot\text{m}$, $38.3 \pm 4.3 \text{ ft}\cdot\text{lb}$)



- 2) Install hub. <Ref. to 4-2 [W2D0].>
- 3) Connect brake pipe, and tighten brake pipe flange nut.

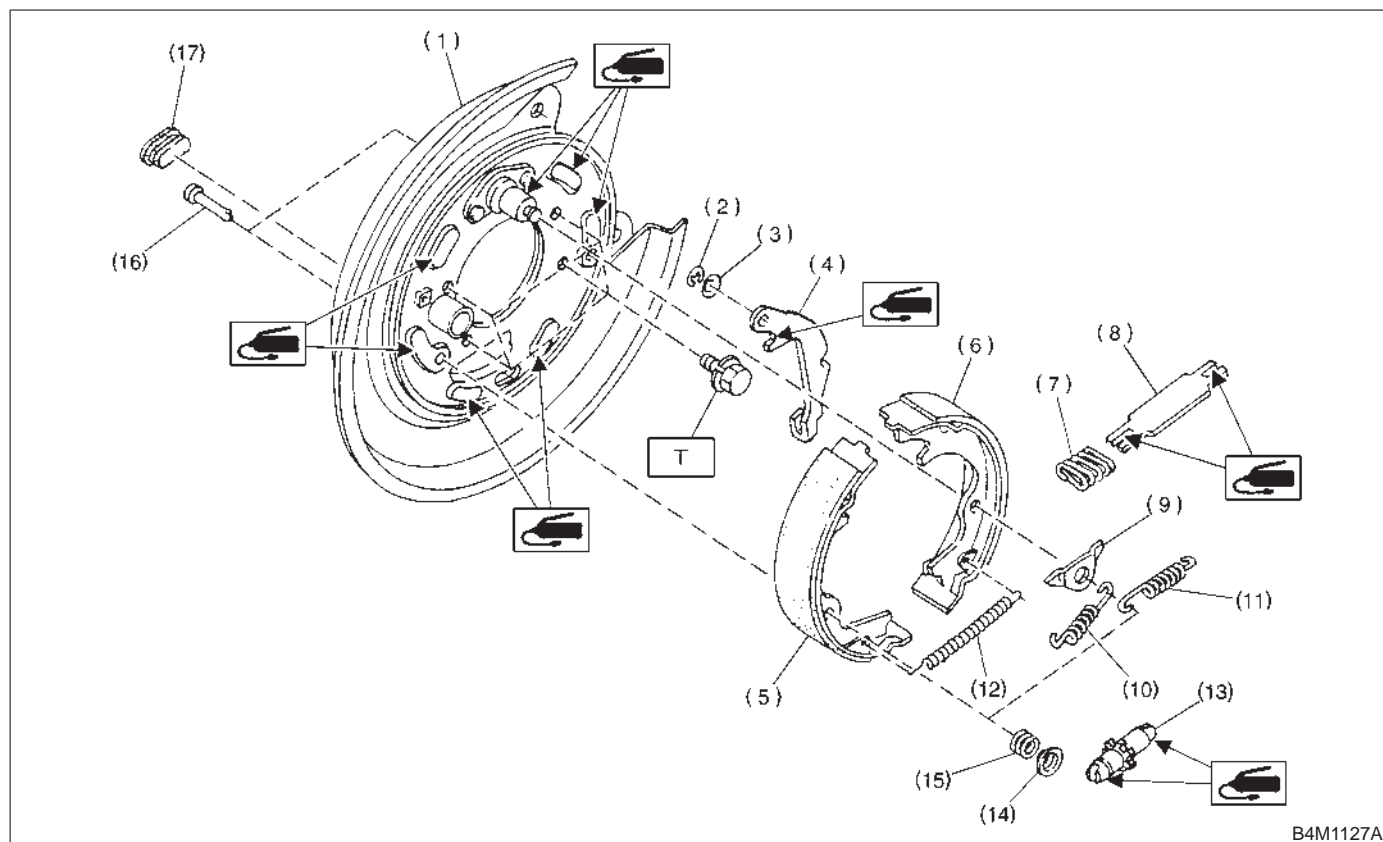
Tightening torque:

$14.7^{+3}_{-2} \text{ N}\cdot\text{m}$ ($1.5^{+0.3}_{-0.2} \text{ kg}\cdot\text{m}$, $10.8^{+2.2}_{-1.4} \text{ ft}\cdot\text{lb}$)

- 4) Set the outside diameter of brake shoes less than 0.5 — 0.8 mm (0.020 — 0.031 in) in comparison with the inside diameter of brake drum.
- 5) Install brake drum.
- 6) After installing brake assembly, bleed air from brake line.

4. Parking Brake (Rear Disc Brake)

A: REMOVAL



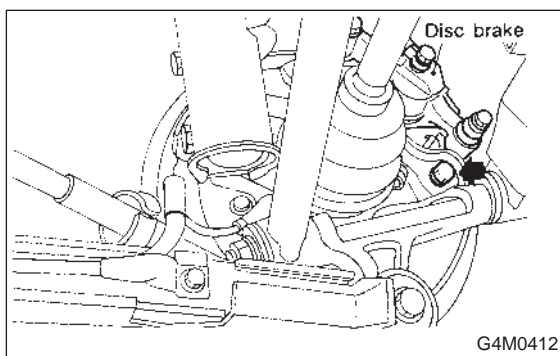
B4M1127A

- | | |
|------------------------------------|------------------------------|
| (1) Back plate | (8) Strut |
| (2) Retainer | (9) Shoe guide plate |
| (3) Spring washer | (10) Primary return spring |
| (4) Lever | (11) Secondary return spring |
| (5) Parking brake shoe (Primary) | (12) Adjusting spring |
| (6) Parking brake shoe (Secondary) | (13) Adjuster |
| (7) Strut | (14) Shoe hold-down cup |

- | |
|----------------------------|
| (15) Shoe hold down spring |
| (16) Shoe hold down pin |
| (17) Adjusting hole cover |

Tightening torque: N·m(kg·m, ft·lb)
T: 52±6 (5.3±0.6, 38.3±4.3)

1) Remove the two mounting bolts to the disc brake assembly and remove the disc brake assembly.



G4M0412

2) Suspend the disc brake assembly so that the hose is not stretched.

3) Remove the disc rotor.

4) Remove shoe return spring from parking brake assembly.

5) Remove front shoe hold down spring and pin with pliers.

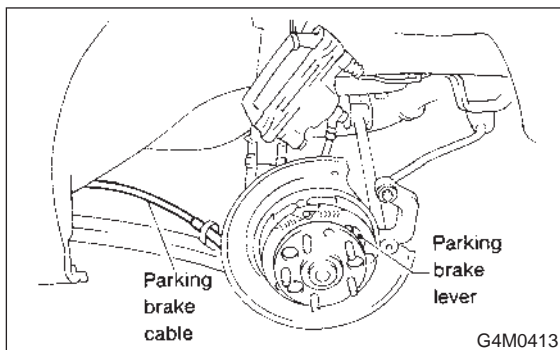
6) Remove strut and strut spring.

7) Remove adjuster assembly from parking brake assembly.

8) Remove brake shoe.

9) Remove rear shoe hold-down spring and pin with pliers.

- 10) Remove parking cable from parking lever.



- 11) Using a standard screwdriver, raise retainer. Remove parking lever and washer from brake shoe.

B: INSPECTION

- 1) Measure brake disc inside diameter. If the disc is scored or worn, replace the brake disc.

Disc inside diameter:

Standard

170 mm (6.69 in)

Service limit

171 mm (6.73 in)

- 2) Measure the lining thickness. If it exceeds the limit, replace shoe assembly.

Lining thickness:

Standard

3.2 mm (0.126 in)

Service limit

1.5 mm (0.059 in)

CAUTION:

Replace the brake shoes on the right and left brake assembly at the same time.

C: INSTALLATION

CAUTION:

Be sure lining surface is free from oil contamination.

Brake grease:

Dow Corning Molykote No 7439 (Part No. 725191460)

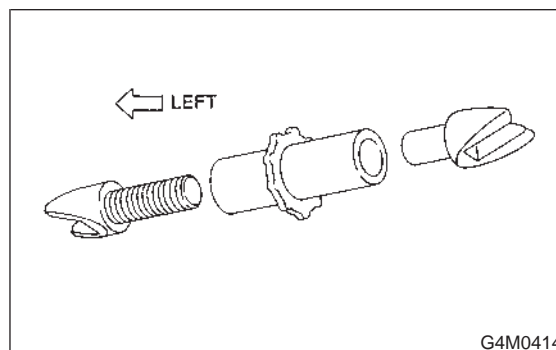
- 1) Apply brake grease to the following places.
 - Six contact surfaces of shoe rim and back plate packing
 - Contact surface of shoe wave and anchor pin
 - Contact surface of lever and strut
 - Contact surface of shoe wave and adjuster assembly
 - Contact surface of shoe wave and strut
 - Contact surface of lever and shoe wave
- 2) Installation is in reverse order of removal.

CAUTION:

- Use new retainers and clinch them when installing brake shoes to levers.
- Ensure that parking lever moves smoothly.
- Do not confuse left parking lever with right one.
- Do not confuse left strut with right one.

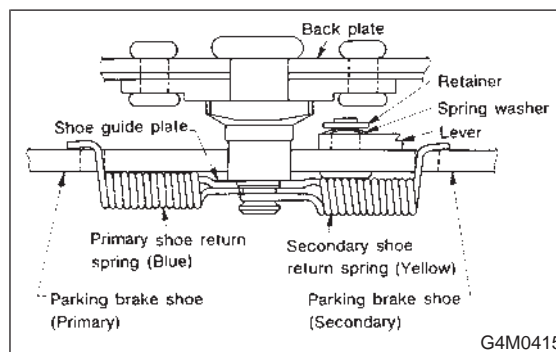
NOTE:

Ensure that adjuster assembly is securely installed with screw in the left side, facing vehicle front.



NOTE:

Ensure that shoe return spring is installed as shown in Figure.



- 3) Adjust parking brakes. <Ref. to 4-4 [W4D0].>

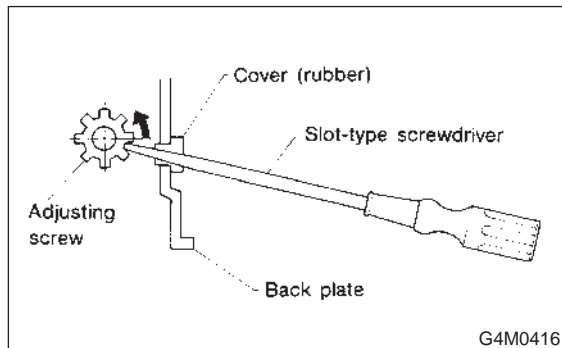
CAUTION:

After replacing parking brake lining, be sure to drive vehicle for "break-in" purposes.

- (1) Drive the vehicle about 35 km/h (22 MPH).
- (2) With the parking brake release button pushed in, pull the parking brake lever gently, pulling with a force of approximately 147 N (15 kg, 33 lb).
- (3) Drive the vehicle for about 200 m (0.12 mile) in this condition.
- (4) Wait 5 to 10 minutes for the parking brake to cool down. Repeat this procedure once more.
- (5) After breaking-in, re-adjust parking brakes.

D: ADJUSTMENT**1. SHOE CLEARANCE**

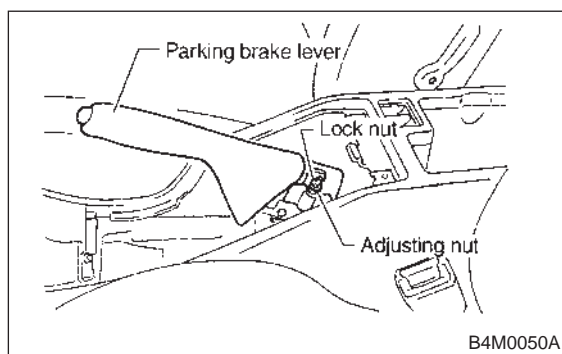
- 1) Remove adjusting hole cover from back plate.
- 2) Turn adjusting screw using a slot-type screwdriver until brake shoe is in close contact with disc rotor.



- 3) Turn back (downward) adjusting screw 3 or 4 notches.
- 4) Install adjusting hole cover to back plate.

2. LEVER STROKE

- 1) Remove console box lid.
- 2) Forcibly pull parking brake lever 3 to 5 times.
- 3) Adjust parking brake lever by turning adjusting nut until parking brake lever stroke is set at 7 to 8 notches with operating force of 196 N (20 kg, 44 lb).



- 4) Tighten lock nut.
- 5) Install console box lid.

Lever stroke:

7 to 8 notches when pulled with a force of 196 N (20 kg, 44 lb)

Tightening torque (Lock nut):

5.9±1.5 N·m (0.60±0.15 kg·m, 4.3±1.1 ft·lb)

5. Master Cylinder**A: REMOVAL**

- 1) Thoroughly drain brake fluid from reservoir tank.
- 2) Disconnect fluid level indicator harness connector.
- 3) Remove brake pipes from master cylinder.
- 4) Remove master cylinder mounting nuts, and take out master cylinder from brake booster.

CAUTION:

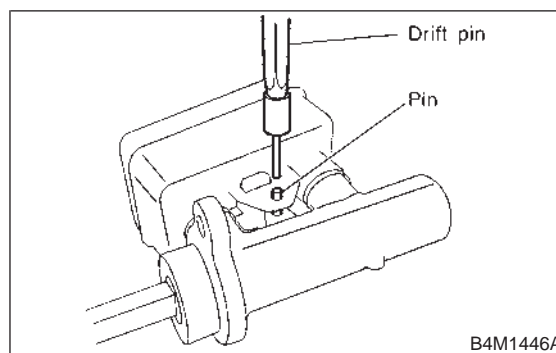
Be extremely careful not to spill brake fluid. Brake fluid spilt on the vehicle body will harm the painted surface; wipe it off quickly if spilt.

B: DISASSEMBLY**1. PRECAUTIONS FOR DISASSEMBLING**

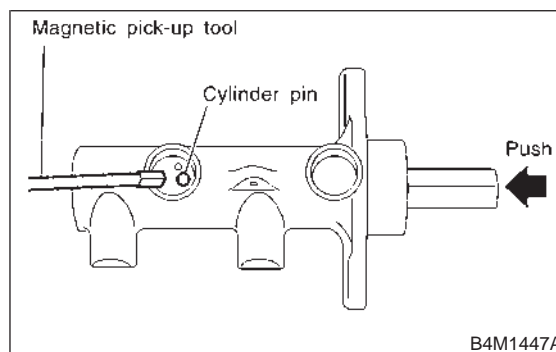
- 1) Remove mud and dirt from the surface of brake master cylinder.
- 2) Prepare tools necessary for disassembly operation, and arrange them neatly on work bench.
- 3) Clean work bench.

2. DISASSEMBLING PROCEDURE (WITH ABS VEHICLES)

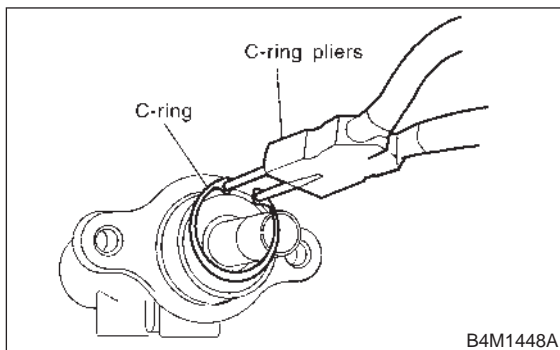
- 1) Remove pin with drift pin which secures reserve tank to master cylinder.



- 2) Remove cylinder pin with magnetic pick-up tool while pushing in primary piston.



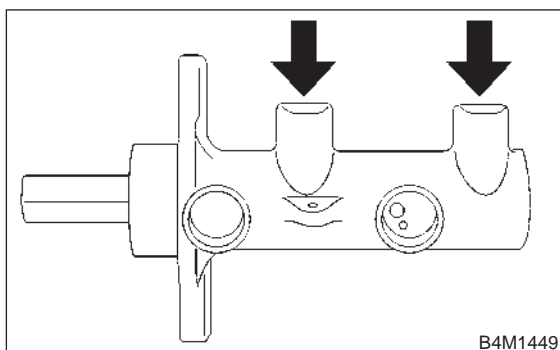
- 3) Remove C-ring with C-ring pliers.



- 4) Gradually supply compressed air via inlet of master cylinder to force piston out.

CAUTION:

- Piston may jump out from master cylinder.
- Do not apply excessively high-pressure.



CAUTION:

- Do not disassemble the piston assembly; otherwise, the spring set value may be changed.
- Use brake fluid or methanol to wash inside wall of cylinder, pistons and piston cups. Be careful not to damage parts when washing. If methanol is used for washing, do not dip rubber parts, such as piston cups, in it for more than 30 seconds; otherwise, they may become swelled.

C: INSPECTION

If any damage, deformation, wear, swelling, rust, and other faults are found on the primary piston assembly, secondary piston assembly, supply valve stopper, or gasket, replace the faulty part.

CAUTION:

- The primary and secondary pistons must be replaced as complete assemblies.
- The service limit of the clearance between each piston and the master cylinder inner dia. is 0.11 mm (0.0043 in).
- When handling parts, be extremely careful not to damage or scratch the parts, or let any foreign matter get on them.

D: ASSEMBLY

1. PRECAUTIONS FOR ASSEMBLING

- 1) When assembling, be sure to use recommended brake fluid.
- 2) Ensure that the inside wall of cylinder, pistons, and piston cups are free from dirt when assembling.
- 3) Be extremely careful not to damage, scratch, or dent cylinder inside wall, pistons, and piston cups.
- 4) Do not drop parts. Never attempt to use any part that has been dropped accidentally.

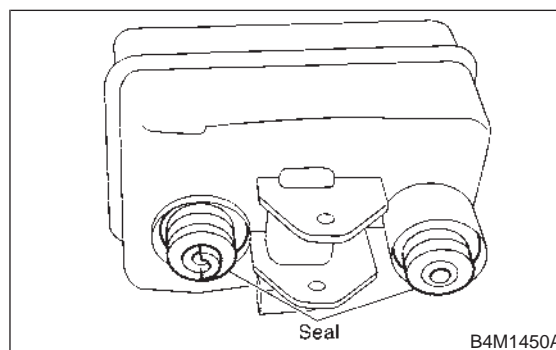
2. ASSEMBLING OPERATION

- 1) Assembling piston assembly:
Apply recommended brake fluid to inside wall of cylinder, and to outer surface of piston assembly, and install piston assemblies carefully into cylinder.
- 2) Assemble cylinder pin by pushing in primary piston.
- 3) Assemble plate and guide assembly.
- 4) Assemble C-ring.

CAUTION:

After assembling, ensure that the C-ring is fitted securely in the ring groove.

- 5) Install seal to reservoir tank.



- 6) Install pin with drift pins which secures reservoir tank to master cylinder.

E: INSTALLATION

To install the master cylinder to the body, reverse the sequence of removal procedure.

Tightening torque:

Master cylinder mounting nut
 $14 \pm 4 \text{ N}\cdot\text{m}$ ($1.4 \pm 0.4 \text{ kg}\cdot\text{m}$, $10.1 \pm 2.9 \text{ ft}\cdot\text{lb}$)

Piping flare nut
 $15^{+3}_{-2} \text{ N}\cdot\text{m}$ ($1.5^{+0.3}_{-0.2} \text{ kg}\cdot\text{m}$, $10.8^{+2.2}_{-1.4} \text{ ft}\cdot\text{lb}$)

CAUTION:

Be sure to use recommended brake fluid.

6. Brake Booster

A: REMOVAL

1) Remove the following parts at engine compartment.

- (1) Disconnect connector for brake fluid level indicator.
- (2) Remove brake pipes from master cylinder.
- (3) Remove master cylinder installing nuts.
- (4) Disconnect vacuum hose from brake booster.

2) Remove the following parts from the pedal bracket.

- (1) Snap pin and clevis pin.
- (2) Four brake booster installing nuts.

3) Remove brake booster while shunning brake pipes.

B: HANDLING PRECAUTIONS

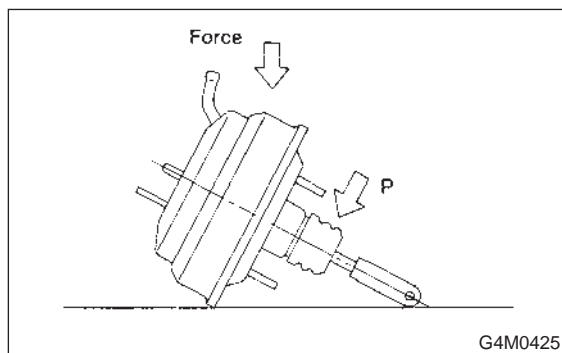
1) Be careful not to drop brake booster. Brake booster should be discarded if it has been dropped.

2) Use special care when handling operating rod. If excessive force is applied to operating rod, sufficient to cause a change in the angle in excess of $\pm 3^\circ$, it may result in damage to the power piston cylinder.

3) Use care when placing brake booster on the floor.

CAUTION:

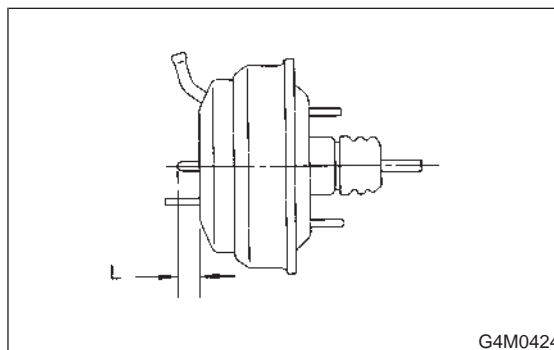
If external force is applied from above when brake booster is placed in this position, the resin portion as indicated by "P", may be damaged.



4) Do not change the push rod length. If it has been changed, reset the projected length "L" to the standard length.

Standard:

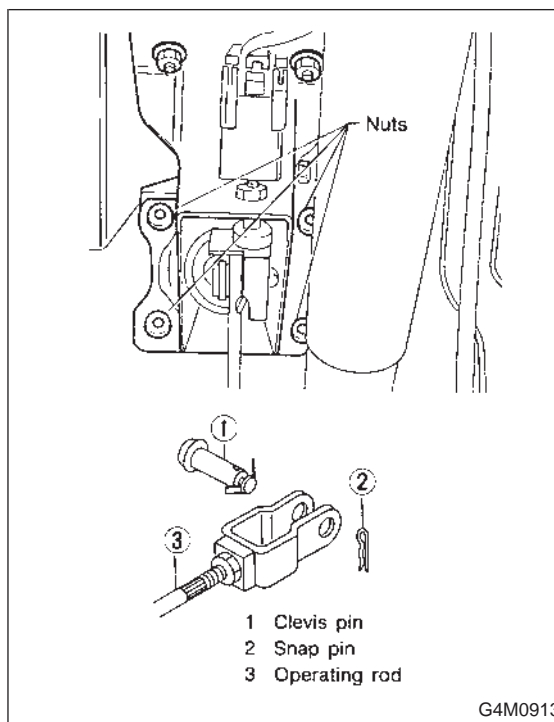
L = 10 mm (0.39 in)



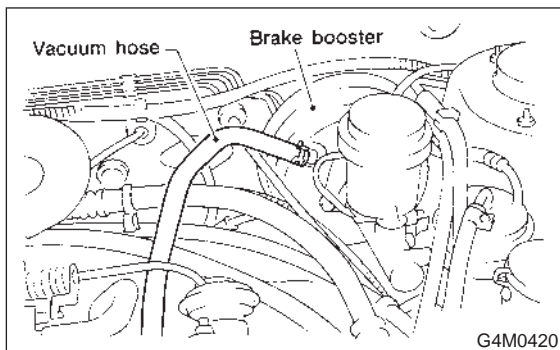
C: INSTALLATION

1) Mount brake booster in position.

2) Connect operating rod to brake pedal with clevis pin and snap pin.



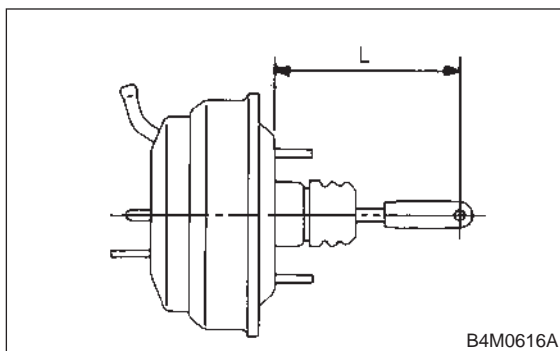
- 3) Connect vacuum hose to brake booster.



- 4) Mount master cylinder onto brake booster.
5) Connect brake pipes to master cylinder.
6) Connect electric connector for brake fluid level indicator.
7) Adjust operating rod of brake booster.

Standard: L
145.3 mm (5.72 in)

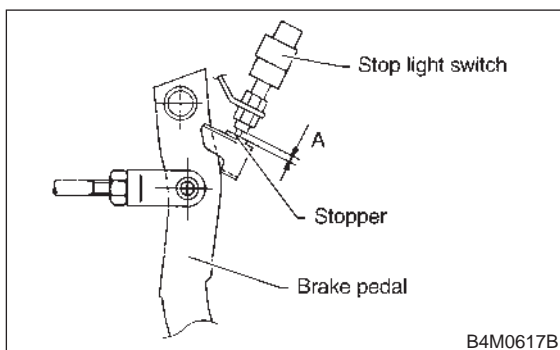
If it is not in specified value, adjust it by adjusting brake booster operating rod.



- 8) Measure the clearance between threaded end of stop light switch and stopper.
If it is not in specified value, adjust it by adjusting position of stop light switch.

CAUTION:
Be careful not to rotate stop light switch.

Stop light switch clearance: A
0.3 mm (0.012 in)



- 9) Apply grease to operating rod connecting pin to prevent it from wearing.

- 10) Bleed air from brake system.

Tightening torque (Air bleeder screw):
 8 ± 1 N·m (0.8 ± 0.1 kg·m, 5.8 ± 0.7 ft·lb)

- 11) Conduct road tests to ensure brakes do not drag.

D: OPERATION CHECK (WITHOUT USING GAUGES)

CAUTION:

When checking operation, be sure to securely apply the hand brake.

1. CHECKING WITHOUT USING GAUGES

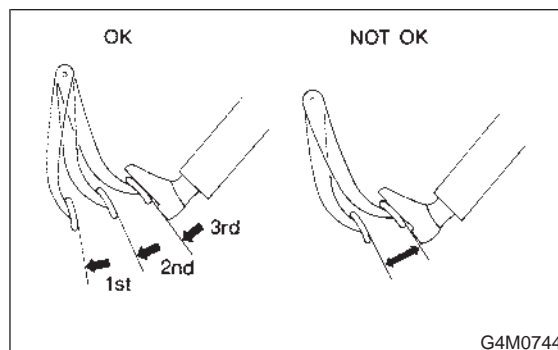
This method cannot determine the exact portion which has failed, but it can provide a rough understanding of the nature of the failure if checking is conducted in accordance with the following procedures.

2. AIR TIGHTNESS CHECK

Start engine, and run it for 1 to 2 minutes, then turn it off. Depress brake pedal several times applying the same pedal force as that used in ordinary braking operations. The pedal stroke should be greatest on the 1st depression, and it should become smaller with each successive depression. If no change occurs in the pedal height while in a depressed state, brake booster is faulty.

NOTE:

- In the event of defective operation, inspect the condition of the check valve and vacuum hose.
- Replace them if faulty and conduct the test again.
- If no improvement is observed, check precisely with gauges.

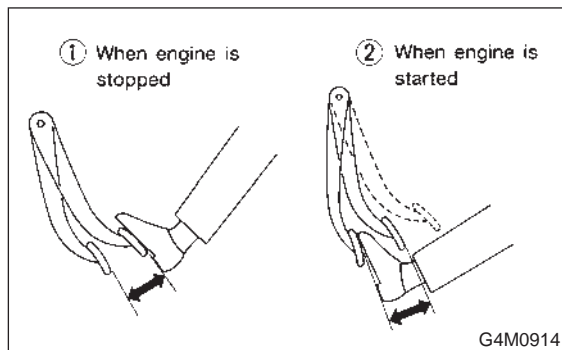


3. OPERATION CHECK

- 1) With engine off, depress brake pedal several times applying the same pedal force and make sure that the pedal height does not vary with each depression of the pedal.
- 2) With brake pedal depressed, start engine.
- 3) As engine starts, brake pedal should move slightly toward the floor. If no change occurs in the pedal height, brake booster is faulty.

NOTE:

If faulty, check precisely with gauges.



4. LOADED AIR TIGHTNESS CHECK

Depress brake pedal while engine is running, and turn off engine while the pedal is still depressed. Keep the pedal depressed for 30 seconds; if no change occurs in the pedal height, brake booster is functioning normally; if the pedal height increases, it is faulty.

NOTE:

If faulty, check precisely with gauges.

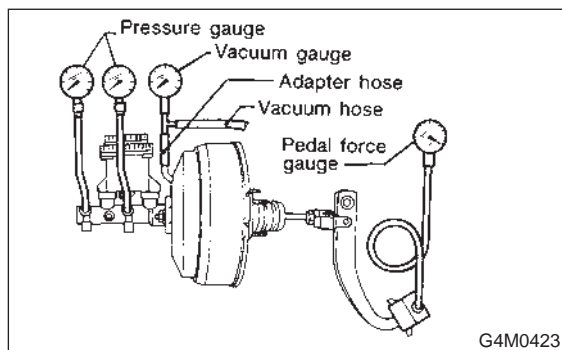
E: OPERATION CHECK (WITH GAUGES)

CAUTION:

When checking operation, be sure to securely apply the hand brake.

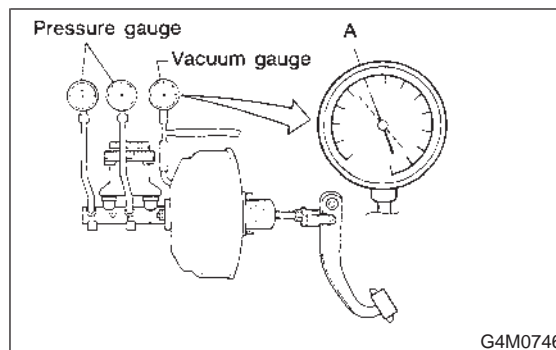
1. CHECKING WITH GAUGES

Connect gauges as shown in Figure. After bleeding air from pressure gauges, proceed to each check.



2. AIR TIGHTNESS CHECK

- 1) Start engine and keep it running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point A is indicated on vacuum gauge. Do not depress brake pedal.

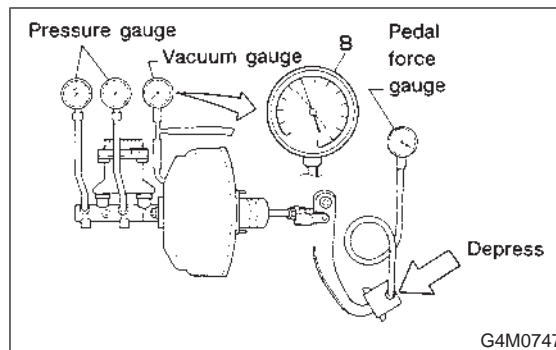


- 2) Stop engine and watch the gauge. If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping engine, brake booster is functioning properly. If defective, the cause may be one of those listed below.

- Check valve malfunction
- Leak from vacuum hose
- Leak from the shell jointed portion or stud bolt welded portion
- Damaged diaphragm
- Leak from valve body seal and bearing portion
- Leak from plate and seal assembly portion
- Leak from poppet valve assembly portion

3. LOADED AIR TIGHTNESS CHECK

- 1) Start engine and depress brake pedal with pedal force of 196 N (20 kg, 44 lb). Keep engine running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point B is indicated on vacuum gauge while the pedal is still depressed.



- 2) Stop engine and watch vacuum gauge. If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping engine, brake booster is functioning properly. If defective, refer to "AIR TIGHTNESS CHECK". <Ref. to 4-4 [W6E2].>

4. LACK OF BOOSTING ACTION CHECK

Turn off engine, and set the vacuum gauge reading at "0". Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed below.

Brake pedal force	147N (15 kg, 33 lb)	294N (30kg, 66 lb)
Models without ABS	785 kPa (8 kg/cm ² , 114 psi)	2,158 kPa (22 kg/cm ² , 313 psi)
Models with ABS	588 kPa (6 kg/cm ² , 85 psi)	1,863 kPa (19 kg/cm ² , 270 psi)

5. BOOSTING ACTION CHECK

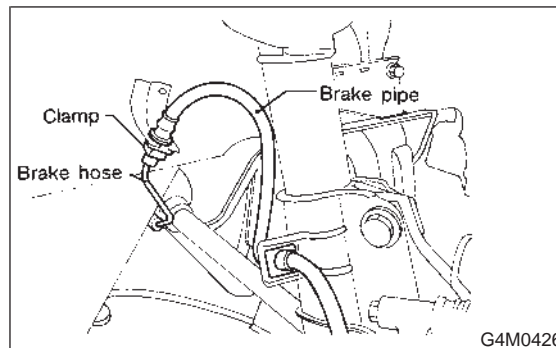
Set the vacuum gauge reading at 66.7 kPa (500 mmHg, 19.69 inHg) by running engine. Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed below.

Brake pedal force	147N (15 kg, 33 lb)	294N (30kg, 66 lb)
Models without ABS	5,492 kPa (56 kg/cm ² , 796 psi)	8,434 kPa (86 kg/cm ² , 1,223 psi)
Models with ABS	5,394 kPa (55 kg/cm ² , 782 psi)	9,219 kPa (94 kg/cm ² , 1,337 psi)

7. Brake Hose

A: REMOVAL

- 1) Separate brake pipe from brake hose.
(Always use flare nut wrench and be careful not to deform flare nut.)



- 2) Pull out clamp to remove brake hose.
- 3) Remove clamp at strut and union bolt.

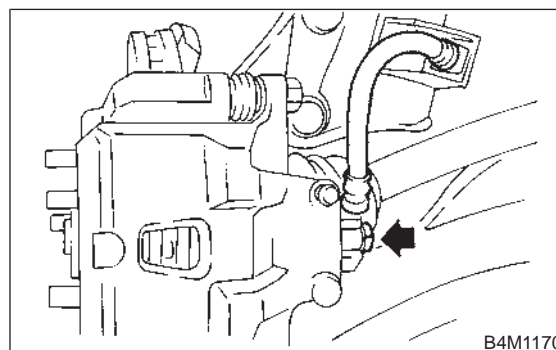
B: INSTALLATION

1. FRONT BRAKE HOSE

- 1) Route end of brake hose (on caliper side) through hole in brake hose bracket at strut location.
- 2) Tighten end of brake hose at caliper using a union bolt.

Torque (Union bolt):

18±3 N·m (1.8±0.3 kg-m, 13.0±2.2 ft-lb)



- 3) Secure middle fitting of brake hose to bracket at strut location using a clamp.
- 4) Position disc in straight-forward direction and route brake hose through hole in bracket on wheel apron side.

CAUTION:

Be sure brake hose is not twisted.

- 5) Temporarily tighten flare nut to connect brake pipe and hose.
- 6) Fix brake hose with clamp at wheel apron bracket.

7) While holding hexagonal part of brake hose fitting with a wrench, tighten flare nut to the specified torque.

Torque (Brake pipe flare nut):

14.7^{+3}_{-2} N·m ($1.5^{+0.3}_{-0.2}$ kg-m, $10.8^{+2.2}_{-1.4}$ ft-lb)

8) Bleed air from the brake system.

2. REAR BRAKE HOSE

- 1) Pass brake hose through the hole of bracket, and lightly tighten flare nut to connect brake pipe.
- 2) Insert clamp upward to fix brake hose.
- 3) Perform the same procedures as before mentioned in steps 7) and 8).

8. Parking Brake Lever

A: REPLACEMENT

- 1) Remove console box from front floor.
- 2) Disconnect electric connector for parking brake switch.
- 3) Loosen parking brake adjuster, and remove inner cable end from equalizer.
- 4) Remove parking brake lever.
- 5) Install parking brake lever in the reverse order of removal.

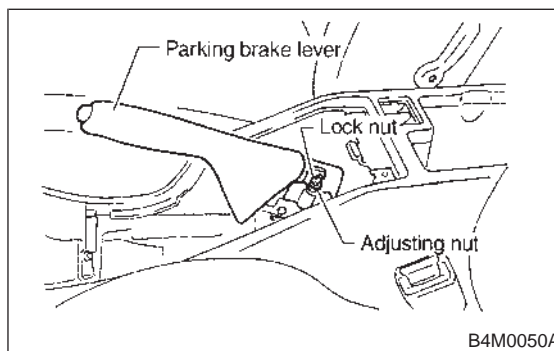
Tightening torque (Lever installing bolt and nut):

18 ± 5 N·m (1.8 ± 0.5 kg-m, 13.0 ± 3.6 ft-lb)

- 6) Adjust parking brake lever by turning adjusting nut until parking brake lever stroke is set at 7 to 8 notches with operating force of 196 N (20 kg, 44 lb).
- 7) Tighten lock nut.

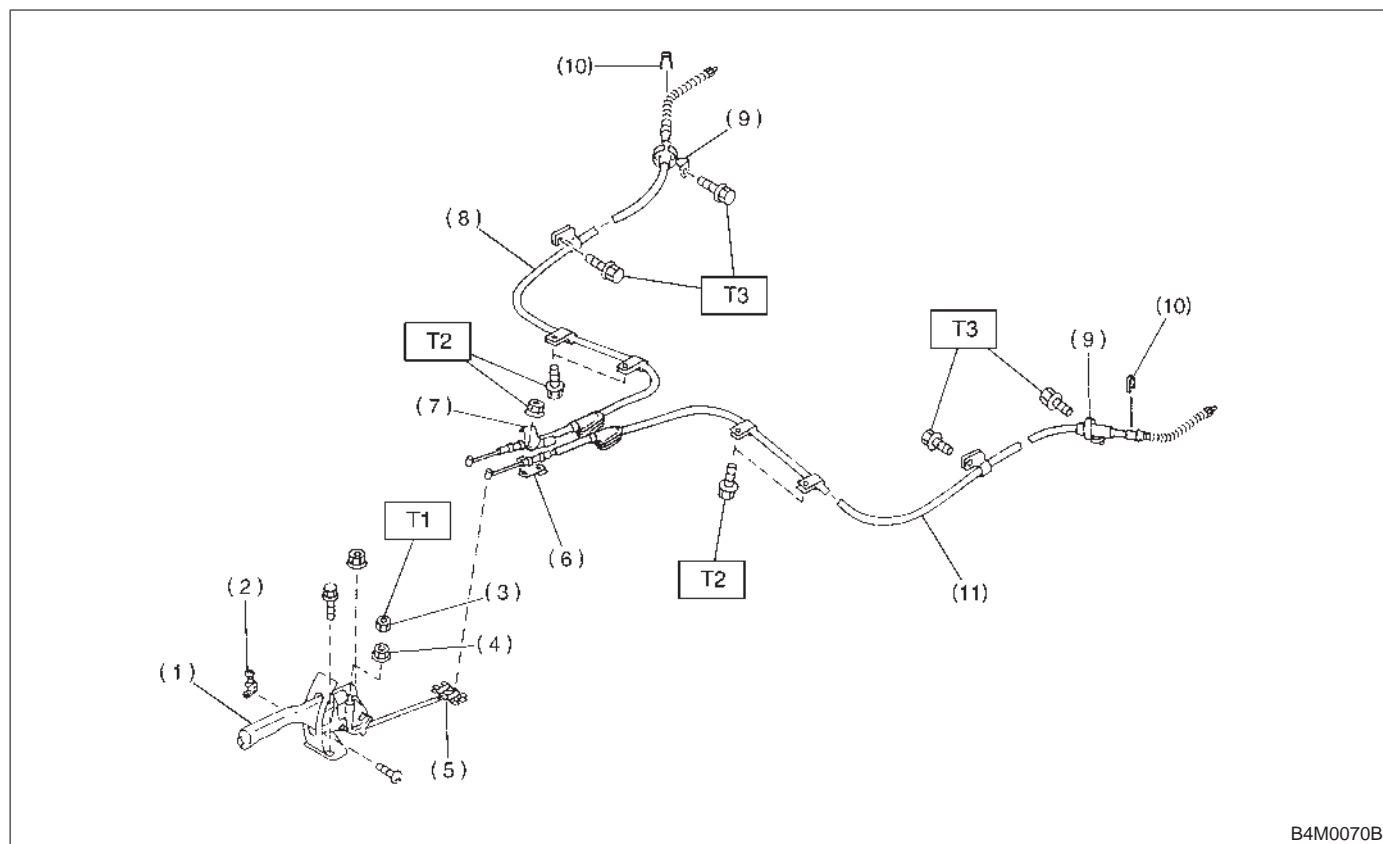
Tightening torque (Lock nut):

5.9 ± 1.5 N·m (0.60 ± 0.15 kg-m, 4.3 ± 1.1 ft-lb)



9. Parking Brake Cable

A: REPLACEMENT



B4M0070B

- | | |
|--------------------------|---|
| (1) Parking brake lever | (7) Clamp |
| (2) Parking brake switch | (8) Parking brake cable RH |
| (3) Lock nut | (9) Cable guide |
| (4) Adjusting nut | (10) Clamp (Rear disc brake model only) |
| (5) Equalizer | (11) Parking brake cable LH |
| (6) Bracket | |

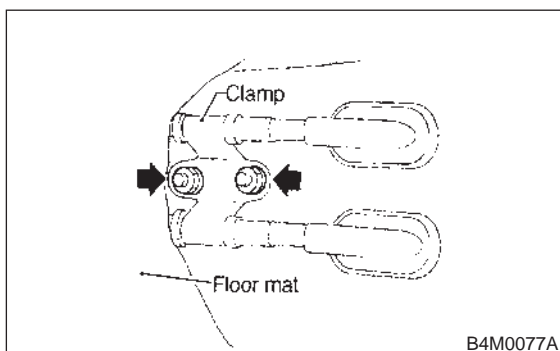
Tightening torque: N-m (kg-m, ft-lb)

T1: 5.9±1.5 (0.60±0.15, 4.3±1.1)

T2: 18±5 (1.8±0.5, 13.0±3.6)

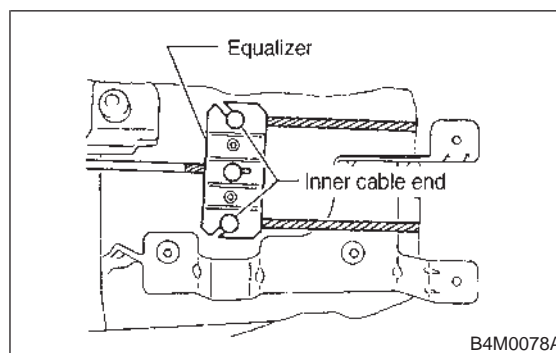
T3: 32±10 (3.3±1.0, 24±7)

- 1) Lift-up vehicle.
- 2) Remove rear wheels.
- 3) Remove rear cushion.
- 4) Remove console box from front floor.
- 5) Loosen parking cable adjusting nut.
- 6) Roll up floor mat and remove clamps.



B4M0077A

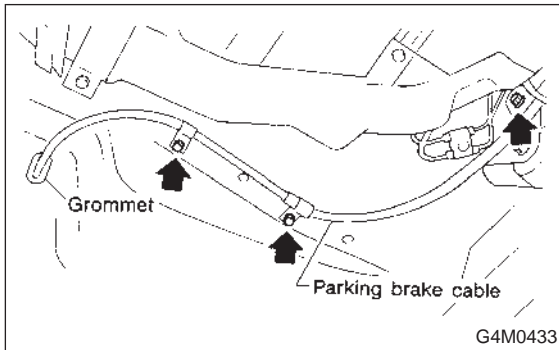
- 7) Remove inner cable end from equalizer.



B4M0078A

- 8) Pull out parking brake cable from parking brake assembly. <Ref. to 4-4 [W4A0].> or <Ref. to 4-4 [W3A0].>
- 9) Pull out clamp from parking brake assembly.
- 10) Remove bolt and bracket from trailing link bracket.

- 11) Remove bolt and clamp from rear floor.



- 12) Detach grommet from rear floor.
13) Remove cable assembly from cabin by forcibly pulling it backward.
14) Detach parking brake cable from cable guide at rear trailing link.
15) Install parking brake assembly in the reverse order of removal.

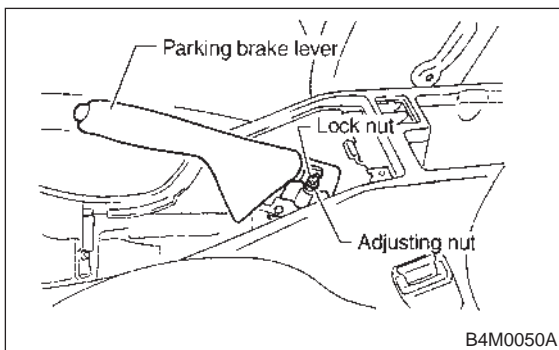
NOTE:

- Be sure to pass cable through cable guide inside the tunnel.
- Be sure to adjust the shoe clearance. (Rear disc brake only) <Ref. to 4-4 [W4D1].>

- 16) Adjust parking brake lever by turning adjusting nut until parking brake lever stroke is set at 7 to 8 notches with operating force of 196 N (20 kg, 44 lb).
17) Tighten lock nut.

Tightening torque (Lock nut):

$5.9 \pm 1.5 \text{ N-m}$ ($0.60 \pm 0.15 \text{ kg-m}$, $4.3 \pm 1.1 \text{ ft-lb}$)



10. Air Bleeding

A: GENERAL RULES FOR EFFECTIVE BLEEDING

- 1) Start with the brakes (wheels) connecting to the secondary chamber of the master cylinder.
- 2) The time interval between two brake pedal operations (from the time when the pedal is released to the time when it is depressed another time) shall be approximately 3 seconds.
- 3) The air bleeder on each brake shall be released for 1 to 2 seconds.

B: BLEEDING PROCEDURE

CAUTION:

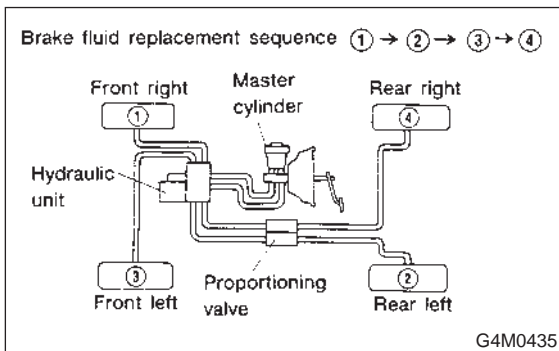
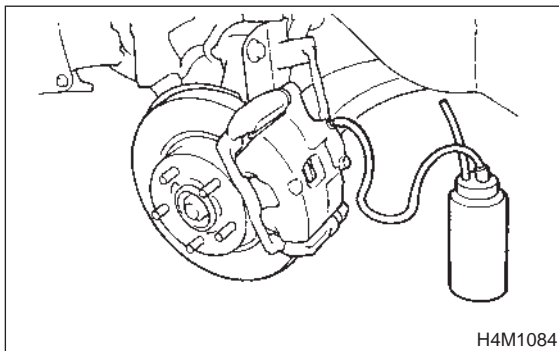
- The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
- Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:

- During bleeding operation, keep the brake reserve tank filled with brake fluid to eliminate entry of air.
- Brake pedal operating must be very slow.
- For convenience and safety, it is advisable to have two men working.

- 1) Make sure that there is no leak from joints and connections of the brake system.

- 2) Fit one end of vinyl tube into the air bleeder and put the other end into a brake fluid container.



- 3) Slowly depress the brake pedal and keep it depressed. Then, open the air bleeder to discharge air together with the fluid. Release air bleeder for 1 to 2 seconds. Next, with the bleeder closed, slowly release the brake pedal. Repeat these steps until there are no more air bubbles in the vinyl tube. Allow 3 to 4 seconds between two brake pedal operations.

CAUTION:

Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.

NOTE:

Brake pedal operating must be very slow.

- 4) Tighten air bleeder securely when no air bubbles are visible.

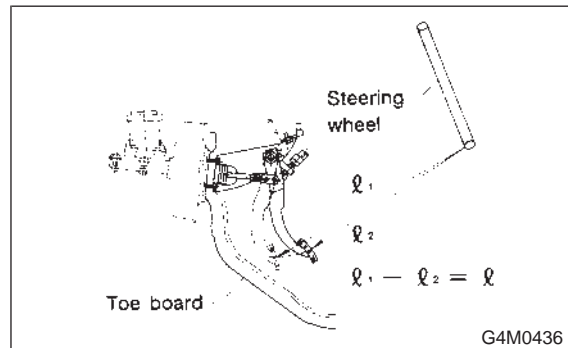
Air bleeder tightening torque:

$8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)

- 5) Perform these steps for the brakes connecting to the secondary chamber of master cylinder, first, and then for the ones connecting to primary chamber. With all procedures completed, fully depress the brake pedal and keep it in that position for approximately 20 seconds to make sure that there is no leak evident in the entire system.
- 6) Perform sequence control. (With ABS model) <Ref. to 4-4 [W14D0].>

- 7) Check the pedal stroke.

While the engine is idling, depress the brake pedal with a 490 N (50 kg, 110 lb) load and measure the distance between the brake pedal and steering wheel. With the brake pedal released, measure the distance between the pedal and steering wheel again. The difference between the two measurements must be more than specified.



Specified pedal stroke:

Without ABS

90 mm (3.54 in)

With ABS

95 mm (3.74 in)

When depressing brake pedal with a 490 N (50 kg, 110 lb) load.

- (1) Models without ABS

If the distance is more than specifications, there is a possibility that air is in the brake line. Bleed air from the brake line.

- (2) Models with ABS

If the distance is more than specifications, there is a possibility air is in the inside of the hydraulic unit. Therefore, air must be bled from the inside of the hydraulic unit to the brake pipes in accordance with the bleeding sequence control. <Ref. to 4-4 [W14D0].>

- 8) Add brake fluid to the required level (MAX. level) of reserve tank.

- 9) As a final step, test run the vehicle at low speed and apply brakes relatively hard 2 to 3 times to ensure that brakes provide normal braking action on all four wheels without dragging and uneven braking.

11. Brake Fluid

A: REPLACEMENT

CAUTION:

- To always maintain the brake fluid characteristics, replace the brake fluid according to maintenance schedule or earlier than that when used in severe condition.
- The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
- Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:

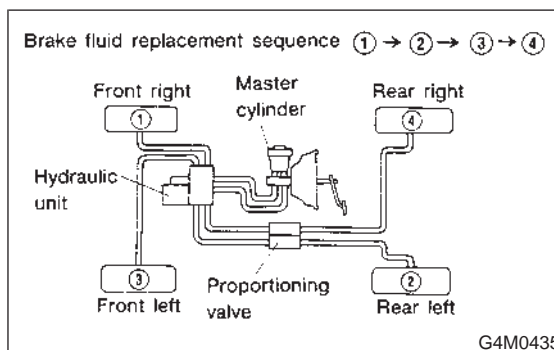
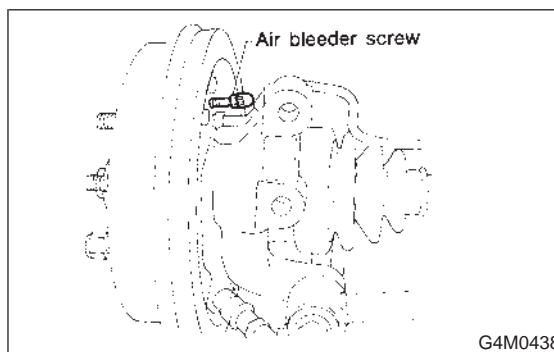
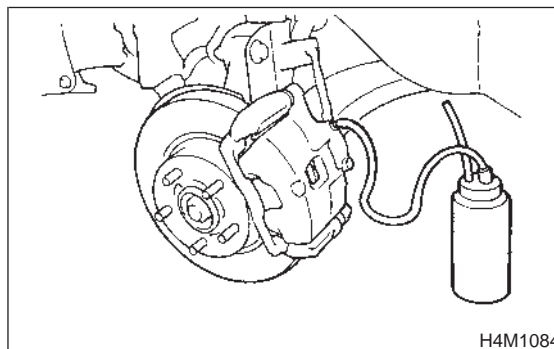
- During bleeding operation, keep the brake reserve tank filled with brake fluid to eliminate entry of air.
- Brake pedal operating must be very slow.
- For convenience and safety, it is advisable to have two men working.
- The amount of brake fluid required is approximately 500 ml (16.9 US fl oz, 17.6 Imp fl oz) for total brake system.

- 1) Either jack-up vehicle and place a safety stand under it, or lift-up vehicle.
- 2) Remove both front and rear wheels.
- 3) Draw out the brake fluid from master cylinder with syringe.
- 4) Refill reservoir tank with recommended brake fluid.

Recommended brake fluid:

FMVSS No. 116, fresh DOT3 or 4 brake fluid

- 5) Install one end of a vinyl tube onto the air bleeder and insert the other end of the tube into a container to collect the brake fluid.



- 6) Instruct your co-worker to depress the brake pedal slowly two or three times and then hold it depressed.
- 7) Loosen bleeder screw approximately 1/4 turn until a small amount of brake fluid drains into container, and then quickly tighten screw.
- 8) Repeat again from the two former procedures above until there are no air bubbles in drained brake fluid and new fluid flows through vinyl tube.

NOTE:

Add brake fluid as necessary while performing the air bleed operation, in order to prevent the tank from running short of brake fluid.

- 9) After completing the bleeding operation, hold brake pedal depressed and tighten screw and install bleeder cap.

Tightening torque (Bleeder screw): **$8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)**

10) Bleed air from each wheel cylinder using the same procedures as described in steps 6) through 7) above.

11) Depress brake pedal with a force of approximately 294 N (30 kg, 66 lb) and hold it there for approximately 20 seconds. At this time check pedal to see if it shows any unusual movement. Visually inspect bleeder screws and brake pipe joints to make sure that there is no fluid leakage.

12) Install wheels, and drive car for a short distance between 2 to 3 km (1 to 2 miles) to make sure that brakes are operating properly.

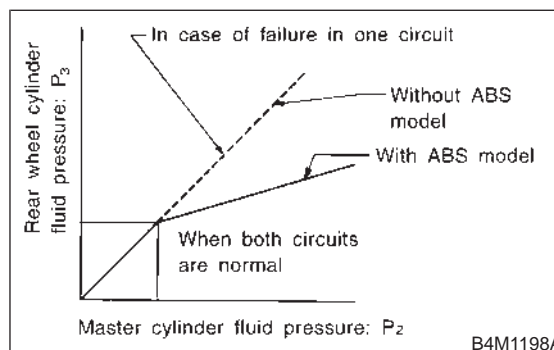
12. Proportioning Valve**A: INSPECTION**

1) Install the oil pressure gauges to measure the master cylinder fluid pressure (front wheel brake fluid pressure) and rear wheel cylinder fluid pressure.

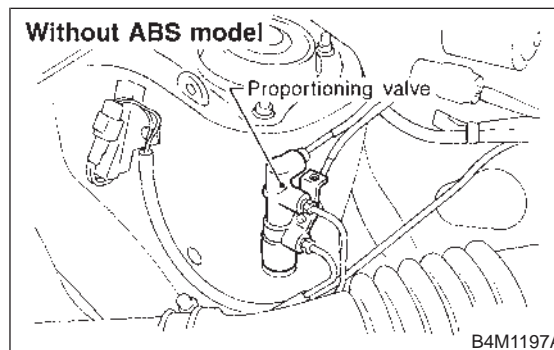
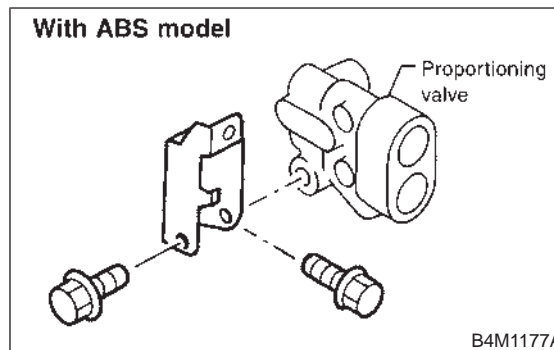
2) Bleed air from the oil pressure gauges.

3) Check the master cylinder fluid pressure and rear wheel cylinder fluid pressure.

The standard values are shown in Figure.



4) For the oil pressure in case of split point, <Ref. to 4-4 [S100].>

B: REMOVAL

1) Remove brake pipe from proportioning valve at four places.

2) Remove proportioning valve from its bracket.

CAUTION:

Do not disassemble or adjust the proportioning valve. (The proportioning valve must be replaced as an assembly.)

C: INSTALLATION

- 1) Install proportioning valve to bracket.
- 2) Connect brake pipes correctly to proportioning valve.
- 3) Bleed air, then check each joint of brake pipe for oil leaks.

Tightening torque:

Proportioning valve to brake pipe flare nut:

15^{+3}_{-2} N·m ($1.5^{+0.3}_{-0.2}$ kg-m, $10.8^{+2.2}_{-1.4}$ ft-lb)

Proportioning valve to bracket (Normal brake vehicle):

22 ± 4.4 N·m (2.25 ± 0.45 kg-m, 16.3 ± 3.3 ft-lb)

Proportioning valve to bracket (ABS equipped vehicle):

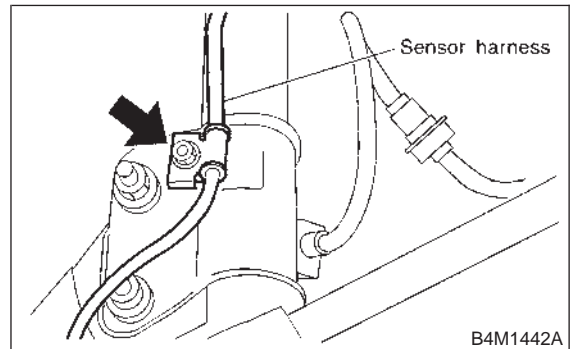
18 ± 5 N·m (1.8 ± 0.5 kg-m, 13.0 ± 3.6 ft-lb)

13. ABS Sensor

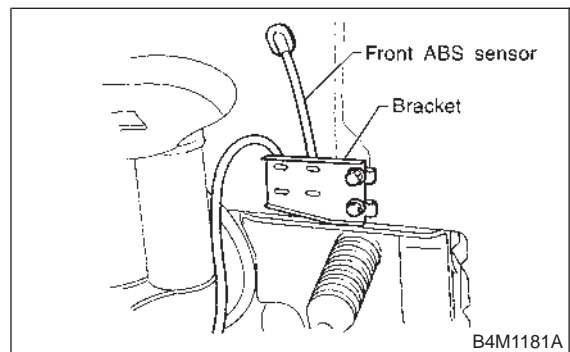
A: REMOVAL

1. FRONT ABS SENSOR

- 1) Disconnect front ABS sensor connector located in engine compartment.
- 2) Remove bolts which secure sensor harness to strut.



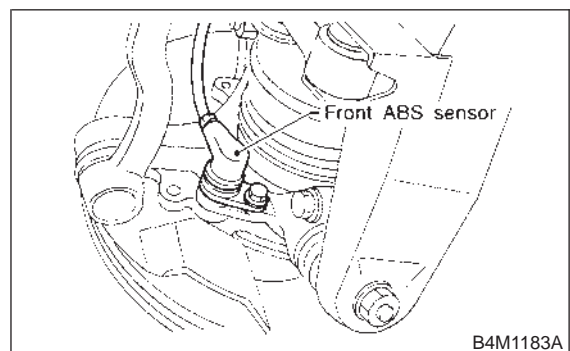
- 3) Remove bolts which secure sensor harness to body.



- 4) Remove bolts which secure front ABS sensor to housing, and remove front ABS sensor.

CAUTION:

- Be careful not to damage pole piece located at tip of the sensor and teeth faces during removal.
- Do not pull sensor harness during removal.

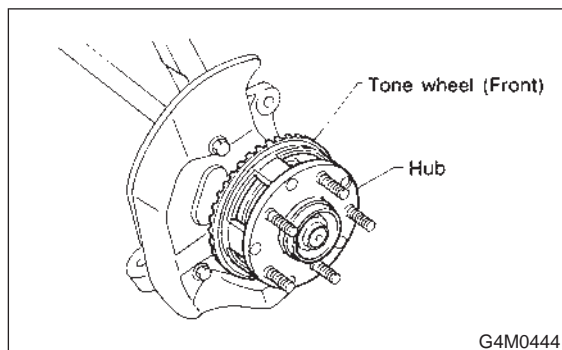


- 5) Remove front disc brake caliper and disc rotor from housing after removing front tire.

- 6) Remove front drive shaft and housing and hub assembly. <Ref. to 4-2 [W1A0].>
- 7) Remove tone wheel while removing hub from housing and hub assembly. <Ref. to 4-2 [W1B0].>

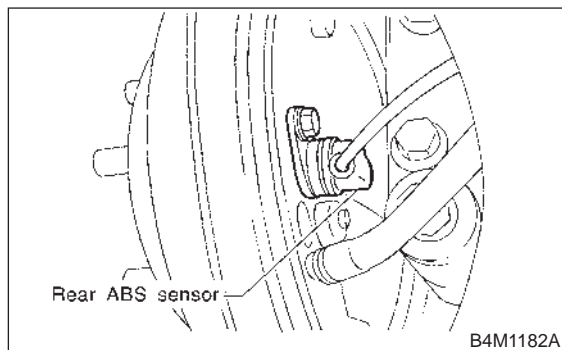
CAUTION:

Be careful not to damage teeth faces of tone wheel during removal.



2. REAR ABS SENSOR

- 1) Remove rear seat and disconnect rear ABS sensor connector.
- 2) Remove rear sensor harness bracket from rear trailing link and bracket.
- 3) Remove rear ABS sensor from rear back plate.



- 4) Remove rear tone wheel while removing hub from housing and hub assembly. <Ref. to 4-2 [W2A0].>

CAUTION:

- Be careful not to damage pole piece located at tip of the sensor and teeth faces during removal.
- Do not pull sensor harness during removal.

B: INSPECTION

1. ABS SENSOR

- 1) Check pole piece of ABS sensor for foreign particles or damage. If necessary, clean pole piece or replace ABS sensor.

- 2) Measure ABS sensor resistance.

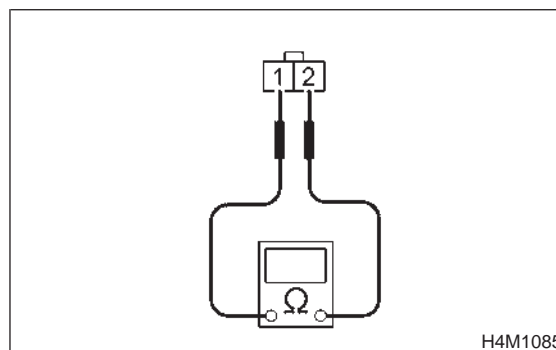
CAUTION:

If resistance is outside the standard value, replace ABS sensor with new one.

NOTE:

Check ABS sensor cable for discontinuity. If necessary, replace with a new one.

ABS sensor	Terminal No.	Standard
Front - LH	1 and 2	1.0±0.2 kΩ
Front - RH	1 and 2	
Rear - LH	1 and 2	
Rear - RH	1 and 2	



2. TONE WHEEL

- 1) Check tone wheel's teeth (44 pieces) for cracks or dents. If necessary, replace tone wheel with a new one.
- 2) Clearances (sensor gaps) should be measured one by one to ensure tone wheel and speed sensor are installed correctly.

NOTE:

- If clearance is narrow, adjust by using spacer (Part No. 26755AA000).
- If clearance is wide, check the outputted voltage then replace ABS sensor or tone wheel if the outputted voltage is outside the specification.

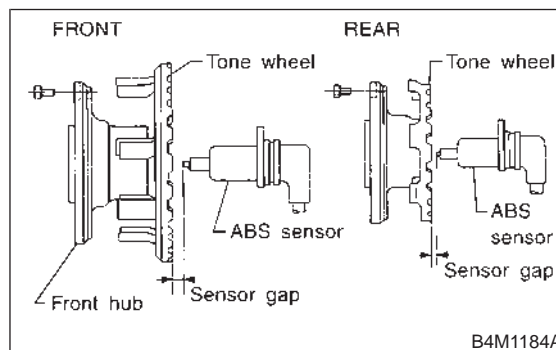
ABS sensor clearance:

Front

0.9 — 1.4 mm (0.035 — 0.055 in)

Rear

0.7 — 1.2 mm (0.028 — 0.047 in)

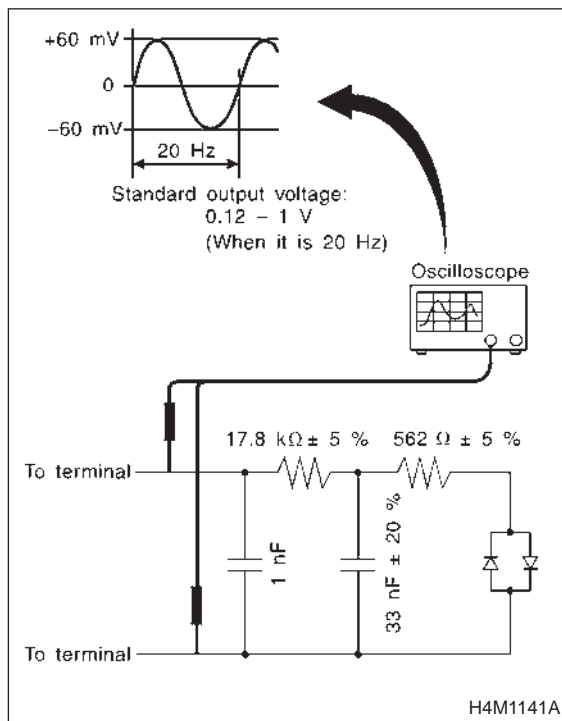


3. OUTPUT VOLTAGE

Output voltage can be checked by the following method. Install resistor and condenser, then rotate wheel about 2.75 km/h (2 MPH) or equivalent.

NOTE:

Regarding terminal No., please refer to item 1. ABS SENSOR.



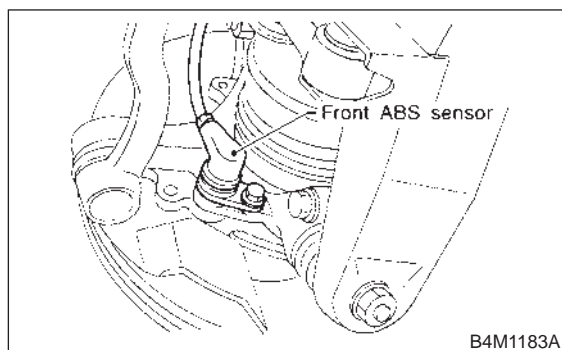
C: INSTALLATION

1. FRONT ABS SENSOR

- 1) Install tone wheel on hub, then install housing on hub assembly. <Ref. to 4-2 [W1D0].>
- 2) Temporarily install front ABS sensor on housing.

CAUTION:

Be careful not to strike ABS sensor's pole piece and tone wheel's teeth against adjacent metal parts during installation.

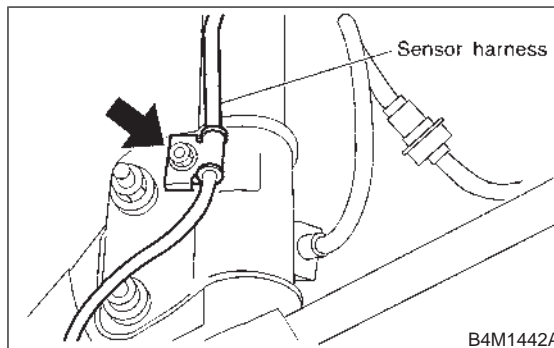


- 3) Install front drive shaft to hub spline. <Ref. to 4-2 [W1E0].>

- 4) Install front ABS sensor on strut and wheel apron bracket.

Tightening torque:

32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)



- 5) Place a thickness gauge between ABS sensor's pole piece and tone wheel's tooth face. After standard clearance is obtained over the entire perimeter, tighten ABS sensor on housing to specified torque.

ABS sensor standard clearance:

0.9 — 1.4 mm (0.035 — 0.055 in)

Tightening torque:

32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

CAUTION:

Check the marks on the harness to make sure that no distortion exists. (RH: white, LH: yellow)

NOTE:

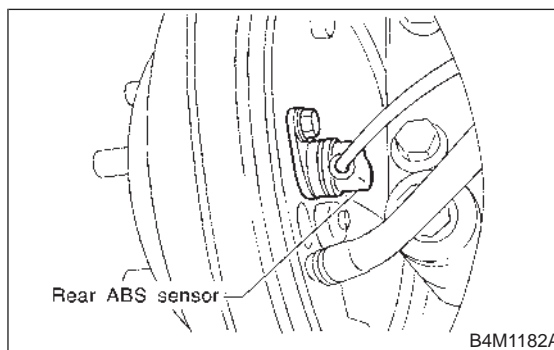
If the clearance is outside specifications, readjust.

2. REAR ABS SENSOR

- 1) Install rear tone wheel on hub, then rear housing on hub. <Ref. to 4-2 [W2D0].>
- 2) Temporarily install rear ABS sensor on back plate.

CAUTION:

Be careful not to strike ABS sensor's pole piece and tone wheel's teeth against adjacent metal parts during installation.

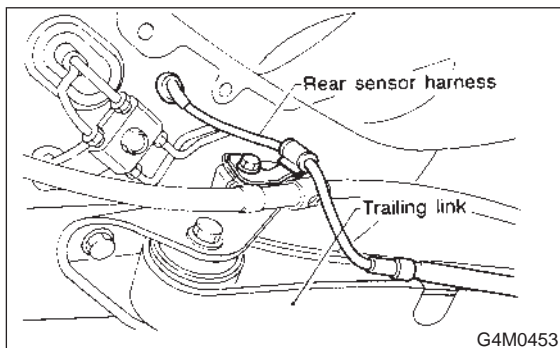


- 3) Install rear drive shaft to rear housing and rear differential spindle. <Ref. to 4-2 [W2E0].>

4) Install rear sensor harness on rear trailing link.

Tightening torque:

32 ± 10 N·m (3.3 ± 1.0 kg-m, 24 ± 7 ft-lb)



5) Place a thickness gauge between ABS sensor's pole piece and tone wheel's tooth face. After standard clearance is obtained over the entire perimeter, tighten ABS sensor on back plate to specified torque.

ABS sensor standard clearance:

$0.7 - 1.2$ mm ($0.028 - 0.047$ in)

Tightening torque:

32 ± 10 N·m (3.3 ± 1.0 kg-m, 24 ± 7 ft-lb)

CAUTION:

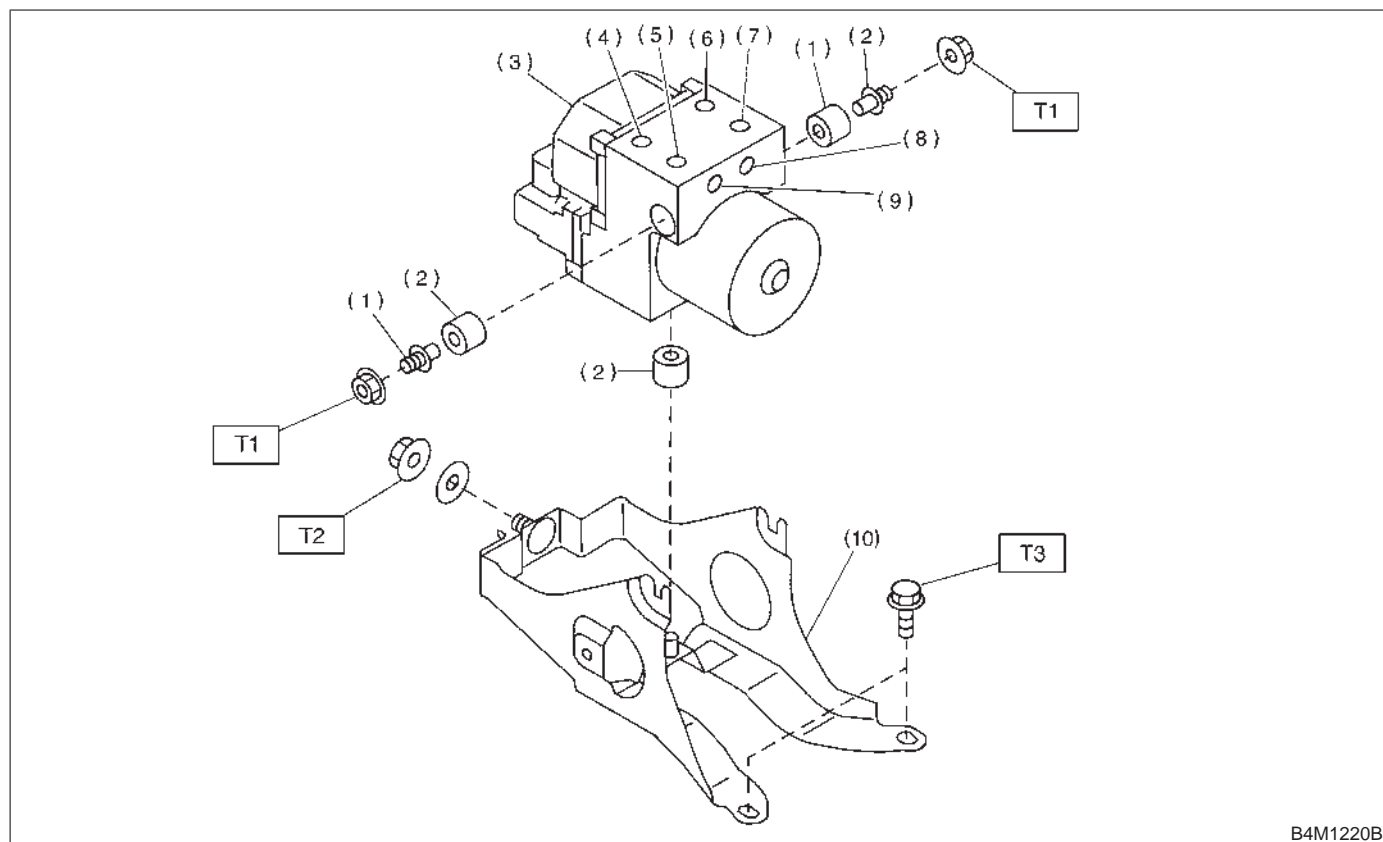
Check the marks on the harness to make sure that no distortion exists. (RH: white, LH: yellow)

NOTE:

If the clearance is outside specifications, readjust.

14. ABS Control Module and Hydraulic Control Unit (ABSCM&H/U)

A: REMOVAL



B4M1220B

- | | |
|---|---------------------|
| (1) Stud bolt | (6) Front-RH outlet |
| (2) Damper | (7) Primary inlet |
| (3) ABS control module and hydraulic control unit | (8) Rear-LH outlet |
| (4) Front-LH outlet | (9) Rear-RH outlet |
| (5) Secondary inlet | (10) Bracket |

Tightening torque: N·m (kg·m, ft·lb)

T1: 18±5 (1.8±0.5, 13.0±3.6)

T2: 29±7 (3.0±0.7, 21.7±5.1)

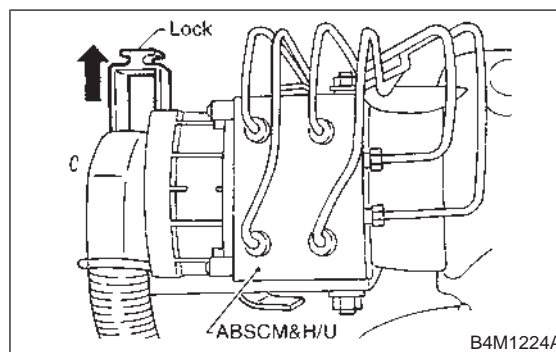
T3: 32±10 (3.3±1.0, 24±7)

- 1) Disconnect ground cable from battery.
- 2) Remove air intake duct from engine compartment to facilitate removal of ABSCM&H/U.
- 3) Use an air-gun to get rid of water around the ABSCM&H/U.

CAUTION:

The contact will be insufficient if the terminal gets wet.

- 4) Pull on the lock of the ABSCM&H/U connector to remove it.



B4M1224A

- 5) Disconnect connector from ABSCM&H/U.

CAUTION:

Be careful not to let water or other foreign matter contact the ABSCM&H/U terminal.

- 6) Unlock cable clip.

7) Disconnect brake pipes from ABSCM&H/U.

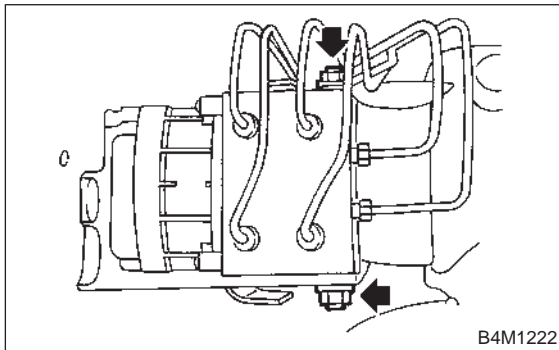
CAUTION:

Wrap brake pipes with vinyl bag to avoid spilling brake fluid on vehicle body.

8) Remove ABSCM&H/U from engine compartment.

CAUTION:

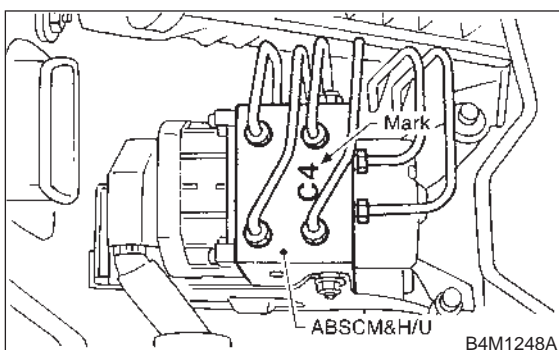
- ABSCM&H/U cannot be disassembled. Do not attempt to loosen bolts and nuts.
- Do not drop or bump ABSCM&H/U.
- Do not turn the ABSCM&H/U upside down or place it on its side.
- Be careful to prevent foreign particles from getting into ABSCM&H/U.
- Apply a coat of rust-preventive wax (Nippeco LT or GB) to bracket attaching bolt after tightening.
- Do not pull harness disconnecting harness connector.



B: INSPECTION

- 1) Check connected and fixed condition of connector.
- 2) Check specifications of the mark with ABSCM&H/U.

Mark	Model
C5	AWD AT
C6	AWD MT



C: CHECKING THE HYDRAULIC UNIT ABS OPERATION

1. CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE

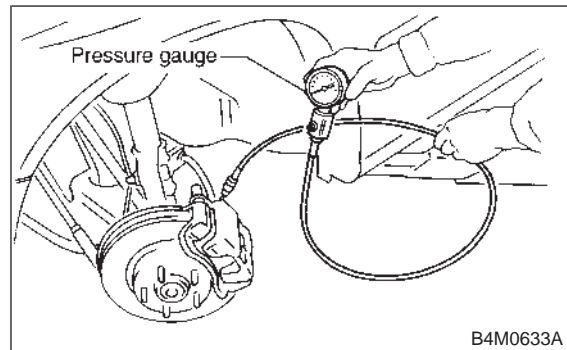
- 1) Lift-up vehicle and remove wheels.
- 2) Disconnect the air bleeder screws from the FL and FR caliper bodies.
- 3) Connect two pressure gauges to the FL and FR caliper bodies.

CAUTION:

- Pressure gauges used exclusively for brake fluid must be used.
- Do not employ pressure gauge previously used for transmission since the piston seal is expanded which may lead to malfunction of the brake.

NOTE:

Wrap sealing tape around the pressure gauge.



- 4) Bleed air from the pressure gauges.
- 5) Perform ABS sequence control.
<Ref. to 4-4 [W14D0].>
- 6) When the hydraulic unit begins to work, and first the FL side performs decompression, holding, and compression, and then the FR side performs decompression, holding, and compression.
- 7) Read values indicated on the pressure gauge and check if the fluctuation of the values between decompression and compression meets the standard values. Also check if any irregular brake pedal tightness is felt.

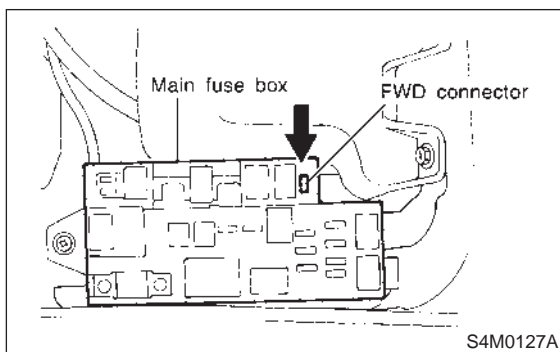
	Front wheel	Rear wheel
Initial value	3,432 kPa (35 kg/cm ² , 498 psi)	3,432 kPa (35 kg/cm ² , 498 psi)
When decompressed	490 kPa (5 kg/cm ² , 71 psi) or less	490 kPa (5 kg/cm ² , 71 psi) or less
When compressed	3,432 kPa (35 kg/cm ² , 498 psi) or more	3,432 kPa (35 kg/cm ² , 498 psi) or more

- 8) Remove pressure gauges from FL and FR caliper bodies.

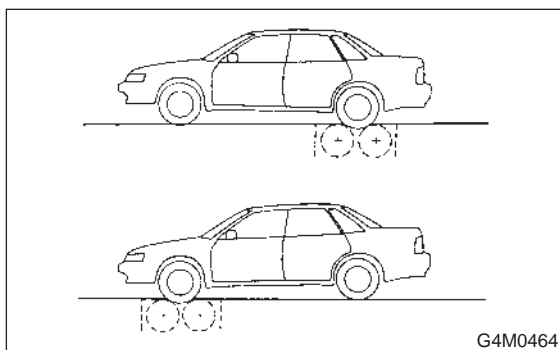
- 9) Remove air bleeder screws from the RL and RR caliper bodies.
- 10) Connect the air bleeder screws to the FL and FR caliper bodies.
- 11) Connect two pressure gauges to the RL and RR caliper bodies.
- 12) Bleed air from the pressure gauges and the FL and FR caliper bodies.
- 13) Perform ABS sequence control.
<Ref. to 4-4 [W14D0].>
- 14) When the hydraulic unit begins to work, at first the RR side performs decompression, holding, and compression, and then the RL side performs decompression, holding, and compression.
- 15) Read values indicated on the pressure gauges and check if they meet the standard value.
- 16) After checking, remove the pressure gauges from caliper bodies.
- 17) Connect the air bleeder screws to RL and RR caliper bodies.
- 18) Bleed air from brake line.

2. CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER

- 1) In the case of AWD AT vehicles, install a spare fuse with the FWD connector in the main fuse box to simulate FWD vehicles.



- 2) Prepare for operating ABS sequence control.
<Ref. to 4-4 [W14D1].> or <Ref. to 4-4 [W14D2].>
- 3) Set the front wheels or rear wheels on the brake tester and set the select lever's position at "neutral".



- 4) Operate the brake tester.

- 5) Perform ABS sequence control. <Ref. to 4-4 [W14D1].> or <Ref. to 4-4 [W14D2].>
- 6) Hydraulic unit begins to work; and check the following working sequence.
 - (1) The FL wheel performs decompression, holding, and compression in sequence, and subsequently the FR wheel repeats the cycle.
 - (2) The RR wheel performs decompression, holding, and compression in sequence, and subsequently the RL wheel repeats the cycle.
- 7) Read values indicated on the brake tester and check if the fluctuation of values, when decompressed and compressed, meet the standard values.

	Front wheel	Rear wheel
Initial value	981 N (100 kg, 221 lb)	981 N (100 kg, 221 lb)
When decompressed	490 N (50 kg, 110 lb) or less	490 N (50 kg, 110 lb) or less
When compressed	981 N (100 kg, 221 lb) or more	981 N (100 kg, 221 lb) or more

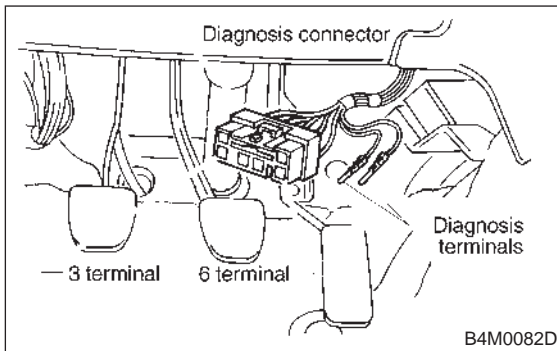
- 8) After checking, also check if any irregular brake pedal tightness is felt.

D: ABS SEQUENCE CONTROL

- 1) Under the ABS sequence control, after the hydraulic unit solenoid valve is driven, the operation of the hydraulic unit can be checked by means of the brake tester or pressure gauge.
- 2) ABS sequence control can be started by diagnosis connector or select monitor.

1. OPERATIONAL GUIDELINES OF THE ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR

- 1) Connect diagnosis terminals to terminals No. 3 and No. 6 of the diagnosis connector beside driver's seat heater unit.



- 2) Set the speed of all wheels at 4 km/h (2 MPH) or less.
- 3) Turn ignition switch OFF.
- 4) Within 0.5 seconds after the ABS warning light goes out, depress the brake pedal and hold it immediately after ignition switch is turned to ON.

CAUTION:

Do not depress the clutch pedal.

NOTE:

- When the ignition switch is set to on, the brake pedal must not be depressed.
 - Engine must not operate.
- 5) After completion of ABS sequence control, turn ignition switch OFF.

2. OPERATIONAL GUIDELINES OF THE ABS SEQUENCE CONTROL WITH SELECT MONITOR

NOTE:

- In the event of any trouble, the sequence control may not be operative. In such a case, activate the sequence control, referring to "OPERATIONAL GUIDELINES OF THE ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR". <Ref. to 4-4 [W14D1].>
- When the diagnosis terminal is connected to the diagnosis connector, the sequence control will not operate.

- 1) Connect select monitor to data link connector beside driver's seat instrument panel lower cover.
- 2) Turn ignition switch ON.
- 3) Turn select monitor switch ON.
- 4) Put select monitor to {ABS/TCS} mode.
- 5) When {Function check sequence} is selected, 'ABS sequence control' will start.
- 6) The message 'Press Brake Pedal Firmly' is displayed as follows:
 - (1) When using the brake tester, depress brake pedal with braking force of 981 N (100 kg, 221 lb).
 - (2) When using the pressure gauge, depress brake pedal so as to make the pressure gauge indicate 3,432 kPa (35 kg/cm², 498 psi).

CAUTION:

Do not depress the clutch pedal.

- 7) When the message "Press YES" is displayed, press YES key.
- 8) Operation points will be displayed on select monitor.

3. CONDITIONS FOR COMPLETION OF ABS SEQUENCE CONTROL

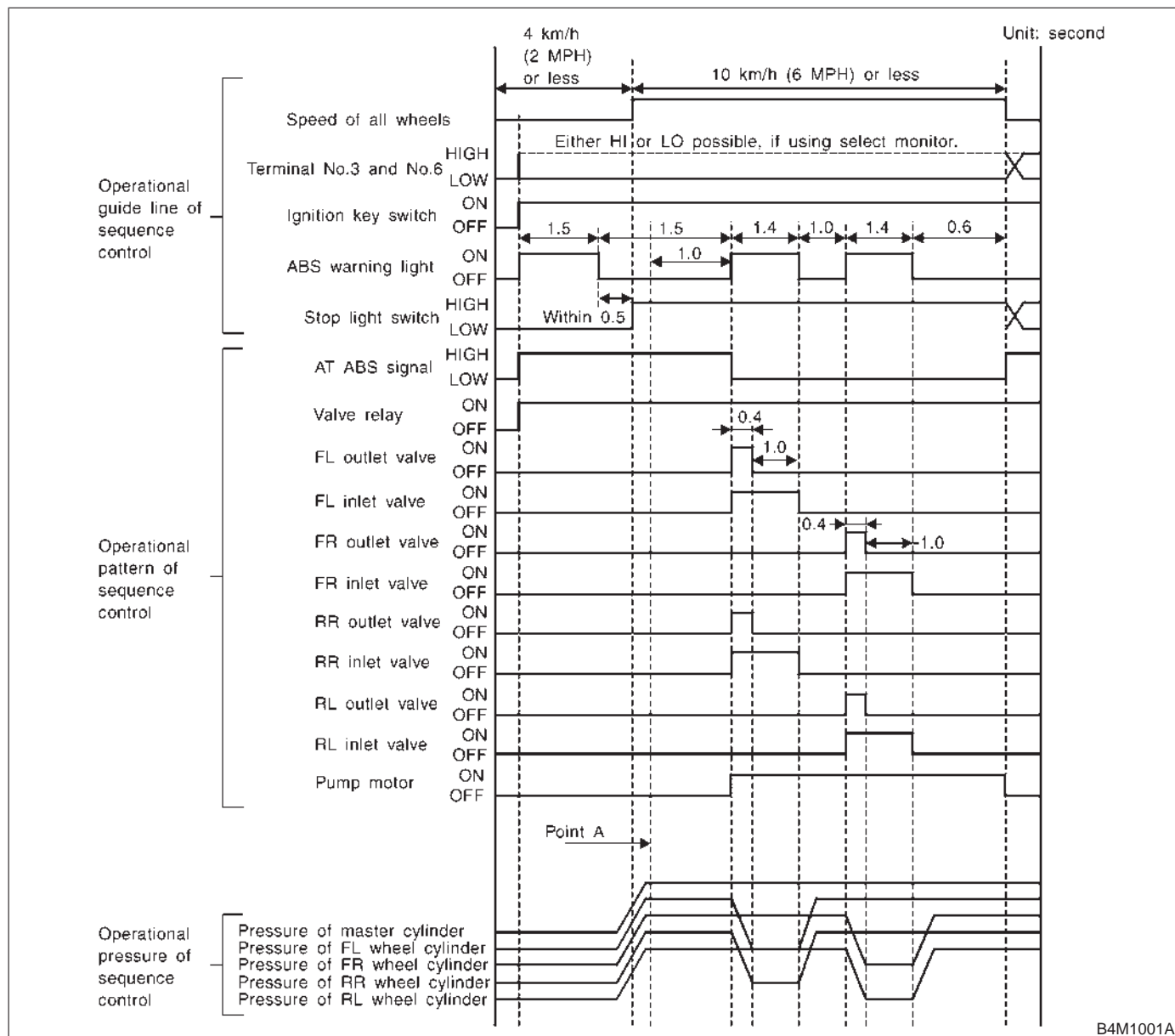
When the following conditions develop, the ABS sequence control stops and ABS operation is returned to the normal control mode.

- 1) When the speed of at least one wheel reaches 10 km/h (6 MPH).
- 2) When terminal No. 3 or No. 6 are separated from diagnosis terminals. (When select monitor is not used.)
- 3) When the brake pedal is released during sequence control and the braking lamp switch is set to off.
- 4) When brake pedal is depressed after ignition key is turned to ON, and before ABS warning light goes out. (When select monitor is not used.)
- 5) When brake pedal is not depressed after ignition key is turned to ON, and within 0.5 seconds after ABS warning light goes out. (When select monitor is not used.)
- 6) After completion of the sequence control.
- 7) When malfunction is detected. (When select monitor is used.)

4. CONDITIONS FOR ABS SEQUENCE CONTROL

NOTE:

- When select monitor is used, control operation starts at point A. The patterns from IGN key ON to the point A show that operation is started by diagnosis connector.
- HIGH means high voltage.
- LOW means low voltage.



B4M1001A

E: INSTALLATION

- 1) Install ABSCM&H/U.

CAUTION:

Confirm that the specifications of the ABSCM&H/U conforms to the vehicle specifications.

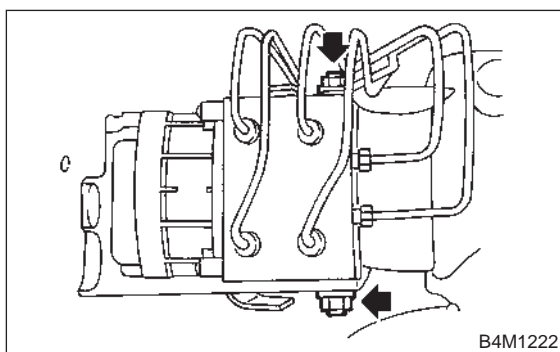
Tightening torque:

$18 \pm 5 \text{ N}\cdot\text{m}$ ($1.8 \pm 0.5 \text{ kg}\cdot\text{m}$, $13.0 \pm 3.6 \text{ ft}\cdot\text{lb}$)

- 2) Connect brake pipes to their correct ABSCM&H/U connections.

Brake pipe tightening torque:

$15^{+3}_{-2} \text{ N}\cdot\text{m}$ ($1.5^{+0.3}_{-0.2} \text{ kg}\cdot\text{m}$, $10.8^{+2.2}_{-1.4} \text{ ft}\cdot\text{lb}$)



- 3) Using cable clip, secure ABSCM&H/U harness to bracket.
- 4) Connect connector to ABSCM&H/U.

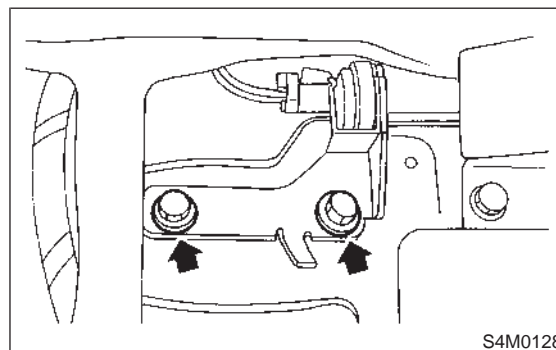
CAUTION:

- Be sure to remove all foreign matter from inside the connector before connecting.
- Ensure that the ABSCM&H/U connector is securely locked.

- 5) Install air intake duct.
- 6) Connect ground cable to battery.
- 7) Bleed air from the brake system.

15. G Sensor**A: REMOVAL AND INSTALLATION**

- 1) Turn ignition switch to OFF.
- 2) Remove console cover. <Ref. to 5-4 [W1A0].>
- 3) Disconnect connector from G sensor.
- 4) Remove G sensor from body.



- 5) To install, reverse the removal procedure.

CAUTION:

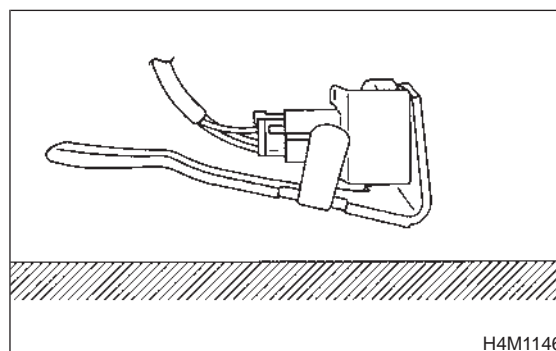
Do not drop or bump G sensor.

B: INSPECTION WITH CIRCUIT TESTER**15B1 : CHECK G SENSOR.**

- 1) Turn ignition switch to OFF.
- 2) Remove G sensor from vehicle.
- 3) Connect connector to G sensor.
- 4) Turn ignition switch to ON.
- 5) Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 3 (-)



CHECK : Is the voltage $2.3 \pm 0.2 \text{ V}$ when G sensor is horizontal?

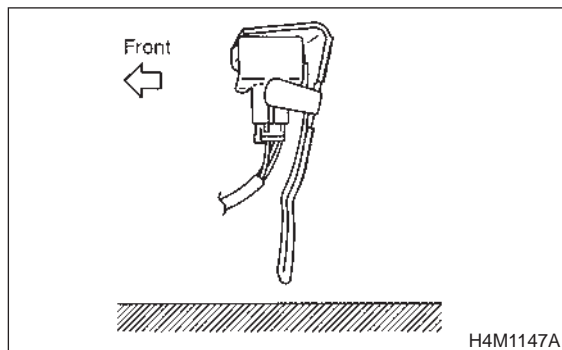
YES : Go to step 15B2.

NO : Replace G sensor.

15B2 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal
(R70) No. 2 (+) — No. 3 (-)

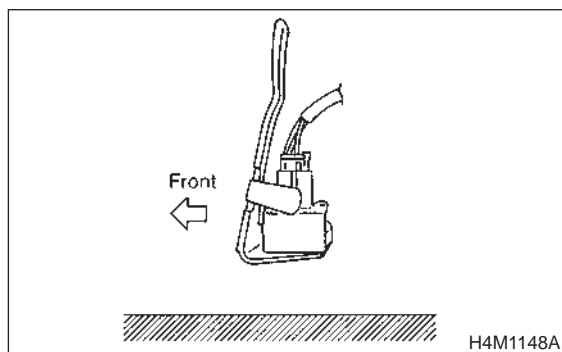


- CHECK** : *Is the voltage 3.9 ± 0.2 V when G sensor is inclined forwards to 90° ?*
- YES** : Go to step 15B3.
- NO** : Replace G sensor.

15B3 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal
(R70) No. 2 (+) — No. 3 (-)



- CHECK** : *Is the voltage 0.7 ± 0.2 V when G sensor is inclined backwards to 90° ?*
- YES** : G sensor is normal.
- NO** : Replace G sensor.

C: INSPECTION WITH SELECT MONITOR

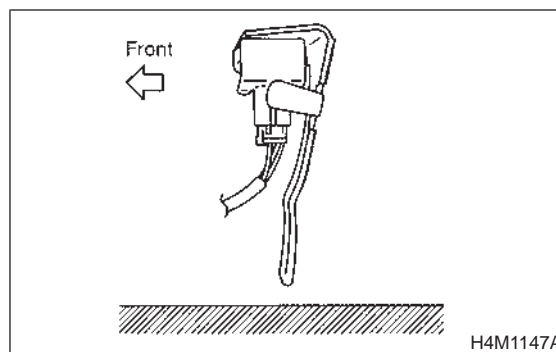
15C1 : CHECK G SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Connect select monitor connector to data link connector.
- 3) Turn select monitor into {ABS/TCS} mode.
- 4) Set the display in the {Current Data Display & Save} mode.
- 5) Read the G sensor output voltage.

- CHECK** : *Is the indicated reading 2.3 ± 0.2 V when the vehicle is in horizontal position?*
- YES** : Go to step 15C2.
- NO** : Replace G sensor.

15C2 : CHECK G SENSOR.

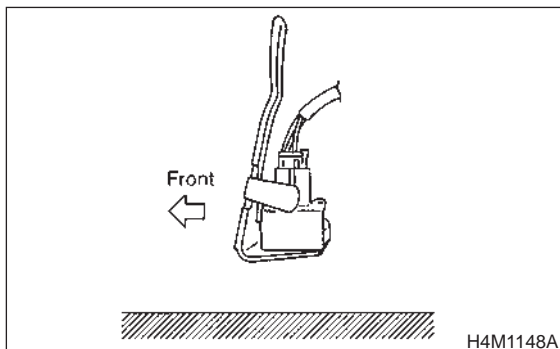
- 1) Remove console box.
- 2) Remove G sensor from vehicle. (Do not disconnect connector.)
- 3) Read the select monitor display.



- CHECK** : *Is the indicated reading 3.9 ± 0.2 V when G sensor is inclined forwards to 90° ?*
- YES** : Go to step 15C3.
- NO** : Replace G sensor.

15C3 : CHECK G SENSOR.

Read the select monitor display.



CHECK : *Is the indicated reading 0.7 ± 0.2 V when G sensor is inclined backwards to 90° ?*

YES : G sensor is normal.

NO : Replace G sensor.

16. Brake Pipe AIRBAG**A: SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"**

Airbag system wiring harness is routed near the center brake pipe.

CAUTION:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage Airbag system wiring harness when servicing the center brake pipe.

B: REMOVAL AND INSTALLATION**CAUTION:**

- When removing and installing the brake pipe, make sure that it is not bent.
- After installing the brake pipe and hose, bleed the air.
- After installing the brake hose, make sure that it does not touch the tire or suspension assembly, etc.

Brake pipe tightening torque:

15^{+3}_{-2} N·m ($1.5^{+0.3}_{-0.2}$ kg-m, $10.8^{+2.2}_{-1.4}$ ft-lb)

BRAKES 4-4

	Page
T DIAGNOSTICS AIRBAG	2
1. Supplemental Restraint System "Airbag"	2
2. Pre-inspection.....	2
3. Electrical Components Location.....	4
4. Schematic.....	6
5. Control Module I/O Signal.....	8
6. Diagnostics Chart for On-board Diagnosis System	11
7. Diagnostics Chart for ABS Warning Light Circuit and Diagnosis Circuit Failure.....	18
8. Diagnostics Chart with Trouble Code by ABS Warning Light.....	29
9. Select Monitor Function Mode	76
10. Diagnostics Chart with Select Monitor	78
11. General Diagnostic Table	162

1. Supplemental Restraint System "Airbag"

Airbag system wiring harness is routed near the ABS sensor, ABS control module and hydraulic control unit.

CAUTION:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage Airbag system wiring harness when servicing the ABS sensor, ABS control module and hydraulic control unit.

2. Pre-inspection

Before performing diagnostics, check the following items which might affect ABS problems:

A: MECHANICAL INSPECTION

1. POWER SUPPLY

- 1) Measure battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V, or more

Specific gravity: Above 1.260

- 2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. BRAKE FLUID

- 1) Check brake fluid level.
- 2) Check brake fluid leakage.

3. BRAKE DRAG

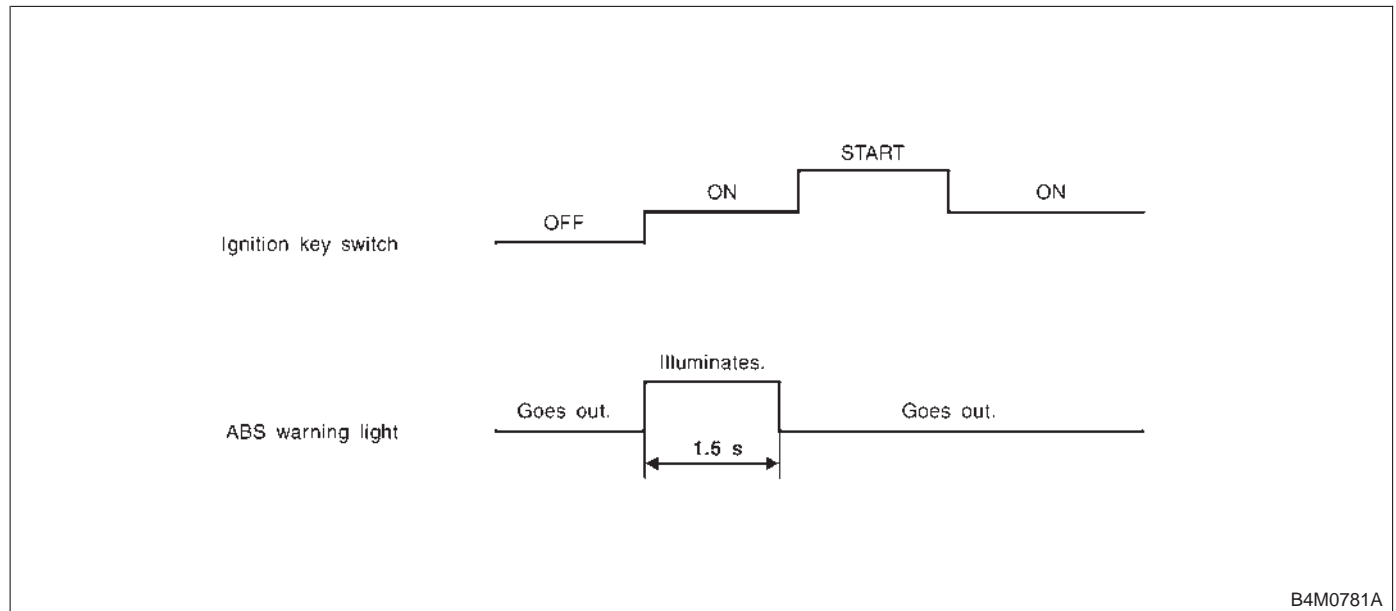
Check brake drag. <Ref. to 4-4 [K100].>

4. BRAKE PAD AND ROTOR

Check brake pad and rotor. <Ref. to 4-4 [K100].>

5. TIRE SPECIFICATIONS, TIRE WEAR AND AIR PRESSURE

Check tire specifications, tire wear and air pressure. <Ref. to 4-2 [S100].>, <Ref. to 4-2 [S200].>

B: ELECTRICAL INSPECTION**1. WARNING LIGHT ILLUMINATION PATTERN**

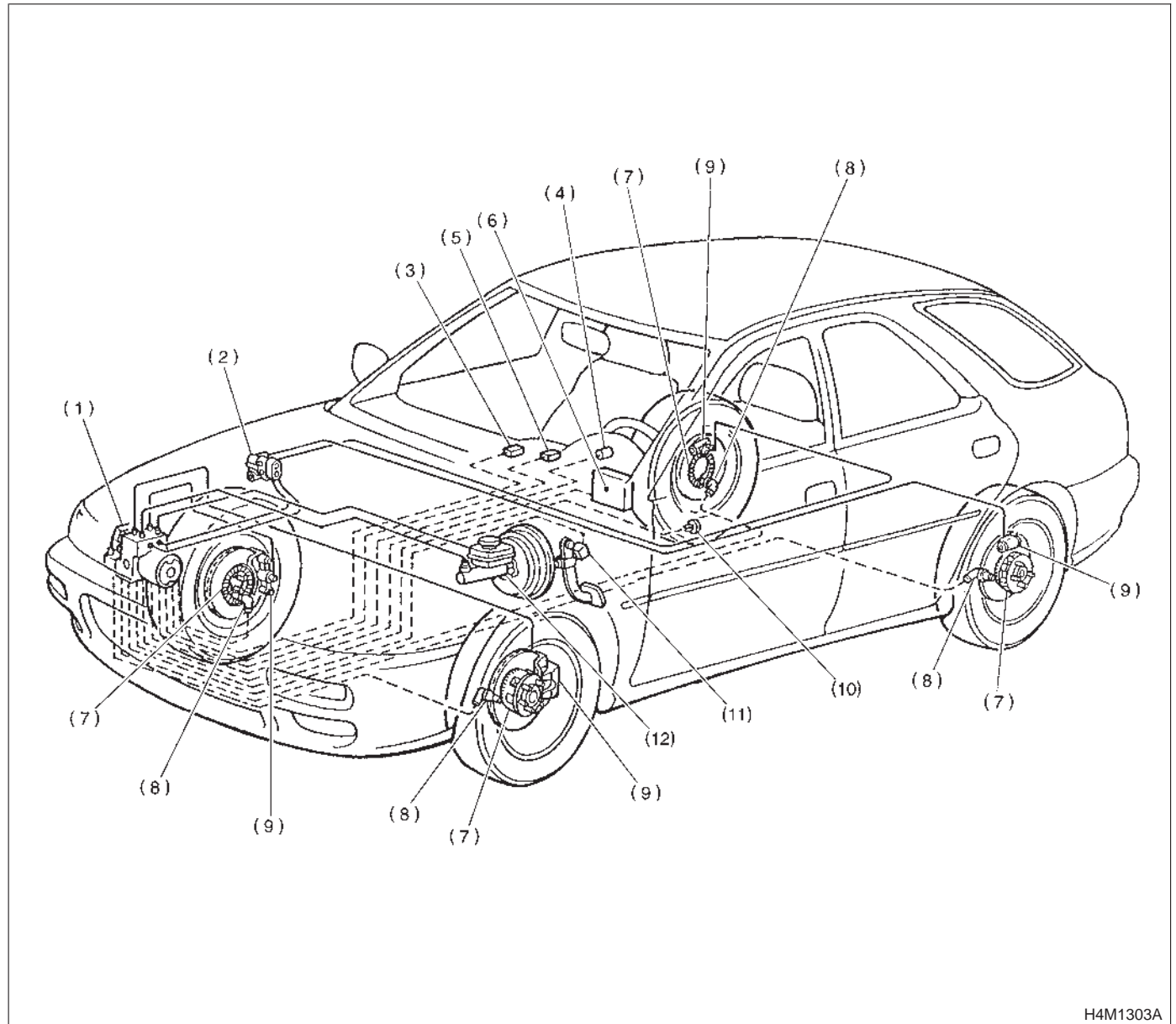
1) When the ABS warning light does not illuminate in accordance with this illumination pattern, there must be an electrical malfunction.

2) When the ABS warning light remains constantly OFF, repair the ABS warning light circuit or diagnosis circuit. <Ref. to 4-4 [T7A0].>

NOTE:

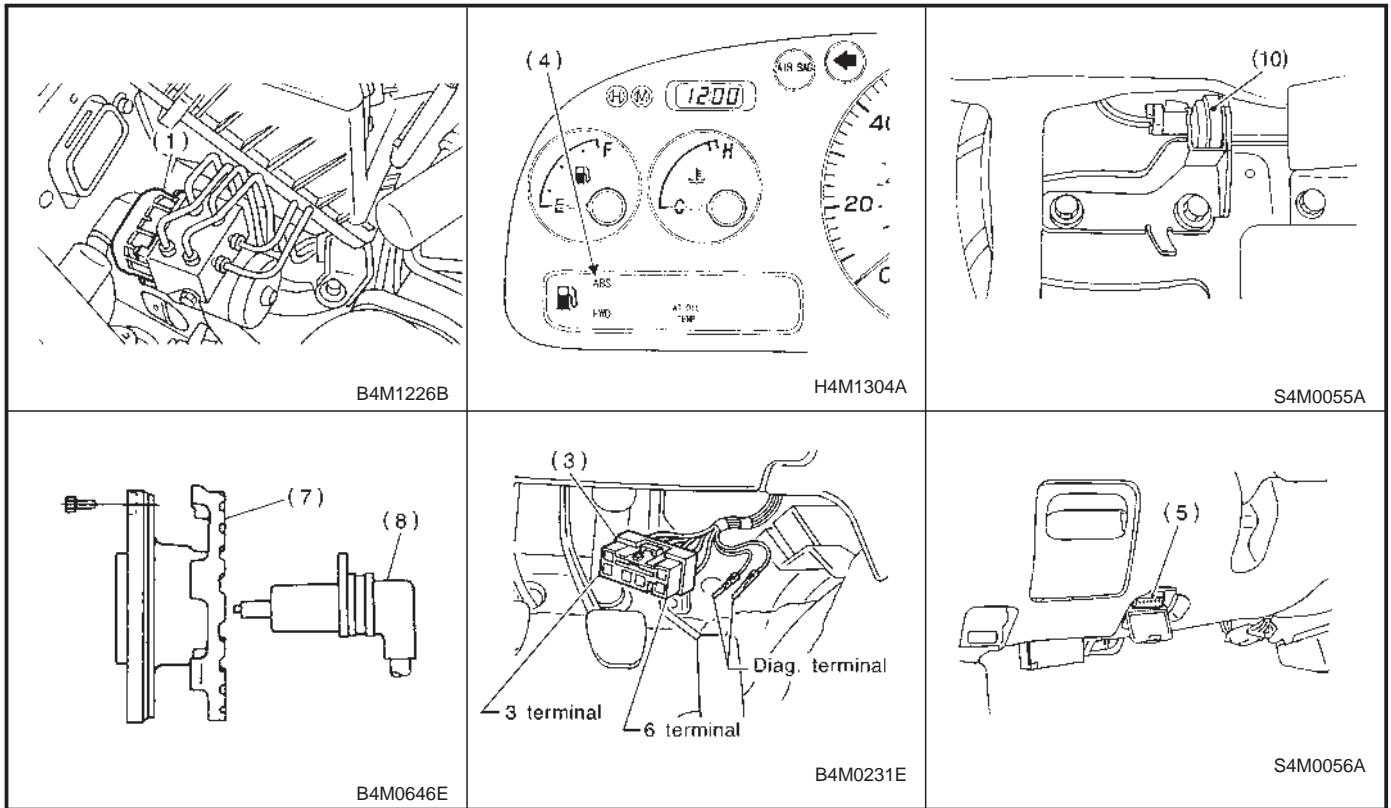
Even though the ABS warning light does not go out 1.5 seconds after it illuminates, the ABS system operates normally when the warning light goes out while driving at approximately 12 km/h (7 MPH). However, the Anti-lock brakes do not work while the ABS warning light is illuminated.

3. Electrical Components Location

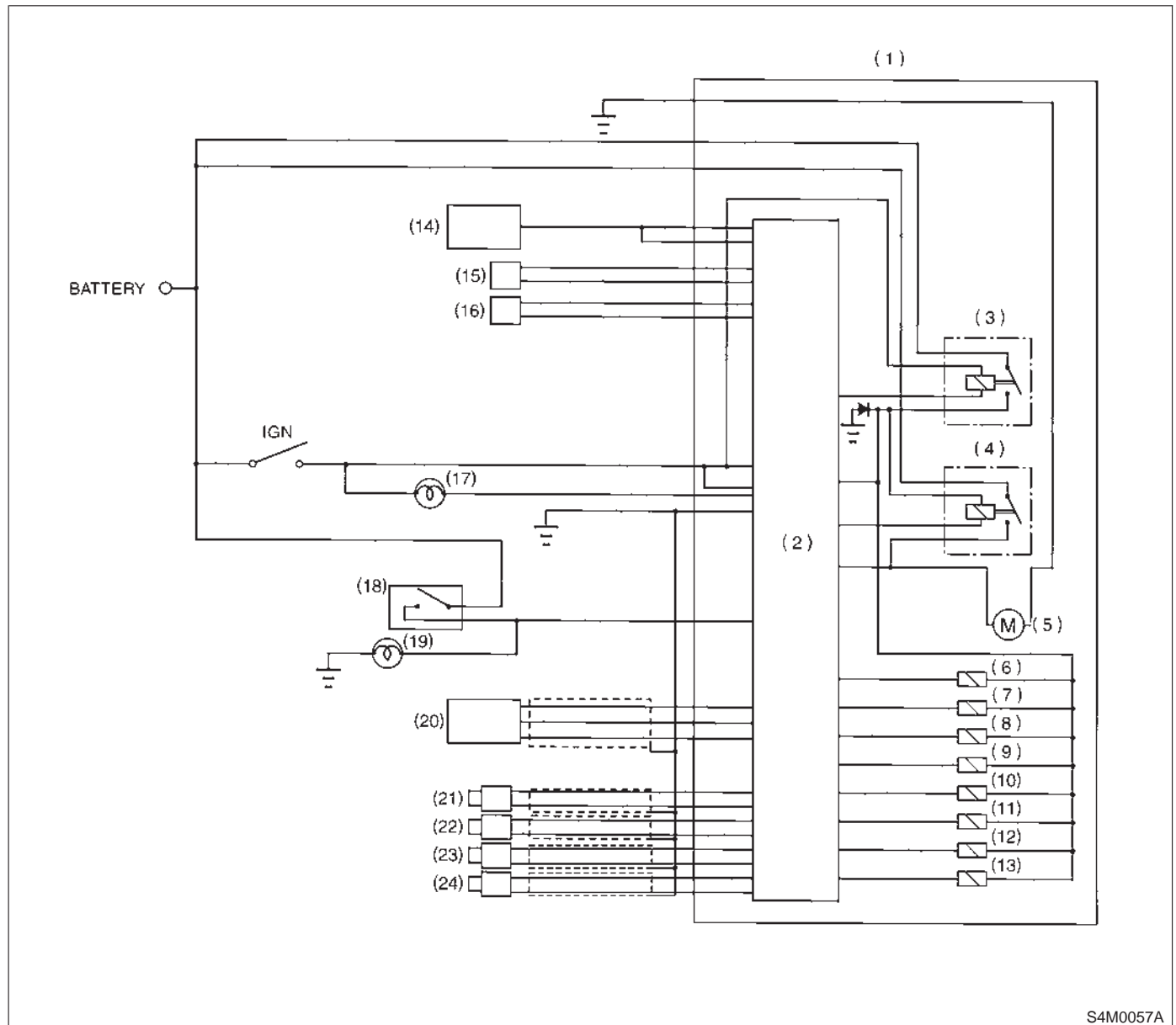


H4M1303A

- | | | |
|---|---|----------------------|
| (1) ABS control module and hydraulic control unit (ABSCM&H/U) | (5) Data link connector (for Subaru select monitor) | (8) ABS sensor |
| (2) Proportioning valve | (6) Transmission control module (only AT vehicle) | (9) Wheel cylinder |
| (3) Diagnosis connector | (7) Tone wheel | (10) G sensor |
| (4) ABS warning light | | (11) Brake switch |
| | | (12) Master cylinder |



4. Schematic

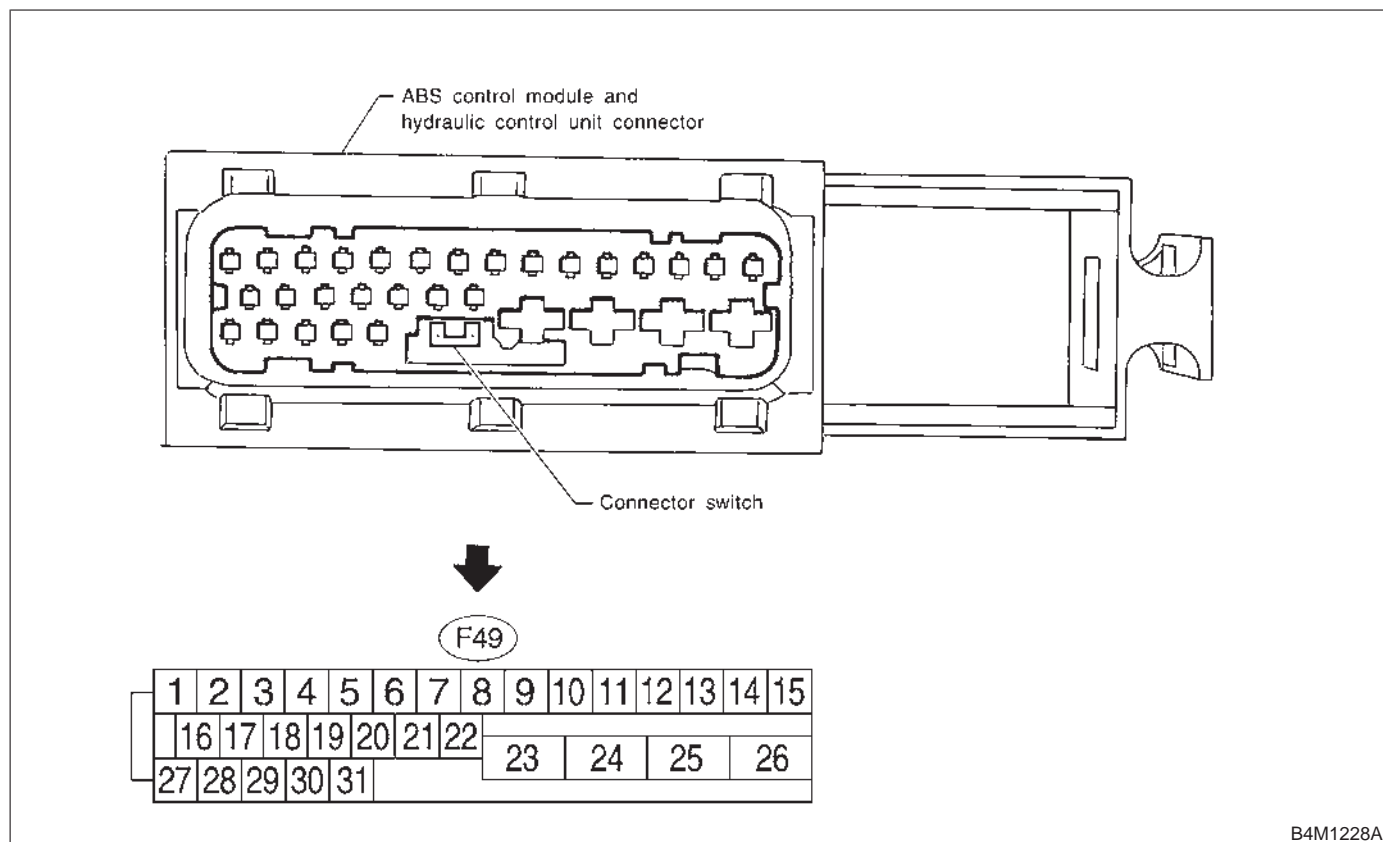


- | | | |
|---|---|-----------------------------|
| (1) ABS control module and hydraulic control unit (ABSCM&H/U) | (9) Front right outlet solenoid valve | (17) ABS warning light |
| (2) ABS control module area | (10) Rear left inlet solenoid valve | (18) Stop light switch |
| (3) Valve relay | (11) Rear left outlet solenoid valve | (19) Stop light |
| (4) Motor relay | (12) Rear right inlet solenoid valve | (20) G sensor |
| (5) Motor | (13) Rear right outlet solenoid valve | (21) Front left ABS sensor |
| (6) Front left inlet solenoid valve | (14) Transmission control module
(only AT model) | (22) Front right ABS sensor |
| (7) Front left outlet solenoid valve | (15) Diagnosis connector | (23) Rear left ABS sensor |
| (8) Front right inlet solenoid valve | (16) Data link connector | (24) Rear right ABS sensor |

MEMO:

5. Control Module I/O Signal

A: I/O SIGNAL VOLTAGE



B4M1228A

NOTE:

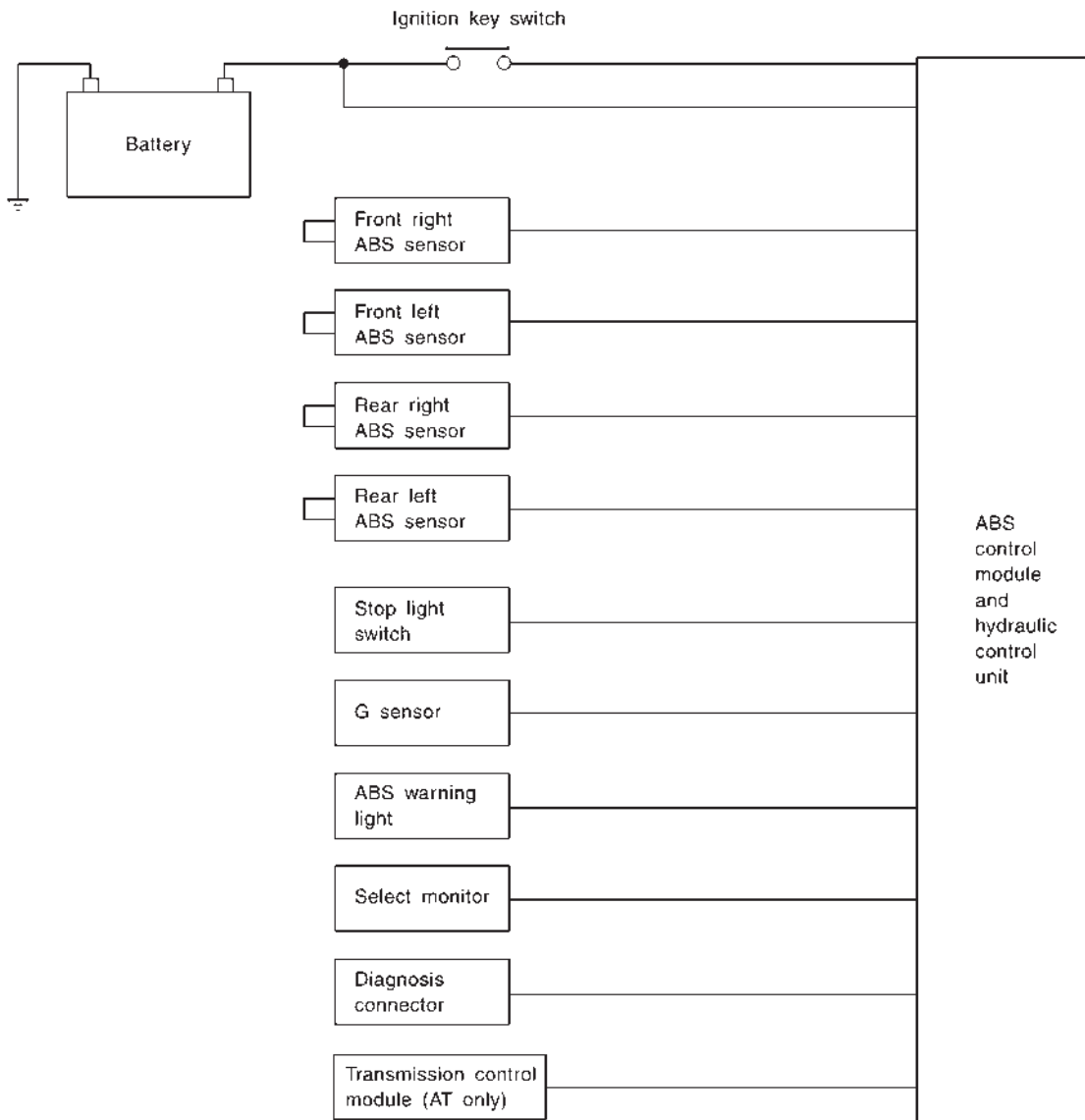
- The terminal numbers in the ABS control module and hydraulic control unit connector are as shown in the figure.
- When the connector is removed from the ABSCM&H/U, the connector switch closes the circuit between terminal No. 21 and No. 23. The ABS warning light illuminates.

Contents		Terminal No. (+)(-)	Input/Output signal
			Measured value and measuring conditions
ABS sensor*2 (Wheel speed sensor)	Front left wheel	9—10	0.12 — 1 V (When it is 20 Hz.)
	Front right wheel	11—12	
	Rear left wheel	7—8	
	Rear right wheel	14—15	
Valve relay power supply*1		24—23	10 — 15 V when ignition switch is ON.
Motor relay power supply*1		25—23	10 — 15 V when ignition switch is ON.
G sensor*2 (AWD model only)	power supply	30—28	4.75 — 5.25 V
	ground	28	—
	output	6—28	2.3±0.2 V when vehicle is in horizontal position.
Stop light switch*1		2—23	Less than 1.5 V when the stop light is OFF and, 10 — 15 V when the stop light is ON.
ABS warning light*2		21—23	Less than 1.5 V during 1.5 seconds when ignition switch is ON, and 10 — 15 V after 1.5 seconds.
AT ABS signal*2 (AT model only)		31—23	Less than 1.5 V when the ABS control does not oper- ate still and more than 5.5 V when ABS operates.
ABS operation signal monitor*2		3—23	Less than 1.5 V when the ABS control does not oper- ate still and more than 5.5 V when ABS operates.
Select monitor*2	Data is received.	20—23	Less than 1.5 V when no data is received.
	Data is sent.	5—23	4.75 — 5.25 V when no data is sent.
ABS diagnosis connector*2	Terminal No. 3	29—23	10 — 15 V when ignition switch is ON.
	Terminal No. 6	4—23	10 — 15 V when ignition switch is ON.
Power supply*1		1—23	10 — 15 V when ignition switch is ON.
Grounding line		23	—
Grounding line		26	—

*1: Measure the I/O signal voltage after removing the connector from the ABSCM&H/U terminal.

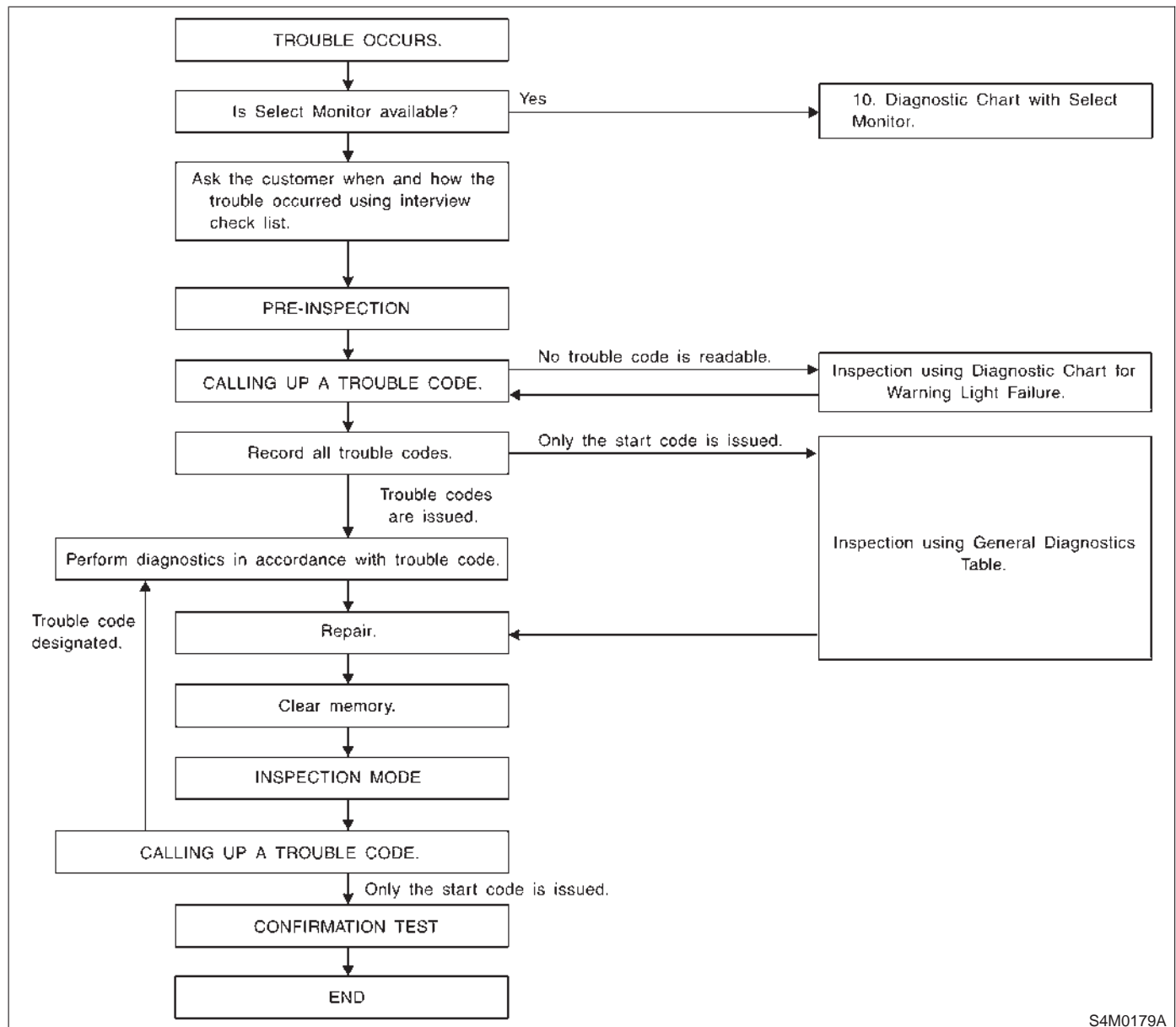
*2: Measure the I/O signal voltage at connector (F2) or (F55).

B: I/O SIGNAL DIAGRAM



6. Diagnostics Chart for On-board Diagnosis System

A: BASIC DIAGNOSTICS PROCEDURE



S4M0179A

CAUTION:

Remove foreign matter (dust, water, etc.) from the ABSCM&H/U connector during removal and installation.

NOTE:

- To check harness for broken wires or short circuits, shake it while holding it or the connector.
- When ABS warning light illuminates, read and record trouble code indicated by ABS warning light.

B: CHECK LIST FOR INTERVIEW

Check The Following Items About The Vehicle's State.

1. THE STATE OF THE ABS WARNING LIGHT

ABS warning light comes on.	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Only once <input type="checkbox"/> Does not come on • When / how long does it come on?:		
Ignition key position	<input type="checkbox"/> LOCK <input type="checkbox"/> ACC <input type="checkbox"/> ON (before starting engine) <input type="checkbox"/> START <input type="checkbox"/> On after starting (Engine is running) <input type="checkbox"/> On after starting (Engine is stop)		
Timing	<input type="checkbox"/> Immediately after ignition is ON. <input type="checkbox"/> Immediately after ignition starts.		
	<input type="checkbox"/> When advancing	km/h to km/h MPH to MPH	
	<input type="checkbox"/> While traveling at a constant speed	km/h	MPH
	<input type="checkbox"/> When decelerating	km/h to km/h MPH to MPH	
	<input type="checkbox"/> When turning to right	Steering angle :	deg
		Steering time :	sec
	<input type="checkbox"/> When turning to left	Steering angle :	deg
		Steering time :	sec
	<input type="checkbox"/> When moving other electrical parts		
	• Parts name : • Operating condition :		

2. SYMPTOMS

ABS operating condition	<input type="checkbox"/> Performs no work.		
	<input type="checkbox"/> Operates only when abruptly applying brakes.	Vehicle speed :	km/h MPH
	• How to step on brake pedal :		
	a) Operating time :	sec	
	b) Operating noise : <input type="checkbox"/> Produce / <input type="checkbox"/> Does not produce		
	• What kind of noise?	<input type="checkbox"/> Knock <input type="checkbox"/> Gong gong <input type="checkbox"/> Bong <input type="checkbox"/> Buzz <input type="checkbox"/> Gong gong buzz <input type="checkbox"/> Others :	
	c) Reaction force of brake pedal		
		<input type="checkbox"/> Stick <input type="checkbox"/> Press down once with a clunk <input type="checkbox"/> Press and released <input type="checkbox"/> Others :	

Behavior of vehicle	a) Directional stability cannot be obtained or steering arm refuses to work when applying brakes : <input type="checkbox"/> Yes / <input type="checkbox"/> No	
	● When :	<input type="checkbox"/> Vehicle turns to right <input type="checkbox"/> Vehicle turns to left <input type="checkbox"/> Spins <input type="checkbox"/> Others :
	b) Directional stability cannot be obtained or steering arm refuses to work when accelerating : <input type="checkbox"/> Yes / <input type="checkbox"/> No	
	● When :	<input type="checkbox"/> Vehicle turns to right <input type="checkbox"/> Vehicle turns to left <input type="checkbox"/> Spins <input type="checkbox"/> Others :
	c) Brakes are out of order : <input type="checkbox"/> Yes / <input type="checkbox"/> No	
	● What :	<input type="checkbox"/> Braking distance is long <input type="checkbox"/> Brakes lock or drag <input type="checkbox"/> Pedal stroke is long <input type="checkbox"/> Pedal sticks <input type="checkbox"/> Others :
	d) Poor acceleration : <input type="checkbox"/> Yes / <input type="checkbox"/> No	
	● What :	<input type="checkbox"/> Fails to accelerate <input type="checkbox"/> Engine stalls <input type="checkbox"/> Others :
	e) Occurrence of vibration : <input type="checkbox"/> Yes / <input type="checkbox"/> No	
	● Where	
	● What kind :	
	f) Occurrence of abnormal noise : <input type="checkbox"/> Yes / <input type="checkbox"/> No	
● Where		
● What kind :		
g) Occurrence of other phenomena : <input type="checkbox"/> Yes / <input type="checkbox"/> No		
● What kind :		

3. CONDITIONS UNDER WHICH TROUBLE OCCURS

Environment	a) Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Various/Others :
	b) Ambient temperature	°F (°C)
	c) Road	<input type="checkbox"/> Urban area <input type="checkbox"/> Suburbs <input type="checkbox"/> Highway <input type="checkbox"/> General road <input type="checkbox"/> Ascending slope <input type="checkbox"/> Descending slope <input type="checkbox"/> Paved road <input type="checkbox"/> Gravel road <input type="checkbox"/> Muddy road <input type="checkbox"/> Sandy place <input type="checkbox"/> Others :
	d) Road surface	<input type="checkbox"/> Dry <input type="checkbox"/> Wet <input type="checkbox"/> New-fallen snow <input type="checkbox"/> Compressed snow <input type="checkbox"/> Frozen slope <input type="checkbox"/> Others :

Condition	a) Brakes	Deceleration : g	
		<input type="checkbox"/> Continuous / <input type="checkbox"/> Intermittent	
	b) Accelerator	Acceleration : g	
		<input type="checkbox"/> Continuous / <input type="checkbox"/> Intermittent	
	c) Vehicle speed	km/h	MPH
		<input type="checkbox"/> Advancing <input type="checkbox"/> Accelerating <input type="checkbox"/> Reducing speed <input type="checkbox"/> Low speed <input type="checkbox"/> Turning <input type="checkbox"/> Others :	
	d) Tire inflation pressure	Front RH tire : kPa	
		Front LH tire : kPa	
		Rear RH tire : kPa	
		Rear LH tire : kPa	
	e) Degree of wear	Front RH tire :	
		Front LH tire :	
		Rear RH tire :	
		Rear LH tire :	
	f) Genuine parts are used. : <input type="checkbox"/> Yes / <input type="checkbox"/> No		
	g) Chain is passed around tires. : <input type="checkbox"/> Yes / <input type="checkbox"/> No		
	h) T tire is used. : <input type="checkbox"/> Yes / <input type="checkbox"/> No		
	i) Condition of suspension alignment :		
j) Loading state :			
k) Repair parts are used. : <input type="checkbox"/> Yes / <input type="checkbox"/> No			
● What :			
l) Others :			

C: INSPECTION MODE

Reproduce the condition under which the problem has occurred as much as possible.

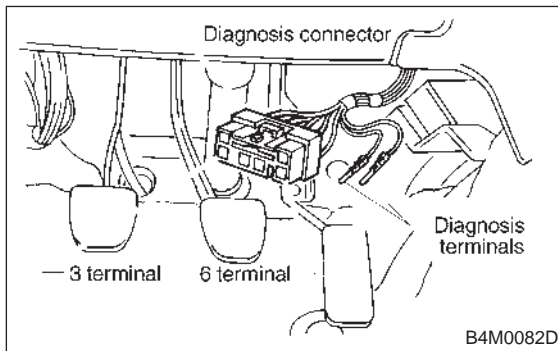
Drive the vehicle at a speed more than 40 km/h (25 MPH) for at least one minute.

D: TROUBLE CODES

When on-board diagnosis of the ABS control module detects a problem, the information (up to a maximum of three) will be stored in the EEPROM as a trouble code. When there are more than three, the most recent three will be stored. (Stored codes will stay in memory until they are cleared.)

1. CALLING UP A TROUBLE CODE

1) Take out diagnosis connector from side of driver's seat heater unit.



- 2) Turn ignition switch OFF.
- 3) Connect diagnosis connector terminal 6 to diagnosis terminal.
- 4) Turn ignition switch ON.
- 5) ABS warning light is set in the diagnostic mode and blinks to identify trouble code.

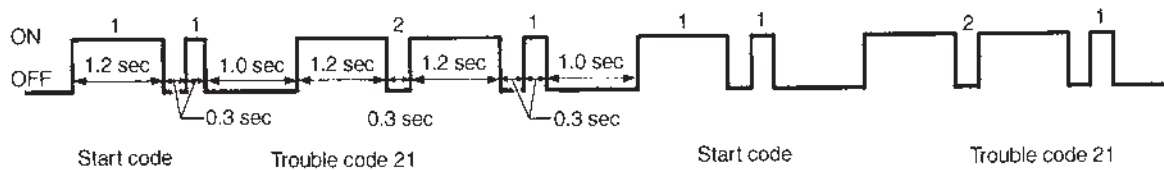
6) After the start code (11) is shown, the trouble codes will be shown in order of the last information first. These repeat for a maximum of 5 minutes.

NOTE:

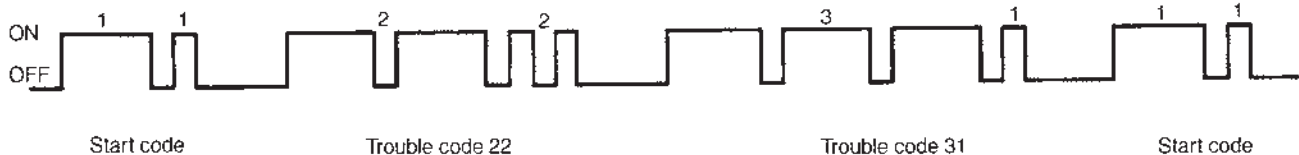
When there are no trouble codes in memory, only the start code (11) is shown.

Example of code indication

Trouble code: 21



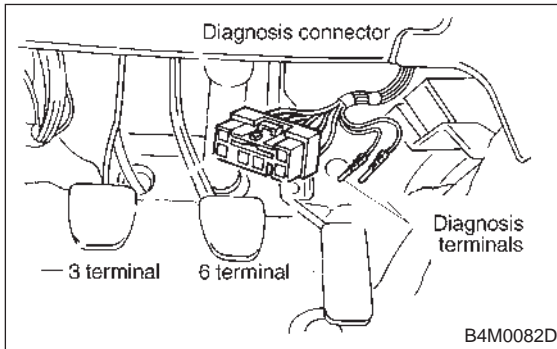
Trouble code: 22, 31



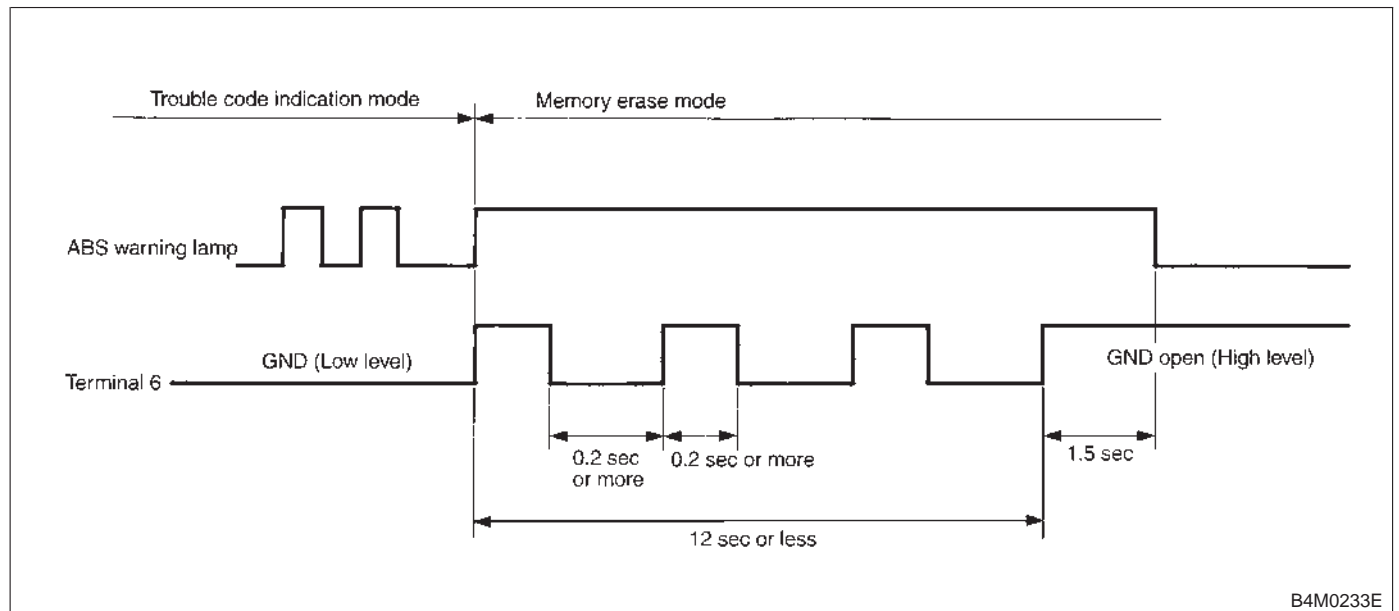
B4M0232A

2. CLEARING MEMORY

1) After calling up a trouble code, disconnect diagnosis connector terminal 6 from diagnosis terminal.



2) Repeat 3 times within approx. 12 seconds; connecting and disconnecting terminal 6 and diagnosis terminal for at least 0.2 seconds each time.



NOTE:

After diagnostics is completed, make sure to clear memory. Make sure only start code (11) is shown after memory is cleared.

MEMO:

7. Diagnostics Chart for ABS Warning Light Circuit and Diagnosis Circuit Failure

A: ABS WARNING LIGHT DOES NOT COME ON.

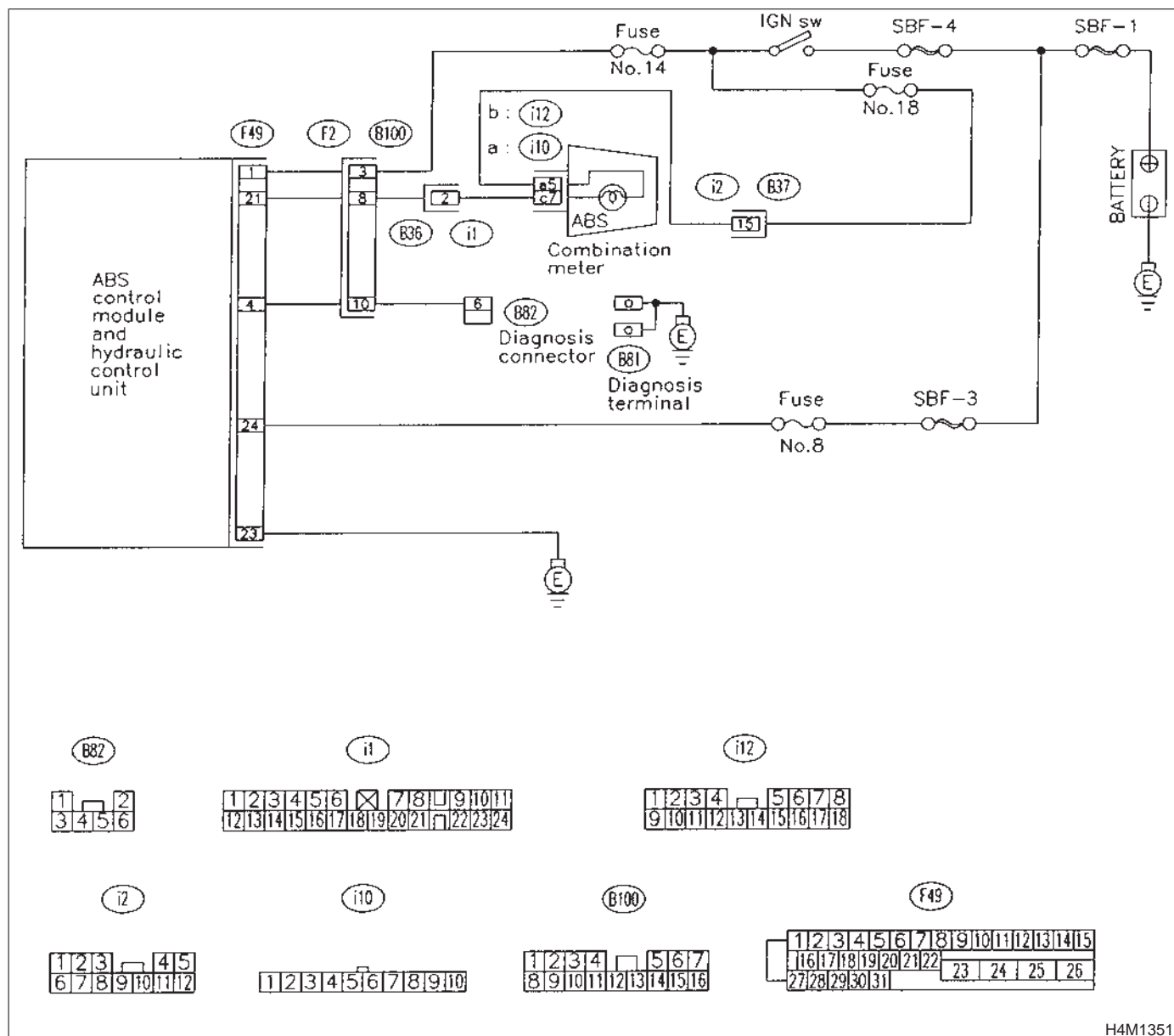
DIAGNOSIS:

- ABS warning light circuit is open or shorted.

TROUBLE SYMPTOM:

- When ignition switch is turned ON (engine OFF), ABS warning light does not come on.

WIRING DIAGRAM:



H4M1351

7A1 : CHECK IF OTHER WARNING LIGHTS TURN ON.

Turn ignition switch to ON (engine OFF).

- CHECK** : **Do other warning lights turn on?**
YES : Go to step 7A2.
NO : Repair combination meter.

7A2 : CHECK ABS WARNING LIGHT BULB.

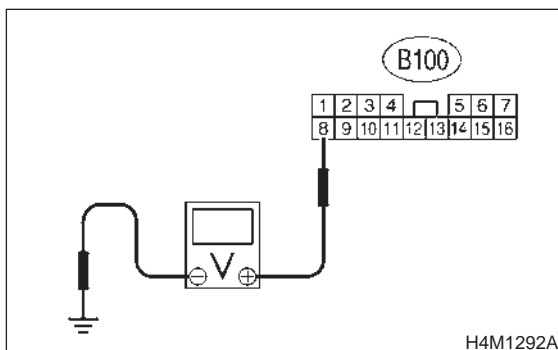
- 1) Turn ignition switch to OFF.
- 2) Remove combination meter.
- 3) Remove ABS warning light bulb from combination meter.

- CHECK** : **Is ABS warning light bulb OK?**
YES : Go to step 7A3.
NO : Replace ABS warning light bulb.

7A3 : CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.

- 1) Disconnect connector (B100) from connector (F2).
- 2) Measure voltage between connector (B100) and chassis ground.

Connector & terminal
(B100) No. 8 (+) — Chassis ground (-):

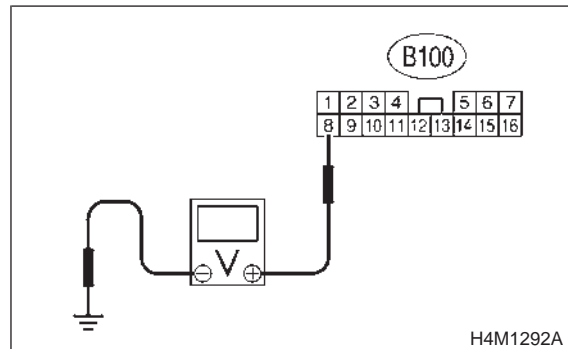


- CHECK** : **Is the voltage less than 3 V?**
YES : Go to step 7A4.
NO : Repair warning light harness.

7A4 : CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between connector (B100) and chassis ground.

Connector & terminal
(B100) No. 8 (+) — Chassis ground (-):

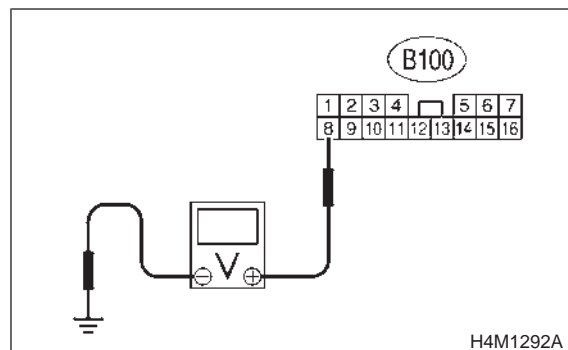


- CHECK** : **Is voltage less than 3 V?**
YES : Go to step 7A5.
NO : Repair warning light harness.

7A5 : CHECK WIRING HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Install ABS warning light bulb from combination meter.
- 3) Install combination meter.
- 4) Turn ignition switch to ON.
- 5) Measure voltage between connector (B100) and chassis ground.

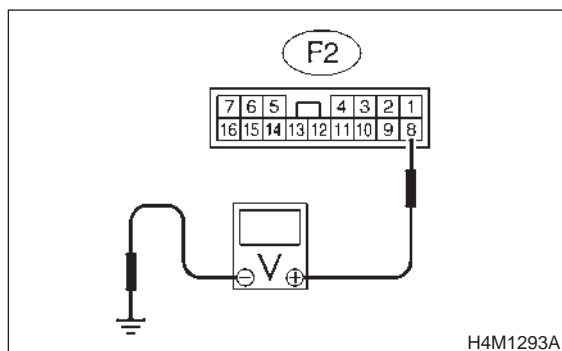
Connector & terminal
(B100) No. 8 (+) — Chassis ground (-):



- CHECK** : **Is voltage between 10 V and 15 V?**
YES : Go to step 7A6.
NO : Repair wiring harness.

7A6 : CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.

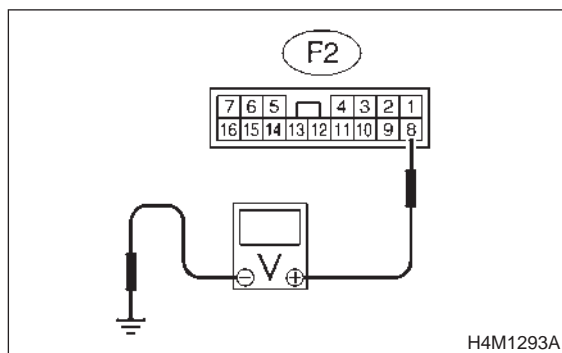
- 1) Turn ignition switch to OFF.
- 2) Measure voltage between connector (F2) and chassis ground.

Connector & terminal**(F2) No. 8 (+) — Chassis ground (-):**

- CHECK** : Is the voltage less than 3 V?
- YES** : Go to step 7A7.
- NO** : Repair wiring harness.

7A7 : CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.

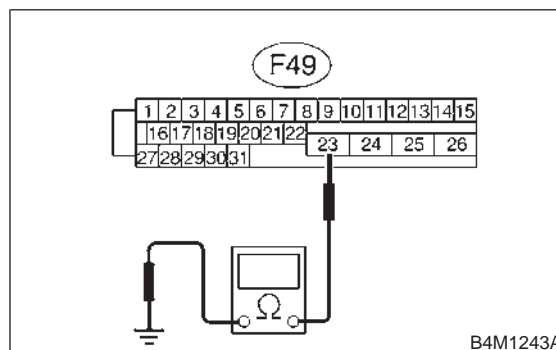
- 1) Turn ignition switch to ON.
- 2) Measure voltage between connector (F2) and chassis ground.

Connector & terminal**(F2) No. 8 (+) — Chassis ground (-):**

- CHECK** : Is voltage less than 3 V?
- YES** : Go to step 7A8.
- NO** : Repair wiring harness.

7A8 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

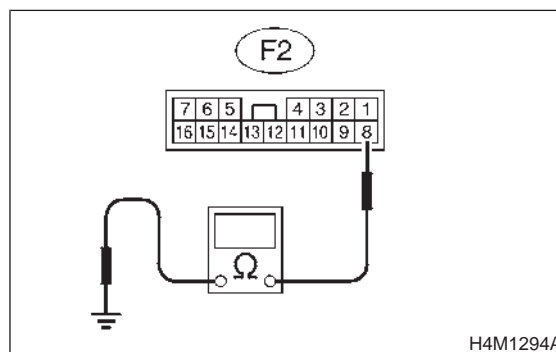
Measure resistance between ABSCM&H/U and chassis ground.

Connector & terminal**(F49) No. 23 — GND:**

- CHECK** : Is the resistance less than 0.5 Ω?
- YES** : Go to step 7A9.
- NO** : Repair ABSCM&H/U ground harness.

7A9 : CHECK WIRING HARNESS.

Measure resistance between connector (F2) and chassis ground.

Connector & terminal**(F2) No. 8 — Chassis ground:**

- CHECK** : Is the resistance less than 0.5 Ω?
- YES** : Go to step 7A10.
- NO** : Repair harness/connector.

7A10 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : *Is there poor contact in connectors between combination meter and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

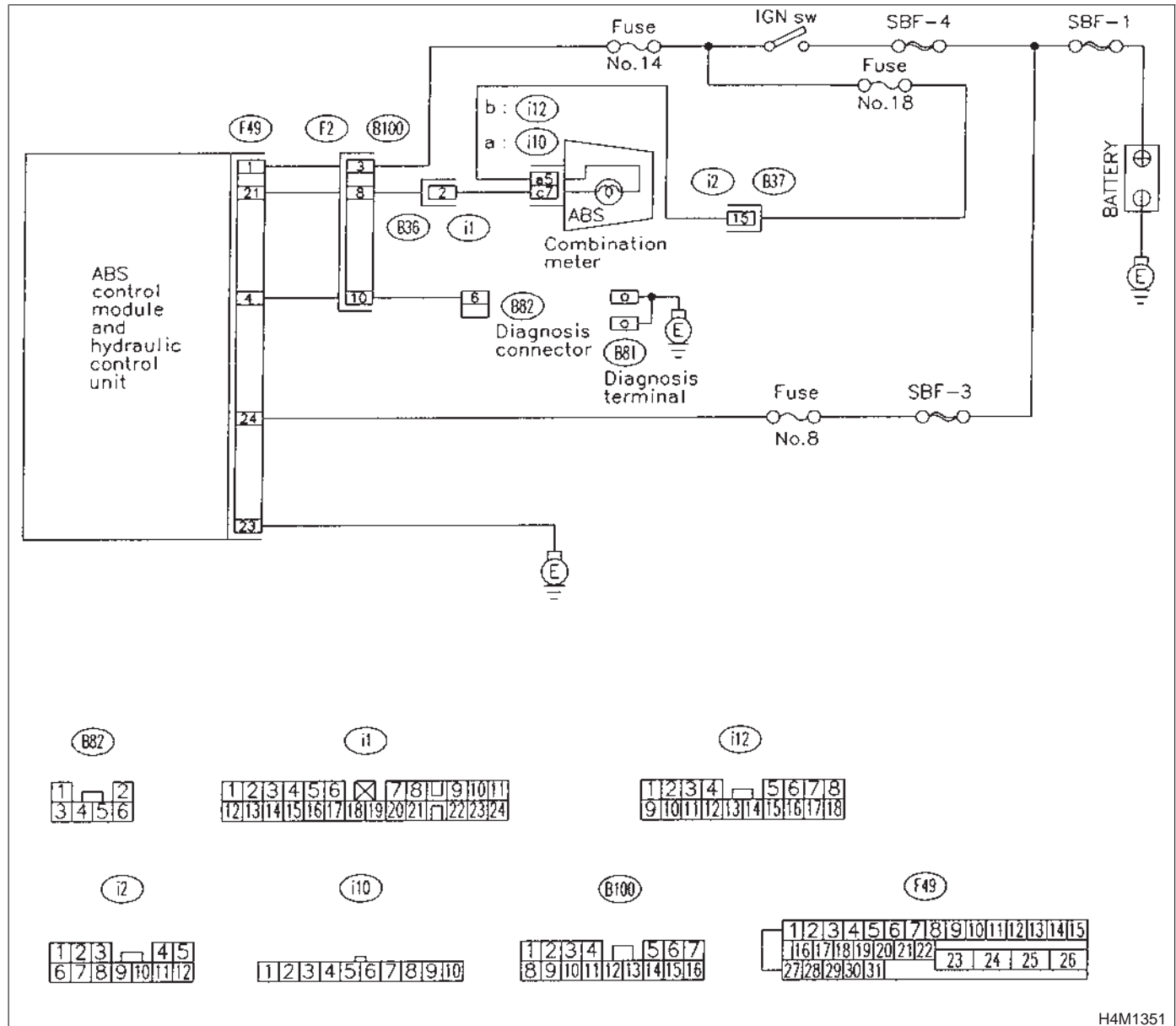
NO : Replace ABSCM&H/U.

B: ABS WARNING LIGHT DOES NOT GO OFF.**DIAGNOSIS:**

- ABS warning light circuit is open or shorted.

TROUBLE SYMPTOM:

- When starting the engine and while ABS warning light is kept ON.

WIRING DIAGRAM:

H4M1351

7B1 : CHECK INSTALLATION OF ABSCM&H/U CONNECTOR.

Turn ignition switch to OFF.

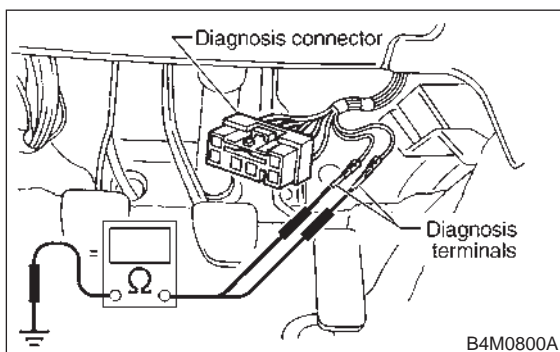
CHECK : *Is ABSCM&H/U connector inserted into ABSCM until the clamp locks onto it?*

YES : Go to step 7B2.

NO : Insert ABSCM&H/U connector into ABSCM&H/U until the clamp locks onto it.

7B2 : CHECK DIAGNOSIS TERMINAL.

Measure resistance between diagnosis terminals (B81) and chassis ground.



Terminals

Diagnosis terminal (A) — Chassis ground:

Diagnosis terminal (B) — Chassis ground:

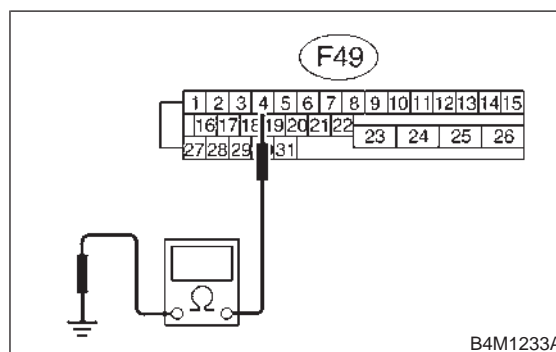
CHECK : *Is the resistance less than 0.5 Ω?*

YES : Go to step 7B3.

NO : Repair diagnosis terminal harness.

7B3 : CHECK DIAGNOSIS LINE.

- 1) Turn ignition switch to OFF.
- 2) Connect diagnosis terminal (B81) to diagnosis connector (B82) No. 6.
- 3) Disconnect connector from ABSCM&H/U.
- 4) Measure resistance between ABSCM&H/U connector and chassis ground.



Connector & terminal

(F49) No. 4 — Chassis ground:

CHECK : *Is the resistance less than 0.5 Ω?*

YES : Go to step 7B4.

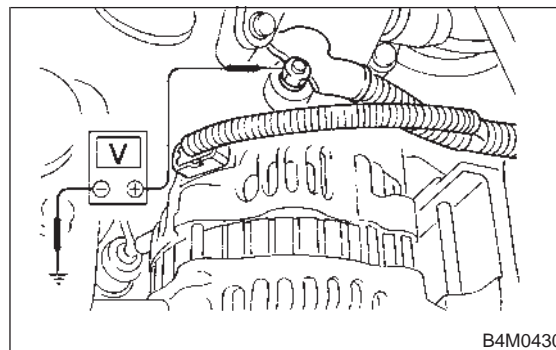
NO : Repair harness connector between ABSCM&H/U and diagnosis connector.

7B4 : CHECK GENERATOR.

- 1) Start the engine.
- 2) Idle the engine.
- 3) Measure voltage between generator and chassis ground.

Terminal

Generator B terminal (+) — Chassis ground (-):



CHECK : *Is the voltage between 10 and 15 V?*

YES : Go to step 7B5.

NO : Repair generator.

7B5 : CHECK BATTERY TERMINAL.

Turn ignition switch to OFF.

CHECK : *Is there poor contact at battery terminal?*

YES : Repair battery terminal.

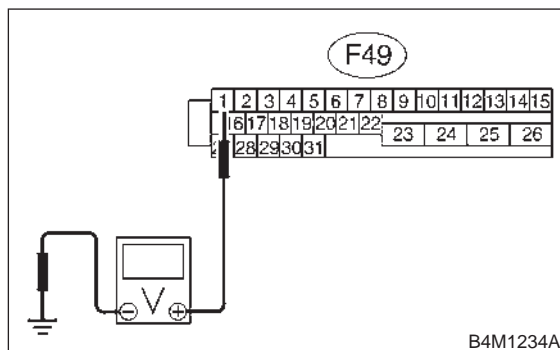
NO : Go to step **7B6**.

7B6 : CHECK POWER SUPPLY OF ABSCM.

- 1) Disconnect connector from ABSCM&H/U.
- 2) Start engine.
- 3) Idle the engine.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):



CHECK : *Is the voltage between 10 and 15 V?*

YES : Go to step **7B7**.

NO : Repair ABSCM&H/U power supply circuit.

7B7 : CHECK WIRING HARNESS.

- 1) Disconnect connector (F2) from connector (B100).
- 2) Turn ignition switch to ON.

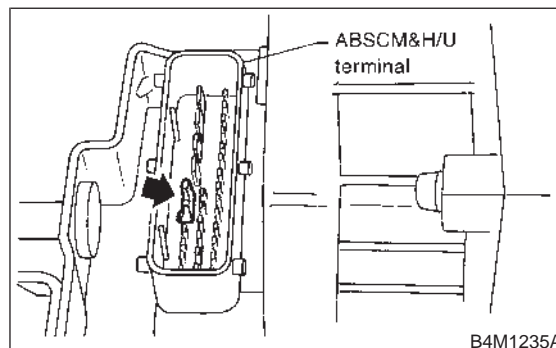
CHECK : *Does the ABS warning light remain off?*

YES : Go to step **7B8**.

NO : Repair front wiring harness.

7B8 : CHECK PROJECTION AT ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Check for broken projection at the ABSCM&H/U terminal.



CHECK : *Are the projection broken?*

YES : Go to step **7B9**.

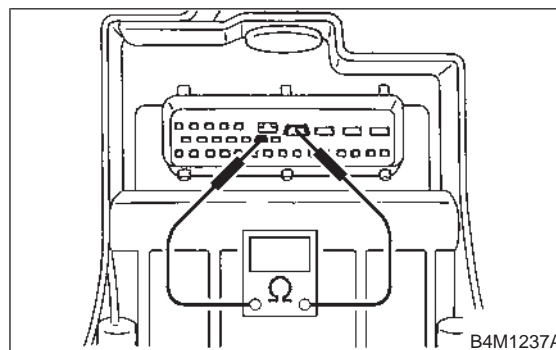
NO : Replace ABSCM&H/U.

7B9 : CHECK ABSCM&H/U.

Measure resistance between ABSCM&H/U terminals.

Terminal

No. 21 — No. 23:



CHECK : *Is the resistance more than 1 MΩ?*

YES : Go to step **7B10**.

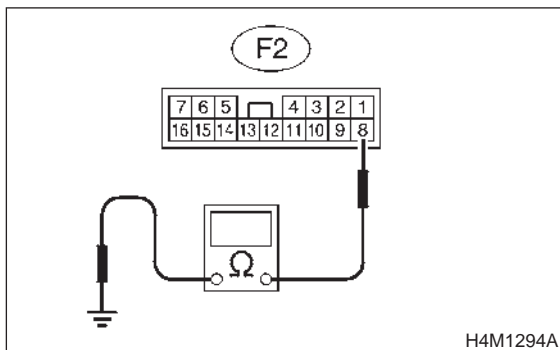
NO : Replace ABSCM&H/U.

7B10 : CHECK WIRING HARNESS.

Measure resistance between connector (F2) and chassis ground.

Connector & terminal

(F2) No. 8 — Chassis ground:



CHECK : **Is the resistance less than 0.5 Ω?**

YES : Go to step 7B11.

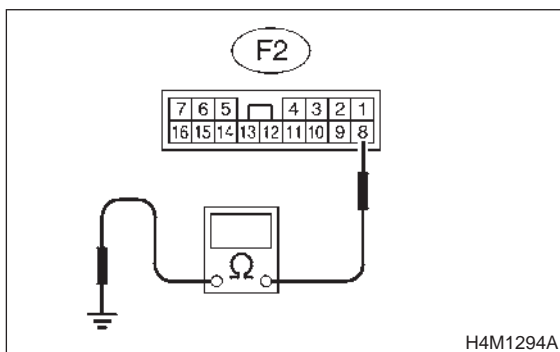
NO : Repair harness.

7B11 : CHECK WIRING HARNESS.

- 1) Connect connector to ABSCM&H/U.
- 2) Measure resistance between connector (F2) and chassis ground.

Connector & terminal

(F2) No. 8 — Chassis ground:



CHECK : **Is the resistance more than 1 MΩ?**

YES : Go to step 7B12.

NO : Repair harness.

7B12 : CHECK POOR CONTACT IN ABSCM&H/U CONNECTOR.

CHECK : **Is there poor contact in ABSCM&H/U connector? <Ref. to FOREWORD [T3C1].>**

YES : Repair connector.

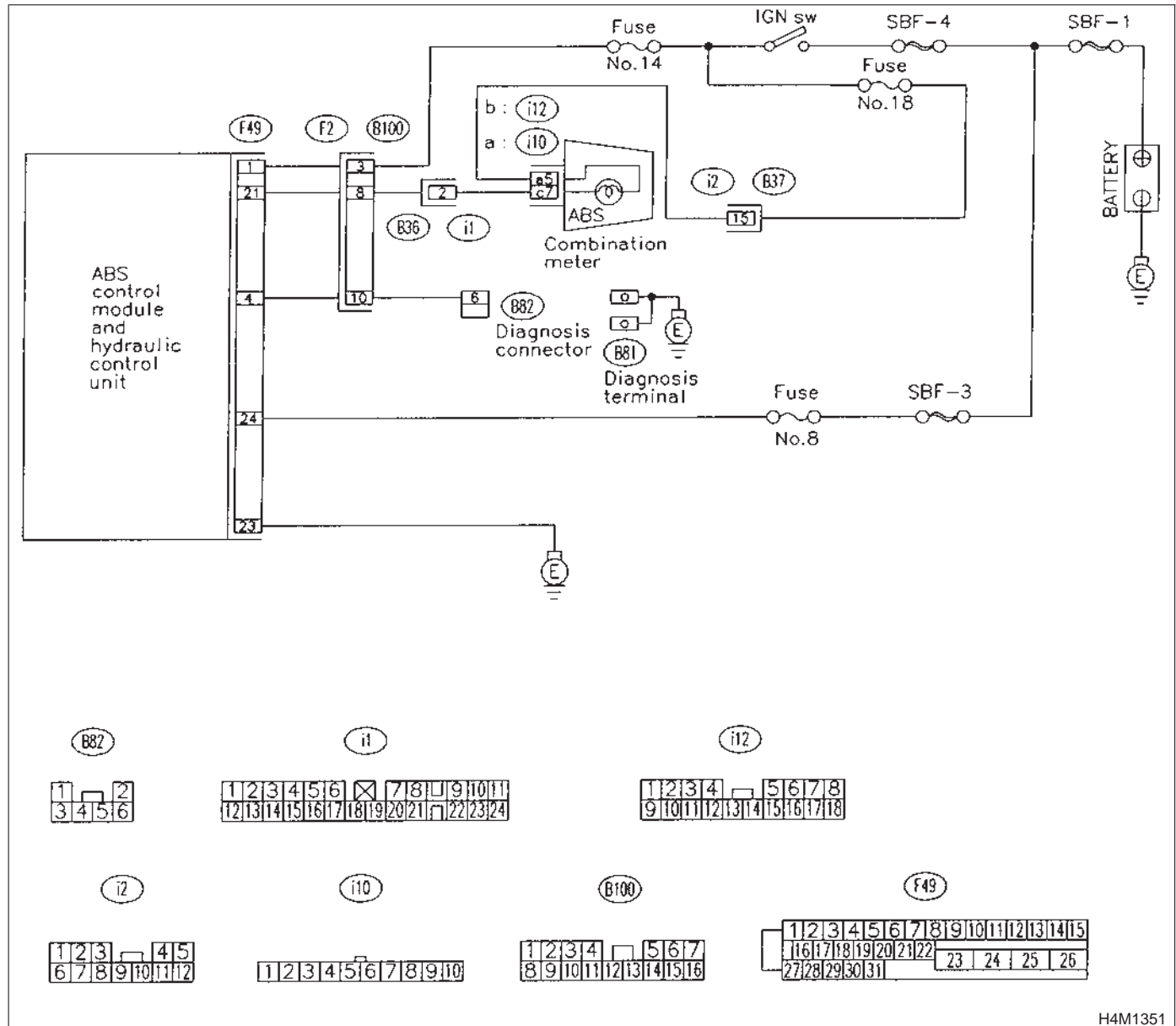
NO : Replace ABSCM&H/U.

C: TROUBLE CODE DOES NOT APPEAR.**DIAGNOSIS:**

- Diagnosis circuit is open.

TROUBLE SYMPTOM:

- The ABS warning light turns on or off normally but the start code cannot be read out in the diagnostic mode.

WIRING DIAGRAM:

H4M1351

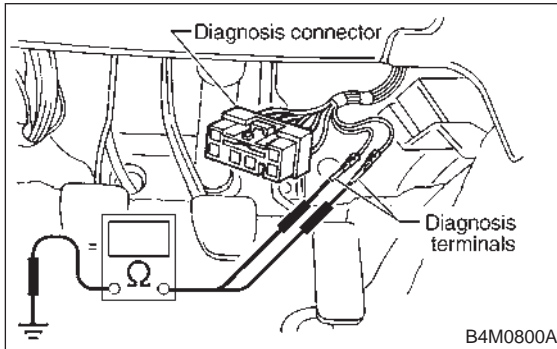
7C1 : CHECK DIAGNOSIS TERMINAL.

Measure resistance between diagnosis terminals (B81) and chassis ground.

Terminals

Diagnosis terminal (A) — Chassis ground:

Diagnosis terminal (B) — Chassis ground:



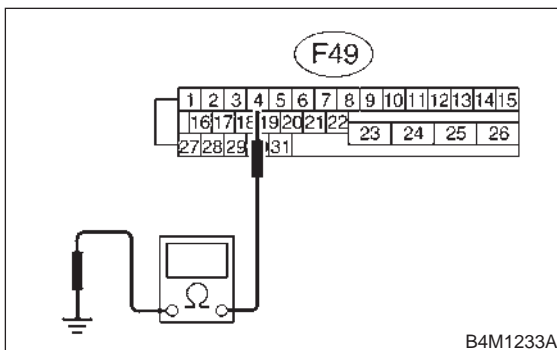
- CHECK** : **Is the resistance less than 0.5 Ω ?**
- YES** : Go to step **7C2**.
- NO** : Repair diagnosis terminal harness.

7C2 : CHECK DIAGNOSIS LINE.

- 1) Turn ignition switch to OFF.
- 2) Connect diagnosis terminal (B81) to diagnosis connector (B82) No. 6.
- 3) Disconnect connector from ABSCM&H/U.
- 4) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 4 — Chassis ground:



- CHECK** : **Is the resistance less than 0.5 Ω ?**
- YES** : Go to step **7C3**.
- NO** : Repair harness connector between ABSCM&H/U and diagnosis connector.

7C3 : CHECK POOR CONTACT IN ABSCM&H/U CONNECTOR.

- CHECK** : **Is there poor contact in ABSCM&H/U connector? <Ref. to FOREWORD [T3C1].>**
- YES** : Repair connector.
- NO** : Replace ABSCM&H/U.

MEMO:

8. Diagnostics Chart with Trouble Code by ABS Warning Light

A: LIST OF TROUBLE CODE

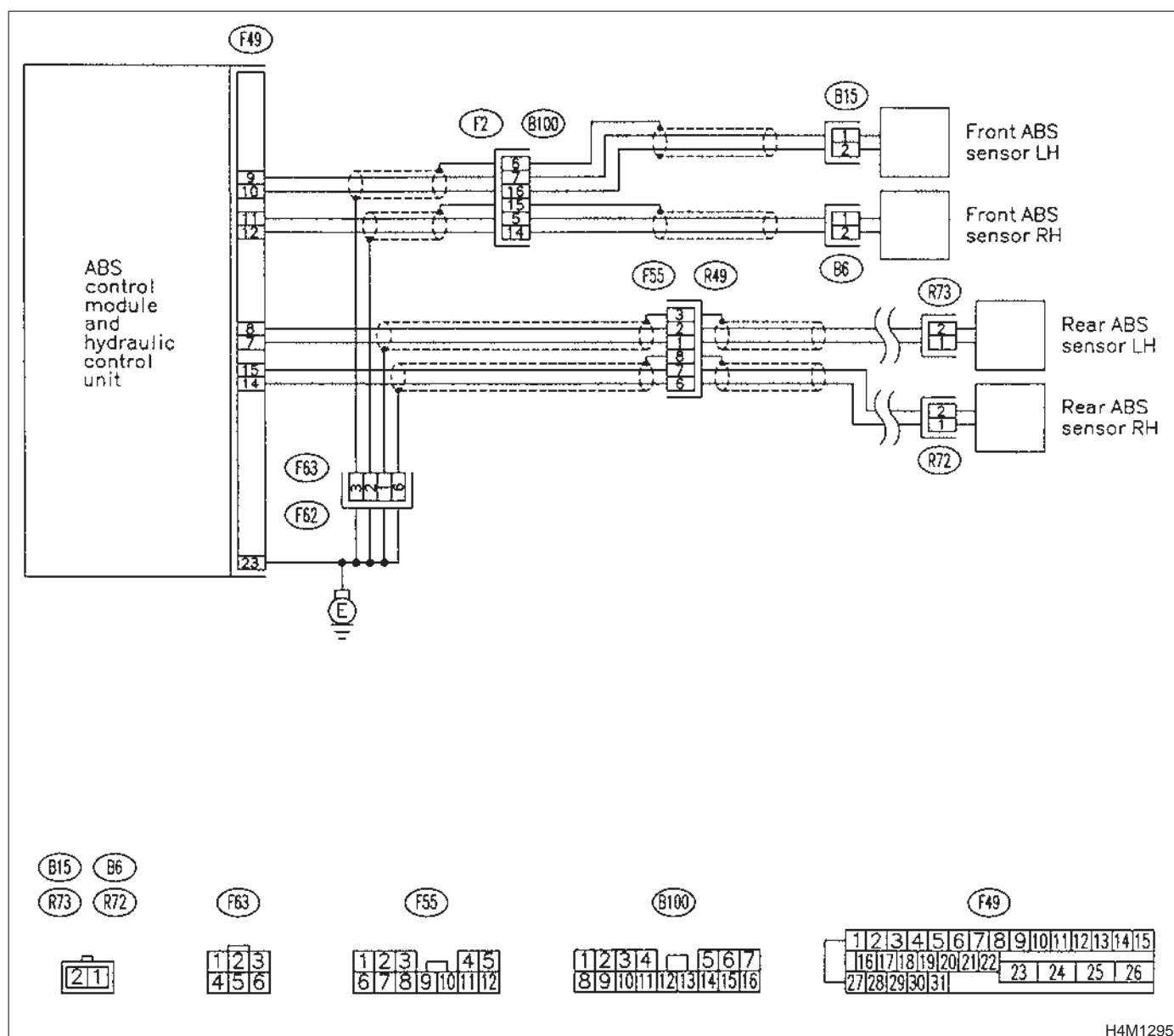
Trouble code	Contents of diagnosis		Index No.
11	Start code ● Trouble code is shown after start code. ● Only start code is shown in normal condition.		—
21	Abnormal ABS sensor (Open circuit or input voltage too high)	Front right ABS sensor	<Ref. to 4-4 [T8B0].>
23		Front left ABS sensor	<Ref. to 4-4 [T8C0].>
25		Rear right ABS sensor	<Ref. to 4-4 [T8D0].>
27		Rear left ABS sensor	<Ref. to 4-4 [T8E0].>
22	Abnormal ABS sensor (Abnormal ABS sensor signal)	Front right ABS sensor	<Ref. to 4-4 [T8F0].>
24		Front left ABS sensor	<Ref. to 4-4 [T8G0].>
26		Rear right ABS sensor	<Ref. to 4-4 [T8H0].>
28		Rear left ABS sensor	<Ref. to 4-4 [T8I0].>
29		Any one of four	<Ref. to 4-4 [T8J0].>
31	Abnormal solenoid valve circuit(s) in ABS control module and hydraulic unit	Front right inlet valve	<Ref. to 4-4 [T8K0].>
32		Front right outlet valve	<Ref. to 4-4 [T8O0].>
33		Front left inlet valve	<Ref. to 4-4 [T8L0].>
34		Front left outlet valve	<Ref. to 4-4 [T8P0].>
35		Rear right inlet valve	<Ref. to 4-4 [T8M0].>
36		Rear right outlet valve	<Ref. to 4-4 [T8Q0].>
37		Rear left inlet valve	<Ref. to 4-4 [T8N0].>
38		Rear left outlet valve	<Ref. to 4-4 [T8R0].>
41	Abnormal ABS control module		<Ref. to 4-4 [T8S0].>
42	Source voltage is abnormal.		<Ref. to 4-4 [T8T0].>
44	A combination of AT control abnormal		<Ref. to 4-4 [T8U0].>
51	Abnormal valve relay		<Ref. to 4-4 [T8V0].>
52	Abnormal motor and/or motor relay		<Ref. to 4-4 [T8W0].>
54	Abnormal stop light switch		<Ref. to 4-4 [T8X0].>
56	Abnormal G sensor output voltage		<Ref. to 4-4 [T8Y0].>

B: TROUBLE CODE 21 (FRONT RH)**C: TROUBLE CODE 23 (FRONT LH)****D: TROUBLE CODE 25 (REAR RH)****E: TROUBLE CODE 27 (REAR LH)****— ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) —****DIAGNOSIS:**

- Faulty ABS sensor (Broken wire, input voltage too high)
- Faulty harness connector

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

H4M1295

8E1 : CHECK ABS SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABS sensor.
- 3) Measure resistance of ABS sensor connector terminals.

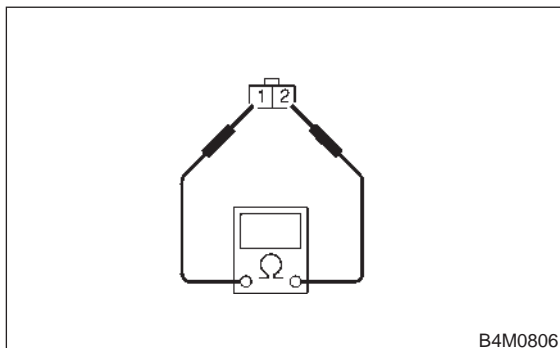
Terminal

Front RH No. 1 — No. 2:

Front LH No. 1 — No. 2:

Rear RH No. 1 — No. 2:

Rear LH No. 1 — No. 2:



CHECK : Is the resistance between 0.8 and 1.2 kΩ?

YES : Go to step 8E2.

NO : Replace ABS sensor.

8E2 : CHECK BATTERY SHORT OF ABS SENSOR.

- 1) Disconnect connector from ABSCM&H/U.
- 2) Measure voltage between ABS sensor and chassis ground.

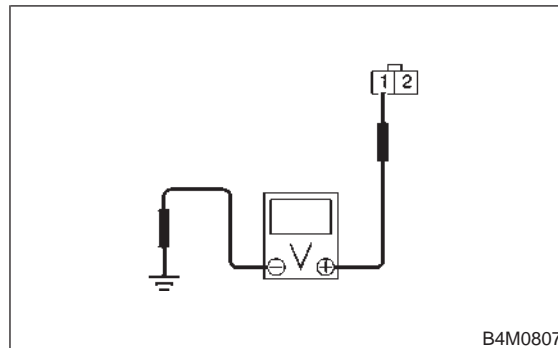
Terminal

Front RH No. 1 (+) — Chassis ground (-):

Front LH No. 1 (+) — Chassis ground (-):

Rear RH No. 1 (+) — Chassis ground (-):

Rear LH No. 1 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step 8E3.

NO : Replace ABS sensor.

8E3 : CHECK BATTERY SHORT OF ABS SENSOR.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ABS sensor and chassis ground.

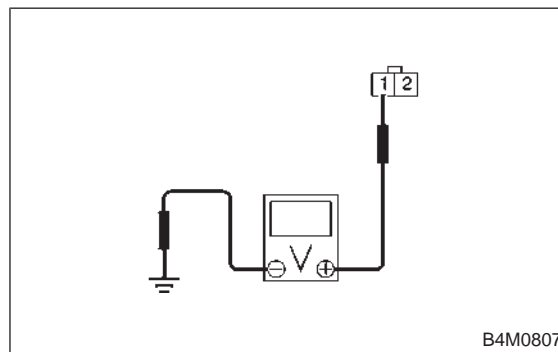
Terminal

Front RH No. 1 (+) — Chassis ground (-):

Front LH No. 1 (+) — Chassis ground (-):

Rear RH No. 1 (+) — Chassis ground (-):

Rear LH No. 1 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step 8E4.

NO : Replace ABS sensor.

8E4 : CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to ABS sensor.
- 3) Measure resistance between ABSCM&H/U connector terminals.

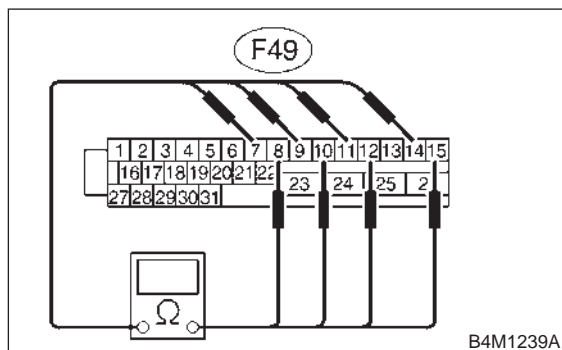
Connector & terminal

Trouble code 21 / (F49) No. 11 — No. 12:

Trouble code 23 / (F49) No. 9 — No. 10:

Trouble code 25 / (F49) No. 14 — No. 15:

Trouble code 27 / (F49) No. 7 — No. 8:



CHECK : **Is the resistance between 0.8 and 1.2 kΩ?**

YES : Go to step **8E5**.

NO : Repair harness/connector between ABSCM&H/U and ABS sensor.

8E5 : CHECK BATTERY SHORT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

Trouble code 21 / (F49) No. 11 (+) —

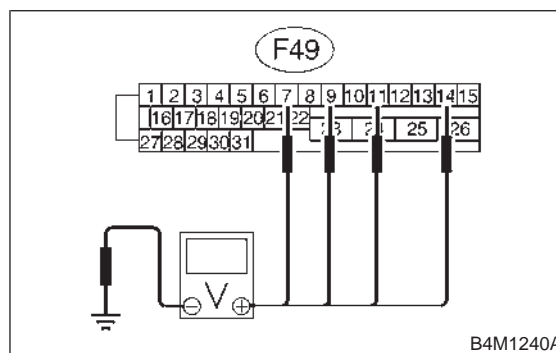
Chassis ground (-):

Trouble code 23 / (F49) No. 9 (+) — Chassis ground (-):

Trouble code 25 / (F49) No. 14 (+) —

Chassis ground (-):

Trouble code 27 / (F49) No. 7 (+) — Chassis ground (-):



CHECK : **Is the voltage less than 1 V?**

YES : Go to step **8E6**.

NO : Repair harness between ABSCM&H/U and ABS sensor.

8E6 : CHECK BATTERY SHORT OF HARNESS.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

Trouble code 21 / (F49) No. 11 (+) —

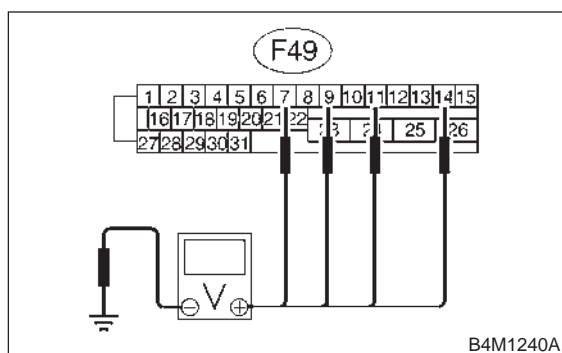
Chassis ground (-):

Trouble code 23 / (F49) No. 9 (+) — Chassis ground (-):

Trouble code 25 / (F49) No. 14 (+) —

Chassis ground (-):

Trouble code 27 / (F49) No. 7 (+) — Chassis ground (-):



- CHECK** : Is the voltage less than 1 V?
- YES** : Go to step 8E7.
- NO** : Repair harness between ABSCM&H/U and ABS sensor.

8E7 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:

32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

- CHECK** : Are the ABS sensor installation bolts tightened securely?
- YES** : Go to step 8E8.
- NO** : Tighten ABS sensor installation bolts securely.

8E8 : CHECK INSTALLATION OF TONE WHEEL.

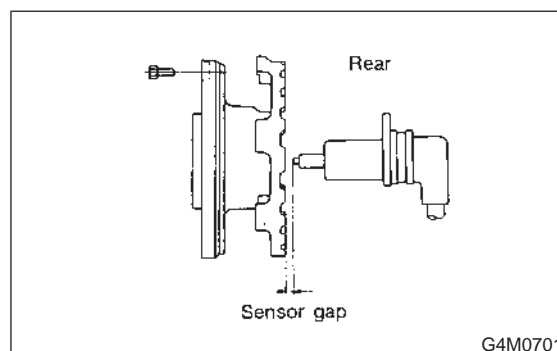
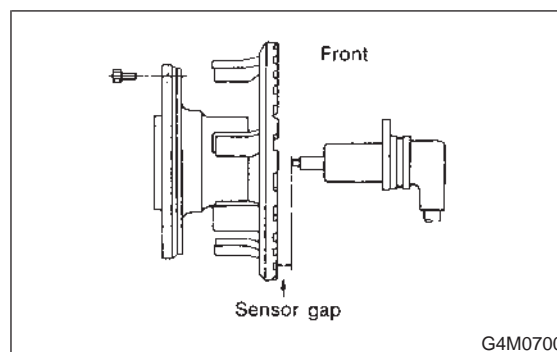
Tightening torque:

13±3 N·m (1.3±0.3 kg-m, 9±2.2 ft-lb)

- CHECK** : Are the tone wheel installation bolts tightened securely?
- YES** : Go to step 8E9.
- NO** : Tighten tone wheel installation bolts securely.

8E9 : CHECK ABS SENSOR GAP.

Measure tone wheel-to-pole piece gap over entire perimeter of the wheel.



	Front wheel	Rear wheel
Specifications	0.9 — 1.4 mm (0.035 — 0.055 in)	0.7 — 1.2 mm (0.028 — 0.047 in)

- CHECK** : Is the gap within the specifications?
- YES** : Go to step 8E10.
- NO** : Adjust the gap.

NOTE:

Adjust the gap using spacers (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

8E10 : CHECK HUB RUNOUT.

Measure hub runout.

CHECK : *Is the runout less than 0.05 mm (0.0020 in)?*

YES : Go to step **8E11**.

NO : Repair hub.

8E11 : CHECK GROUND SHORT OF ABS SENSOR.

- 1) Turn ignition switch to ON.
- 2) Measure resistance between ABS sensor and chassis ground.

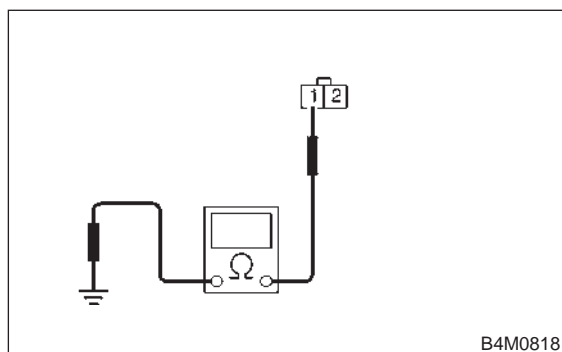
Terminal

Front RH No. 1 — Chassis ground:

Front LH No. 1 — Chassis ground:

Rear RH No. 1 — Chassis ground:

Rear LH No. 1 — Chassis ground:



CHECK : *Is the resistance more than 1 MΩ?*

YES : Go to step **8E12**.

NO : Replace ABS sensor and ABSCM&H/U.

8E12 : CHECK GROUND SHORT OF HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to ABS sensor.
- 3) Measure resistance between ABSCM&H/U connector terminal and chassis ground.

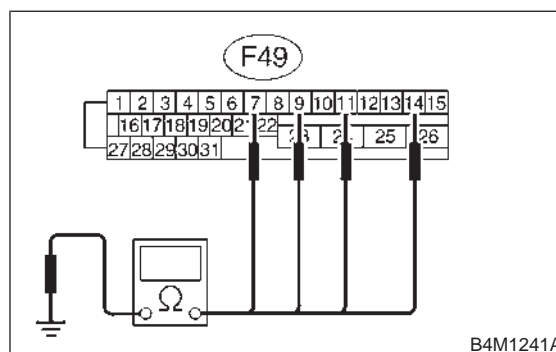
Connector & terminal

Trouble code 21 / (F49) No. 11 — Chassis ground:

Trouble code 23 / (F49) No. 9 — Chassis ground:

Trouble code 25 / (F49) No. 14 — Chassis ground:

Trouble code 27 / (F49) No. 7 — Chassis ground:



CHECK : *Is the resistance more than 1 MΩ?*

YES : Go to step **8E13**.

NO : Repair harness between ABSCM&H/U and ABS sensor.
Replace ABSCM&H/U.

8E13 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connectors between ABSCM&H/U and ABS sensor? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

NO : Go to step **8E14**.

8E14 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step **8E15**.

8E15 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

NOTE:

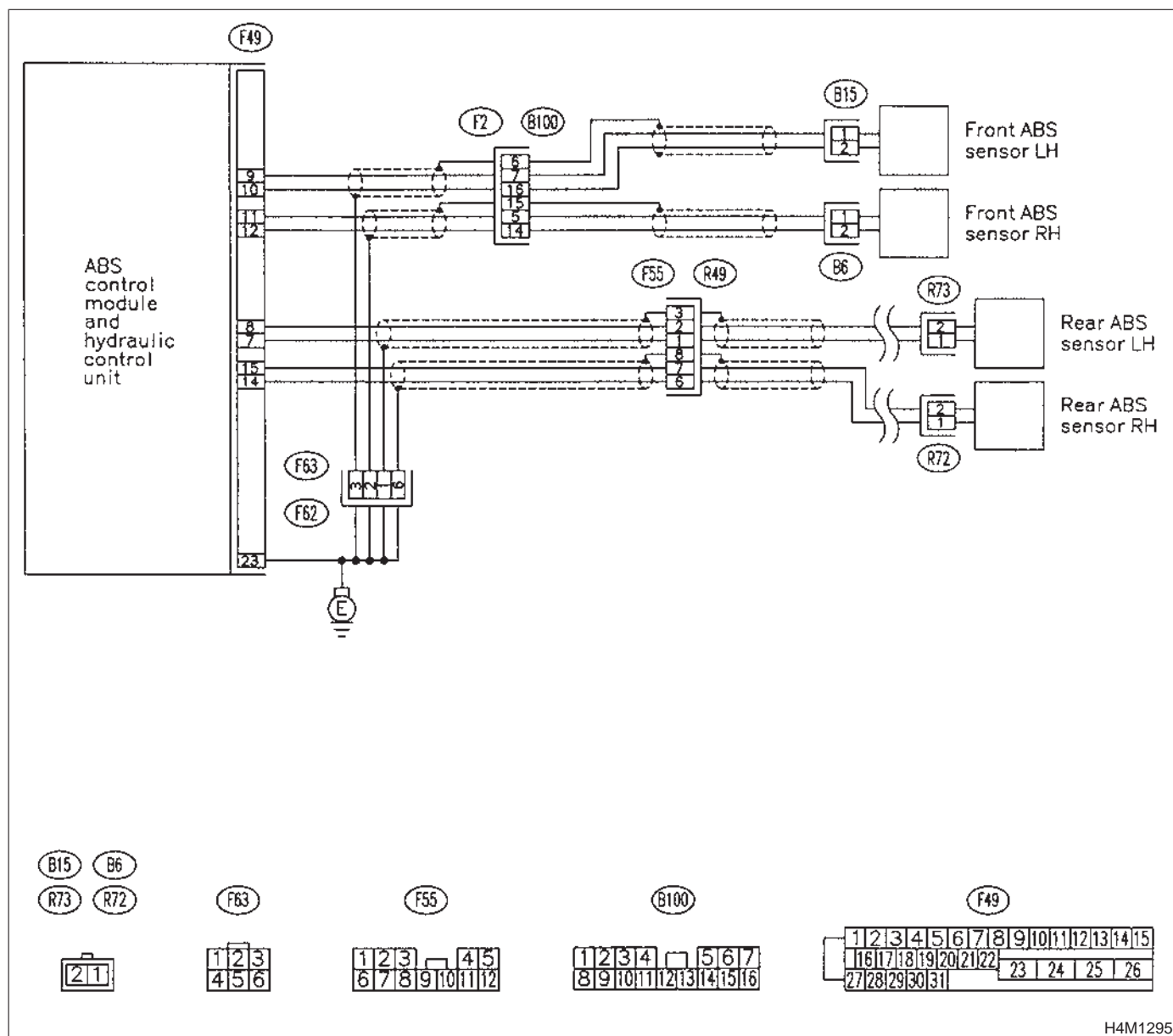
Check harness and connectors between ABSCM&H/U and ABS sensor.

F: TROUBLE CODE 22 (FRONT RH)**G: TROUBLE CODE 24 (FRONT LH)****H: TROUBLE CODE 26 (REAR RH)****I: TROUBLE CODE 28 (REAR LH)****— ABNORMAL ABS SENSOR (ABNORMAL ABS SENSOR SIGNAL) —****DIAGNOSIS:**

- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty harness/connector

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

H4M1295

8I1 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:

32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

- CHECK** : Are the ABS sensor installation bolts tightened securely?
- YES** : Go to step 8I2.
- NO** : Tighten ABS sensor installation bolts securely.

8I2 : CHECK INSTALLATION OF TONE WHEEL.

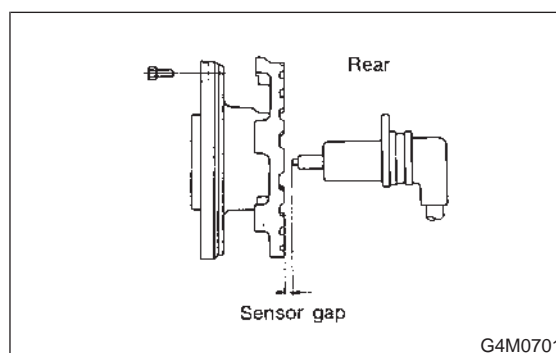
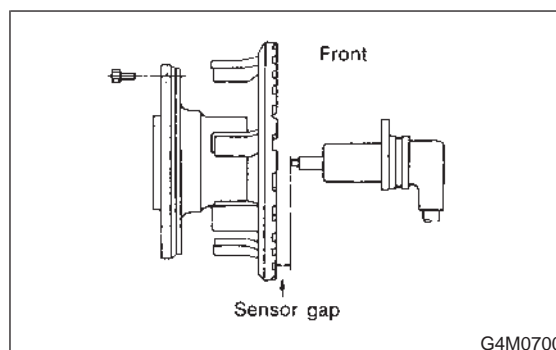
Tightening torque:

13±3 N·m (1.3±0.3 kg-m, 9±2.2 ft-lb)

- CHECK** : Are the tone wheel installation bolts tightened securely?
- YES** : Go to step 8I3.
- NO** : Tighten tone wheel installation bolts securely.

8I3 : CHECK ABS SENSOR GAP.

Measure tone wheel to pole piece gap over entire perimeter of the wheel.



	Front wheel	Rear wheel
Specifications	0.9 — 1.4 mm (0.035 — 0.055 in)	0.7 — 1.2 mm (0.028 — 0.047 in)

- CHECK** : Is the gap within the specifications?
- YES** : Go to step 8I4.
- NO** : Adjust the gap.

NOTE:

Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

8I4 : CHECK OSCILLOSCOPE.

- CHECK** : Is an oscilloscope available?
- YES** : Go to step 8I5.
- NO** : Go to step 8I6.

8I5 : CHECK ABS SENSOR SIGNAL.

- 1) Raise all four wheels of ground.
- 2) Turn ignition switch OFF.
- 3) Connect the oscilloscope to the connector.
- 4) Turn ignition switch ON.
- 5) Rotate wheels and measure voltage at specified frequency.

NOTE:

When this inspection is completed, the ABSCM&H/U sometimes stores the trouble code 29.

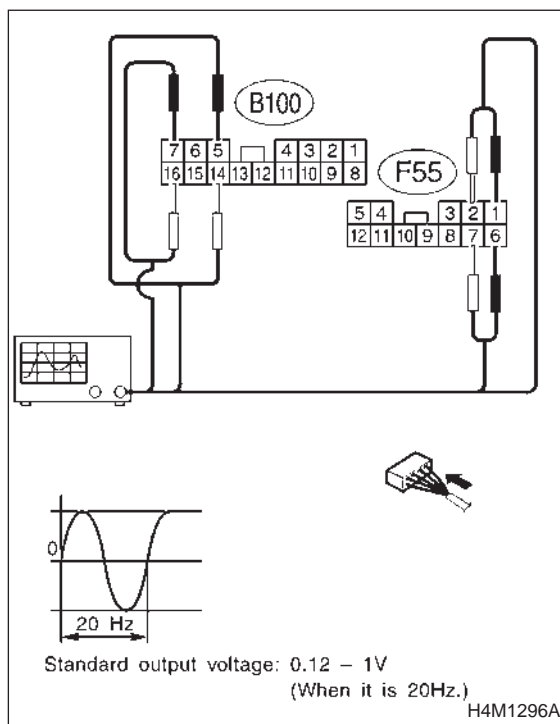
Connector & terminal

Trouble code 22 / (B100) No. 5 (+) — No. 14 (-):

Trouble code 24 / (B100) No. 7 (+) — No. 16 (-):

Trouble code 26 / (F55) No. 6 (+) — No. 7 (-):

Trouble code 28 / (F55) No. 1 (+) — No. 2 (-):



CHECK : *Is oscilloscope pattern smooth, as shown in figure?*

YES : Go to step **8I9**.

NO : Go to step **8I6**.

8I6 : CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.

Remove disc rotor or drum from hub in accordance with trouble code.

CHECK : *Is the ABS sensor pole piece or the tone wheel contaminated by dirt or other foreign matter?*

YES : Thoroughly remove dirt or other foreign matter.

NO : Go to step **8I7**.

8I7 : CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.

CHECK : *Are there broken or damaged in the ABS sensor pole piece or the tone wheel?*

YES : Replace ABS sensor or tone wheel.

NO : Go to step **8I8**.

8I8 : CHECK HUB RUNOUT.

Measure hub runout.

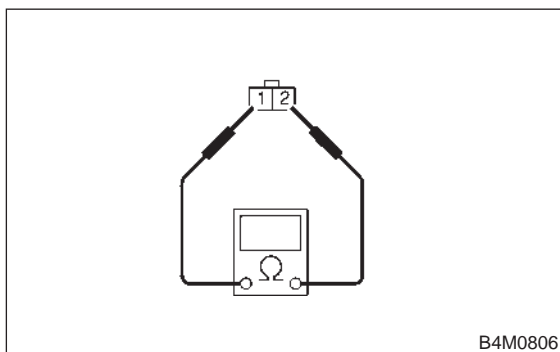
CHECK : *Is the runout less than 0.05 mm (0.0020 in)?*

YES : Go to step **8I9**.

NO : Repair hub.

8I9 : CHECK RESISTANCE OF ABS SENSOR.

- 1) Turn ignition switch OFF.
- 2) Disconnect connector from ABS sensor.
- 3) Measure resistance between ABS sensor connector terminals.

Terminal**Front RH No. 1 — No. 2:****Front LH No. 1 — No. 2:****Rear RH No. 1 — No. 2:****Rear LH No. 1 — No. 2:**

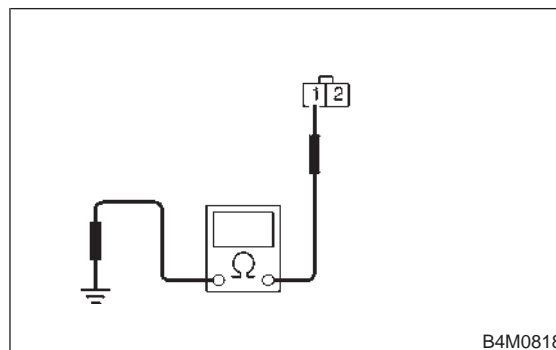
CHECK : Is the resistance between 0.8 and 1.2 kΩ?

YES : Go to step 8I10.

NO : Replace ABS sensor.

8I10 : CHECK GROUND SHORT OF ABS SENSOR.

Measure resistance between ABS sensor and chassis ground.

Terminal**Front RH No. 1 — Chassis ground:****Front LH No. 1 — Chassis ground:****Rear RH No. 1 — Chassis ground:****Rear LH No. 1 — Chassis ground:**

CHECK : Is the resistance more than 1 MΩ?

YES : Go to step 8I11.

NO : Replace ABS sensor.

8I11 : CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS SENSOR.

- 1) Connect connector to ABS sensor.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance at ABSCM&H/U connector terminals.

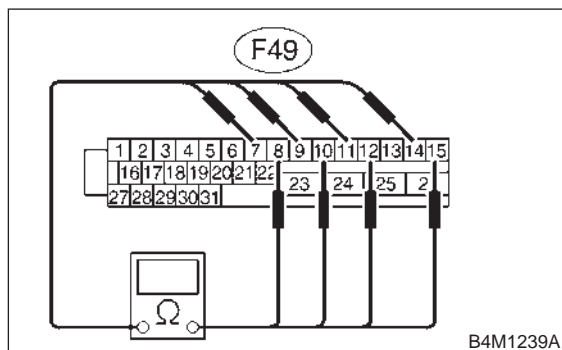
Connector & terminal

Trouble code 22 / (F49) No. 11 — No. 12:

Trouble code 24 / (F49) No. 9 — No. 10:

Trouble code 26 / (F49) No. 14 — No. 15:

Trouble code 28 / (F49) No. 7 — No. 8:



CHECK : Is the resistance between 0.8 and 1.2 k Ω ?

YES : Go to step 8I12.

NO : Repair harness/connector between ABSCM&H/U and ABS sensor.

8I12 : CHECK GROUND SHORT OF HARNESS.

Measure resistance between ABSCM&H/U connector and chassis ground.

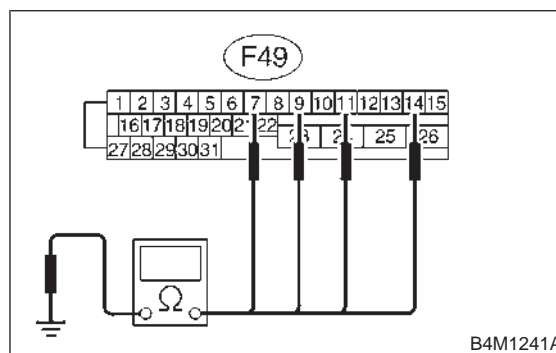
Connector & terminal

Trouble code 22 / (F49) No. 11 — Chassis ground:

Trouble code 24 / (F49) No. 9 — Chassis ground:

Trouble code 26 / (F49) No. 14 — Chassis ground:

Trouble code 28 / (F49) No. 7 — Chassis ground:



CHECK : Is the resistance more than 1 M Ω ?

YES : Go to step 8I13.

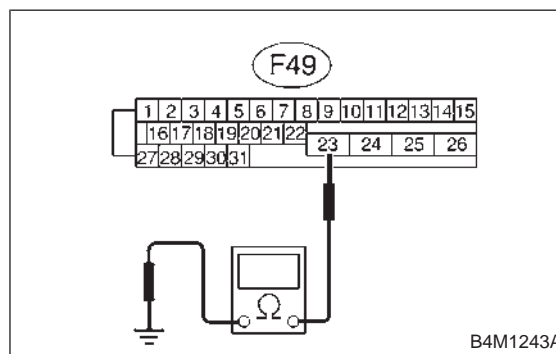
NO : Repair harness/connector between ABSCM&H/U and ABS sensor.

8I13 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

Measure resistance between ABSCM&H/U and chassis ground.

Connector & terminal

(F49) No. 23 — GND:



CHECK : Is the resistance less than 0.5 Ω ?

YES : Go to step 8I14.

NO : Repair ABSCM&H/U ground harness.

8I14 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connectors between ABSCM&H/U and ABS sensor? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

NO : Go to step 8I15.

8I15 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : *Is the car telephone or the wireless transmitter properly installed?*

YES : Go to step 8I16.

NO : Properly install the car telephone or the wireless transmitter.

8I16 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : *Are noise sources (such as an antenna) installed near the sensor harness?*

YES : Install the noise sources apart from the sensor harness.

NO : Go to step 8I17.

8I17 : CHECK SHIELD CIRCUIT.

- 1) Connect all connectors.
- 2) Measure resistance between shield connector and chassis ground.

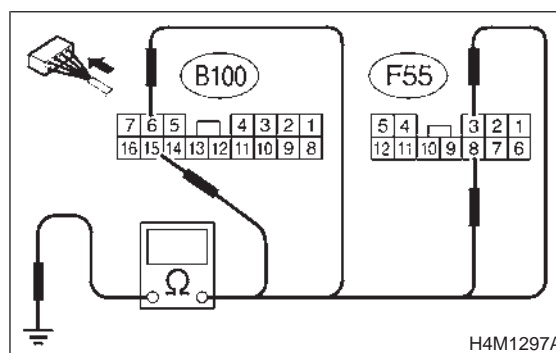
Connector & terminal

Trouble code 22 / (B100) No. 15 — Chassis ground:

Trouble code 24 / (B100) No. 6 — Chassis ground:

Trouble code 26 / (F55) No. 8 — Chassis ground:

Trouble code 28 / (F55) No. 3 — Chassis ground:



CHECK : *Is the resistance less than 0.5 Ω?*

YES : Go to step 8I18.

NO : Repair shield harness.

8I18 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step 8I19.

8I19 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

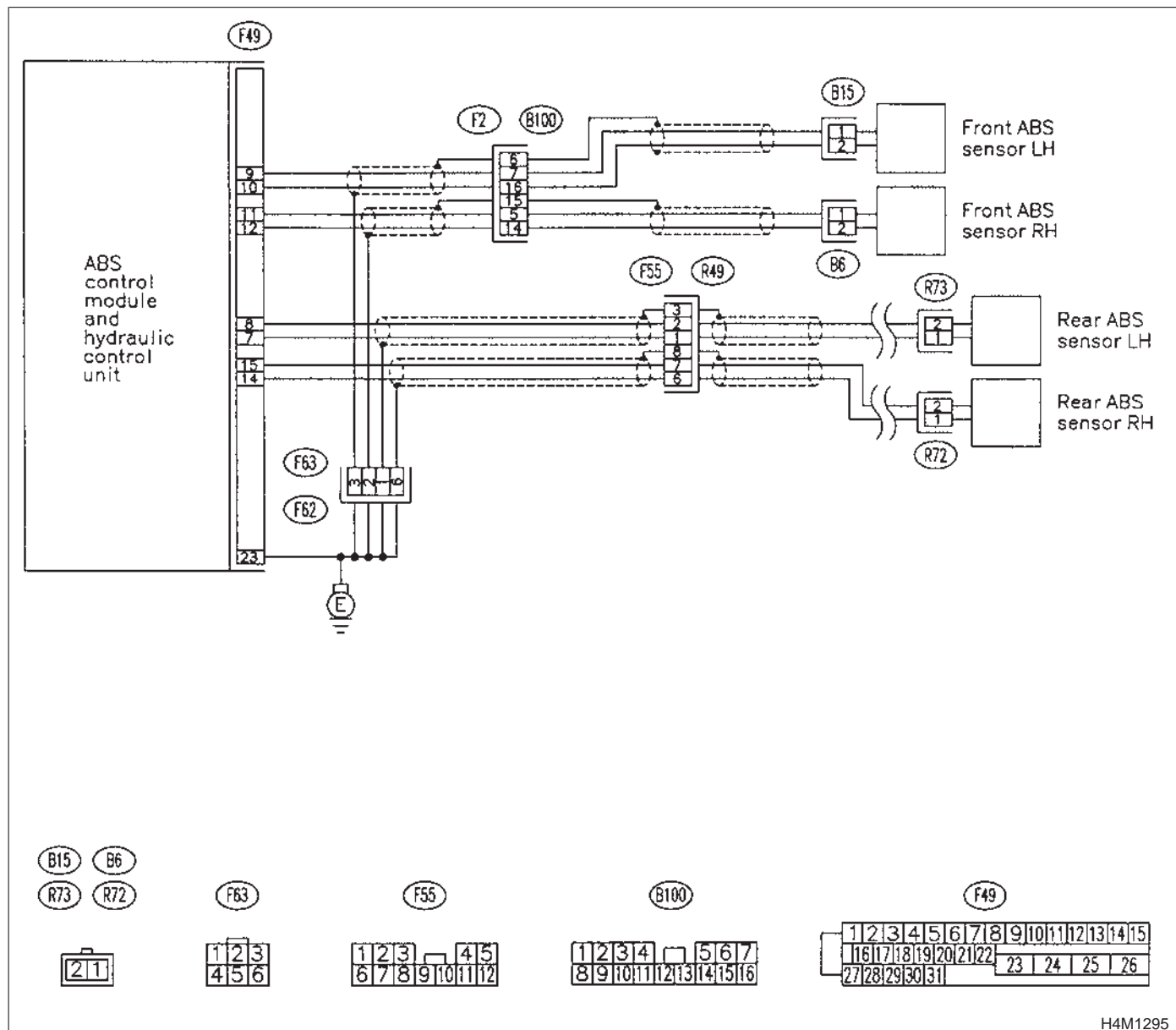
NO : A temporary noise interference.

J: TROUBLE CODE 29**— ABNORMAL ABS SENSOR SIGNAL (ANY ONE OF FOUR) —****DIAGNOSIS:**

- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty tone wheel
- Wheels turning freely for a long time

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

H4M1295

8J1 : CHECK IF THE WHEELS HAVE TURNED FREELY FOR A LONG TIME.

CHECK : Check if the wheels have been turned freely for more than one minute, such as when the vehicle is jacked-up, under full-lock cornering or when tire is not in contact with road surface.

YES : The ABS is normal. Erase the trouble code.

NOTE:

When the wheels turn freely for a long time, such as when the vehicle is towed or jacked-up, or when steering wheel is continuously turned all the way, this trouble code may sometimes occur.

NO : Go to step 8J2.

8J2 : CHECK TIRE SPECIFICATIONS.

CHECK : Are the tire specifications correct?

YES : Go to step 8J3.

NO : Replace tire.

8J3 : CHECK WEAR OF TIRE.

CHECK : Is the tire worn excessively?

YES : Replace tire.

NO : Go to step 8J4.

8J4 : CHECK TIRE PRESSURE.

CHECK : Is the tire pressure correct?

YES : Go to step 8J5.

NO : Adjust tire pressure.

8J5 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:

$32 \pm 10 \text{ N-m}$ ($3.3 \pm 1.0 \text{ kg-m}$, $24 \pm 7 \text{ ft-lb}$)

CHECK : Are the ABS sensor installation bolts tightened securely?

YES : Go to step 8J6.

NO : Tighten ABS sensor installation bolts securely.

8J6 : CHECK INSTALLATION OF TONE WHEEL.

Tightening torque:

$13 \pm 3 \text{ N-m}$ ($1.3 \pm 0.3 \text{ kg-m}$, $9 \pm 2.2 \text{ ft-lb}$)

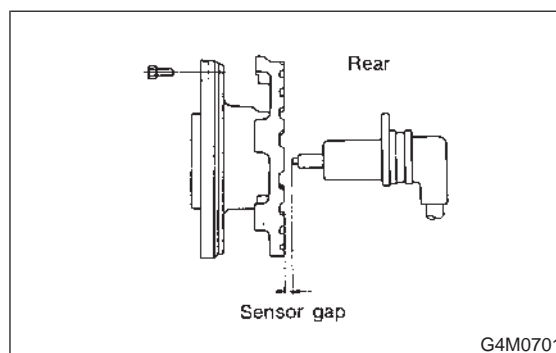
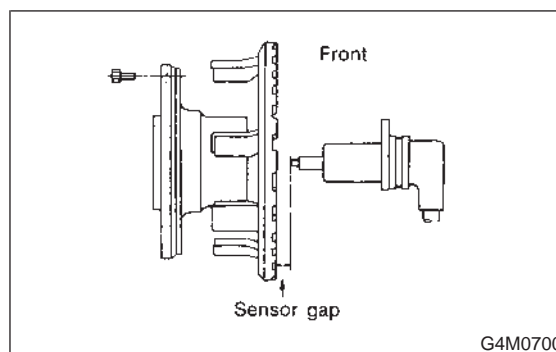
CHECK : Are the tone wheel installation bolts tightened securely?

YES : Go to step 8J7.

NO : Tighten tone wheel installation bolts securely.

8J7 : CHECK ABS SENSOR GAP.

Measure tone wheel to pole piece gap over entire perimeter of the wheel.



	Front wheel	Rear wheel
Specifications	0.9 — 1.4 mm (0.035 — 0.055 in)	0.7 — 1.2 mm (0.028 — 0.047 in)

CHECK : Is the gap within the specifications?

YES : Go to step 8J8.

NO : Adjust the gap.

NOTE:

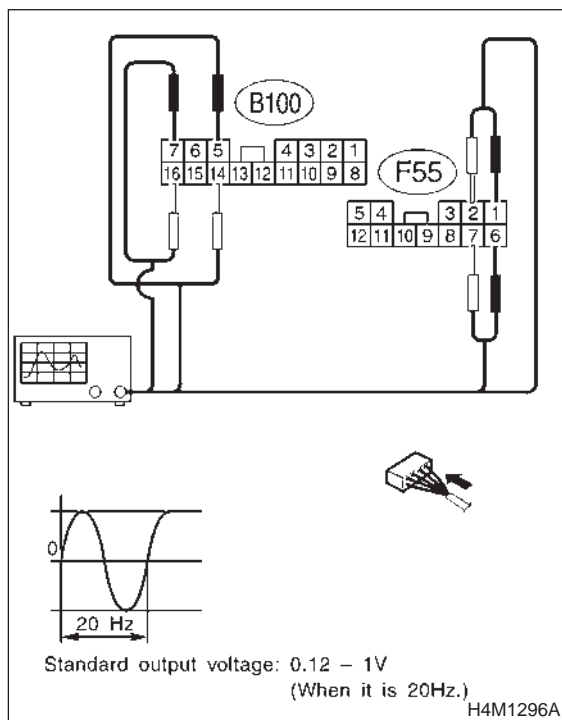
Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

8J8 : CHECK OSCILLOSCOPE.**CHECK** : *Is an oscilloscope available?***YES** : Go to step **8J9**.**NO** : Go to step **8J10**.**8J9 : CHECK ABS SENSOR SIGNAL.**

- 1) Raise all four wheels of ground.
- 2) Turn ignition switch OFF.
- 3) Connect the oscilloscope to the connector.
- 4) Turn ignition switch ON.
- 5) Rotate wheels and measure voltage at specified frequency.

NOTE:

When this inspection is completed, the ABSCM&H/U sometimes stores the trouble code 29.

Connector & terminal**(B100) No. 5 (+) — No. 14 (–) (Front RH):****(B100) No. 7 (+) — No. 16 (–) (Front LH):****(F55) No. 6 (+) — No. 7 (–) (Rear RH):****(F55) No. 1 (+) — No. 2 (–) (Rear LH):****CHECK** : *Is oscilloscope pattern smooth, as shown in figure?***YES** : Go to step **8J13**.**NO** : Go to step **8J10**.**8J10 : CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.**

Remove disc rotor from hub.

CHECK : *Is the ABS sensor pole piece or the tone wheel contaminated by dirt or other foreign matter?***YES** : Thoroughly remove dirt or other foreign matter.**NO** : Go to step **8J11**.**8J11 : CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.****CHECK** : *Are there broken or damaged teeth in the ABS sensor pole piece or the tone wheel?***YES** : Replace ABS sensor or tone wheel.**NO** : Go to step **8J12**.**8J12 : CHECK HUB RUNOUT.**

Measure hub runout.

CHECK : *Is the runout less than 0.05 mm (0.0020 in)?***YES** : Go to step **8J13**.**NO** : Repair hub.**8J13 : CHECK ABSCM&H/U.**

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors.
- 3) Erase the memory.
- 4) Perform inspection mode.
- 5) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?***YES** : Replace ABSCM&H/U.**NO** : Go to step **8J14**.**8J14 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.****CHECK** : *Are other trouble codes being output?***YES** : Proceed with the diagnosis corresponding to the trouble code.**NO** : A temporary poor contact.

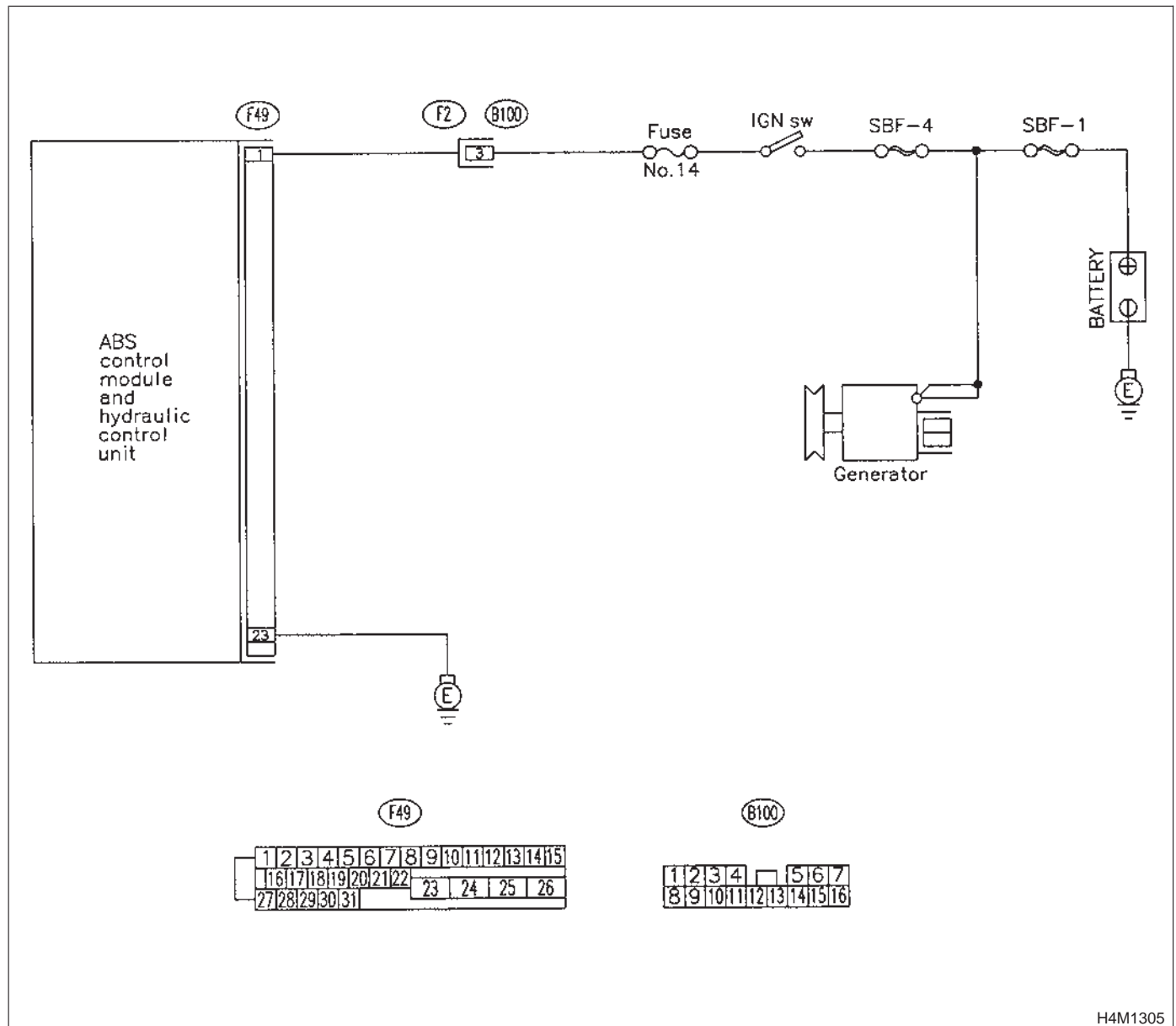
MEMO:

K: TROUBLE CODE 31 (FRONT RH)**L: TROUBLE CODE 33 (FRONT LH)****M: TROUBLE CODE 35 (REAR RH)****N: TROUBLE CODE 37 (REAR LH)****— ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U —****DIAGNOSIS:**

- Faulty harness/connector
- Faulty inlet solenoid valve in ABSCM&H/U

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

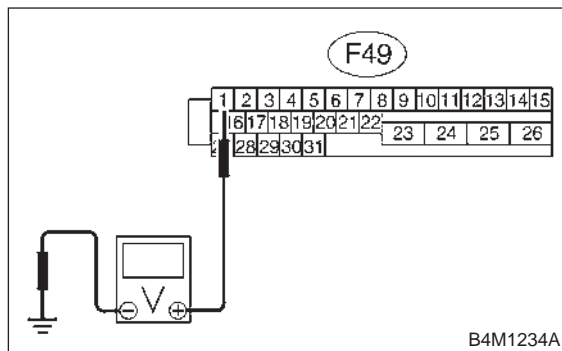
H4M1305

8N1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Disconnect connector from ABSCM&H/U.
- 2) Run the engine at idle.
- 3) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):



CHECK : Is the voltage between 10 V and 15 V?

YES : Go to step 8N2.

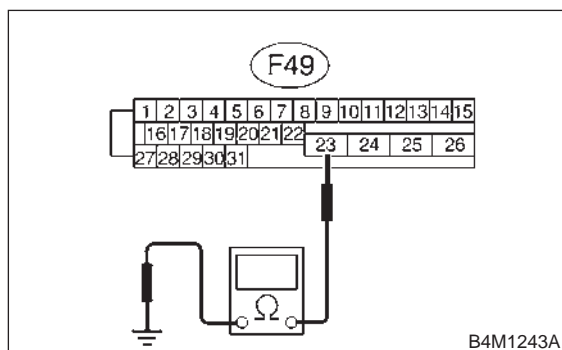
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

8N2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



CHECK : Is the resistance less than 0.5 Ω?

YES : Go to step 8N3.

NO : Repair ABSCM&H/U ground harness.

8N3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>

YES : Repair connector.

NO : Go to step 8N4.

8N4 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABSCM&H/U.

NO : Go to step 8N5.

8N5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?

YES : Proceed with the diagnosis corresponding to the trouble code.

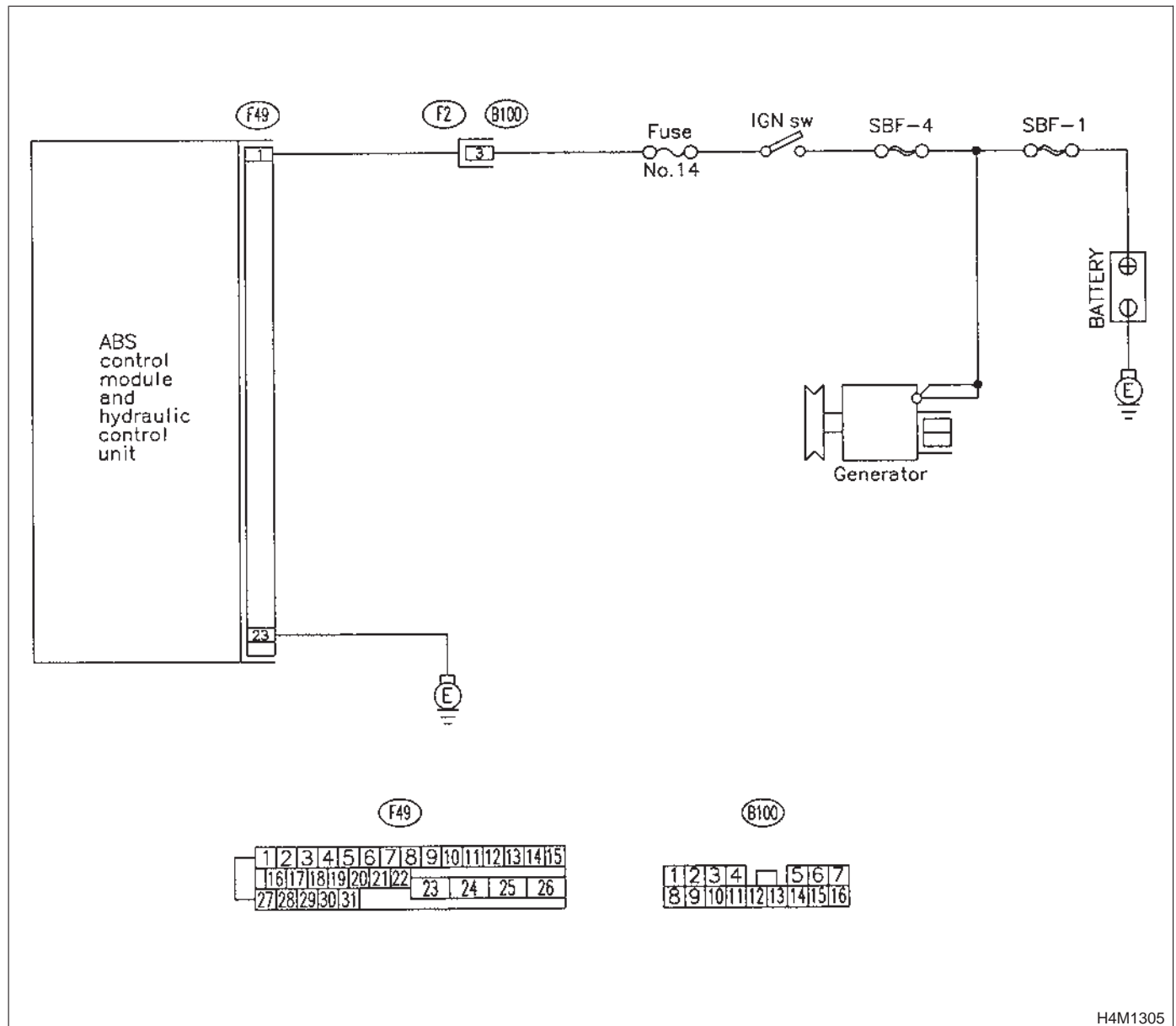
NO : A temporary poor contact.

O: TROUBLE CODE 32 (FRONT RH)**P: TROUBLE CODE 34 (FRONT LH)****Q: TROUBLE CODE 36 (REAR RH)****R: TROUBLE CODE 38 (REAR LH)****— ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U —****DIAGNOSIS:**

- Faulty harness/connector
- Faulty outlet solenoid valve in ABSCM&H/U

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

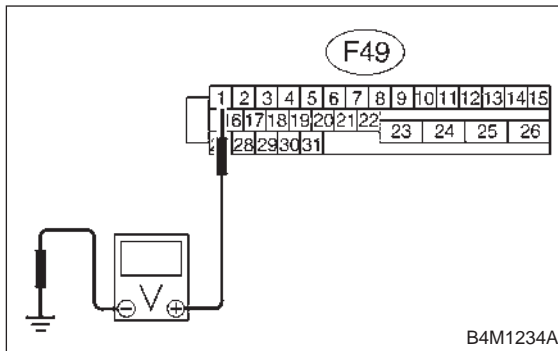
H4M1305

8R1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Disconnect connector from ABSCM&H/U.
- 2) Run the engine at idle.
- 3) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):



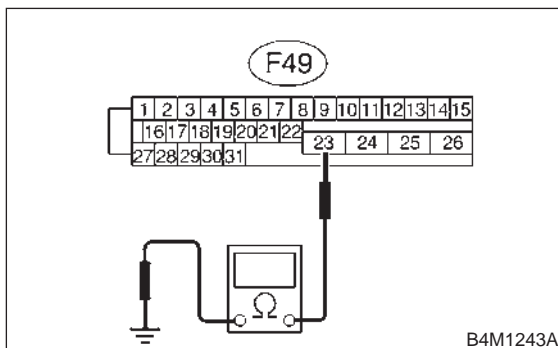
- CHECK** : Is the voltage between 10 V and 15 V?
- YES** : Go to step 8R2.
- NO** : Repair harness connector between battery, ignition switch and ABSCM&H/U.

8R2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



- CHECK** : Is the resistance less than 0.5 Ω?
- YES** : Go to step 8R3.
- NO** : Repair ABSCM&H/U ground harness.

8R3 : CHECK POOR CONTACT IN CONNECTORS.

- CHECK** : Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>

- YES** : Repair connector.
- NO** : Go to step 8R4.

8R4 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

- CHECK** : Is the same trouble code as in the current diagnosis still being output?
- YES** : Replace ABSCM&H/U.
- NO** : Go to step 8R5.

8R5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

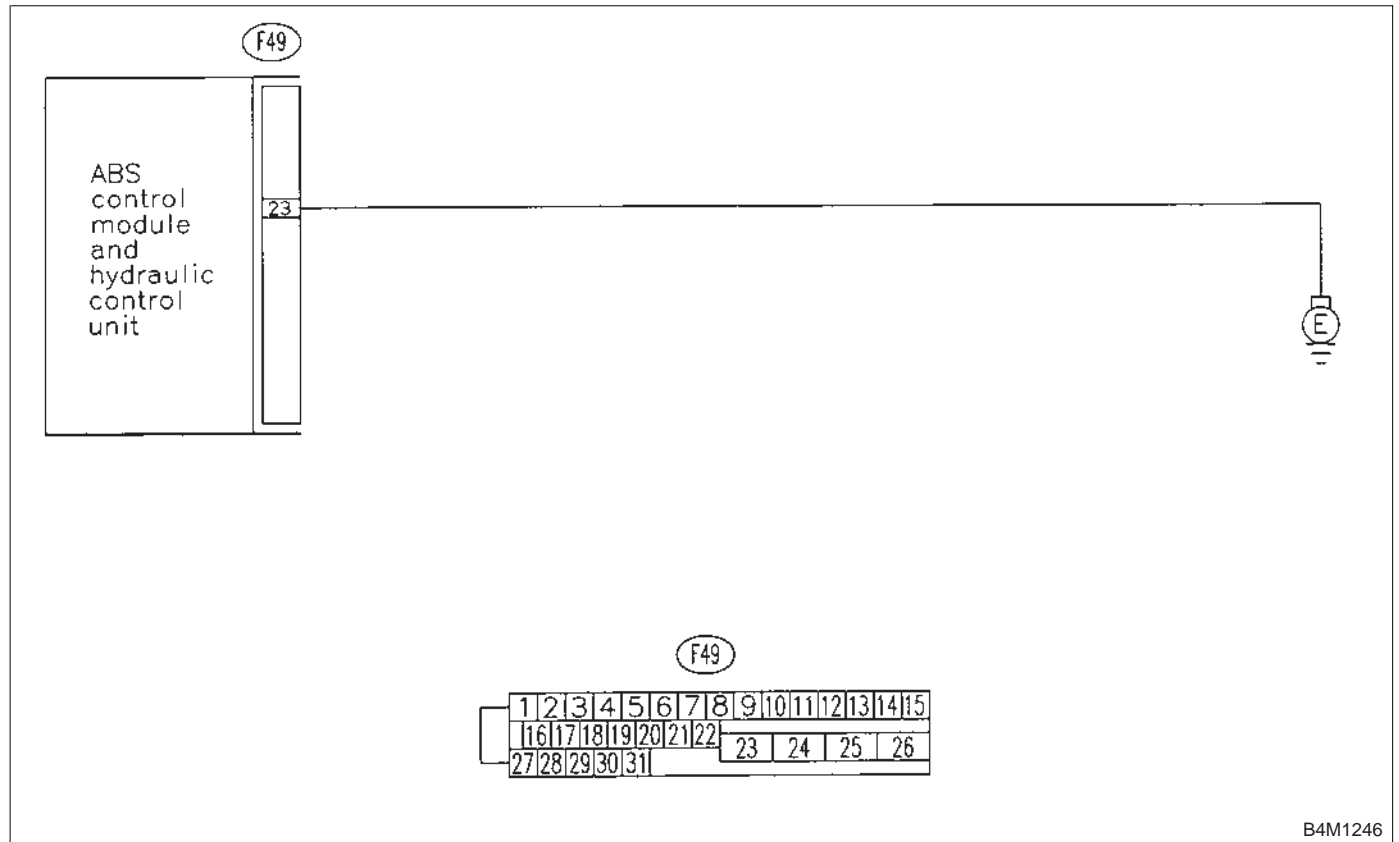
- CHECK** : Are other trouble codes being output?
- YES** : Proceed with the diagnosis corresponding to the trouble code.
- NO** : A temporary poor contact.

S: TROUBLE CODE 41
— ABNORMAL ABS CONTROL MODULE —**DIAGNOSIS:**

- Faulty ABSCM&H/U

TROUBLE SYMPTOM:

- ABS does not operate.

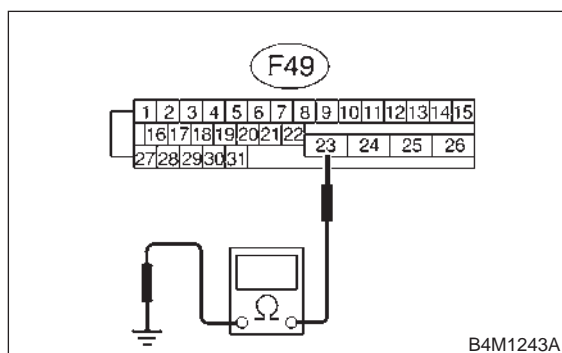
WIRING DIAGRAM:

8S1 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance between ABSCM&H/U and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



- CHECK** : Is the resistance less than 0.5Ω ?
- YES** : Go to step 8S2.
- NO** : Repair ABSCM&H/U ground harness.

8S2 : CHECK POOR CONTACT IN CONNECTORS.

- CHECK** : Is there poor contact in connectors between battery, ignition switch and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>
- YES** : Repair connector.
- NO** : Go to step 8S3.

8S3 : CHECK SOURCES OF SIGNAL NOISE.

- CHECK** : Is the car telephone or the wireless transmitter properly installed?
- YES** : Go to step 8S4.
- NO** : Properly install the car telephone or the wireless transmitter.

8S4 : CHECK SOURCES OF SIGNAL NOISE.

- CHECK** : Are noise sources (such as an antenna) installed near the sensor harness?
- YES** : Install the noise sources apart from the sensor harness.
- NO** : Go to step 8S5.

8S5 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
 - 2) Erase the memory.
 - 3) Perform inspection mode.
 - 4) Read out the trouble code.
- CHECK** : Is the same trouble code as in the current diagnosis still being output?
- YES** : Replace ABSCM&H/U.
- NO** : Go to step 8S6.

8S6 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

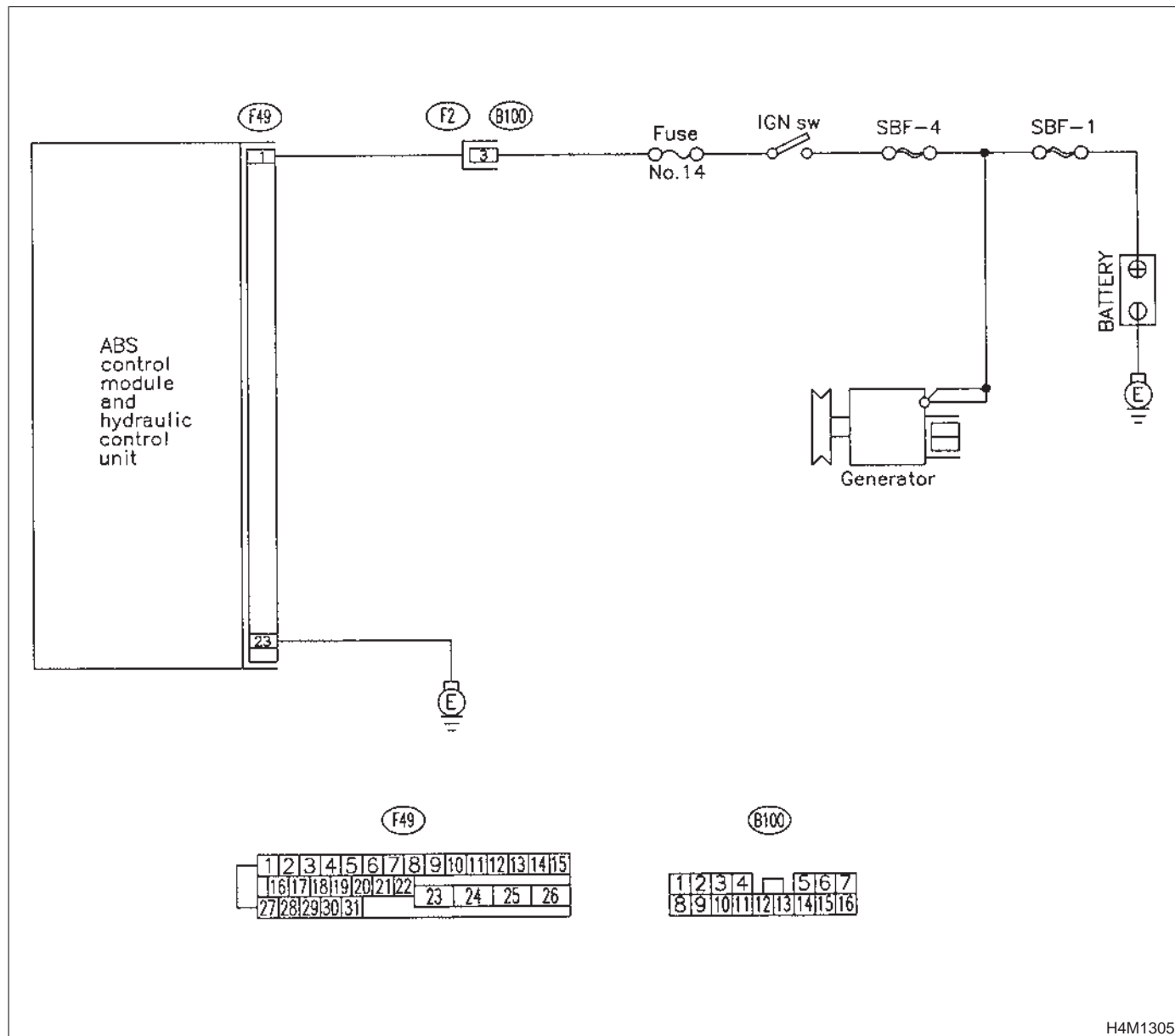
- CHECK** : Are other trouble codes being output?
- YES** : Proceed with the diagnosis corresponding to the trouble code.
- NO** : A temporary poor contact.

T: TROUBLE CODE 42**— SOURCE VOLTAGE IS ABNORMAL. —****DIAGNOSIS:**

- Power source voltage of the ABSCM&H/U is low or high.

TROUBLE SYMPTOM:

- ABS does not operate.

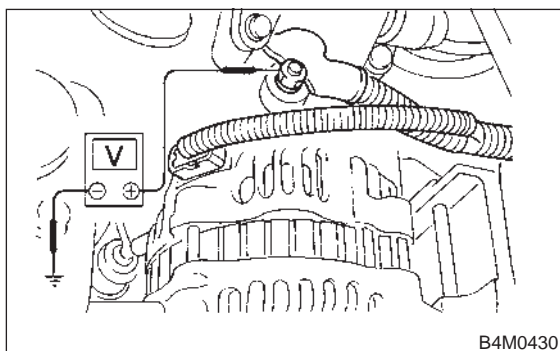
WIRING DIAGRAM:

8T1 : CHECK GENERATOR.

- 1) Start engine.
- 2) Idling after warm-up.
- 3) Measure voltage between generator B terminal and chassis ground.

Terminal

Generator B terminal — Chassis ground:



- CHECK** : Is the voltage between 10 V and 17 V?
- YES** : Go to step 8T2.
- NO** : Repair generator.

8T2 : CHECK BATTERY TERMINAL.

Turn ignition switch to OFF.

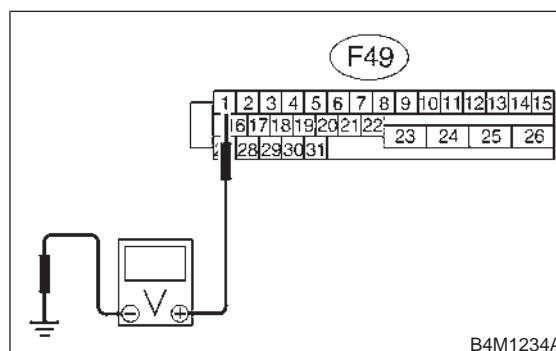
- CHECK** : Are the positive and negative battery terminals tightly clamped?
- YES** : Go to step 8T3.
- NO** : Tighten the clamp of terminal.

8T3 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Disconnect connector from ABSCM&H/U.
- 2) Run the engine at idle.
- 3) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):



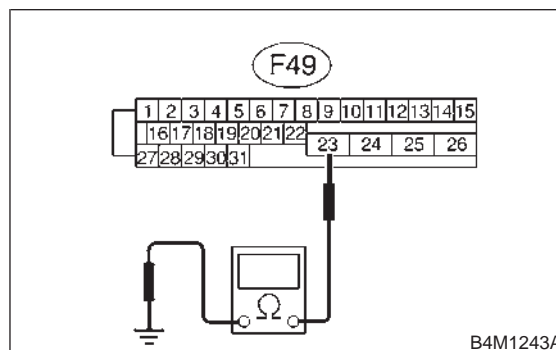
- CHECK** : Is the voltage between 10 V and 17 V?
- YES** : Go to step 8T4.
- NO** : Repair harness connector between battery, ignition switch and ABSCM&H/U.

8T4 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



- CHECK** : Is the resistance less than 0.5 Ω?
- YES** : Go to step 8T5.
- NO** : Repair ABSCM&H/U ground harness.

8T5 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

NO : Go to step **8T6**.

8T6 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step **8T7**.

8T7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

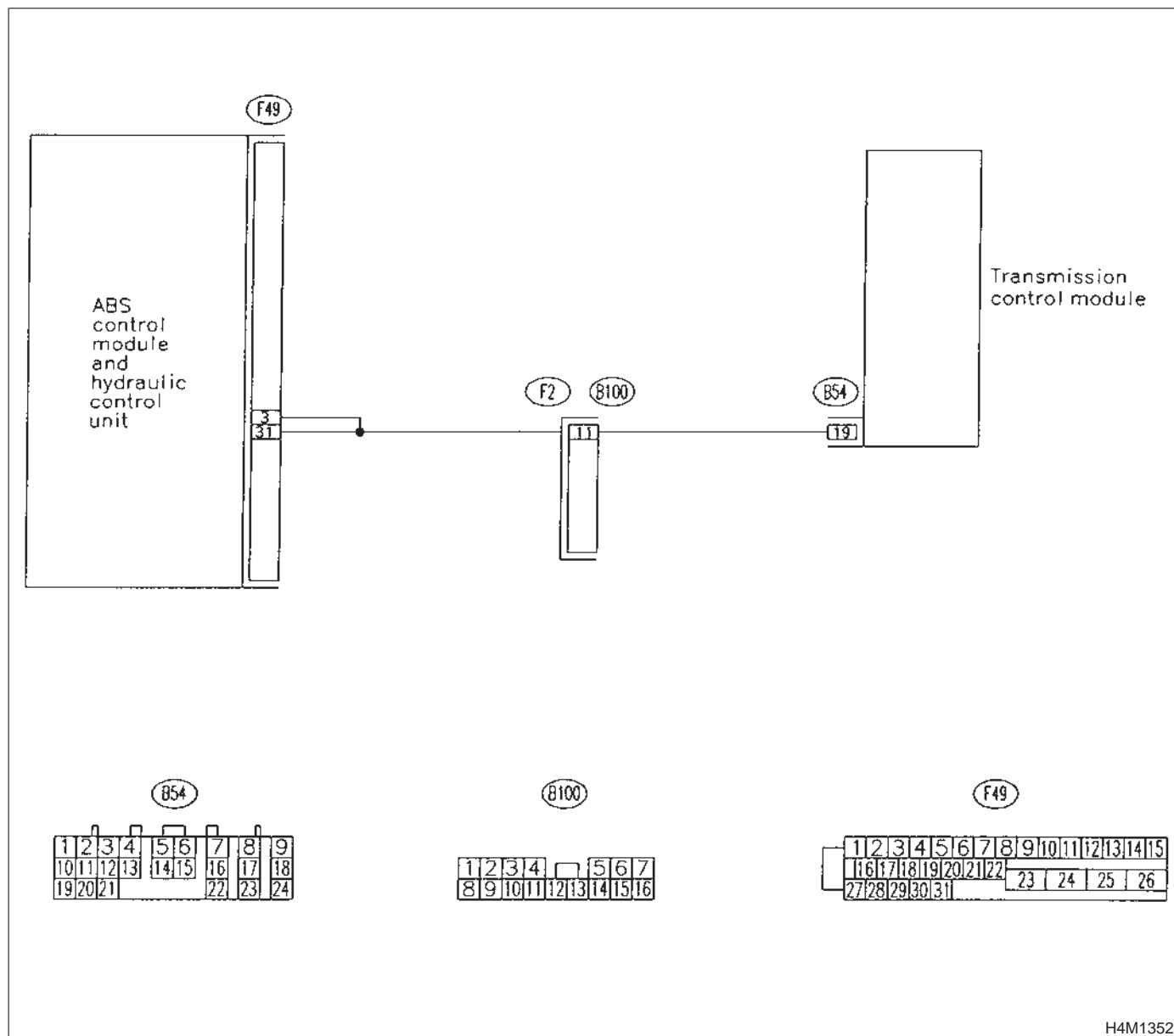
MEMO:

U: TROUBLE CODE 44**— A COMBINATION OF AT CONTROL ABNORMAL —****DIAGNOSIS:**

- Combination of AT control faults

TROUBLE SYMPTOM:

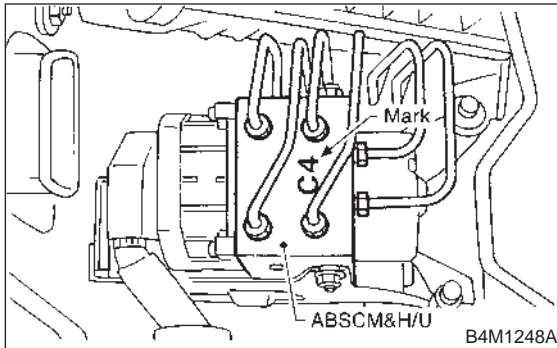
- ABS does not operate.

WIRING DIAGRAM:

H4M1352

8U1 : CHECK SPECIFICATIONS OF THE ABSCM&H/U.

Check specifications of the mark to the ABSCM&H/U.



Mark	Model
C5	AWD AT
C6	AWD MT

CHECK : Is an ABSCM&H/U for AT model installed on a MT model?

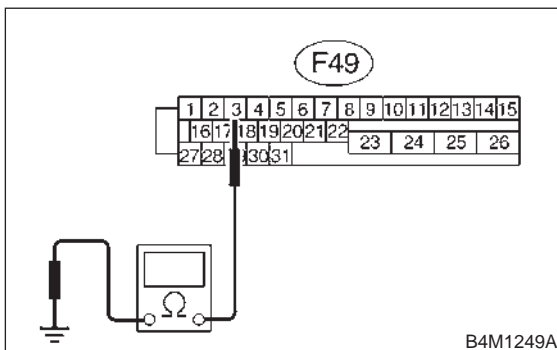
YES : Replace ABSCM&H/U.

NO : Go to step 8U2.

8U2 : CHECK GROUND SHORT OF HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect two connectors from TCM.
- 3) Disconnect connector from ABSCM&H/U.
- 4) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 3 — Chassis ground:



CHECK : Is the resistance more than 1 MΩ?

YES : Go to step 8U3.

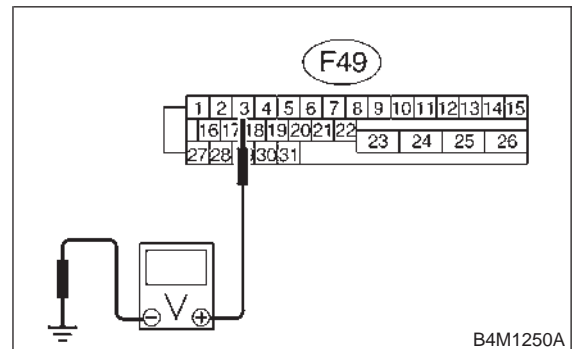
NO : Repair harness between TCM and ABSCM&H/U.

8U3 : CHECK BATTERY SHORT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step 8U4.

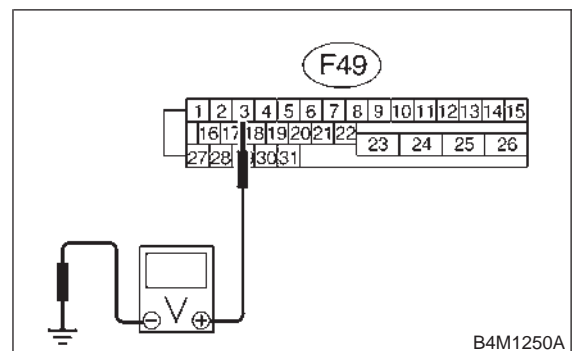
NO : Repair harness between TCM and ABSCM&H/U.

8U4 : CHECK BATTERY SHORT OF HARNESS.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 (+) — Chassis ground (-):



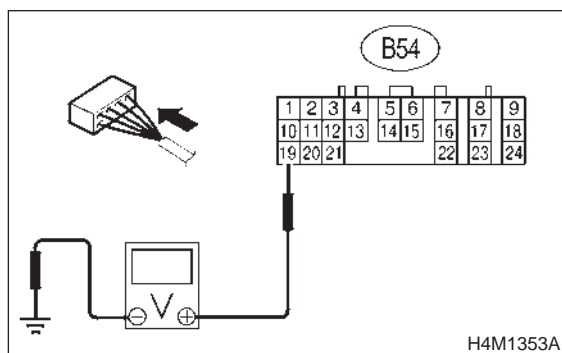
CHECK : Is the voltage less than 1 V?

YES : Go to step 8U5.

NO : Repair harness between TCM and ABSCM&H/U.

8U5 : CHECK TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors to TCM.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM connector terminal and chassis ground.

Connector & terminal**(B54) No. 19 (+) — Chassis ground (-):**

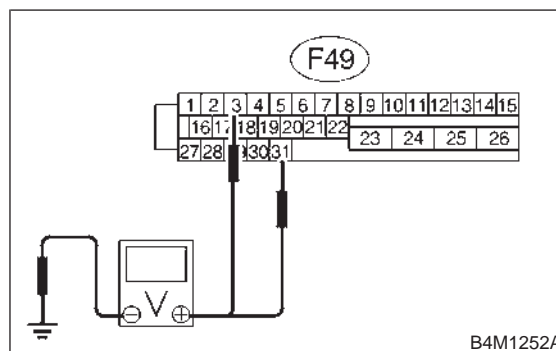
- CHECK** : Is the voltage between 10 V and 15 V?
- YES** : Go to step 8U7.
- NO** : Go to step 8U6.

8U6 : CHECK AT.

- CHECK** : Is the AT functioning normally?
- YES** : Replace TCM.
- NO** : Repair AT.

8U7 : CHECK OPEN CIRCUIT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal**(F49) No. 3 (+) — Chassis ground (-):****(F49) No. 31 (+) — Chassis ground (-):**

- CHECK** : Is the voltage between 10 V and 15 V?
- YES** : Go to step 8U8.
- NO** : Repair harness/connector between TCM and ABSCM&H/U.

8U8 : CHECK POOR CONTACT IN CONNECTORS.

- CHECK** : Is there poor contact in connectors between TCM and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>
- YES** : Repair connector.
- NO** : Go to step 8U9.

8U9 : CHECK ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors.
- 3) Erase the memory.
- 4) Perform inspection mode.
- 5) Read out the trouble code.

- CHECK** : Is the same trouble code as in the current diagnosis still being output?
- YES** : Replace ABSCM&H/U.
- NO** : Go to step 8U10.

8U10 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK: *Are other trouble codes being output?***YES**

: Proceed with the diagnosis corresponding to the trouble code.

NO

: A temporary poor contact.

V: TROUBLE CODE 51 — ABNORMAL VALVE RELAY —

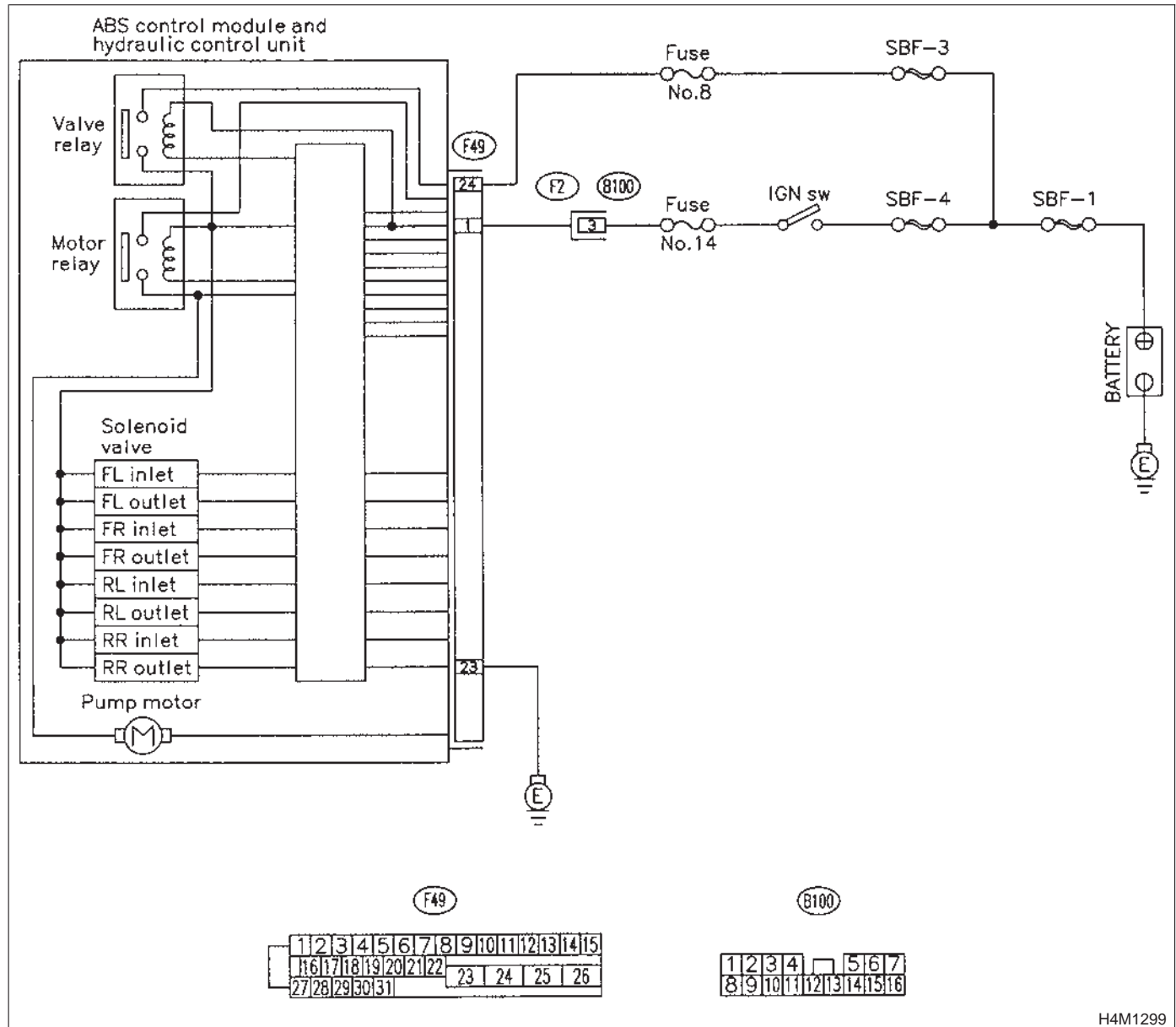
DIAGNOSIS:

- Faulty valve relay

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



H4M1299

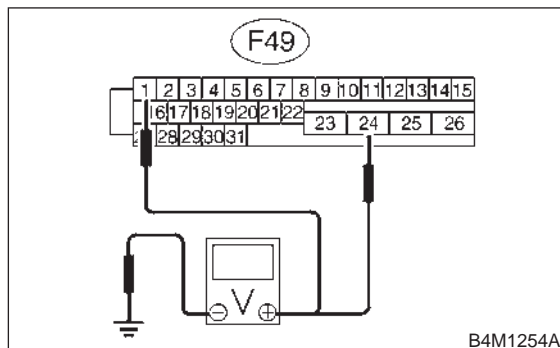
8V1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Run the engine at idle.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):

(F49) No. 24 (+) — Chassis ground (-):



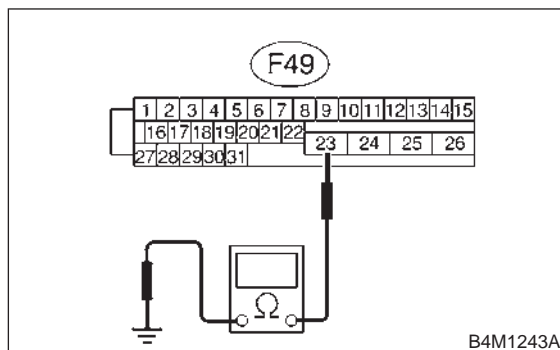
- CHECK** : Is the voltage between 10 V and 15 V?
- YES** : Go to step 8V2.
- NO** : Repair harness connector between battery and ABSCM&H/U.

8V2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



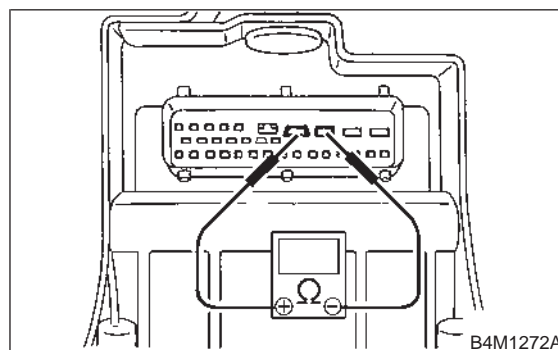
- CHECK** : Is the resistance less than 0.5 Ω?
- YES** : Go to step 8V3.
- NO** : Repair ABSCM&H/U ground harness.

8V3 : CHECK VALVE RELAY IN ABSCM&H/U.

Measure resistance between ABSCM&H/U and terminals.

Terminals

No. 23 (+) — No. 24 (-):



- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 8V4.
- NO** : Replace ABSCM&H/U.

8V4 : CHECK POOR CONTACT IN CONNECTORS.

- CHECK** : Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>
- YES** : Repair connector.
- NO** : Go to step 8V5.

8V5 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

- CHECK** : Is the same trouble code as in the current diagnosis still being output?
- YES** : Replace ABSCM&H/U.
- NO** : Go to step 8V6.

8V6 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.
--

- CHECK** : *Are other trouble codes being output?*
- YES** : Proceed with the diagnosis corresponding to the trouble code.
- NO** : A temporary poor contact.

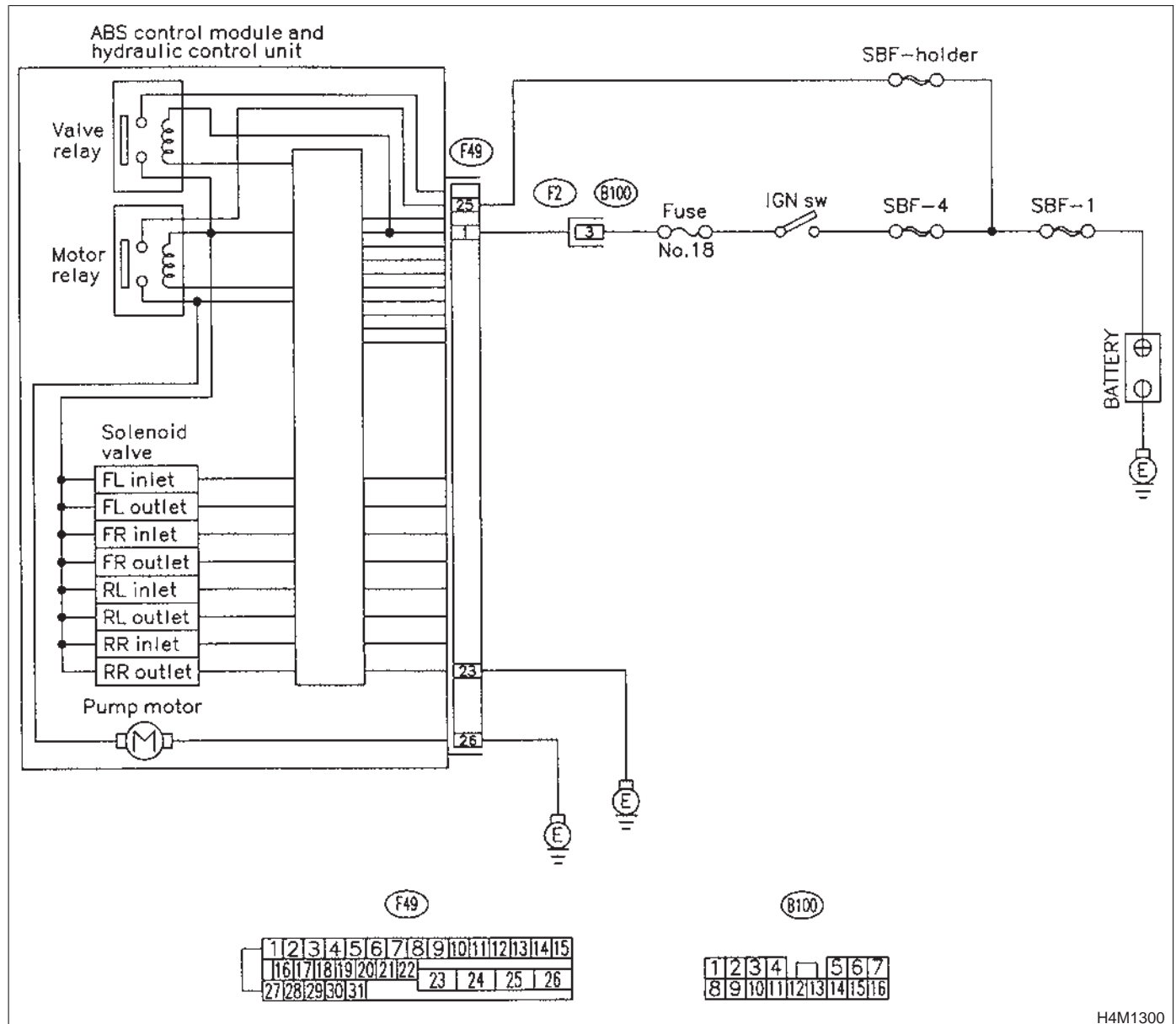
MEMO:

W: TROUBLE CODE 52**— ABNORMAL MOTOR AND/OR MOTOR RELAY —****DIAGNOSIS:**

- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

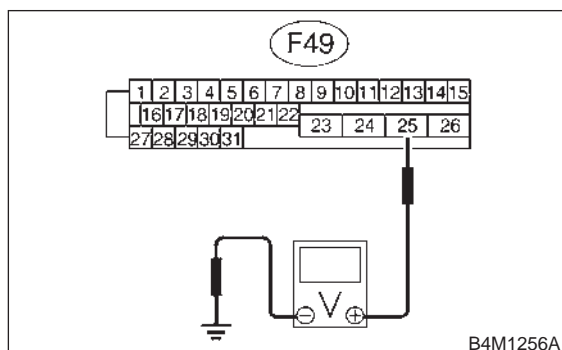
H4M1300

8W1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 25 (+) — Chassis ground (-):



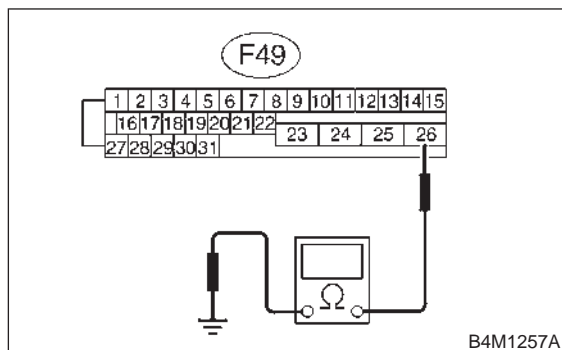
- CHECK** : Is the voltage between 10 V and 15 V?
- YES** : Go to step 8W2.
- NO** : Repair harness/connector between battery and ABSCM&H/U and check fuse SBF-holder.

8W2 : CHECK GROUND CIRCUIT OF MOTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 26 — Chassis ground:



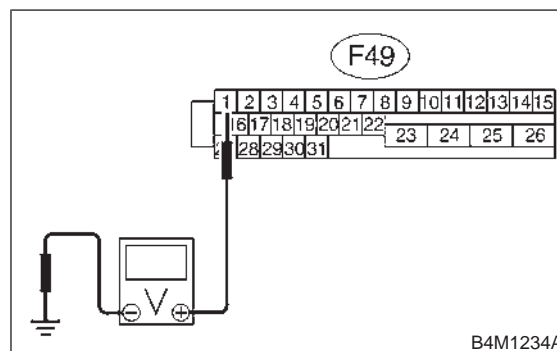
- CHECK** : Is the resistance less than 0.5 Ω?
- YES** : Go to step 8W3.
- NO** : Repair ABSCM&H/U ground harness.

8W3 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Run the engine at idle.
- 2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):



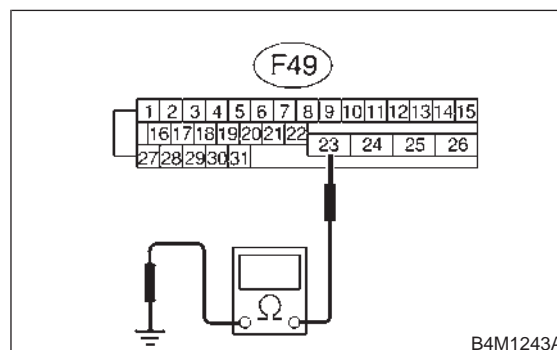
- CHECK** : Is the voltage between 10 V and 15 V?
- YES** : Go to step 8W4.
- NO** : Repair harness connector between battery, ignition switch and ABSCM&H/U.

8W4 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



- CHECK** : Is the resistance less than 0.5 Ω?
- YES** : Go to step 8W5.
- NO** : Repair ABSCM&H/U ground harness.

8W5 : CHECK MOTOR OPERATION.

Operate the sequence control. <Ref. to 4-4 [W14D1].>

NOTE:

Use the diagnosis connector to operate the sequence control.

CHECK : ***Can motor revolution noise (buzz) be heard when carrying out the sequence control?***

YES : Go to step **8W6**.

NO : Replace ABSCM&H/U.

8W6 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : ***Is there poor contact in connector between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***

YES : Repair connector.

NO : Go to step **8W7**.

8W7 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***

YES : Replace ABSCM&H/U.

NO : Go to step **8W8**.

8W8 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

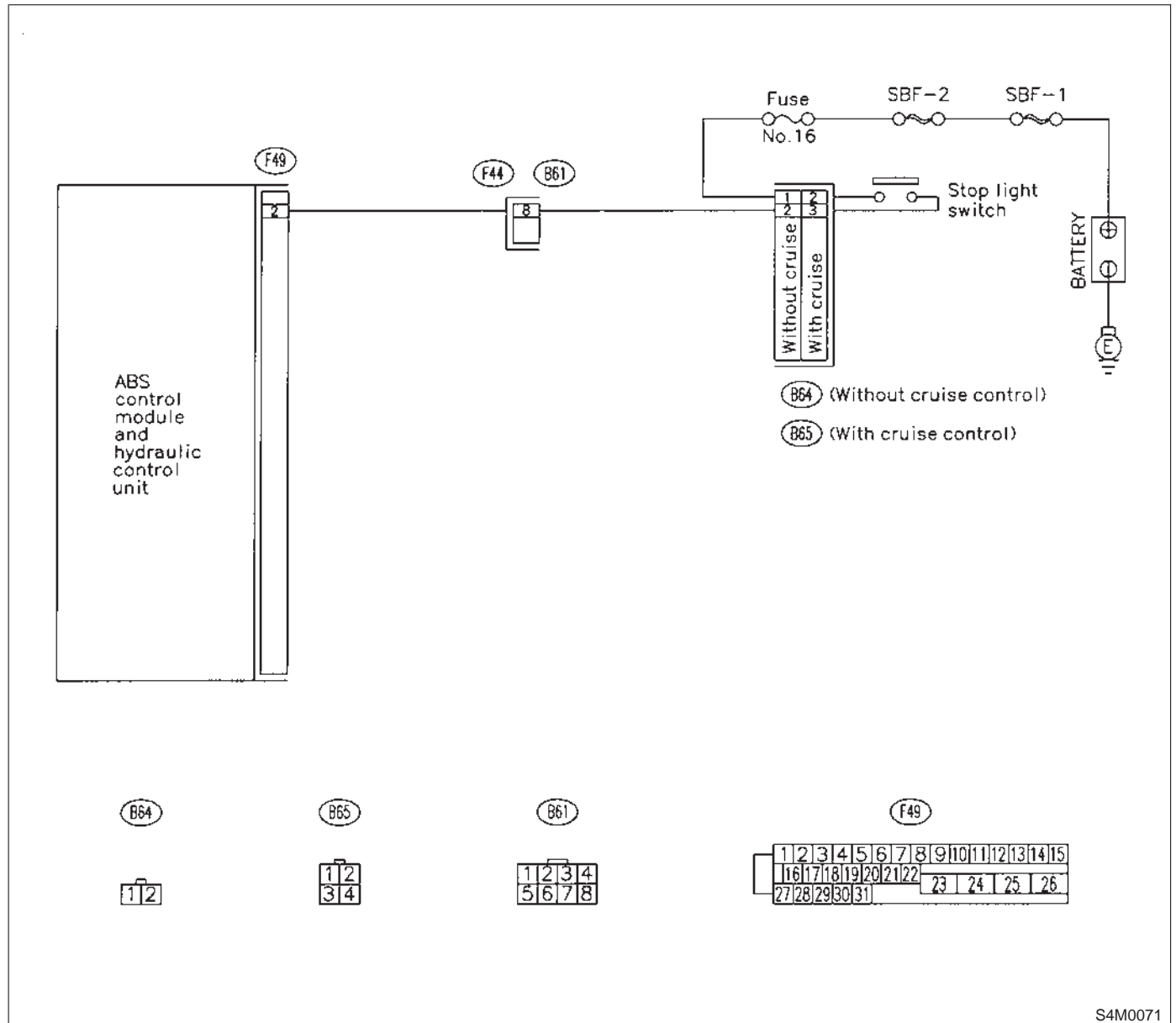
MEMO:

X: TROUBLE CODE 54**— ABNORMAL STOP LIGHT SWITCH —****DIAGNOSIS:**

- Faulty stop light switch

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

S4M0071

8X1 : CHECK STOP LIGHTS COME ON.

Depress the brake pedal.

CHECK : *Do stop lights come on?*

YES : Go to step **8X2**.

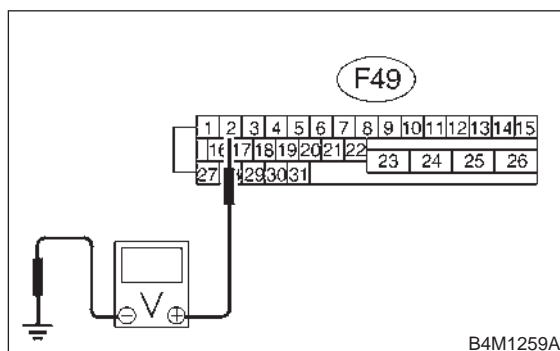
NO : Repair stop lights circuit.

8X2 : CHECK OPEN CIRCUIT IN HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Depress brake pedal.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 2 (+) — Chassis ground (-):



CHECK : *Is the voltage between 10 V and 15 V?*

YES : Go to step **8X3**.

NO : Repair harness between stop light switch and ABSCM&H/U.

8X3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connector between stop light switch and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

NO : Go to step **8X4**.

8X4 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step **8X5**.

8X5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

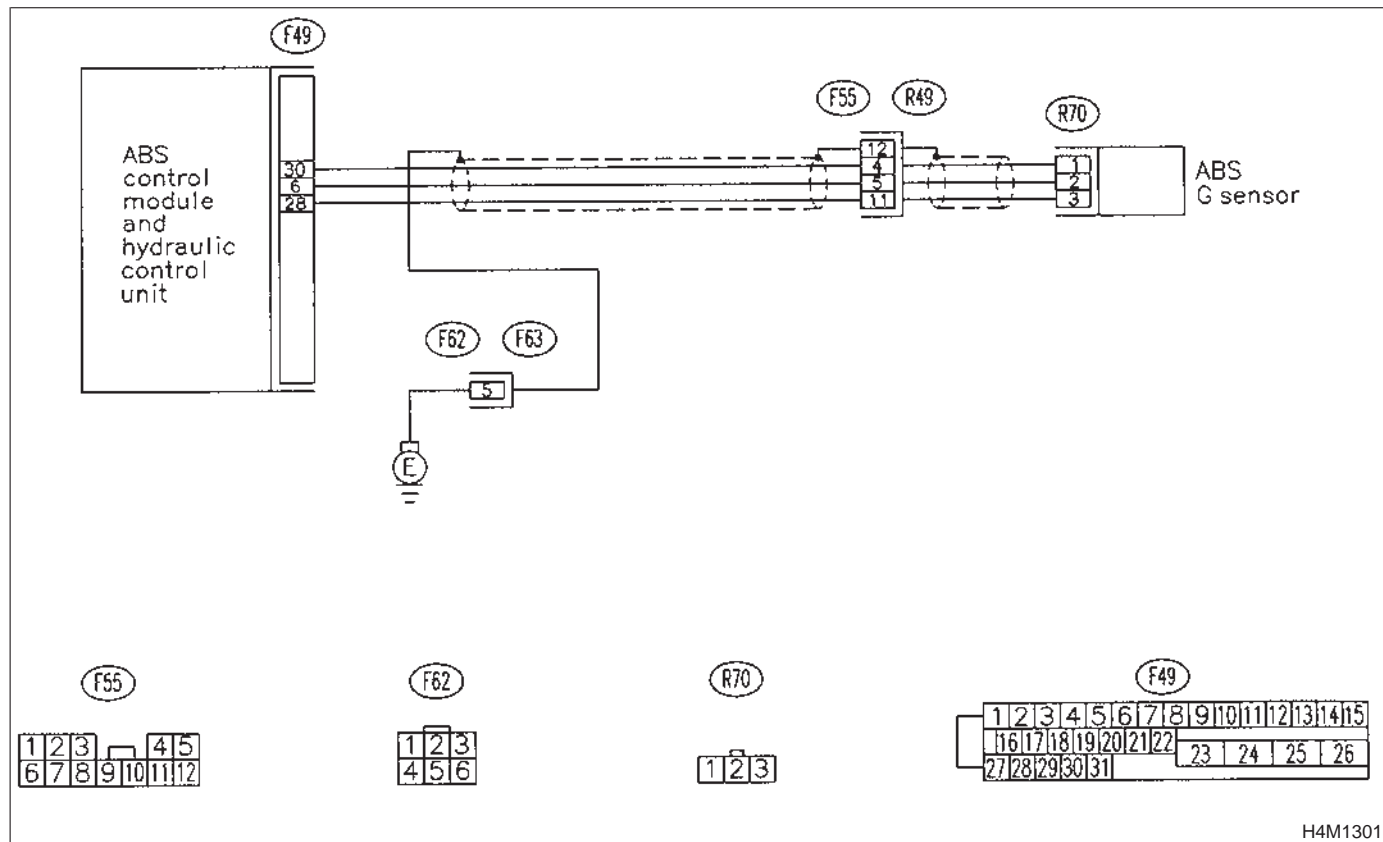
NO : A temporary poor contact.

Y: TROUBLE CODE 56**— ABNORMAL G SENSOR OUTPUT VOLTAGE —****DIAGNOSIS:**

- Faulty G sensor output voltage

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

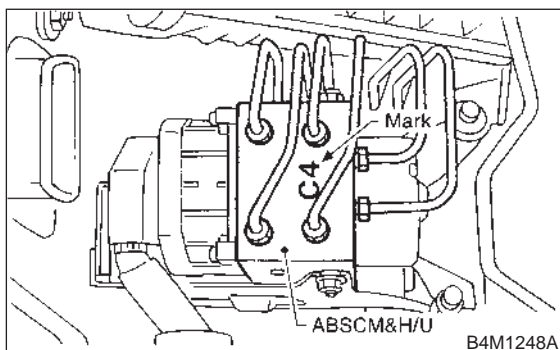
H4M1301

8Y1 : CHECK ALL FOUR WHEELS FOR FREE TURNING.

- CHECK** : *Have the wheels been turned freely such as when the vehicle is lifted up, or operated on a rolling road?*
- YES** : The ABS is normal. Erase the trouble code.
- NO** : Go to step 8Y2.

8Y2 : CHECK SPECIFICATIONS OF ABSCM&H/U.

Check specifications of the mark to the ABSCM&H/U.



Mark	Model
C5	AWD AT
C6	AWD MT

- CHECK** : *Is an ABSCM for AWD model installed on a FWD model?*
- YES** : Replace ABSCM&H/U.

CAUTION:

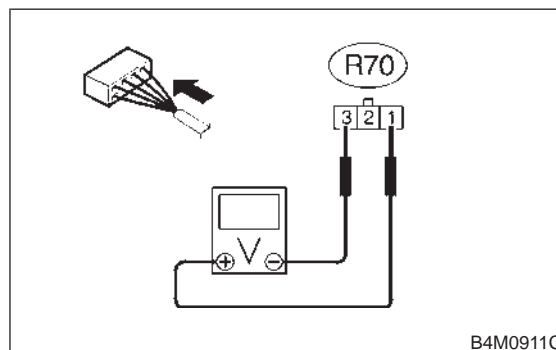
Be sure to turn ignition switch to OFF when removing ABSCM&H/U.

- NO** : Go to step 8Y3.

8Y3 : CHECK INPUT VOLTAGE OF G SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Remove console box.
- 3) Disconnect G sensor from body. (Do not disconnect connector.)
- 4) Turn ignition switch to ON.
- 5) Measure voltage between G sensor connector terminals.

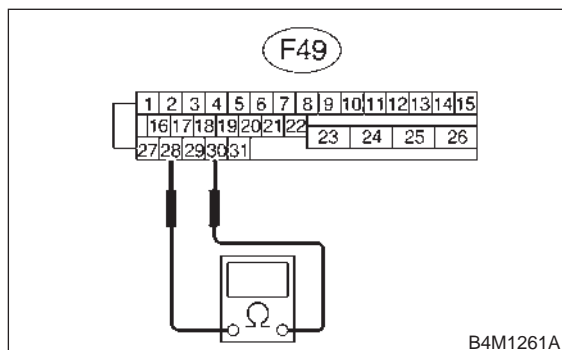
Connector & terminal
(R70) No. 1 (+) — No. 3 (-):



- CHECK** : *Is the voltage between 4.75 and 5.25 V?*
- YES** : Go to step 8Y4.
- NO** : Repair harness/connector between G sensor and ABSCM&H/U.

8Y4 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal
(F49) No. 30 — No. 28:


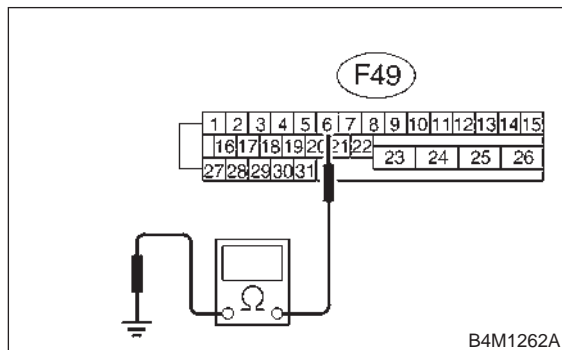
CHECK : Is the resistance between 4.3 and 4.9 $k\Omega$?

YES : Go to step 8Y5.

NO : Repair harness/connector between G sensor and ABSCM&H/U.

8Y5 : CHECK GROUND SHORT IN G SENSOR OUTPUT HARNESS.

- 1) Disconnect connector from G sensor.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 6 — Chassis ground:


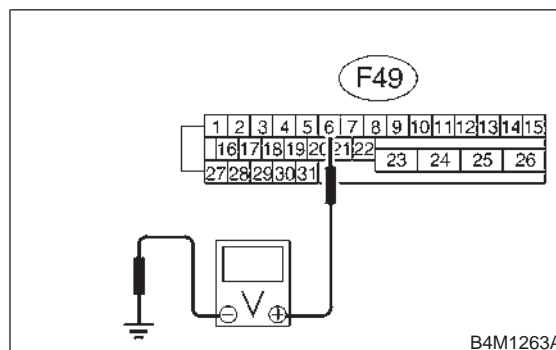
CHECK : Is the resistance more than 1 $M\Omega$?

YES : Go to step 8Y6.

NO : Repair harness between G sensor and ABSCM&H/U.

8Y6 : CHECK BATTERY SHORT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 6 (+) — Chassis ground (-):


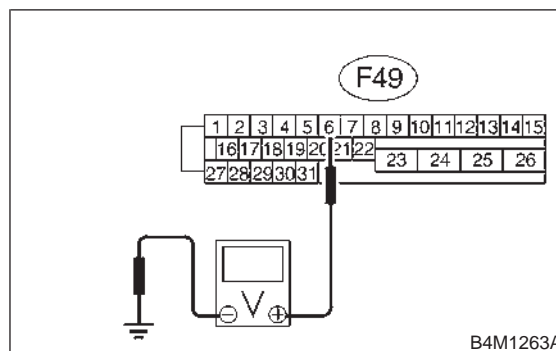
CHECK : Is the voltage less than 1 V?

YES : Go to step 8Y7.

NO : Repair harness between G sensor and ABSCM&H/U.

8Y7 : CHECK BATTERY SHORT OF HARNESS.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 6 (+) — Chassis ground (-):


CHECK : Is the voltage less than 1 V?

YES : Go to step 8Y8.

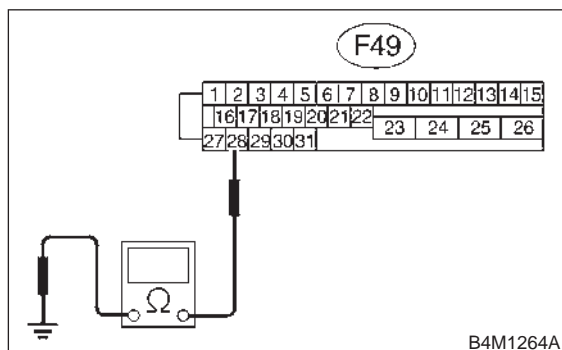
NO : Repair harness between G sensor and ABSCM&H/U.

8Y8 : CHECK GROUND SHORT OF HARNESS.

Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 28 — Chassis ground:



CHECK : Is the resistance more than 1 MΩ?

YES : Go to step 8Y9.

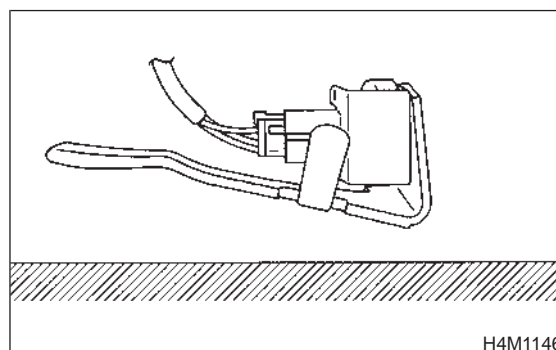
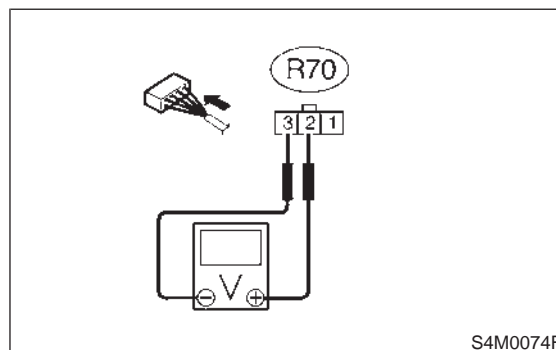
NO : Repair harness between G sensor and ABSCM&H/U.
Replace ABSCM&H/U.

8Y9 : CHECK G SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Remove G sensor from vehicle.
- 3) Connect connector to G sensor.
- 4) Connect connector to ABSCM&H/U.
- 5) Turn ignition switch to ON.
- 6) Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 3 (-):



CHECK : Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?

YES : Go to step 8Y10.

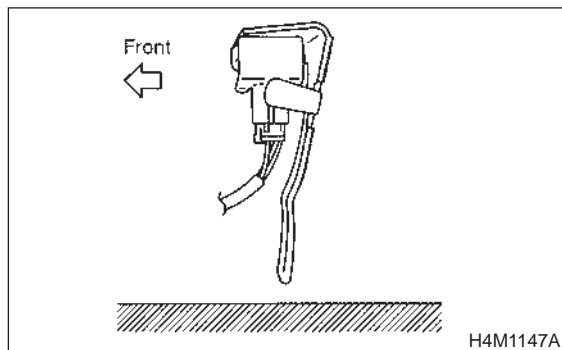
NO : Replace G sensor.

8Y10 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 3 (-):



CHECK : *Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?*

YES : Go to step 8Y11.

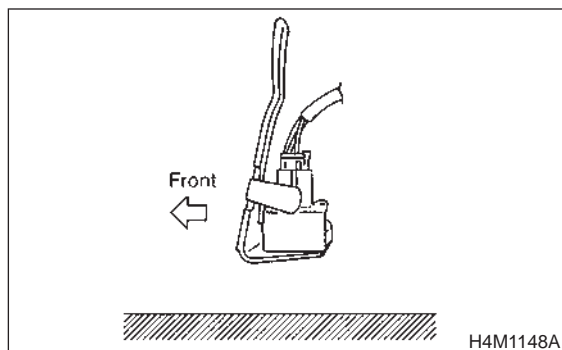
NO : Replace G sensor.

8Y11 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 3 (-):



CHECK : *Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?*

YES : Go to step 8Y12.

NO : Replace G sensor.

8Y12 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

NO : Go to step 8Y13.

8Y13 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step 8Y14.

8Y14 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

MEMO:

9. Select Monitor Function Mode

Applicable cartridge of select monitor: No. 24082AA090

NOTE:

For basic handling of the select monitor, refer to its Operation Manual.

A: LIST OF FUNCTION MODE

1. ANALOG DATA ARE DISPLAYED.

Display screen	Contents to be monitored
FR wheel speed	Wheel speed detected by the Front Right ABS sensor is displayed in km/h or mile/h.
FL wheel speed	Wheel speed detected by the Front Left ABS sensor is displayed in km/h or mile/h.
RR wheel speed	Wheel speed detected by the Rear Right ABS sensor is displayed in km/h or mile/h.
RL wheel speed	Wheel speed detected by the Rear Left ABS sensor is displayed in km/h or mile/h.
Stop light switch	Stop light switch monitor voltage is displayed.
G sensor output voltage	Refers to vehicle acceleration detecting by the analog G sensor. It appears on the select monitor display in volts.

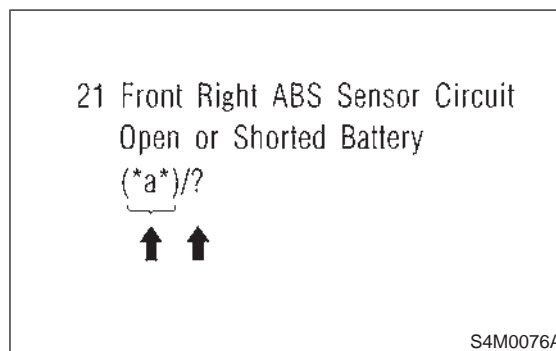
2. ON/OFF DATA ARE DISPLAYED.

Display screen	Contents to be monitored
Stop light switch	Stop light switch signal
Valve relay signal	Valve relay signal
Motor relay signal	Motor relay signal
ABS signal to TCM	ABS operation signal from ABS control module to TCM
ABS warning light	ABS warning light
Valve relay monitor	Valve relay operation monitor signal
Motor relay monitor	Motor relay operation monitor signal
CCM signal	ABS operation signal from ABS control module to TCM

3. TROUBLE CODES ARE DISPLAYED.

A maximum of 3 trouble codes are displayed in order of occurrence.

- If a particular trouble code is not properly stored in memory (due to a drop in ABSCM&H/U power supply, etc.) when a problem occurs, the trouble code, followed by a question mark "?", appears on the select monitor display. This shows it may be an unreliable reading.



- *a* refers to the troubles in order of occurrence (Latest, Old, Older and Reference).

Display screen	Contents to be monitored
Latest	The most recent trouble code appears on the select monitor display.
Old	The second most recent trouble code appears on the select monitor display.
Older	The third most recent trouble code appears on the select monitor display.
Reference	A specified period of time proceeding trouble code appears on the select monitor display.

4. CLEAR MEMORY

Display screen	Contents to be monitored
Clear memory?	Function of clearing trouble code and freeze frame data.

5. ABS SEQUENCE CONTROL

Display screen	Contents to be monitored	Index No.
ABS sequence control	Perform ABS sequence control by operating valve and pump motor sequentially.	<Ref. to 4-4 [W14D0].>

6. FREEZE FRAME DATA

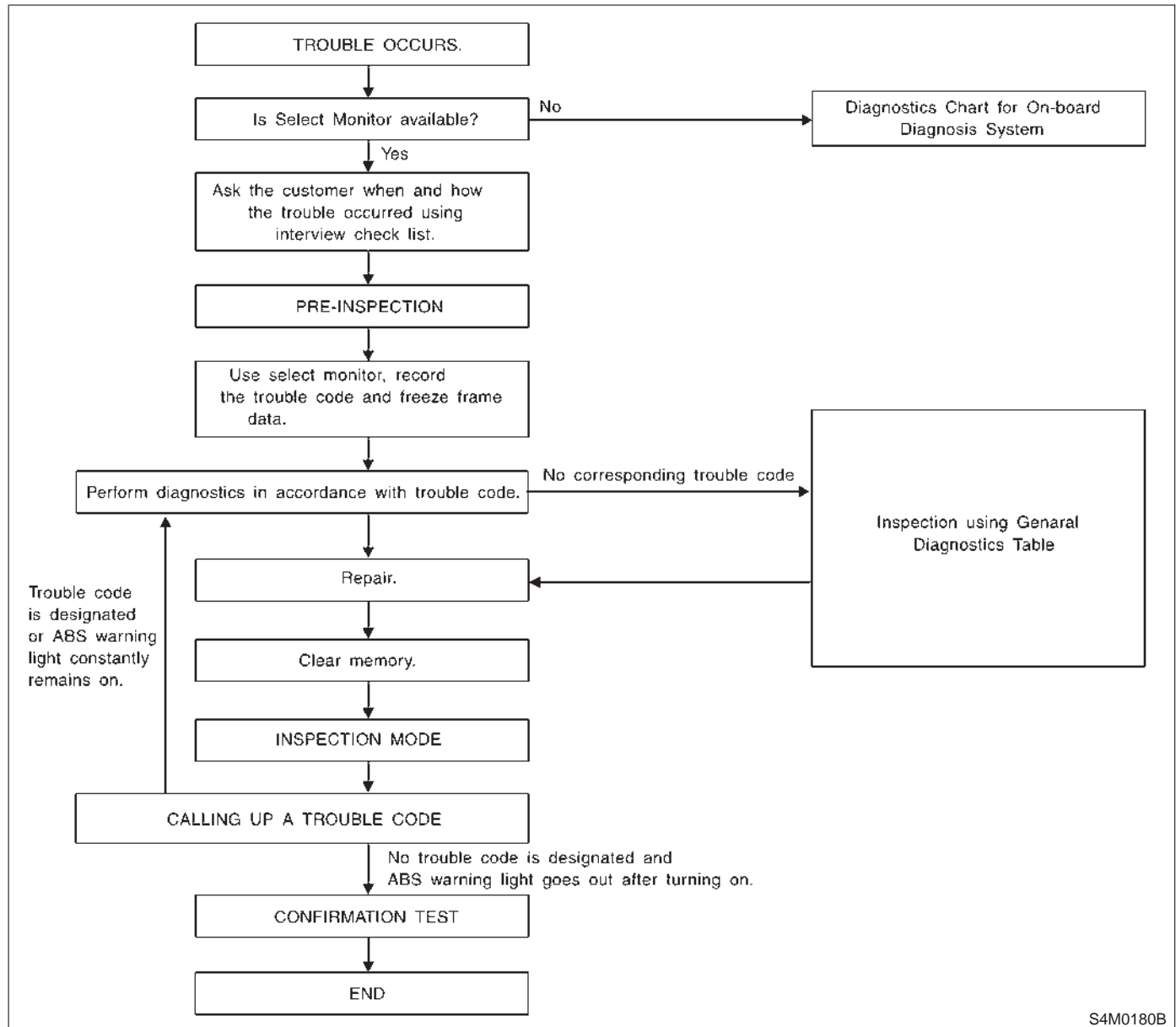
NOTE:

- Data stored at the time of trouble occurrence is shown on display.
- Each time trouble occurs, the latest information is stored in the freeze frame data in memory.
- If freeze frame data is not properly stored in memory (due to a drop in ABSCM power supply, etc.), a trouble code, preceded by a question mark "?", appears on the select monitor display. This shows it may be an unreliable reading.

Display screen	Contents to be monitored
FR wheel speed	Wheel speed detected by the Front Right ABS sensor is displayed in km/h or mile/h.
FL wheel speed	Wheel speed detected by the Front Left ABS sensor is displayed in km/h or mile/h.
RR wheel speed	Wheel speed detected by the Rear Right ABS sensor is displayed in km/h or mile/h.
RL wheel speed	Wheel speed detected by the Rear Left ABS sensor is displayed in km/h or mile/h.
ABSCM power voltage	Power (in volts) supplied to ABSCM&H/U appears on the select monitor display.
G sensor output voltage	Refers to vehicle acceleration detected by the analog G sensor. It appears on the select monitor display in volts.
Motor relay monitor	Motor relay operation monitor signal
Stop light switch	Stop light switch signal
ABS signal to TCM	ABS operation signal from ABS control module to TCM
ABS-AT control	ABS operation signal from ABS control module to TCM
ABS operation signal	ABS operation signal

10. Diagnostics Chart with Select Monitor

A: BASIC DIAGNOSTIC CHART



S4M0180B

CAUTION:

Remove foreign matter (dust, water, etc.) from the ABSCM&H/U connector during removal and installation.

NOTE:

- To check harness for broken wires or short circuits, shake it while holding it or the connector.
- Check list for interview. <Ref. to 4-4 [T6B0].>

B: LIST OF DIAGNOSTIC TROUBLE CODE

Code	Display screen	Contents of diagnosis	Index No.
—	Communication for initializing impossible	Select monitor communication failure	<Ref. to 4-4 [T10C0].>
—	No trouble code	Although no trouble code appears on the select monitor display, the ABS warning light remains on.	<Ref. to 4-4 [T10D0].>
21	Open or short circuit in front right ABS sensor circuit	Open or short circuit in front right ABS sensor circuit	<Ref. to 4-4 [T10E0].>
22	Front right ABS sensor abnormal signal	Front right ABS sensor abnormal signal	<Ref. to 4-4 [T10I0].>
23	Open or short circuit in front left ABS sensor circuit	Open or short circuit in front left ABS sensor circuit	<Ref. to 4-4 [T10F0].>
24	Front left ABS sensor abnormal signal	Front left ABS sensor abnormal signal	<Ref. to 4-4 [T10J0].>
25	Open or short circuit in rear right ABS sensor circuit	Open or short circuit in rear right ABS sensor circuit	<Ref. to 4-4 [T10G0].>
26	Rear right ABS sensor abnormal signal	Rear right ABS sensor abnormal signal	<Ref. to 4-4 [T10K0].>
27	Open or short circuit in rear left ABS sensor circuit	Open or short circuit in rear left ABS sensor circuit	<Ref. to 4-4 [T10H0].>
28	Rear left ABS sensor abnormal signal	Rear left ABS sensor abnormal signal	<Ref. to 4-4 [T10L0].>
29	Abnormal ABS sensor signal on any one of four sensor	Abnormal ABS sensor signal on any one of four	<Ref. to 4-4 [T10M0].>
31	Front right inlet valve malfunction	Front right inlet valve malfunction	<Ref. to 4-4 [T10N0].>
32	Front right outlet valve malfunction	Front right outlet valve malfunction	<Ref. to 4-4 [T10R0].>
33	Front left inlet valve malfunction	Front left inlet valve malfunction	<Ref. to 4-4 [T10O0].>
34	Front left outlet valve malfunction	Front left outlet valve malfunction	<Ref. to 4-4 [T10S0].>
35	Rear right inlet valve malfunction	Rear right inlet valve malfunction	<Ref. to 4-4 [T10P0].>
36	Rear right outlet valve malfunction	Rear right outlet valve malfunction	<Ref. to 4-4 [T10T0].>
37	Rear left inlet valve malfunction	Rear left inlet valve malfunction	<Ref. to 4-4 [T10Q0].>
38	Rear left outlet valve malfunction	Rear left outlet valve malfunction	<Ref. to 4-4 [T10U0].>
41	ABS control module malfunction	ABS control module and hydraulic control unit malfunction	<Ref. to 4-4 [T10V0].>
42	Power supply voltage too low	Power supply voltage too low	<Ref. to 4-4 [T10W0].>
42	Power supply voltage too high	Power supply voltage too high	<Ref. to 4-4 [T10X0].>
44	ABS-AT control (Non Controlled)	ABS-AT control (Non Controlled)	<Ref. to 4-4 [T10Y0].>
44	ABS-AT control (Controlled)	ABS-AT control (Controlled)	<Ref. to 4-4 [T10Z0].>
51	Valve relay malfunction	Valve relay malfunction	<Ref. to 4-4 [T10AA0].>
51	Valve relay ON failure	Valve relay ON failure	<Ref. to 4-4 [T10AB0].>
52	Open circuit in motor relay circuit	Open circuit in motor relay circuit	<Ref. to 4-4 [T10AC0].>
52	Motor relay ON failure	Motor relay ON failure	<Ref. to 4-4 [T10AD0].>
52	Motor malfunction	Motor malfunction	<Ref. to 4-4 [T10AE0].>
54	Stop light switch signal circuit malfunction	Stop light switch signal circuit malfunction	<Ref. to 4-4 [T10AF0].>
56	Open or short circuit in G sensor circuit	Open or short circuit in G sensor circuit	<Ref. to 4-4 [T10AG0].>
56	Battery short in G sensor circuit	Battery short in G sensor circuit	<Ref. to 4-4 [T10AH0].>
56	Abnormal G sensor high μ output	Abnormal G sensor high μ output	<Ref. to 4-4 [T10AI0].>
56	Detection of G sensor stick	Detection of G sensor stick	<Ref. to 4-4 [T10AJ0].>

NOTE:

High μ means high friction coefficient against road surface.

C: COMMUNICATION FOR INITIALIZING IMPOSSIBLE — SELECT MONITOR COMMUNICATION FAILURE —

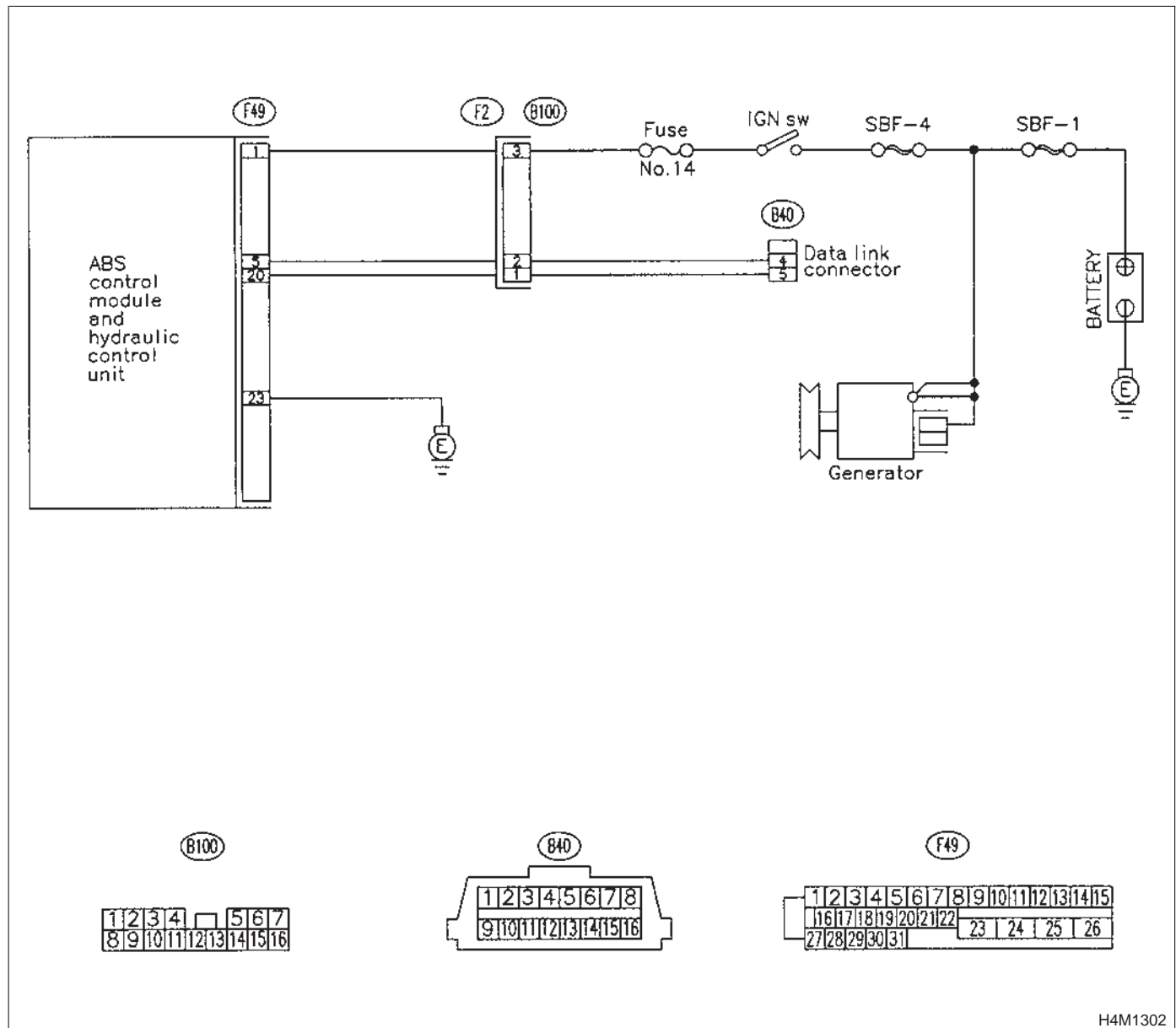
DIAGNOSIS:

- Faulty harness connector

TROUBLE SYMPTOM:

- ABS warning light remains on.

WIRING DIAGRAM:



H4M1302

10C1 : CHECK IGNITION SWITCH.

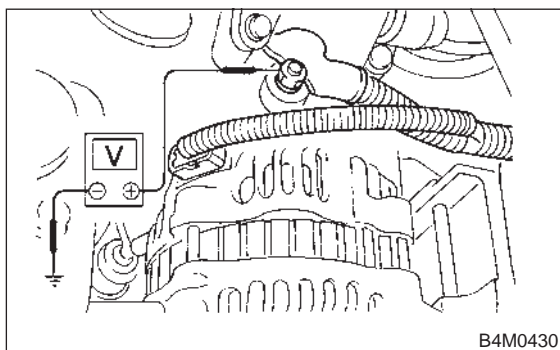
- CHECK** : *Is ignition switch ON?*
YES : Go to step 10C2.
NO : Turn ignition switch ON, and select ABS/TCS mode using the select monitor.

10C2 : CHECK GENERATOR.

- 1) Start the engine.
- 2) Idle the engine.
- 3) Measure voltage between generator and chassis ground.

Terminal

Generator B terminal (+) — Chassis ground (-):



- CHECK** : *Is the voltage between 10 and 15 V?*
YES : Go to step 10C3.
NO : Repair generator.

10C3 : CHECK BATTERY TERMINAL.

Turn ignition switch to OFF.

- CHECK** : *Is there poor contact at battery terminal?*
YES : Repair battery terminal.
NO : Go to step 10C4.

10C4 : CHECK COMMUNICATION OF SELECT MONITOR.

Using the select monitor, check whether communication to other system (such as engine, AT, etc.) can be executed normally.

- CHECK** : *Are the name and year of the system displayed on the select monitor?*
YES : Go to step 10C5.
NO : Repair select monitor communication cable and connector.

10C5 : CHECK INSTALLATION OF ABSCM&H/U CONNECTOR.

Turn ignition switch to OFF.

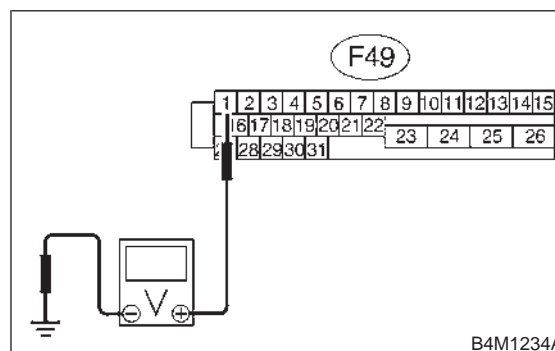
- CHECK** : *Is ABSCM&H/U connector inserted into ABSCM&H/U until the clamp locks onto it?*
YES : Go to step 10C6.
NO : Insert ABSCM&H/U connector into ABSCM&H/U until the clamp locks onto it.

10C6 : CHECK POWER SUPPLY OF ABSCM&H/U.

- 1) Disconnect connector from ABSCM&H/U.
- 2) Start engine.
- 3) Idle the engine.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

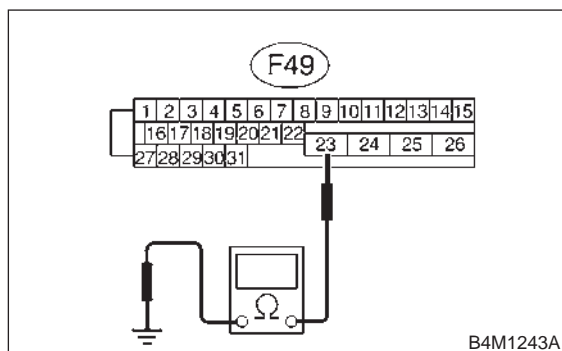
(F49) No. 1 (+) — Chassis ground (-):



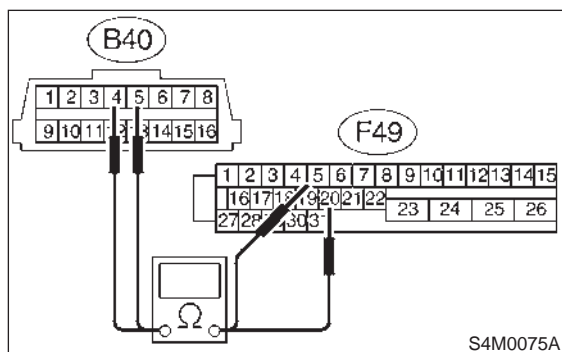
- CHECK** : *Is the voltage between 10 and 15 V?*
YES : Go to step 10C7.
NO : Repair ABSCM&H/U power supply circuit.

10C7 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal**(F49) No. 23 — Chassis ground:****CHECK** : **Is the resistance less than 0.5 Ω ?****YES** : Repair harness/connector between ABSCM&H/U and select monitor.**NO** : Go to step **10C8**.**10C8 : CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND DATA LINK CONNECTOR.**

- 1) Turn ignition switch OFF.
- 2) Measure resistance between ABSCM&H/U connector and data link connector.

Connector & terminal**(F49) No. 20 — (B40) No. 5:****(F49) No. 5 — (B40) No. 4:****CHECK** : **Is the resistance less than 0.5 Ω ?****YES** : Repair harness and connector between ABSCM&H/U and data link connector.**NO** : Go to step **10C9**.**10C9 : CHECK POOR CONTACT IN CONNECTORS.****CHECK** : **Is there poor contact in connectors between ABSCM&H/U and data link connector? <Ref. to FOREWORD [T3C1].>****YES** : Repair connector.**NO** : Replace ABSCM&H/U.

MEMO:

D: NO TROUBLE CODE

— **ALTHOUGH NO TROUBLE CODE APPEARS ON THE SELECT MONITOR DISPLAY, THE ABS WARNING LIGHT REMAINS ON. —**

DIAGNOSIS:

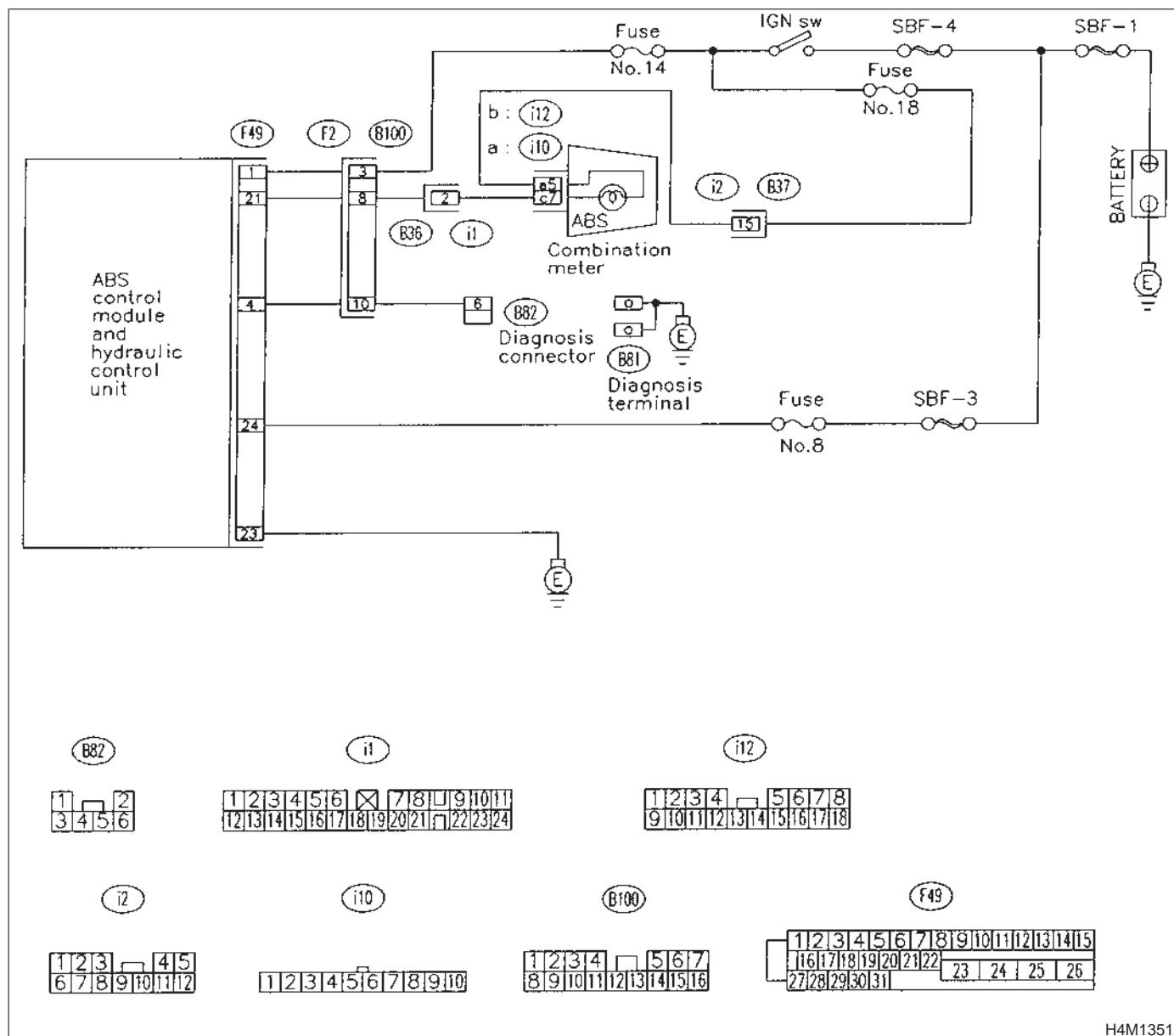
- ABS warning light circuit is shorted.

TROUBLE SYMPTOM:

- ABS warning light remains on.
- NO TROUBLE CODE displayed on the select monitor.

NOTE:

When the ABS warning light is OFF and "NO TROUBLE CODE" is displayed on the select monitor, the system is in normal condition.

WIRING DIAGRAM:

H4M1351

10D1 : CHECK WIRING HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector (F2) from connector (B100).
- 3) Turn ignition switch to ON.

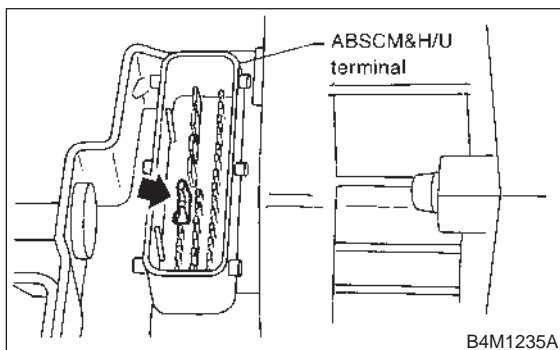
CHECK : *Does the ABS warning light remain off?*

YES : Go to step 10D2.

NO : Repair front wiring harness.

10D2 : CHECK PROJECTION AT ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Check for broken projection at the ABSCM&H/U terminal.



CHECK : *Are the projection broken?*

YES : Go to step 10D3.

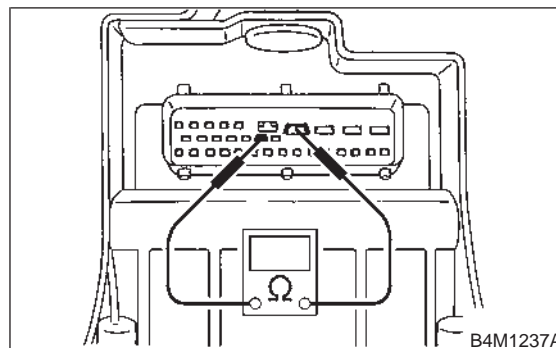
NO : Replace ABSCM&H/U.

10D3 : CHECK ABSCM&H/U.

Measure resistance between ABSCM&H/U terminals.

Terminals

No. 21 — No. 23:



CHECK : *Is the resistance more than 1 MΩ?*

YES : Go to step 10D4.

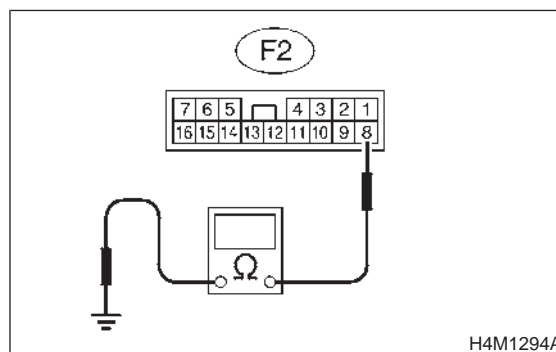
NO : Replace valve relay.

10D4 : CHECK WIRING HARNESS.

Measure resistance between connector (F2) and chassis ground.

Connector & terminal

(F2) No. 8 — Chassis ground:



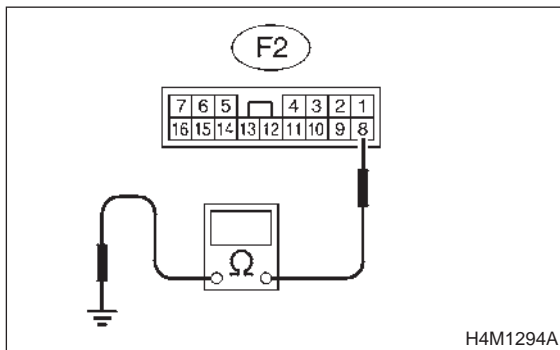
CHECK : *Is the resistance less than 0.5 Ω?*

YES : Go to step 10D5.

NO : Repair harness.

10D5 : CHECK WIRING HARNESS.

- 1) Connect connector to ABSCM&H/U.
- 2) Measure resistance between connector (F2) and chassis ground.

Connector & terminal**(F2) No. 8 — Chassis ground:**

- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step **10D6**.
- NO** : Repair harness.

10D6 : CHECK POOR CONTACT IN ABSCM&H/U CONNECTOR.

- CHECK** : *Is there poor contact in ABSCM&H/U connector? <Ref. to FOREWORD [T3C1].>*
- YES** : Repair connector.
- NO** : Replace ABSCM&H/U.

MEMO:

E: TROUBLE CODE 21 OPEN OR SHORT CIRCUIT IN FRONT RIGHT ABS SENSOR CIRCUIT

F: TROUBLE CODE 23 OPEN OR SHORT CIRCUIT IN FRONT LEFT ABS SENSOR CIRCUIT

G: TROUBLE CODE 25 OPEN OR SHORT CIRCUIT IN REAR RIGHT ABS SENSOR CIRCUIT

H: TROUBLE CODE 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT

— ABNORMAL ABS SENSOR (OPEN OR SHORT CIRCUIT IN ABS SENSOR CIRCUIT) —

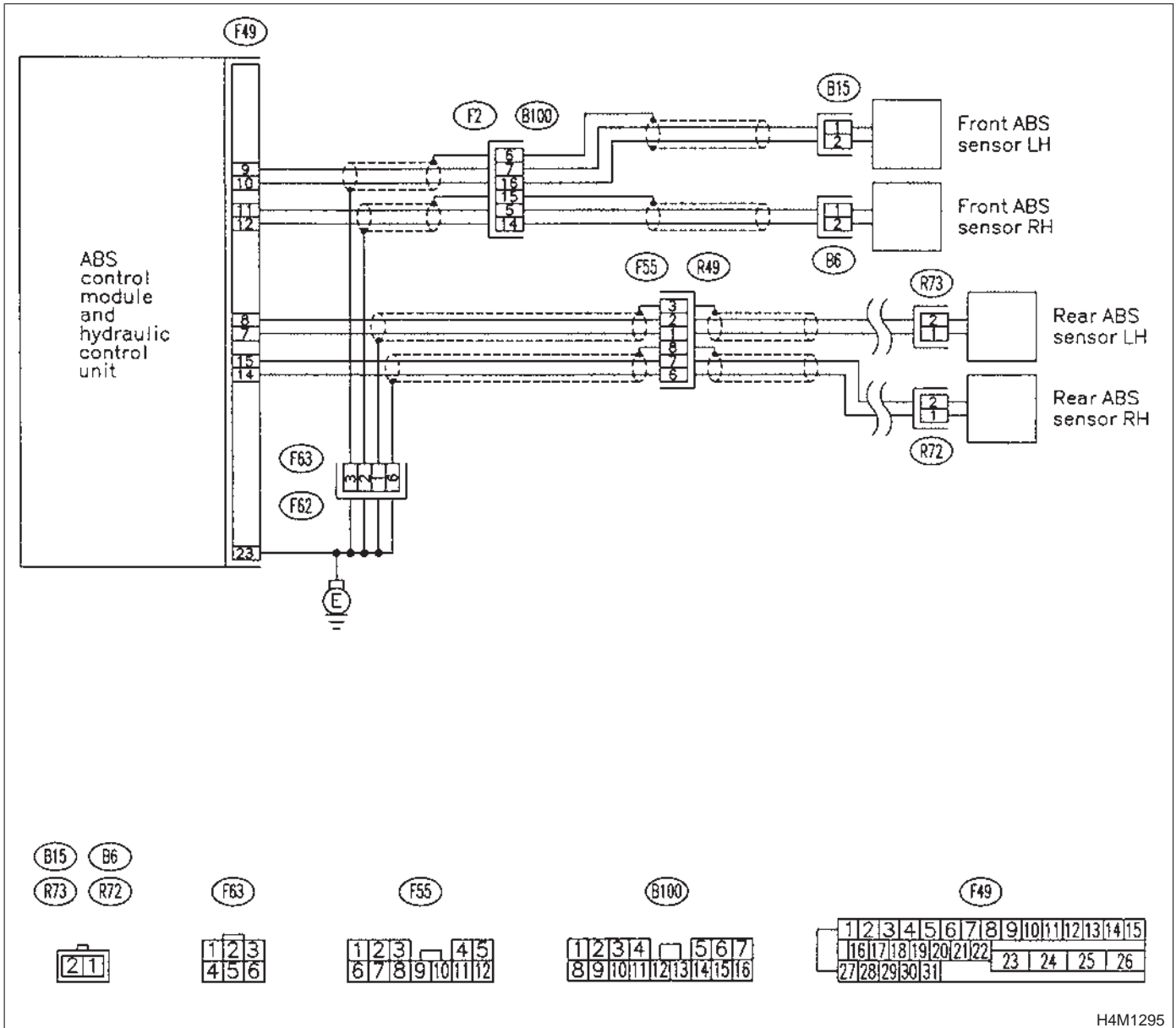
DIAGNOSIS:

- Faulty ABS sensor (Broken wire, input voltage too high)
- Faulty harness connector

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



H4M1295

10H1 : CHECK OUTPUT OF ABS SENSOR USING SELECT MONITOR.

- 1) Select "Current data display & Save" on the select monitor.
- 2) Read the ABS sensor output corresponding to the faulty system in the select monitor data display mode.

CHECK : *Does the speed indicated on the display change in response to the speedometer reading during acceleration/deceleration when the steering wheel is in the straight-ahead position?*

YES : Go to step 10H2.

NO : Go to step 10H9.

10H2 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:

32 ± 10 N·m (3.3 ± 1.0 kg·m, 24 ± 7 ft·lb)

CHECK : *Are the ABS sensor installation bolts tightened securely?*

YES : Go to step 10H3.

NO : Tighten ABS sensor installation bolts securely.

10H3 : CHECK INSTALLATION OF TONE WHEEL.

Tightening torque:

13 ± 3 N·m (1.3 ± 0.3 kg·m, 9 ± 2.2 ft·lb)

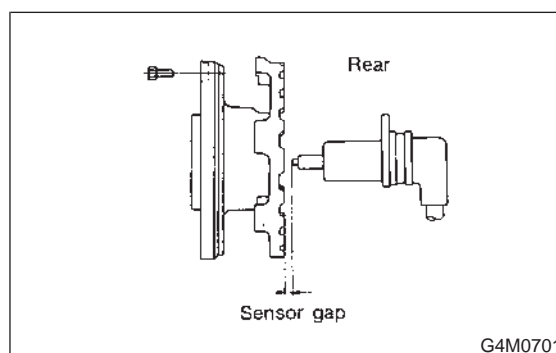
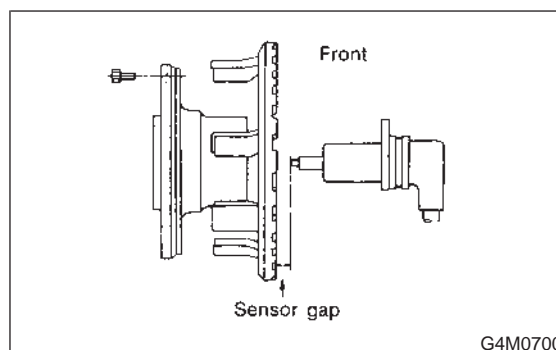
CHECK : *Are the tone wheel installation bolts tightened securely?*

YES : Go to step 10H4.

NO : Tighten tone wheel installation bolts securely.

10H4 : CHECK ABS SENSOR GAP.

Measure tone wheel-to-pole piece gap over entire perimeter of the wheel.



	Front wheel	Rear wheel
Specifications	0.9 — 1.4 mm (0.035 — 0.055 in)	0.7 — 1.2 mm (0.028 — 0.047 in)

CHECK : *Is the gap within the specifications?*

YES : Go to step 10H5.

NO : Adjust the gap.

NOTE:

Adjust the gap using spacers (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

10H5 : CHECK HUB RUNOUT.

Measure hub runout.

CHECK : *Is the runout less than 0.05 mm (0.0020 in)?*

YES : Go to step 10H6.

NO : Repair hub.

10H6 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : *Is there poor contact in connectors between ABSCM&H/U and ABS sensor? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

NO : Go to step 10H7.

10H7 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step 10H8.

10H8 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

NOTE:

Check harness and connectors between ABSCM&H/U and ABS sensor.

10H9 : CHECK ABS SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABS sensor.
- 3) Measure resistance of ABS sensor connector terminals.

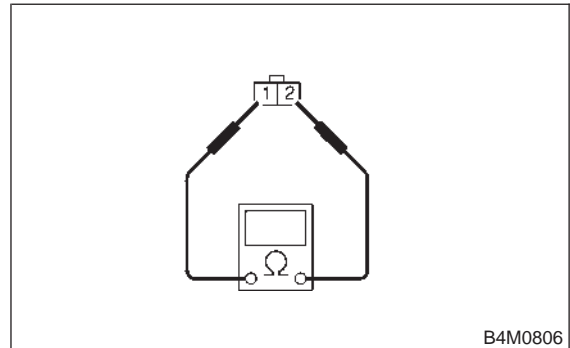
Terminal

Front RH No. 1 — No. 2:

Front LH No. 1 — No. 2:

Rear RH No. 1 — No. 2:

Rear LH No. 1 — No. 2:



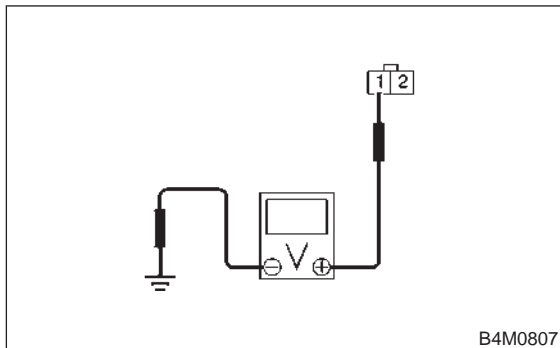
CHECK : *Is the resistance between 0.8 and 1.2 kΩ?*

YES : Go to step 10H10.

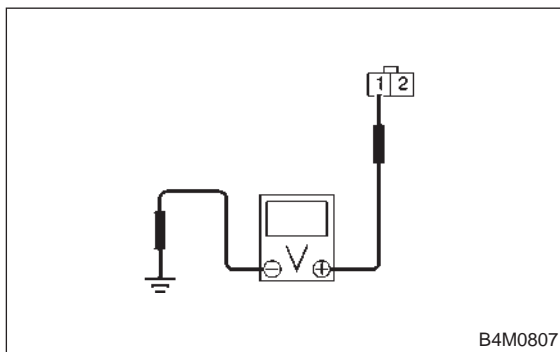
NO : Replace ABS sensor.

10H10 : CHECK BATTERY SHORT OF ABS SENSOR.

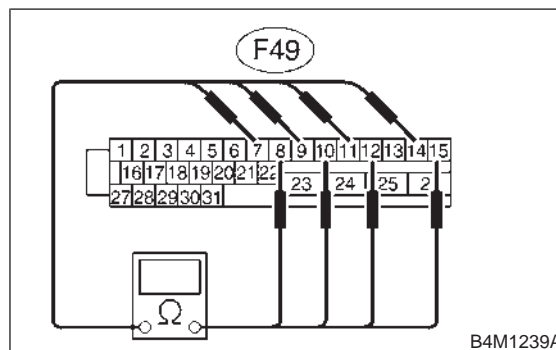
- 1) Disconnect connector from ABSCM&H/U.
- 2) Measure voltage between ABS sensor and chassis ground.

Terminal**Front RH No. 1 (+) — Chassis ground (-):****Front LH No. 1 (+) — Chassis ground (-):****Rear RH No. 1 (+) — Chassis ground (-):****Rear LH No. 1 (+) — Chassis ground (-):****CHECK** : **Is the voltage less than 1 V?****YES** : Go to step **10H11**.**NO** : Replace ABS sensor.**10H11 : CHECK BATTERY SHORT OF ABS SENSOR.**

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ABS sensor and chassis ground.

Terminal**Front RH No. 1 (+) — Chassis ground (-):****Front LH No. 1 (+) — Chassis ground (-):****Rear RH No. 1 (+) — Chassis ground (-):****Rear LH No. 1 (+) — Chassis ground (-):****CHECK** : **Is the voltage less than 1 V?****YES** : Go to step **10H12**.**NO** : Replace ABS sensor.**10H12 : CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS SENSOR.**

- 1) Turn ignition switch to OFF.
- 2) Connect connector to ABS sensor.
- 3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal**Trouble code 21 / (F49) No. 11 — No. 12:****Trouble code 23 / (F49) No. 9 — No. 10:****Trouble code 25 / (F49) No. 14 — No. 15:****Trouble code 27 / (F49) No. 7 — No. 8:****CHECK** : **Is the resistance between 0.8 and 1.2 kΩ?****YES** : Go to step **10H13**.**NO** : Repair harness/connector between ABSCM&H/U and ABS sensor.

10H13 : CHECK BATTERY SHORT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

Trouble code 21 / (F49) No. 11 (+) —

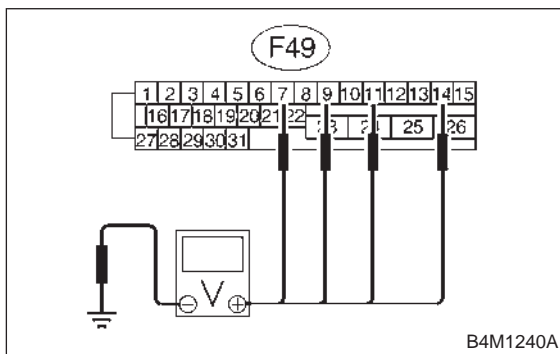
Chassis ground (-):

Trouble code 23 / (F49) No. 9 (+) — Chassis ground (-):

Trouble code 25 / (F49) No. 14 (+) —

Chassis ground (-):

Trouble code 27 / (F49) No. 7 (+) — Chassis ground (-):



CHECK : **Is the voltage less than 1 V?**

YES : Go to step **10H14**.

NO : Repair harness between ABSCM&H/U and ABS sensor.

10H14 : CHECK BATTERY SHORT OF HARNESS.

1) Turn ignition switch to ON.

2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

Trouble code 21 / (F49) No. 11 (+) —

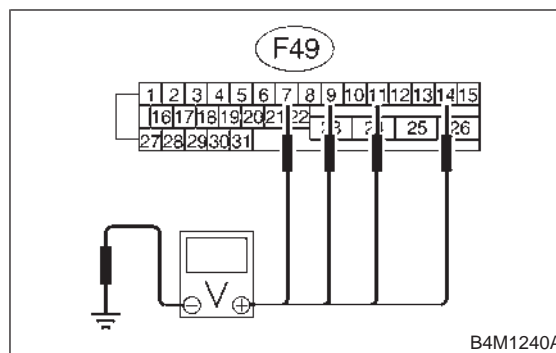
Chassis ground (-):

Trouble code 23 / (F49) No. 9 (+) — Chassis ground (-):

Trouble code 25 / (F49) No. 14 (+) —

Chassis ground (-):

Trouble code 27 / (F49) No. 7 (+) — Chassis ground (-):



CHECK : **Is the voltage less than 1 V?**

YES : Go to step **10H15**.

NO : Repair harness between ABSCM&H/U and ABS sensor.

10H15 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:

32±10 N·m (3.3±1.0 kg·m, 24±7 ft·lb)

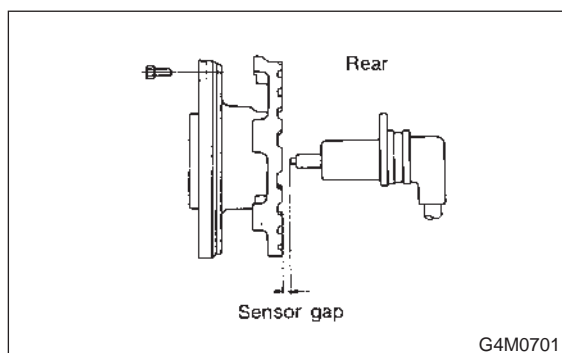
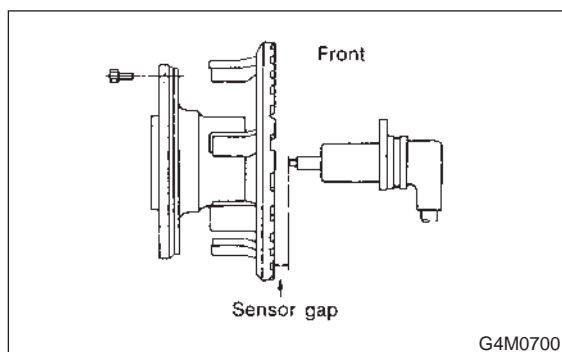
CHECK : **Are the ABS sensor installation bolts tightened securely?**

YES : Go to step **10H16**.

NO : Tighten ABS sensor installation bolts securely.

10H16 : CHECK INSTALLATION OF TONE WHEEL.**Tightening torque:** **13 ± 3 N·m (1.3 ± 0.3 kg·m, 9 ± 2.2 ft·lb)****CHECK** : Are the tone wheel installation bolts tightened securely?**YES** : Go to step 10H17.**NO** : Tighten tone wheel installation bolts securely.**10H17 : CHECK ABS SENSOR GAP.**

Measure tone wheel-to-pole piece gap over entire perimeter of the wheel.



	Front wheel	Rear wheel
Specifications	0.9 — 1.4 mm (0.035 — 0.055 in)	0.7 — 1.2 mm (0.028 — 0.047 in)

CHECK : Is the gap within the specifications?**YES** : Go to step 10H18.**NO** : Adjust the gap.**NOTE:**

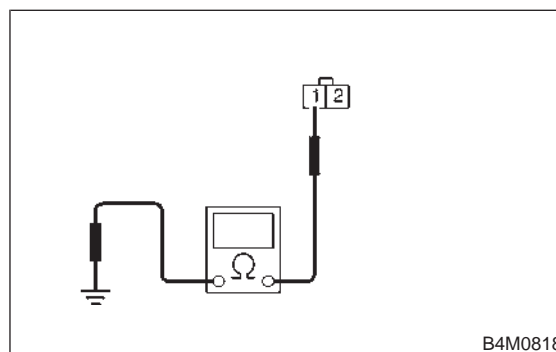
Adjust the gap using spacers (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

10H18 : CHECK HUB RUNOUT.

Measure hub runout.

CHECK : Is the runout less than 0.05 mm (0.0020 in)?**YES** : Go to step 10H19.**NO** : Repair hub.**10H19 : CHECK GROUND SHORT OF ABS SENSOR.**

- 1) Turn ignition switch to ON.
- 2) Measure resistance between ABS sensor and chassis ground.

Terminal**Front RH No. 1 — Chassis ground:****Front LH No. 1 — Chassis ground:****Rear RH No. 1 — Chassis ground:****Rear LH No. 1 — Chassis ground:****CHECK** : Is the resistance more than 1 MΩ?**YES** : Go to step 10H20.**NO** : Replace ABS sensor and ABSCM&H/U.

10H20 : CHECK GROUND SHORT OF HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to ABS sensor.
- 3) Measure resistance between ABSCM&H/U connector terminal and chassis ground.

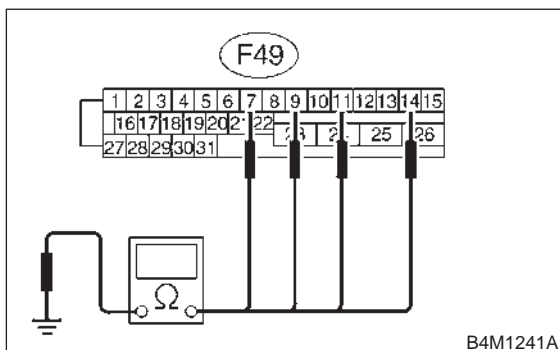
Connector & terminal

Trouble code 21 / (F49) No. 11 — Chassis ground:

Trouble code 23 / (F49) No. 9 — Chassis ground:

Trouble code 25 / (F49) No. 14 — Chassis ground:

Trouble code 27 / (F49) No. 7 — Chassis ground:



- CHECK** : **Is the resistance more than 1 MΩ?**
- YES** : Go to step 10H21.
- NO** : Repair harness between ABSCM&H/U and ABS sensor.
And replace ABSCM&H/U.

10H21 : CHECK POOR CONTACT IN CONNECTORS.

- CHECK** : **Is there poor contact in connectors between ABSCM&H/U and ABS sensor? <Ref. to FOREWORD [T3C1].>**
- YES** : Repair connector.
- NO** : Go to step 10H22.

10H22 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

- CHECK** : **Is the same trouble code as in the current diagnosis still being output?**
- YES** : Replace ABSCM&H/U.
- NO** : Go to step 10H23.

10H23 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

- CHECK** : **Are other trouble codes being output?**
- YES** : Proceed with the diagnosis corresponding to the trouble code.
- NO** : A temporary poor contact.

NOTE:

Check harness and connectors between ABSCM&H/U and ABS sensor.

I: TROUBLE CODE 22 FRONT RIGHT ABS SENSOR ABNORMAL SIGNAL

J: TROUBLE CODE 24 FRONT LEFT ABS SENSOR ABNORMAL SIGNAL

K: TROUBLE CODE 26 REAR RIGHT ABS SENSOR ABNORMAL SIGNAL

L: TROUBLE CODE 28 REAR LEFT ABS SENSOR ABNORMAL SIGNAL

— ABNORMAL ABS SENSOR (ABS SENSOR ABNORMAL SIGNAL) —

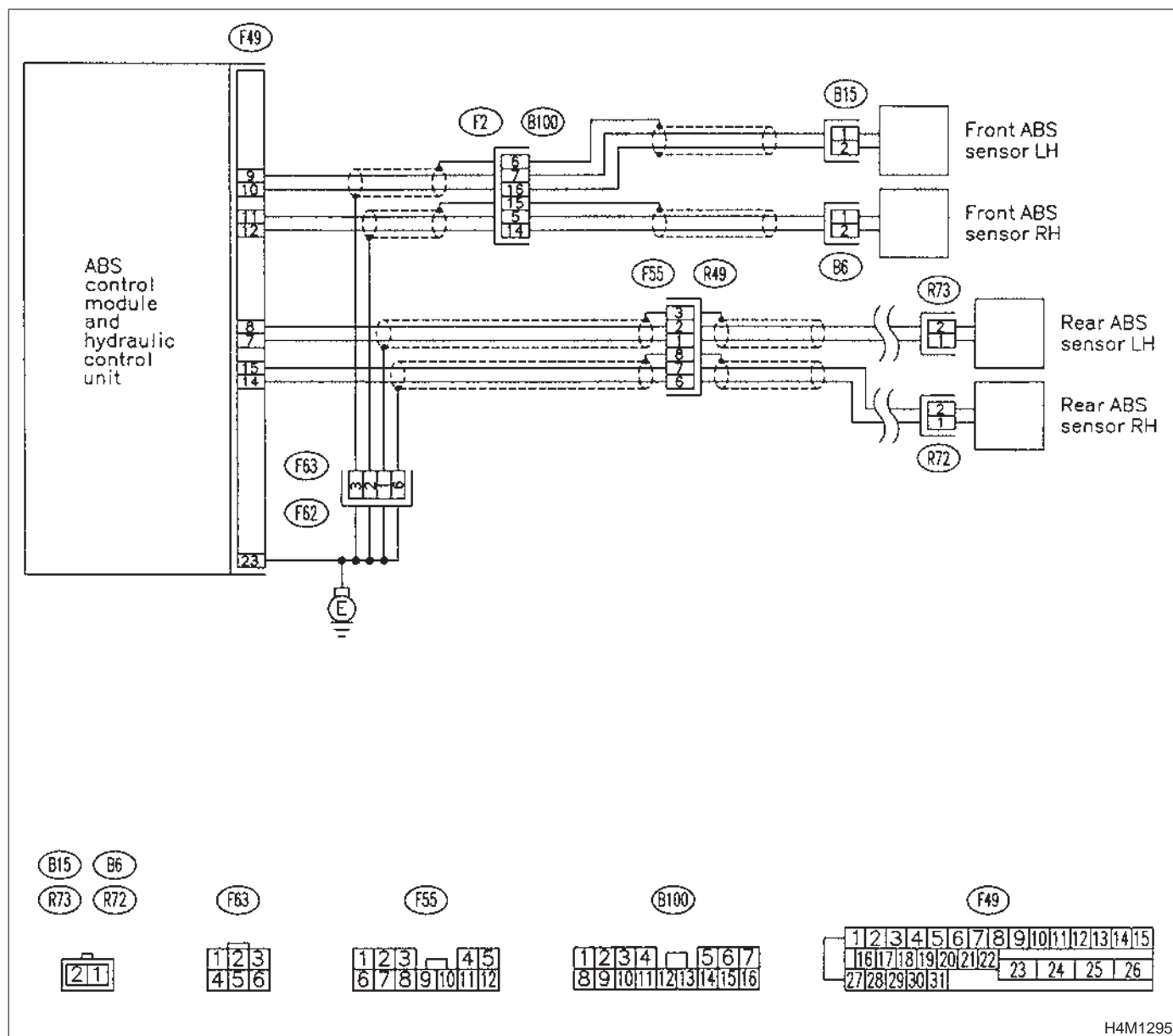
DIAGNOSIS:

- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty harness/connector

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



H4M1295

10L1 : CHECK OUTPUT OF ABS SENSOR USING SELECT MONITOR.

- 1) Select "Current data display & Save" on the select monitor.
- 2) Read the ABS sensor output corresponding to the faulty system in the select monitor data display mode.

CHECK : *Does the speed indicated on the display change in response to the speedometer reading during acceleration/deceleration when the steering wheel is in the straight-ahead position?*

YES : Go to step 10L2.

NO : Go to step 10L8.

10L2 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : *Is there poor contact in connectors between ABSCM&H/U and ABS sensor?*

YES : Repair connector.

NO : Go to step 10L3.

10L3 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : *Is the car telephone or the wireless transmitter properly installed?*

YES : Go to step 10L4.

NO : Properly install the car telephone or the wireless transmitter.

10L4 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : *Are noise sources (such as an antenna) installed near the sensor harness?*

YES : Install the noise sources apart from the sensor harness.

NO : Go to step 10L5.

10L5 : CHECK SHIELD CIRCUIT.

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors.
- 3) Measure resistance between shield connector and chassis ground.

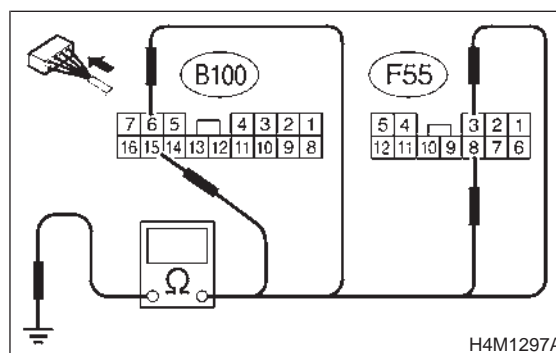
Connector & terminal

Trouble code 22 / (B100) No. 15 — Chassis ground:

Trouble code 24 / (B100) No. 6 — Chassis ground:

Trouble code 26 / (F55) No. 8 — Chassis ground:

Trouble code 28 / (F55) No. 3 — Chassis ground:



CHECK : *Is the resistance less than 0.5 Ω?*

YES : Go to step 10L6.

NO : Repair shield harness.

10L6 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step 10L7.

10L7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary noise interference.

10L8 : CHECK INSTALLATION OF ABS SENSOR.**Tightening torque:** **32 ± 10 N·m (3.3 ± 1.0 kg·m, 24 ± 7 ft·lb)**

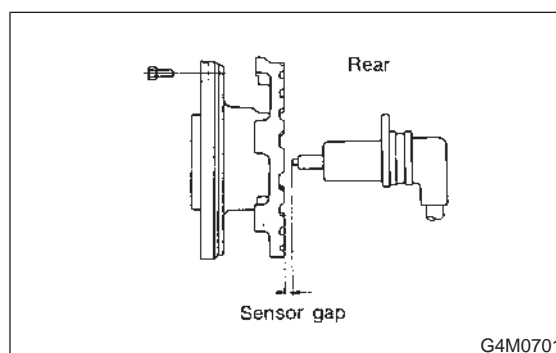
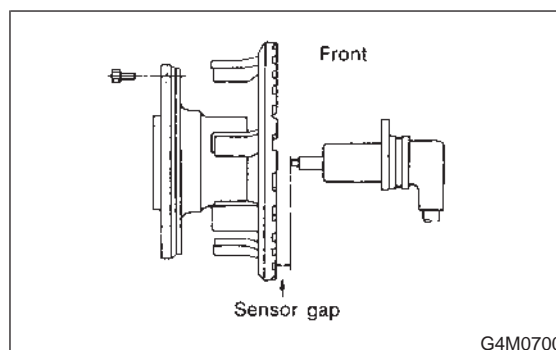
- CHECK** : Are the ABS sensor installation bolts tightened securely?
- YES** : Go to step 10L9.
- NO** : Tighten ABS sensor installation bolts securely.

10L9 : CHECK INSTALLATION OF TONE WHEEL.**Tightening torque:** **13 ± 3 N·m (1.3 ± 0.3 kg·m, 9 ± 2.2 ft·lb)**

- CHECK** : Are the tone wheel installation bolts tightened securely?
- YES** : Go to step 10L10.
- NO** : Tighten tone wheel installation bolts securely.

10L10 : CHECK ABS SENSOR GAP.

Measure tone wheel to pole piece gap over entire perimeter of the wheel.



	Front wheel	Rear wheel
Specifications	0.9 — 1.4 mm (0.035 — 0.055 in)	0.7 — 1.2 mm (0.028 — 0.047 in)

- CHECK** : Is the gap within the specifications?
- YES** : Go to step 10L11.
- NO** : Adjust the gap.

NOTE:

Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

10L11 : CHECK OSCILLOSCOPE.

- CHECK** : Is an oscilloscope available?
- YES** : Go to step 10L12.
- NO** : Go to step 10L13.

10L12 : CHECK ABS SENSOR SIGNAL.

- 1) Raise all four wheels of ground.
- 2) Turn ignition switch OFF.
- 3) Connect the oscilloscope to the connector.
- 4) Turn ignition switch ON.
- 5) Rotate wheels and measure voltage at specified frequency.

NOTE:

When this inspection is completed, the ABS/CM&H/U sometimes stores the trouble code 29.

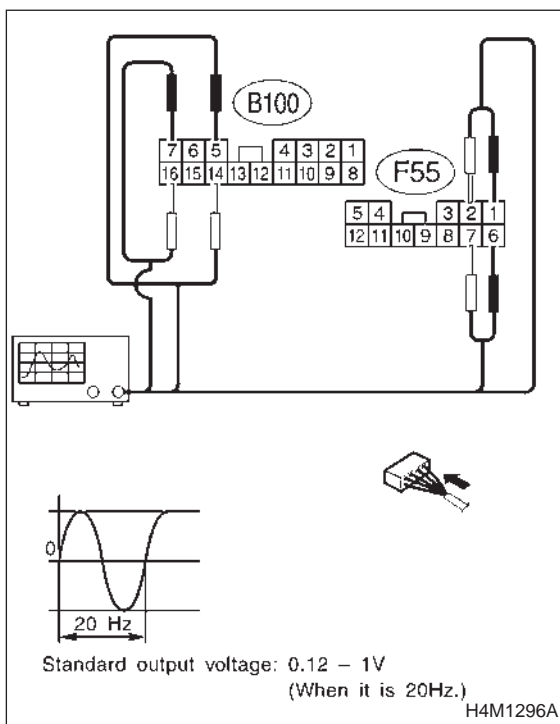
Connector & terminal

Trouble code 22 / (B100) No. 5 (+) — No. 14 (-):

Trouble code 24 / (B100) No. 7 (+) — No. 16 (-):

Trouble code 26 / (F55) No. 6 (+) — No. 7 (-):

Trouble code 28 / (F55) No. 1 (+) — No. 2 (-):



CHECK : *Is oscilloscope pattern smooth, as shown in figure?*

YES : Go to step 10L16.

NO : Go to step 10L13.

10L13 : CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.

Remove disc rotor or drum from hub in accordance with trouble code.

CHECK : *Is the ABS sensor pole piece or the tone wheel contaminated by dirt or other foreign matter?*

YES : Thoroughly remove dirt or other foreign matter.

NO : Go to step 10L14.

10L14 : CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.

CHECK : *Are there broken or damaged in the ABS sensor pole piece or the tone wheel?*

YES : Replace ABS sensor or tone wheel.

NO : Go to step 10L15.

10L15 : CHECK HUB RUNOUT.

Measure hub runout.

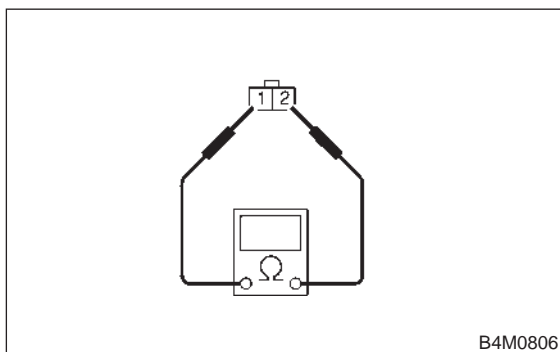
CHECK : *Is the runout less than 0.05 mm (0.0020 in)?*

YES : Go to step 10L16.

NO : Repair hub.

10L16 : CHECK RESISTANCE OF ABS SENSOR.

- 1) Turn ignition switch OFF.
- 2) Disconnect connector from ABS sensor.
- 3) Measure resistance between ABS sensor connector terminals.

Terminal**Front RH No. 1 — No. 2:****Front LH No. 1 — No. 2:****Rear RH No. 1 — No. 2:****Rear LH No. 1 — No. 2:**

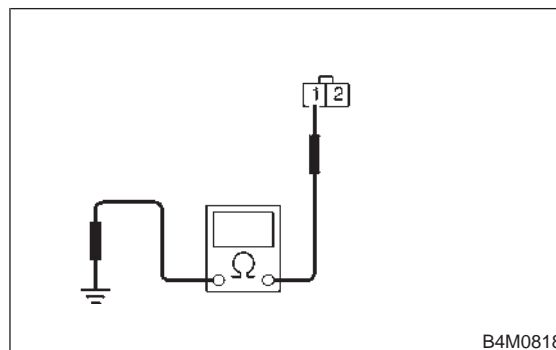
CHECK : Is the resistance between 0.8 and 1.2 k Ω ?

YES : Go to step 10L17.

NO : Replace ABS sensor.

10L17 : CHECK GROUND SHORT OF ABS SENSOR.

Measure resistance between ABS sensor and chassis ground.

Terminal**Front RH No. 1 — Chassis ground:****Front LH No. 1 — Chassis ground:****Rear RH No. 1 — Chassis ground:****Rear LH No. 1 — Chassis ground:**

CHECK : Is the resistance more than 1 M Ω ?

YES : Go to step 10L18.

NO : Replace ABS sensor.

10L18 : CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS SENSOR.

- 1) Connect connector to ABS sensor.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance at ABSCM&H/U connector terminals.

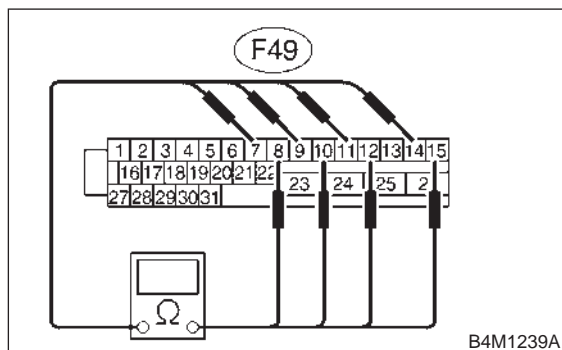
Connector & terminal

Trouble code 22 / (F49) No. 11 — No. 12:

Trouble code 24 / (F49) No. 9 — No. 10:

Trouble code 26 / (F49) No. 14 — No. 15:

Trouble code 28 / (F49) No. 7 — No. 8:



- CHECK** : Is the resistance between 0.8 and 1.2 k Ω ?
- YES** : Go to step 10L19.
- NO** : Repair harness/connector between ABSCM&H/U and ABS sensor.

10L19 : CHECK GROUND SHORT OF HARNESS.

Measure resistance between ABSCM&H/U connector and chassis ground.

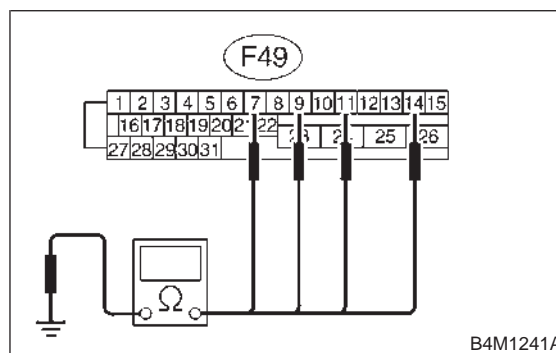
Connector & terminal

Trouble code 22 / (F49) No. 11 — Chassis ground:

Trouble code 24 / (F49) No. 9 — Chassis ground:

Trouble code 26 / (F49) No. 14 — Chassis ground:

Trouble code 28 / (F49) No. 7 — Chassis ground:



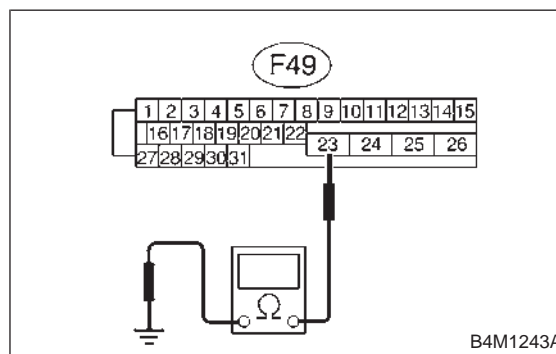
- CHECK** : Is the resistance more than 1 M Ω ?
- YES** : Go to step 10L20.
- NO** : Repair harness/connector between ABSCM&H/U and ABS sensor.

10L20 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

Measure resistance between ABSCM&H/U and chassis ground.

Connector & terminal

(F49) No. 23 — GND:



- CHECK** : Is the resistance less than 0.5 Ω ?
- YES** : Go to step 10L21.
- NO** : Repair ABSCM&H/U ground harness.

10L21 : CHECK POOR CONTACT IN CONNECTORS.

- CHECK** : *Is there poor contact in connectors between ABSCM&H/U and ABS sensor? <Ref. to FOREWORD [T3C1].>*
- YES** : Repair connector.
- NO** : Go to step 10L22.

10L22 : CHECK SOURCES OF SIGNAL NOISE.

- CHECK** : *Is the car telephone or the wireless transmitter properly installed?*
- YES** : Go to step 10L23.
- NO** : Properly install the car telephone or the wireless transmitter.

10L23 : CHECK SOURCES OF SIGNAL NOISE.

- CHECK** : *Are noise sources (such as an antenna) installed near the sensor harness?*
- YES** : Install the noise sources apart from the sensor harness.
- NO** : Go to step 10L24.

10L24 : CHECK SHIELD CIRCUIT.

- 1) Connect all connectors.
- 2) Measure resistance between shield connector and chassis ground.

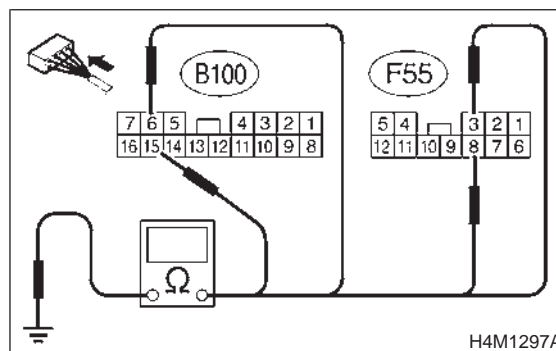
Connector & terminal

Trouble code 22 / (B100) No. 15 — Chassis ground:

Trouble code 24 / (B100) No. 6 — Chassis ground:

Trouble code 26 / (F55) No. 8 — Chassis ground:

Trouble code 28 / (F55) No. 3 — Chassis ground:



- CHECK** : *Is the resistance less than 0.5 Ω?*
- YES** : Go to step 10L25.
- NO** : Repair shield harness.

10L25 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

- CHECK** : *Is the same trouble code as in the current diagnosis still being output?*
- YES** : Replace ABSCM&H/U.
- NO** : Go to step 10L26.

10L26 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

- CHECK** : *Are other trouble codes being output?*
- YES** : Proceed with the diagnosis corresponding to the trouble code.
- NO** : A temporary noise interference.

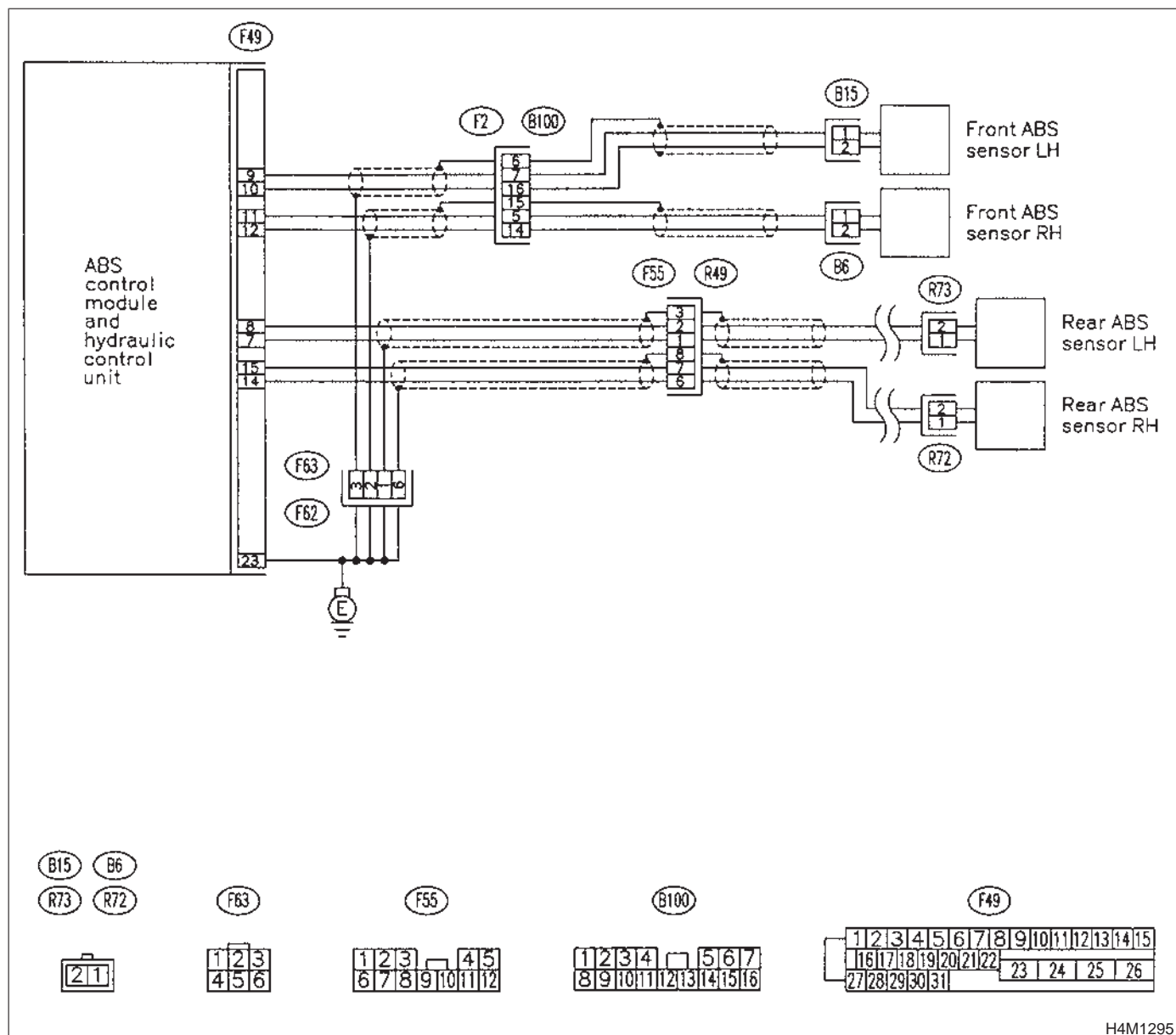
MEMO:

M: TROUBLE CODE 29 ABNORMAL ABS SENSOR SIGNAL ON ANY ONE OF FOUR SENSOR**— ABNORMAL ABS SENSOR SIGNAL ON ANY ONE OF FOUR —****DIAGNOSIS:**

- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty tone wheel
- Wheels turning freely for a long time

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

H4M1295

10M1 : CHECK IF THE WHEELS HAVE TURNED FREELY FOR A LONG TIME.

- CHECK** : Check if the wheels have been turned freely for more than one minute, such as when the vehicle is jacked-up, under full-lock cornering or when tire is not in contact with road surface.
- YES** : The ABS is normal. Erase the trouble code.

NOTE:

When the wheels turn freely for a long time, such as when the vehicle is towed or jacked-up, or when steering wheel is continuously turned all the way, this trouble code may sometimes occur.

- NO** : Go to step 10M2.

10M2 : CHECK TIRE SPECIFICATIONS.

Turn ignition switch to OFF.

- CHECK** : Are the tire specifications correct?
- YES** : Go to step 10M3.
- NO** : Replace tire.

10M3 : CHECK WEAR OF TIRE.

- CHECK** : Is the tire worn excessively?
- YES** : Replace tire.
- NO** : Go to step 10M4.

10M4 : CHECK TIRE PRESSURE.

- CHECK** : Is the tire pressure correct?
- YES** : Go to step 10M5.
- NO** : Adjust tire pressure.

10M5 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:

$32 \pm 10 \text{ N-m}$ ($3.3 \pm 1.0 \text{ kg-m}$, $24 \pm 7 \text{ ft-lb}$)

- CHECK** : Are the ABS sensor installation bolts tightened securely?
- YES** : Go to step 10M6.
- NO** : Tighten ABS sensor installation bolts securely.

10M6 : CHECK INSTALLATION OF TONE WHEEL.

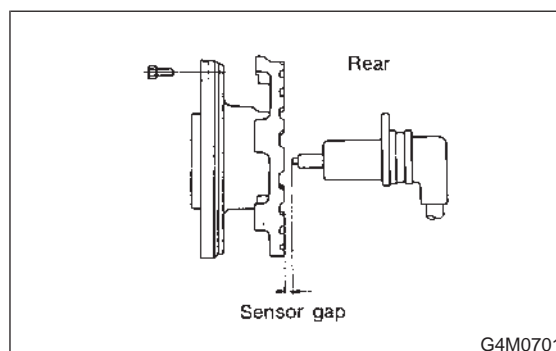
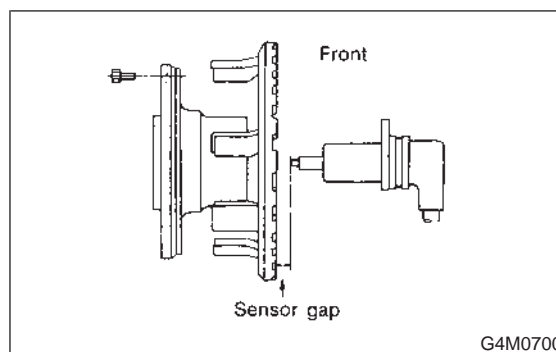
Tightening torque:

$13 \pm 3 \text{ N-m}$ ($1.3 \pm 0.3 \text{ kg-m}$, $9 \pm 2.2 \text{ ft-lb}$)

- CHECK** : Are the tone wheel installation bolts tightened securely?
- YES** : Go to step 10M7.
- NO** : Tighten tone wheel installation bolts securely.

10M7 : CHECK ABS SENSOR GAP.

Measure tone wheel to pole piece gap over entire perimeter of the wheel.



	Front wheel	Rear wheel
Specifications	0.9 — 1.4 mm (0.035 — 0.055 in)	0.7 — 1.2 mm (0.028 — 0.047 in)

- CHECK** : Is the gap within the specifications?
- YES** : Go to step 10M8.
- NO** : Adjust the gap.

NOTE:

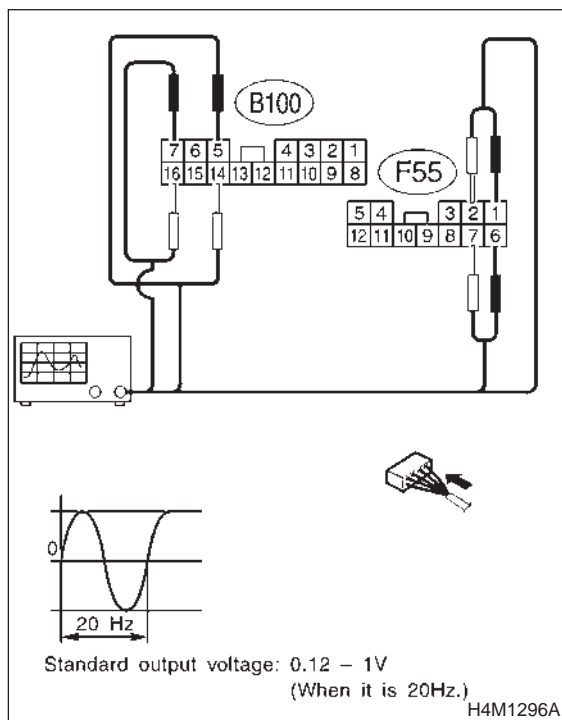
Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

10M8 : CHECK OSCILLOSCOPE.**CHECK** : *Is an oscilloscope available?***YES** : Go to step **10M9**.**NO** : Go to step **10M10**.**10M9 : CHECK ABS SENSOR SIGNAL.**

- 1) Raise all four wheels of ground.
- 2) Turn ignition switch OFF.
- 3) Connect the oscilloscope to the connector.
- 4) Turn ignition switch ON.
- 5) Rotate wheels and measure voltage at specified frequency.

NOTE:

When this inspection is completed, the ABSCM&H/U sometimes stores the trouble code 29.

Connector & terminal**(B100) No. 5 (+) — No. 14 (–) (Front RH):****(B100) No. 7 (+) — No. 16 (–) (Front LH):****(F55) No. 6 (+) — No. 7 (–) (Rear RH):****(F55) No. 1 (+) — No. 2 (–) (Rear LH):****CHECK** : *Is oscilloscope pattern smooth, as shown in figure?***YES** : Go to step **10M13**.**NO** : Go to step **10M10**.**10M10 : CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.**

Remove disc rotor from hub.

CHECK : *Is the ABS sensor pole piece or the tone wheel contaminated by dirt or other foreign matter?***YES** : Thoroughly remove dirt or other foreign matter.**NO** : Go to step **10M11**.**10M11 : CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.****CHECK** : *Are there broken or damaged teeth in the ABS sensor pole piece or the tone wheel?***YES** : Replace ABS sensor or tone wheel.**NO** : Go to step **10M12**.**10M12 : CHECK HUB RUNOUT.**

Measure hub runout.

CHECK : *Is the runout less than 0.05 mm (0.0020 in)?***YES** : Go to step **10M13**.**NO** : Repair hub.**10M13 : CHECK ABSCM&H/U.**

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors.
- 3) Erase the memory.
- 4) Perform inspection mode.
- 5) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?***YES** : Replace ABSCM&H/U.**NO** : Go to step **10M14**.**10M14 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.****CHECK** : *Are other trouble codes being output?***YES** : Proceed with the diagnosis corresponding to the trouble code.**NO** : A temporary poor contact.

MEMO:

Q: TROUBLE CODE 37 REAR LEFT INLET VALVE MALFUNCTION — INLET SOLENOID VALVE MALFUNCTION —

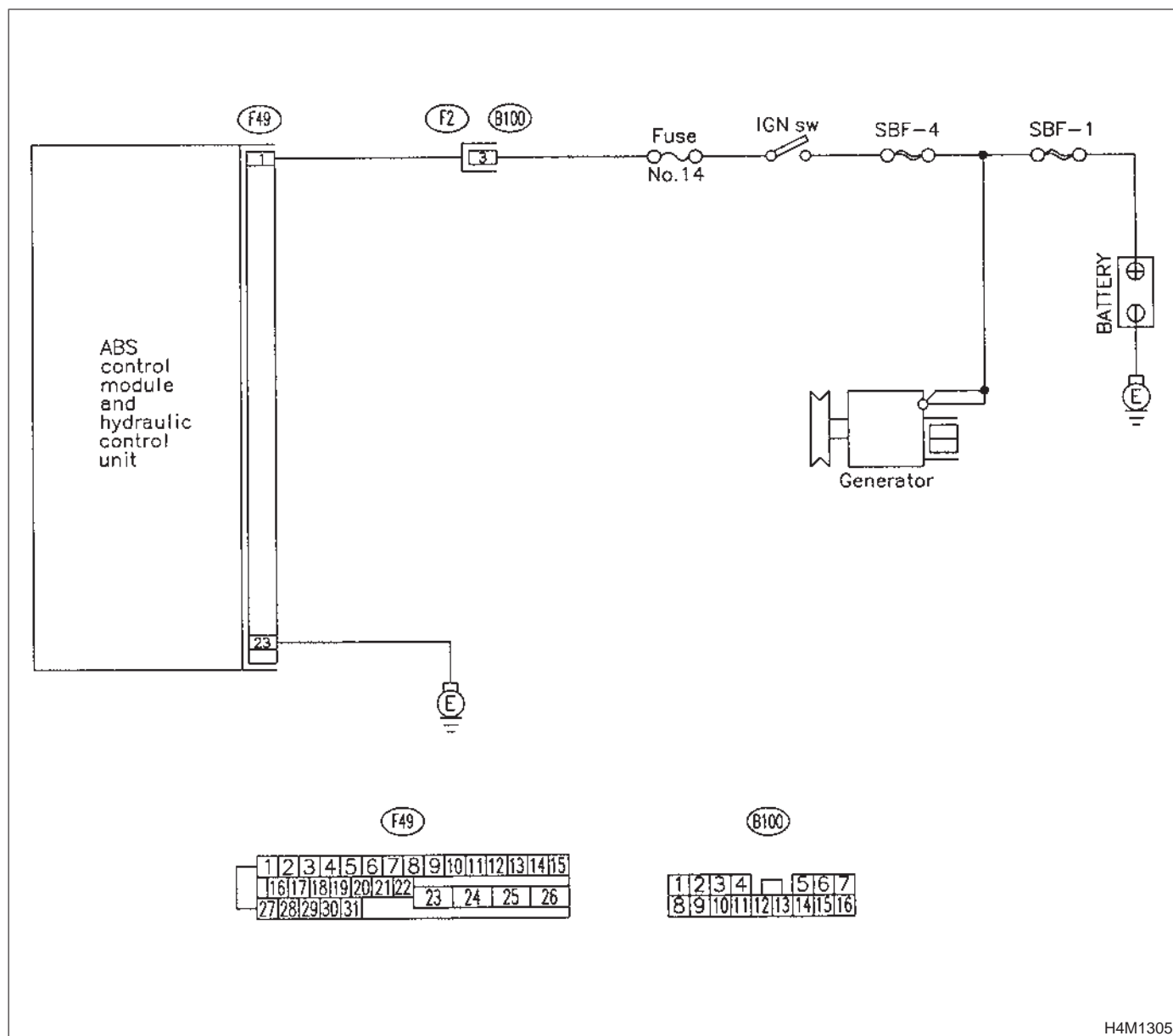
DIAGNOSIS:

- Faulty harness/connector
- Faulty inlet solenoid valve

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

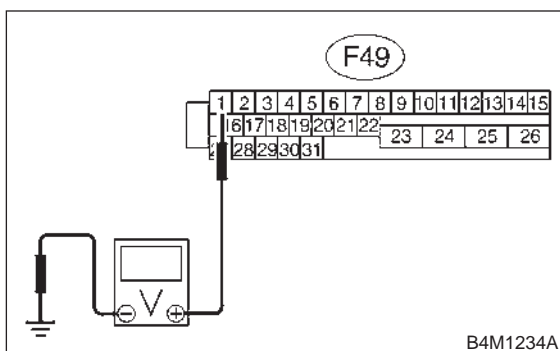


10Q1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Run the engine at idle.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):



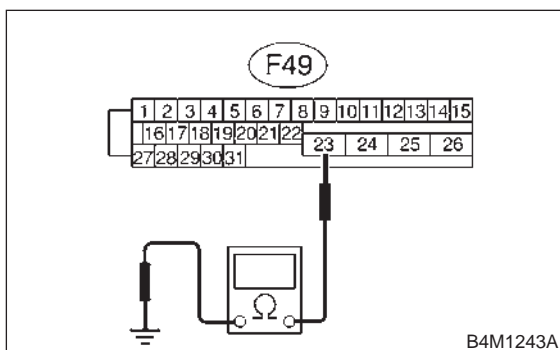
- CHECK** : Is the voltage between 10 V and 15 V?
- YES** : Go to step 10Q2.
- NO** : Repair harness connector between battery, ignition switch and ABSCM&H/U.

10Q2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



- CHECK** : Is the resistance less than 0.5 Ω?
- YES** : Go to step 10Q3.
- NO** : Repair ABSCM&H/U ground harness.

10Q3 : CHECK POOR CONTACT IN CONNECTORS.

- CHECK** : Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>

- YES** : Repair connector.
- NO** : Go to step 10Q4.

10Q4 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

- CHECK** : Is the same trouble code as in the current diagnosis still being output?

- YES** : Replace ABSCM&H/U.
- NO** : Go to step 10Q5.

10Q5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

- CHECK** : Are other trouble codes being output?

- YES** : Proceed with the diagnosis corresponding to the trouble code.
- NO** : A temporary poor contact.

U: TROUBLE CODE 38 REAR LEFT OUTLET VALVE MALFUNCTION — OUTLET SOLENOID VALVE MALFUNCTION —

- Faulty harness/connector
- Faulty outlet solenoid valve

- ABS does not operate.

WIRING DIAGRAM:

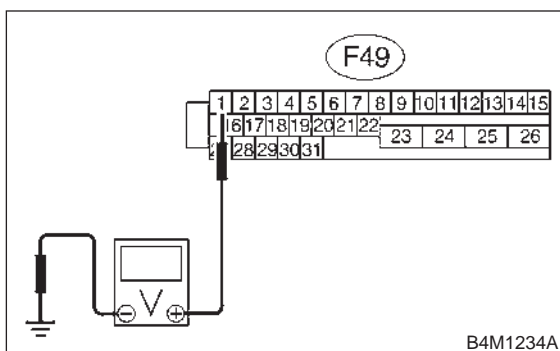


10U1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Run the engine at idle.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):



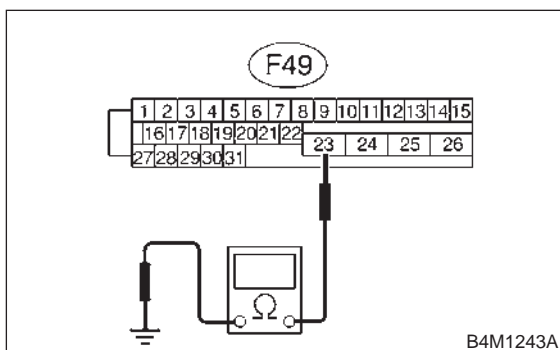
- CHECK** : Is the voltage between 10 V and 15 V?
- YES** : Go to step 10U2.
- NO** : Repair harness connector between battery, ignition switch and ABSCM&H/U.

10U2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



- CHECK** : Is the resistance less than 0.5 Ω?
- YES** : Go to step 10U3.
- NO** : Repair ABSCM&H/U ground harness.

10U3 : CHECK POOR CONTACT IN CONNECTORS.

- CHECK** : Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>

- YES** : Repair connector.
- NO** : Go to step 10U4.

10U4 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

- CHECK** : Is the same trouble code as in the current diagnosis still being output?

- YES** : Replace ABSCM&H/U.
- NO** : Go to step 10U5.

10U5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

- CHECK** : Are other trouble codes being output?

- YES** : Proceed with the diagnosis corresponding to the trouble code.
- NO** : A temporary poor contact.

V: TROUBLE CODE 41 ABS CONTROL MODULE MALFUNCTION — ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT MALFUNCTION—

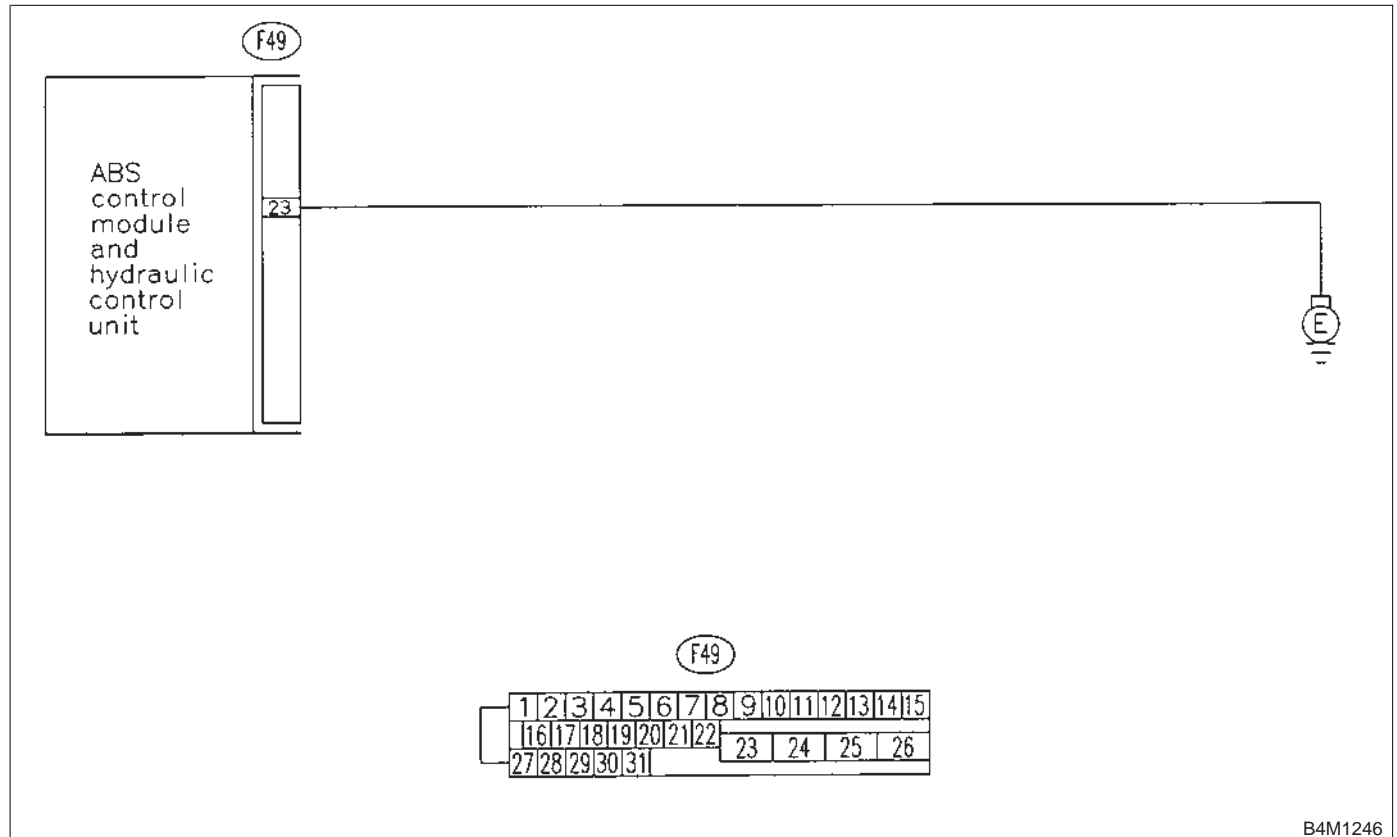
DIAGNOSIS:

- Faulty ABSCM&H/U

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

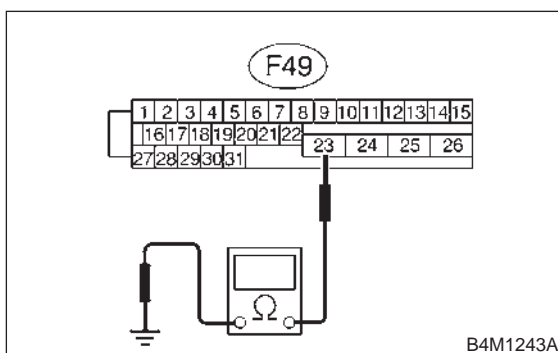


10V1 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance between ABSCM&H/U and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



- CHECK** : Is the resistance less than 0.5Ω ?
- YES** : Go to step 10V2.
- NO** : Repair ABSCM&H/U ground harness.

10V2 : CHECK POOR CONTACT IN CONNECTORS.

- CHECK** : Is there poor contact in connectors between battery, ignition switch and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>
- YES** : Repair connector.
- NO** : Go to step 10V3.

10V3 : CHECK SOURCES OF SIGNAL NOISE.

- CHECK** : Is the car telephone or the wireless transmitter properly installed?
- YES** : Go to step 10V4.
- NO** : Properly install the car telephone or the wireless transmitter.

10V4 : CHECK SOURCES OF SIGNAL NOISE.

- CHECK** : Are noise sources (such as an antenna) installed near the sensor harness?
- YES** : Install the noise sources apart from the sensor harness.
- NO** : Go to step 10V5.

10V5 : CHECK ABSCM&H/U.

- 1) Turn ignition switch to OFF.
 - 2) Connect all connectors.
 - 3) Erase the memory.
 - 4) Perform inspection mode.
 - 5) Read out the trouble code.
- CHECK** : Is the same trouble code as in the current diagnosis still being output?
- YES** : Replace ABSCM&H/U.
- NO** : Go to step 10V6.

10V6 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

- CHECK** : Are other trouble codes being output?
- YES** : Proceed with the diagnosis corresponding to the trouble code.
- NO** : A temporary poor contact.

W: TROUBLE CODE 42 POWER SUPPLY VOLTAGE TOO LOW — POWER SUPPLY VOLTAGE TOO LOW —

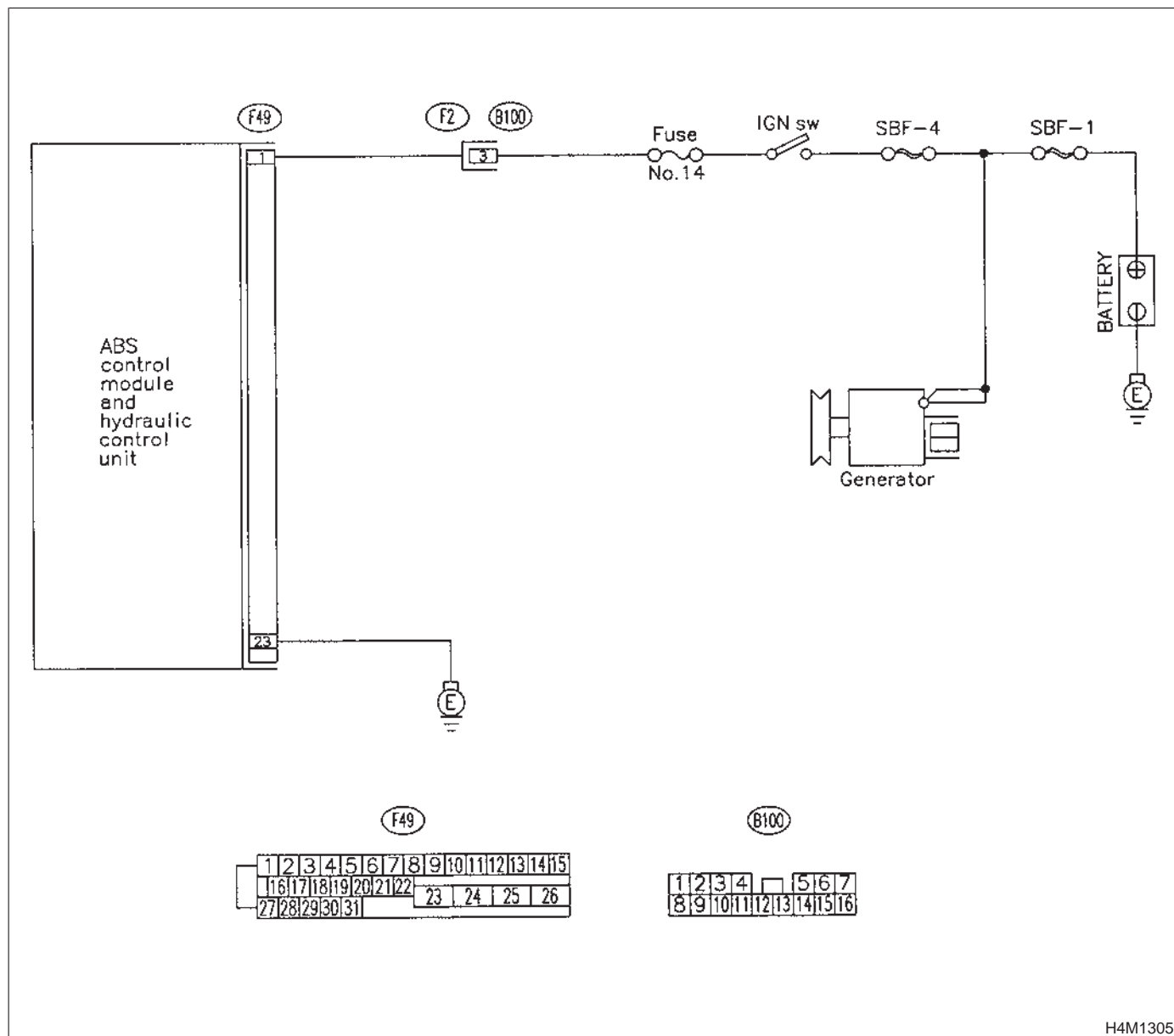
DIAGNOSIS:

- Power source voltage of the ABSCM&H/U is low.

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



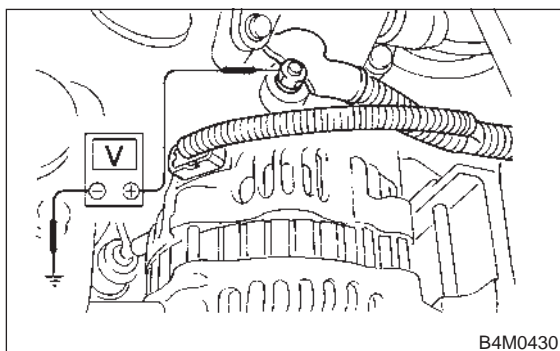
H4M1305

10W1 : CHECK GENERATOR.

- 1) Start engine.
- 2) Idling after warm-up.
- 3) Measure voltage between generator B terminal and chassis ground.

Terminal

Generator B terminal — Chassis ground:



- CHECK** : Is the voltage between 10 V and 15 V?
- YES** : Go to step 10W2.
- NO** : Repair generator.

10W2 : CHECK BATTERY TERMINAL.

Turn ignition switch to OFF.

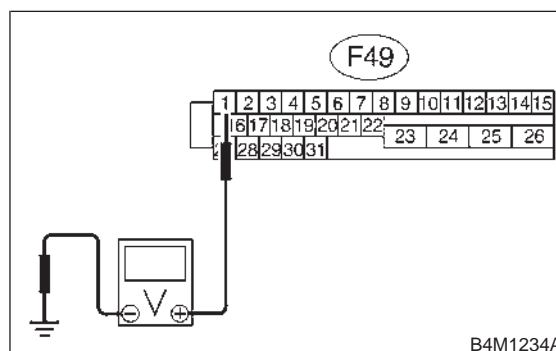
- CHECK** : Are the positive and negative battery terminals tightly clamped?
- YES** : Go to step 10W3.
- NO** : Tighten the clamp of terminal.

10W3 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Disconnect connector from ABSCM&H/U.
- 2) Run the engine at idle.
- 3) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):



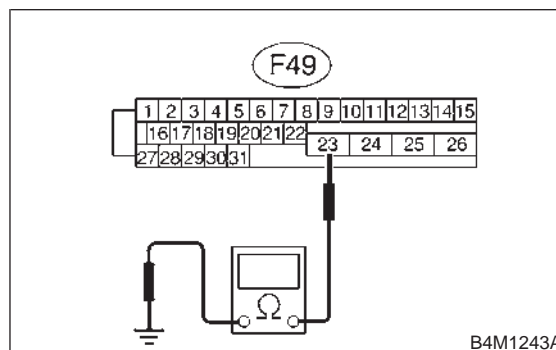
- CHECK** : Is the voltage between 10 V and 15 V?
- YES** : Go to step 10W4.
- NO** : Repair harness connector between battery, ignition switch and ABSCM&H/U.

10W4 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



- CHECK** : Is the resistance less than 0.5 Ω?
- YES** : Go to step 10W5.
- NO** : Repair ABSCM&H/U ground harness.

10W5 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

NO : Go to step **10W6**.

10W6 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step **10W7**.

10W7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

MEMO:

X: TROUBLE CODE 42 POWER SUPPLY VOLTAGE TOO HIGH — POWER SUPPLY VOLTAGE TOO HIGH —

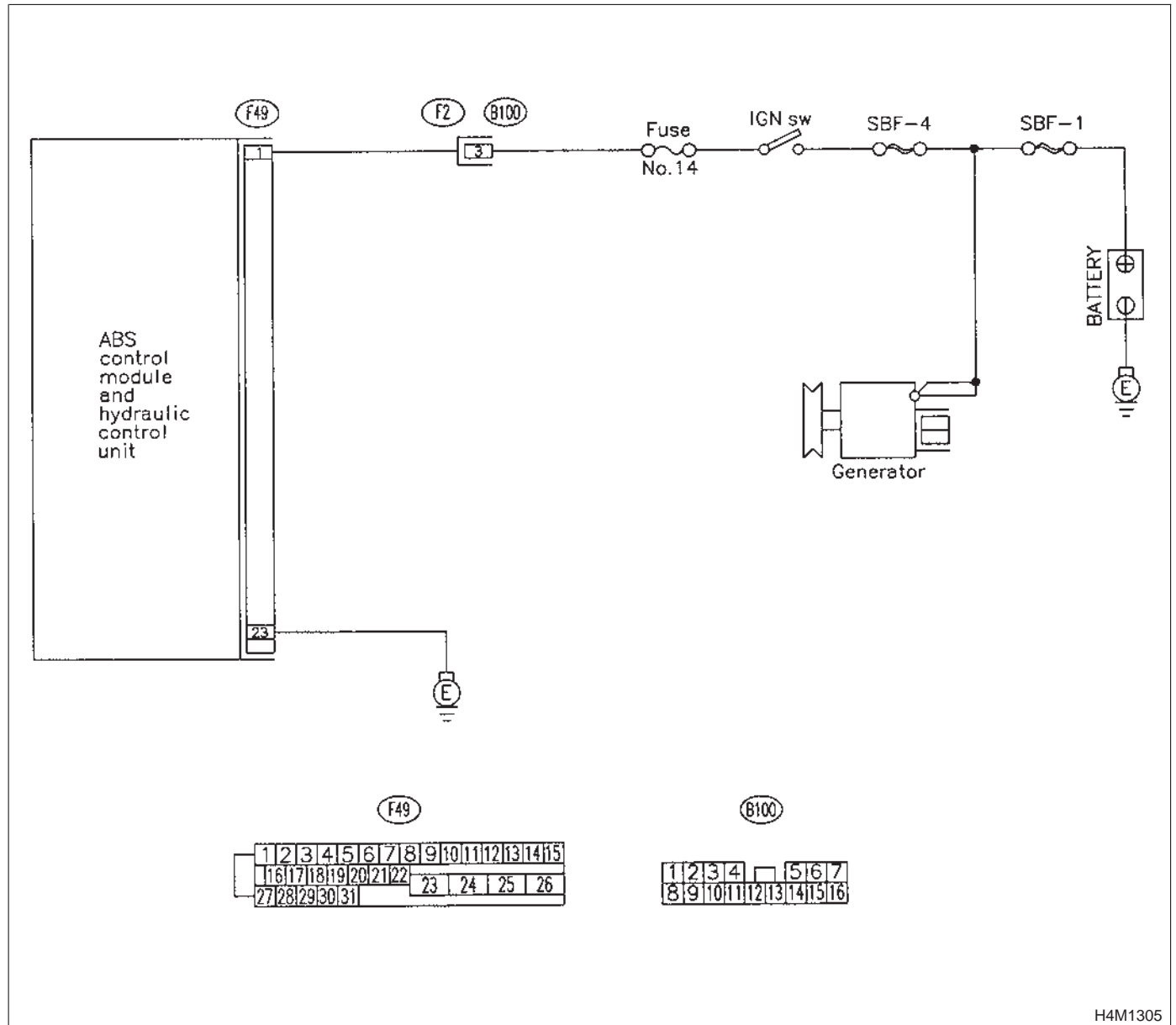
DIAGNOSIS:

- Power source voltage of the ABSCM&H/U is high.

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



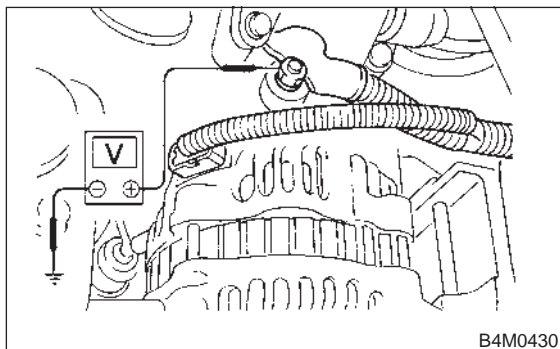
H4M1305

10X1 : CHECK GENERATOR.

- 1) Start engine.
- 2) Idling after warm-up.
- 3) Measure voltage between generator B terminal and chassis ground.

Terminal

Generator B terminal — Chassis ground:



- CHECK** : Is the voltage between 10 V and 17 V?
- YES** : Go to step 10X2.
- NO** : Repair generator.

10X2 : CHECK BATTERY TERMINAL.

Turn ignition switch to OFF.

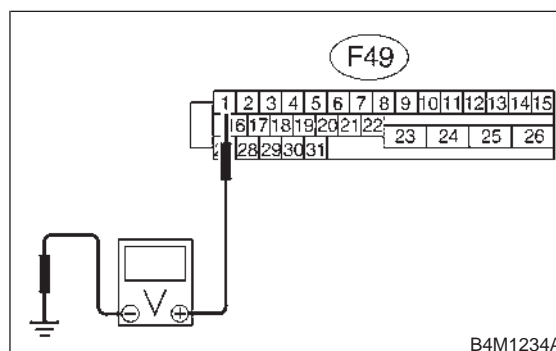
- CHECK** : Are the positive and negative battery terminals tightly clamped?
- YES** : Go to step 10X3.
- NO** : Tighten the clamp of terminal.

10X3 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Disconnect connector from ABSCM&H/U.
- 2) Run the engine at idle.
- 3) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):



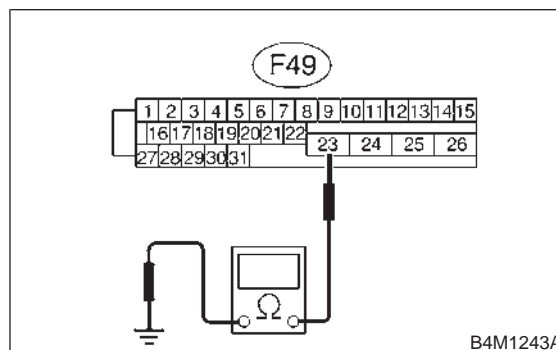
- CHECK** : Is the voltage between 10 V and 17 V?
- YES** : Go to step 10X4.
- NO** : Repair harness connector between battery, ignition switch and ABSCM&H/U.

10X4 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



- CHECK** : Is the resistance less than 0.5 Ω?
- YES** : Go to step 10X5.
- NO** : Repair ABSCM&H/U ground harness.

10X5 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

NO : Go to step **10X6**.

10X6 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step **10X7**.

10X7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

MEMO:

Y: TROUBLE CODE 44 ABS-AT CONTROL (NON CONTROLLED) **— ABS-AT CONTROL (NON CONTROLLED) —**

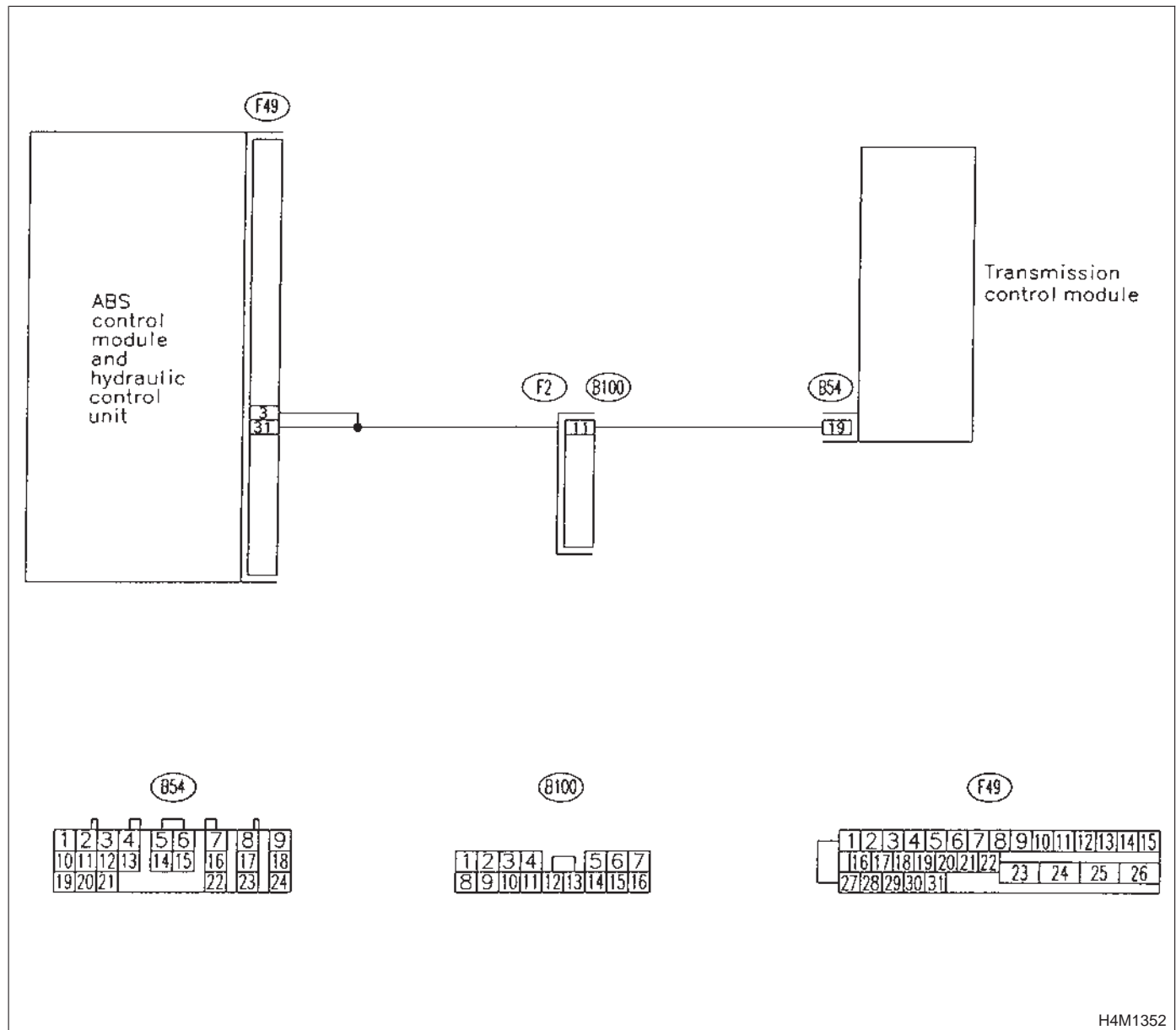
DIAGNOSIS:

- Combination of AT control faults

TROUBLE SYMPTOM:

- ABS does not operate.

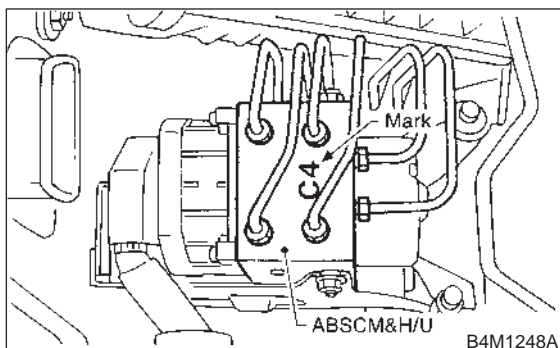
WIRING DIAGRAM:



H4M1352

10Y1 : CHECK SPECIFICATIONS OF THE ABSCM&H/U.

Check specifications of the mark to the ABSCM&H/U.



Mark	Model
C5	AWD AT
C6	AWD MT

CHECK : Is an ABSCM&H/U for AT model installed on a MT model?

YES : Replace ABSCM&H/U.

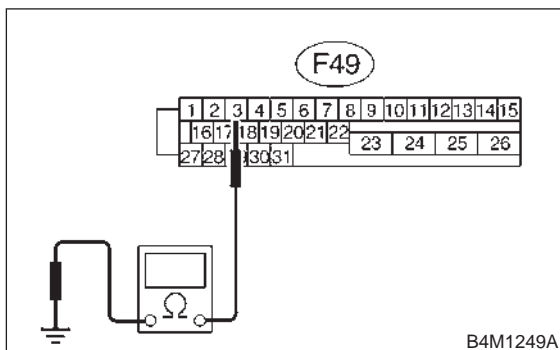
NO : Go to step 10Y2.

10Y2 : CHECK GROUND SHORT OF HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect two connectors from TCM.
- 3) Disconnect connector from ABSCM&H/U.
- 4) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 — Chassis ground:



CHECK : Is the resistance more than 1 MΩ?

YES : Go to step 10Y3.

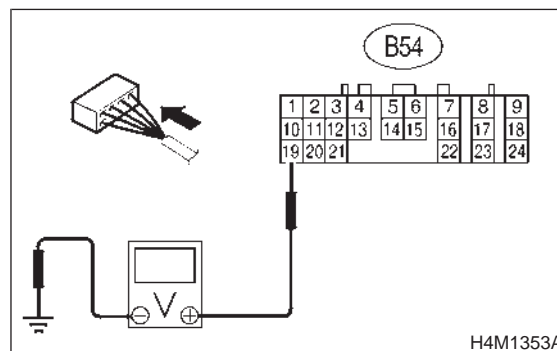
NO : Repair harness between TCM and ABSCM&H/U.

10Y3 : CHECK TCM.

- 1) Connect all connectors to TCM.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between TCM connector terminal and chassis ground.

Connector & terminal

(B54) No. 19 (+) — Chassis ground (-):



CHECK : Is the voltage between 10 V and 15 V?

YES : Go to step 10Y5.

NO : Go to step 10Y4.

10Y4 : CHECK AT.

CHECK : Is the AT functioning normally?

YES : Replace TCM.

NO : Repair AT.

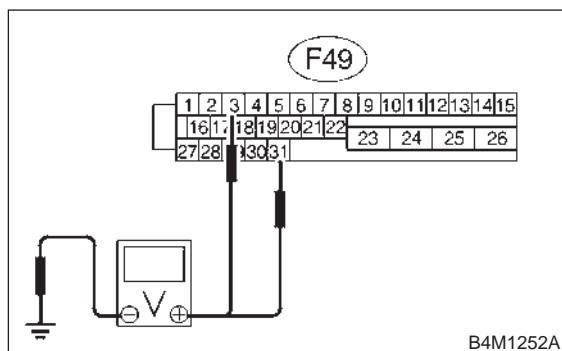
10Y5 : CHECK OPEN CIRCUIT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 (+) — Chassis ground (–):

(F49) No. 31 (+) — Chassis ground (–):



CHECK : *Is the voltage more than 10 V?*

YES : Go to step 10Y6.

NO : Repair harness/connector between AT control module and ABSCM&H/U.

10Y6 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connectors between AT control module and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

NO : Go to step 10Y7.

10Y7 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step 10Y8.

10Y8 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

MEMO:

Z: TROUBLE CODE 44 ABS-AT CONTROL (CONTROLLED) — ABS-AT CONTROL (CONTROLLED) —

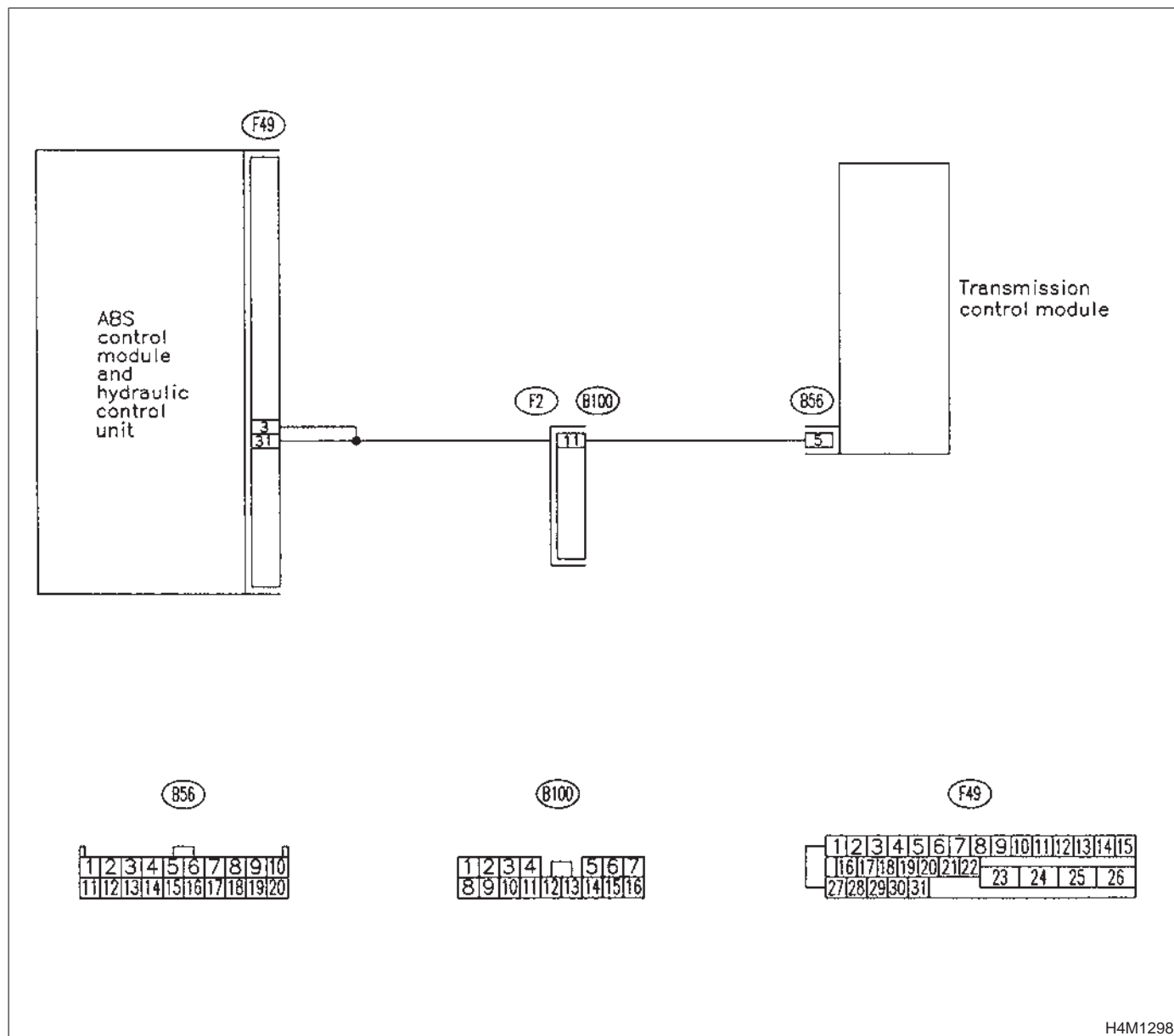
DIAGNOSIS:

- Combination of AT control faults

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



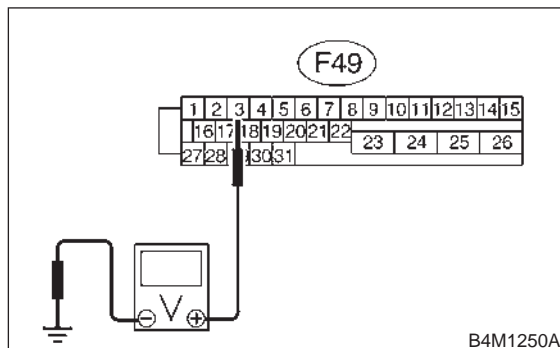
H4M1298

10Z1 : CHECK BATTERY SHORT OF HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect two connectors from AT control module.
- 3) Disconnect connector from ABSCM&H/U.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 (+) — Chassis ground (-):



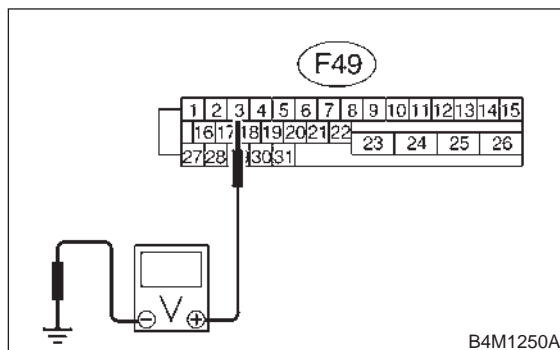
- CHECK** : Is the voltage less than 1 V?
- YES** : Go to step 10Z2.
- NO** : Repair harness between AT control module and ABSCM&H/U.

10Z2 : CHECK BATTERY SHORT OF HARNESS.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 (+) — Chassis ground (-):



- CHECK** : Is the voltage less than 1 V?
- YES** : Go to step 10Z3.
- NO** : Repair harness between AT control module and ABSCM&H/U.

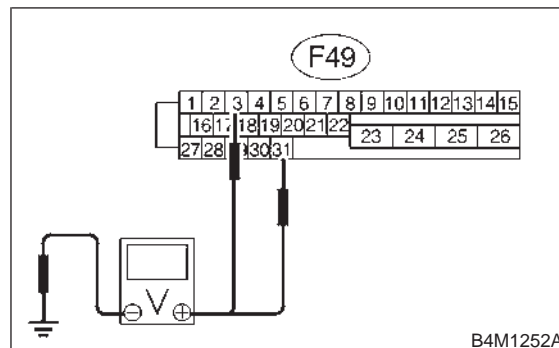
10Z3 : CHECK OPEN CIRCUIT OF HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors to TCM.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 (+) — Chassis ground (-):

(F49) No. 31 (+) — Chassis ground (-):



- CHECK** : Is the voltage between 10 V and 13 V?
- YES** : Go to step 10Z4.
- NO** : Repair harness/connector between TCM and ABSCM&H/U.

10Z4 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

- CHECK** : Is there poor contact in connectors between AT control module and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>

- YES** : Repair connector.
- NO** : Go to step 10Z5.

10Z5 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

- CHECK** : Is the same trouble code as in the current diagnosis still being output?
- YES** : Replace ABSCM&H/U.
- NO** : Go to step 10Z6.

10Z6 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

- CHECK** : *Are other trouble codes being output?*
- YES** : Proceed with the diagnosis corresponding to the trouble code.
- NO** : A temporary poor contact.

MEMO:

AA: TROUBLE CODE 51 VALVE RELAY MALFUNCTION — VALVE RELAY MALFUNCTION —

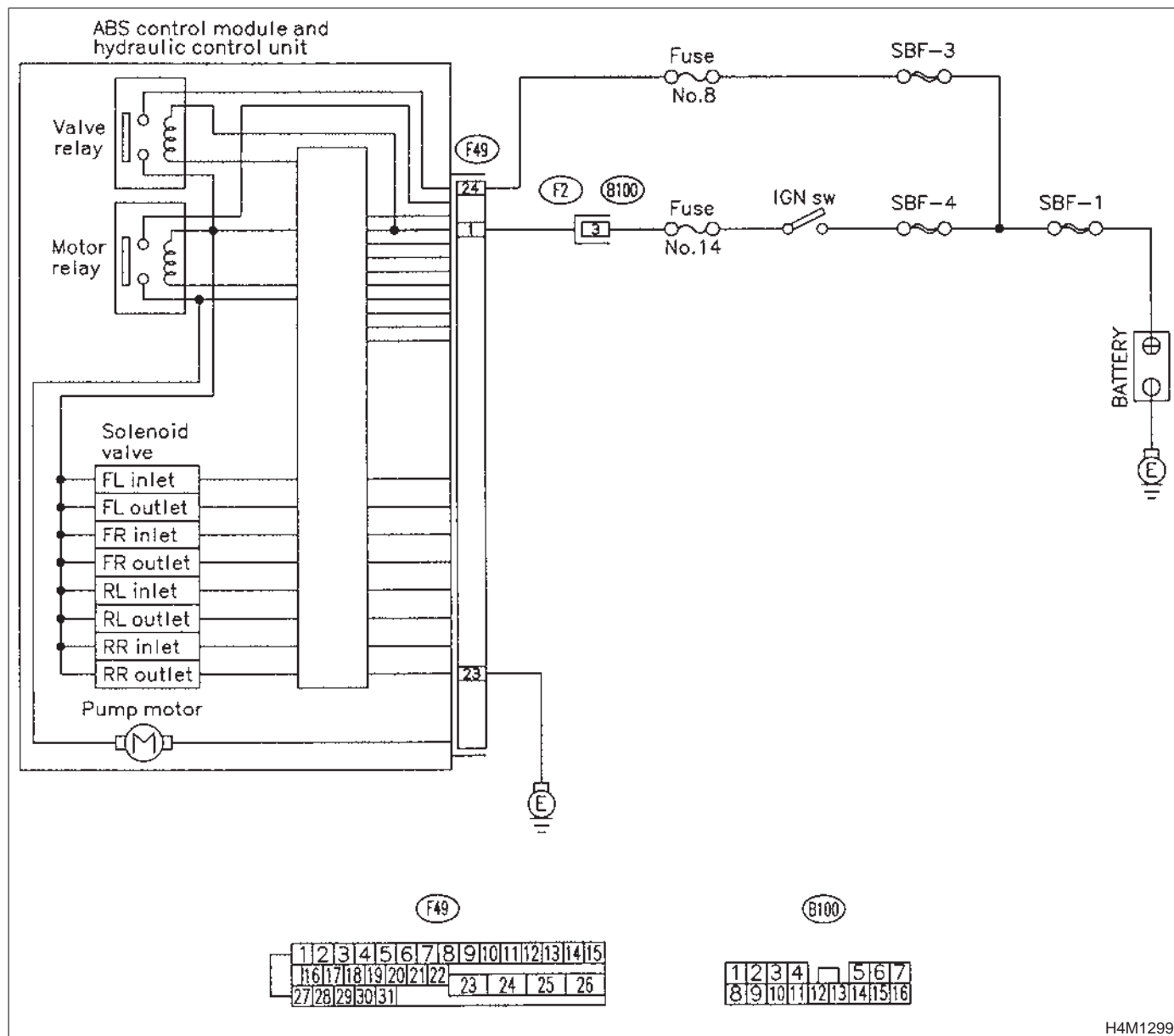
DIAGNOSIS:

- Faulty valve relay

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



H4M1299

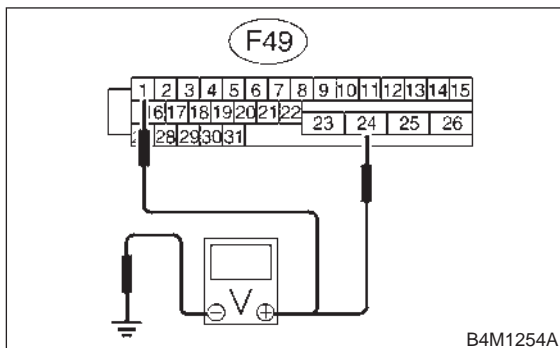
10AA1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Run the engine at idle.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):

(F49) No. 24 (+) — Chassis ground (-):



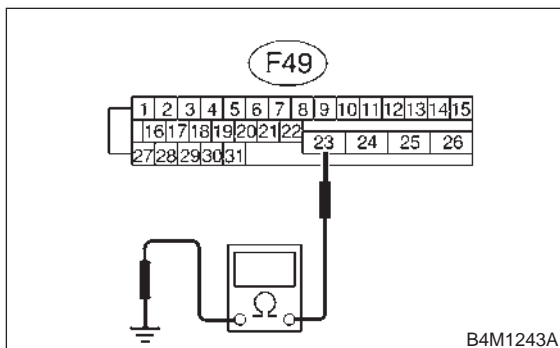
- CHECK** : Is the voltage between 10 V and 15 V?
- YES** : Go to step 10AA2.
- NO** : Repair harness connector between battery and ABSCM&H/U.

10AA2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



- CHECK** : Is the resistance less than 0.5 Ω?
- YES** : Go to step 10AA3.
- NO** : Repair ABSCM&H/U ground harness.

10AA3 : CHECK POOR CONTACT IN CONNECTORS.

- CHECK** : Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>

- YES** : Repair connector.
- NO** : Go to step 10AA4.

10AA4 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

- CHECK** : Is the same trouble code as in the current diagnosis still being output?
- YES** : Replace ABSCM&H/U.
- NO** : Go to step 10AA5.

10AA5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

- CHECK** : Are other trouble codes being output?
- YES** : Proceed with the diagnosis corresponding to the trouble code.
- NO** : A temporary poor contact.

AB: TROUBLE CODE 51 VALVE RELAY ON FAILURE — VALVE RELAY ON FAILURE —

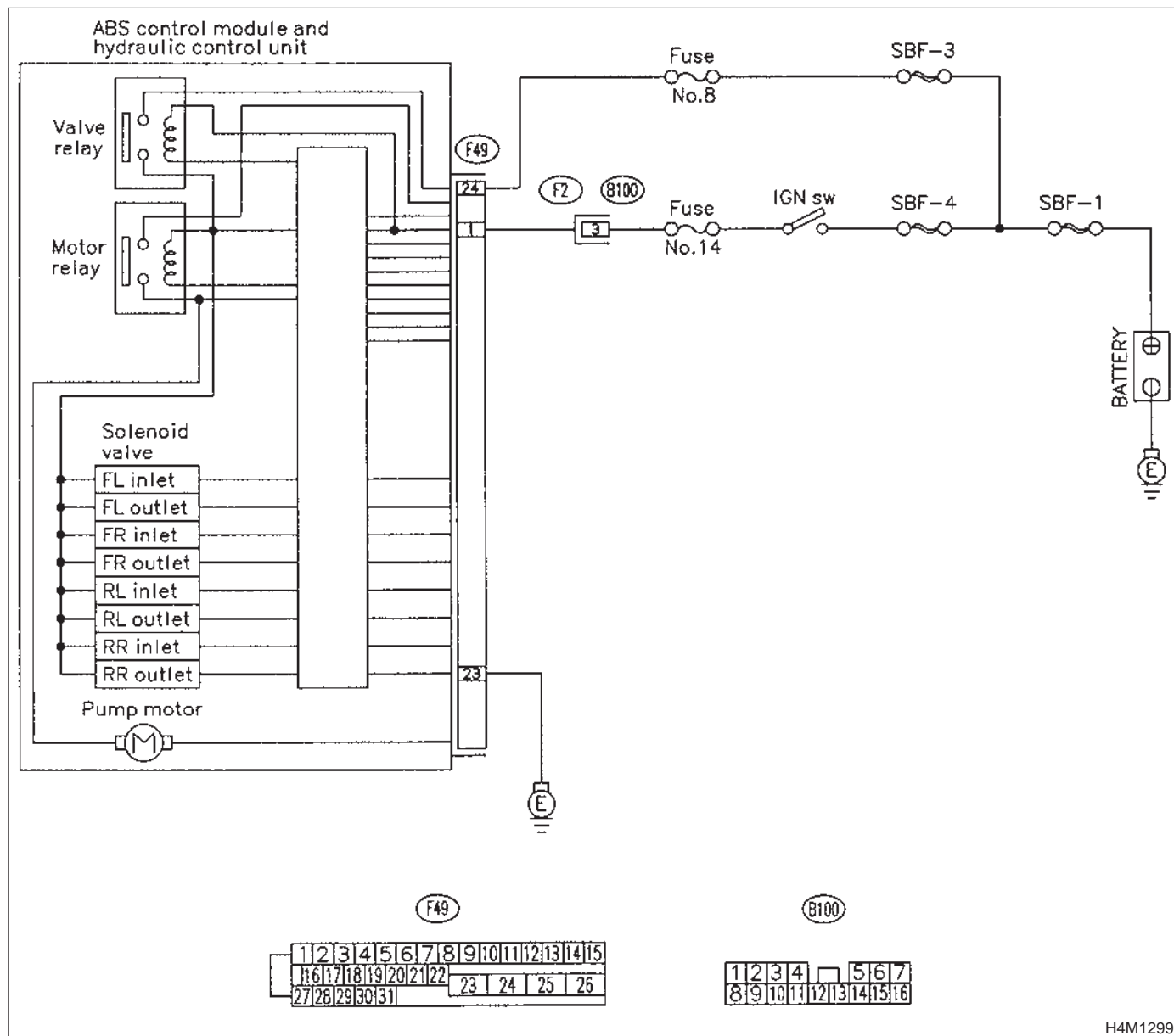
DIAGNOSIS:

- Faulty valve relay

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



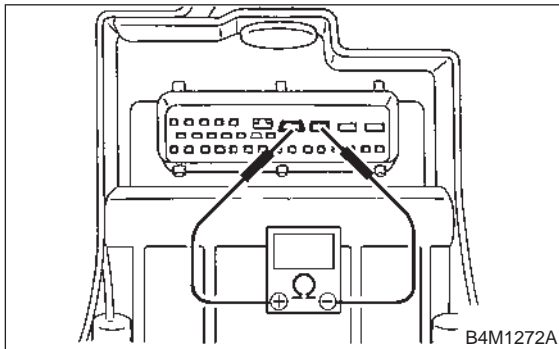
H4M1299

10AB1 : CHECK VALVE RELAY IN ABSCM&H/U.

Measure resistance between ABSCM&H/U terminals.

Terminals

No. 23 (+) — No. 24 (-):



- CHECK** : *Is the resistance more than 1 MΩ?*
YES : Go to step **10AB2**.
NO : Replace ABSCM&H/U.

10AB2 : CHECK POOR CONTACT IN CONNECTORS.

- CHECK** : *Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>*
YES : Repair connector.
NO : Go to step **10AB3**.

10AB3 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

- CHECK** : *Is the same trouble code as in the current diagnosis still being output?*
YES : Replace ABSCM&H/U.
NO : Go to step **10AB4**.

10AB4 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

- CHECK** : *Are other trouble codes being output?*
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

AC: TROUBLE CODE 52 OPEN CIRCUIT IN MOTOR RELAY CIRCUIT — OPEN CIRCUIT IN MOTOR RELAY CIRCUIT —

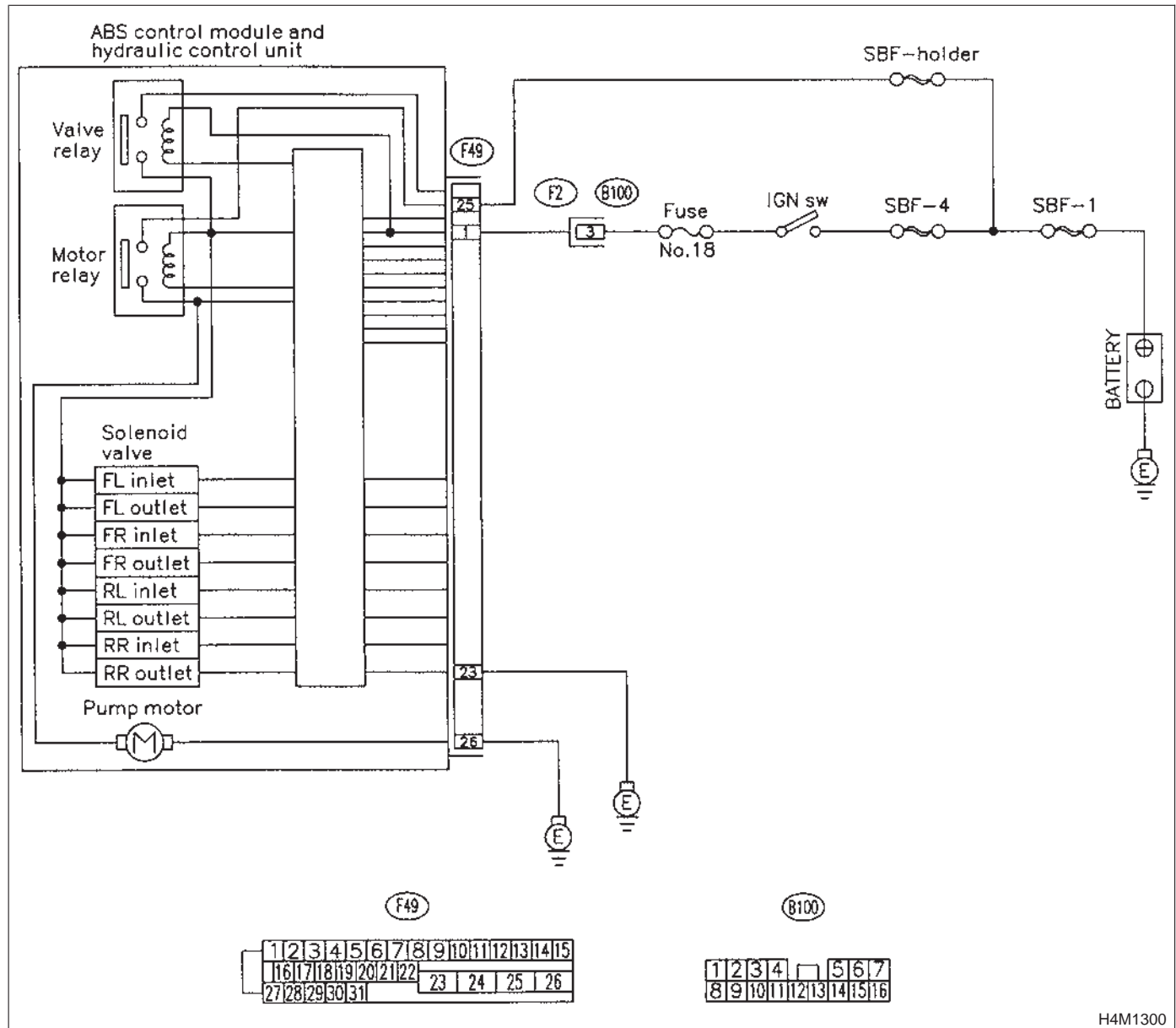
DIAGNOSIS:

- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



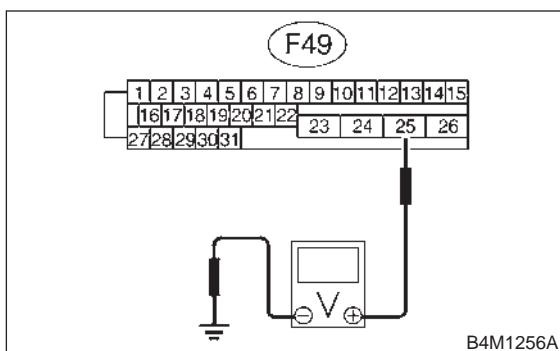
H4M1300

10AC1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 25 (+) — Chassis ground (-):



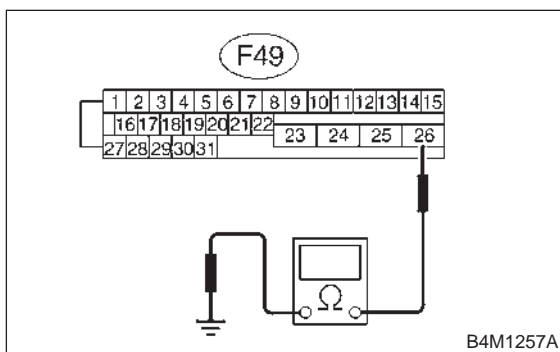
- CHECK** : *Is the voltage between 10 V and 13 V?*
- YES** : Go to step **10AC2**.
- NO** : Repair harness/connector between battery and ABSCM&H/U and check fuse SBF-holder.

10AC2 : CHECK GROUND CIRCUIT OF MOTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 26 — Chassis ground:



- CHECK** : *Is the resistance less than 0.5 Ω?*
- YES** : Go to step **10AC3**.
- NO** : Repair ABSCM&H/U ground harness.

10AC3 : CHECK MOTOR OPERATION.

Operate the sequence control. <Ref. to 4-4 [W14D0].>

NOTE:

Use the diagnosis connector to operate the sequence control.

- CHECK** : *Can motor revolution noise (buzz) be heard when carrying out the check sequence?*

YES : Go to step **10AC4**.

NO : Replace ABSCM&H/U.

10AC4 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

- CHECK** : *Is there poor contact in connector between hydraulic unit, relay box and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

NO : Go to step **10AC5**.

10AC5 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

- CHECK** : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step **10AC6**.

10AC6 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

- CHECK** : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

AD: TROUBLE CODE 52 MOTOR RELAY ON FAILURE — MOTOR RELAY ON FAILURE —

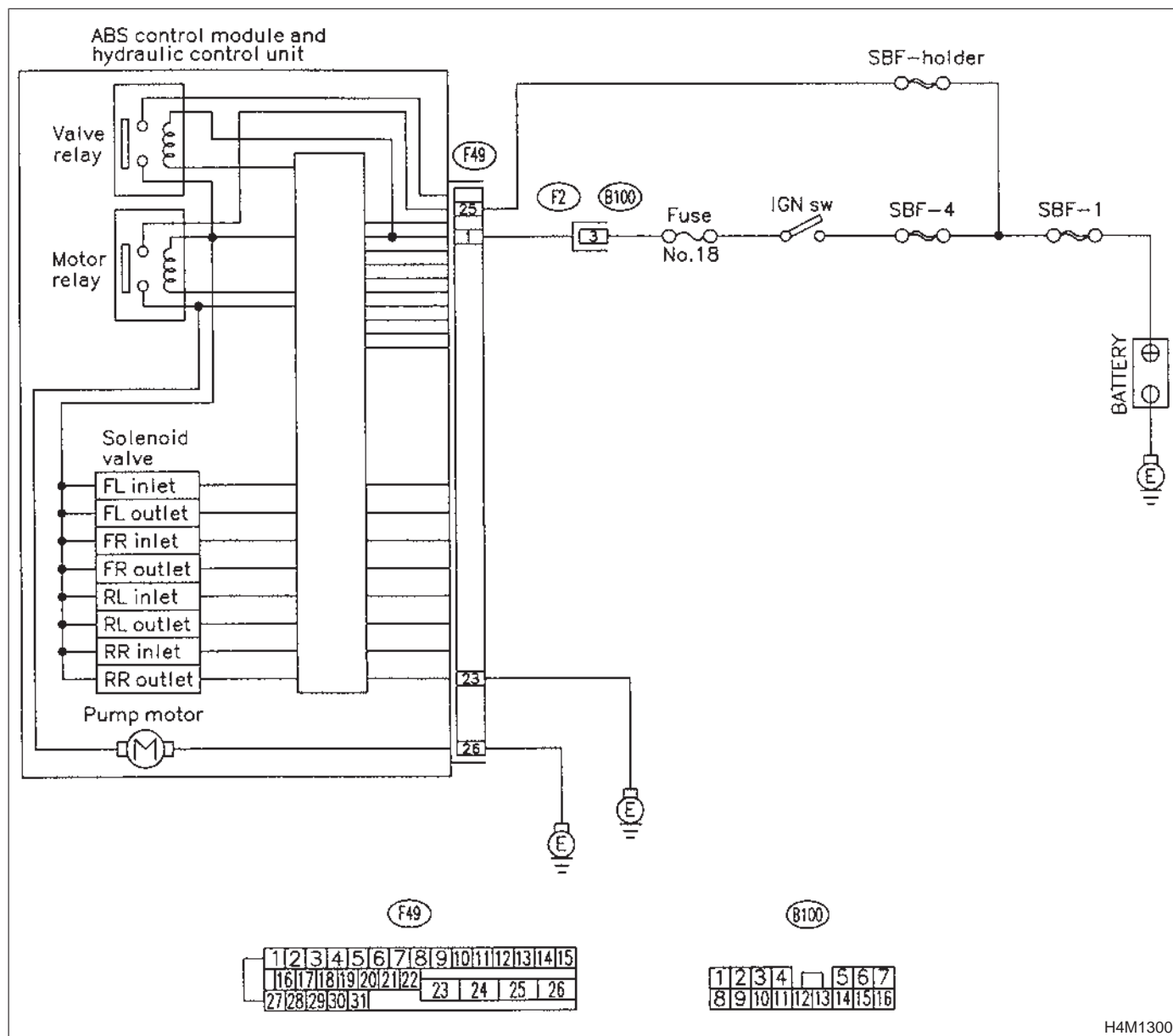
DIAGNOSIS:

- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



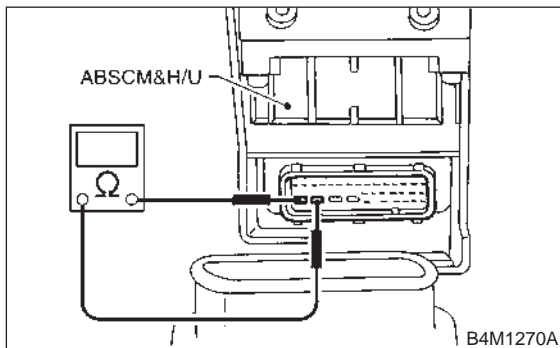
H4M1300

10AD1 : CHECK MOTOR RELAY IN ABSCM&H/U.

Measure resistance between ABSCM&H/U terminals.

Terminals

No. 25 — No. 26:



- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step 10AD2.
- NO** : Replace ABSCM&H/U.

10AD2 : CHECK MOTOR OPERATION.

Operate the sequence control. <Ref. to 4-4 [W14D0].>

NOTE:

Use the diagnosis connector to operate the sequence control.

- CHECK** : *Can motor revolution noise (buzz) be heard when carrying out the sequence control?*
- YES** : Go to step 10AD3.
- NO** : Replace ABSCM&H/U.

10AD3 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

- CHECK** : *Is there poor contact in connector between hydraulic unit, relay box and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>*
- YES** : Repair connector.
- NO** : Go to step 10AD4.

10AD4 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

- CHECK** : *Is the same trouble code as in the current diagnosis still being output?*
- YES** : Replace ABSCM&H/U.
- NO** : Go to step 10AD5.

10AD5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

- CHECK** : *Are other trouble codes being output?*
- YES** : Proceed with the diagnosis corresponding to the trouble code.
- NO** : A temporary poor contact.

AE: TROUBLE CODE 52 MOTOR MALFUNCTION — MOTOR MALFUNCTION —

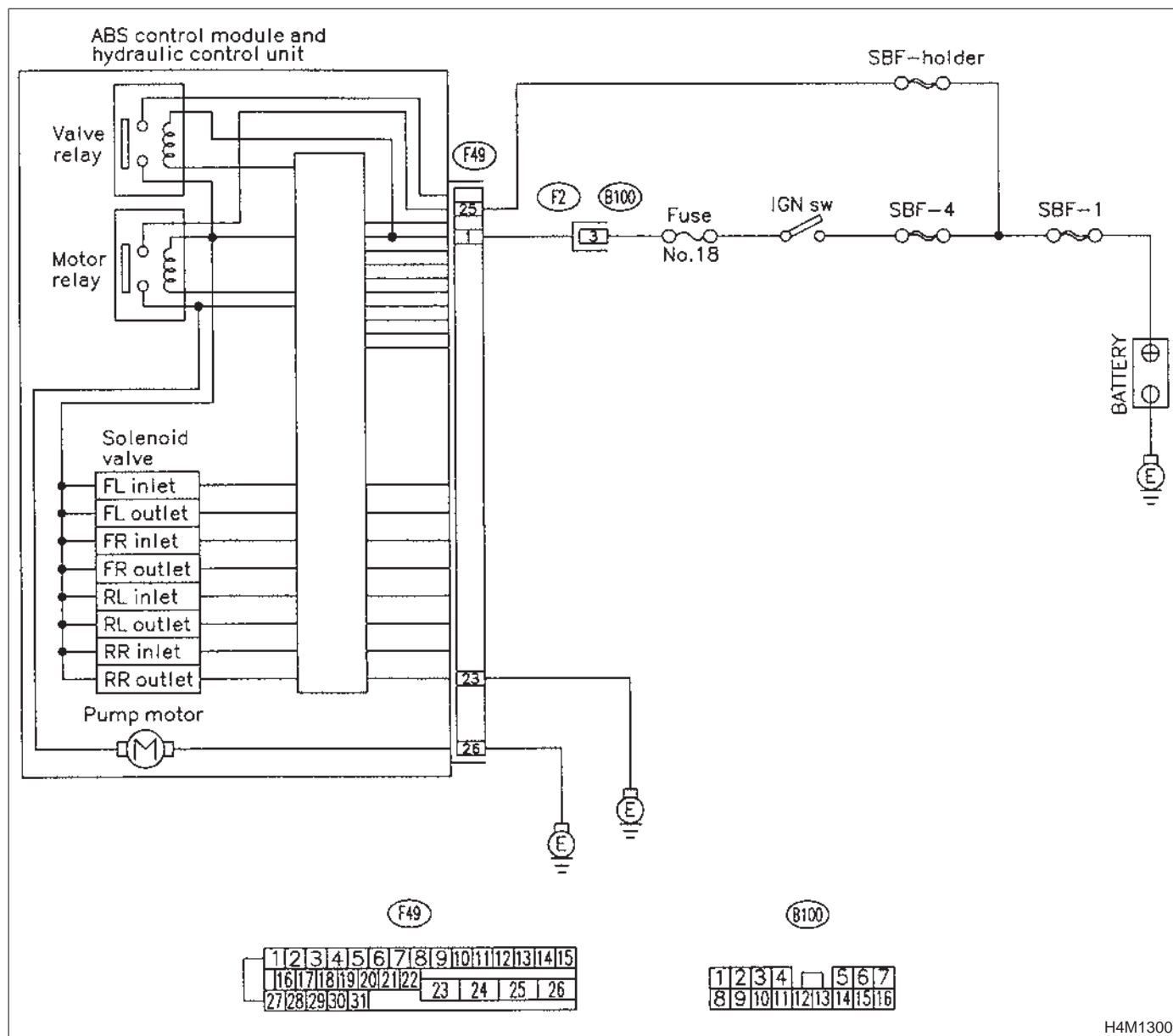
DIAGNOSIS:

- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



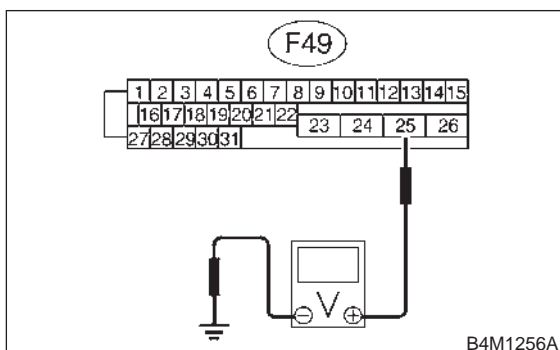
H4M1300

10AE1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 25 (+) — Chassis ground (-):



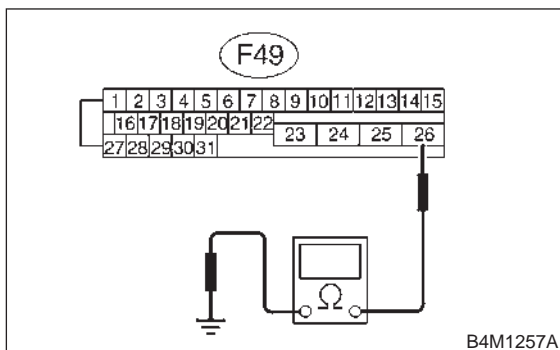
- CHECK** : Is the voltage between 10 V and 13 V?
- YES** : Go to step 10AE2.
- NO** : Repair harness/connector between battery and ABSCM&H/U and check fuse SBF-holder.

10AE2 : CHECK GROUND CIRCUIT OF MOTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 26 — Chassis ground:



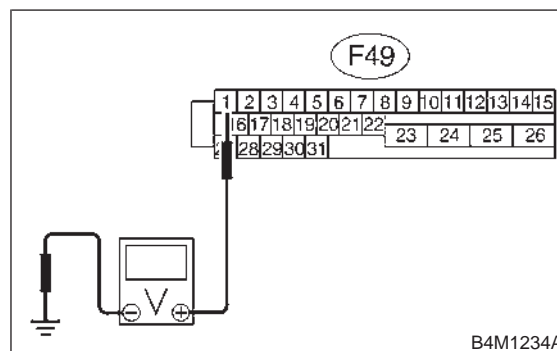
- CHECK** : Is the resistance less than 0.5 Ω?
- YES** : Go to step 10AE3.
- NO** : Repair ABSCM&H/U ground harness.

10AE3 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Run the engine at idle.
- 2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):



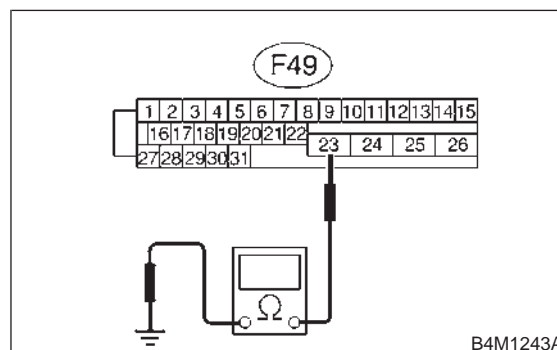
- CHECK** : Is the voltage between 10 V and 15 V?
- YES** : Go to step 10AE4.
- NO** : Repair harness connector between battery, ignition switch and ABSCM&H/U.

10AE4 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



- CHECK** : Is the resistance less than 0.5 Ω?
- YES** : Go to step 10AE5.
- NO** : Repair ABSCM&H/U ground harness.

10AE5 : CHECK MOTOR OPERATION.

Operate the sequence control. <Ref. to 4-4 [W14D0].>

NOTE:

Use the diagnosis connector to operate the sequence control.

CHECK : ***Can motor revolution noise (buzz) be heard when carrying out the sequence control?***

YES : Go to step **10AE6**.

NO : Replace hydraulic unit.

10AE6 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : ***Is there poor contact in connector between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***

YES : Repair connector.

NO : Go to step **10AE7**.

10AE7 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***

YES : Replace ABSCM&H/U.

NO : Go to step **10AE8**.

10AE8 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

MEMO:

AF: TROUBLE CODE 54 STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION

— STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION —

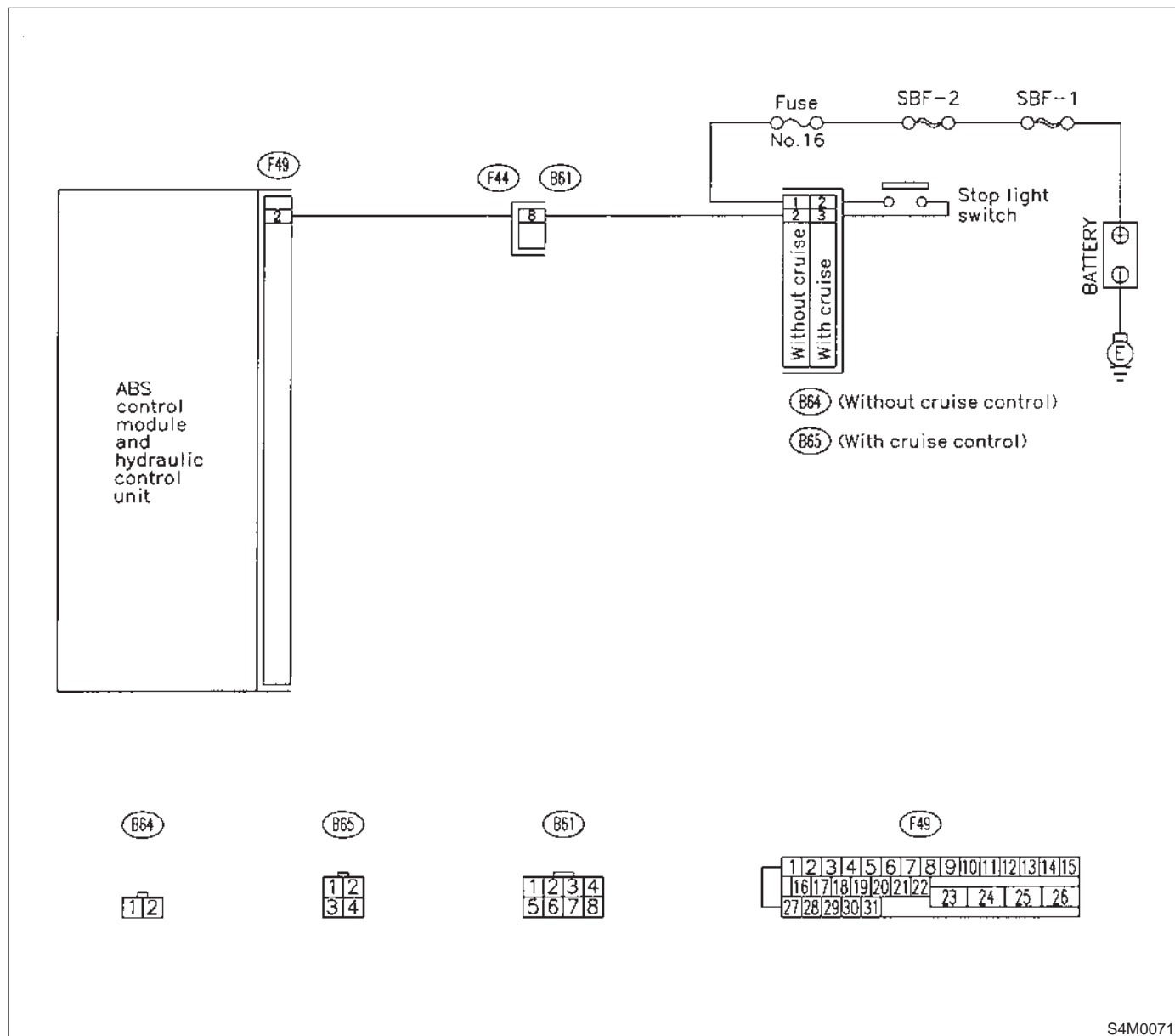
DIAGNOSIS:

- Faulty stop light switch

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



S4M0071

10AF1 : CHECK OUTPUT OF STOP LIGHT SWITCH USING SELECT MONITOR.

- 1) Select "Current data display & Save" on the select monitor.
- 2) Release the brake pedal.
- 3) Read the stop light switch output in the select monitor data display.

CHECK : *Is the reading indicated on monitor display less than 1.5 V?*

YES : Go to step 10AF2.

NO : Go to step 10AF3.

10AF2 : CHECK OUTPUT OF STOP LIGHT SWITCH USING SELECT MONITOR.

- 1) Depress the brake pedal.
- 2) Read the stop light switch output in the select monitor data display.

CHECK : *Is the reading indicated on monitor display between 10 V and 15 V?*

YES : Go to step 10AF5.

NO : Go to step 10AF3.

10AF3 : CHECK IF STOP LIGHTS COME ON.

Depress the brake pedal.

CHECK : *Do stop lights turn on?*

YES : Go to step 10AF4.

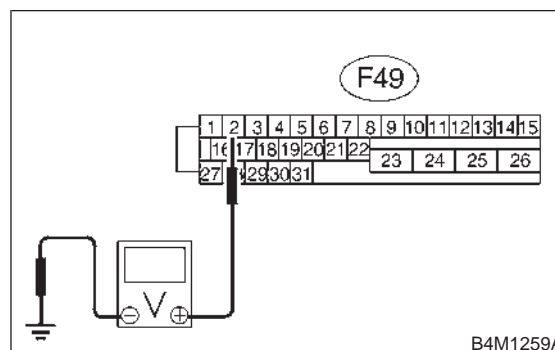
NO : Repair stop lights circuit.

10AF4 : CHECK OPEN CIRCUIT IN HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Depress brake pedal.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 2 — Chassis ground:



CHECK : *Is the voltage between 10 V and 15 V?*

YES : Go to step 10AF5.

NO : Repair harness between stop light switch and ABSCM&H/U connector.

10AF5 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connector between stop light switch and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

NO : Go to step 10AF6.

10AF6 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step 10AF7.

10AF7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.
--

- CHECK** : *Are other trouble codes being output?*
- YES** : Proceed with the diagnosis corresponding to the trouble code.
- NO** : A temporary poor contact.

MEMO:

AG: TROUBLE CODE 56 OPEN OR SHORT CIRCUIT IN G SENSOR CIRCUIT — OPEN OR SHORT CIRCUIT IN G SENSOR CIRCUIT —

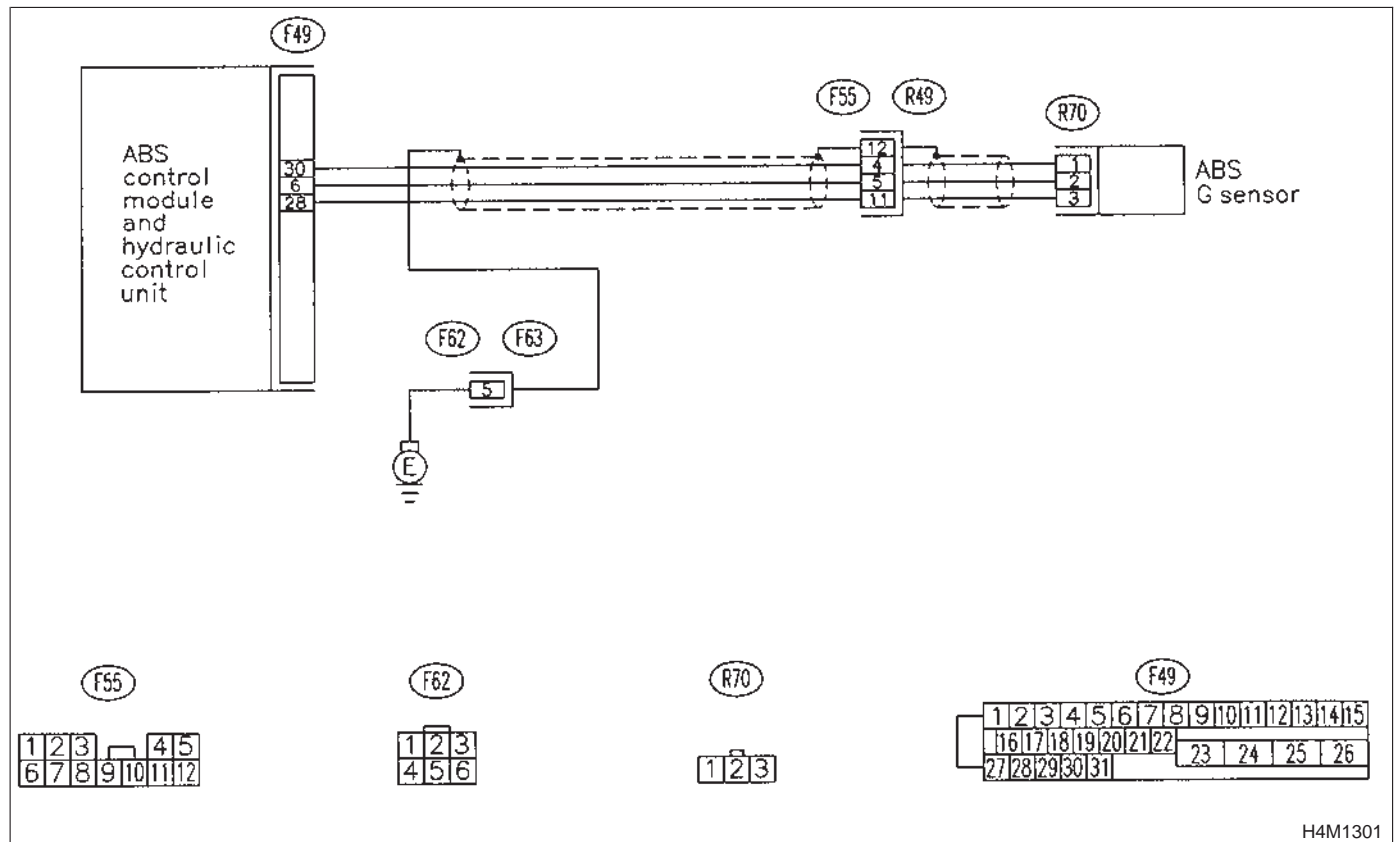
DIAGNOSIS:

- Faulty G sensor output voltage

TROUBLE SYMPTOM:

- ABS does not operate.

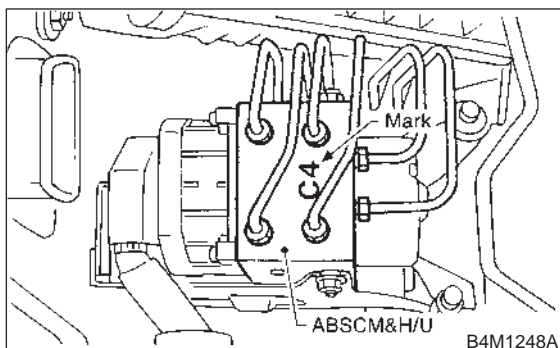
WIRING DIAGRAM:



H4M1301

10AG1 : CHECK SPECIFICATIONS OF ABSCM&H/U.

Check specifications of the mark to the ABSCM&H/U.



Mark	Model
C5	AWD AT
C6	AWD MT

CHECK : *Is an ABSCM for AWD model installed on a FWD model?*

YES : Replace ABSCM&H/U.

CAUTION:

Be sure to turn ignition switch to OFF when removing ABSCM&H/U.

NO : Go to step 10AG2.

10AG2 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

- 1) Select "Current data display & Save" on the select monitor.
- 2) Read the G sensor output in select monitor data display.

CHECK : *Is the G sensor output on the monitor display between 2.1 and 2.5 V when the G sensor is in horizontal position?*

YES : Go to step 10AG3.

NO : Go to step 10AG6.

10AG3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

NO : Go to step 10AG4.

10AG4 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step 10AG5.

10AG5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

10AG6 : CHECK FREEZE FRAME DATA.

- 1) Select "Freeze frame data" on the select monitor.
- 2) Read front right wheel speed on the select monitor display.

CHECK : *Is the front right wheel speed on monitor display 0 km?*

YES : Go to step 10AG7.

NO : Go to step 10AG15.

10AG7 : CHECK FREEZE FRAME DATA.

Read front left wheel speed on the select monitor display.

CHECK : *Is the front left wheel speed on monitor display 0 km?*

YES : Go to step 10AG8.

NO : Go to step 10AG15.

10AG8 : CHECK FREEZE FRAME DATA.

Read rear right wheel speed on the select monitor display.

CHECK : *Is the rear right wheel speed on monitor display 0 km?*

YES : Go to step 10AG9.

NO : Go to step 10AG15.

10AG9 : CHECK FREEZE FRAME DATA.

Read rear left wheel speed on the select monitor display.

CHECK : *Is the rear left wheel speed on monitor display 0 km?*

YES : Go to step **10AG10**.

NO : Go to step **10AG15**.

10AG10 : CHECK FREEZE FRAME DATA.

Read G sensor output on the select monitor display.

CHECK : *Is the G sensor output on monitor display more than 3.65 V?*

YES : Go to step **10AG11**.

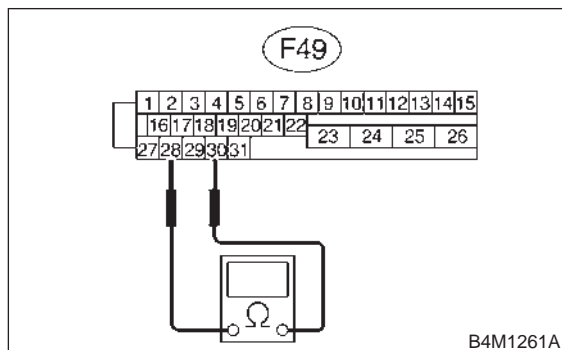
NO : Go to step **10AG15**.

10AG11 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal

(F49) No. 30 — No. 28:



CHECK : *Is the resistance between 4.3 and 4.9 kΩ?*

YES : Go to step **10AG12**.

NO : Repair harness/connector between G sensor and ABSCM&H/U.

10AG12 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

NO : Go to step **10AG13**.

10AG13 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step **10AG14**.

10AG14 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

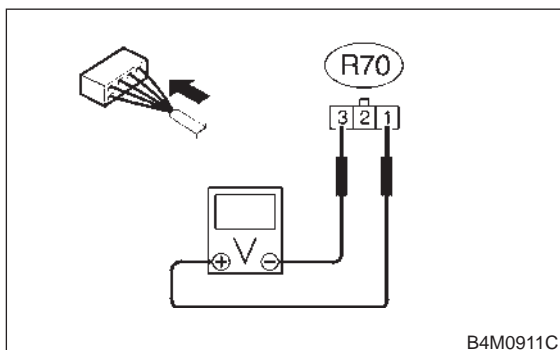
NO : A temporary poor contact.

10AG15 : CHECK INPUT VOLTAGE OF G SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Remove console box.
- 3) Disconnect G sensor from body. (Do not disconnect connector.)
- 4) Turn ignition switch to ON.
- 5) Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 1 (+) — No. 3 (-):



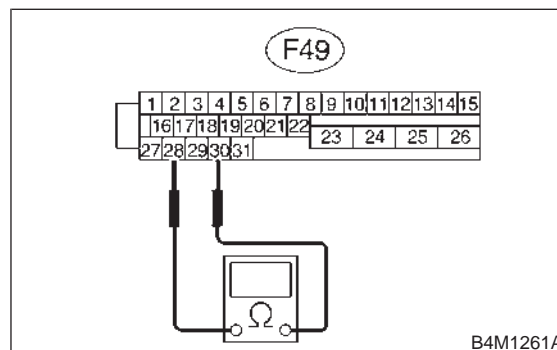
- CHECK** : Is the voltage between 4.75 and 5.25 V?
- YES** : Go to step **10AG16**.
- NO** : Repair harness/connector between G sensor and ABSCM&H/U.

10AG16 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal

(F49) No. 30 — No. 28:



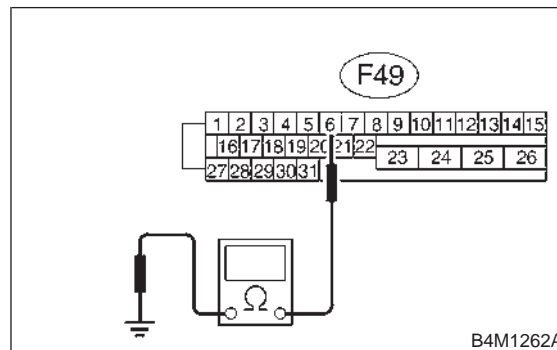
- CHECK** : Is the resistance between 4.3 and 4.9 kΩ?
- YES** : Go to step **10AG17**.
- NO** : Repair harness/connector between G sensor and ABSCM&H/U.

10AG17 : CHECK GROUND SHORT IN G SENSOR OUTPUT HARNESS.

- 1) Disconnect connector from G sensor.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

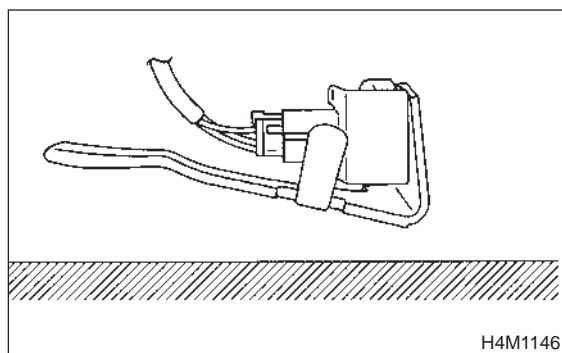
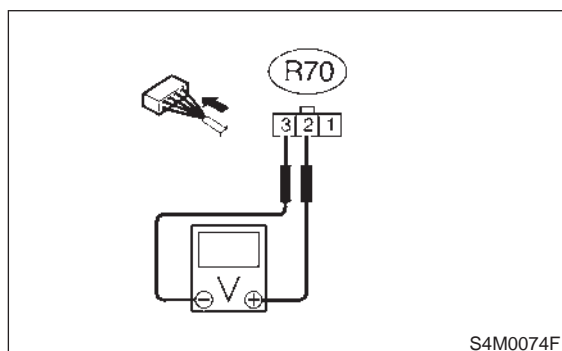
(F49) No. 6 — Chassis ground:



- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step **10AG18**.
- NO** : Repair harness between G sensor and ABSCM&H/U.

10AG18 : CHECK G SENSOR.

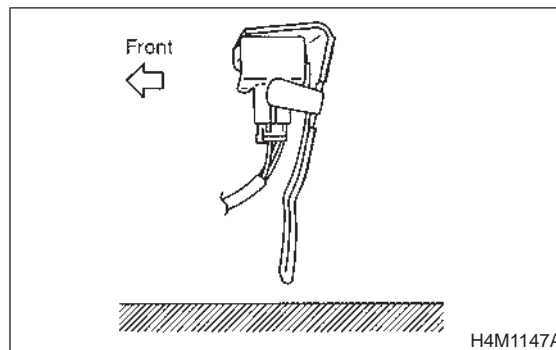
- 1) Connect connector to G sensor.
- 2) Connect connector to ABSCM&H/U.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between G sensor connector terminals.

Connector & terminal**(R70) No. 2 (+) — No. 3 (-):**

- CHECK** : Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?
- YES** : Go to step 10AG19.
- NO** : Replace G sensor.

10AG19 : CHECK G SENSOR.

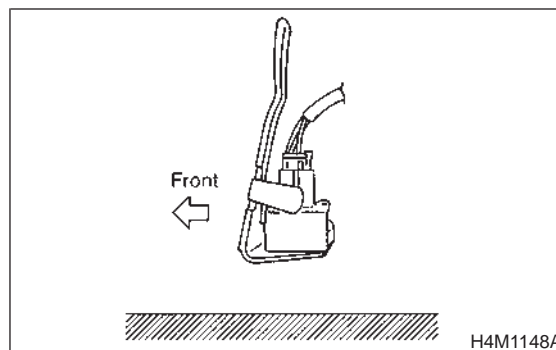
Measure voltage between G sensor connector terminals.

Connector & terminal**(R70) No. 2 (+) — No. 3 (-):**

- CHECK** : Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?
- YES** : Go to step 10AG20.
- NO** : Replace G sensor.

10AG20 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal**(R70) No. 2 (+) — No. 3 (-):**

- CHECK** : Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?
- YES** : Go to step 10AG21.
- NO** : Replace G sensor.

10AG21 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : *Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

NO : Go to step **10AG22**.

10AG22 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step **10AG23**.

10AG23 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

AH: TROUBLE CODE 56 BATTERY SHORT IN G SENSOR CIRCUIT — BATTERY SHORT IN G SENSOR CIRCUIT —

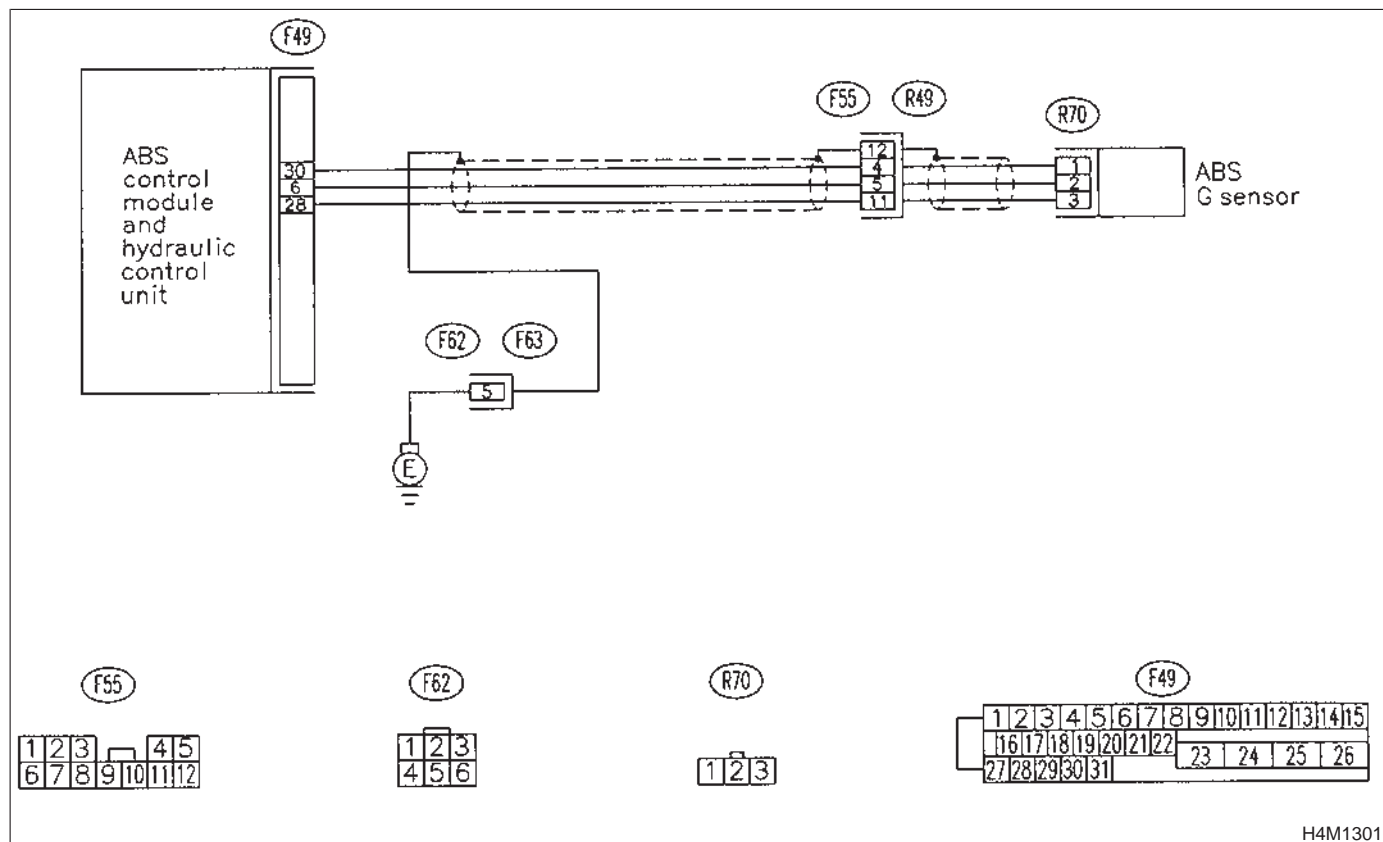
DIAGNOSIS:

- Faulty G sensor output voltage

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



H4M1301

10AH1 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

- 1) Select "Current data display & Save" on the select monitor.
- 2) Read G sensor output on the select monitor display.

CHECK : *Is the G sensor output on monitor display between 2.1 and 2.5 V when the G sensor is in horizontal position?*

YES : Replace ABSCM&H/U.

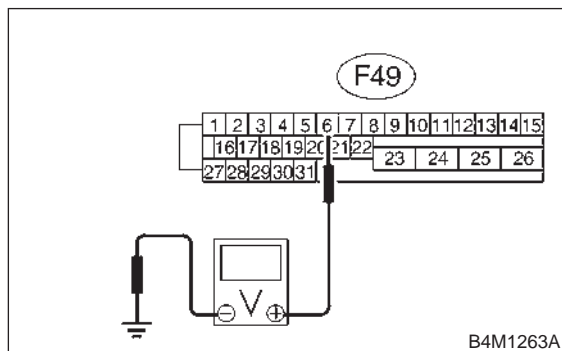
NO : Go to step 10AH2.

10AH2 : CHECK BATTERY SHORT OF HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Remove console box.
- 3) Disconnect connector from G sensor.
- 4) Disconnect connector from ABSCM&H/U.
- 5) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 6 (+) — Chassis ground (-):



CHECK : *Is the voltage less than 1 V?*

YES : Go to step 10AH3.

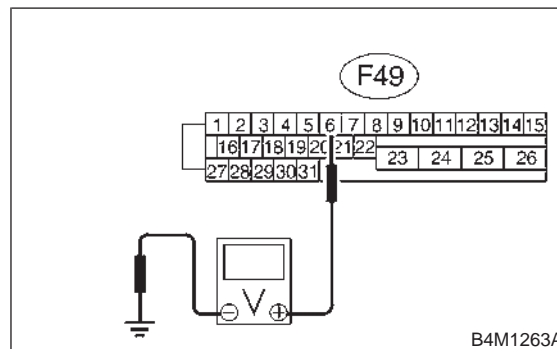
NO : Repair harness between G sensor and ABSCM&H/U.

10AH3 : CHECK BATTERY SHORT OF HARNESS.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 6 (+) — Chassis ground (-):



CHECK : *Is the voltage less than 1 V?*

YES : Go to step 10AH4.

NO : Repair harness between G sensor and ABSCM&H/U.

10AH4 : CHECK ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors.
- 3) Erase the memory.
- 4) Perform inspection mode.
- 5) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step 10AH5.

10AH5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

AI: TROUBLE CODE 56 ABNORMAL G SENSOR HIGH μ OUTPUT — ABNORMAL G SENSOR HIGH μ OUTPUT —

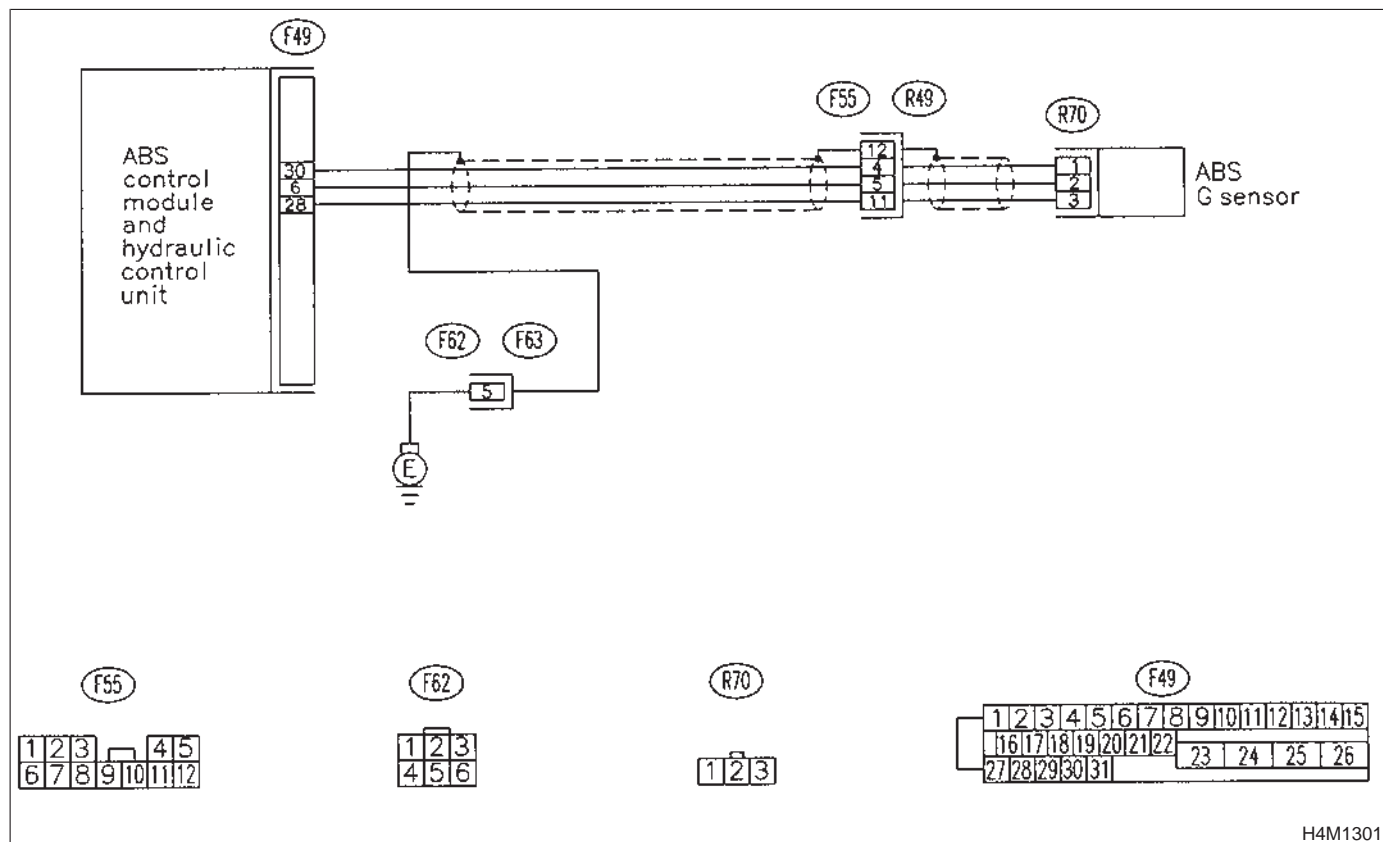
DIAGNOSIS:

- Faulty G sensor output voltage

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



H4M1301

10AI1 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

- 1) Select "Current data display & Save" on the select monitor.
- 2) Read G sensor output on the select monitor display.

CHECK : *Is the G sensor output on monitor display 2.3 ± 0.2 V when the G sensor is in horizontal position?*

YES : Go to step 10AI2.

NO : Go to step 10AI6.

10AI2 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : *Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [T3C1].>*

YES : Repair connector.

NO : Go to step 10AI3.

10AI3 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step 10AI4.

10AI4 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

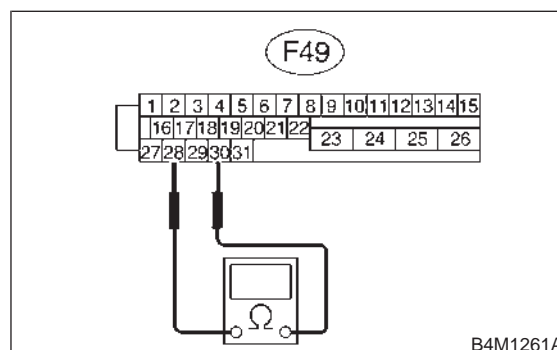
YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

10AI5 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal
(F49) No. 30 — No. 28:



CHECK : *Is the resistance between 4.3 and 4.9 kΩ?*

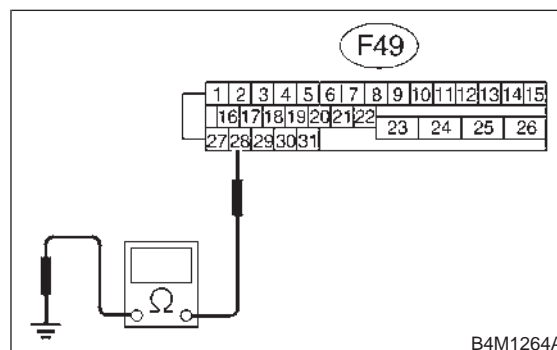
YES : Go to step 10AI6.

NO : Repair harness/connector between G sensor and ABSCM&H/U.

10AI6 : CHECK GROUND SHORT OF HARNESS.

Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 28 — Chassis ground:



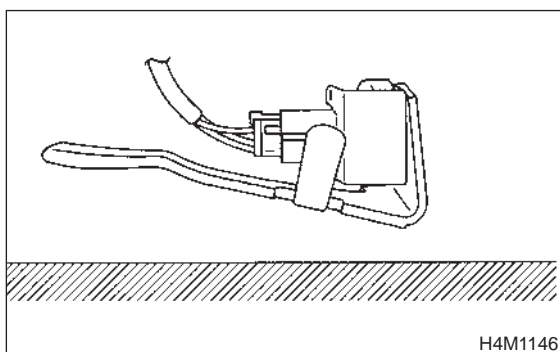
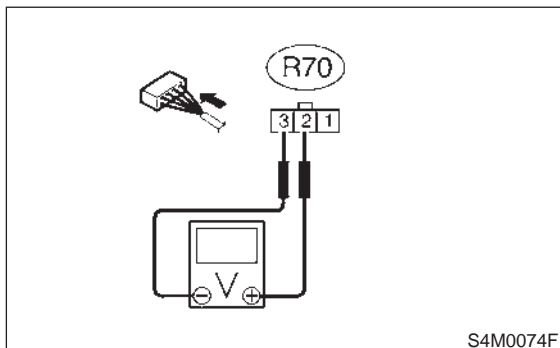
CHECK : *Is the resistance more than 1 MΩ?*

YES : Go to step 10AI7.

NO : Repair harness between G sensor and ABSCM&H/U.
Replace ABSCM&H/U.

10AI7 : CHECK G SENSOR.

- 1) Remove console box.
- 2) Remove G sensor from vehicle.
- 3) Connect connector to G sensor.
- 4) Connect connector to ABSCM&H/U.
- 5) Turn ignition switch to ON.
- 6) Measure voltage between G sensor connector terminals.

Connector & terminal**(R70) No. 2 (+) — No. 3 (-):**

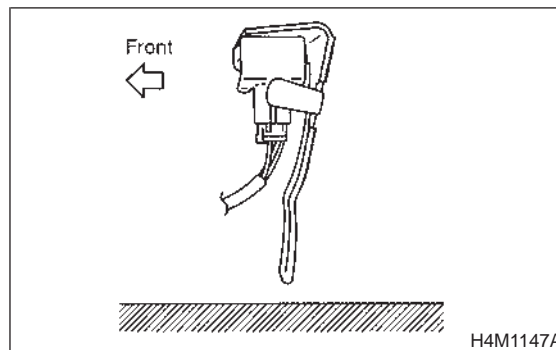
CHECK : *Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?*

YES : Go to step **10AI8**.

NO : Replace G sensor.

10AI8 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal**(R70) No. 2 (+) — No. 3 (-):**

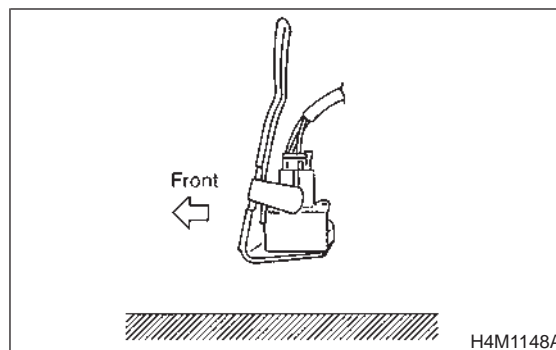
CHECK : *Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?*

YES : Go to step **10AI9**.

NO : Replace G sensor.

10AI9 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal**(R70) No. 2 (+) — No. 3 (-):**

CHECK : *Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?*

YES : Go to step **10AI10**.

NO : Replace G sensor.

10AI10 : CHECK ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors.
- 3) Erase the memory.
- 4) Perform inspection mode.
- 5) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step **10AI11**.

10AI11 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

AJ: TROUBLE CODE 56 DETECTION OF G SENSOR STICK — DETECTION OF G SENSOR STICK —

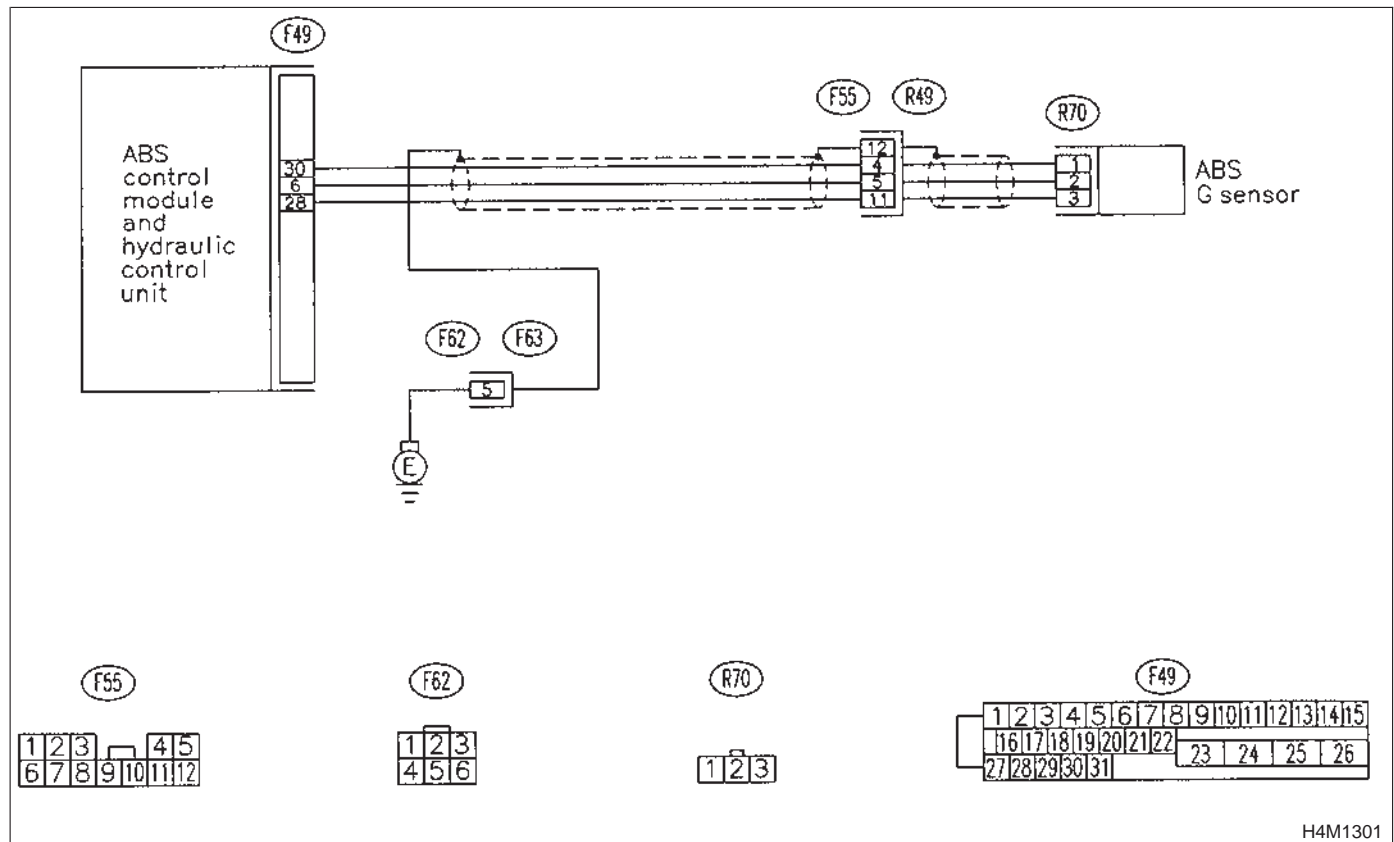
DIAGNOSIS:

- Faulty G sensor output voltage

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



H4M1301

10AJ1 : CHECK ALL FOUR WHEELS FOR FREE TURNING.

- CHECK** : *Have the wheels been turned freely such as when the vehicle is lifted up, or operated on a rolling road?*
- YES** : The ABS is normal. Erase the trouble code.
- NO** : Go to step 10AJ2.

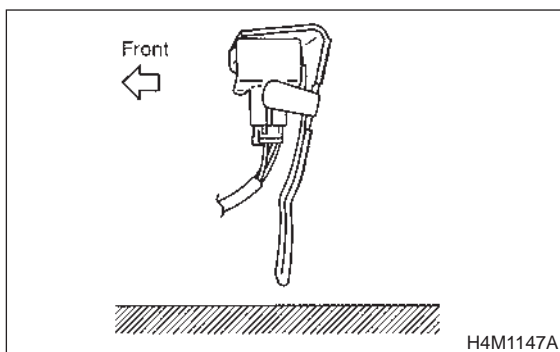
10AJ2 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

- 1) Select "Current data display & Save" on the select monitor.
- 2) Read the select monitor display.

- CHECK** : *Is the G sensor output on the monitor display between 2.1 and 2.5 V when the vehicle is in horizontal position?*
- YES** : Go to step 10AJ3.
- NO** : Go to step 10AJ8.

10AJ3 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

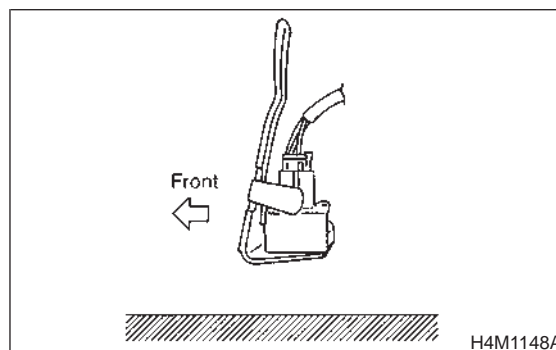
- 1) Turn ignition switch to OFF.
- 2) Remove console box.
- 3) Remove G sensor from vehicle. (Do not disconnect connector.)
- 4) Turn ignition switch to ON.
- 5) Select "Current data display & Save" on the select monitor.
- 6) Read the select monitor display.



- CHECK** : *Is the G sensor output on the monitor display between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?*
- YES** : Go to step 10AJ4.
- NO** : Replace G sensor.

10AJ4 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

Read the select monitor display.



- CHECK** : *Is the G sensor output on the monitor display between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?*
- YES** : Go to step 10AJ5.
- NO** : Replace G sensor.

10AJ5 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

- CHECK** : *Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [T3C1].>*
- YES** : Repair connector.
- NO** : Go to step 10AJ6.

10AJ6 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

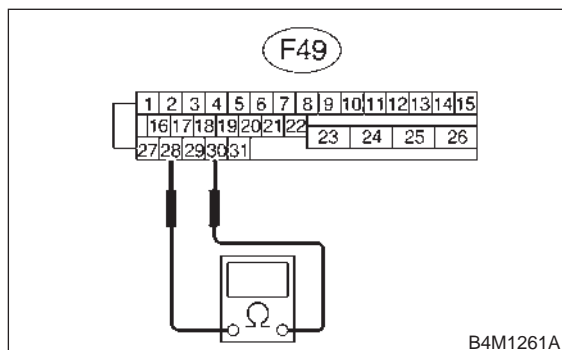
- CHECK** : *Is the same trouble code as in the current diagnosis still being output?*
- YES** : Replace ABSCM&H/U.
- NO** : Go to step 10AJ7.

10AJ7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

- CHECK** : *Are other trouble codes being output?*
- YES** : Proceed with the diagnosis corresponding to the trouble code.
- NO** : A temporary poor contact.

10AJ8 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal
(F49) No. 30 — No. 28:


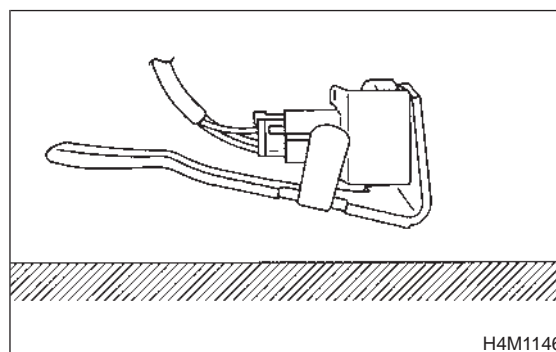
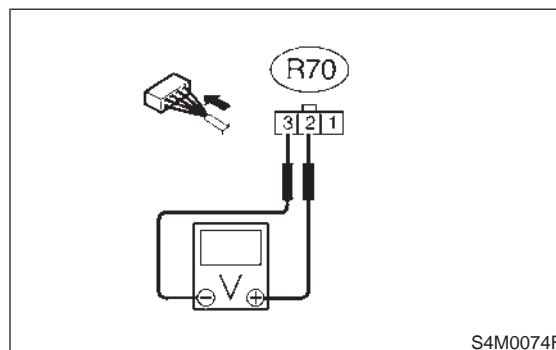
CHECK : *Is the resistance between 4.3 and 4.9 kΩ?*

YES : Go to step **10AJ9**.

NO : Repair harness/connector between G sensor and ABSCM&H/U.

10AJ9 : CHECK G SENSOR.

- 1) Remove console box.
- 2) Remove G sensor from vehicle.
- 3) Connect connector to G sensor.
- 4) Connect connector to ABSCM&H/U.
- 5) Turn ignition switch to ON.
- 6) Measure voltage between G sensor connector terminals.

Connector & terminal
(R70) No. 2 (+) — No. 1 (-):


CHECK : *Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?*

YES : Go to step **10AJ10**.

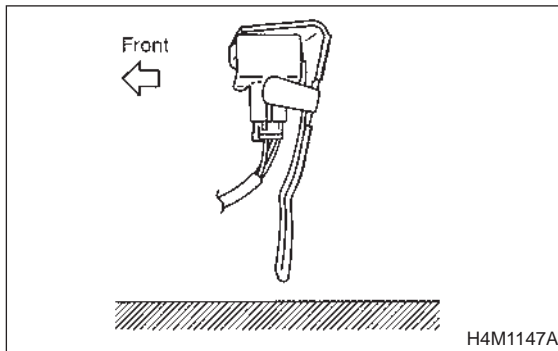
NO : Replace G sensor.

10AJ10 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 1 (-):



CHECK : *Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?*

YES : Go to step **10AJ11**.

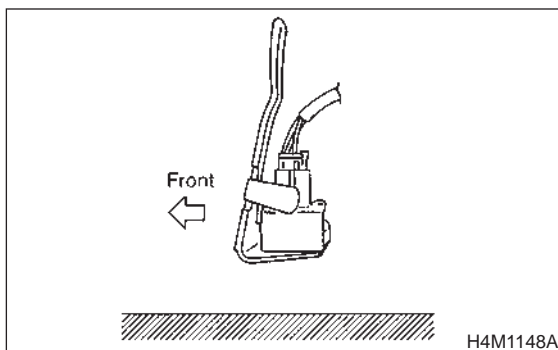
NO : Replace G sensor.

10AJ11 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 1 (-):



CHECK : *Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?*

YES : Go to step **10AJ12**.

NO : Replace G sensor.

10AJ12 : CHECK ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors.
- 3) Erase the memory.
- 4) Perform inspection mode.
- 5) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U.

NO : Go to step **10AJ13**.

10AJ13 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

11. General Diagnostic Table

A: SYMPTOMS AND PROBABLE CAUSES

Symptom		Probable faulty units/parts
Vehicle instability during braking	Vehicle pulls to either side.	<ul style="list-style-type: none"> ● ABSCM&H/U (solenoid valve) ● ABS sensor ● Brake (caliper & piston, pads) ● Wheel alignment ● Tire specifications, tire wear and air pressures ● Incorrect wiring or piping connections ● Road surface (uneven, camber)
	Vehicle spins.	<ul style="list-style-type: none"> ● ABSCM&H/U (solenoid valve) ● ABS sensor ● Brake (pads) ● Tire specifications, tire wear and air pressures ● Incorrect wiring or piping connections
Poor braking	Long braking/stopping distance	<ul style="list-style-type: none"> ● ABSCM&H/U (solenoid valve) ● Brake (pads) ● Air in brake line ● Tire specifications, tire wear and air pressures ● Incorrect wiring or piping connections
	Wheel locks.	<ul style="list-style-type: none"> ● ABSCM&H/U (solenoid valve, motor) ● ABS sensor ● Incorrect wiring or piping connections
	Brake dragging	<ul style="list-style-type: none"> ● ABSCM&H/U (solenoid valve) ● ABS sensor ● Master cylinder ● Brake (caliper & piston) ● Parking brake ● Axle & wheels ● Brake pedal play
	Long brake pedal stroke	<ul style="list-style-type: none"> ● Air in brake line ● Brake pedal play
	Vehicle pitching	<ul style="list-style-type: none"> ● Suspension play or fatigue (reduced damping) ● Incorrect wiring or piping connections ● Road surface (uneven)
	Unstable or uneven braking	<ul style="list-style-type: none"> ● ABSCM&H/U (solenoid valve) ● ABS sensor ● Brake (caliper & piston, pads) ● Tire specifications, tire wear and air pressures ● Incorrect wiring or piping connections ● Road surface (uneven)
Vibration and/or noise (while driving on slippery roads)	Excessive pedal vibration	<ul style="list-style-type: none"> ● Incorrect wiring or piping connections ● Road surface (uneven)
	Noise from ABSCM&H/U	<ul style="list-style-type: none"> ● ABSCM&H/U (mount bushing) ● ABS sensor ● Brake piping
	Noise from front of vehicle	<ul style="list-style-type: none"> ● ABSCM&H/U (mount bushing) ● ABS sensor ● Master cylinder ● Brake (caliper & piston, pads, rotor) ● Brake piping ● Brake booster & check valve ● Suspension play or fatigue
	Noise from rear of vehicle	<ul style="list-style-type: none"> ● ABS sensor ● Brake (caliper & piston, pads, rotor) ● Parking brake ● Brake piping ● Suspension play or fatigue

B: CHECKING THE HYDRAULIC UNIT OPERATION

11B1 : PREPARING THE BRAKE TESTER.

- CHECK** : *Is the brake tester available?*
- YES** : CHECKING THE HYDRAULIC UNIT
ABS OPERATION WITH BRAKE
TESTER <Ref. to 4-4 [W14C2].>
- NO** : CHECKING THE HYDRAULIC UNIT
ABS OPERATION BY PRESSURE
GAUGE <Ref. to 4-4 [W14C1].>

MEMO:

1. Entire Brake System

Trouble and possible cause	Corrective action
1. Insufficient braking	
(1) Fluid leakage from the hydraulic mechanism	Repair or replace (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose).
(2) Entry of air into the hydraulic mechanism	Bleed the air.
(3) Excessively wide shoe clearance	Adjust the clearance.
(4) Wear, deteriorated surface material, adhering water or fluid on the lining	Replace, grind or clean.
(5) Improper operation of master cylinder, disc caliper, brake booster or check valve	Correct or replace.
2. Unstable or uneven braking	
(1) Fluid on the lining, drum or rotor	Eliminate cause of fluid leakage, clean, or replace.
(2) Drum or rotor eccentricity	Correct or replace the drum or rotor.
(3) Worn brake drum, or damage to the drum caused by sand	Correct by grinding, or replace.
(4) Improper lining contact, deteriorated surface material, improper inferior material, or wear	Correct by grinding, or replace.
(5) Deformed back plate	Correct or replace.
(6) Improper tire inflation	Inflate to correct pressure.
(7) Disordered wheel alignment	Adjust alignment.
(8) Loosened back plate or the support installing bolts	Retighten.
(9) Loosened wheel bearing	Retighten to normal tightening torque or replace.
(10) Trouble in the hydraulic system	Replace the cylinder, brake pipe or hose.
(11) Uneven effect of the parking brake	Check, adjust, or replace the rear brake and cable system.
3. Excessive pedal stroke	
(1) Entry of air into the hydraulic mechanism	Bleed the air.
(2) Excessive play in the master cylinder push rod	Adjust.
(3) Fluid leakage from the hydraulic mechanism	Repair or replace (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose).
(4) Improperly adjusted shoe clearance	Adjust.
(5) Improper lining contact or worn lining	Correct or replace.
4. Brake dragging or improper brake return	
(1) Insufficient pedal play	Adjust play.
(2) Improper master cylinder return	Clean or replace the cylinder.
(3) Clogged hydraulic system	Replace.
(4) Improper return or adjustment of parking brake	Correct or adjust.
(5) Weakened spring tension or breakage of shoe return spring	Replace the spring.
(6) Excessively narrow shoe clearance	Adjust the clearance.
(7) Improper disc caliper operation	Correct or replace.
(8) Improper adjusted wheel bearing	Adjust or replace.
5. Brake noise (1) (creak sound)	
(1) Hardened or deteriorated lining	Replace the shoe assembly or pad.
(2) Worn lining	Replace the shoe assembly or pad.
(3) Loosened back plate or the support installing bolts	Retighten.
(4) Loose wheel bearing	Retighten to normal tightening torque.
(5) Dirty drum or rotor	Clean the drum or rotor, or clean and replace the brake assembly.
6. Brake noise (2) (hissing sound)	
(1) Worn lining	Replace the shoe assembly or pad.
(2) Improper installed shoe or pad	Correct or replace the shoe assembly or pad.
(3) Loose or bent drum or rotor	Retighten or replace.

Trouble and possible cause	Corrective action
7. Brake noise (3) (click sound)	
In the case of the disc brake:	
(1) Excessively worn pad or the support	Replace the pad or the support.
In the case of the drum brake:	
(1) Excessively worn shoe ridge	Replace the back plate.
(2) Lack of oil on the shoe ridge surface and anchor	Add more grease.

MEMO:

PEDAL SYSTEM AND CONTROL
CABLES

4-5

	Page
S SPECIFICATIONS AND SERVICE DATA.....	2
1. Pedal System	2
C COMPONENT PARTS	3
1. Pedal	3
W SERVICE PROCEDURE	6
1. Pedal	6
2. Clutch Cable.....	13
3. Accelerator Cable.....	14
K DIAGNOSTICS.....	16
1. Pedal System and Control Cables.....	16

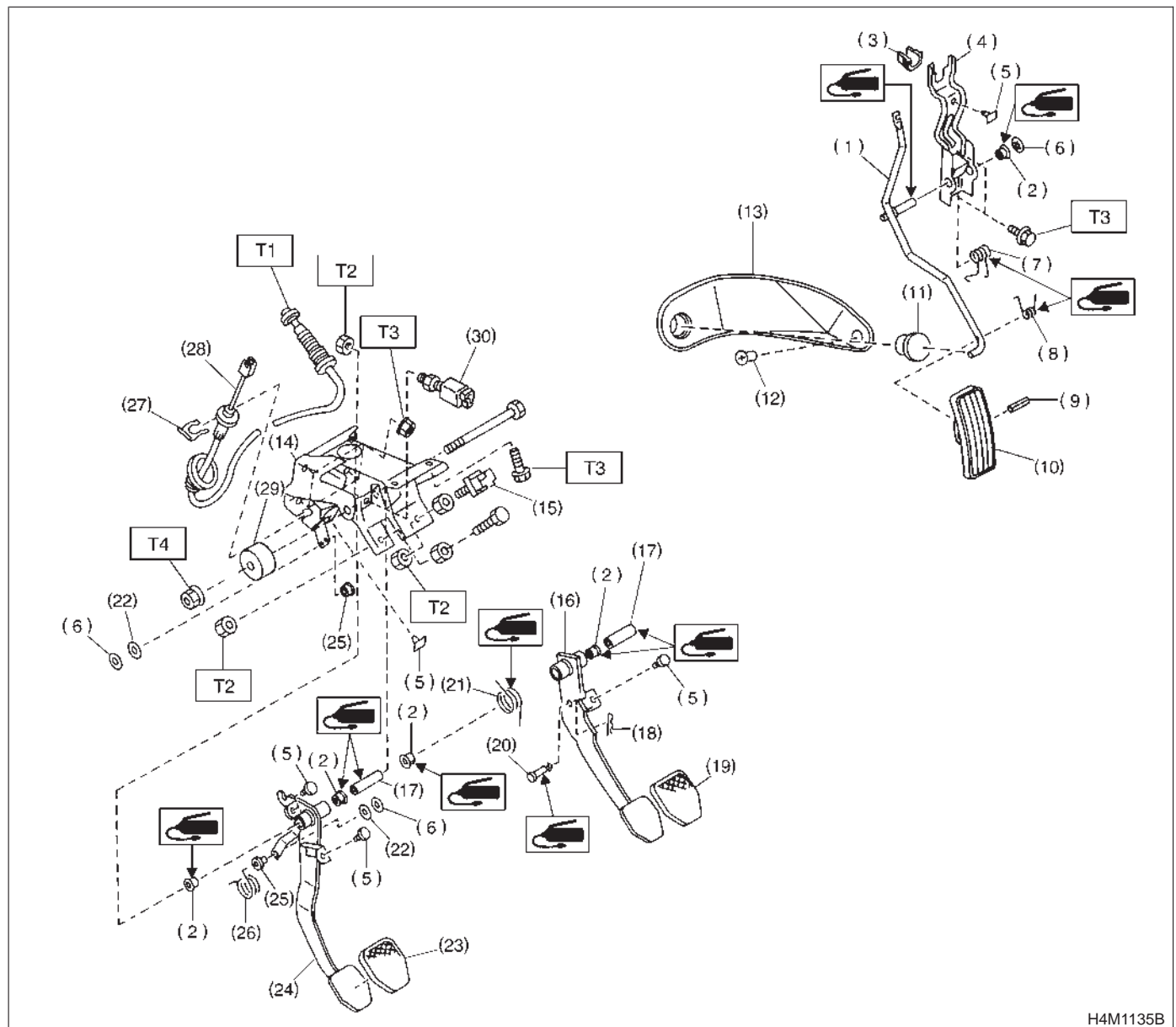
1. Pedal System

Brake pedal	Free play		1 — 3 mm (0.04 — 0.12 in) [Depress brake pedal pad with a force of less than 10 N (1 kg, 2 lb).]
Clutch pedal	Free play	At clutch pedal pad	Except 2500 cc model: 10 — 20 mm (0.39 — 0.79 in) 2500 cc model: 4 — 13 mm (0.16 — 0.51 in)
	Full stroke	At clutch pedal pad	Except 2500 cc model: 140 — 145 mm (5.51 — 5.71 in) 2500 cc model: 130 — 135 mm (5.12 — 5.31 in)
Accelerator pedal	Free play	At pedal pad	1 — 4 mm (0.04 — 0.16 in)
	Stroke	At pedal pad	50 — 55 mm (1.97 — 2.17 in)

1. Pedal

A: MT MODEL

1. 2200 cc MODEL



H4M1135B

- | | | |
|------------------------------|-------------------------|--|
| (1) Accelerator pedal | (14) Pedal bracket | (27) Clutch cable clamp |
| (2) Bushing | (15) Stop light switch | (28) Clutch cable |
| (3) Holder | (16) Brake pedal | (29) Mass damper |
| (4) Accelerator bracket | (17) Spacer | (30) Clutch switch (Starter interlock) |
| (5) Stopper | (18) Snap pin | |
| (6) Clip | (19) Brake pedal pad | |
| (7) Accelerator spring | (20) Clevis pin | |
| (8) Accelerator pedal spring | (21) Brake pedal spring | |
| (9) Spring pin | (22) Washer | |
| (10) Accelerator pedal pad | (23) Clutch pedal pad | |
| (11) Accelerator stopper | (24) Clutch pedal | |
| (12) Clip | (25) Bushing assist | |
| (13) Accelerator plate | (26) Spring assist | |

Tightening torque: N-m (kg-m, ft-lb)

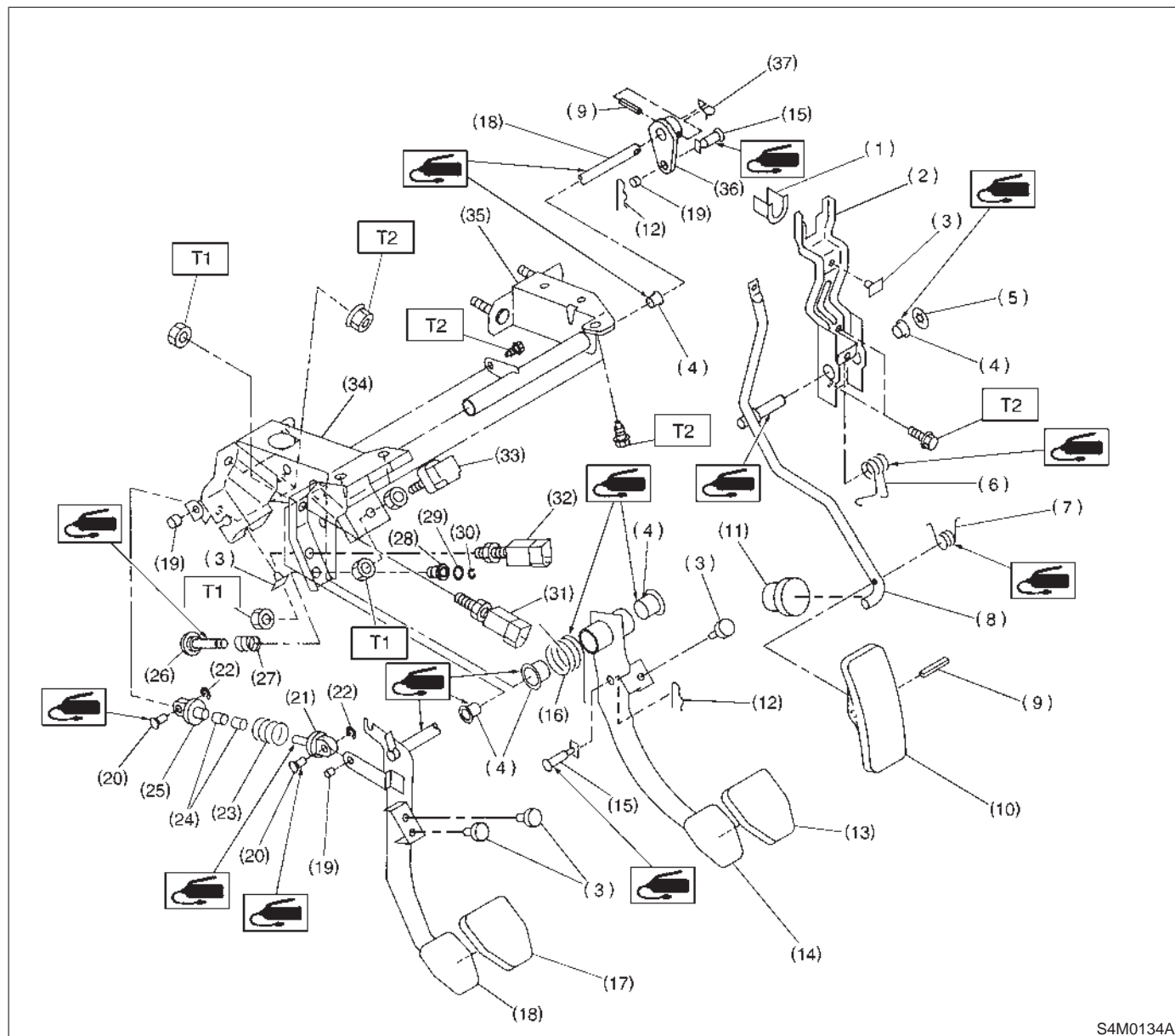
T1: 5.9±1.5 (0.60±0.15, 4.3±1.1)

T2: 8±2 (0.8±0.2, 5.8±1.4)

T3: 18±5 (1.8±0.5, 13.0±3.6)

T4: 29±7 (3.0±0.7, 21.7±5.1)

2. 2500 cc MODEL

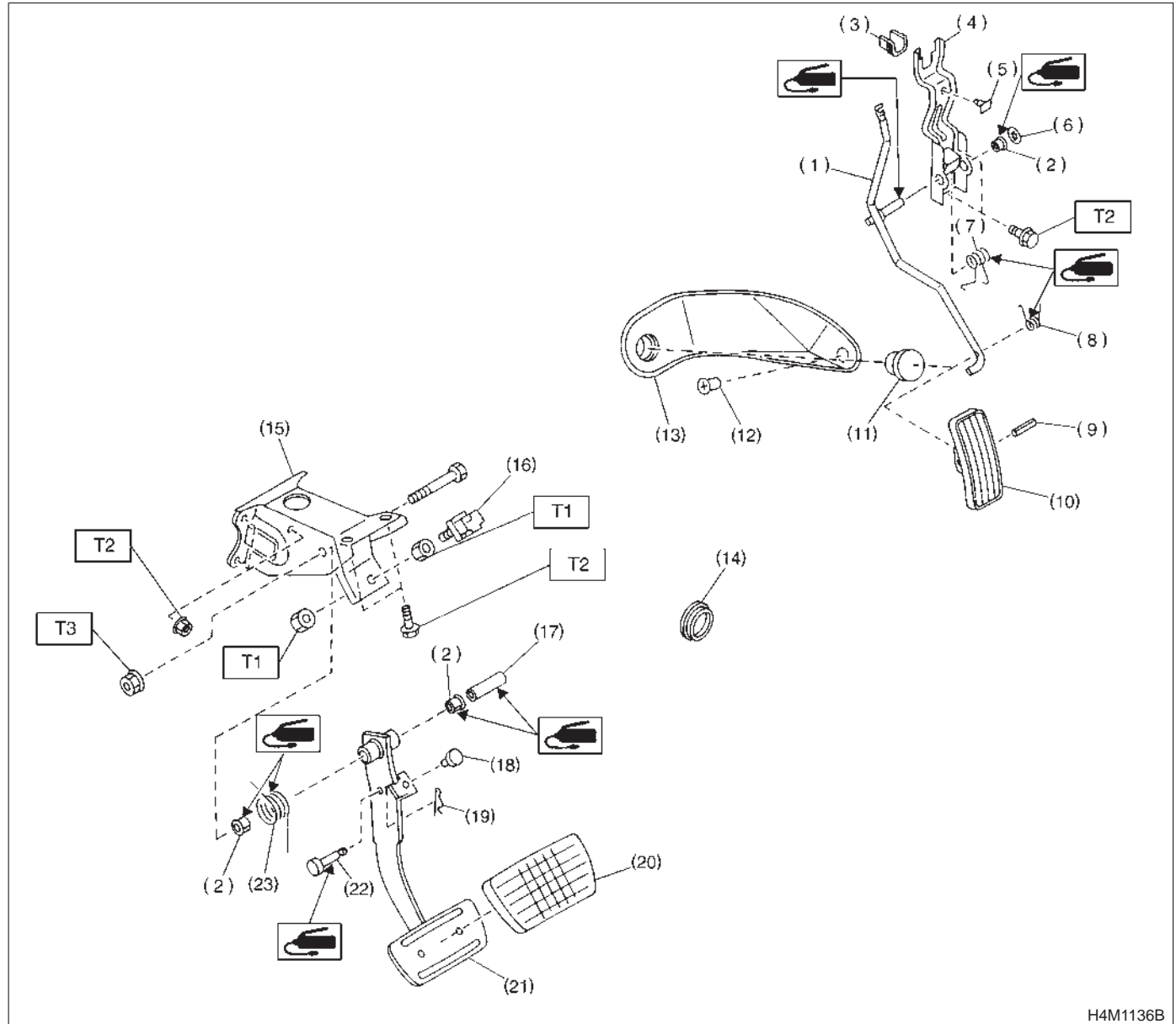


S4M0134A

- | | | |
|------------------------------|-------------------------|--|
| (1) Holder | (16) Brake pedal spring | (31) Clutch switch (Starter interlock) |
| (2) Accelerator bracket | (17) Clutch pedal pad | (32) Clutch switch (With cruise control) |
| (3) Stopper | (18) Clutch pedal | (33) Stop light switch |
| (4) Bushing | (19) Bushing C | (34) Pedal bracket |
| (5) Clip | (20) Clutch clevis pin | (35) Clutch master cylinder bracket |
| (6) Accelerator spring | (21) Assist rod A | (36) Lever |
| (7) Accelerator pedal spring | (22) Clip | (37) Lock wire |
| (8) Accelerator pedal | (23) Assist spring | |
| (9) Spring pin | (24) Assist bushing | |
| (10) Accelerator pedal pad | (25) Assist rod B | |
| (11) Accelerator stopper | (26) Rod S | |
| (12) Snap pin | (27) Spring S | |
| (13) Brake pedal pad | (28) Bushing S | |
| (14) Brake pedal | (29) O-ring | |
| (15) Clevis pin | (30) Clip | |

Tightening torque: N·m (kg·m, ft·lb)**T1: 8±2 (0.8±0.2, 5.8±1.4)****T2: 18±5 (1.8±0.5, 13.0±3.6)**

B: AT MODEL



H4M1136B

- | | |
|------------------------------|--------------------------|
| (1) Accelerator pedal | (11) Accelerator stopper |
| (2) Bushing | (12) Clip |
| (3) Holder | (13) Accelerator plate |
| (4) Accelerator bracket | (14) Plug |
| (5) Stopper | (15) Pedal bracket |
| (6) Clip | (16) Stop light switch |
| (7) Accelerator spring | (17) Spacer |
| (8) Accelerator pedal spring | (18) Stopper |
| (9) Spring pin | (19) Snap pin |
| (10) Accelerator pedal | (20) Brake pedal pad |

- | |
|-------------------------|
| (21) Brake pedal |
| (22) Clevis pin |
| (23) Brake pedal spring |

Tightening torque: N·m (kg·m, ft·lb)

T1: 8±2 (0.8±0.2, 5.8±1.4)

T2: 18±5 (1.8±0.5, 13.0±3.6)

T3: 29±7 (3.0±0.7, 21.7±5.1)

1. Pedal

1. Pedal

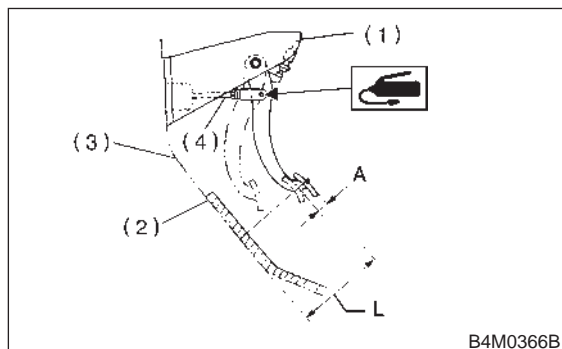
A: ON-CAR SERVICE

1. BRAKE PEDAL

- 1) Check position of pedal pad.

Pedal height: L

148 mm (5.83 in)



- (1) Stop light switch
- (2) Mat
- (3) Toe board
- (4) Brake booster operating rod

2) If it is not in specified value, adjust it by adjusting brake booster operating rod length.

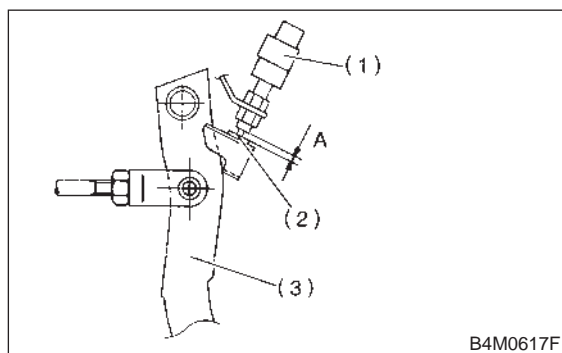
3) Measure the clearance between threaded end of stop light switch and stopper. If it is not in specified value, adjust it by adjusting position of stop light switch.

CAUTION:

Be careful not to rotate stop light switch.

Stop light switch clearance: A

0.3 mm (0.012 in)



- (1) Stop light switch
- (2) Stopper
- (3) Brake pedal

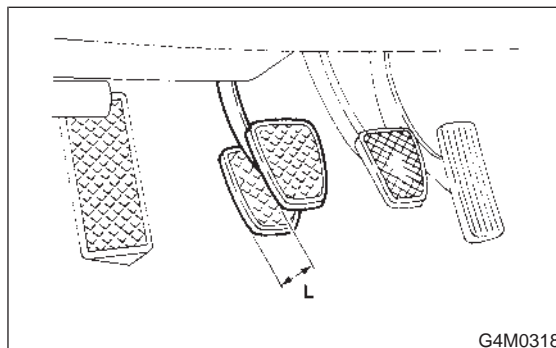
4) Apply grease to operating rod connecting pin to prevent it from wearing.

2. CLUTCH PEDAL (2200 cc MODEL)

- 1) Check clutch pedal free play by operating pedal by hand.

Free play: L (At clutch pedal pad)

10 — 20 mm (0.39 — 0.79 in)

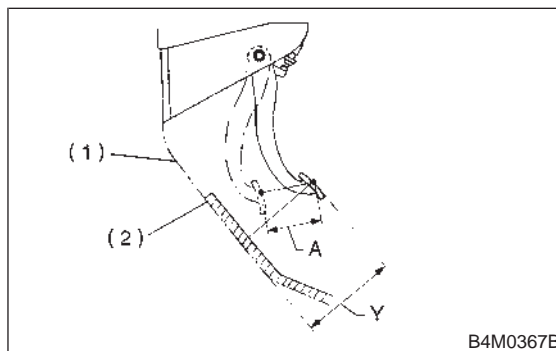


Pedal height: Y

158 mm (6.22 in)

Pedal stroke: A

140 — 145 mm (5.51 — 5.71 in)



- (1) Toe board
- (2) Mat

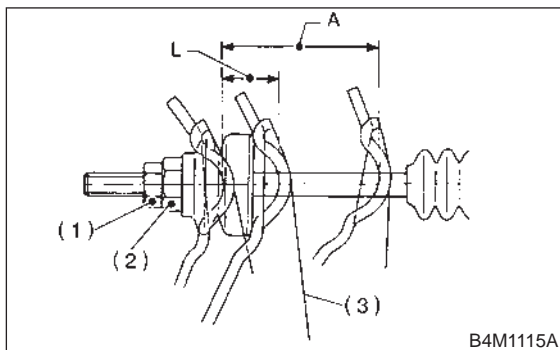
2) If it is not in specified value, adjust it by turning adjusting nut on engine side end of clutch cable.

Free play: L

2 — 4 mm (0.08 — 0.16 in)

Full stroke: A

25.5 — 27 mm (1.004 — 1.063 in)



- (1) Lock nut
- (2) Adjusting nut
- (3) Release fork

3) Apply grease to connecting portion of clutch pedal and clutch cable.

Lock nut tightening torque:

5.9±1.5 N·m (0.60±0.15 kg-m, 4.3±1.1 ft-lb)

3. ACCELERATOR PEDAL

Check pedal stroke and free play by operating accelerator pedal by hand.

If it is not within specified value, adjust it by turning nut connecting accelerator cable to throttle body.

Free play at pedal pad: L

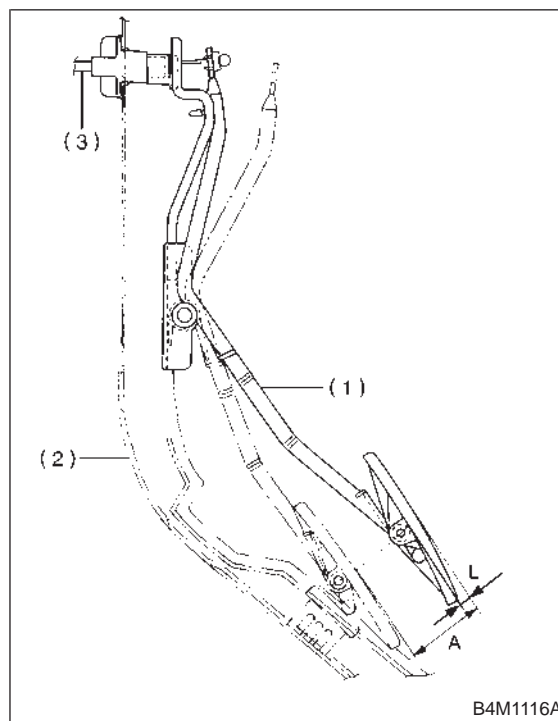
1 — 4 mm (0.04 — 0.16 in)

Stroke at pedal pad: A

46 — 50 mm (1.81 — 1.97 in)

Accelerator cable lock nut tightening torque:

14±4 N·m (1.4±0.4 kg-m, 10.1±2.9 ft-lb)

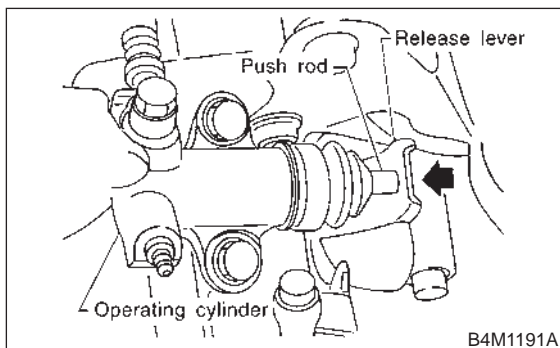


- (1) Accelerator pedal
- (2) Toe board
- (3) Accelerator cable

1. Pedal

4. CLUTCH PEDAL (2500 cc MODEL)

1) Push release fork until operating cylinder push rod retracts. Check that clutch fluid level in reservoir tank increases.



2) If clutch fluid level increases, hydraulic clutch play is correct.

3) If clutch fluid level does not increase or push rod does not retract, clutch pedal must be adjusted. <Ref. to 4-5 [W1F1].>

4) Check the fluid level on the outside of the clutch master cylinder tank. If the level is below "MIN", add clutch fluid to bring it up to "MAX".

Recommended clutch fluid:

FMVSS No. 116, fresh DOT 3 or DOT 4 brake fluid

B: REMOVAL

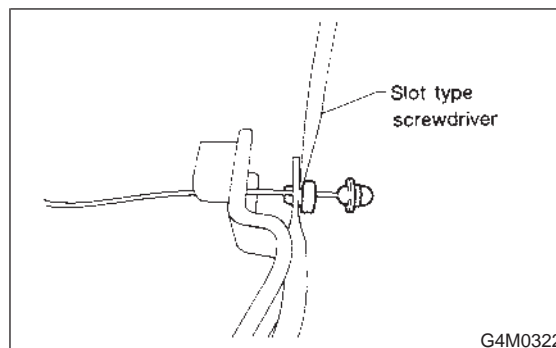
1. ACCELERATOR PEDAL

- 1) Disconnect ground cable from battery.
- 2) Disconnect accelerator cable from throttle body.

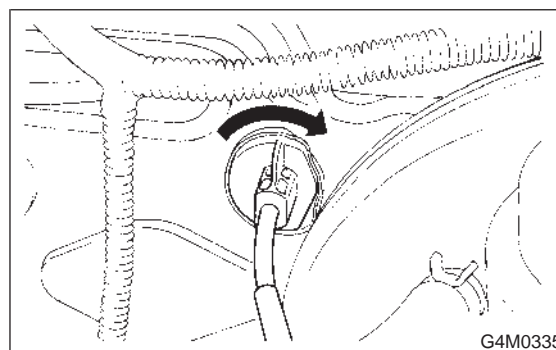
CAUTION:

Be careful not to kink accelerator cable.

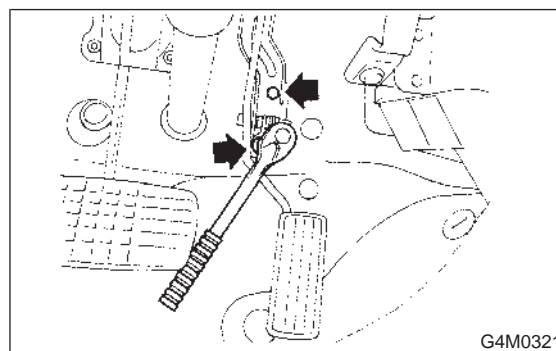
- 3) Remove instrument panel lower cover from instrument panel, and connector.
- 4) Disconnect accelerator cable from accelerator pedal lever.



- 5) Working inside engine compartment, remove casing cap out of the toe board by turning it clockwise.



- 6) Pull out the cable from the toe board hole.
- 7) Remove accelerator pedal connecting bolt from accelerator pedal bracket.

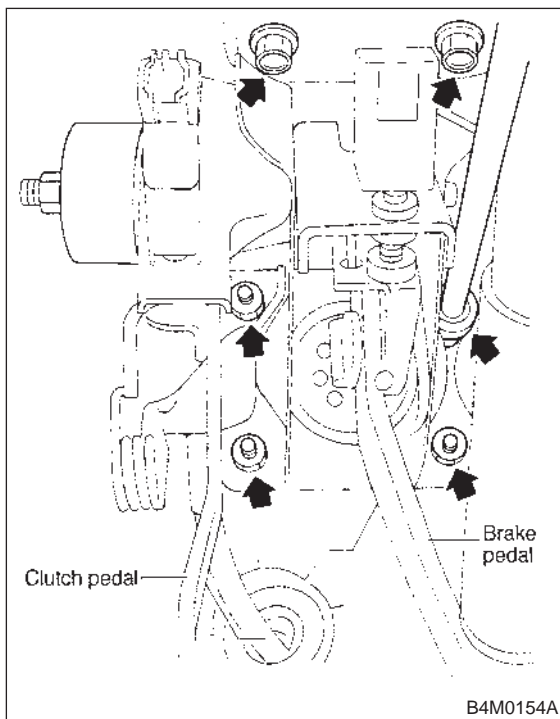


2. BRAKE AND CLUTCH PEDAL (2200 cc MODEL)

- 1) Disconnect ground cable from battery.
- 2) Disconnect clutch cable from release lever.
- 3) Remove instrument panel lower cover from instrument panel.
- 4) Disconnect the following parts from pedal bracket.
 - (1) Operating rod of brake booster
 - (2) Electrical connectors (for stop light switch, etc.)
- 5) Remove clevis pin which secures pedal to push rod.
- 6) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal bracket and clutch cable as a unit.

CAUTION:

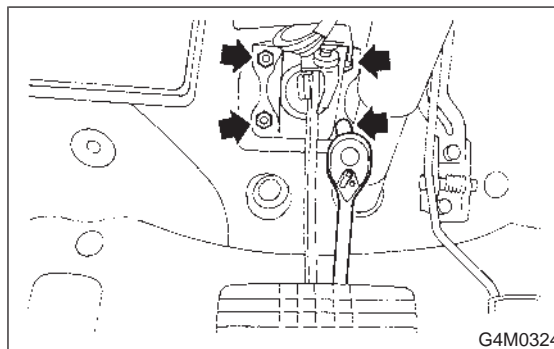
Before removing clutch cable from toe board, remove grommet. Slowly remove clutch cable, being careful not to scratch it.



- 7) Depress clutch pedal, disconnect clutch cable from clutch pedal.

3. BRAKE PEDAL

- 1) Disconnect ground cable from battery.
- 2) Remove instrument panel lower cover from instrument panel.
- 3) Remove clevis pin which secures brake pedal to brake booster operating rod. Also disconnect stop lamp switch connector.
- 4) Remove two bolts and four nuts which secure brake pedal to pedal.



4. BRAKE AND CLUTCH PEDAL (2500 cc MODEL)

- 1) Remove steering bolts.
- 2) Raise vehicle on hoist and remove the two bolts which secure steering unit to underside of body.
- 3) Lower vehicle to floor.
- 4) Remove instrument panel lower cover from instrument panel.
- 5) Disconnect the following parts from pedal bracket.
 - Operating rod of brake booster
 - Electrical connectors (for stop light switch, etc.)
- 6) Remove clevis pin which secures lever to push rod.
- 7) Remove nut which secures clutch master cylinder.
- 8) Remove steering assembly.
- 9) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal assembly.

1. Pedal

C: INSPECTION**1. BRAKE AND CLUTCH PEDALS**

Move brake and clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kg, 2 lb) to ensure pedal deflection is in specified range.

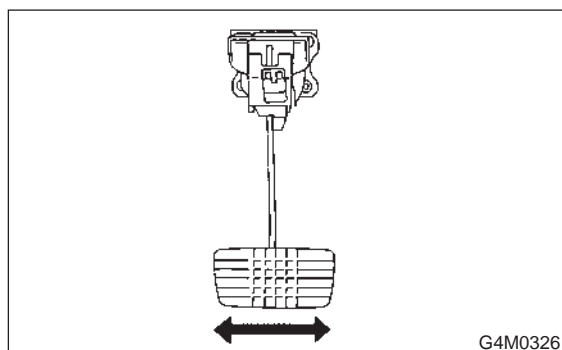
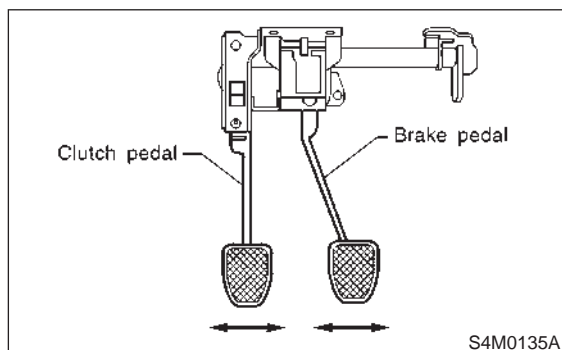
CAUTION:

If excessive deflection is noted, replace bushings with new ones.

Deflection of brake and clutch pedal:

Service limit

5.0 mm (0.197 in) or less

**2. ACCELERATOR PEDAL**

Lightly move pedal pad in lateral the direction to ensure pedal deflection is in specified range.

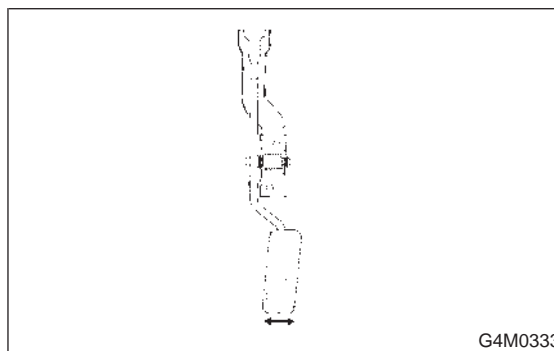
CAUTION:

If excessive deflection is noted, replace bushing and clip with new ones.

Deflection of accelerator pedal:

Service limit

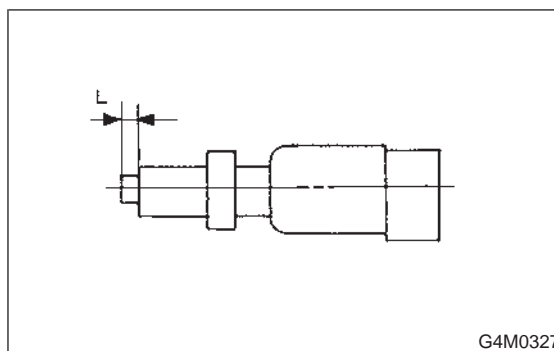
5.0 mm (0.197 in) or less

**3. STOP LIGHT SWITCH**

If stop light switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

Specified position: L

$2^{+1.5}/_0$ mm (0.079 $^{+0.059}/_0$ in)



D: ASSEMBLY**1. BRAKE AND CLUTCH PEDAL**

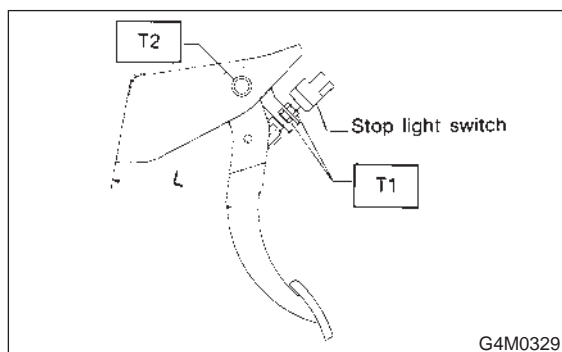
- 1) Attach stop light switch, etc. to pedal bracket temporarily.
- 2) Clean inside of bores of clutch pedal and brake pedal, apply grease, and set bushings into bores.
- 3) Align bores of pedal bracket, clutch pedal and brake pedal, attach brake pedal return spring and clutch pedal effort reducing spring, and then install pedal bolt.

NOTE:

Clean up inside of bushings and apply grease before installing spacer.

Tightening torque:

T2: 29 ± 7 N·m (3.0 ± 0.7 kg·m, 21.7 ± 5.1 ft·lb)



- 4) Set brake pedal position by adjusting position of stop light switch.

Pedal position: L

125.9 mm (4.96 in)

Tightening torque:

T1: 8 ± 2 N·m (0.8 ± 0.2 kg·m, 5.8 ± 1.4 ft·lb)

2. ACCELERATOR PEDAL

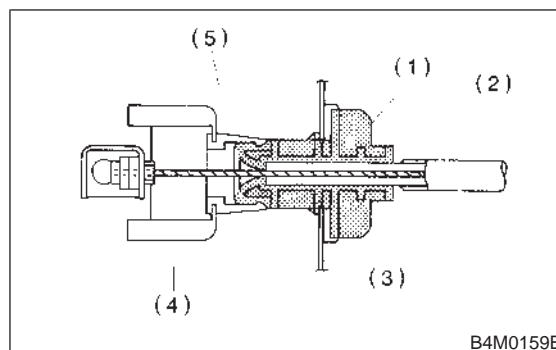
Clean and apply grease to spacer and inside bore of accelerator pedal. Install accelerator pedal onto pedal bracket.

E: INSTALLATION

- 1) Installation is in the reverse order of removal procedures.

CAUTION:

- Be careful not to bend clutch cable too much.
- Never fail to cover outer cable end with boot.
- Be careful not to kink accelerator cable.
- Make sure that holder and casing cap are securely connected.



- (1) Casing cap
- (2) Accelerator cable
- (3) Toe board
- (4) Accelerator pedal bracket
- (5) Holder

- 2) Adjust clutch pedal (2500 cc model) <Ref. to 4-5 [W1F1].>
- 3) Adjustment after pedal installation <Ref. to 4-5 [W1A0].>

F: ADJUSTMENT**1. CLUTCH PEDAL (2500 cc MODEL)**

1) Turn cruise control clutch switch lock nuts until clutch pedal full stroke length is within specifications.

CAUTION:

Do not attempt to turn clutch switch to adjust clutch pedal full stroke length.

NOTE:

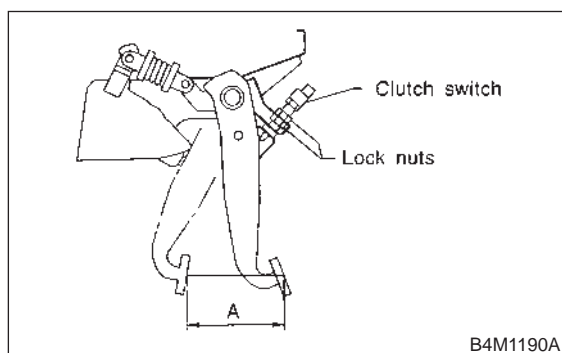
If lock nuts cannot adjust clutch pedal full stroke length to specifications, turn master cylinder push rod to adjust it.

Specified clutch pedal full stroke: A

130 — 135 mm (5.12 — 5.31 in)

Tightening torque (Clutch switch lock nut):

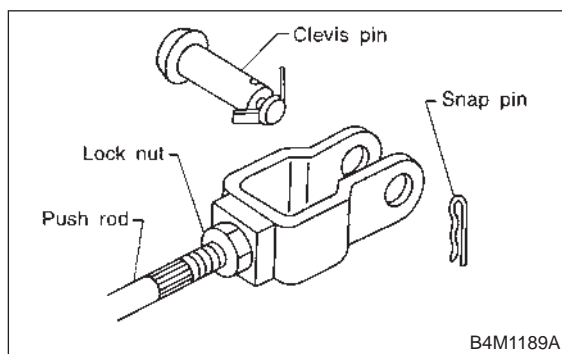
8 ± 2 N·m (0.8 ± 0.2 kg·m, 5.8 ± 1.4 ft·lb)



2) Turn master cylinder push rod so that clevis pin moves to the left and then to the right. Clevis pin must move without resistance while it is rattling.

Tightening torque (Push rod lock nut):

10 ± 2 N·m (1.0 ± 0.2 kg·m, 7.2 ± 1.4 ft·lb)



3) Depress and release clutch pedal 2 to 3 times to ensure that clutch pedal and release fork operate smoothly. If clutch pedal and release fork do not operate smoothly, bleed air from clutch hydraulic system. <Ref. to 2-10 [W2A2].>

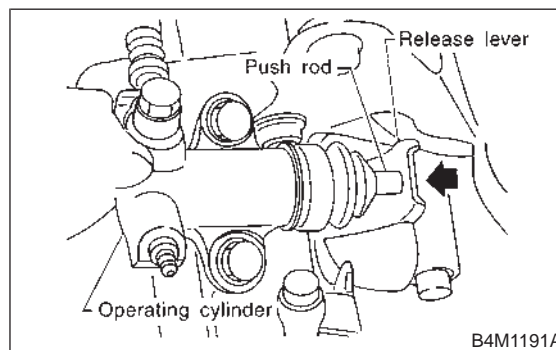
4) Measure clutch pedal full stroke length again to ensure that it is within specifications. If it is not, repeat adjustment procedures again from the beginning.

Specified clutch pedal full stroke:

130 — 135 mm (5.12 — 5.31 in)

5) Move clevis pin to the left and then to the right. It should move without resistance while it is rattling. If resistance is felt, repeat adjustment procedures again from the beginning.

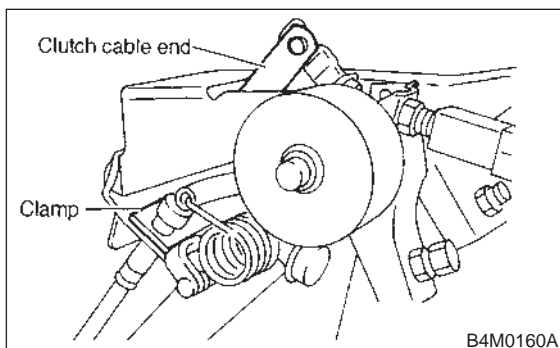
6) Push release lever until operating cylinder push rod retracts. Ensure that clutch fluid level in reservoir tank increases. If clutch fluid level increases, hydraulic clutch is properly adjusted; if fluid level does not increase or push rod does not retract, replace master cylinder with new one. <Ref. to 2-10 [W600].>



2. Clutch Cable

A: REMOVAL

- 1) Disconnect clutch cable from release lever.
- 2) Remove clutch cable clamp from pedal bracket.



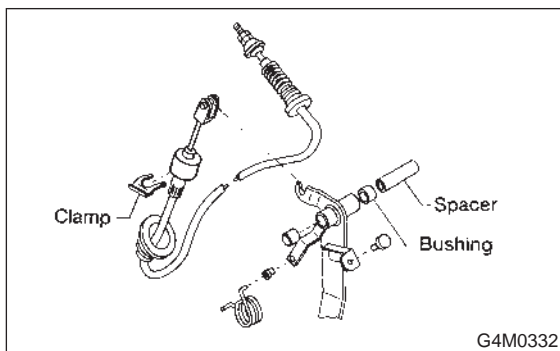
- 3) Disconnect clutch cable from pedal bracket and pedal end.
- 4) Remove clutch cable from body.

CAUTION:

Before removing clutch cable from toe board, remove grommet. Slowly remove clutch cable, being careful not to scratch it.

B: INSTALLATION

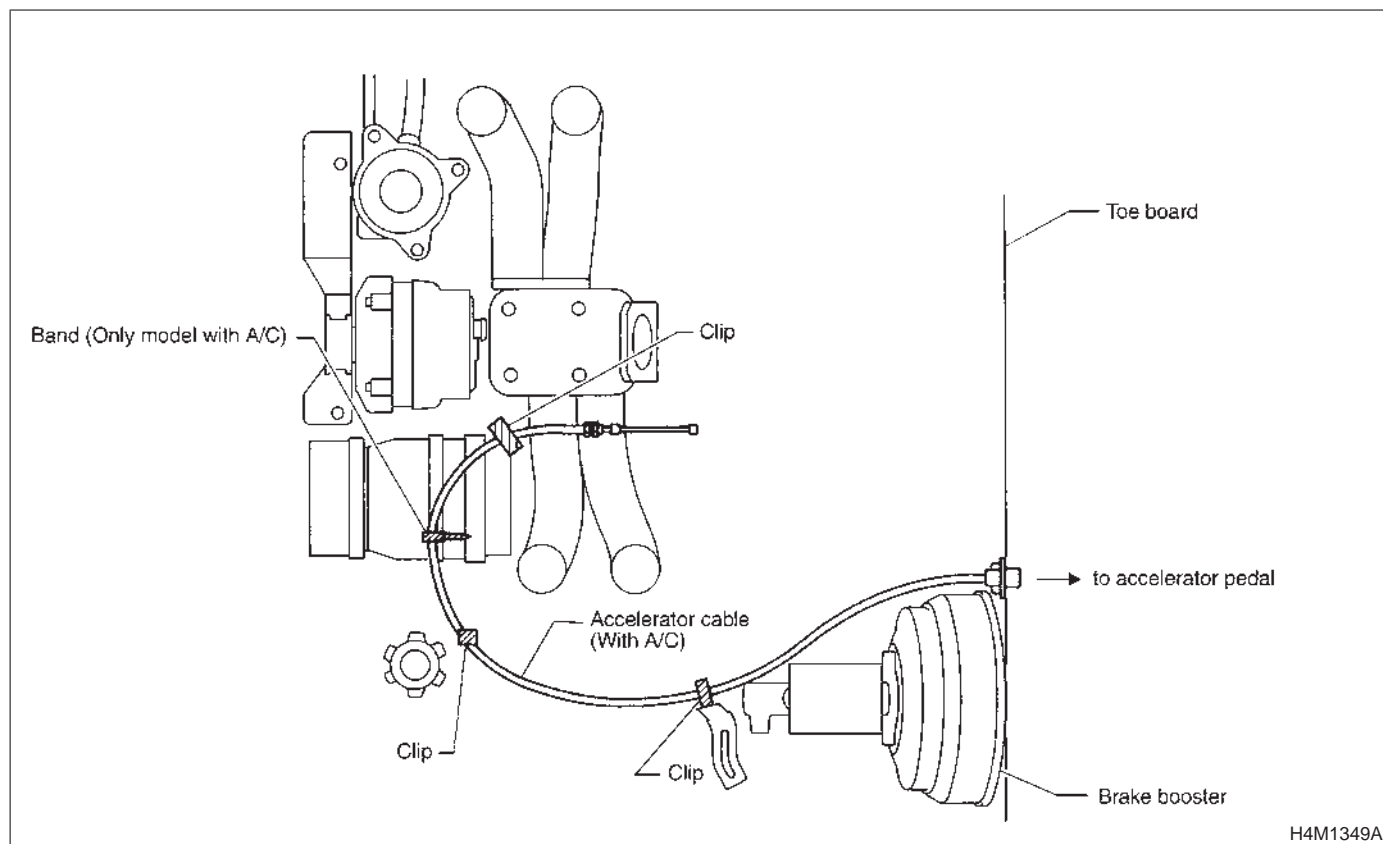
- 1) Clean clutch pedal fitting hole, and apply grease. Connect clutch cable to clutch pedal.



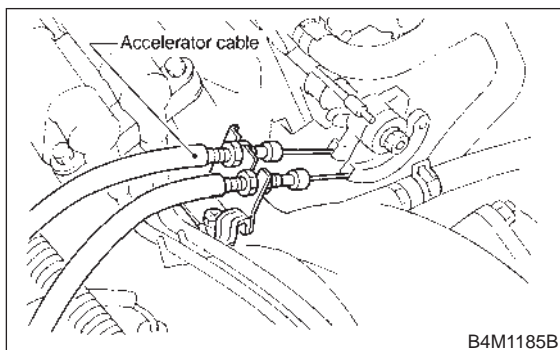
- 2) Fit clutch pedal to pedal bolt, and connect clutch cable to bracket with clamp.
- 3) Connect clutch cable end to pedal end.
- 4) Connect clutch cable from release lever.
- 5) Install grommet to toe board.
- 6) Adjust after cable installation. <Ref. to 4-5 [W1A2].>

3. Accelerator Cable

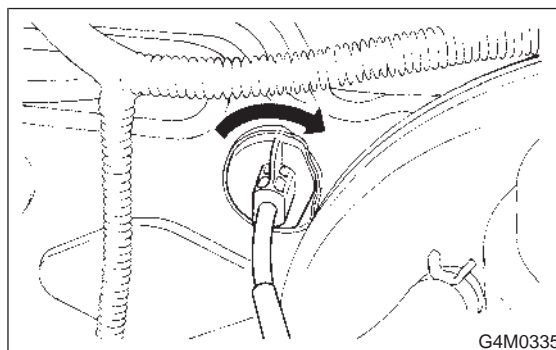
A: REMOVAL



- 1) Disconnect accelerator cable from connector inside engine compartment first.
- 2) Remove lock nut from accelerator cable bracket.
- 3) Separate accelerator cable from bracket, then unlock inner cable.



- 7) Working inside engine compartment, remove cable connection by turning toe board clockwise.



- 8) Pull out the cable from the toe board hole.

- 4) Remove cable end from throttle cam using your fingertips.

CAUTION:

Be careful not to bend inner cable.

- 5) Disconnect cable end from accelerator cable bracket inside driver compartment.
- 6) Remove clip inside engine compartment.

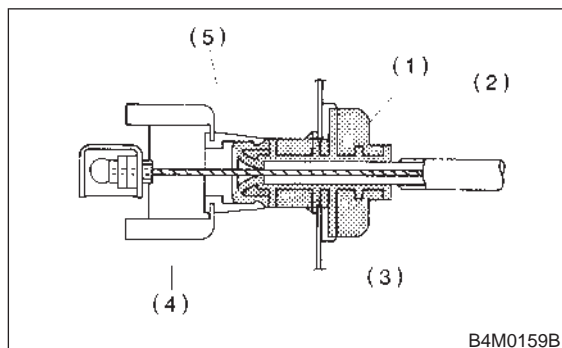
B: INSTALLATION

1) Installation is in the reverse order of removal procedures.

CAUTION:

- Be careful not to kink accelerator cable.
- Make sure that holder and casing cap are securely connected.

2) Adjust after cable installation. <Ref. to 4-5 [W1A3].>



- (1) Casing cap
- (2) Accelerator cable
- (3) Toe board
- (4) Accelerator pedal bracket
- (5) Holder

1. Pedal System and Control Cables

Trouble	Corrective action
Excessively worn brake pedal pad	Replace.
Failure of clutch and/or accelerator pedals to operate	Connect cables correctly.
Stop light switch does not light up.	Adjust position of stop light switch.
Stop light switch is not smooth and/or stroke is not correct.	Replace.
Insufficient pedal play	Adjust pedal play.
Clutch and/or brake pedal free play insufficient	Adjust pedal free play.
Maladjustment of brake pedal or booster push rod	Inspect and adjust.
Excessively worn and damaged pedal shaft and/or bushing	Replace bushing and/or shaft with new one.

HEATER AND VENTILATOR

4-6

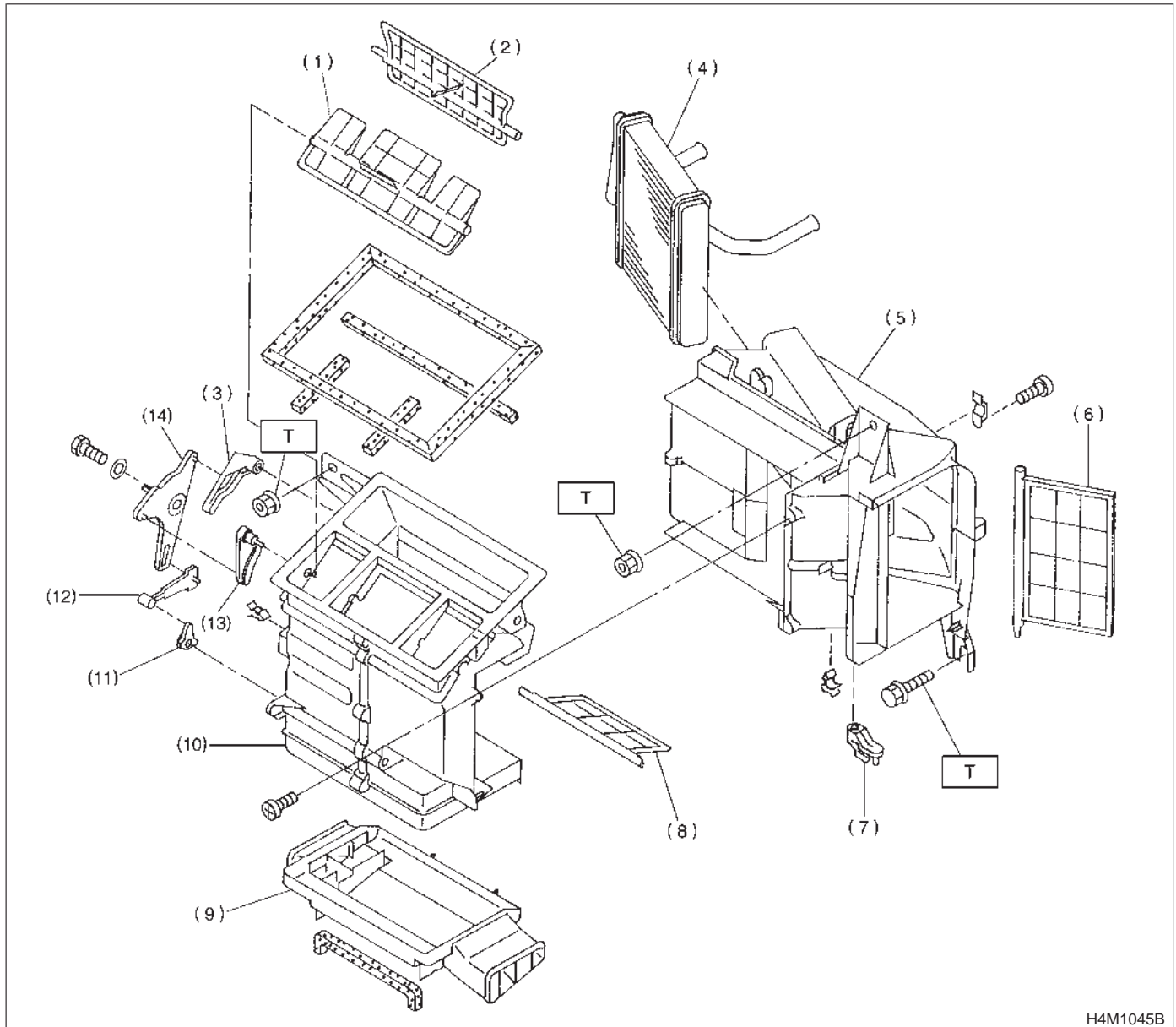
	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Specifications	2
C COMPONENT PARTS	3
1. Heater Unit	3
2. Intake Unit	4
3. Control Unit	5
W SERVICE PROCEDURE	6
1. Precaution	6
2. Heater Unit	6
3. Blower Motor Assembly.....	7
4. Control Unit	7

1. Specifications

A: HEATER SYSTEM

Item		Specifications	Condition	
Heating capacity		4.652 kW (4,000 kcal/h, 15,872 BTU/h) or more	● Mode selector switch	: HEAT
			● Temperature control switch	: FULL HOT
			● Temperature difference between hot water and inlet air	: 65°C (149°F)
			● Hot water flow rate : 360 ℓ (95.1 US gal, 79.2 Imp gal)/h	
Air flow rate		270 m ³ (9,534 cu ft)/h	Heat mode (FRESH), FULL HOT at 12.5 V	
Max air flow rate		480 m ³ (16,949 cu ft)/h	● Temperature control switch	: FULL COLD
			● Blower fan speed	: 4th position
			● Mode selector lever	: RECIRC
Heater core size (height x length x width x thickness)		192.4 x 152.0 x 25.0 x 1.8 mm (7.57 x 5.98 x 0.984 x 0.071 in)	—	
Blower motor	Type	Magnet motor 200 W or less	at 12 V	
	Fan type and size (diameter x width)	Sirocco fan type 150 x 75 mm (5.91 x 2.95 in)	—	

1. Heater Unit



- | | |
|-----------------------|-----------------------|
| (1) Vent door | (7) Mix lever |
| (2) DEF door | (8) Foot door |
| (3) DEF lever | (9) Foot duct |
| (4) Heater core | (10) Heater case REAR |
| (5) Heater case FRONT | (11) Foot lever lower |
| (6) Mix door | (12) Foot lever upper |

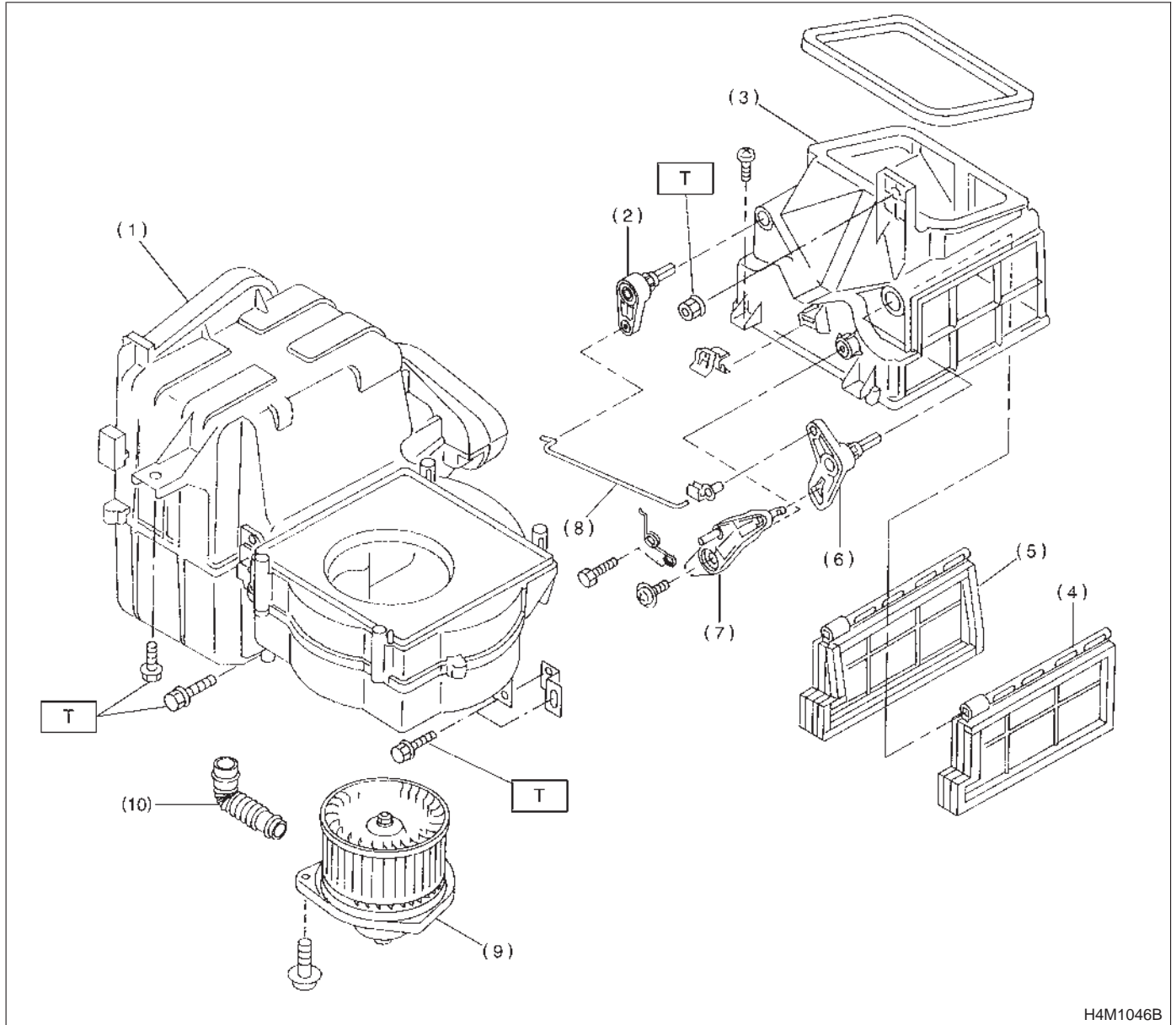
- (13) Vent lever
(14) Side link

Tightening torque: N-m (kg-m, ft-lb)

T: 7.35±1.96

(0.750±0.200, 5.421±1.446)

2. Intake Unit



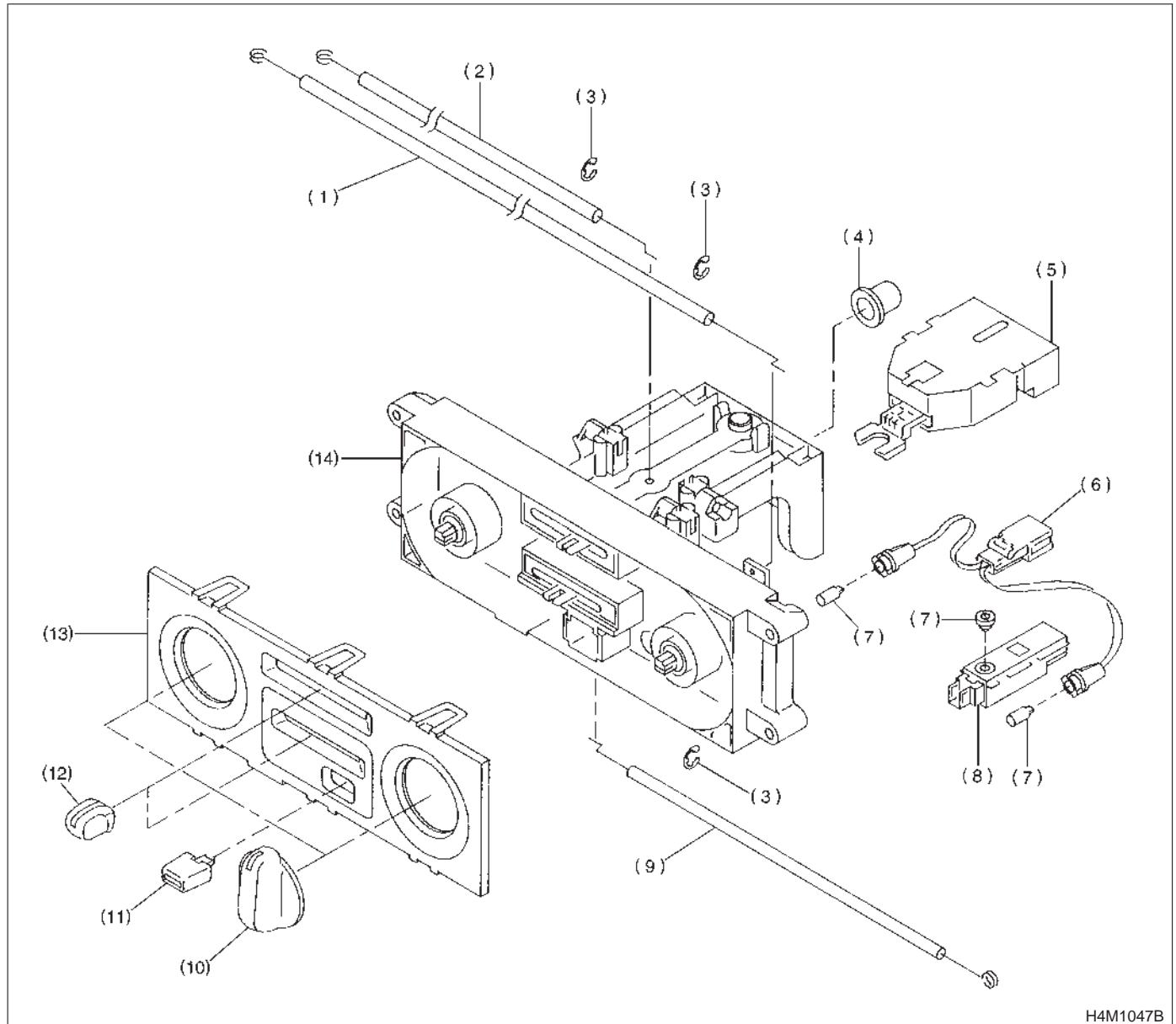
- | | |
|----------------------------|-----------------------|
| (1) Intake unit case lower | (6) Lever (A) |
| (2) Lever (B) | (7) Link |
| (3) Intake unit case upper | (8) Rod |
| (4) Door (A) | (9) Blower motor ASSY |
| (5) Door (B) | (10) Aspirator pipe |

Tightening torque: N-m (kg-m, ft-lb)

T: 7.35±1.96

(0.750±0.200, 5.421±1.446)

3. Control Unit



H4M1047B

- | | | |
|-------------------------------|------------------------|-------------------------|
| (1) Temperature control cable | (6) Harness ASSY | (11) A/C switch knob |
| (2) Recirc control cable | (7) Bulb | (12) Control lever knob |
| (3) Clip | (8) A/C switch ASSY | (13) Plate |
| (4) Grommet | (9) Mode control cable | (14) Base unit |
| (5) Blower switch ASSY | (10) Control dial knob | |

1. Precaution

A: SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the instrument panel, heater unit, blower motor and control unit.

CAUTION:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage Airbag system wiring harness when servicing the instrument panel, heater unit, blower motor and control unit.

2. Heater Unit

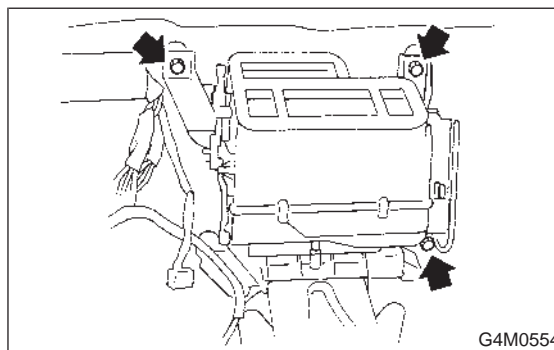
A: REMOVAL AND INSTALLATION

- 1) Disconnect GND cable from battery.
- 2) Remove heater hoses (inlet, outlet) in engine compartment.

NOTE:

Drain as much coolant from heater unit as possible, and plug disconnected hose with cloth.
<Ref. to 2-5 [W200].>

- 3) Remove instrument panel.
<Ref. to 5-4 [W1A0].>
- 4) Remove steering support beam.
<Ref. to 5-1 [C600].>
- 5) Remove cooling unit.
<Ref. to 4-7 [W14A0].>
- 6) Remove heater unit.



- 7) Installation is in the reverse order of removal.

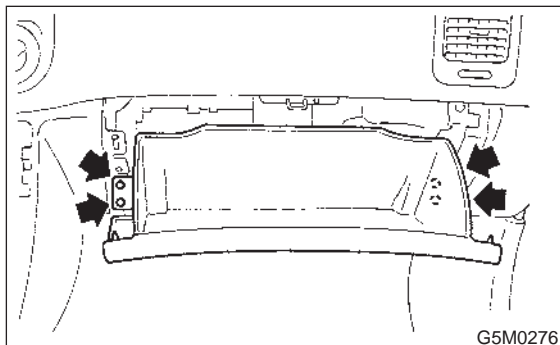
Fitted length of heater hose over pipe:
 27.5 ± 2.5 mm (1.083 ± 0.098 in)

- 8) Pour coolant.
<Ref. to 2-5 [W200].>

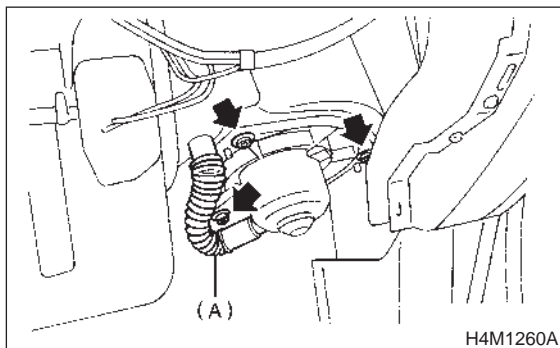
3. Blower Motor Assembly

A: REMOVAL AND INSTALLATION

- 1) Disconnect GND cable from battery.
- 2) Remove glove box.



- 3) Disconnect blower motor harness connector.
- 4) Disconnect aspirator pipe (A).
- 5) Remove blower motor mounting screw.



- 6) Remove blower motor assembly.
- 7) Installation is in the reverse order of removal.

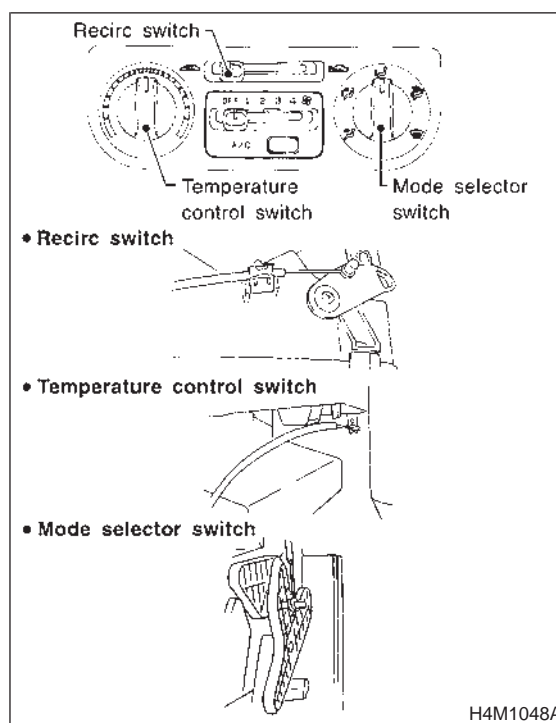
4. Control Unit

A: REMOVAL AND INSTALLATION

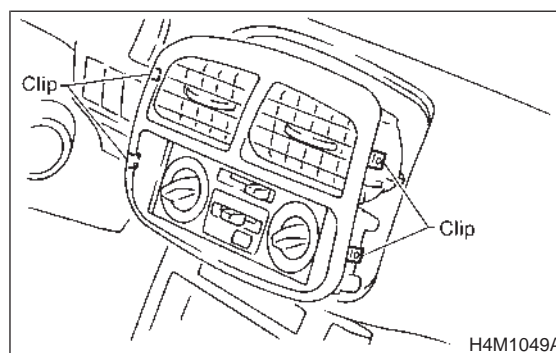
- 1) Disconnect GND cable from battery.
- 2) Set temperature control switch to "FULL HOT" and mode selector switch to "DEF" position and recirc switch to "FRESH" position.
- 3) Disconnect temperature control cable and mode door control cable from heater unit then disconnect recirc control cable from intake unit.

NOTE:

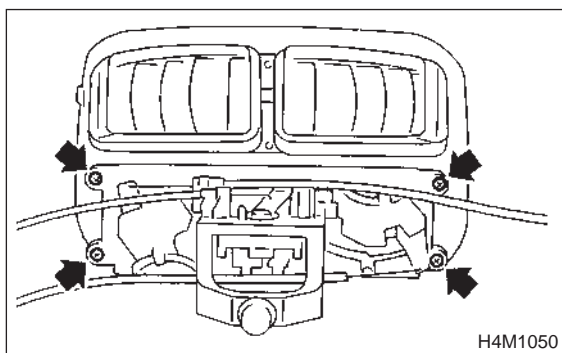
Do not attempt to move links during installation.



- 4) Remove center panel from instrument panel then disconnect connectors.



5) Remove control unit assembly from center panel.



6) Installation is in the reverse order of removal.

NOTE:

Before installing control unit, set temperature control switch to "FULL HOT" and mode selector switch to "DEF" position and recirc switch to "FRESH" position.

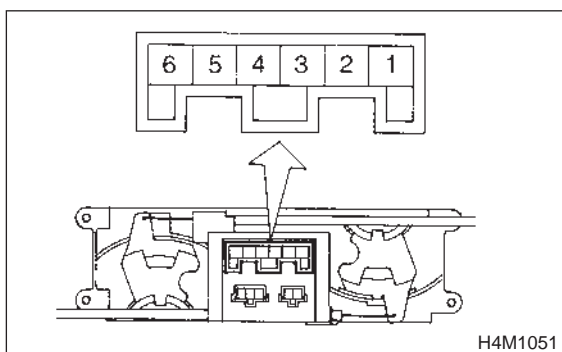
B: INSPECTION

1. FAN SWITCH

Check continuity between terminals at each switch position.

Switch position	Terminals					
	1	2	3	4	5	6
1	○				○	○
2	○			○		○
3	○		○			○
4	○	○				○
	IGN					GND

H5M1280A

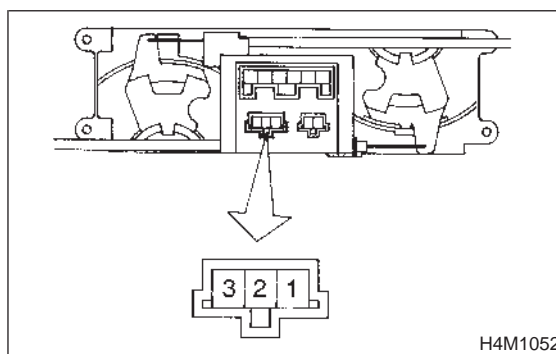


2. A/C SWITCH

Check A/C switch continuity between each terminal.

Terminal	Switch ON	Illumi.
1		○
2	○	○
3	○	○

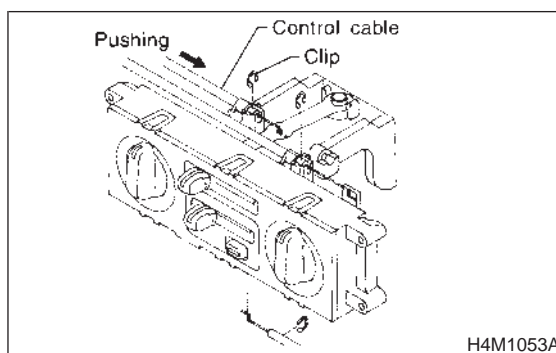
H5M1281A



C: ADJUSTMENT

1) Operate temperature control switch to "FULL COLD" and mode selector switch to "VENT" position and recirc switch to "RECIRC" position.

2) Install control cable to lever. While pushing outer cable, secure control cable with clip.

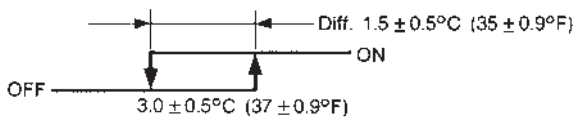


AIR CONDITIONING SYSTEM

4-7

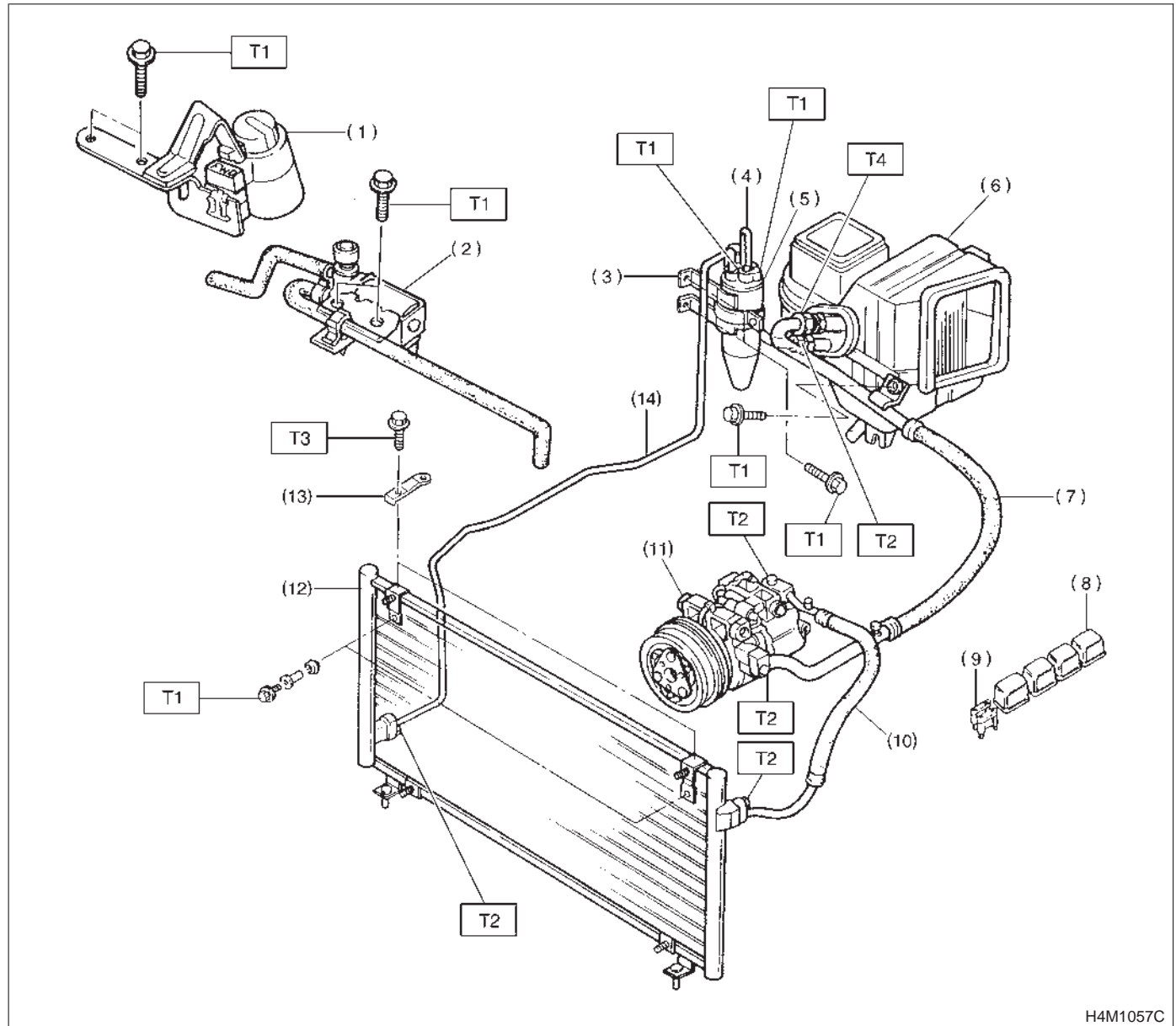
	Page
S SPECIFICATIONS	2
1. Specifications	2
C COMPONENT PARTS	3
1. Air Conditioning System	3
2. Intake Unit with Evaporator	4
3. Compressor	5
W SERVICE PROCEDURE	6
1. Safety Precautions	6
2. Basic Information	7
3. Tools and Equipment	8
4. O-ring Connections	11
5. Refrigerant Service Procedure	13
6. Discharge the System	14
7. Evacuating and Charging	14
8. Leak Testing	18
9. Lubrication	20
10. Performance Test	21
11. Compressor	21
12. Condenser	25
13. Receiver Drier	26
14. Intake Unit with Evaporator	26
15. Condenser Fan Assembly	28
16. Flexible Hose	28
17. Relay and Fuse	29
18. Pressure Switch (Dual Switch)	31
K DIAGNOSTICS	32
1. Air Conditioning System Diagnosis	32
2. Performance Test Diagnosis	33
3. Blower Motor Diagnosis	36
4. Compressor Diagnosis	37
5. Compressor Clutch Diagnosis	38
6. Radiator Fan (Main Fan) Diagnosis	39
7. Condenser Fan (Sub Fan) Diagnosis (I)	40
8. Condenser Fan (Sub Fan) Diagnosis (II)	41

1. Specifications

Item			Specifications	
Type of air conditioner			Reheat air-mix type	
Cooling capacity			5.234 kW (4,500 kcal/h, 17,856 BTU/h)	
Refrigerant			HFC-134a (CH ₂ FCF ₃) [0.6±0.05 kg (1.3±0.11 lb)]	
Compressor	Type	5-vane rotary, fix volume (CR-14)		
	Discharge	144 cm ³ (8.79 cu in)/rev		
	Max. permissible speed	7,000 rpm		
Magnet clutch	Type	Dry, single-disc type		
	Power consumption	47 W		
	Type of belt	V-Ribbed 4 PK		
	Pulley dia. (effective dia.)	125 mm (4.92 in)		
	Pulley ratio	1.064		
Condenser	Type	Corrugated fin (Multi-flow)		
	Core face area	0.211 m ² (2.27 sq ft)		
	Core thickness	19 mm (0.75 in)		
	Radiation area	5.76 m ² (62 sq ft)		
Receiver drier	Effective inner capacity	250 cm ³ (15.26 cu in)		
Expansion valve	Type	Internal equalizing		
Evaporator	Type	Single tank		
	Dimensions (W × H × T)	74 × 222 × 235 mm (2.91 × 8.74 × 9.25 in)		
	Fan type	Sirocco fan		
Blower fan	Outer diameter × width	140 × 75 mm (5.51 × 2.95 in)		
	Power consumption	200 W at 12 V		
	Motor type	Magnet		
Condenser fan (Sub fan)	Power consumption	70 W at 12 V		
	Fan outer diameter	320 mm (12.60 in)		
	Motor type	Magnet		
Radiator fan (Main fan)	Power consumption	70 W at 12 V		
	Fan outer diameter	320 mm (12.60 in)		
	Idling speed (A/C ON)	MPFI model	850±100 rpm (700±100 rpm “D” range in AT model)	
Dual switch (Pressure switch)	Low-pressure switch operating pressure kPa (kg/cm ² , psi)	ON → OFF	176±29 (1.80±0.30, 25.5±4.3)	
		OFF → ON	186 ^{+39/-25} (1.90 ^{+0.4/-0.25} , 27.0 ^{+5.7/-3.6})	
	High-pressure switch operating pressure kPa (kg/cm ² , psi)	ON → OFF	2,746±98 (28±1, 398±14)	
		DIFF	588±196 (6±2, 85±28)	
Compressor relief valve blow-out pressure kPa (kg/cm ² , psi)			3,727±196 (38±2.0, 540±28)	
Thermo control amplifier working temperature (Evaporator outlet air)				
Compressor thermocut temperature			150±5°C (302±9°F) Diff. -3±5°C (27±9°F)	

G4M0938

1. Air Conditioning System



- | | |
|------------------------------------|--|
| (1) A/C cut relay | (9) Fuse |
| (2) FICD (1800 cc model) | (10) Hose (High-pressure) |
| (3) Receiver drier bracket | (11) Compressor |
| (4) Pipe (Receiver drier — C/unit) | (12) Condenser |
| (5) Receiver drier | (13) Radiator bracket |
| (6) Cooling unit | (14) Pipe (Condenser — Receiver drier) |
| (7) Hose (Low-pressure) | |
| (8) A/C relay | |

Tightening torque: N·m (kg·m, ft·lb)

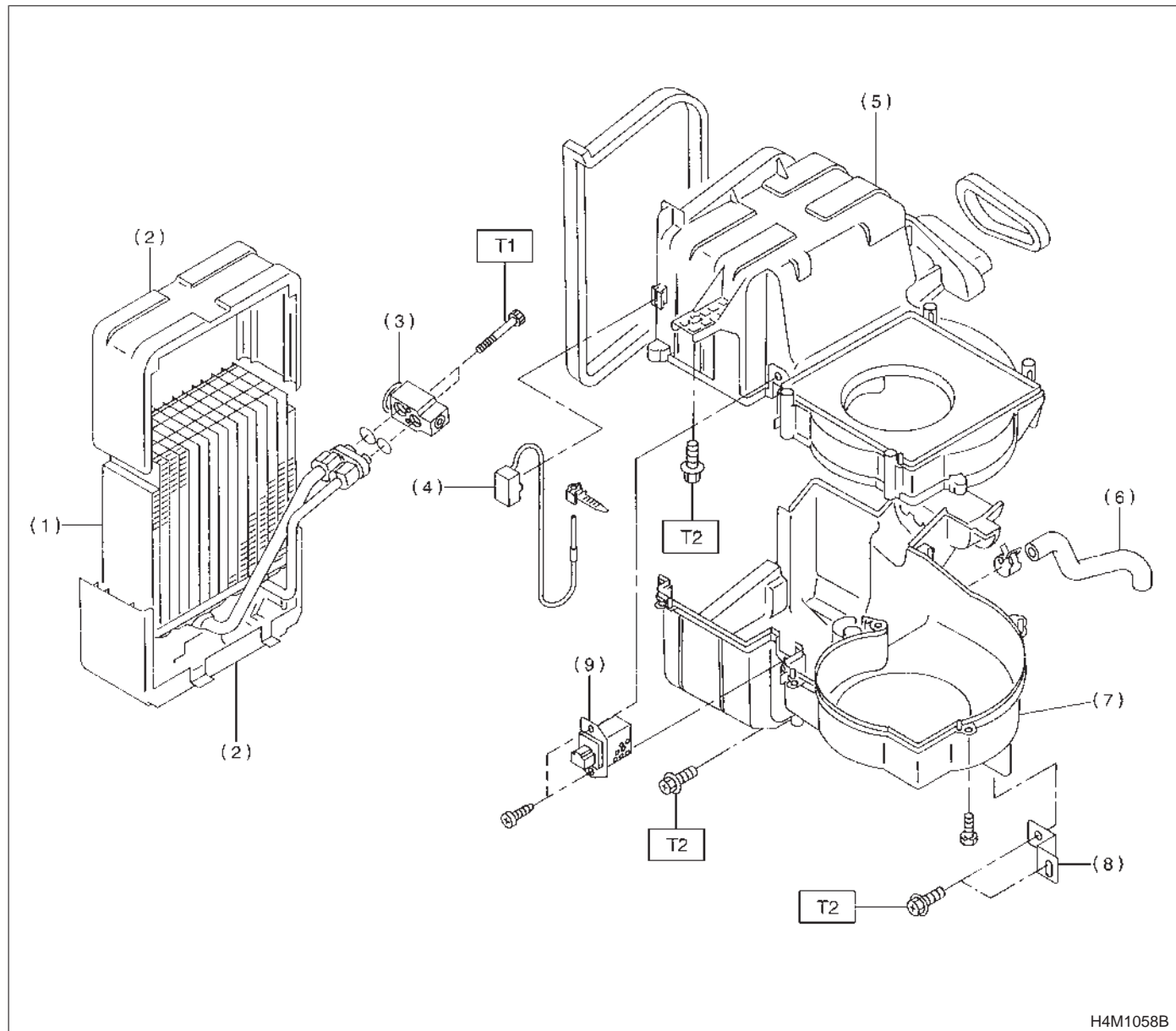
T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)

T2: 18±5 (1.8±0.5, 13±3.6)

T3: 15±5 (1.5±0.5, 11±3.6)

T4: 25±5 (2.5±0.5, 18±3.6)

2. Intake Unit with Evaporator



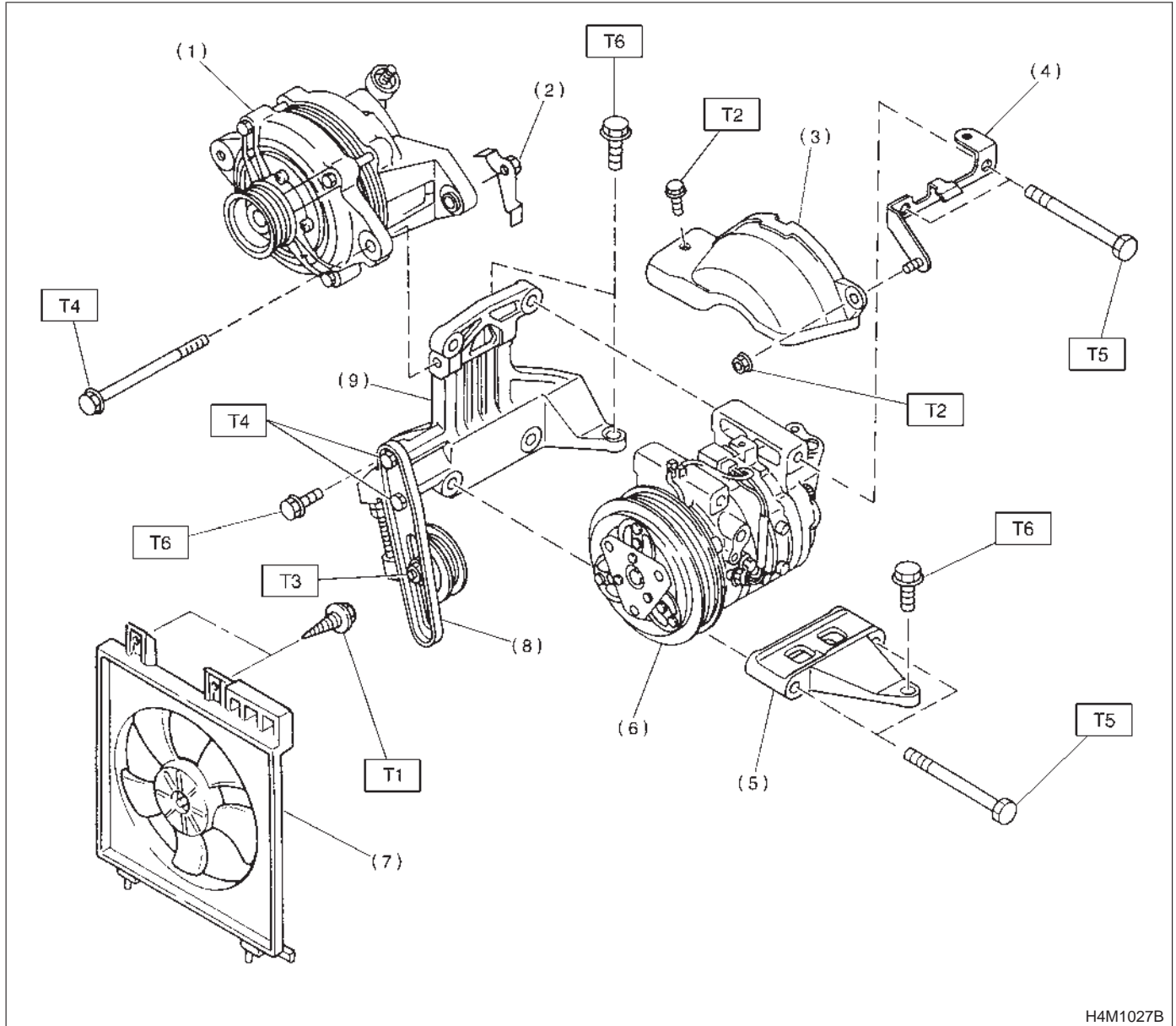
- | | |
|------------------------------|----------------------------|
| (1) Evaporator | (6) Drain hose |
| (2) Insulator | (7) Intake unit case lower |
| (3) Block expansion valve | (8) Mount bracket |
| (4) Thermo control amplifier | (9) Resistor |
| (5) Intake unit case upper | |

Tightening torque: N·m (kg·m, ft·lb)

T1: 4 ± 1 (0.4 ± 0.1 , 2.9 ± 0.7)

T2: 7.4 ± 2.0 (0.75 ± 0.2 , 5.4 ± 1.4)

3. Compressor



H4M1027B

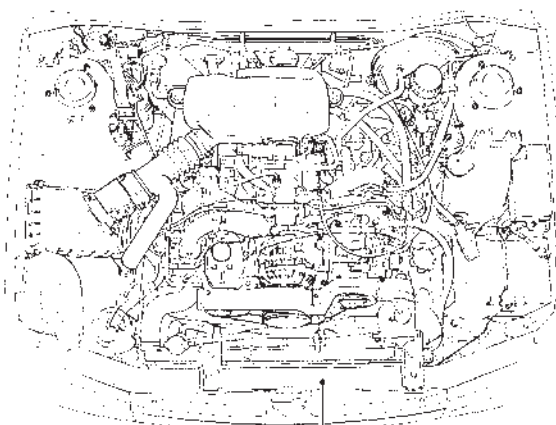
- | | |
|------------------------------|------------------------------|
| (1) Alternator | (7) Condenser fan motor ASSY |
| (2) Alternator bracket nut | (8) Idler pulley ASSY |
| (3) Compressor belt cover | (9) Compressor bracket upper |
| (4) Bracket | |
| (5) Compressor bracket lower | |
| (6) Compressor | |

Tightening torque: N·m (kg·m, ft·lb)**T1: 5±1.5 (0.5±0.15, 3.6±1.1)****T2: 7.4±2 (0.75±0.2, 5.4±1.4)****T3: 23±3 (2.3±0.3, 17±2.2)****T4: 23.0±3 (2.35±0.3, 17.0±2.2)****T5: 28.9±4.4 (2.95±0.45, 21.3±3.3)****T6: 35±4 (3.6±0.4, 26±2.9)**

1. Safety Precautions

A: HFC-134a AIR CONDITIONING SYSTEM

Component parts of the cooling system, refrigerant, compressor oil, and other parts are not the same for the HFC-134a system and the older CFC-12 system. Do not interchange parts or liquid. Vehicles with HFC-134a air conditioning systems, use only HFC-134a parts that are indicated on a label attached to the vehicle. Before performing any maintenance, verify the type of air conditioning system installed in the vehicle.



 SUBARU TOKYO JAPAN AIR CONDITIONER (LI-TYPE)		CAUTION: USE ONLY REFRIGERANT HFC134a AND OIL DH-PR FOR THIS AIR CONDITIONER. DON'T USE REFRIGERANT CFC12 AND OIL DH-150CX. ATTENTION: UTILISEZ LE LIQUIDE RÉFRIGÉRANT HFC134a ET L'HUILE DH-PR DANS CE CLIMATISEUR. NE JAMAIS UTILISER LE RÉFRIGÉRANT CFC12 ET L'HUILE DH-150CX. VORSICHT: NUR KÄL TEMITTEL HFC134a UND ÖL DH-PR FÜR DIESE KLIMAANLAGE VERWENDEN. NIEMALS KÄL TEMITTEL CFC12 UND ÖL DH-150CX.
REFRIGERANT CHARGE: HFC134a, 19-23 OZ (0.55-0.65kg) COMPRESSOR OIL : DH-PR COMPRESSOR BELT: 73323FA030 (1.6L) 73323AC000 or 73323AC010 (1.8L, 2.0L, 2.2L)	REFRIGERANT UNDER HIGH PRESSURE. CONSULT SERVICE MANUAL. CAUTION: SYSTEM TO BE SERVICED BY QUALIFIED PERSONNEL. SAE J639	

H4M1065A

B: COMPRESSOR OIL

Do not use any compressor oil that is not specifically designated for the HFC-134a air conditioning system; only use DH-PR. Also, do not use HFC-134a compressor oil in the CFC-12 air conditioning system. If compression oils are mixed, poor lubrication will result and the compressor itself may be damaged.

Because HFC-134a compressor oil is very hygroscopic (easily absorbs moisture), when parts of the air conditioning system are being removed, quickly install a blind plug to prevent contact with the outside air. Also, always make sure that the service container for compressor oil is tightly closed except

when in use. Store compressor oil in a tightly closed steel container.

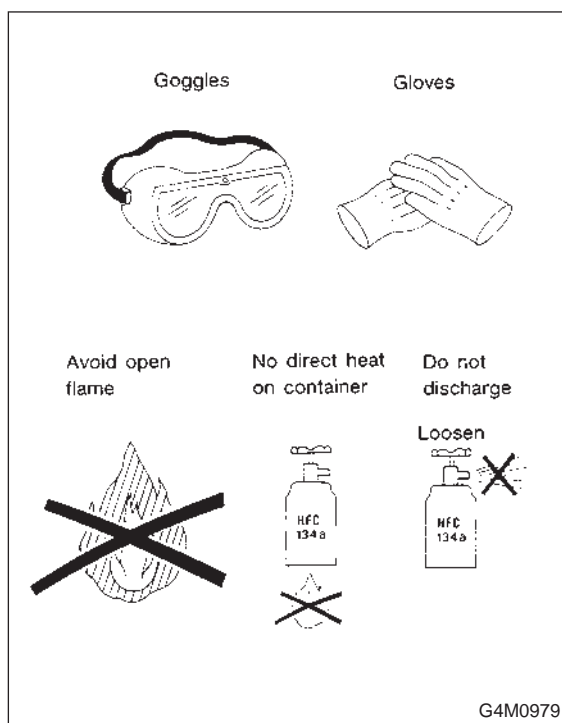
C: REFRIGERANT

Do not put CFC-12 refrigerant into a HFC-134a air conditioning system. Also, do not put HFC-134a refrigerant into a CFC-12 air conditioning system. If the wrong refrigerant is used, poor lubrication will result and the compressor itself may be destroyed.

D: HANDLING OF REFRIGERANT

Because refrigerant boils at approx. -30°C (-22°F) at sea level, it is cold enough to give you severe frostbite. Always wear goggles to protect your eyes and gloves to protect your hands. Also, even under the pressures normally found in CFC-12 containers, refrigerant will boil with the addition of heat. This could raise the pressure inside the container to a dangerous level.

Never expose a can of HFC-134a to direct sunlight, or to temperatures over 40°C (104°F). One more thing to remember about HFC-134a is that when it is exposed to an open flame or to hot metal, it forms phosgene, a deadly gas. Do not discharge HFC-134a into the atmosphere on purpose. Always read and follow the precautions on the HFC-134a bottle.



2. Basic Information

1) The combination of moisture and refrigerant forms acid, therefore, moisture should not be allowed to enter the refrigerant.

2) Refrigerant oil readily absorbs moisture, therefore, keep refrigerant oil containers tightly capped.

3) The process of evacuating the system is performed to remove small amounts of moisture. This is accomplished by lowering the pressure inside the system, which allows the moisture to boil off, in much the same way that a pot of water will boil away to nothing given enough time. The evacuation process does not suck the moisture out of the system.

4) A minimum level of vacuum must be reached to satisfactorily evacuate the system. This minimum level of vacuum depends on the temperature inside the system. The chart below shows the level of vacuum required to boil water at various temperatures.

Additionally, the vacuum level shown on a gauge will read approx. 4 kPa (25 mmHg, 1 inHg) less for each 304.8 m (1,000 ft) above sea level, due to the decrease in atmospheric pressure at altitude.

Vacuum level required to boil water (at sea level)	
Temperature $^{\circ}\text{C}$ ($^{\circ}\text{F}$)	Vacuum kPa (mmHg, inHg)
1.7 (35)	100.9 (757, 29.8)
7.2 (45)	100.6 (754, 29.7)
12.8 (55)	99.9 (749, 29.5)
18.3 (65)	99.2 (744, 29.3)
23.9 (75)	98.5 (739, 29.1)
29.4 (85)	97.2 (729, 28.7)
35 (95)	95.8 (719, 28.3)

3. Tools and Equipment

The following section provides information about the tools and equipment that will be necessary to properly service the A/C system.

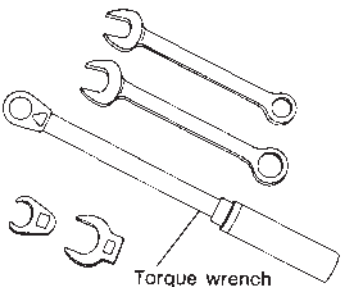
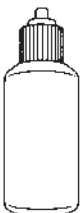
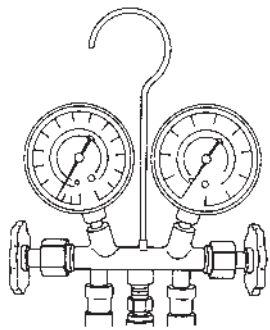
Since equipment may vary slightly depending on the manufacturer, it is important to always read and follow the manufacturer's instructions.


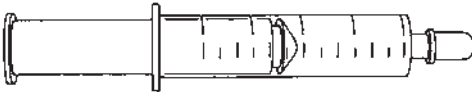
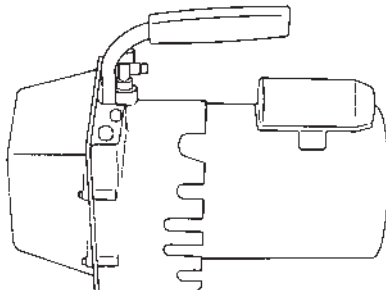
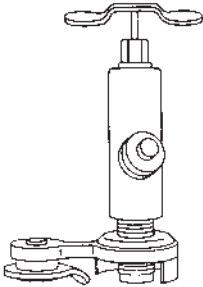
CAUTION:

When working on vehicles with the HFC-134a system, only use HFC-134a specified tools and parts. Do not mix with CFC-12 tools and parts. If HFC-134a and CFC-12 refrigerant or com-

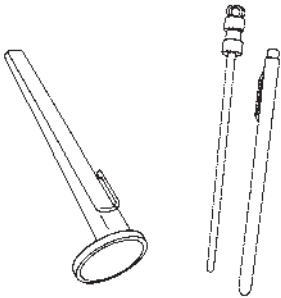
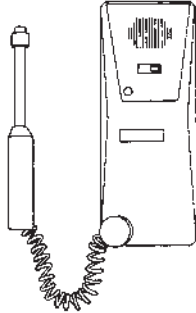

pressor oil is mixed, poor lubrication will result and the compressor itself may be destroyed. In order to help prevent mixing HFC-134a and CFC-12 parts and liquid, the tool and screw type and the type of service valves used are different. The gas leak detectors for the HFC-134a and CFC-12 systems must also not be interchanged.

	HFC-134a	CFC-12
Tool & screw type	Millimeter size	Inch size
Valve type	Quick joint type	Screw-in type

Tools and Equipment	Description
<ul style="list-style-type: none"> ● WRENCH <p>Various WRENCHES will be required to service any A/C system. A 7 to 40 N·m (0.7 to 4.1 kg-m, 5 to 30 ft-lb) torque wrench with various crowfoot wrenches will be needed. Open end or flare nut wrenches will be needed for back-up on the tube and hose fittings.</p>	 <p>G4M0571</p>
<ul style="list-style-type: none"> ● APPLICATOR BOTTLE <p>A small APPLICATOR BOTTLE is recommended to apply refrigerant oil to the various parts. They can be obtained at a hardware or drug store.</p>	 <p>G4M0572</p>
<ul style="list-style-type: none"> ● MANIFOLD GAUGE SET <p>A MANIFOLD GAUGE SET (with hoses) can be obtained from either a commercial refrigeration supply house or from an auto shop equipment supplier.</p>	 <p>G4M0573</p>

Tools and Equipment	Description
<p>● REFRIGERANT RECOVERY SYSTEM</p> <p>A REFRIGERANT RECOVERY SYSTEM is used for the recovery and reuse of A/C system refrigerant after contaminants and moisture have been removed from the refrigerant.</p>	 <p>G4M0574</p>
<p>● SYRINGE</p> <p>A graduated plastic SYRINGE will be needed to add oil back into the system. The syringe can be found at a pharmacy or drug store.</p>	 <p>G4M0575</p>
<p>● VACUUM PUMP</p> <p>A VACUUM PUMP (in good working condition) is necessary, and may be obtained from either a commercial refrigeration supply house or an automotive equipment supplier.</p>	 <p>G4M0576</p>
<p>● CAN TAP</p> <p>A CAN TAP for the 397 g (14 oz) can is available from an auto supply store.</p>	 <p>G4M0577</p>

3. Tools and Equipment

Tools and Equipment	Description
<ul style="list-style-type: none"> ● THERMOMETER <p>Pocket THERMOMETERS are available from either industrial hardware store or commercial refrigeration supply houses.</p>	 <p>G4M0578</p>
<ul style="list-style-type: none"> ● ELECTRONIC LEAK DETECTOR <p>An ELECTRONIC LEAK DETECTOR can be obtained from either a specialty tool supply or an A/C equipment supplier.</p>	 <p>G4M0579</p>
<ul style="list-style-type: none"> ● WEIGHT SCALE <p>A WEIGHT SCALE such as an electronic charging scale or a bathroom scale with digital display will be needed if a 13.6 kg (30 lb) refrigerant container is used.</p>	 <p>G4M0580</p>

4. O-ring Connections

A: GENERAL

The following points should be kept in mind when assembling O-ring connections:

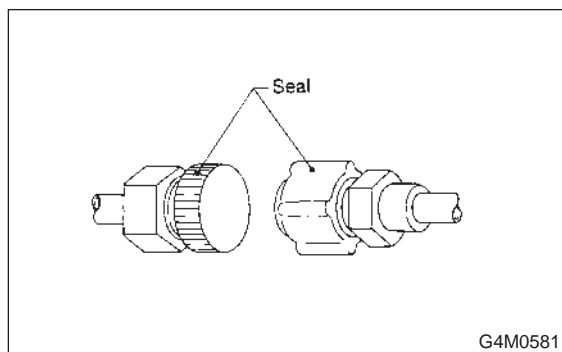
- 1) Avoid unnecessary handling and contact of O-rings with your hands, since even clean fingers contain body acids, which can contaminate the O-ring surface.
- 2) Do not handle O-rings with gloves, shop towels, etc., since lint particles may cling to the O-ring, possibly causing a leak upon assembly.
- 3) Always lubricate O-rings before assembly to allow the O-ring to seat itself properly.
- 4) Be certain to use torque wrenches when tightening O-ring fittings, because overtightening can not only damage the O-ring, but it can distort the tube end as well.

B: REMOVE PROTECTIVE SEALS

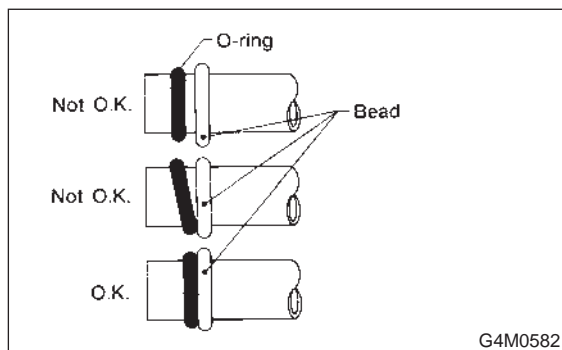
- 1) Just prior to making the connection, remove the protective seals.

CAUTION:

If for any reason you have to stop before making a connection, recap the tube, component or fitting.



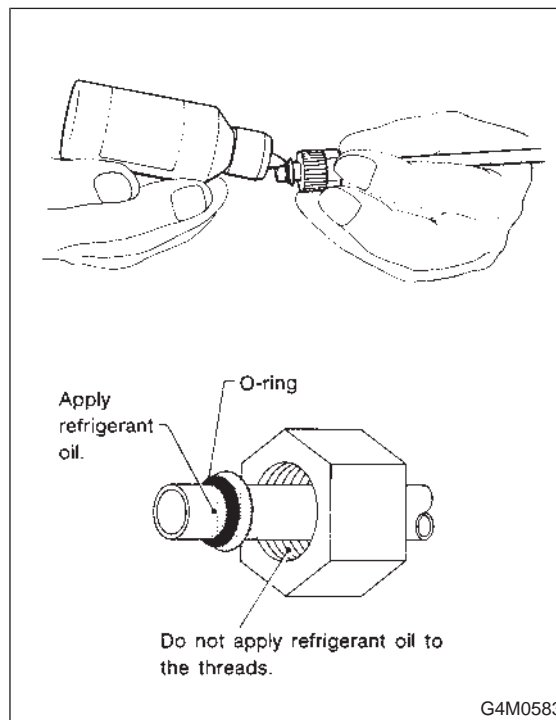
- 2) Visually inspect the O-ring surface, the O-ring mating surface, the threads and the connection points. If a defective part is found, replace it. The O-ring must sit square against the tube bead. If necessary, slide the O-ring into proper position with clean hands.



C: LUBRICATE THE COMPONENTS

For lubrication of the components, use only refrigerant oil as described in the appropriate service manual. Apply oil from an oil squirt gun or other closed container. Do not use your finger to spread the oil over the O-ring.

Apply a small amount of refrigerant oil to the top and sides of the O-ring. The area covered by oil should include the O-ring and the tube bead.



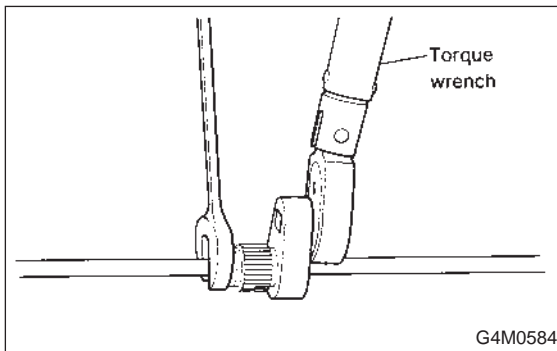
D: TORQUE THE FITTING

Using a back-up wrench in conjunction with a calibrated torque wrench, torque the connection to the midrange of the specification.

After completion of torquing, use a clean shop towel to remove any excess oil from the connection or any oil that may have dripped on the vehicle body or other parts.

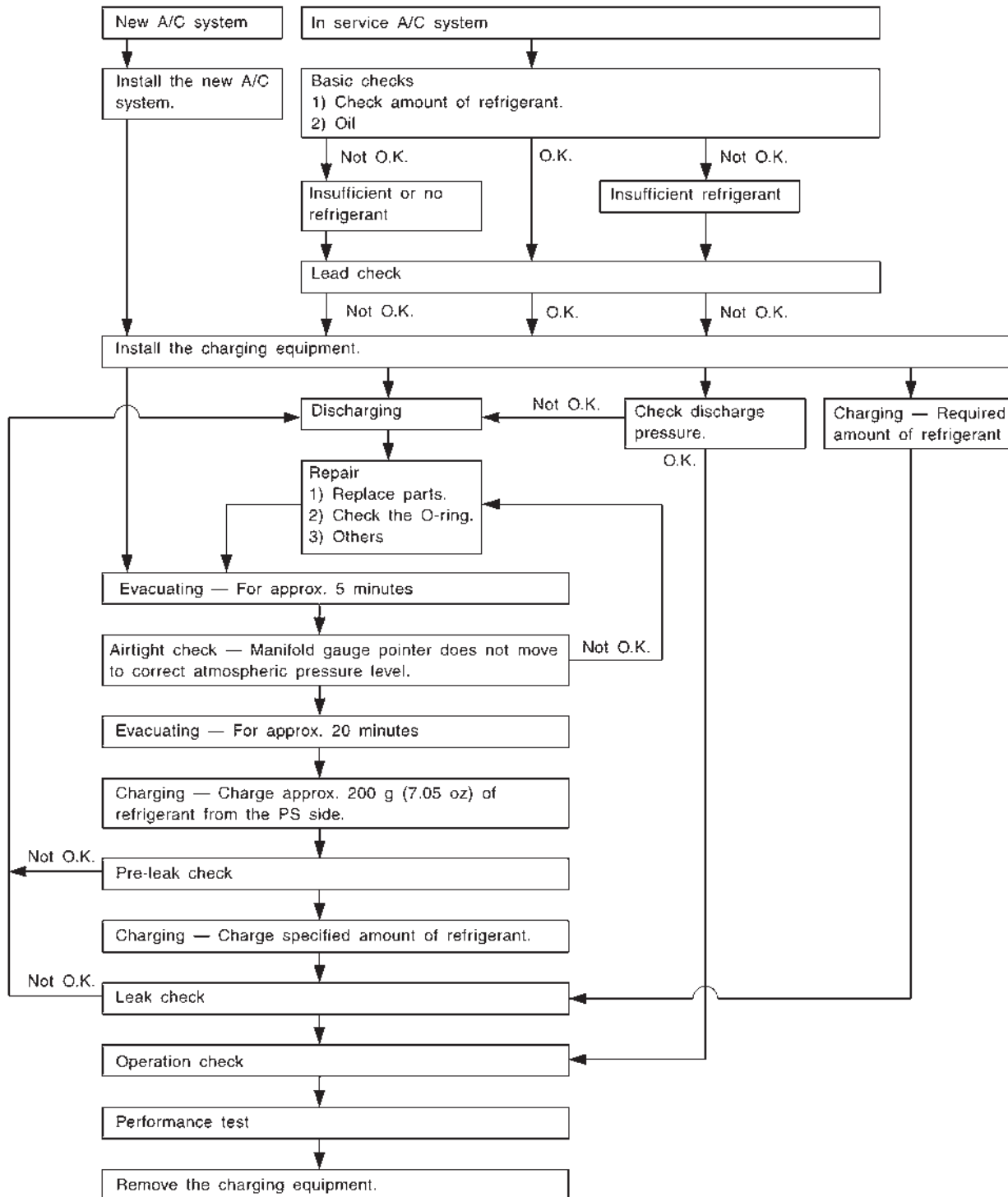
CAUTION:

If a leak is suspected after torquing, do not retighten or retorque the connection. Instead, disassemble the connection, remove the O-ring, and inspect the O-ring, threads, joints and seating surfaces.



5. Refrigerant Service Procedure

A: WORK FLOW



6. Discharge the System

CAUTION:

The following points must be kept in mind when discharging the system.

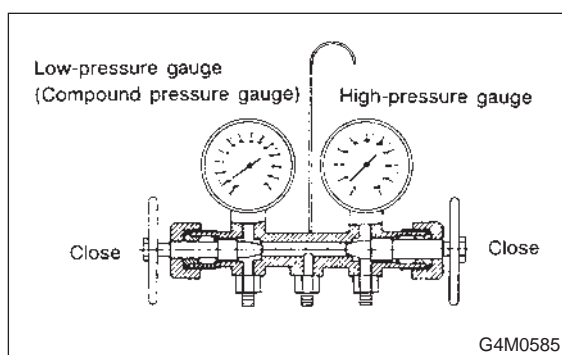
- Be certain that goggles and gloves are worn.
- Connect refrigerant recovery system to manifold gauge set and remove recycle refrigerant from the A/C system.

NOTE:

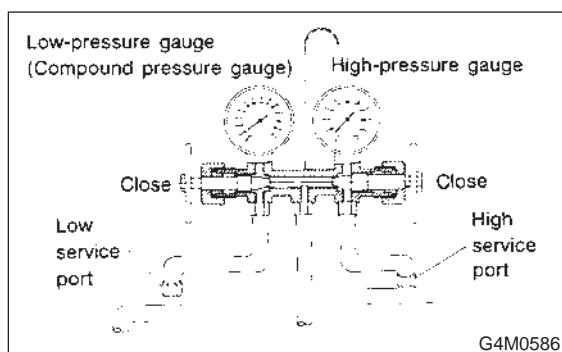
Refer to that refrigerant recovery system instruction manual for operating procedures.

A: CONNECTING THE MANIFOLD GAUGE SET

- 1) Close the high and low side manifold valves



- 2) Turn the A/C system ON and turn the IG switch OFF.
- 3) Attach the high- and low-pressure manifolds to the high and low services port on the vehicle.

**B: PREPARE FOR DISCHARGING**

Connect center manifold hose to refrigerant recovery system to recycle refrigerant.

7. Evacuating and Charging

The following points should be kept in mind when evacuating and charging with a manifold gauge set:

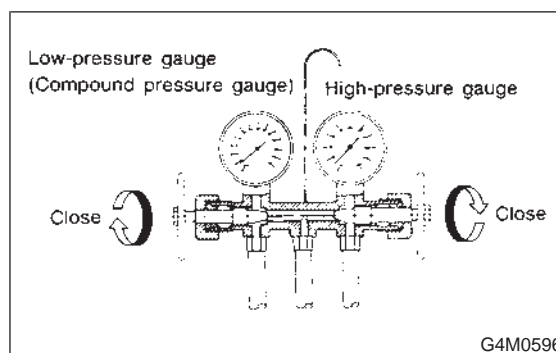
- 1) Be certain that goggles and gloves are worn.
- 2) If bulk refrigerant [13.6 kg (30 lb) canister] is used, be certain to weigh the charge amount carefully, using the correct equipment, to avoid overcharging the system.
- 3) The charging procedure described in this section begins by charging liquid refrigerant into the high- pressure side of the system with the engine off. The procedure is completed by charging refrigerant vapor into the low- pressure side of the system with the engine running.

CAUTION:

Never open the high-pressure manifold valve when the engine is running.

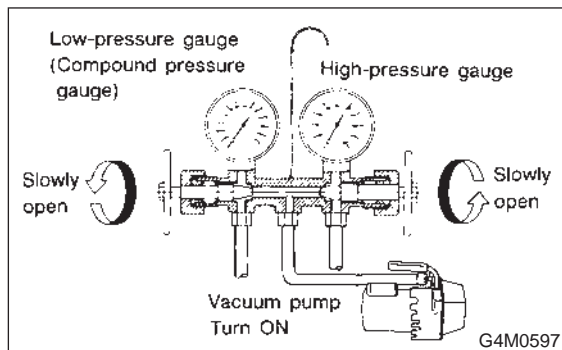
A: CONNECT THE GAUGE SET

- 1) Close the high- and low-pressure manifold valves



- 2) Attach the low-pressure manifold hose to the low-pressure service port on the vehicle. Check the low-pressure gauge. If more than 68.6 kPa (0.70 kg/cm², 10 psi) is indicated, discharge the system prior to charging.
- 3) Attach the high-pressure manifold hose to the high- pressure service port on the vehicle.
- 4) Connect the center hose from the manifold to the vacuum pump.
- 5) Turn on the vacuum pump.

6) Slowly open the low-pressure manifold valve.

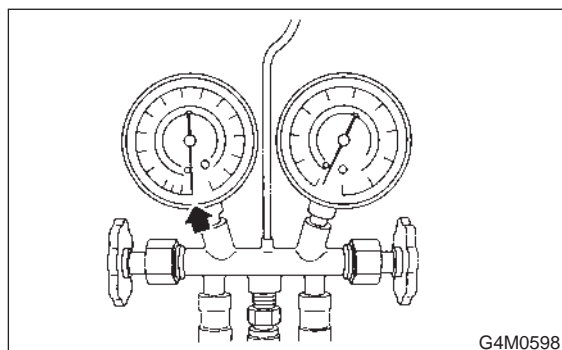


7) When the low-pressure gauge reaches approximately 66.43 kPa (498.3 mmHg, 19.62 inHg), slowly open the high-pressure manifold valve.

8) Maintain a minimum vacuum level of 100.56 kPa (754.4 mmHg, 29.70 inHg) for a minimum of 15 minutes on a new system or 30 minutes for an in-service system.

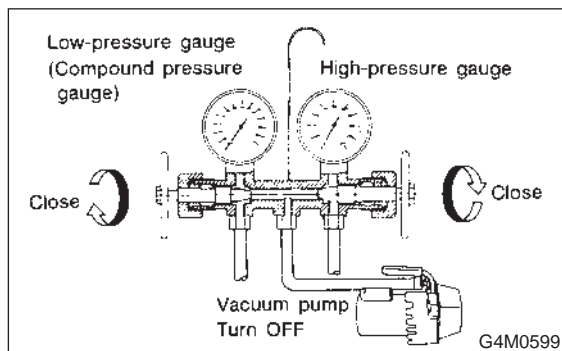
NOTE:

The gauge will read 4 kPa (25 mmHg, 1 inHg) less for every 304.8 m (1,000 ft) above sea level.



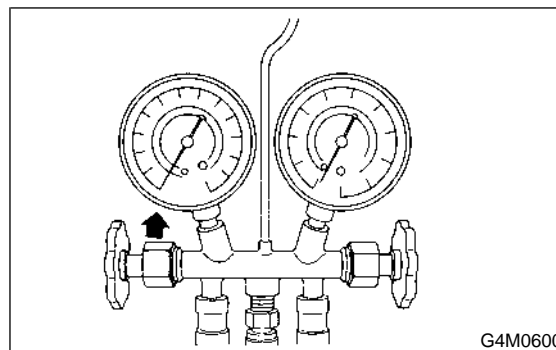
B: PERFORM A VACUUM LEAK TEST

- 1) After 15 minutes (or more) of evacuation, close the high-pressure manifold valve.
- 2) Close the low-pressure manifold valve.



3) Turn off the vacuum pump.

4) Note the low side gauge reading.

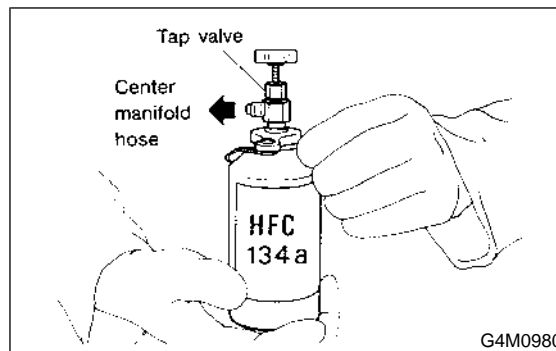


5) After 5 minutes, re-check the low-pressure gauge reading.

If the vacuum level has changed more than 4 kPa (25 mmHg, 1 inHg), perform an HFC-134a leak test.

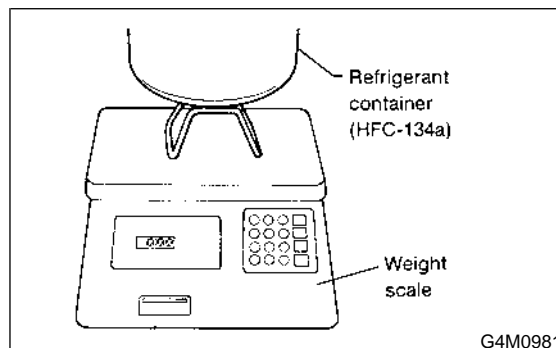
If the vacuum reading is about the same as noted in step 4), continue on to next step.

6) Carefully attach the can tap to the refrigerant can by following the can tap manufacturer's instructions.



7) Disconnect the center manifold hose from the vacuum pump and connect the hose to the tap valve.

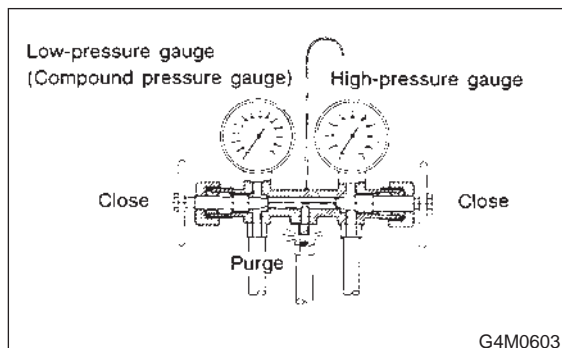
8) If a 13.6 kg (30 lb) container of refrigerant is used a weight scale will be needed. This scale is to determine the amount of refrigerant that is used. Connect the center hose from the manifold to the valve. Place the 13.6 kg (30 lb) container on the scale, valve end down.



C: PURGE THE CENTER HOSE**CAUTION:**

Be certain that goggle and glove are worn.

- 1) Verify that all three hose connections are tight at the manifold gauge set.



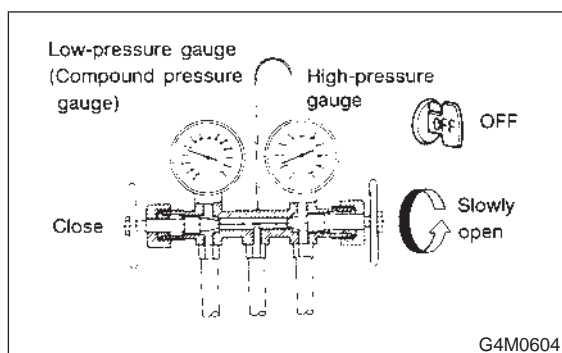
- 2) Open the valve on the HFC-134a source.
- 3) Loosen the center hose connection at the manifold and allow the HFC-134a to escape for no more than two or three seconds, then quickly retighten the hose fitting at the manifold.

D: INITIAL CHARGING THROUGH THE HIGH SIDE

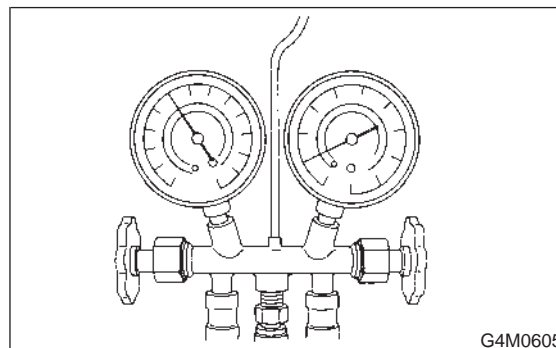
- 1) Connect a tachometer to the engine.
- 2) With the engine off, start charging by slowly opening the high-pressure manifold valve.

NOTE:

The initial charge rate can be increased by immersing the can in lukewarm [below 38°C (100°F)] water for a short time.

**E: CHECK THE GAUGE READINGS**

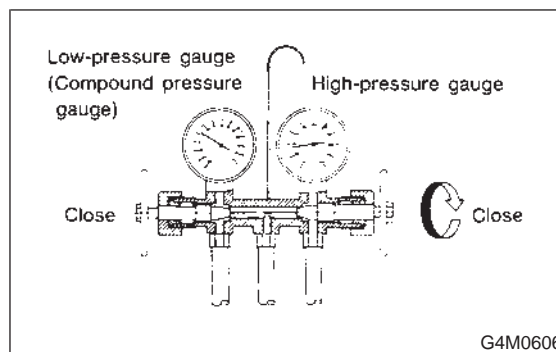
When both the high- and low-pressure gauge readings are about equal, or the HFC-134a source is empty, or the system has been filled to specifications, close the high-pressure manifold valve.

**F: ADD ADDITIONAL CANS**

If the HFC-134a source is exhausted, first close the high-pressure manifold valve, second, close the can tap valve, then slowly purge the refrigerant from the service hose by loosening the fitting at the can tap.

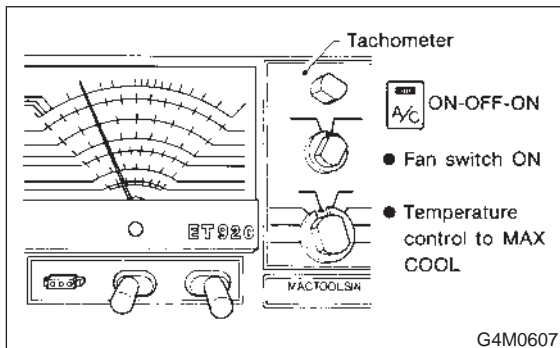
G: COMPLETE CHARGING THROUGH THE LOW SIDE

- 1) Verify that the high-pressure manifold valve is closed (should have already been closed).
- 2) Verify that the low-pressure manifold valve is closed (should have already been closed).



- 3) With the A/C switch off and the windows rolled down, start the engine and run at idle rpm.
- 4) Set the A/C controls on maximum cool and set the blower speed on the highest setting.

5) Quickly turn the A/C switch on-off-on-off a few times to prevent initial compressor damage due to "load shock." Finish this operation with the A/C switch in the ON position.



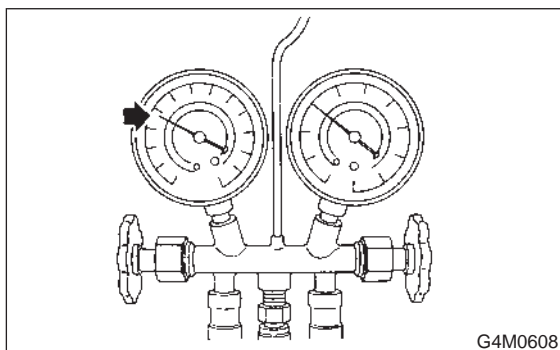
6) Raise engine rpm to approximately 1,500 rpm.

H: CHARGE THE SYSTEM

1) With the refrigerant source connected and the service hose purged, slowly open the low-pressure manifold valve, while checking the low-pressure gauge reading.

CAUTION:

The refrigerant source must be positioned for vapor (valve up).



2) Keep the low side pressure below 276 kPa (2.81 kg/cm², 40 psi) by using the low-pressure manifold valve to regulate the flow of refrigerant into the system.

3) When the system is fully charged, close the low-pressure manifold valve.

4) Close the valve at the refrigerant source.

● Refrigerant capacity

	Unit: kg (lb)	
Refrigerant	Minimum	Maximum
HFC-134a	0.55 (1.21)	0.65 (1.43)

I: COMPLETE ALL SYSTEM CHECKS

1) Evaluate the system performance. <Ref. to 4-7 [K200].>

2) Perform leak detection test. <Ref. to 4-7 [W800].>

CAUTION:

Always perform leak checking in an environment free of refrigerant pollution.

Do not disconnect the high- or low-pressure hoses from the vehicle before leak checking.

J: DISCONNECT THE MANIFOLD GAUGE SET

Remove the high- or low-pressure hoses from the service ports and install the service port caps.

8. Leak Testing

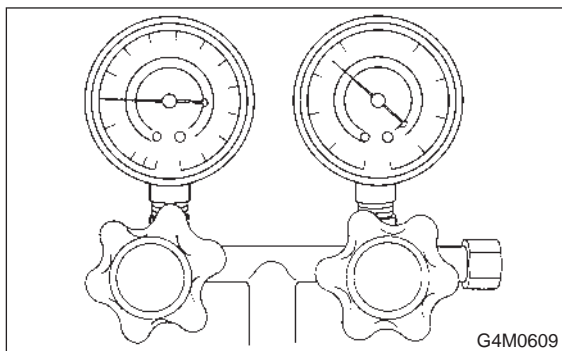
A: INSPECTION

The following points should be kept in mind when conducting a refrigerant leak test.

- 1) The A/C system to be tested must have an adequate refrigerant charge to begin with.
- 2) The area where the leak test is conducted must be free of wind and drafts, with still air being the ideal condition.
- 3) The atmosphere where the leak test is conducted must be free of refrigerant contamination.
- 4) Operate the A/C system for approx. 10 minutes, then turn the engine off and begin the leak test.
- 5) Refrigerant gas is heavier than air, therefore always hold the probe below the connection being tested.
- 6) When checking for a leak along a length of hose or tube, the leak detector probe must be moved slowly, approx. 25 mm (1 in) per second making sure probe does not come in contact with the component being tested.
- 7) When checking for a leak at a certain point, the leak detector probe must be held at that point for at least 5 seconds.

1. CHECK THE SYSTEM PRESSURE

With gauges connected to the A/C system, operate the A/C and confirm that the high side pressure is above 690 kPa (7.03 kg/cm², 100 psi). If not, evacuate and charge the system before leak checking. <Ref. to 4-7 [W700].>



2. CLEAN CONNECTIONS BEFORE TESTING

Before testing, use a clean shop towel to wipe off refrigerant oil, dirt, or foreign material from all of the connections and components to be tested.

NOTE:

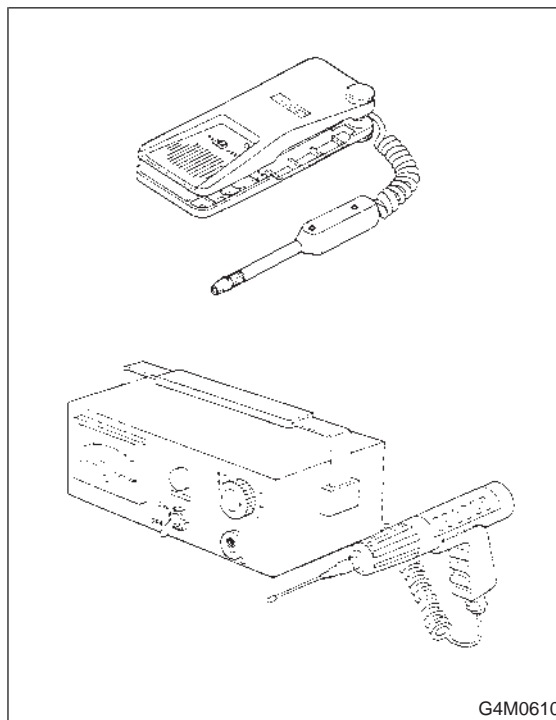
Since refrigerant oil absorbs refrigerant, excess oil on or near a connection may falsely signal a leak.

3. CALIBRATE LEAK DETECTOR

Refer to the manufacturer's instructions for the particular type of detector used and calibrate the instrument.

CAUTION:

Always make sure that the probe tip filter is clean and free of contamination.



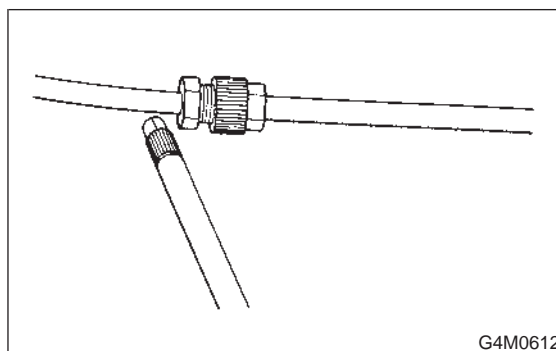
4. LEAK TEST — HIGH-PRESSURE SIDE

Operate the A/C system for approx. 10 minutes, then turn the engine off and begin the leak test.

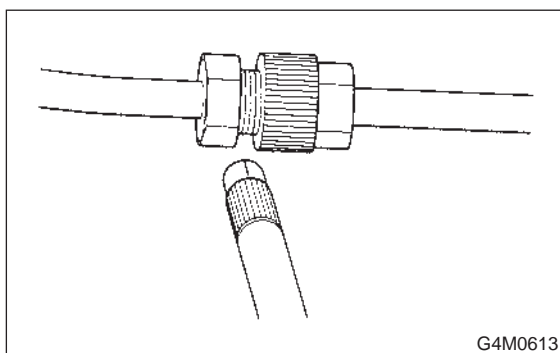
- 1) Begin at the connection of the high-pressure tube to the evaporator, and work your way along the high-pressure side of the system to the compressor. There are three places to check each tube connection.

- 2) Check the area.

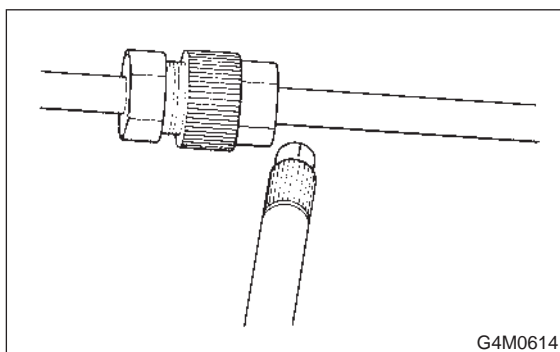
- Check the area where the fitting meets the tube.



- Check the area where the two parts of the fitting join each other.



- Check the area where the nut meets the tube.



- 3) Check the area of the pressure switch (dual switch), and also check the seams of the receiver drier.
- 4) Check the connections of the tubes to the condenser, and also check any welded joints on the condenser.

CAUTION:

An oily area on the fins of the condenser may indicate a leak.

- 5) Check the area where the hoses attach to the compressor.
- 6) Check around the machined portions of the compressor (where the compressor sections join each other).
- 7) If equipped, check the thermal limiter on the compressor housing.
- 8) Check the compressor shaft seal by probing near the center of the compressor clutch pulley.

NOTE:

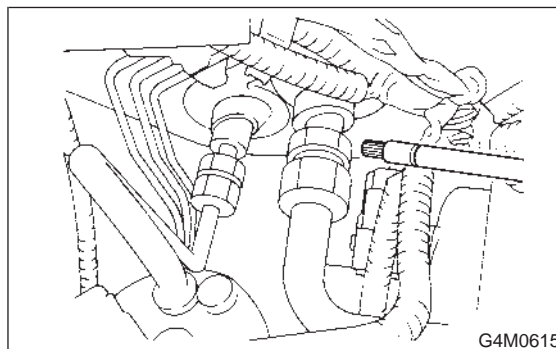
Some shaft seals have a very slight amount of normal leakage [approximately 28 g (1.0 oz) per year].

5. LEAK TEST — LOW-PRESSURE SIDE

- 1) Begin at the connection of the low pressure tube to the evaporator, and work your way along the low-pressure of the system to the compressor. There are three places to check on each tube connection.

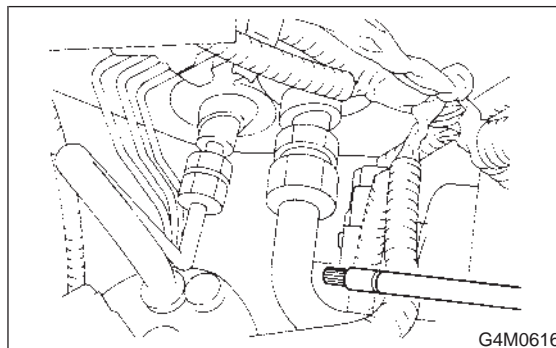
- 2) Check the area.

- (1) Check the area where the fitting joins the tube.



- (2) Check the area where the two parts of the fitting join each other.

- (3) Check the area where the nut joins the tube.

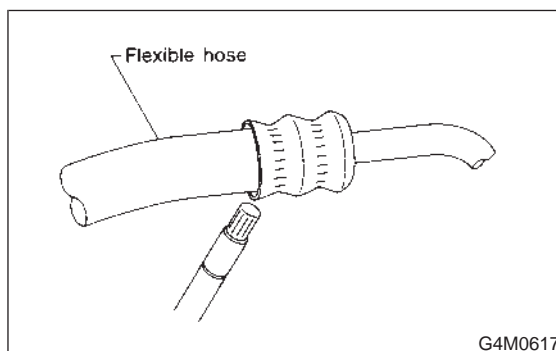


6. CHECK THE FLEXIBLE HOSES

Visually inspect the rubber portions of the flexible hoses for cracking. Probe the rubber section, including the ends of any insulators or protectors which may cover sections of the rubber hose, and near the ends where the rubber meets the metal collar.

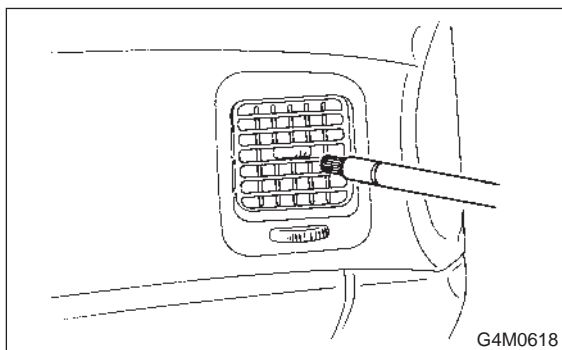
NOTE:

Be certain to move the probe slowly [approximately 25 mm (1 in) per second] when probing along any length of hose or tube.



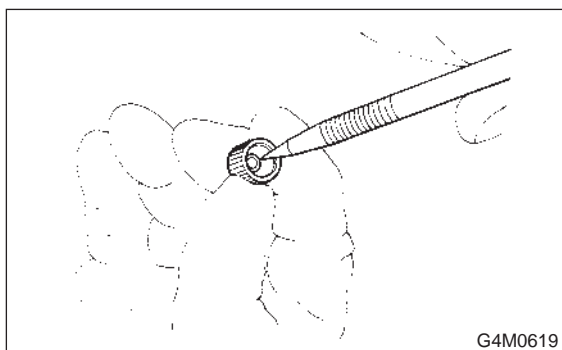
7. CHECK THE EVAPORATOR ASSEMBLY

- 1) Use one or both of the following methods to check the evaporator assembly.
- 2) Remove the drain hose from the case drain nipple. Hold the probe at the end of the case drain nipple for at least 10 seconds. Be certain to reconnect the drain hose when finished.
- 3) With the ignition key in the "ACC" position, run the blower on high speed for 1 minute, then turn the blower off. Place the probe in the center instrument panel vent, and turn the blower on low speed for 1 to 2 seconds, then turn the blower off. Leave the probe in the vent for at least 10 seconds.



8. CHECK THE SERVICE PORT CAPS

Visually inspect the inside of the service port caps. Make sure the rubber seal is in place on the inside of the caps. Disconnect the gauges from the vehicle and install the service port caps.



9. Lubrication

A: ADJUSTMENT

1. SYSTEM OIL STABILIZATION

- 1) Prior to opening the refrigerant system for repairs (except compressor seizure) the system must be stabilized for correct oil replenishment.
- 2) Follow these procedures:
 - (1) Engine speed set to 1,500 rpm.
 - (2) A/C "ON".
 - (3) Air source to recirculate
 - (4) Blower 4th or high speed position
- Make sure the air entering the evaporator is above 26.7°C (80°F).
- The discharge (high) side pressure must be above 588 kPa (6 kg/cm², 85 psi).
- (5) Operate the A/C for 10 minutes.

2. SYSTEM DISCHARGE

Slowly, discharge the system starting with the high-pressure side until the pressure drops below 345 kPa (3.52 kg/cm², 50 psi), then open the low-pressure side.

B: REPLACEMENT

1. OIL REPLACEMENT

- 1) After stabilization and discharge, replace the component, adding the appropriate amount of oil (DH-PR) to the new component before installation.

Evaporator	114 ml (3.9 US fl oz, 4.0 Imp fl oz)
Receiver drier	5 ml (0.2 fl oz, 0.2 fl oz)
Condenser	2 ml (0.07 fl oz, 0.07 fl oz)
Hose	1 ml (0.03 fl oz, 0.04 fl oz)

- 2) If the compressor is replaced (after stabilization):
 - (1) Drain and measure the oil from the original compressor.
 - (2) Drain the oil from the replacement compressor and refill with the same amount that was drained from the original [20 ml (0.7 US fl oz, 0.7 Imp fl oz) minimum]. Always use DH-PR for the replacement oil.

10. Performance Test

A: INSPECTION

1. VEHICLE SET UP

In order to obtain meaningful test results, the vehicle must be set up to meet the following conditions:

- Vehicle in shade
- No wind
- All vehicle doors closed
- Front windows open
- Hood open
- Engine speed set at 1,500 rpm.
- A/C ON
- Temperature control dial — Maximum cold
- Air source — Recirculation
- Blower speed — 4th position (High)
- Operate A/C for 10 minutes (Minimum) before taking measurement.

2. MEASUREMENTS

After 10 minutes (Minimum) of A/C operation and using accurate test equipment, take the following measurements (in order):

- 1) Evaporator intake air temperature at recirculation door.
- 2) Evaporator discharge air temperature at center grill.
- 3) Condenser (Ambient) intake air temperature measured 0.9 m (3 ft) in front and in line with the center of the condenser
- 4) Suction (Low) side pressure
- 5) Discharge (High) side pressure

NOTE:

If only one thermometer is available; 1) take the ambient measurement first; then 2) the intake air; and 3) discharge air temperature.

11. Compressor

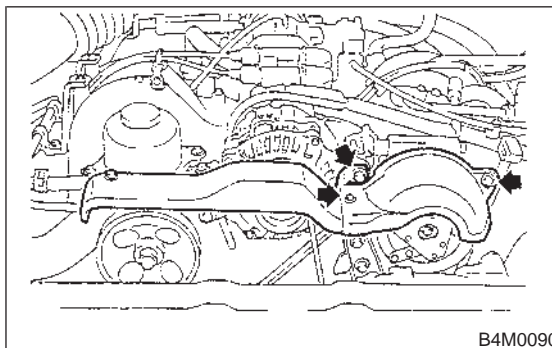
A: INSPECTION

1. COMPRESSOR CLUTCH

NOTE:

- Compressor is a 5-vane rotary type. When trouble occurs, replace compressor as a single unit.
- Compressor clutch trouble is often caused by clutch slippage and noise. Check and take corrective measures, as required.

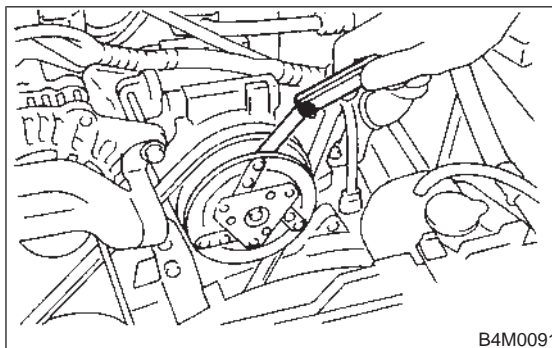
- 1) Remove belt cover.



- 2) Check that clearance between drive plate and pulley over the entire perimeter is within specifications.

Clearance:

$0.45 \pm 0.15 \text{ mm } (0.0177 \pm 0.0059 \text{ in})$



- 3) Check that voltage applied to magnetic coil is at least 10.5 volts.
- 4) When noise is noted, check that it originates in either compressor or pulley bearing.

B: REMOVAL

- 1) Disconnect ground cable from battery.

2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>

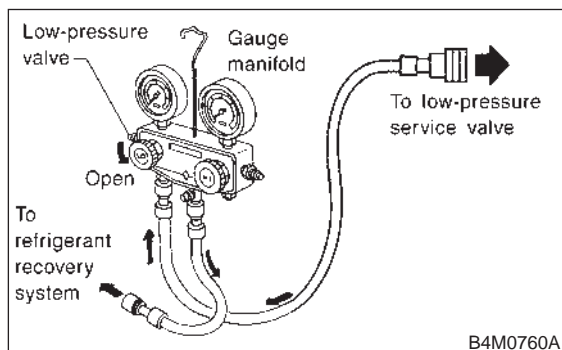
(1) Fully close low-pressure valve of manifold gauge.

(2) Connect low-pressure charging hose of manifold gauge to low-pressure service valve.

(3) Open low-pressure manifold gauge valve slightly, and slowly discharge refrigerant from system.

CAUTION:

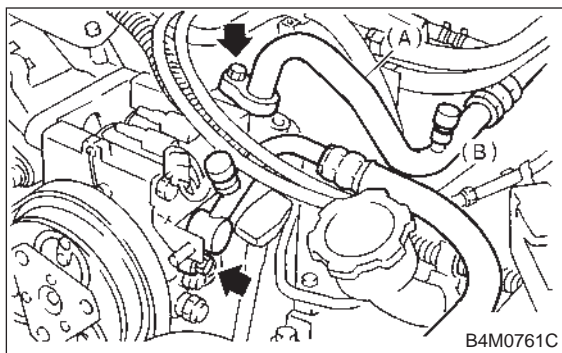
Do not allow refrigerant to rush out. Otherwise, compressor oil will be discharged along with refrigerant.



3) Remove low-pressure hose (A) (Flexible hose Ps) and high-pressure hose (B) (Flexible hose Pd).

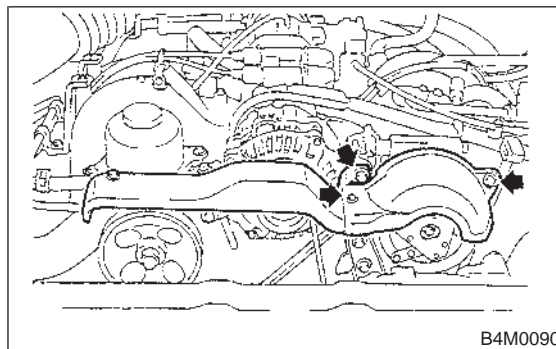
CAUTION:

- Be careful not to lose O-ring of low-pressure hose.
- Plug the opening to prevent foreign matter from entering.



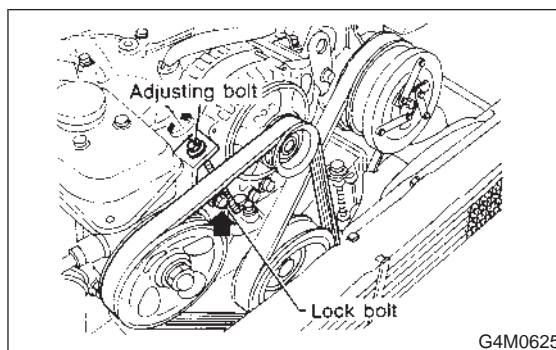
4) Compressor belt cover and generator belt cover:

Remove bolts which secure belt covers.



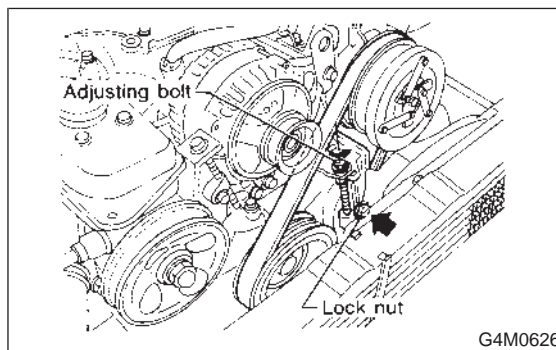
5) Remove alternator V-belt:

- (1) Loosen lock bolt on generator bracket.
- (2) Turn adjusting bolt and remove V-belt.

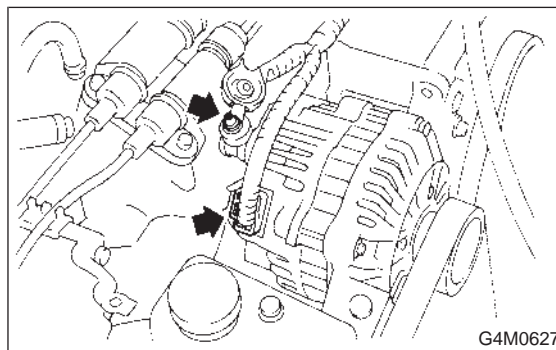


6) Remove compressor V-belt:

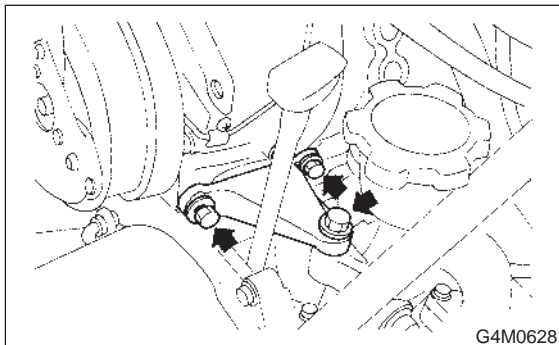
- (1) Loosen lock bolt on idler pulley.
- (2) Turn adjusting bolt and remove V-belt.



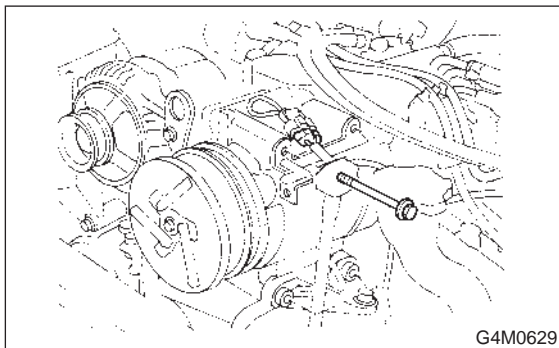
7) Disconnect alternator harness.



- 8) Disconnect compressor harness:
Disconnect compressor harness from body harness.
- 9) Remove lower bracket:
Remove bolts which secure lower compressor bracket.

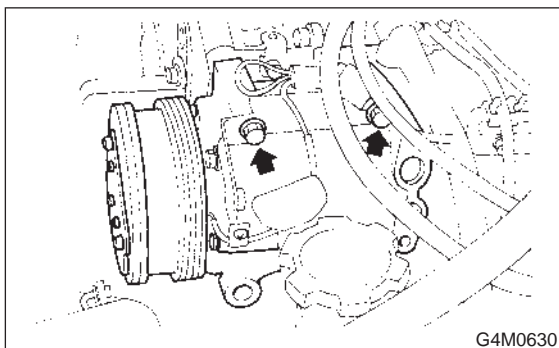


- 10) Remove compressor:
 - (1) Remove bolts which secure compressor.
 - (2) Remove compressor from bracket.

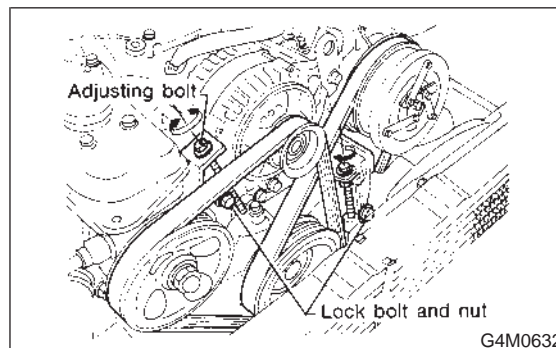


C: INSTALLATION

- 1) Install compressor:
Install compressor on bracket.



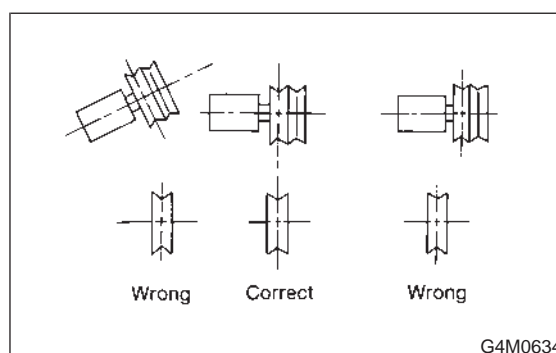
- 2) Connect compressor harness.
- 3) Connect alternator harness.
- 4) Install compressor V-belt (Rear):
After adjusting belt tension, tighten tension pulley lock bolt securely.
- 5) Install alternator V-belt:
After adjusting V-belt tension, tighten generator bracket lock bolt securely.

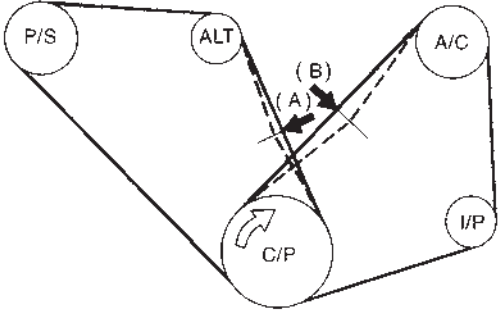


- 6) Check drive belt tension and adjust it if necessary by changing alternator position and/or idler pulley position.

CAUTION:

- Ensure that the V-belt is aligned correctly. If it is not, check for loose bolts.
- The V-belt should not be too tight or too loose. A belt which is too tight may break bearing or cause gas to leak from the shaft seal. A belt which is too loose slips, thereby causing the belt cut.
- After completing the compressor installation and testing the system operation, check and adjust the tension of both V-belts again.



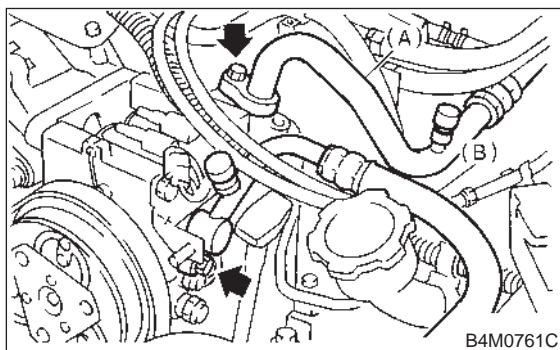
Pulley arrangement	Tension mm (in)/98N (10 kg, 22 lb)	
	(A)	(B)
Figures in table refer to the number of grooves in pulleys. C/P: Crankshaft pulley ALT: Alternator pulley P/S: Power steering oil pump pulley A/C: Air conditioner compressor pulley I/P: Idler pulley	*New belt: 7.0 – 9.0 (0.276 – 0.354) Existing belt: 9.0 – 11.0 (0.354 – 0.433)	*New belt: 7.5 – 8.5 (0.295 – 0.335) Existing belt: 9.0 – 10.0 (0.354 – 0.394)
	*When replacing belts with new ones, adjust tensions to specification and then readjust to the same specification after running engine for 5 minutes.	

B4M1098A

7) Install high-pressure hose (B) (Flexible hose Pd) and low-pressure hose (A) (Flexible hose Ps): Connect high-pressure hose (B) and low-pressure hose (A) with compressor.

CAUTION:

Be sure to apply compressor oil to the periphery of O-ring.



B4M0761C

8) Install belt cover.

CAUTION:

- After installing belt cover, make sure it is not misaligned or twisted.
- After installing belt cover, check the clearance between pulley and belt cover.

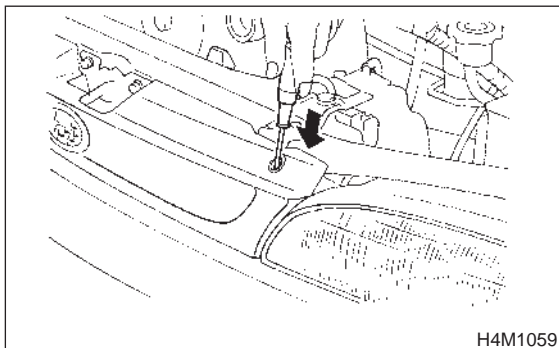
9) Connect ground cable to negative terminal of battery.

10) Charging refrigerant. <Ref. to 4-7 [W700].>

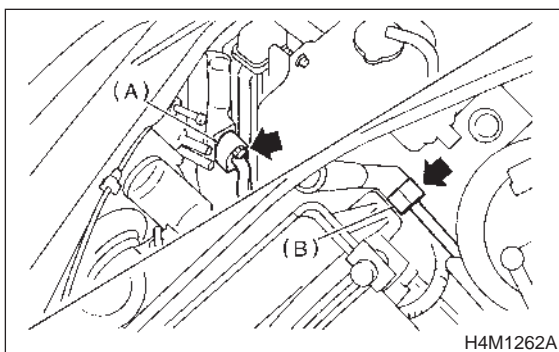
12. Condenser

A: REMOVAL AND INSTALLATION

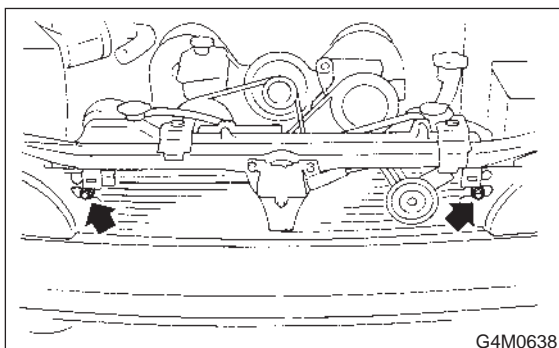
- 1) Disconnect battery negative terminal.
- 2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
- 3) Remove front grille.



- 4) Remove the radiator bracket.
- 5) Disconnect high-pressure hose (A) and high-pressure pipe (B) from condenser.



- 6) Remove the two bolts which secure condenser. While lifting condenser, remove it through space between radiator and radiator panel.



- 7) The condenser should be installed in the reverse order in which it was removed.

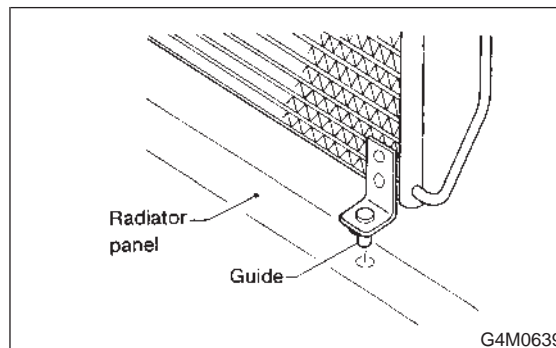
When installing the condenser, pay attention to the following:

CAUTION:

Before connecting the pipe, be sure to apply oil to the periphery of O-ring.

NOTE:

After installing condenser, ensure that guide on lower side of condenser is inserted into hole in radiator panel. Tighten attaching bolts.



- 8) Charge refrigerant. <Ref. to 4-7 [W700].>

B: INSPECTION

- 1) Make sure the condenser fins are free from dust and insects. If the fins are clogged, clean by blowing air or water through them.

NOTE:

To prevent dust and water from getting into the condenser, this work must be done when the condenser is installed in an actual vehicle.

- 2) Check the condenser to see if it shows any sign of oil. If oil ooze or gas leak occur from the condenser, replace it with a new one.

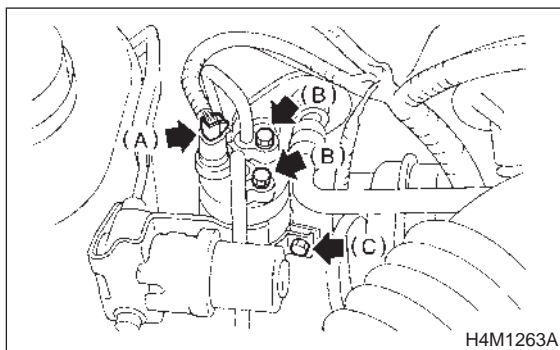
13. Receiver Drier

A: REMOVAL AND INSTALLATION

- 1) Disconnect battery negative terminal.
- 2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
- 3) Disconnect pressure switch connector (A).
- 4) Disconnect pipes (B).
- 5) Remove mounting bolt (C) and remove receiver drier.

CAUTION:

The receiver drier contains a desiccant. Be sure to put a blind plug in the detached receiver drier to protect it from moisture.

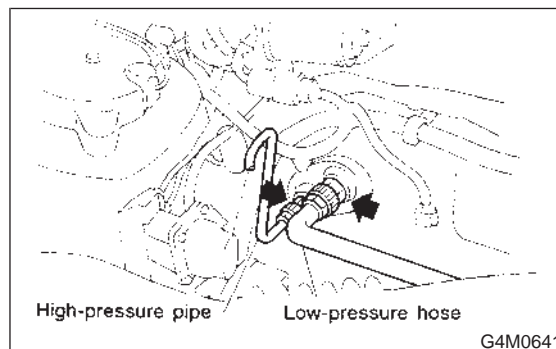


- 6) Install the receiver drier in the reverse order of removal.
- 7) Charge refrigerant. <Ref. to 4-7 [W700].>

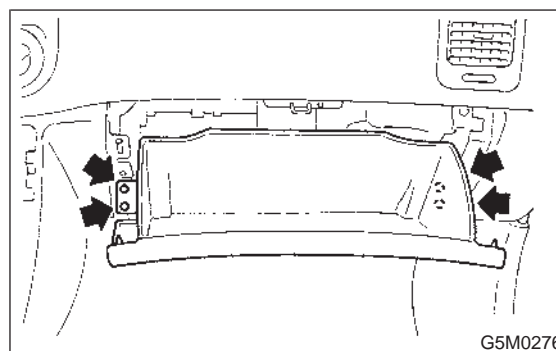
14. Intake Unit with Evaporator

A: REMOVAL AND INSTALLATION

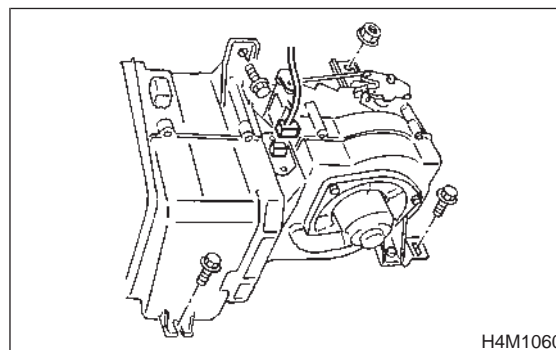
- 1) Disconnect battery negative terminal.
- 2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
- 3) Disconnect discharge pipe, suction pipe and grommets.



- 4) Remove glove box.



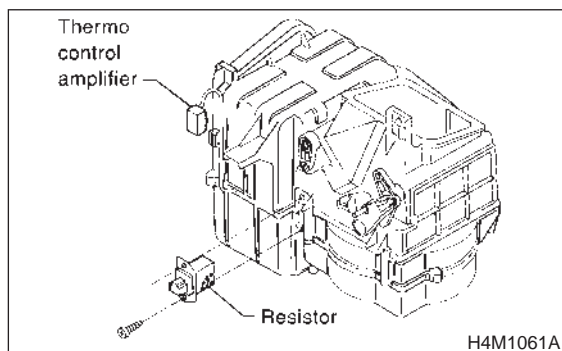
- 5) Disconnect the harness connector from evaporator.
- 6) Disconnect drain hose.
- 7) Remove intake unit mounting bolt and nut.



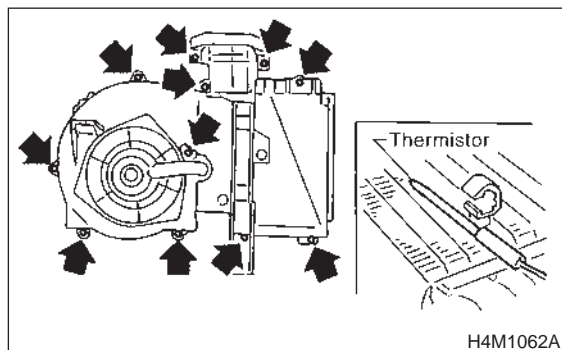
- 8) Install the intake unit in the reverse order of removal.
- 9) Charge refrigerant. <Ref. to 4-7 [W700].>

B: DISASSEMBLY AND ASSEMBLY

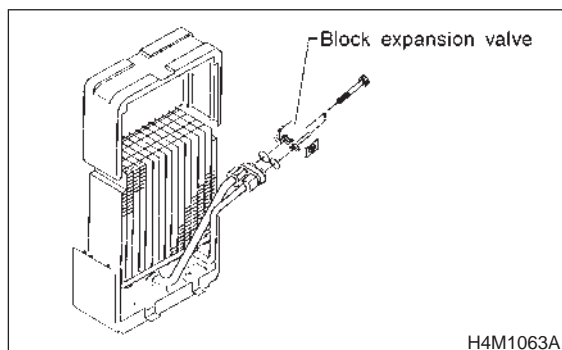
- 1) Remove resistor assembly and remove thermo control amplifier from intake unit case.



- 2) Remove some screws then separate intake unit case.
3) Remove thermistor from clip with the evaporator.



- 4) Remove the block expansion valve from pipes.



- 5) Check to see if the evaporator fins are clogged. If they are, clean them with compressed air.

CAUTION:

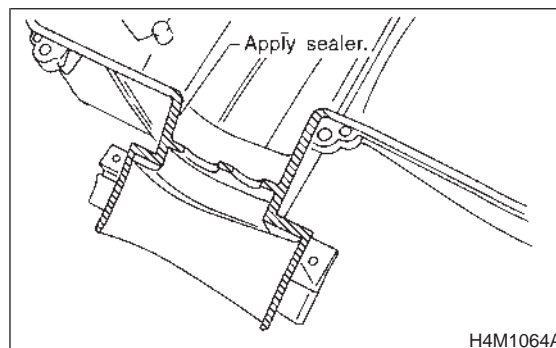
Water must never be used to clean the evaporator.

- 6) Check parts that have been removed for cracks or scratches, and repair or replace them with new ones, if necessary.

- 7) Before assembling intake unit, apply sealer to flange of intake unit case.

Sealer:

THREE BOND 1215 or equivalent



- 8) Reassemble the intake unit in the reverse order of disassembly.

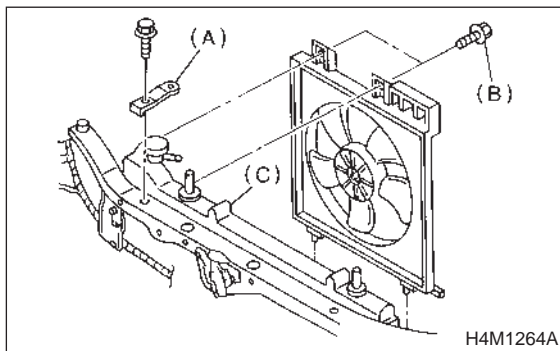
NOTE:

Confirm that the O-ring is inserted in the specified position.

15. Condenser Fan Assembly

A: REMOVAL AND INSTALLATION

- 1) Disconnect battery negative terminal.
- 2) Disconnect harness connector from fan motor.
- 3) Remove radiator bracket (RH) (A) and remove condenser fan bolt (B) from radiator (C).



- 4) Pull condenser fan assembly.
- 5) Install the condenser fan assembly in the reverse order of removal.

16. Flexible Hose

A: REMOVAL AND INSTALLATION

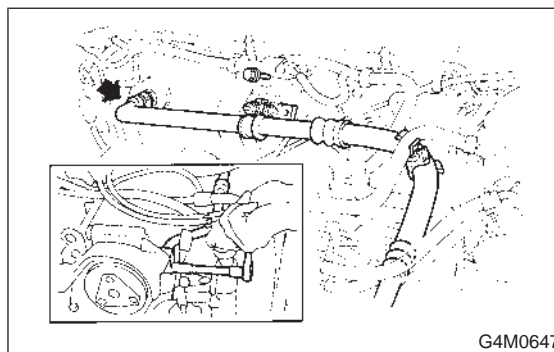
- 1) Disconnect battery negative terminal.
- 2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
- 3) Remove low-pressure hose:

CAUTION:

With the following cautions, replace flexible hoses with new ones if they are damaged or swollen.

- The flexible hoses should be free from twists and tension after they have been connected.
- The flexible hoses must not be bent or twisted forcibly.

- (1) Remove hose attaching bolts.



- (2) Remove hose clip.

CAUTION:

Plug the opening to prevent foreign matter from getting in.

- (3) Disconnect the connector at evaporator unit.

4) Remove high-pressure hose:

CAUTION:

With the following cautions, replace flexible hoses with new ones if they are damaged or swollen.

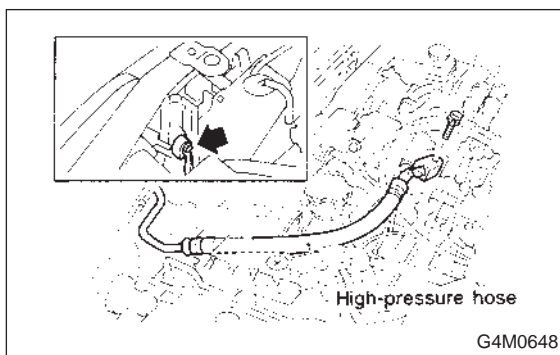
- The flexible hoses should be free from twists and tension after they have been connected.
- The flexible hoses must not be bent or twisted forcibly.

(1) Disconnect hose attaching bolt (compressor side).

(2) Disconnect hose attaching bolt (condenser side).

CAUTION:

Plug the opening to prevent foreign matter from getting in.



5) Installation is in the reverse order of removal.

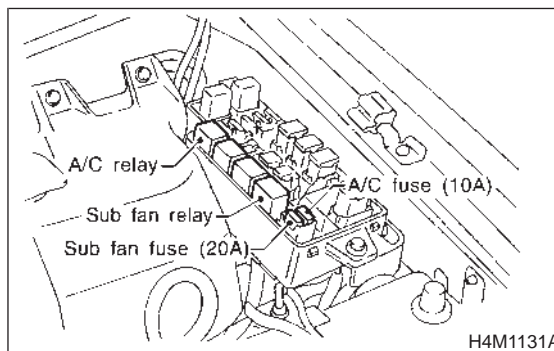
6) Charge refrigerant. <Ref. to 4-7 [W700].>

17. Relay and Fuse

A: LOCATION

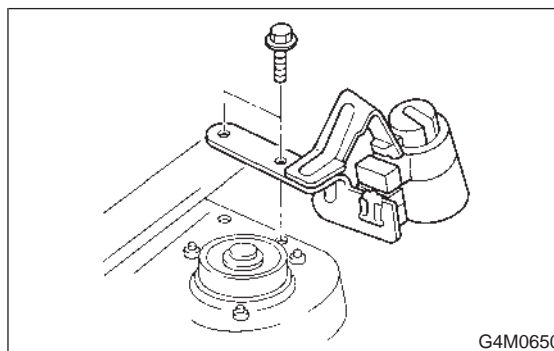
Relays used with A/C system are located as shown in figure.

- A/C relay
- Sub fan (condenser fan) relay
- Fuses (10 A and 20 A)



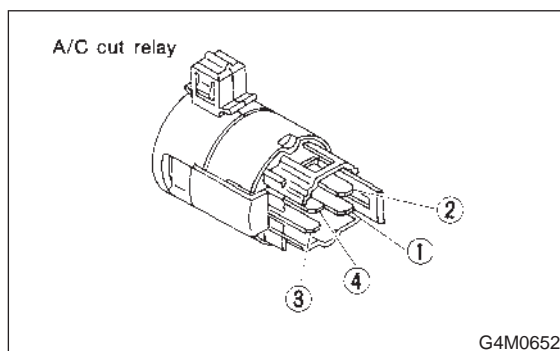
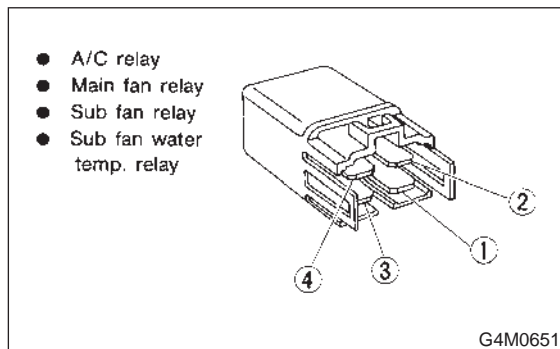
- A/C cut relay

A/C cut relay is attached by a bolt to top of front suspension bracket (RH) via a bracket.



B: INSPECTION

1) Check conduction with a circuit tester (ohm range) according to the following table in figure.



2) Replace relays which do not meet specifications.

A/C relay Main fan relay Sub fan relay Sub fan water temp. relay	A/C cut relay
About 100Ω between ① and ②	About 120Ω between ① and ②
$\infty\Omega$ between ③ and ④	$\infty\Omega$ between ③ and ④

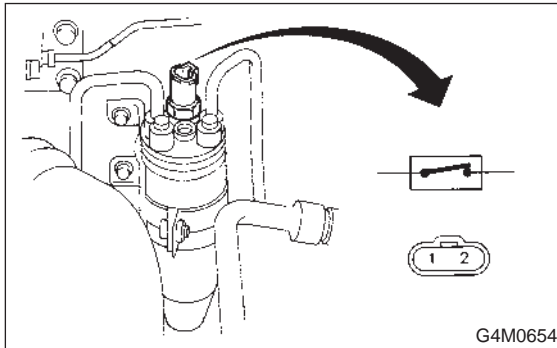
G4M0653

18. Pressure Switch (Dual Switch)

A: INSPECTION

NOTE:

Pressure switch is attached to receiver dryer. It has two built-in switches.

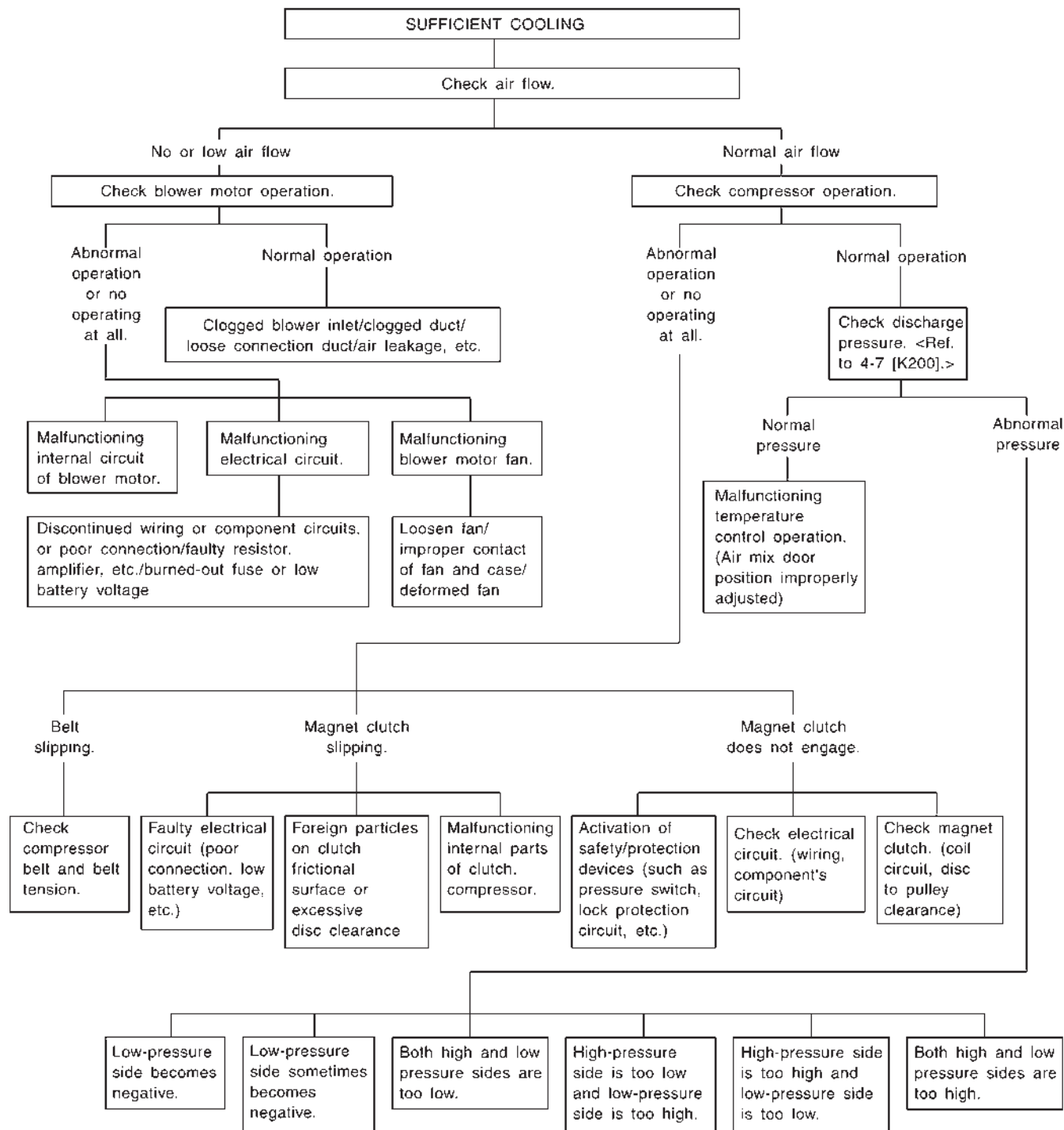


1) Remove cap from high-pressure line service valve, and connect gauge manifold to service valve.

2) Disconnect pressure switch harness connector, and check pressure switch for proper ON-OFF operation. Use a circuit tester.

	Terminal	Operation	High-pressure side line pressure kPa (kg/cm ² , psi)
High and low pressure switch	1 — 2	Turns OFF.	Increasing to 2,746±98 (28±1, 398±14)
			Decreasing to 177±29 (1.8±0.3, 26±4)
		Turns ON.	Increasing to 186 ^{+39/-25} (1.9 ^{+0.4/-0.25} , 27 ^{+5.7/-3.6})
			Decreasing to 2,059±196 (21±2, 299±28)

1. Air Conditioning System Diagnosis

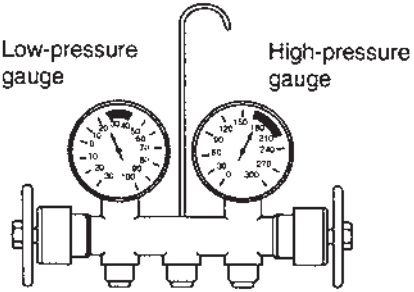
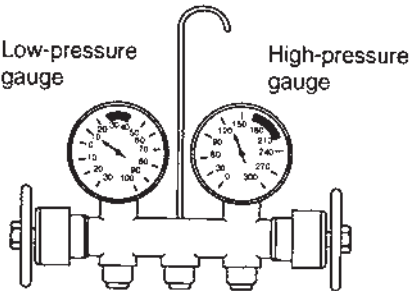
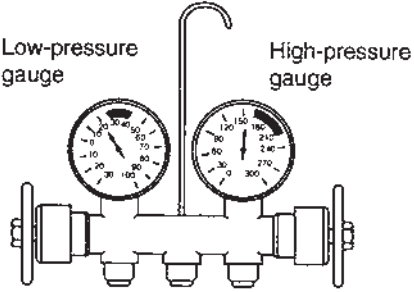


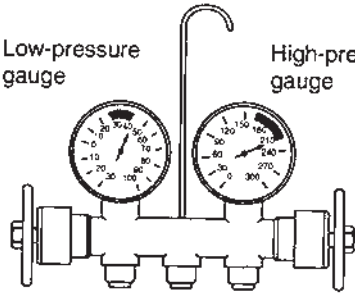
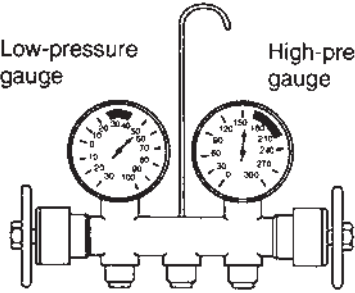
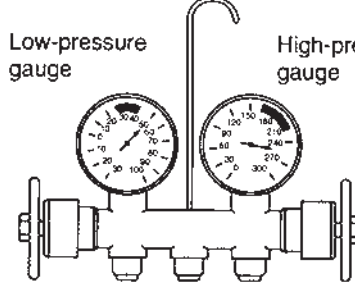
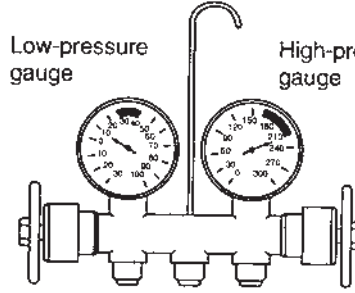
2. Performance Test Diagnosis

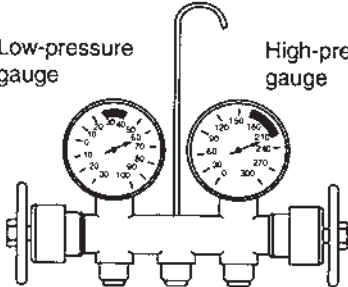
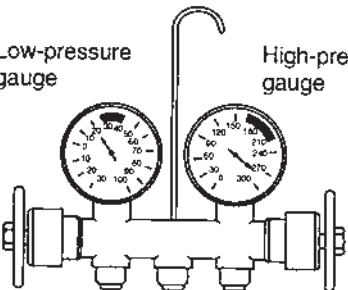
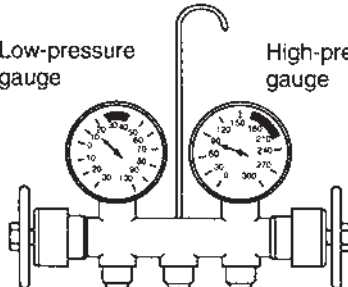
If various conditions caused to other air conditioning system, the characteristics revealed on manifold gauge reading are shown in the following.

As to the method of a performance test, refer to the item of "Performance Test".

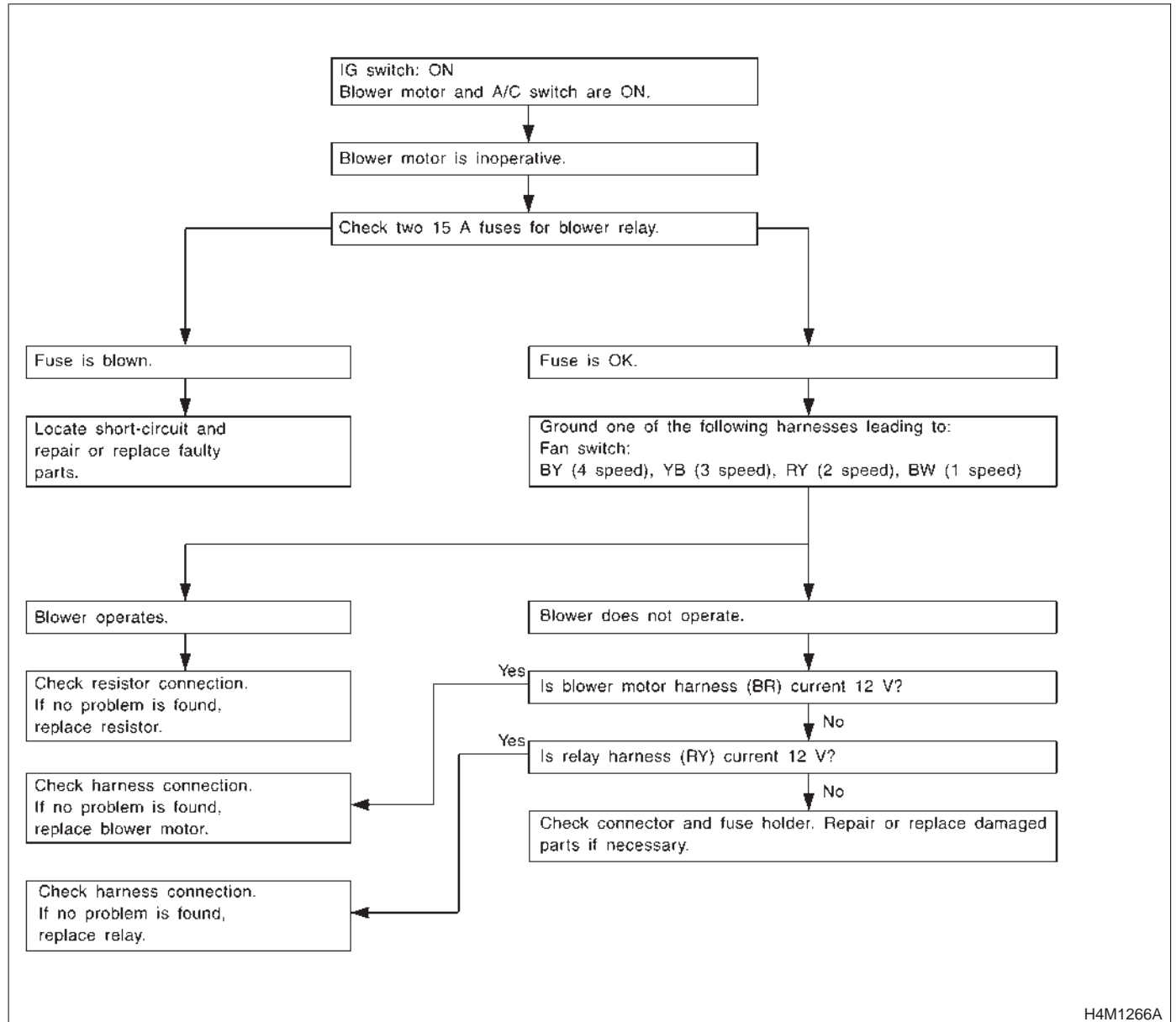
Each shaded area on the following tables indicates a reading of the normal system when the temperature of outside air is 32.5°C (91°F).

Condition		Probable cause	Corrective action
INSUFFICIENT REFRIGERANT CHARGE	Insufficient cooling.	Refrigerant is small, or leaking a little.	1. Leak test. 2. Repair leak. 3. Charge system. Evacuate, as necessary, and recharge system.
 G4M0673			
ALMOST NO REFRIGERANT	No cooling action.	Serious refrigerant leak.	Stop compressor immediately. 1. Leak test. 2. Discharge system. 3. Repair leak(s). 4. Replace receiver drier if necessary. 5. Check oil level. 6. Evacuate and recharge system.
 G4M0674			
FAULTY EXPANSION VALVE	Slight cooling. Sweating or frosted expansion valve inlet.	Expansion valve restricts refrigerant flow. ● Expansion valve is clogged. ● Expansion valve is inoperative. ● Valve stuck closed. Thermal bulb has lost charge.	If valve inlet reveals sweat or frost: 1. Discharge system. 2. Remove valve and clean it. Replace it if necessary. 3. Evacuate system. 4. Charge system. If valve does not operate: 1. Discharge system. 2. Replace valve. 3. Evacuate and charge system.
 G4M0675			

Condition	Probable cause	Corrective action
 <p>G4M0676</p>  <p>G4M0677</p>	<p>Insufficient cooling. Sweated suction line. No cooling. Sweating or frosted suction line.</p>	<p>Expansion valve allows too much refrigerant through evaporator. Faulty seal of O-ring in expansion valve.</p> <p>Check valve for operation. If suction side does not show a pressure decrease, replace valve. 1. Discharge system. 2. Remove expansion valve and replace O-ring. 3. Evacuate and replace system.</p>
AIR IN SYSTEM	Insufficient cooling.	Air mixed with refrigerant in system.
 <p>G4M0678</p>		<p>1. Discharge system. 2. Replace receiver drier. 3. Evacuate and charge system.</p>
MOISTURE IN SYSTEM	After operation for a while, pressure on suction side may show vacuum pressure reading. During this condition, discharge air will be warm. As warning of this, reading shows 39 kPa (0.4 kg/cm ² , 6 psi) vibration.	Drier is saturated with moisture. Moisture has frozen at expansion valve. Refrigerant flow is restricted.
 <p>G4M0679</p>		<p>1. Discharge system. 2. Replace receiver drier (twice if necessary). 3. Evacuate system completely (Repeat 30 minute evacuating three times.). 4. Recharge system.</p>

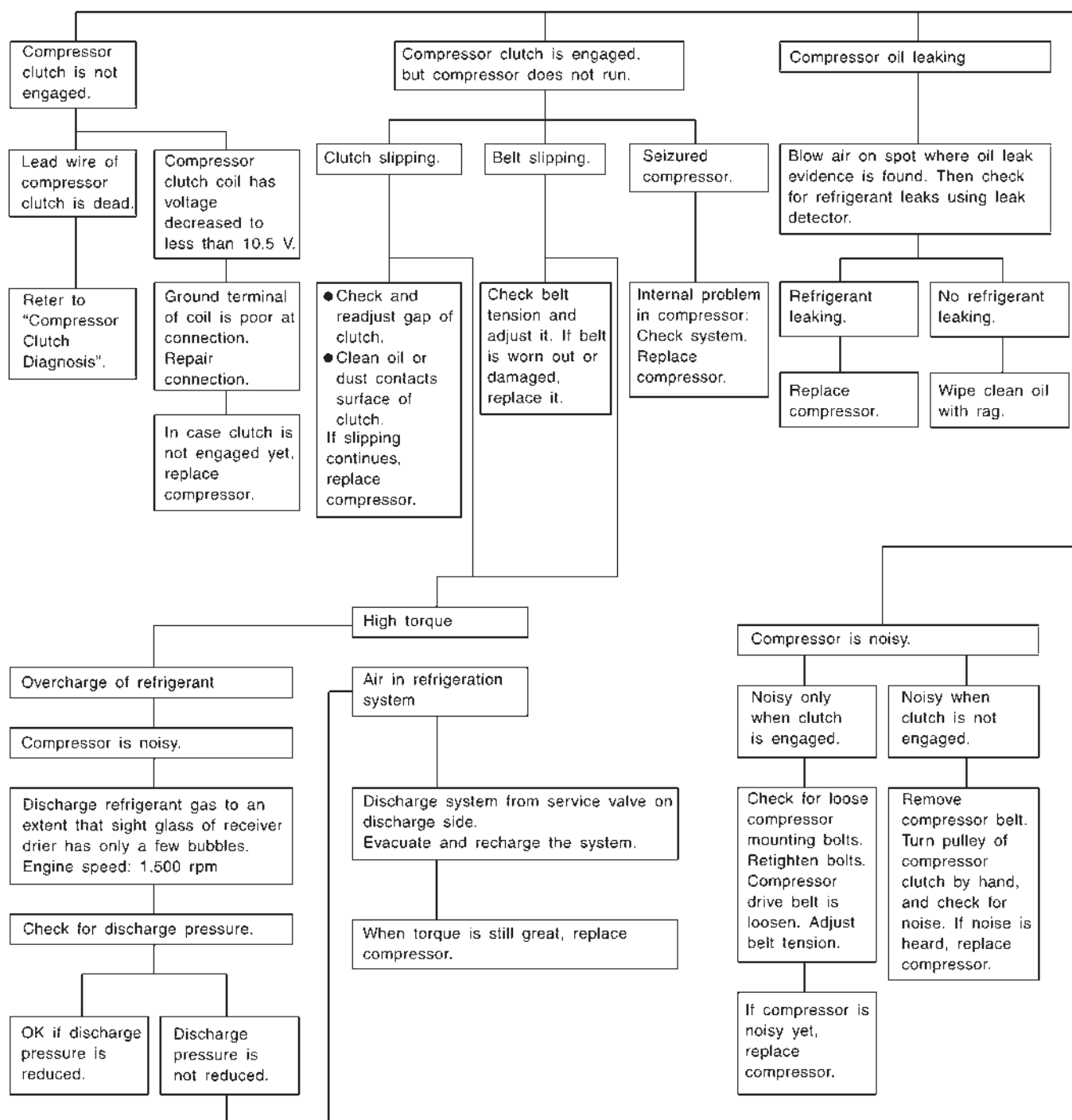
Condition		Probable cause	Corrective action
FAULTY CONDENSER <div><div><div>Low-pressure gauge</div><div>High-pressure gauge</div></div><div>G4M0680</div></div>	No cooling action. Engine may overheat. Suction line is very hot.	Condenser is often found not functioning well.	<ul style="list-style-type: none">● Check condenser cooling fan.● Check condenser for dirt accumulation.● Check engine cooling system for overheat.● Check for refrigerant overcharge. If pressure remains high in spite of all above actions taken, remove and inspect the condenser for possible oil clogging.
HIGH-PRESSURE LINE BLOCKED <div><div><div>Low-pressure gauge</div><div>High-pressure gauge</div></div><div>G4M0681</div></div>	Insufficient cooling. Frosted high-pressure liquid line.	Drier clogged, or restriction in high-pressure line.	<ol style="list-style-type: none">1. Discharge system.2. Remove receiver drier or strainer and replace it.3. Evacuate and charge system.
FAULTY COMPRESSOR <div><div><div>Low-pressure gauge</div><div>High-pressure gauge</div></div><div>G4M0682</div></div>	Insufficient cooling.	Internal problem in compressor, or damaged gasket and valve.	<ol style="list-style-type: none">1. Discharge system.2. Remove and check compressor.3. Repair or replace compressor.4. Check oil level.5. Replace receiver drier.6. Evacuate and charge system.

3. Blower Motor Diagnosis



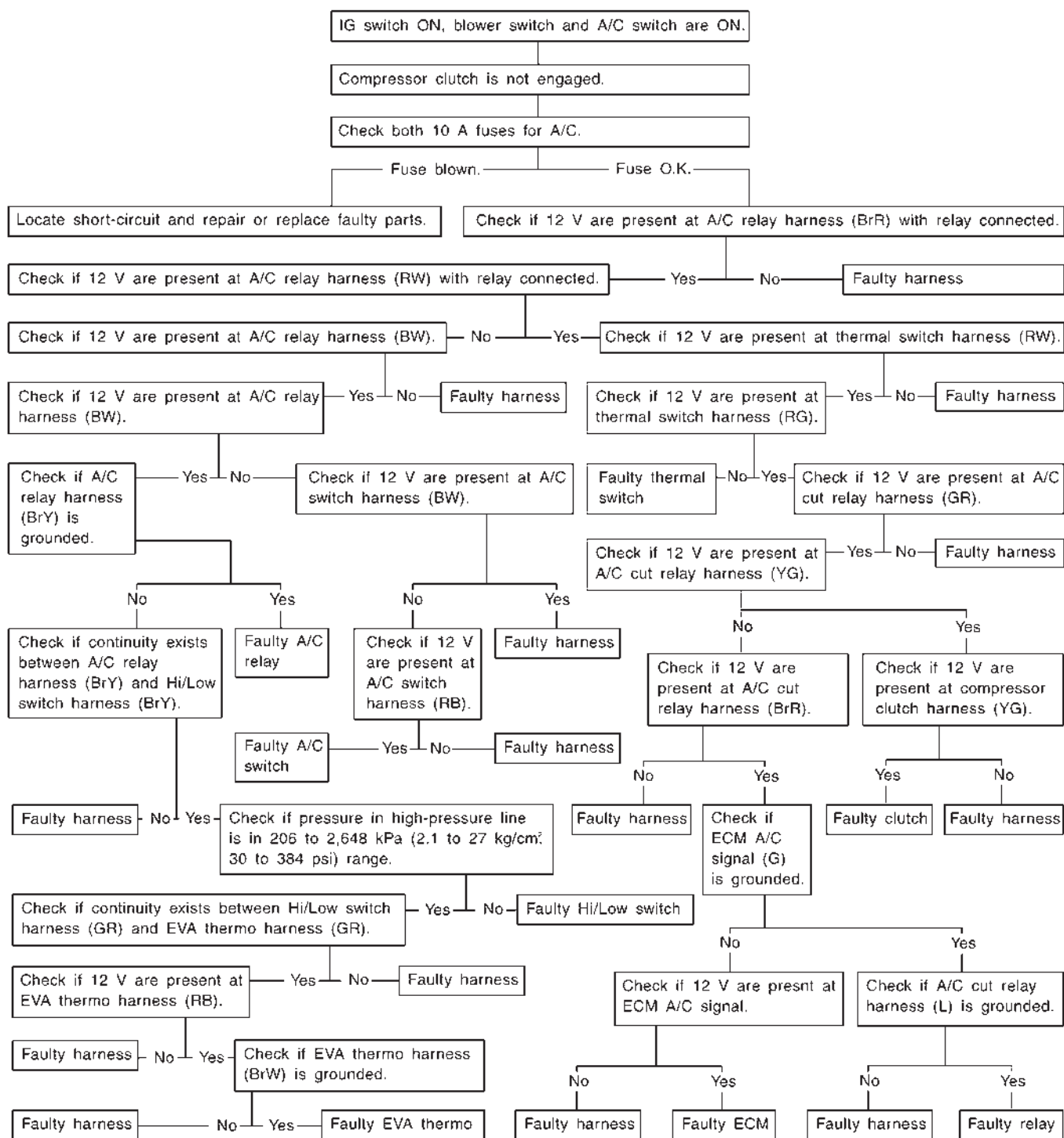
H4M1266A

4. Compressor Diagnosis



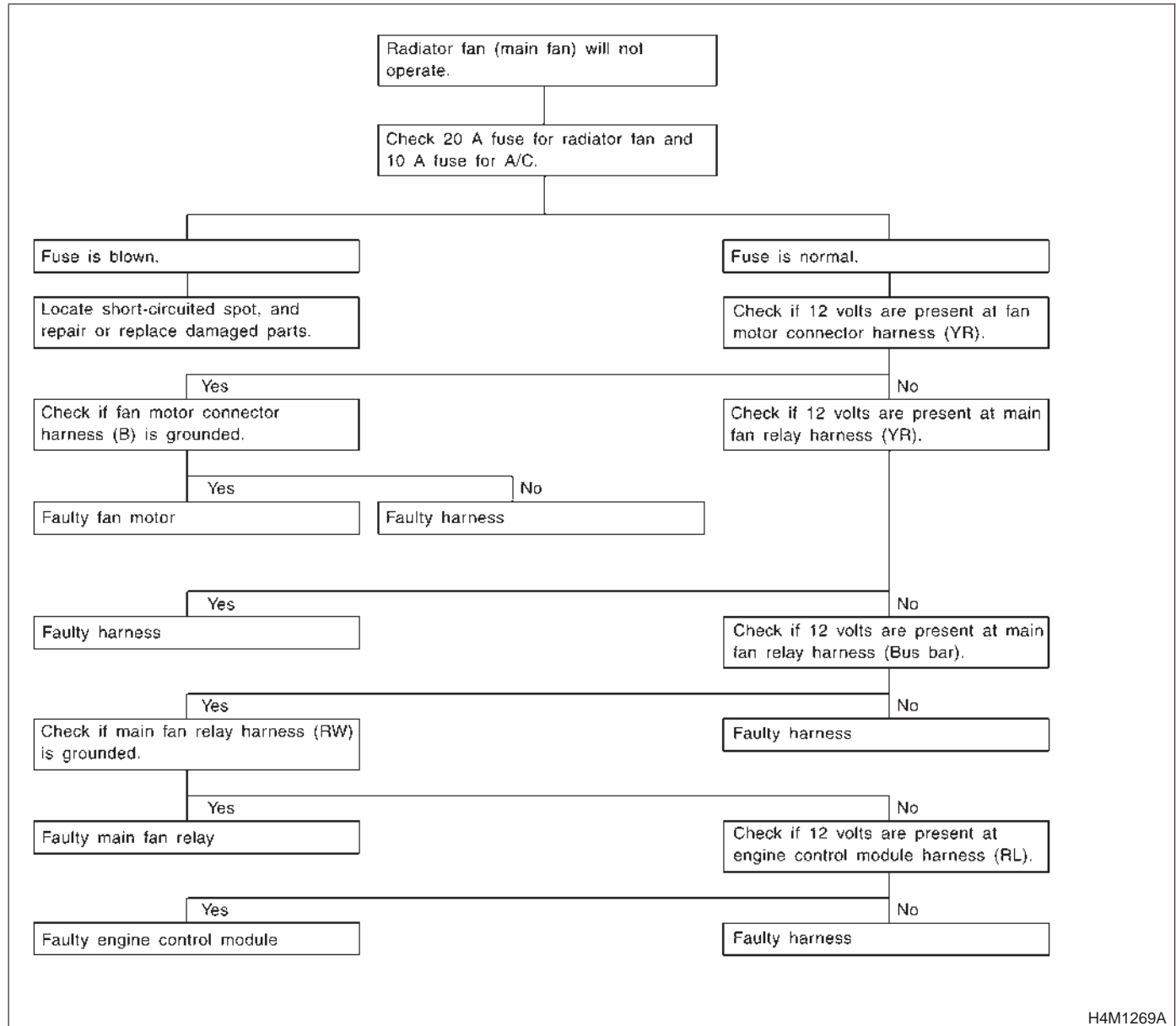
H4M1267A

5. Compressor Clutch Diagnosis



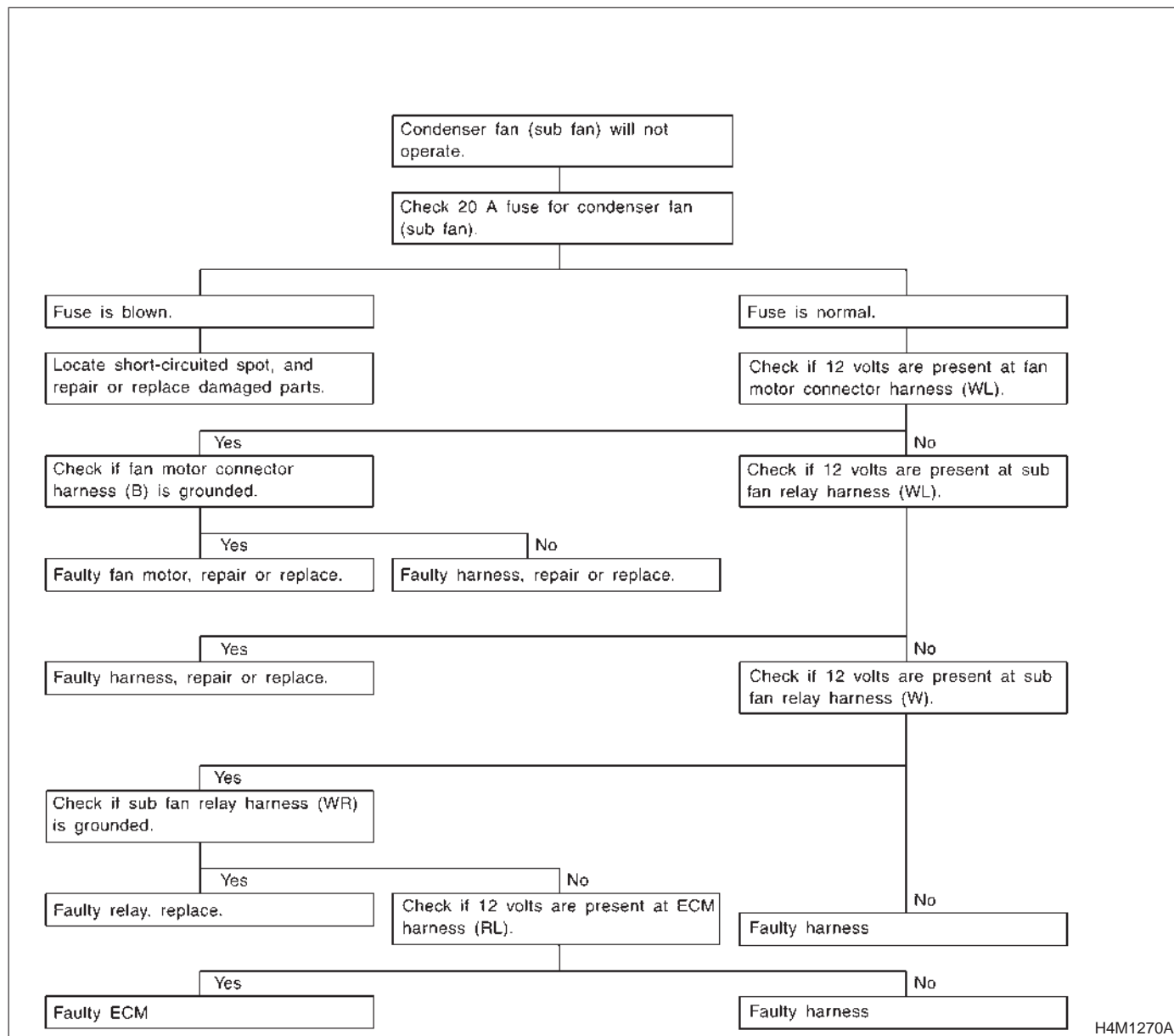
H4M1268A

6. Radiator Fan (Main Fan) Diagnosis

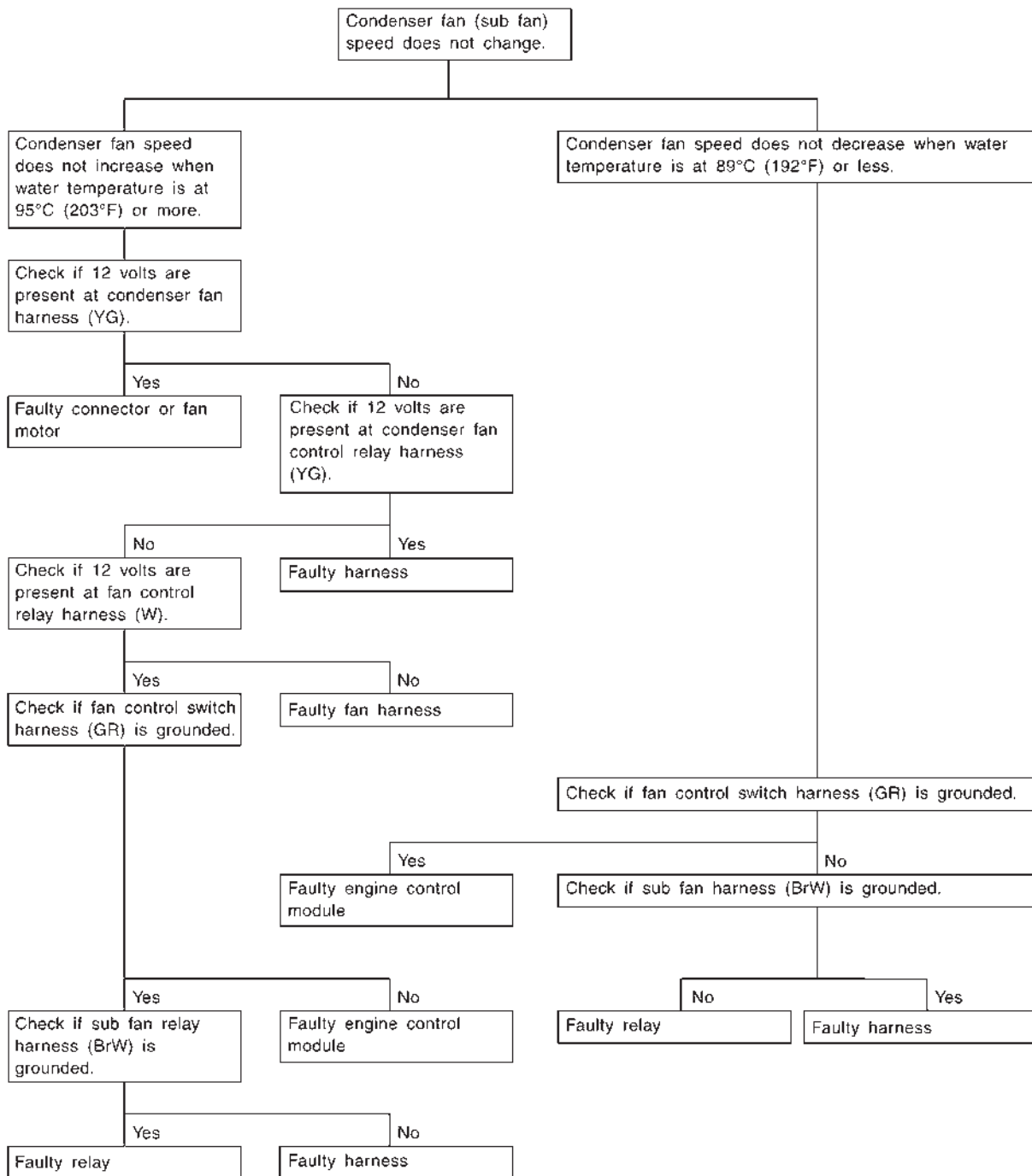


H4M1269A

7. Condenser Fan (Sub Fan) Diagnosis (I)



8. Condenser Fan (Sub Fan) Diagnosis (II)



MEMO:

BODY AND EXTERIOR

5-1

	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Precaution	2
2. Body Datum Points	3
3. Datum Dimensions	20
4. Datum Points and Dimensions Concerning On-Board Aiming Adjustment.....	28
C COMPONENT PARTS	29
1. Front Hood and Hood Lock.....	29
2. Trunk Lid	30
3. Front Bumper	31
4. Rear Bumper	32
5. Sunroof	33
6. Steering Support Beam.....	34
7. Guard Pipe	35
W SERVICE PROCEDURE	36
1. Hood	36
2. Trunk Lid	37
3. Fuel Flap	39
4. Front Bumper	39
5. Rear Bumper	40
6. Coating Method for PP Bumper	42
7. Repair Instructions for Colored PP Bumper	43
8. Side Protector.....	47
9. Front Fender.....	48
10. Mud Guard and Rear Arch Protector	49
11. Cowl Panel	49
12. Molding and Retainer	50
13. Front Grille.....	50
14. Sunroof	51
15. Rear Spoiler	54
16. Hood Duct	54
K DIAGNOSTICS	55
1. Sunroof	55

1. Precaution

A: SUPPLEMENTAL RESTRAINT SYSTEM “AIRBAG”

Airbag system wiring harness is routed on and along body panels.

CAUTION:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage Airbag system wiring harness when repairing the body panel.

2. Body Datum Points

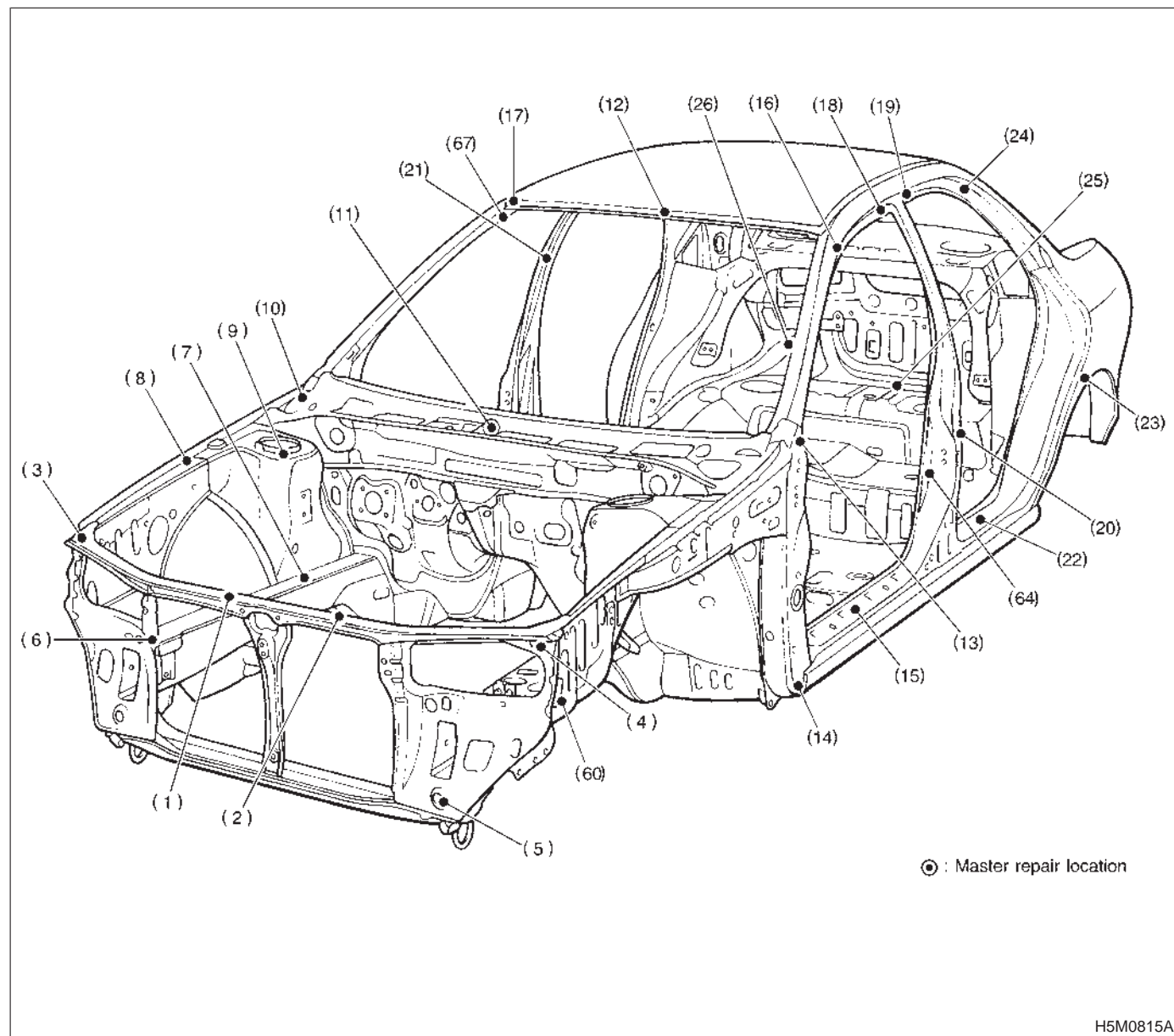
Various master repair locations are established as datum points used during body repairs. In addition, guide holes, locators and indents are provided to facilitate panel replacement and achieve alignment accuracy.

NOTE:

Left and right datum points are all symmetrical to each other.

A: ENGINE COMPARTMENT AND ROOM

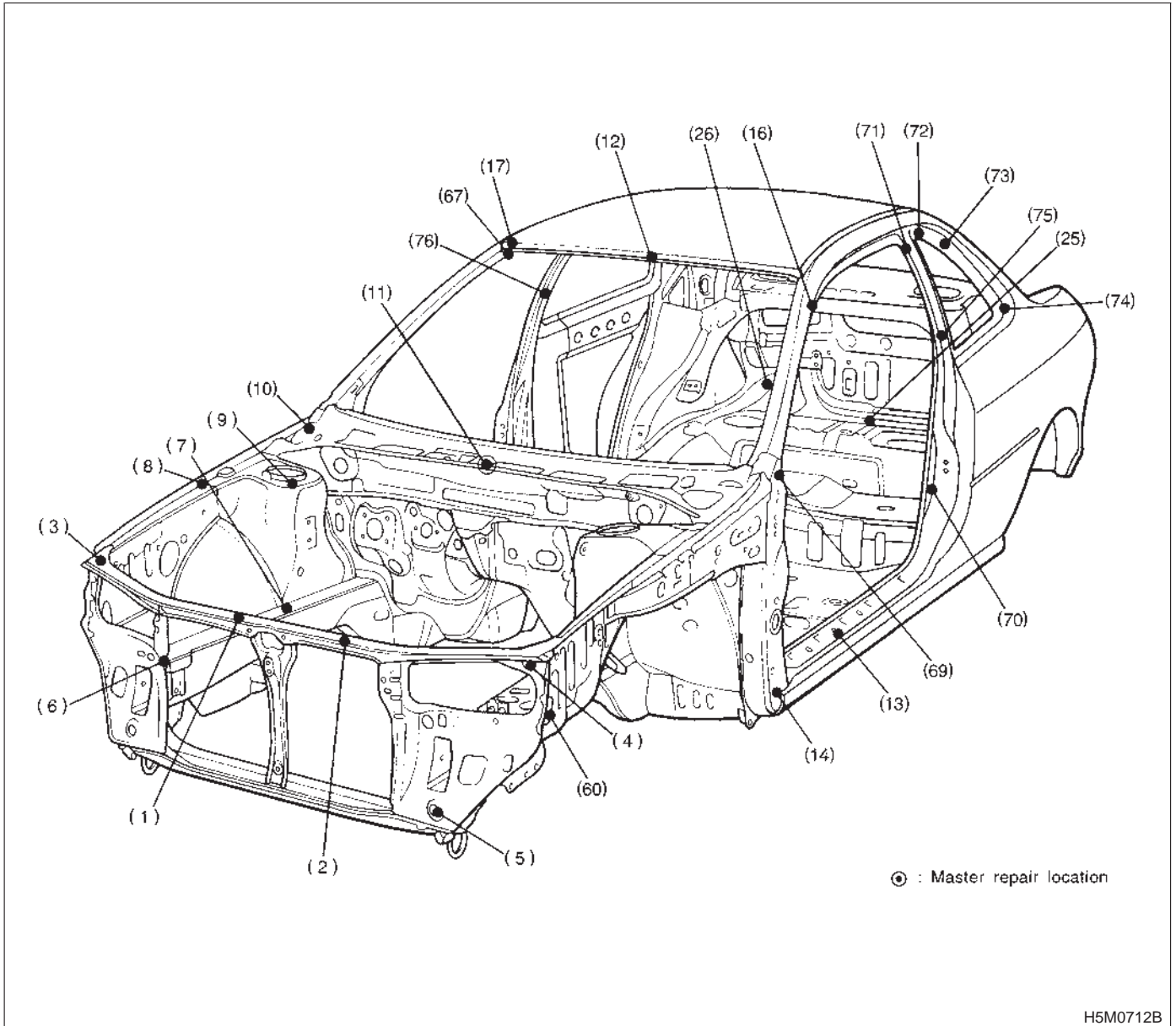
1. SEDAN AND WAGON



2. Body Datum Points

- | | | |
|---|---|--|
| (1) Radiator panel (UPR) repair bolt hole M8 (Right) | (10) Hood hinge attaching bolt hole M8 (Symmetrical) | (20) Center pillar gauge hole 10 mm (0.39 in) dia. (Symmetrical) |
| (2) Radiator panel (UPR) repair bolt hole M8 (Left) | (11) Cowl panel mounting hole 5 mm (0.20 in) dia. (Located in center of vehicle.) | (21) Belt anchor attaching bolt hole (Symmetrical) |
| (3) Fender attaching bolt hole M6 (Symmetrical) | (12) Front rail (Inner) mirror attaching bolt hole 8 mm (0.31 in) dia. | (22) Wax coat hole, 20 mm (0.79 in) dia. (Symmetrical) |
| (4) Headlight attaching bolt hole M6 (Symmetrical) | (13) Fender attaching bolt hole M6 (Symmetrical) | (23) Rear door switch attaching hole 20 mm (0.79 in) dia. (Symmetrical) |
| (5) Radiator panel side gauge hole 24 mm (0.94 in) dia. (Symmetrical) | (14) Front pillar gauge hole 20 mm (0.79 in) dia. (Symmetrical) | (24) Retainer attaching square hole 7 mm (0.28 in) (Symmetrical) |
| (6) Front bumper mounting hole 14 x 17 mm (0.55 x 0.67 in) dia. (Symmetrical) | (15) Wax coat hole, 20 mm (0.79 in) dia. (Symmetrical) | (25) Spare tire attaching bolt hole M8 |
| (7) Front crossmember attaching bolt hole 12.4 mm (0.488 in) dia. (Symmetrical) | (16) Retainer attaching square hole 7 mm (0.28 in) (Symmetrical) | (26) Air draw hole 7 mm (0.28 in) dia. (Symmetrical) |
| (8) Fender attaching bolt hole M6 (Symmetrical) | (17) Sun visor attaching hole 20 mm (0.79 in) dia. (Symmetrical) | (60) Fender attaching bolt hole M6 (Symmetrical) |
| (9) Front strut mounting hole 10 mm (0.39 in) dia. (Symmetrical) | (18) Retainer attaching square hole 7 mm (0.28 in) (Symmetrical) | (64) Door switch attaching hole 20 mm (0.79 in) dia. (Symmetrical) |
| | (19) Retainer attaching square hole 7 mm (0.28 in) (Symmetrical) | (67) Front glass attaching hole Right 6.5 mm (0.256 in) dia. Left 6.5 x 10 mm (0.256 x 0.39 in) dia. |

2. COUPE



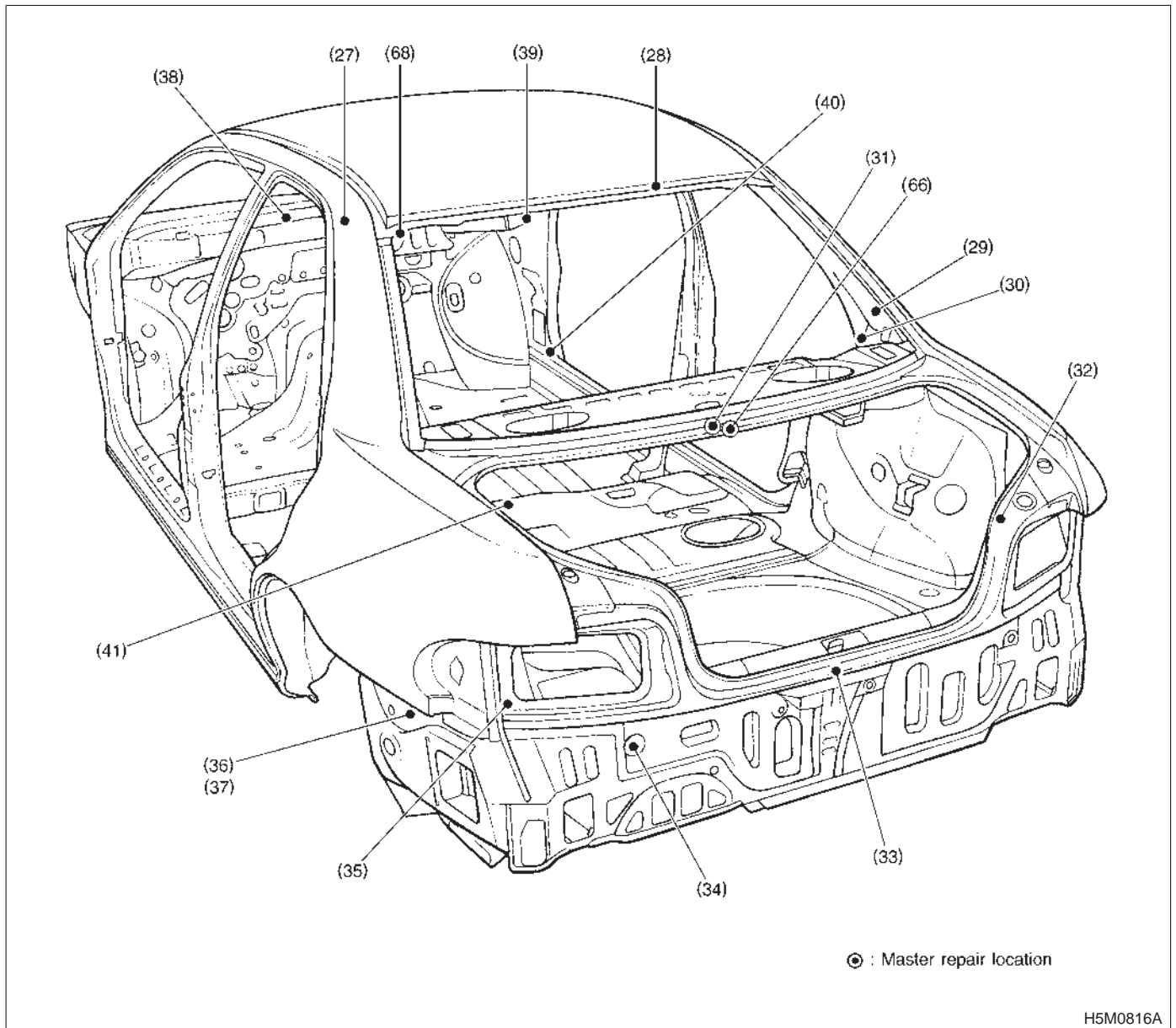
H5M0712B

2. Body Datum Points

-
- | | | |
|---|--|--|
| (1) Radiator panel (UPR) repair bolt hole M8 (Right) | (11) Cowl panel mounting hole 5 mm (0.20 in) dia. (Located in center of vehicle.) | (70) Door switch attaching hole 13.5 mm (0.531 in) dia. (Symmetrical) |
| (2) Radiator panel (UPR) repair bolt hole M8 (Left) | (12) Front rail (Inner) mirror attaching bolt hole 8 mm (0.31 in) dia. | (71) Retainer attaching square hole 8 mm (0.31 in). (Symmetrical) |
| (3) Fender attaching bolt hole M6 (Symmetrical) | (13) Fender attaching bolt hole M6 (Symmetrical) | (72) Rear quarter glass attaching hole 8 mm (0.31 in) dia. (Symmetrical) |
| (4) Headlight attaching bolt hole M6 (Symmetrical) | (14) Front pillar gauge hole 20 mm (0.79 in) dia. (Symmetrical) | (73) Rear quarter glass attaching hole 7 mm (0.28 in) dia. (Symmetrical) |
| (5) Radiator panel side gauge hole 24 mm (0.94 in) dia. (Symmetrical) | (16) Retainer attaching square hole 7 mm (0.28 in) (Symmetrical) | (74) Rear quarter glass attaching hole 8 x 5.5 mm (0.31 x 0.217 in) dia. (Symmetrical) |
| (6) Front bumper mounting hole 14 x 17 mm (0.55 x 0.67 in) dia. (Symmetrical) | (17) Sun visor attaching hole 20 mm (0.79 in) dia. (Symmetrical) | (75) Retainer attaching square hole 8 mm (0.31 in). (Symmetrical) |
| (7) Front crossmember attaching bolt hole 12.4 mm (0.488 in) dia. (Symmetrical) | (25) Spare tire attaching bolt hole M8 | (76) Seat belt anchor attaching bolt hole 16 mm (0.63 in) dia. (Symmetrical) |
| (8) Fender attaching bolt hole M6 (Symmetrical) | (26) Air draw hole 7 mm (0.28 in) dia. (Symmetrical) | |
| (9) Front strut mounting hole 10 mm (0.39 in) dia. (Symmetrical) | (60) Fender attaching bolt hole M6 (Symmetrical) | |
| (10) Hood hinge attaching bolt hole M8 (Symmetrical) | (67) Front glass attaching hole Right 6.5 mm (0.256 in) dia. Left 6.5 x 10 mm (0.256 x 0.39 in) dia. | |
| | (69) Wax coat hole 20 mm (0.79 in) dia. (Symmetrical) | |

B: LUGGAGE COMPARTMENT AND ROOM

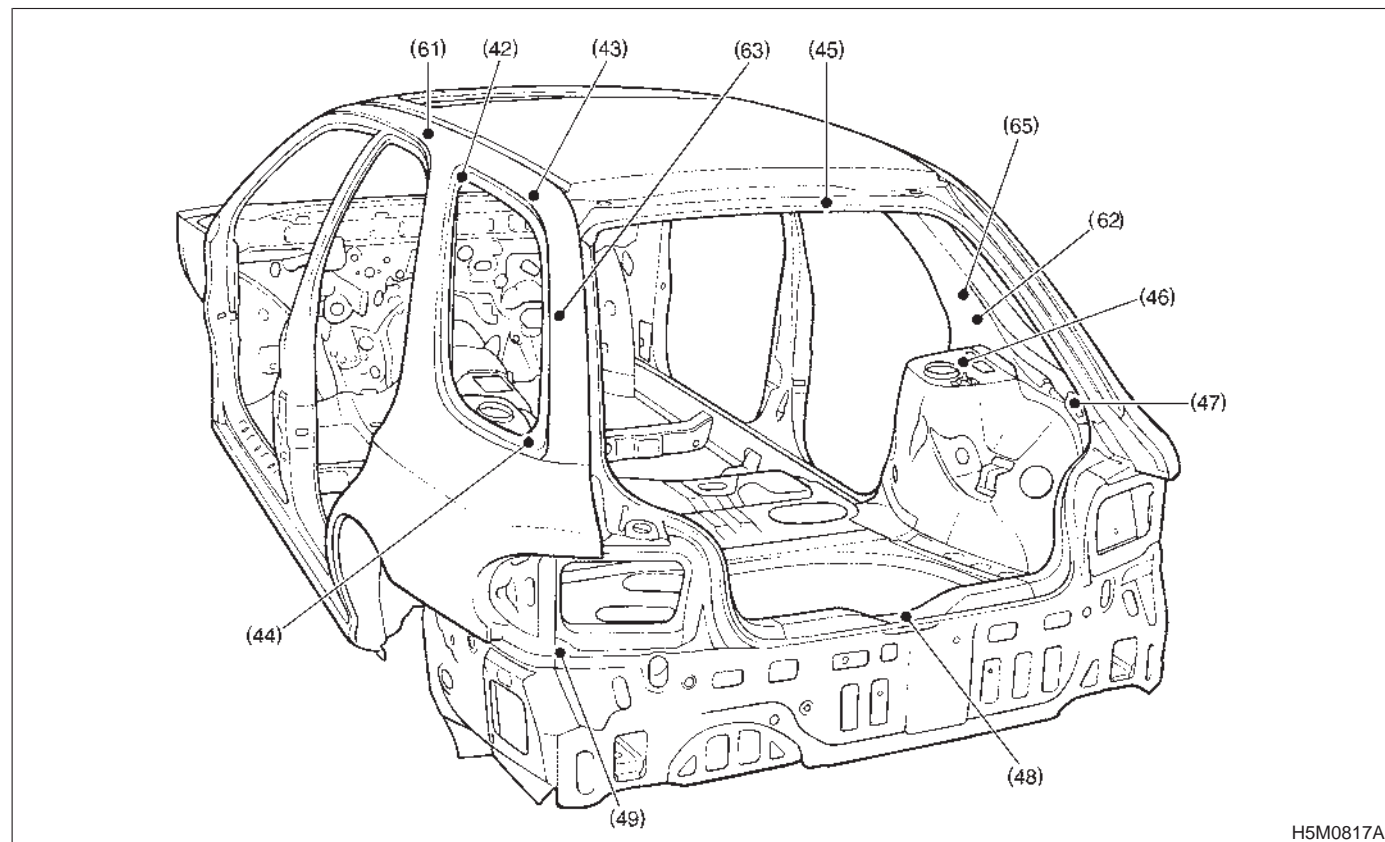
1. SEDAN AND COUPE



2. Body Datum Points

- | | | |
|--|--|---|
| (27) Rear pillar (Inner) gauge hole 8 mm (0.31 in) dia. (Symmetrical) | (33) Rear skirt (UPR) cutout (Repair locator) | (39) Steering support beam attaching bolt hole M8 (Symmetrical) |
| (28) Rear roof trim attaching hole 8 mm (0.31 in) dia. (Symmetrical) | (34) Rear skirt gauge hole 20 mm (0.79 in) dia. (Symmetrical) | (40) Front pillar (Inner) gauge hole 10 mm (0.39 in) dia. (Symmetrical) |
| (29) Rear quarter trim attaching hole 8 mm (0.31 in) dia. (Symmetrical) | (35) Rear combination light mounting hole 9 mm (0.35 in) dia. (Symmetrical) | (41) Floor mat attaching clip hole 8 mm (0.31 in) dia. (Symmetrical) |
| (30) Seat belt anchor attaching bolt hole (Symmetrical) | (36) Rear quarter bumper side gauge hole 20 mm (0.79 in) dia. (Left) | (66) Rear panel (Center) repair locator (Located in center of vehicle.) |
| (31) Reinforcement (Rear panel rear) repair locator (Located in center of vehicle) | (37) Rear quarter bumper side gauge hole 20 mm (0.79 in) dia. (Right) | (68) Rear glass attaching hole (Right): 6.5 mm (0.256 in) dia. (Left): 6.5 x 10 mm (0.256 x 0.39 in) dia. |
| (32) Rear corner patch at flange (Symmetrical) | (38) Instrument panel attaching square hole 22 x 34.5 mm (0.87 x 1.358 in) (Right) | |

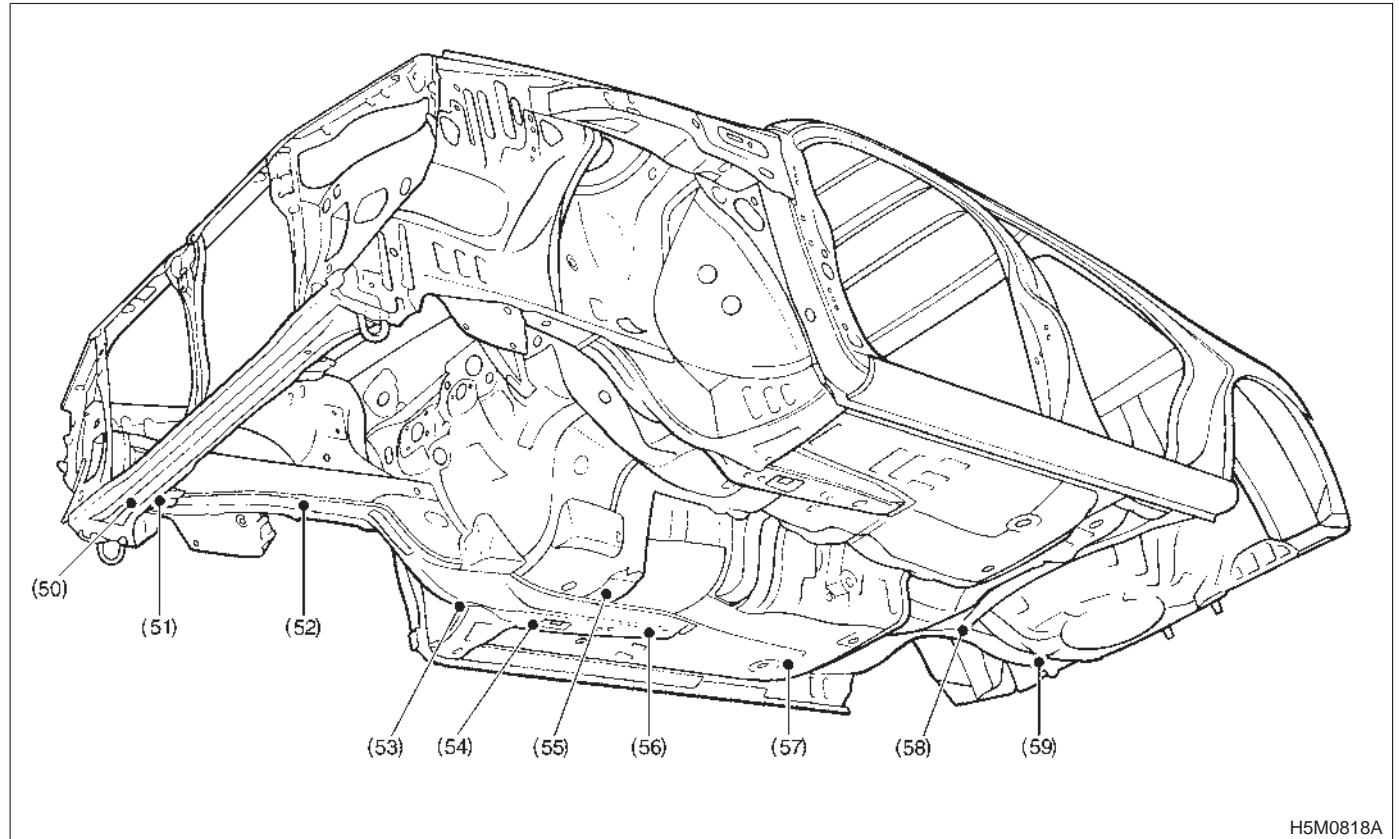
2. WAGON



H5M0817A

- | | | |
|--|--|---|
| (42) Rear quarter glass attaching hole 8 mm (0.31 in) dia. (Symmetrical) | (46) Rear strut mounting hole 10 mm (0.39 in) dia. (Symmetrical) | (61) Side rail (Inner) gauge hole 8 mm (0.31 in) dia. (Symmetrical) |
| (43) Roof rail attaching hole 10 mm (0.39 in) dia. (Symmetrical) | (47) Rear gate stay attaching bolt hole M8 (Symmetrical) | (62) Rear quarter trim attaching hole 8 mm (0.31 in) dia. (Symmetrical) |
| (44) Rear quarter glass attaching hole 8 x 15 mm (0.31 x 0.59 in) dia. (Symmetrical) | (48) Child seat anchor attaching bolt hole | (63) Rear quarter harness attaching clip hole 7 mm (0.28 in) dia. (Symmetrical) |
| (45) Rear roof trim attaching hole 8 mm (0.31 in) dia. (Symmetrical) | (49) Rear combination light mounting hole 10 mm (0.39 in) dia. (Symmetrical) | (65) Seat belt anchor attaching bolt hole (Symmetrical) |

C: UNDER BODY

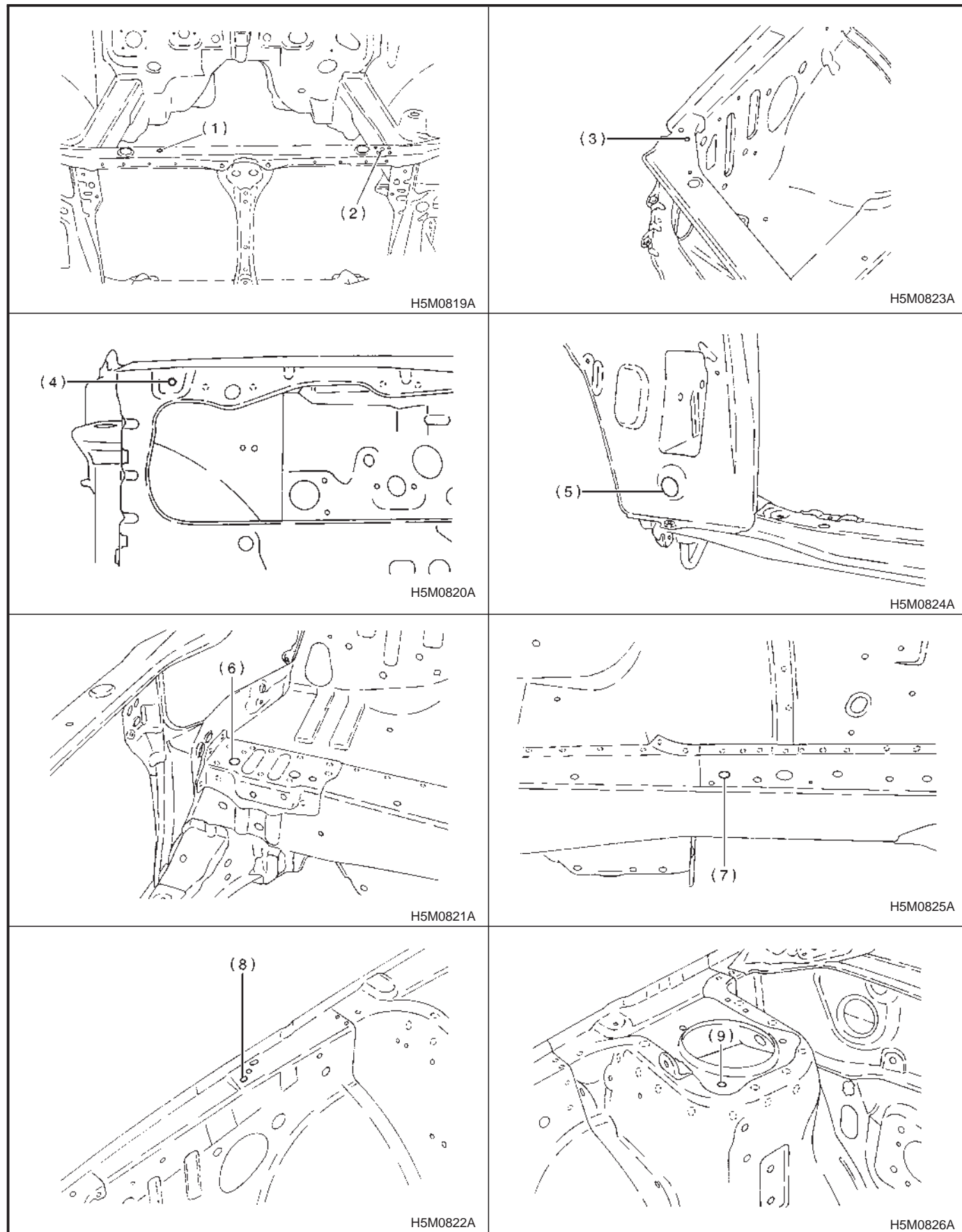


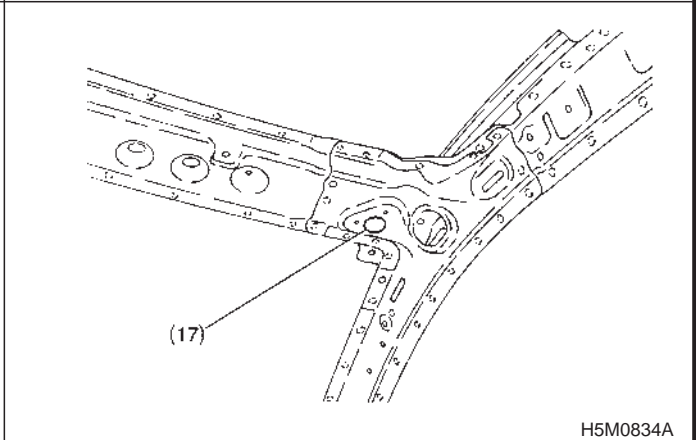
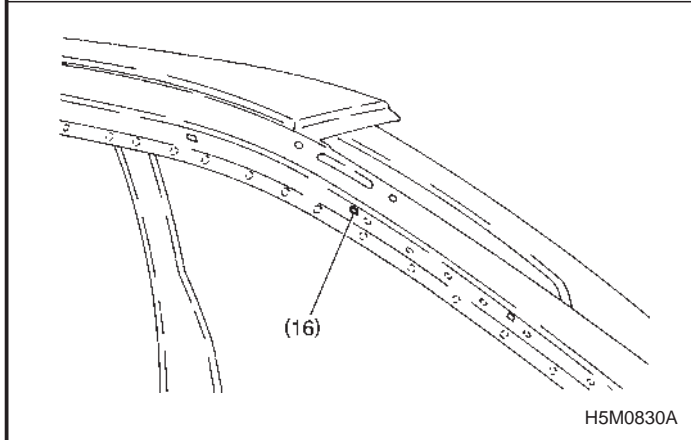
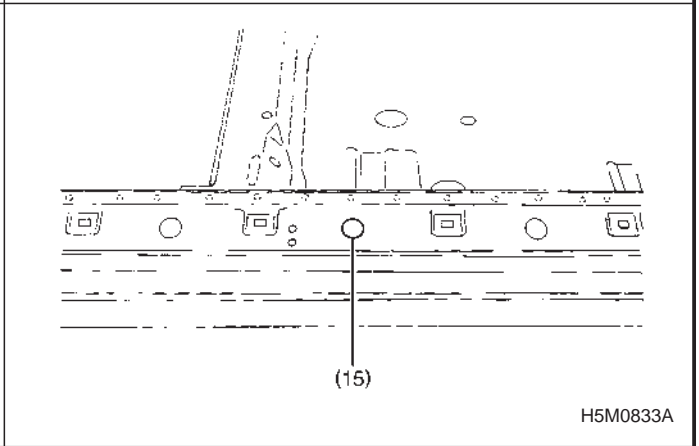
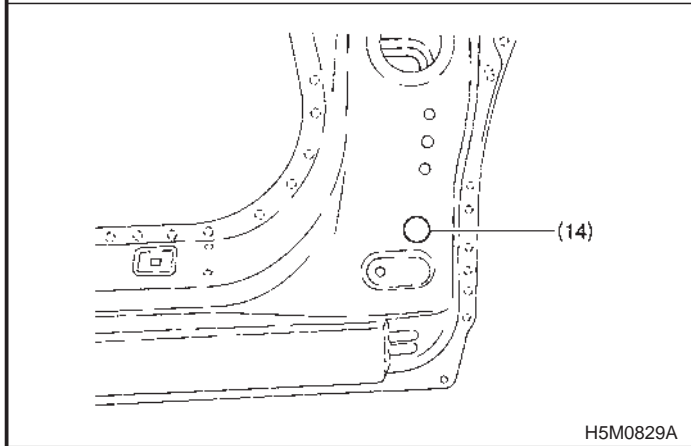
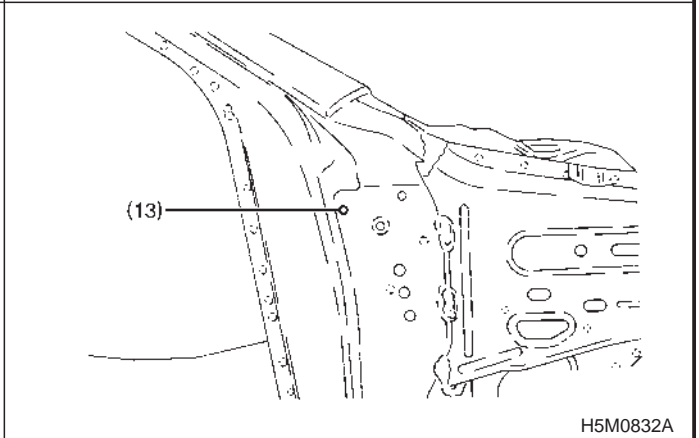
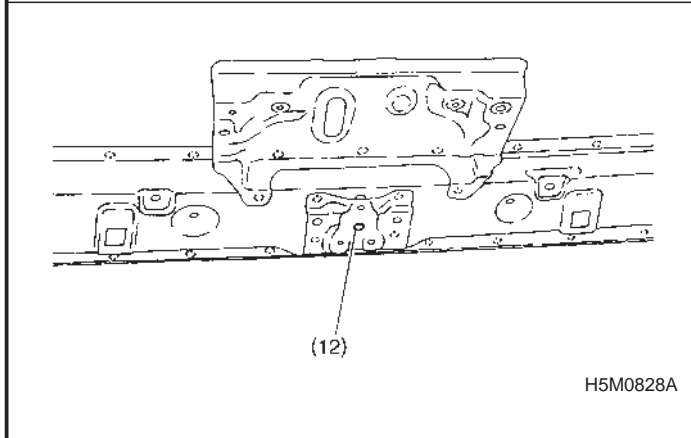
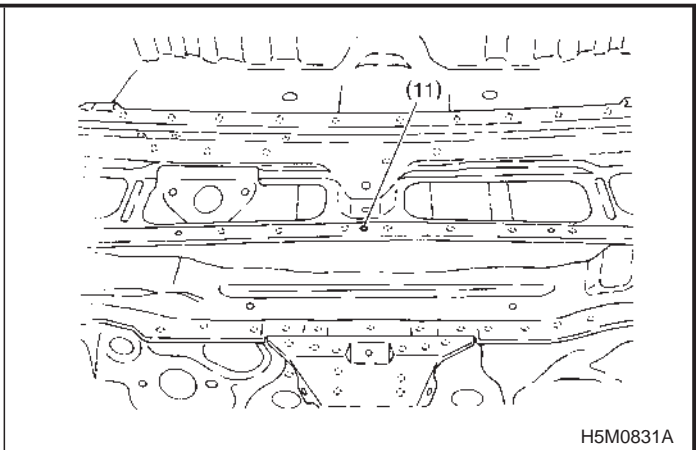
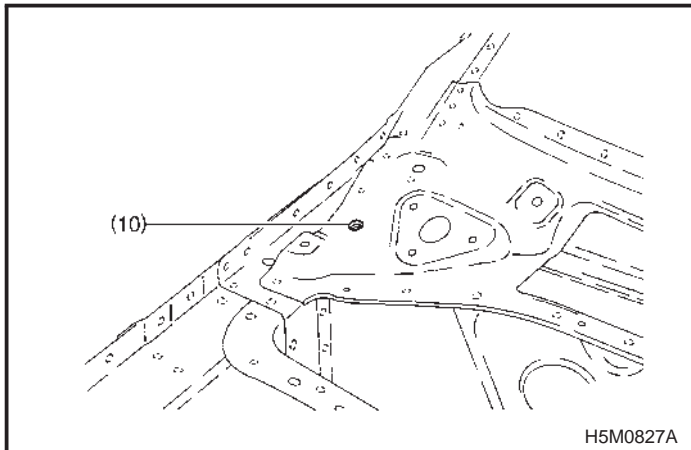
- (50) Radiator panel (LWR) frame gauge hole 15 mm (0.59 in) dia. (Symmetrical)
- (51) Front side frame gauge hole 20 mm (0.79 in) dia. (Symmetrical)
- (52) Front crossmember attaching hole 12.4 mm (0.488 in) dia. (Symmetrical)

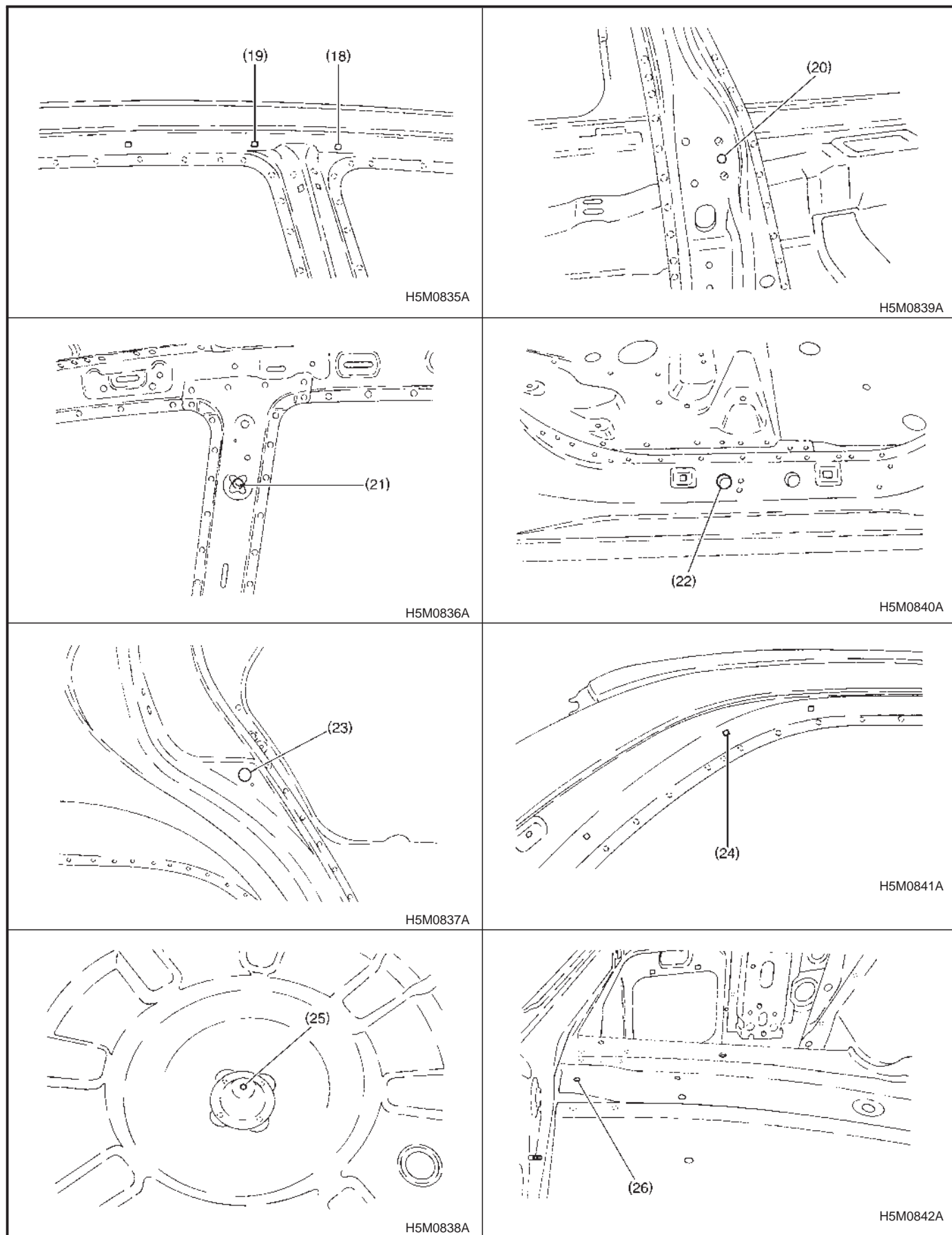
- (53) Front suspension attaching bolt hole M14
- (54) Side frame gauge hole 20 mm (0.79 in) dia. (Symmetrical)
- (55) Transmission mount attaching bolt hole M10 (Symmetrical)
- (56) Side frame gauge hole 15 mm (0.59 in) dia. (Symmetrical)

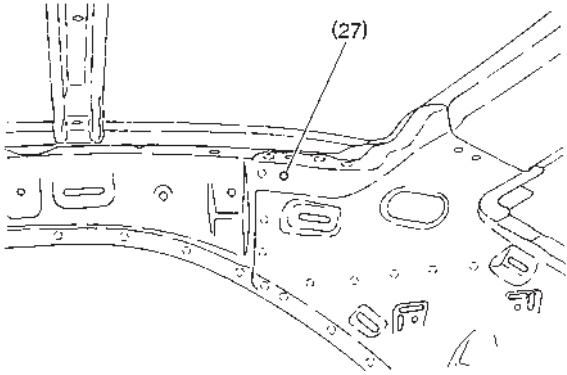
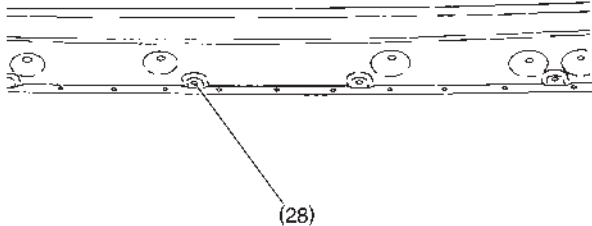
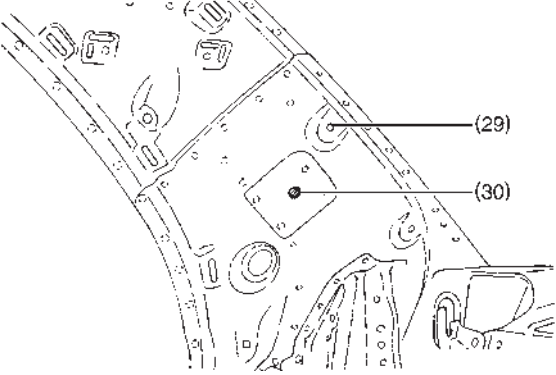
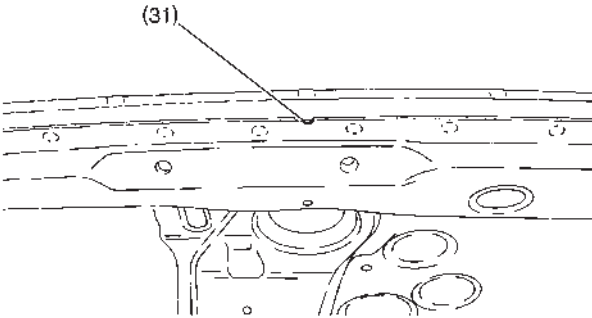
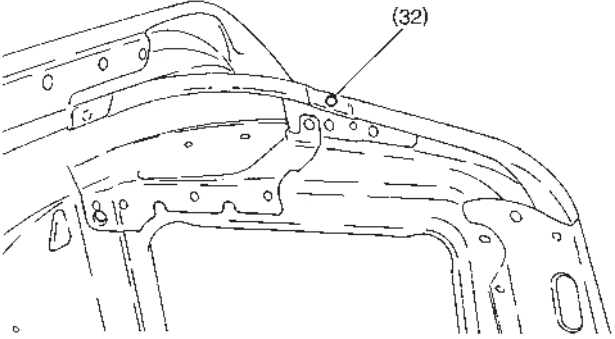
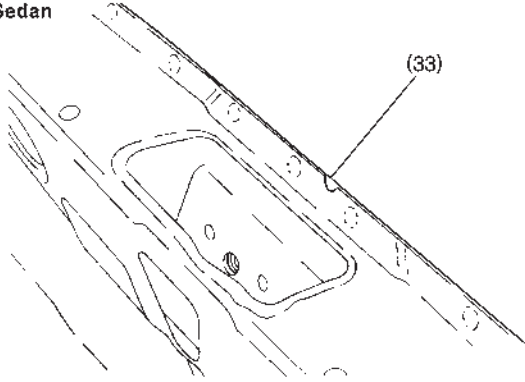
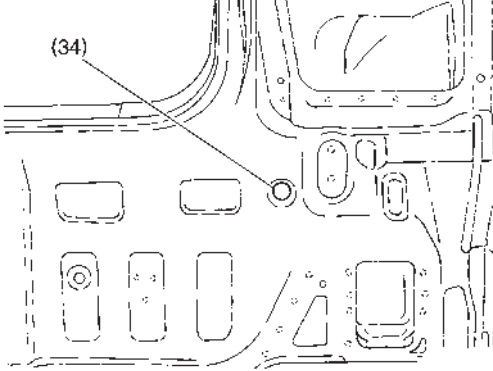
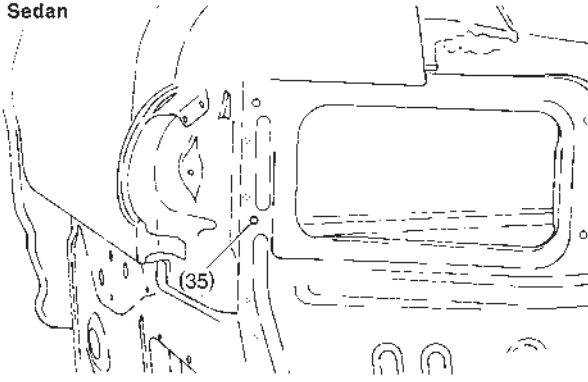
- (57) Rear differential attaching bolt hole M12 (Symmetrical)
- (58) Rear suspension attaching bolt hole M12 (Symmetrical)
- (59) Rear side frame gauge hole 15 mm (0.59 in) dia. (Symmetrical)

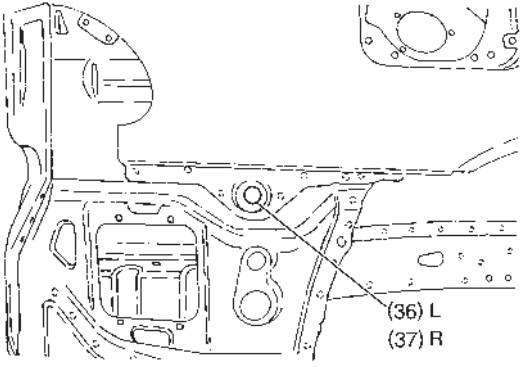
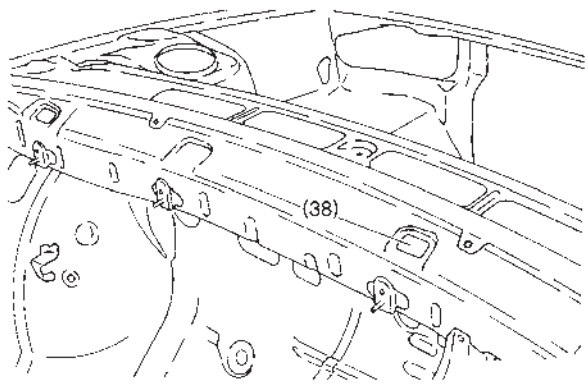
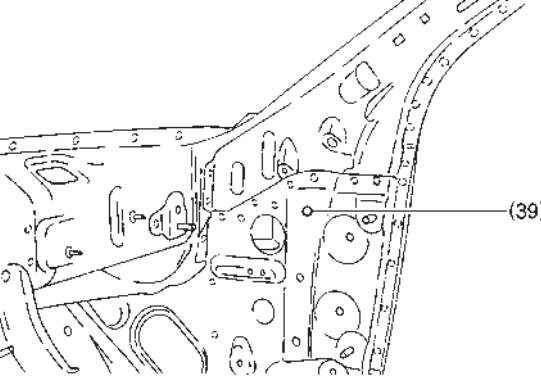
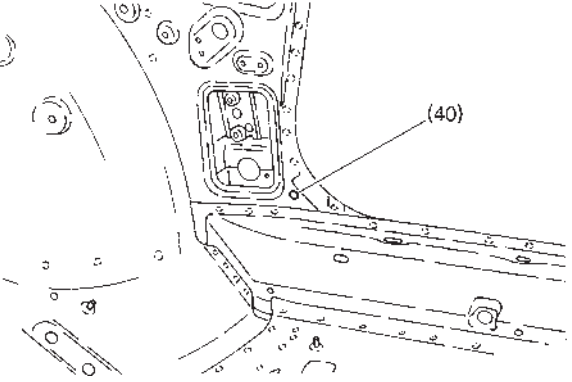
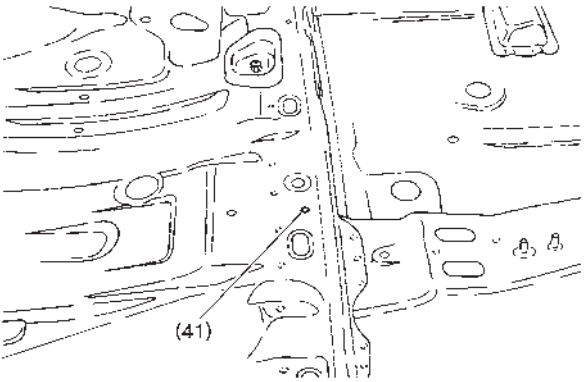
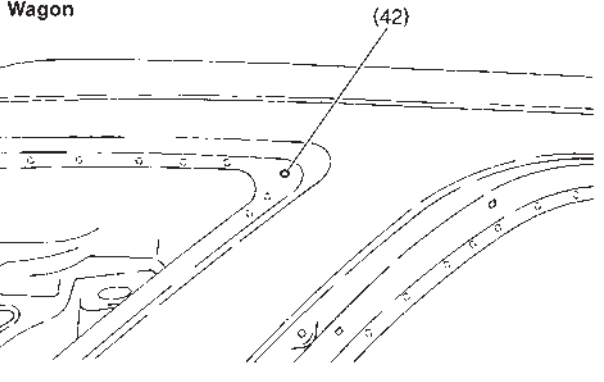
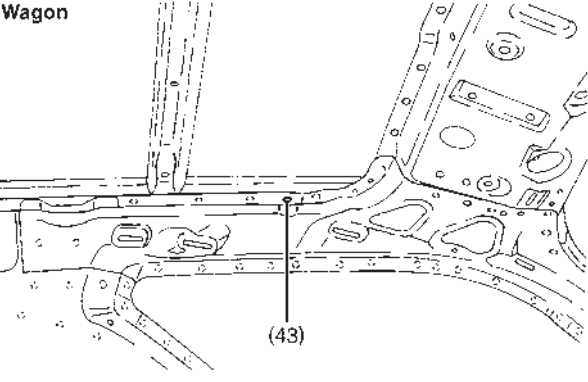
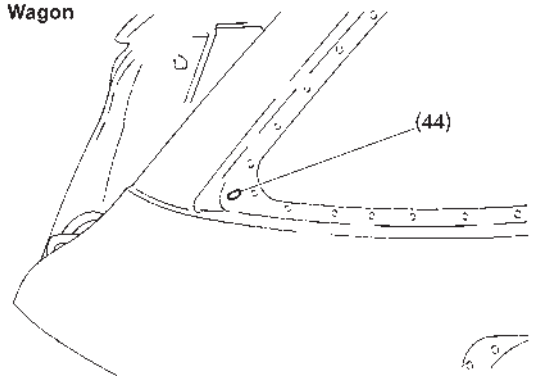
D: DATUM POINT LOCATION

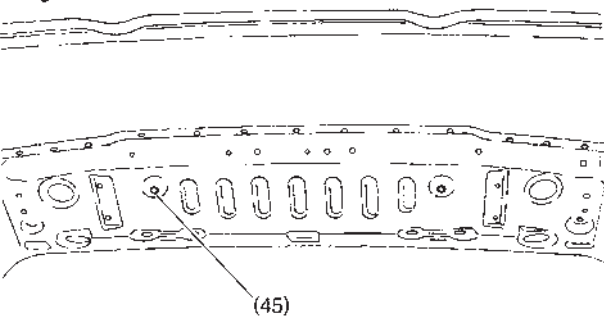
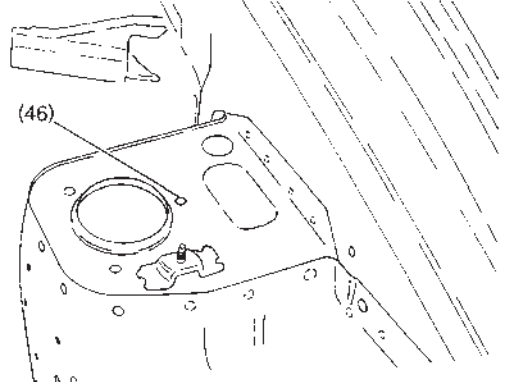
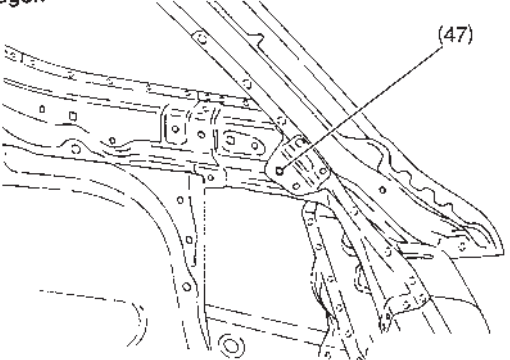
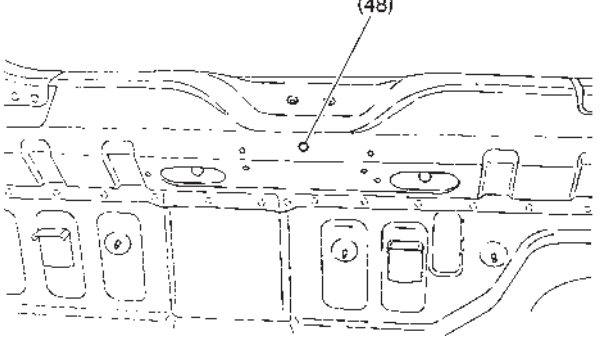
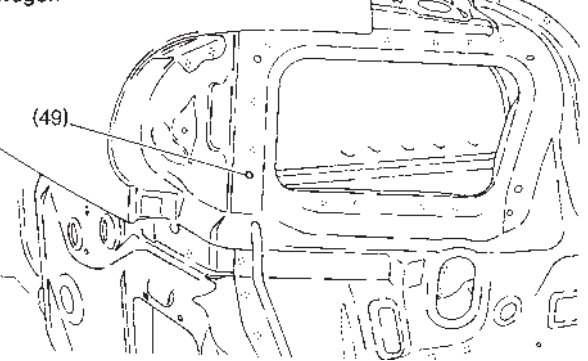
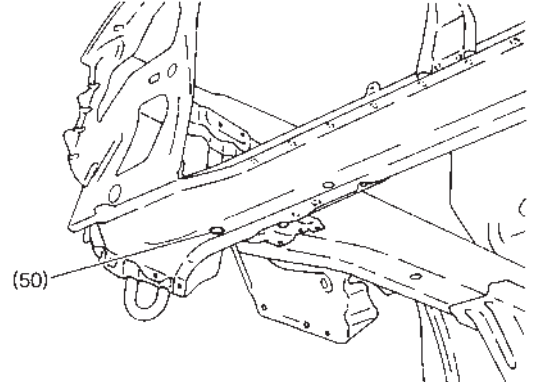
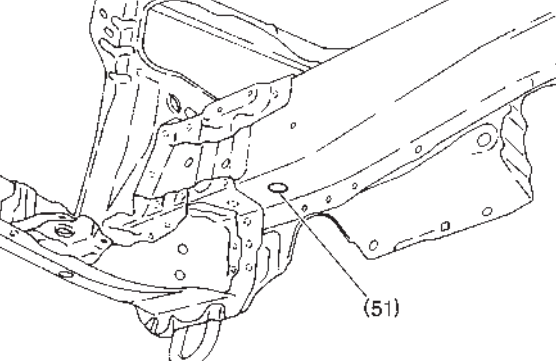
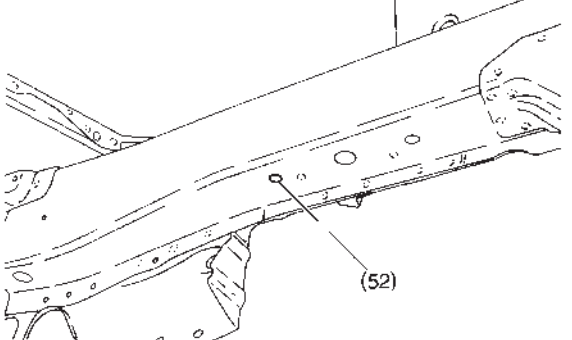


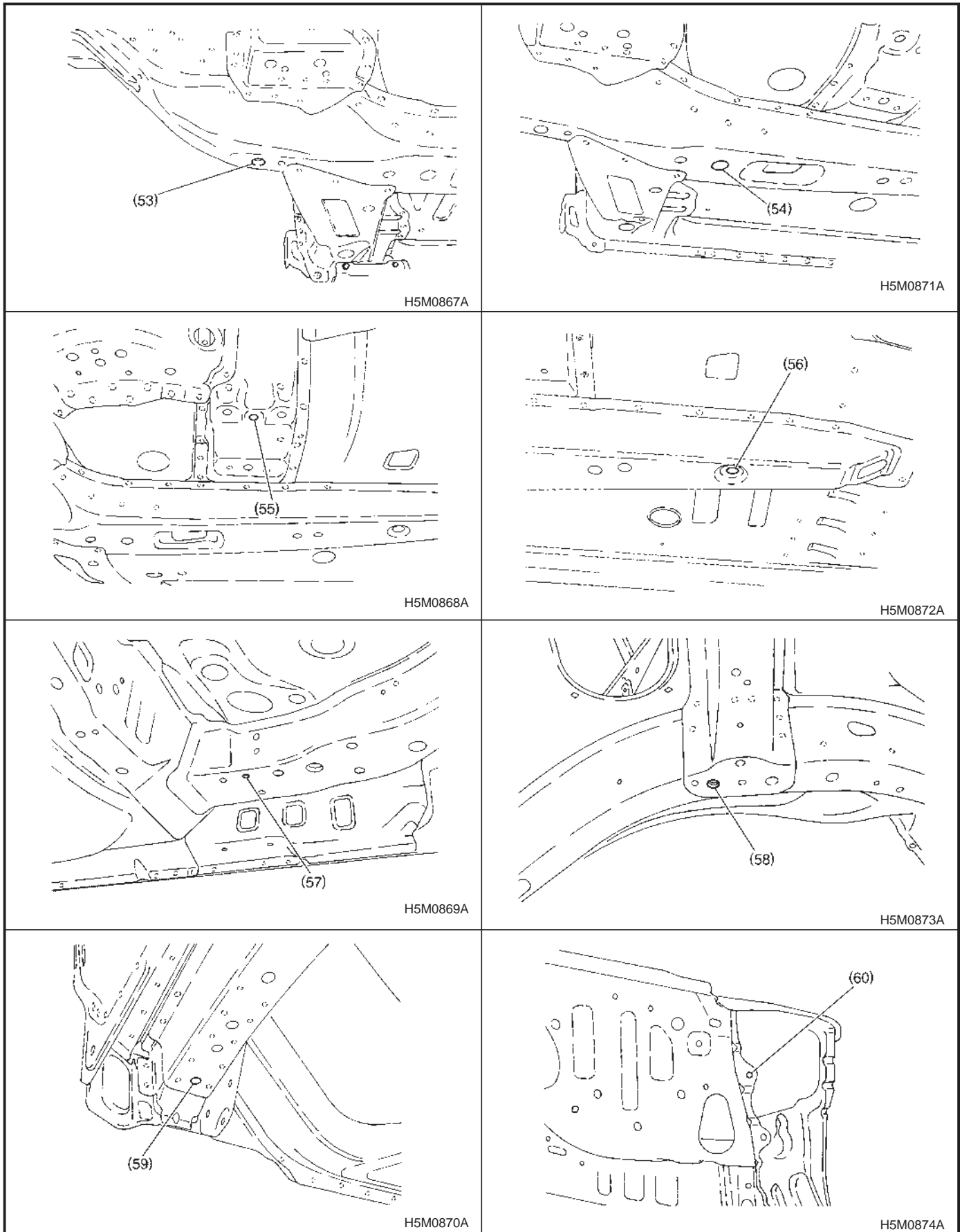


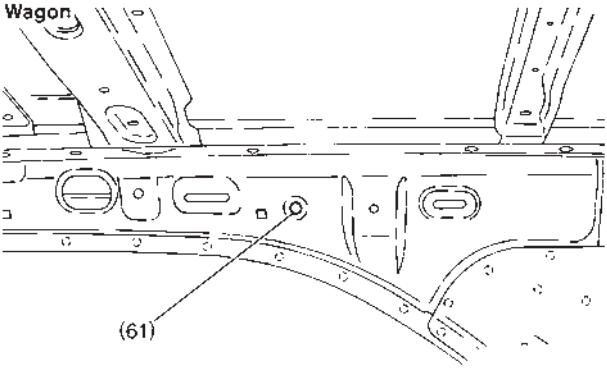
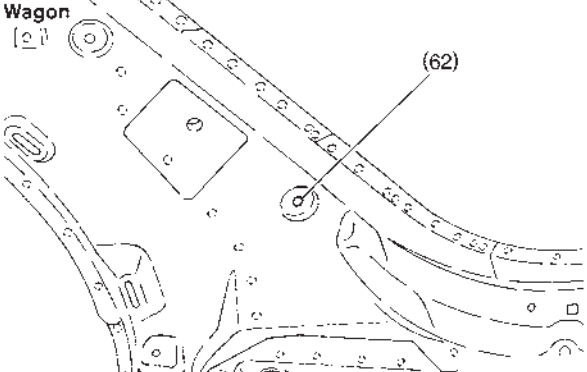
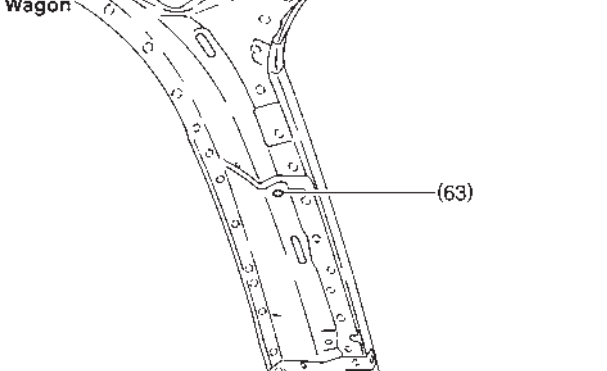
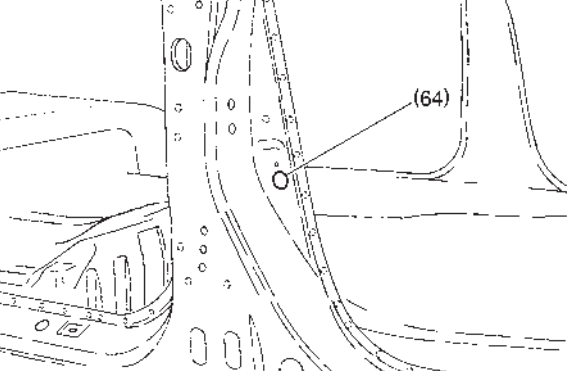
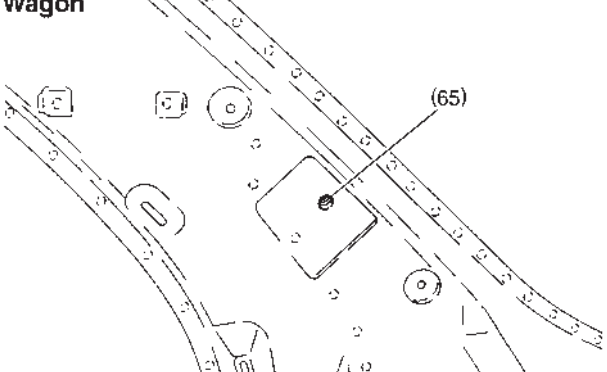
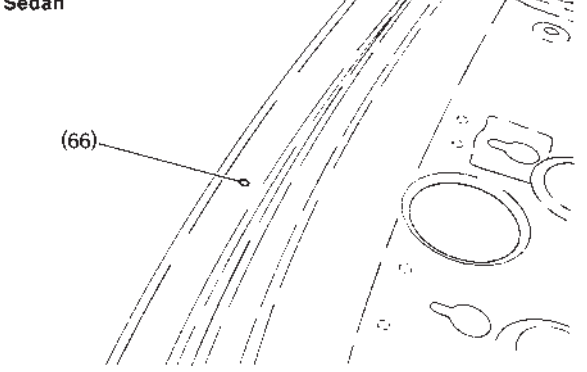
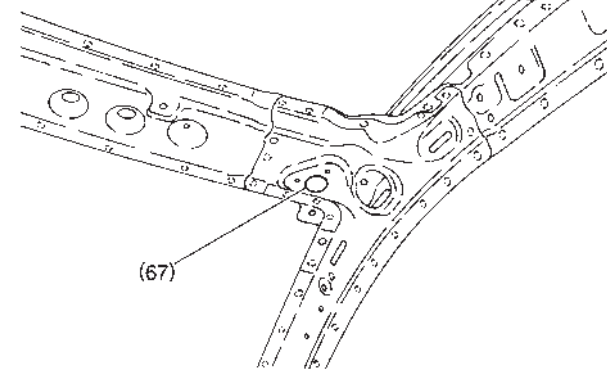
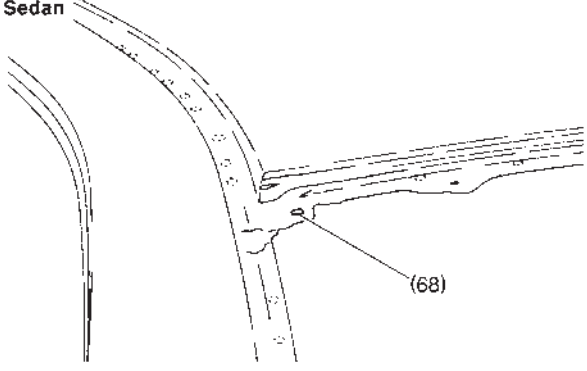


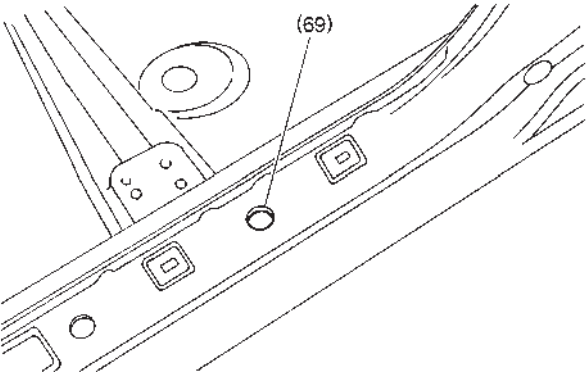
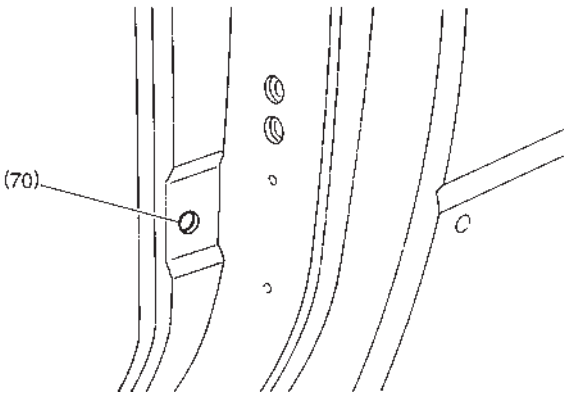
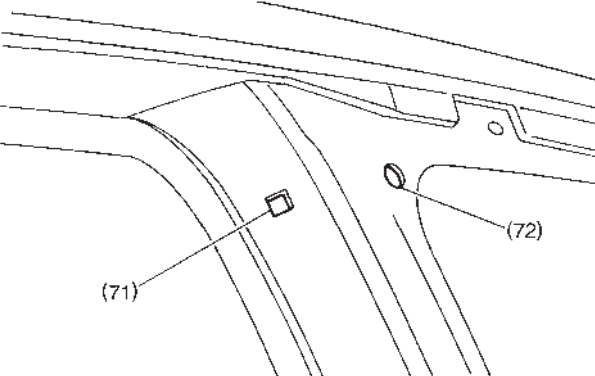
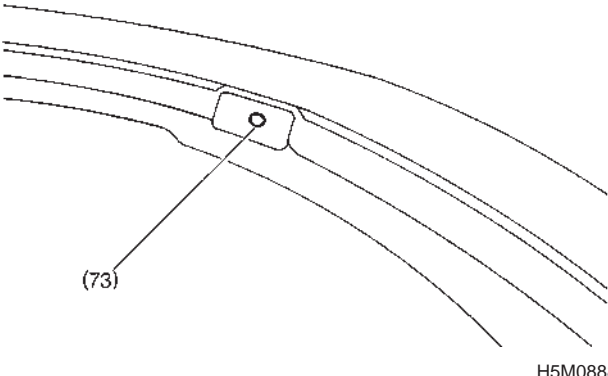
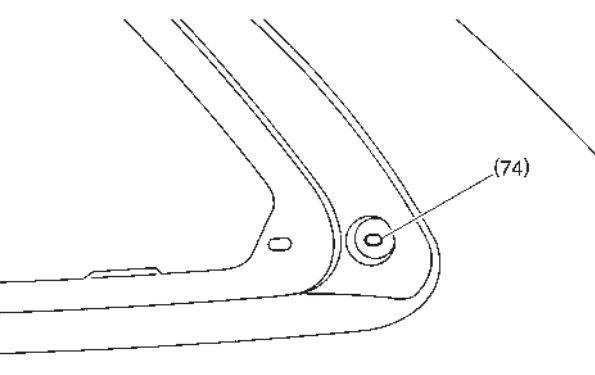
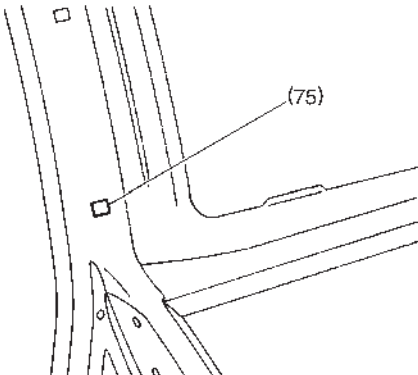
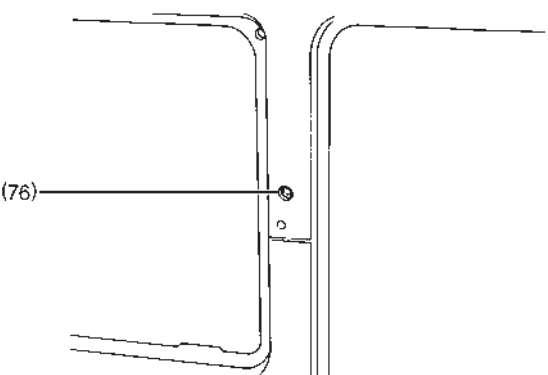

 <p>(27)</p> <p>H5M0843A</p>	<p>Sedan</p>  <p>(28)</p> <p>H5M0847A</p>
 <p>(29)</p> <p>(30)</p> <p>H5M0844A</p>	<p>Sedan</p>  <p>(31)</p> <p>H5M0848A</p>
 <p>(32)</p> <p>H5M0845A</p>	<p>Sedan</p>  <p>(33)</p> <p>H5M0849A</p>
 <p>(34)</p> <p>H5M0846A</p>	<p>Sedan</p>  <p>(35)</p> <p>H5M0850A</p>

 <p>(36) L (37) R</p> <p>H5M0851A</p>	 <p>(38)</p> <p>H5M0855A</p>
 <p>(39)</p> <p>H5M0852A</p>	 <p>(40)</p> <p>H5M0856A</p>
 <p>(41)</p> <p>H5M0853A</p>	<p>Wagon</p>  <p>(42)</p> <p>H5M0857A</p>
<p>Wagon</p>  <p>(43)</p> <p>H5M0854A</p>	<p>Wagon</p>  <p>(44)</p> <p>H5M0858A</p>

<p>Wagon</p>  <p>(45)</p> <p>H5M0859A</p>	 <p>(46)</p> <p>H5M0863A</p>
<p>Wagon</p>  <p>(47)</p> <p>H5M0860A</p>	<p>Wagon</p>  <p>(48)</p> <p>H5M0864A</p>
<p>Wagon</p>  <p>(49)</p> <p>H5M0861A</p>	 <p>(50)</p> <p>H5M0865A</p>
 <p>(51)</p> <p>H5M0862A</p>	 <p>(52)</p> <p>H5M0866A</p>

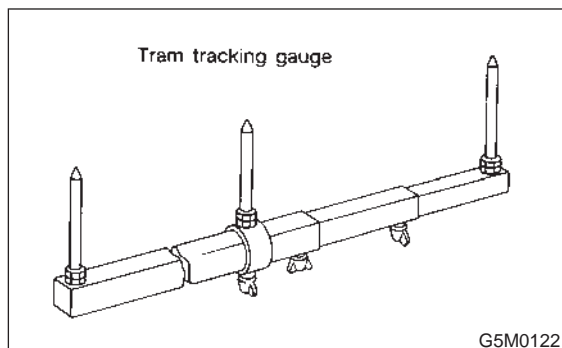


<p>Wagon</p>  <p>(61)</p> <p>H5M0875A</p>	<p>Wagon</p>  <p>(62)</p> <p>H5M0879A</p>
<p>Wagon</p>  <p>(63)</p> <p>H5M0876A</p>	 <p>(64)</p> <p>H5M0880A</p>
<p>Wagon</p>  <p>(65)</p> <p>H5M0670B</p>	<p>Sedan</p>  <p>(66)</p> <p>H5M0881A</p>
 <p>(67)</p> <p>H5M0878A</p>	<p>Sedan</p>  <p>(68)</p> <p>H5M0882A</p>

 <p>(69)</p> <p>H5M0883A</p>	 <p>(70)</p> <p>H5M0887A</p>
 <p>(71)</p> <p>(72)</p> <p>H5M0884A</p>	 <p>(73)</p> <p>H5M0888A</p>
 <p>(74)</p> <p>H5M0885A</p>	 <p>(75)</p> <p>H5M0889A</p>
 <p>(76)</p> <p>H5M0886A</p>	

3. Datum Dimensions

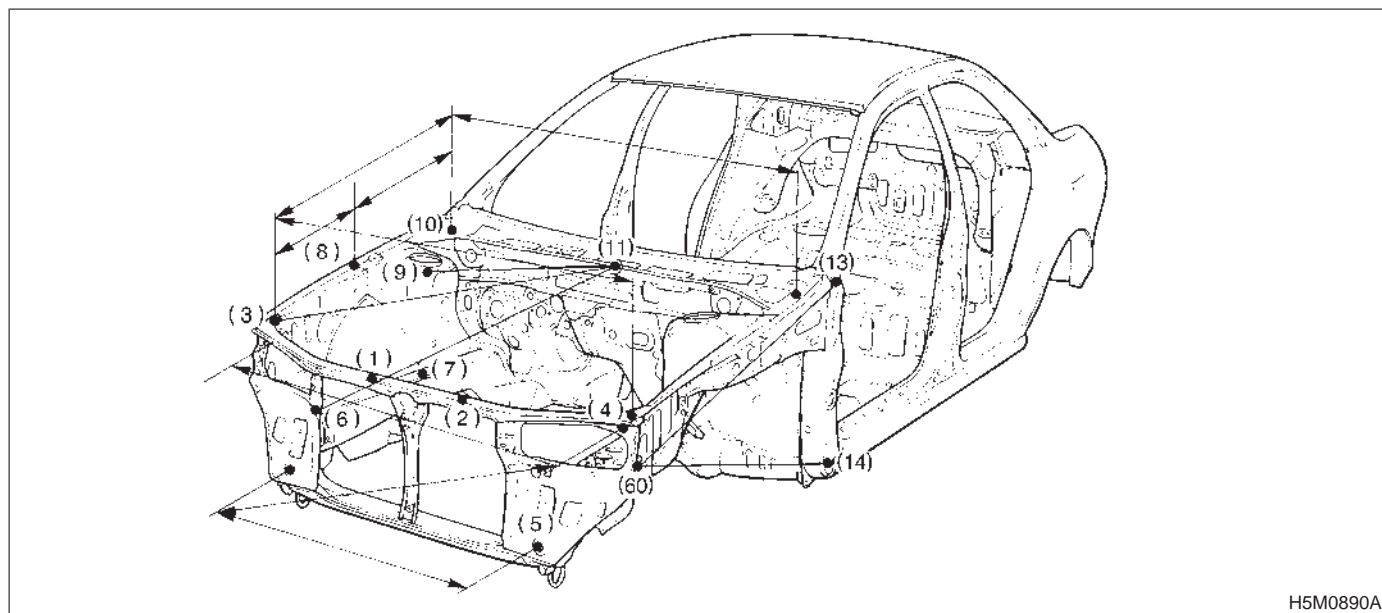
Use a tram tracking gauge to measure all dimensions. If a measuring tape is used, be extremely careful because it tends to deflect or twist, which results in a false reading.



NOTE:

- A suffix character "R" or "L" refers to the right or the left.
- All dimensions refer to the distance between the centers of holes measured in a straight line
- Each dimension indicates a projected dimension between hole centers.

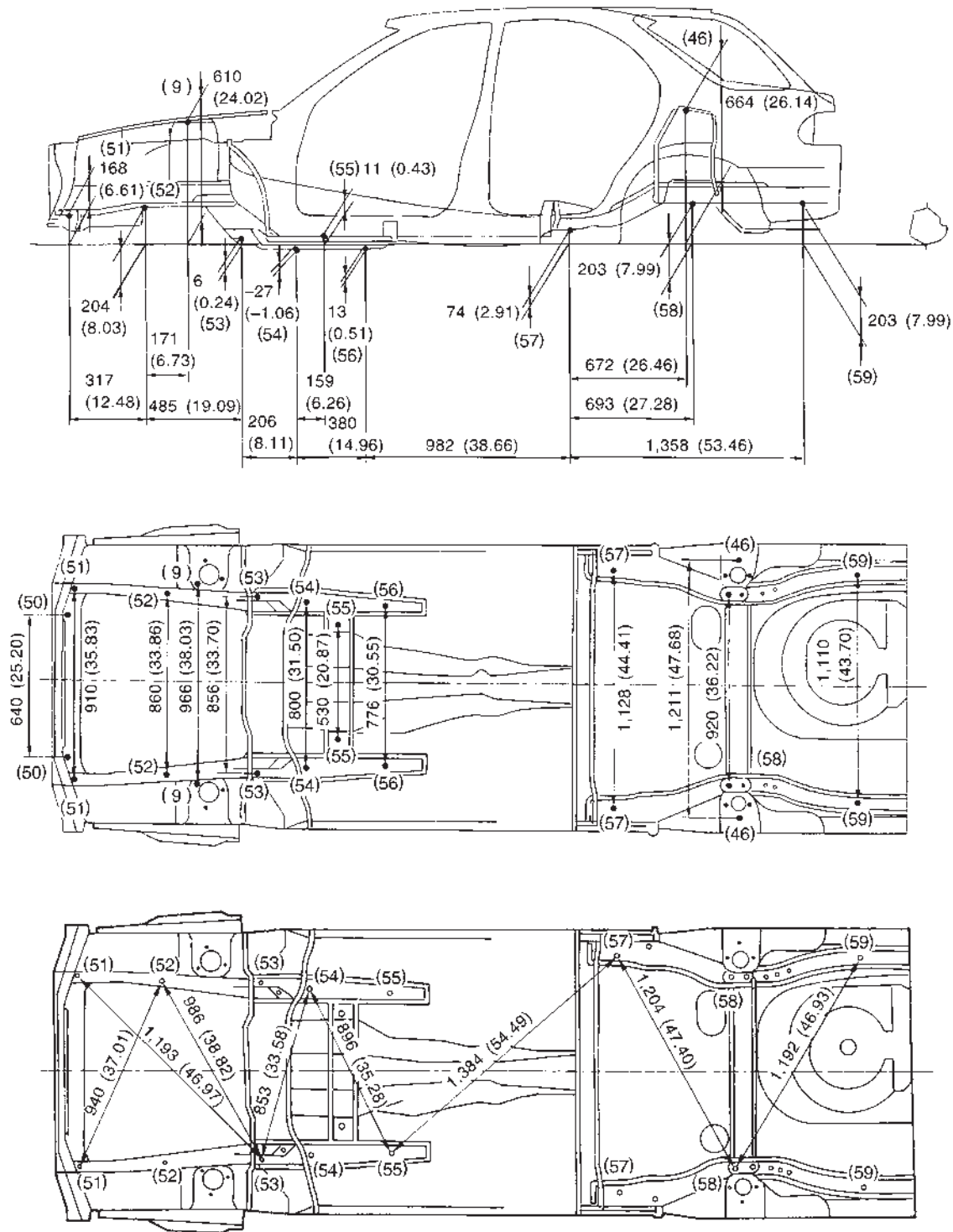
A: FRONT STRUCTURE



Unit: mm (in)			
Point to point	Dimension	Point to point	Dimension
(11) to (9) R	525 (20.67)	(10) R to (10) L	1,382 (54.41)
(11) to (9) L	525 (20.67)	(3) R to (3) L	1,336 (52.60)
(11) to (6) R	988 (38.90)	(5) R to (5) L	942 (37.09)
(11) to (6) L	988 (38.90)	(5) R to (4) R	1,174 (46.22)
(11) to (3) R	990 (38.98)	(5) L to (4) L	1,174 (46.22)
(11) to (3) L	990 (38.98)	(4) R to (4) L	1,269 (49.96)
(10) R to (3) R	829 (32.64)	(60) R to (13) R	1,113 (43.82)
(10) L to (3) L	829 (32.64)	(60) L to (13) L	1,113 (43.82)
(10) R to (8) R	567 (22.32)	(60) R to (14) R	1,076 (42.36)
(10) L to (8) L	567 (22.32)	(60) L to (14) L	1,076 (42.36)
(8) R to (3) R	264 (10.39)	(1) to (11)	882 (34.72)
(8) L to (3) L	264 (10.39)	(2) to (11)	913 (35.94)

B: CENTER STRUCTURE

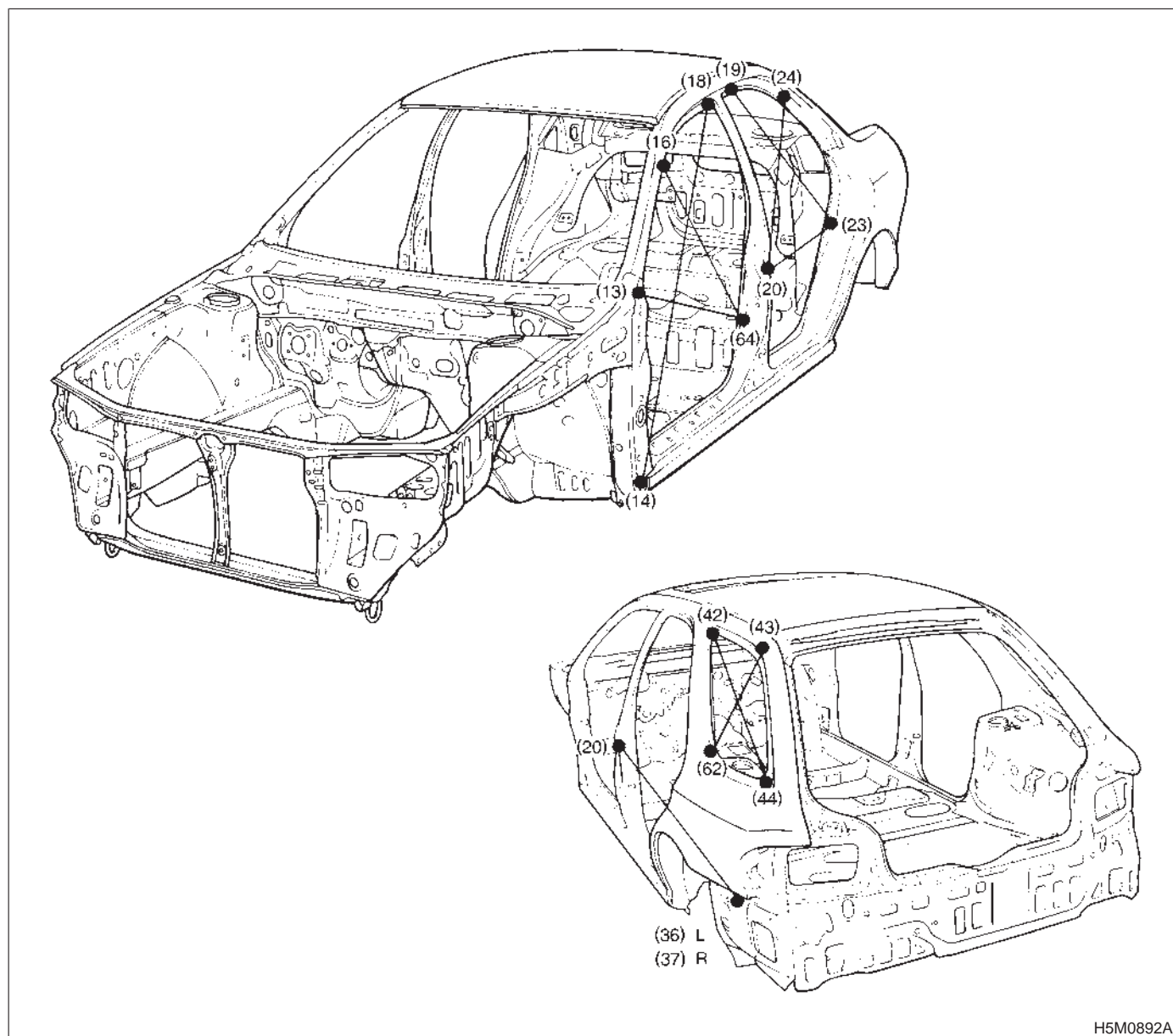
Unit: mm (in)



H5M0891A

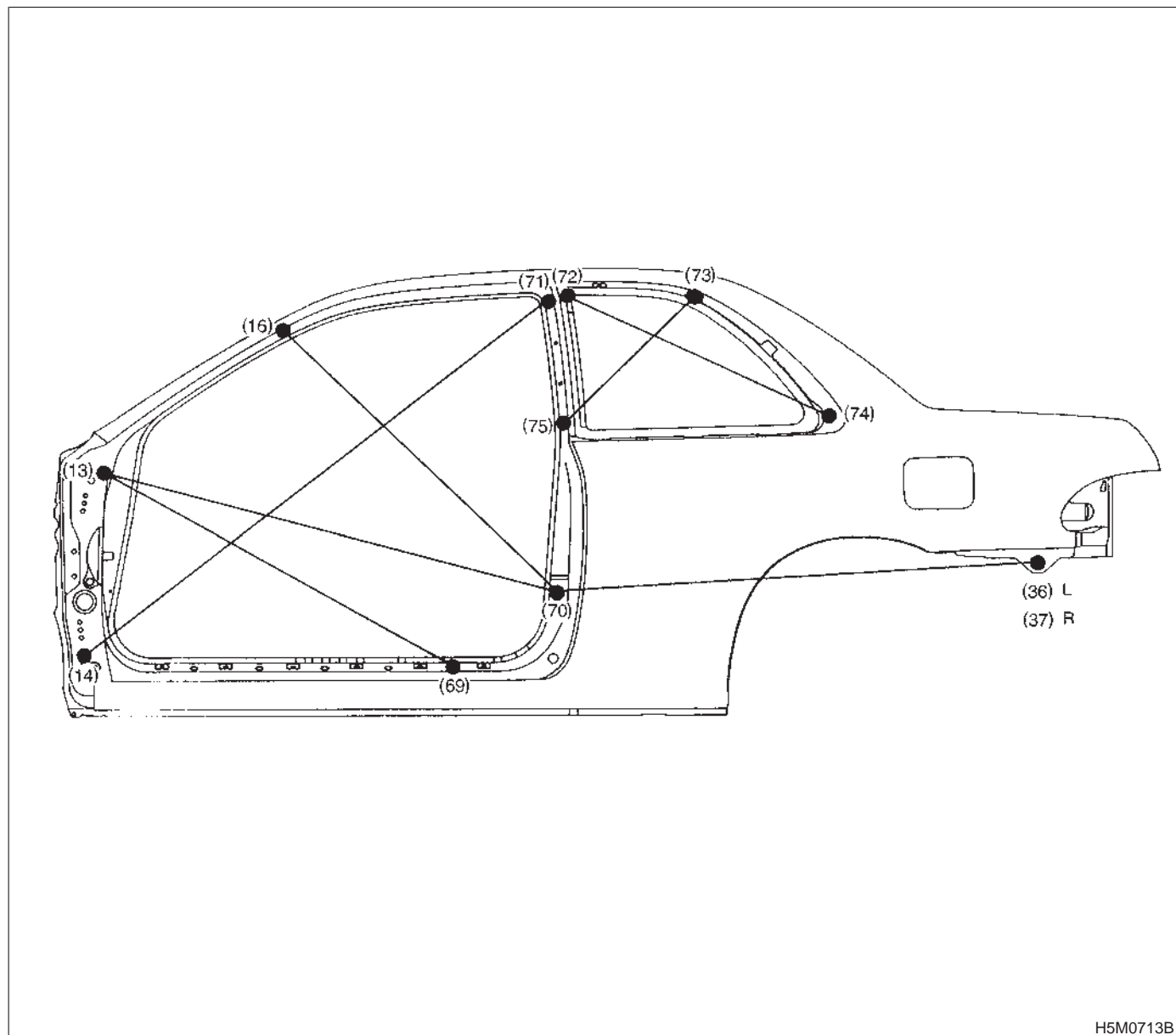
C: DOORS AND REAR QUARTER

1. SEDAN AND WAGON



Unit: mm (in)			
Point to point	Dimension	Point to point	Dimension
(14) to (18)	1,495 (58.86)	(19) to (23)	912 (35.91)
(13) to (64)	947 (37.28)	(20) to (36) L*	1,462 (57.56)
(16) to (64)	976 (38.43)	(20) R to (37) R*	1,481 (58.31)
(20) to (23)	803 (31.61)	(62) to (43) *	377 (14.84)
(20) to (24)	829 (32.64)	(42) to (44) *	847 (33.35)
*: Wagon only			

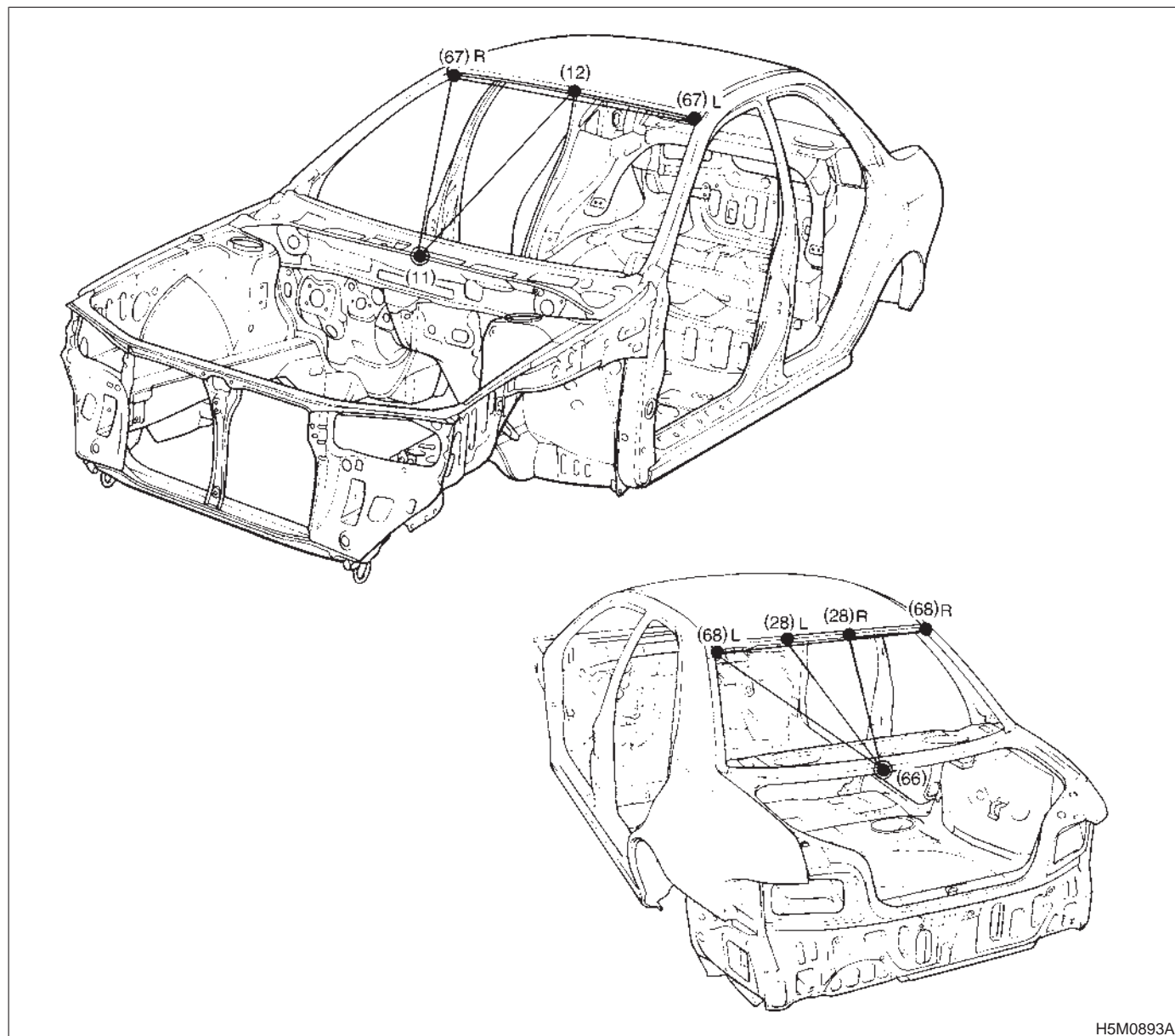
2. COUPE



H5M0713B

Unit: mm (in)			
Point to point	Dimension	Point to point	Dimension
(14) to (71)	1,576 (62.05)	(72) to (74)	778 (30.63)
(13) to (70)	1,251 (49.25)	(73) to (75)	512 (20.16)
(16) to (70)	997 (39.25)	(70) to (36) L	1,295 (50.98)
(13) to (69)	1,063 (41.85)	(70) to (37) R	1,243 (48.94)

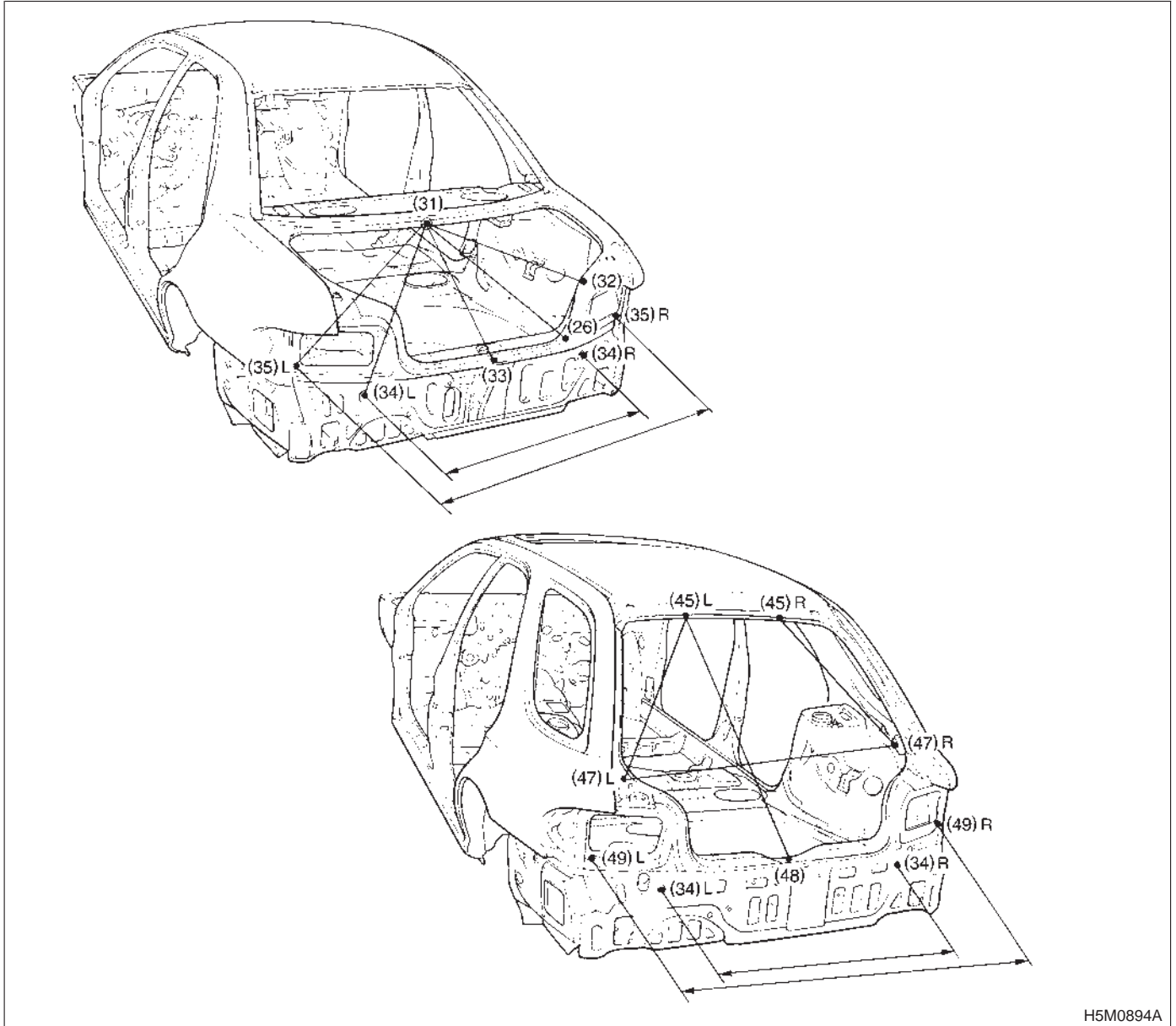
D: FRONT WINDSHIELD AND REAR WINDOW



H5M0893A

Unit: mm (in)			
Point to point	Dimension	Point to point	Dimension
(11) to (12)	989 (38.94)	(66) to (28) L	714 (28.11)
(67) R to (67) L	1,012 (39.84)	(66) to (68) R	856 (33.70)
(11) to (67) R	1,116 (43.94)	(66) to (68) L	856 (33.70)
(11) to (67) L	1,116 (43.94)	(68) R to (68) L	1,012 (39.84)
(66) to (28) R	714 (28.11)		

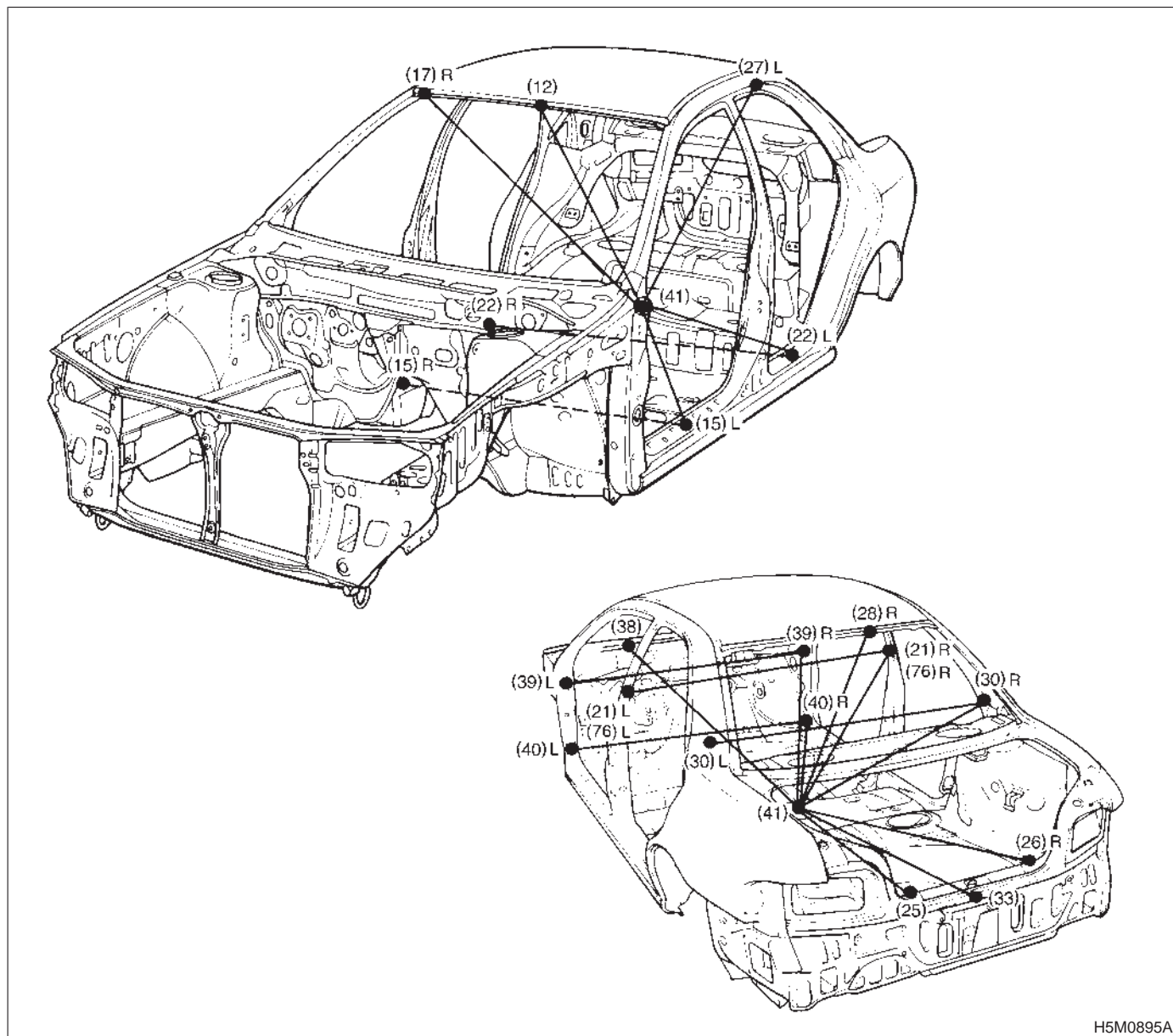
E: TRUNK LID AND REAR GATE



H5M0894A

Unit: mm (in)			
Point to point	Dimension	Point to point	Dimension
(31) to (32) R	575 (22.64)	(35) R to (35) L	1,364 (53.70)
(31) to (32) L	575 (22.64)	(45) R to (48)	988 (38.90)
(31) to (26) R	812 (31.97)	(45) L to (48)	988 (38.90)
(31) to (26) L	812 (31.97)	(45) R to (47) R	926 (36.46)
(31) to (33)	522 (20.55)	(45) L to (47) L	926 (36.46)
(31) to (35) R	794 (31.26)	(47) R to (47) L	1,043 (41.06)
(31) to (35) L	794 (31.26)	(49) R to (49) L	1,355 (52.56)
(34) R to (34)L	890 (35.04)	(34) R to (34) L	890 (35.04)

F: COMPARTMENT

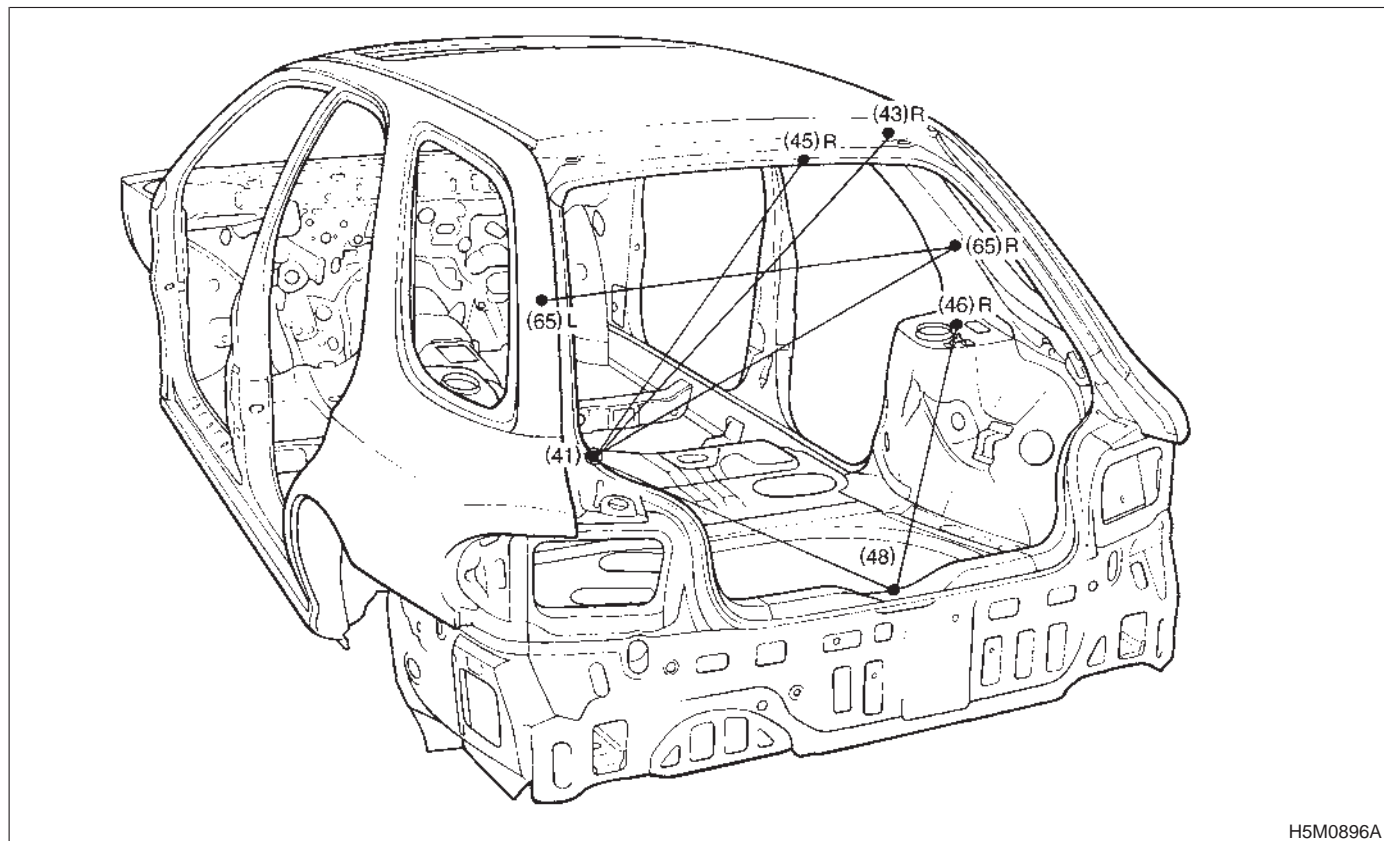


H5M0895A

Unit: mm (in)							
Point to point	Dimension		Point to point	Dimension		Point to point	Dimension
(30) R to (30) L	1,197 (47.13)		(41) to (15) R	1,140 (44.88)		(41) to (30) L*	1,168 (45.98)
(21) R to (21) L	1,061 (41.77)		(41) to (15) L	1,140 (44.88)		(41) to (28) R*	1,050 (41.34)
(15) R to (15) L	1,453 (57.20)		(41) to (22) R	733 (28.86)		(41) to (28) L*	1,050 (41.34)
(22) R to (22) L	1,453 (57.20)		(41) to (22) L	733 (28.86)		(41) to (21) R	1,038 (40.87)
(39) R to (39) L	1,388 (54.65)		(41) to (12)	1,156 (45.51)		(41) to (21) L	1,038 (40.87)
(40) R to (40) L	1,401 (55.16)		(41) to (27) R	1,085 (42.72)		(41) to (17) R	1,208 (47.56)
(41) to (38)	1,527 (60.12)		(41) to (27) L	1,085 (42.72)		(41) to (17) L	1,208 (47.56)
(41) to (39) R	1,524 (60.00)		(41) to (26) R	1,568 (61.73)		(41) to (33) *	1,569 (61.77)
(41) to (39) L	1,524 (60.00)		(41) to (26) L	1,568 (61.73)		(76) R to (76) L☆	1,212 (47.72)
(41) to (40) R	1,756 (69.13)		(41) to (25)	1,184 (46.61)			
(41) to (40) L	1,756 (69.13)		(41) to (30) R*	1,168 (45.98)			
*: Sedan only ☆ : Coupe only							

*: Sedan only ☆ : Coupe only

G: LUGGAGE ROOM

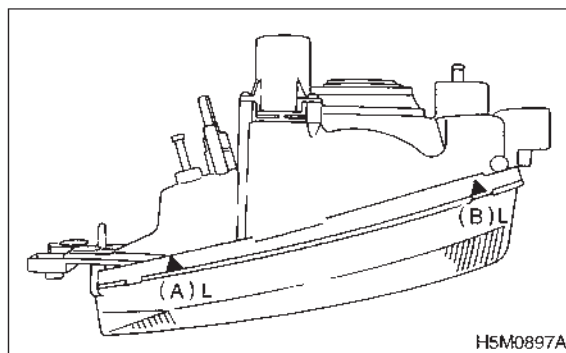
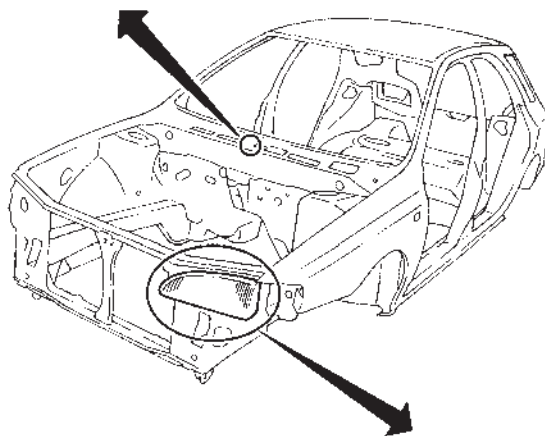
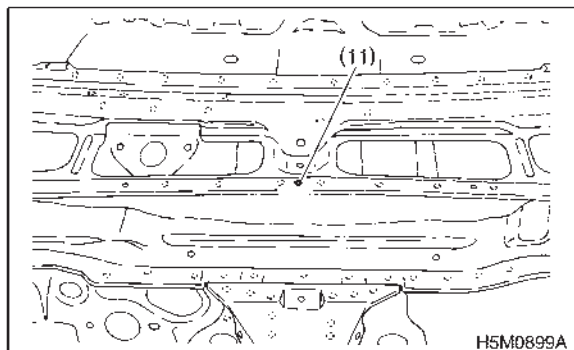


H5M0896A

Unit: mm (in)			
Point to point	Dimension	Point to point	Dimension
(41) to (65) R	1,122 (44.17)	(41) to (43) R	1,237 (48.70)
(41) to (65) L	1,122 (44.17)	(41) to (43) L	1,237 (48.70)
(41) to (45) R	1,225 (48.23)	(48) to (46) R	971 (38.23)
(41) to (45) L	1,225 (48.23)	(48) to (46) L	971 (38.23)
(41) to (48)	1,446 (56.93)	(65) R to (65) L	1,235 (48.62)

4. Datum Points and Dimensions Concerning On-Board Aiming Adjustment

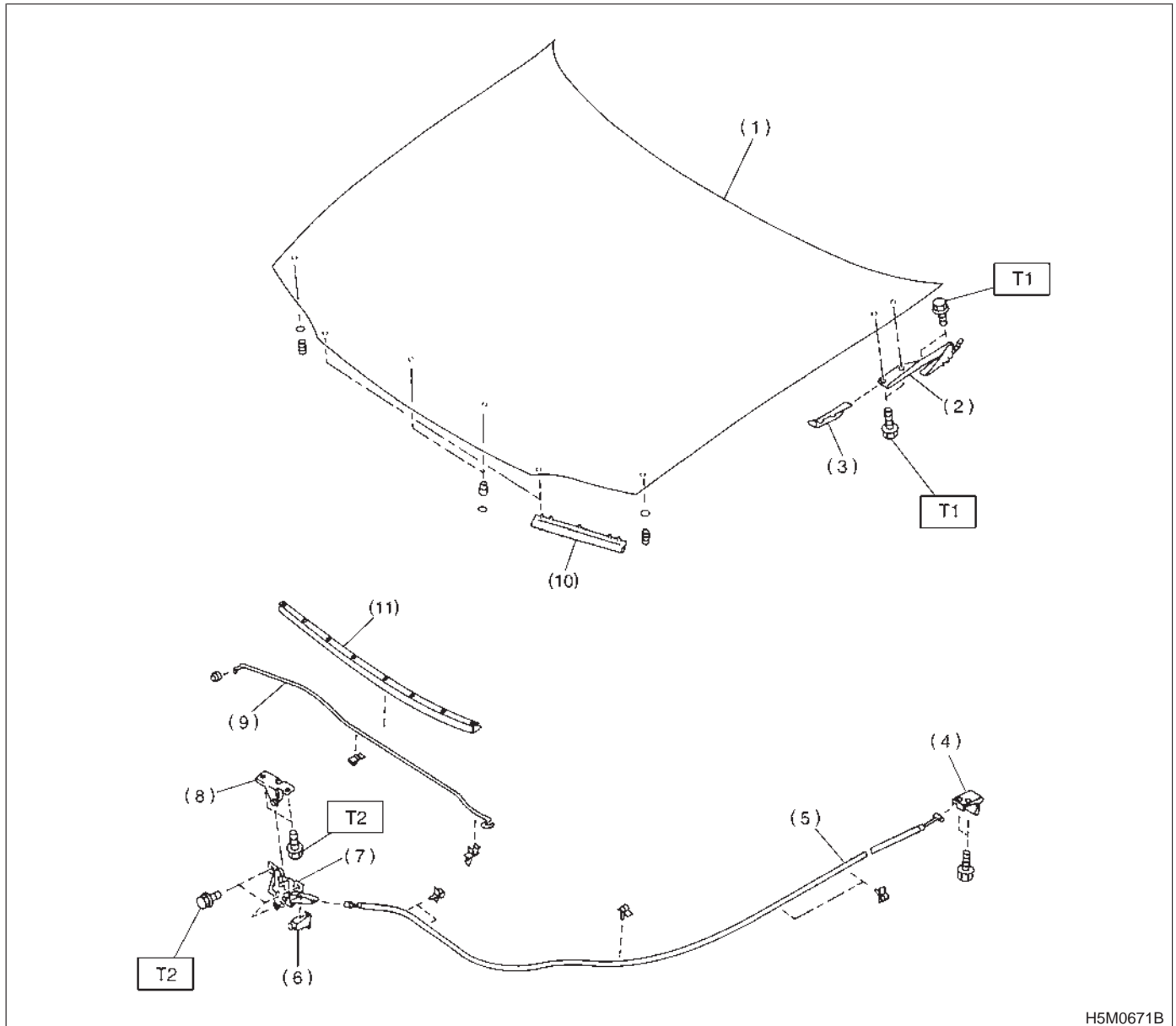
If headlight aiming is misaligned due to damaged body panel, repair headlight mating surface using body and headlight datum points as a guide.



H5M0898A

Unit: mm (in)				
Point to point	Dimension		Point to point	Dimension
(11) to (A) L	993 (39.09)		(11) to (B) L	1,048 (41.26)
(11) to (A) R	993 (39.09)		(11) to (B) R	1,048 (41.26)

1. Front Hood and Hood Lock



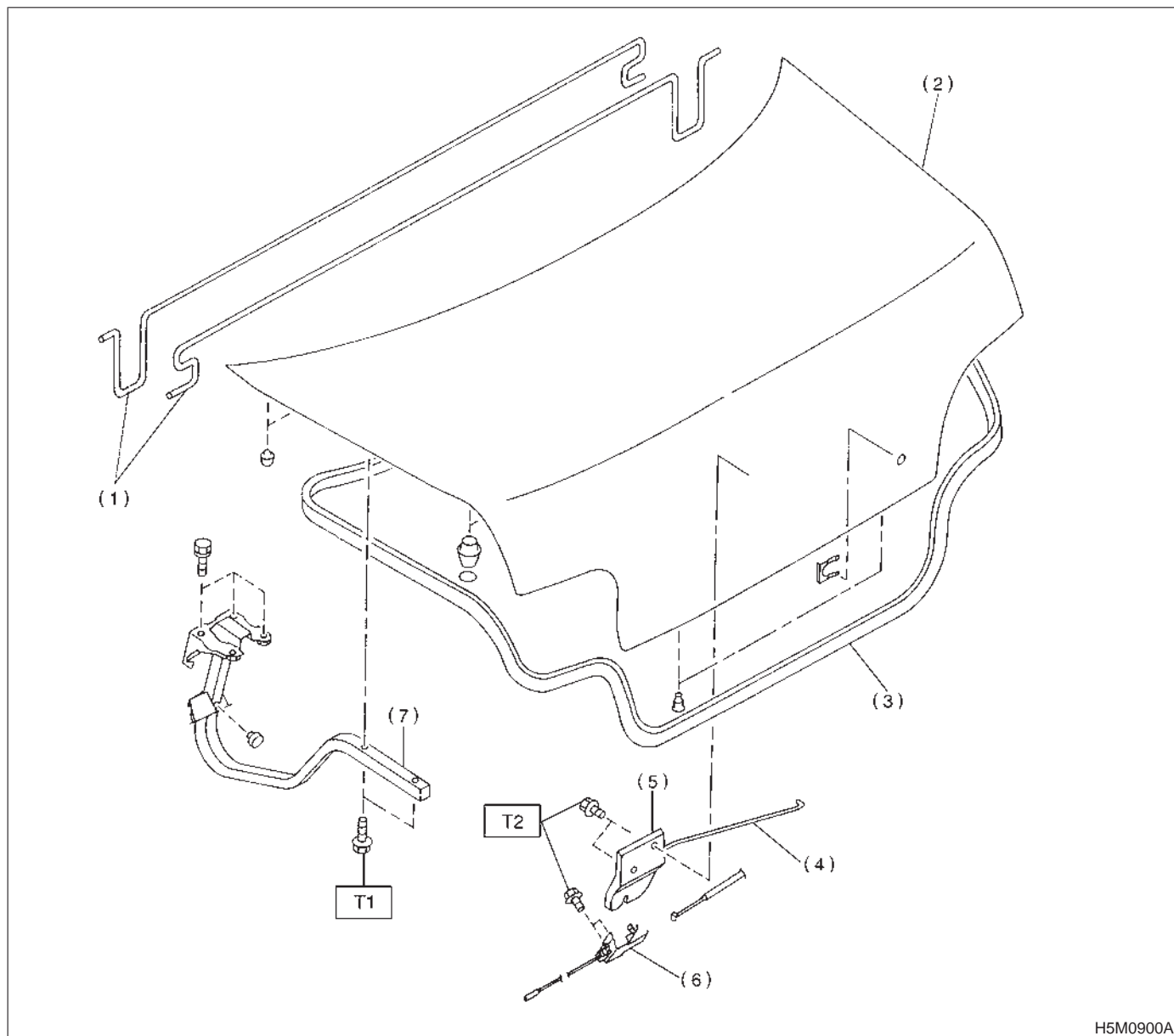
- | | |
|-------------------------------|----------------------------|
| (1) Front hood | (7) Hood lock ASSY |
| (2) Hinge (RH, LH) | (8) Striker |
| (3) Hood hinge cover (RH, LH) | (9) Front hood stay |
| (4) Lever ASSY | (10) Seal (Front hood) SD |
| (5) Cable | (11) Seal (Front hood) CTR |
| (6) Stopper | |

Tightening torque: N·m (kg·m, ft·lb)

T1: 14±9 (1.4±0.9, 10.1±6.5)

T2: 32±1 (3.3±0.1, 23.9±0.7)

2. Trunk Lid



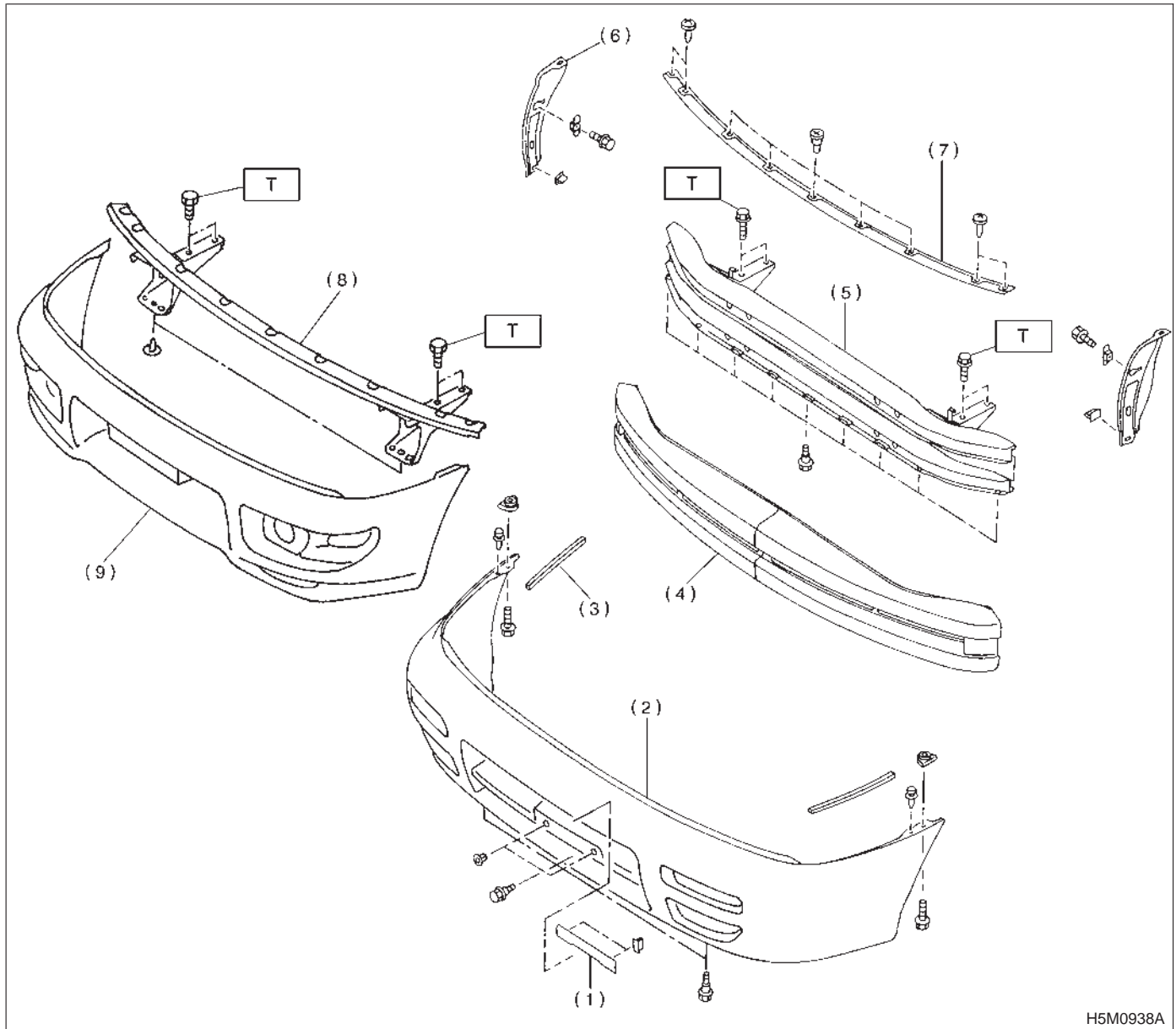
- | | |
|------------------|-------------------------|
| (1) Torsion bar | (5) Trunk lid lock ASSY |
| (2) Trunk lid | (6) Striker |
| (3) Weatherstrip | (7) Hinge ASSY |
| (4) Rod | |

Tightening torque: N·m (kg·m, ft·lb)

T1: 14±4 (1.4±0.4, 10.1±2.9)

T2: 18±5 (1.8±0.5, 13.0±3.6)

3. Front Bumper



H5M0938A

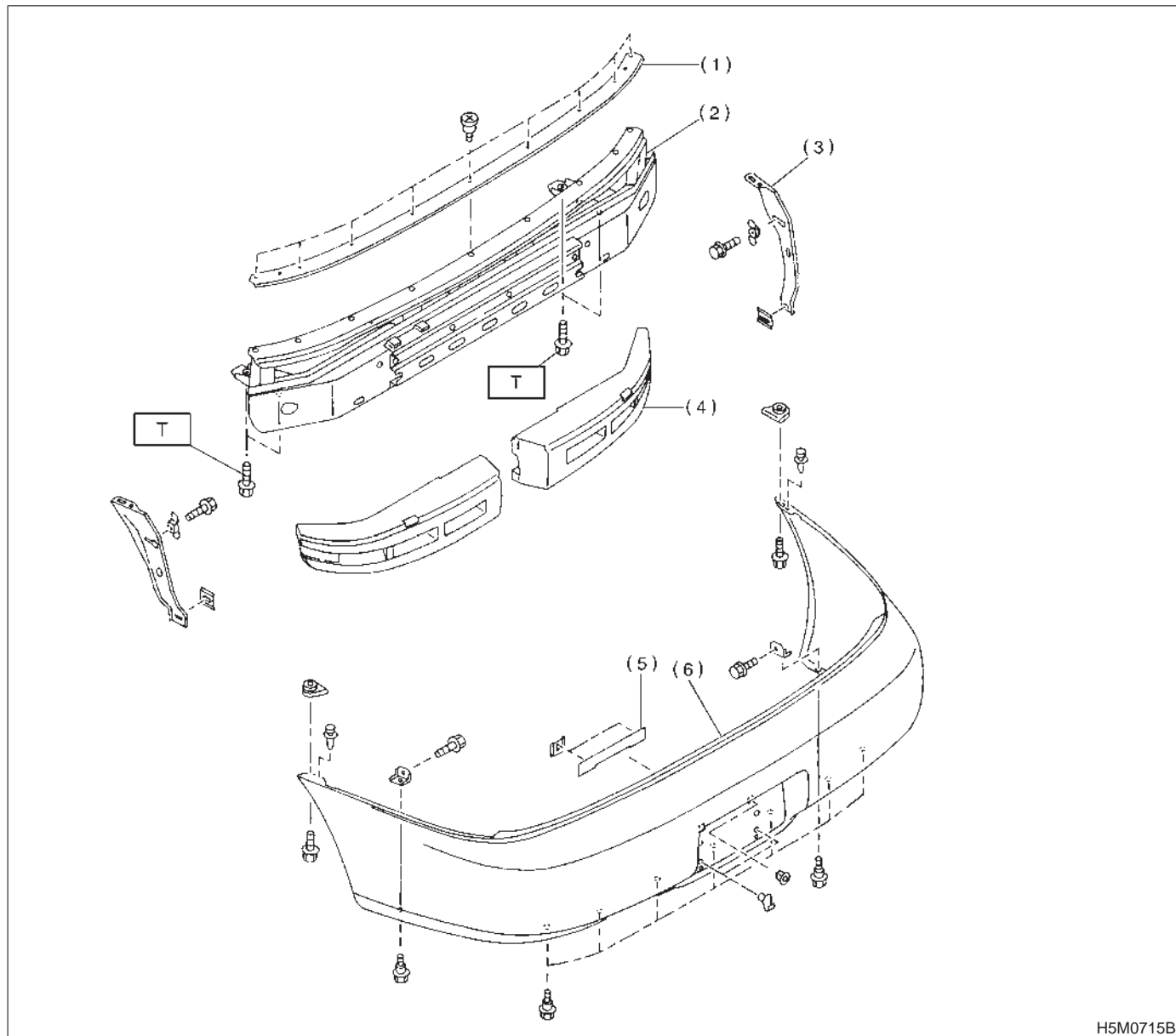
- (1) Plate
- (2) Bumper face (Except USA 2500 cc)
- (3) Spacer
- (4) E/A form bumper

- (5) Front beam (Except USA 2500 cc)
- (6) Bracket (Side)
- (7) Holder upper
- (8) Front beam (USA 2500 cc)

- (9) Bumper face (USA 2500 cc)

Tightening torque: N·m (kg·m, ft·lb)
T: 93±25 (9.5±2.5, 69±18)

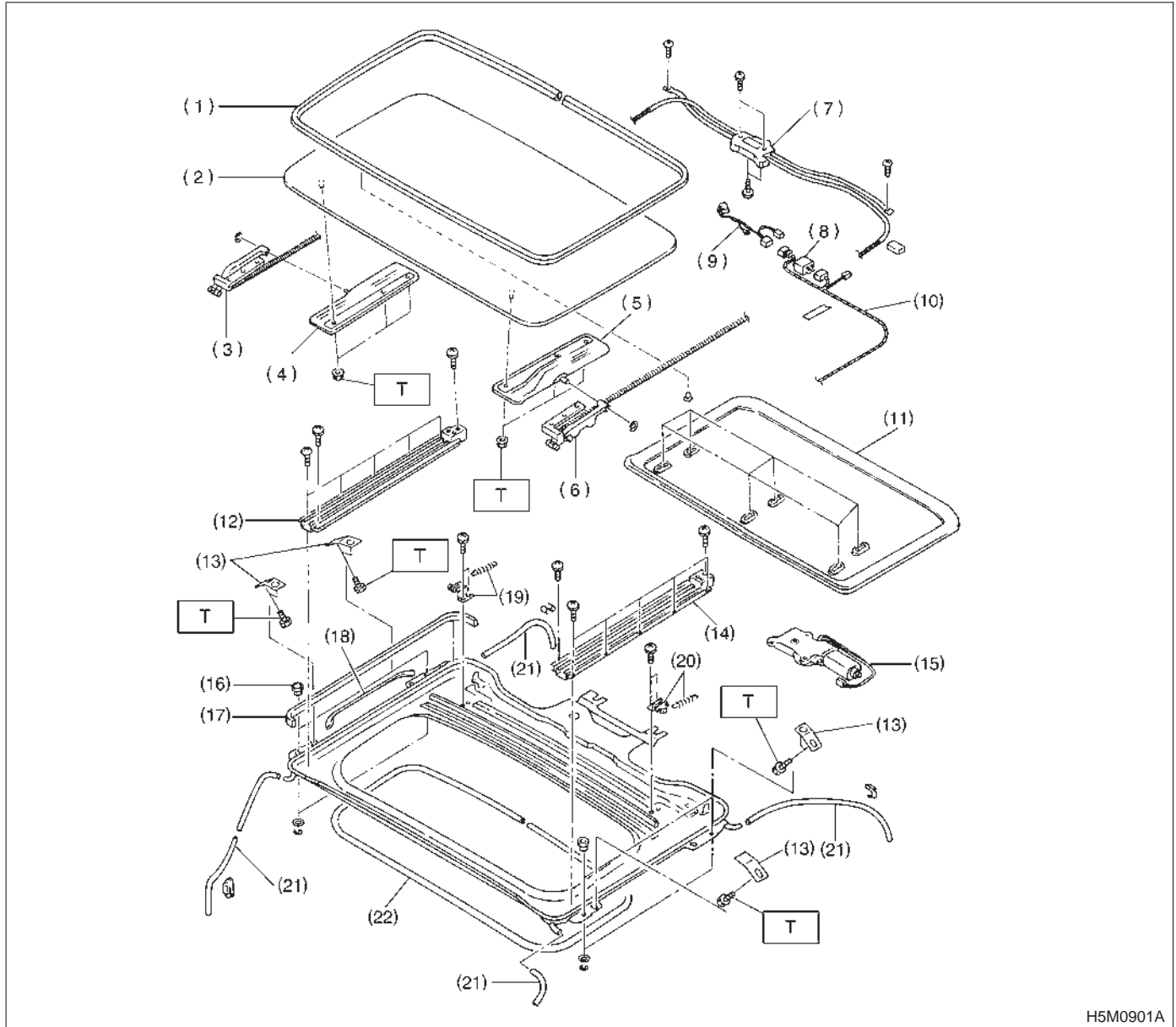
4. Rear Bumper



- | | |
|--------------------|---------------------|
| (1) Holder upper | (4) E/A from bumper |
| (2) Bumper beam | (5) Plate |
| (3) Bracket (Side) | (6) Bumper surface |

Tightening torque: N·m (kg·m, ft·lb)
T: 93±25 (9.5±2.5, 69±18)

5. Sunroof

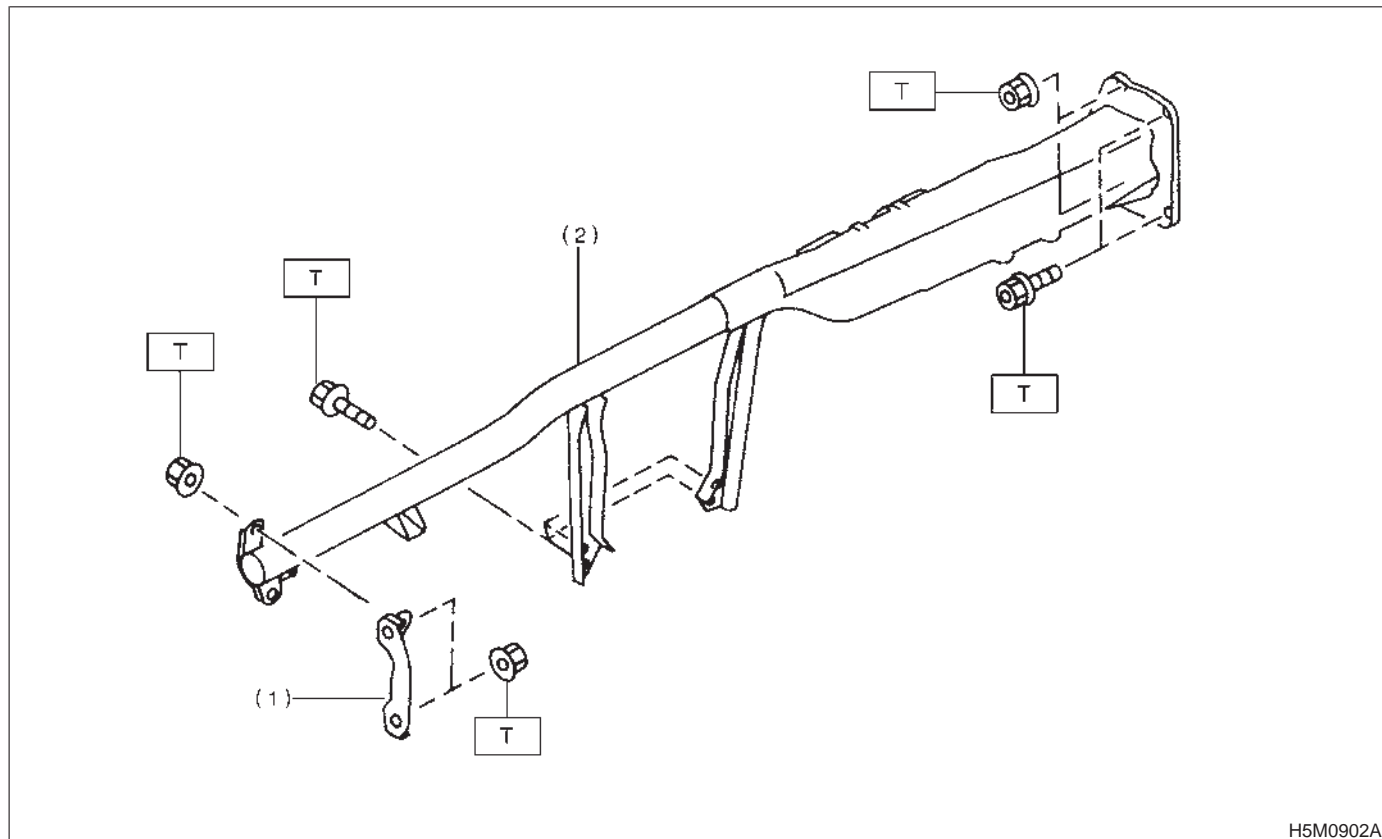


H5M0901A

- | | | |
|---------------------|---------------------|-------------------------|
| (1) Weatherstrip | (10) Harness | (19) Shutting ASSY (RH) |
| (2) Sunroof panel | (11) Sunroof trim | (20) Shutting ASSY (LH) |
| (3) Rear guide ASSY | (12) Guide rail | (21) Drain tube |
| (4) Lower panel | (13) Set bracket | (22) Garnish |
| (5) Lower panel | (14) Guide rail | |
| (6) Rear guide ASSY | (15) Motor ASSY | |
| (7) Drive unit | (16) Sealed tape | |
| (8) Relay | (17) Frame ASSY | |
| (9) Harness | (18) Sealed cushion | |

Tightening torque: N·m (kg·m, ft·lb)
T: 7.4±2.0 (0.75±0.2, 5.4±1.4)

6. Steering Support Beam

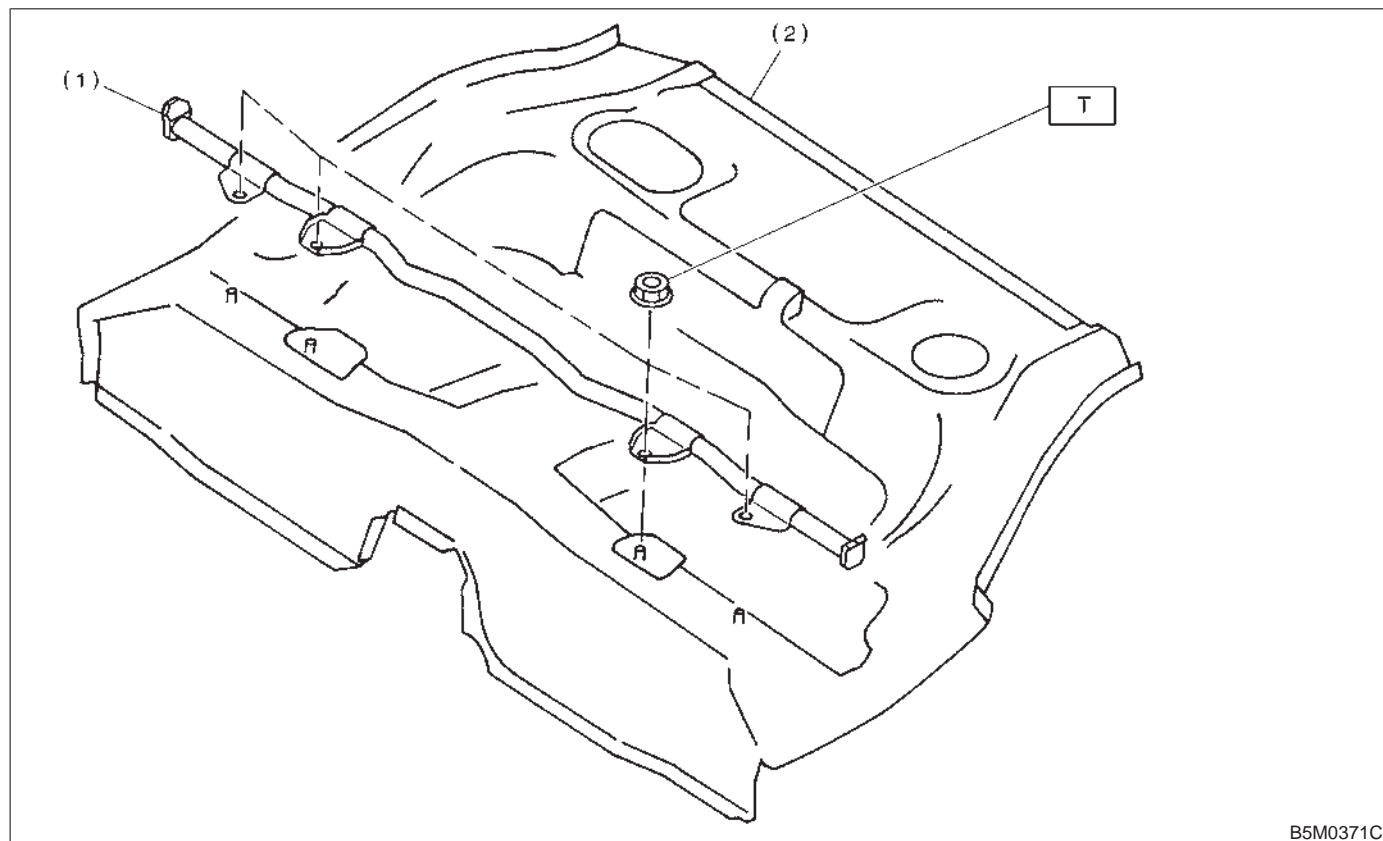


H5M0902A

- (1) Bracket
- (2) Steering beam

Tightening torque: N·m (kg·m, ft·lb)
T: 18±5 (1.8±0.5, 13.0±3.6)

7. Guard Pipe



B5M0371C

- (1) Guard pipe
- (2) Rear floor panel

Tightening torque: N·m (kg·m, ft·lb)
T: 32±10 (3.3±1.0, 23.9±7)

1. Hood

A: REMOVAL AND INSTALLATION

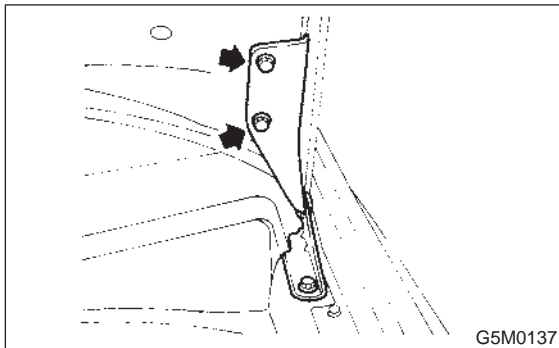
NOTE:

The hood lock has a dual locking design which consists of a main lock and a safety lock mechanism. When the release knob located at the front pillar on the driver's side is pulled back, the main lock is released through the cable attached to the knob.

The safety lock can be released by pushing the lever protruding above the front grill while opening the hood.

1. HOOD

- 1) Open front hood, and remove washer hose.
- 2) Remove attaching bolts.



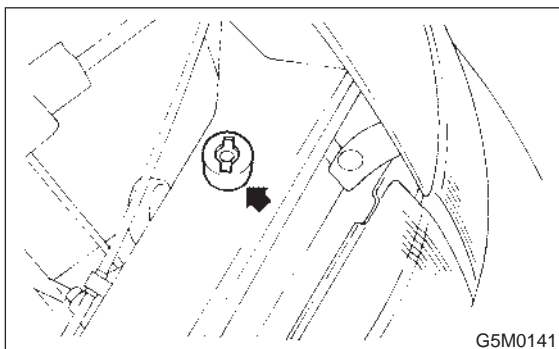
- 3) Detach front hood from hinges.
- 4) Installation is in the reverse order of removal.

CAUTION:

Adjust buffer assembly on each end so that main lock is applied securely when hood is released from a height of approx. 20 mm (0.79 in).

NOTE:

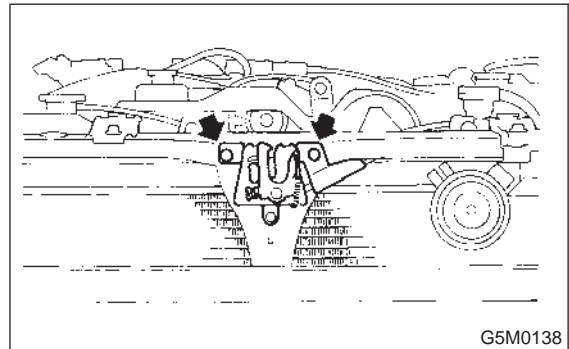
Align the center of striker with lock during installation. Make sure safety lever is properly caught by striker under the hood's own weight.



2. HOOD LOCK

- 1) Open front hood and remove front grille.

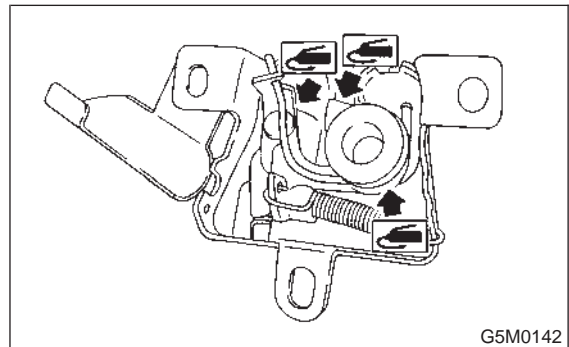
- 2) Remove bolts which secure lock assembly to radiator panel, and remove lock assembly.



- 3) Disconnect release cable from lock assembly
- 4) Installation is in the reverse order of removal.

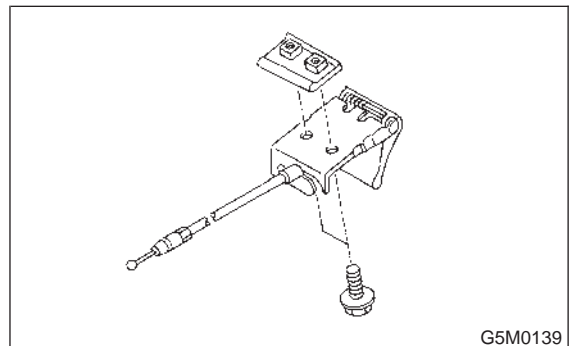
NOTE:

- Route hood lock release cable and hold with clips.
- After installing release cable, ensure it operates smoothly.
- Apply grease to sliding surfaces of parts.



3. RELEASE CABLE

- 1) Remove front grille.
- 2) Remove release cable from lock assembly.
- 3) Remove cable clip from engine compartment.
- 4) Remove bracket from front pillar.

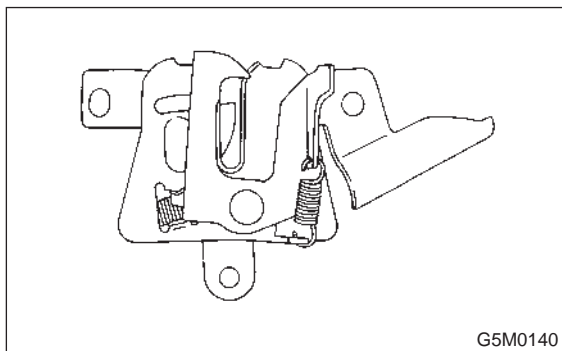


- 5) Installation is in the reverse order of removal.

B: POINTS TO CHECK

- 1) Check striker for bending or abnormal wear.
- 2) Check safety lever for improper movement.

- 3) Check other levers and spring for rust formation and unsmooth movement.

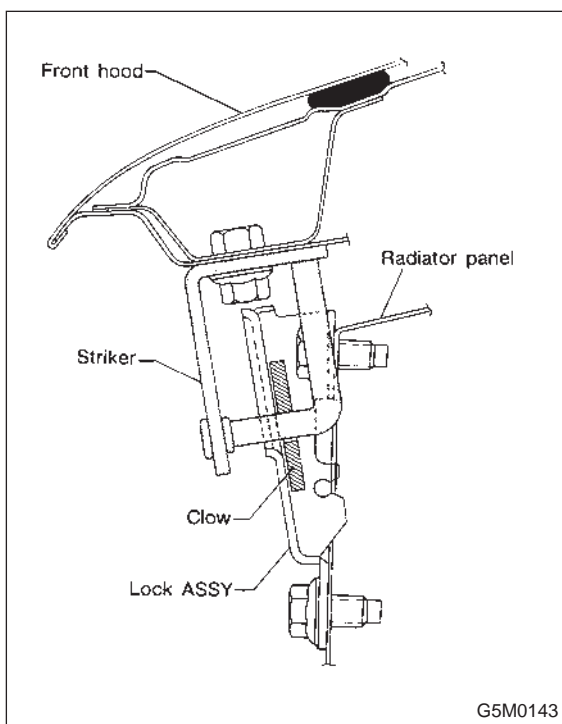


C: ADJUSTMENT

- 1) Fore-aft and left-right adjustments Loosen striker mounting bolts and adjust fore-and-aft position of striker.

CAUTION:

Do not adjust striker position using the lock. Doing so may result in a misaligned front grille.



- 2) Up-down adjustment

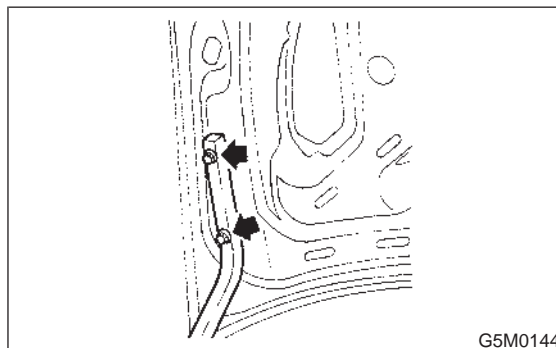
Make up-and-down adjustment of striker only when hood does not properly contact buffer or hood is not flush with fender, or when release cable does not properly operate. Adjustment can be made by adjusting the stroke length of striker after lock assembly mounting screws are removed.

2. Trunk Lid

A: REMOVAL AND INSTALLATION

1. TRUNK LID

- 1) Open trunk lid.
- 2) Remove trunk lid mounting bolts and detach trunk lid from hinges.



- 3) Installation is in the reverse order of removal.

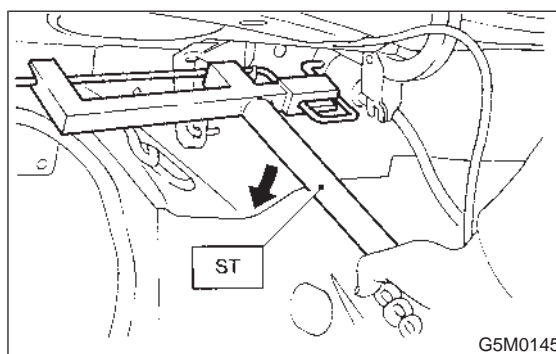
2. TORSION BAR

- 1) Open trunk lid. Remove torsion bars from hinge links using ST.

ST 927780000 REMOVER

CAUTION:

Be careful because torsion bar quickly swings back when released.



- 2) Remove the left and right torsion bars.

WARNING:

Be careful because trunk lid drops under its own weight when torsion bars are removed.

- 3) Installation is in the reverse order of removal.

NOTE:

Apply a coat of grease to the rotary section of hinges and contact surfaces of torsion bars.

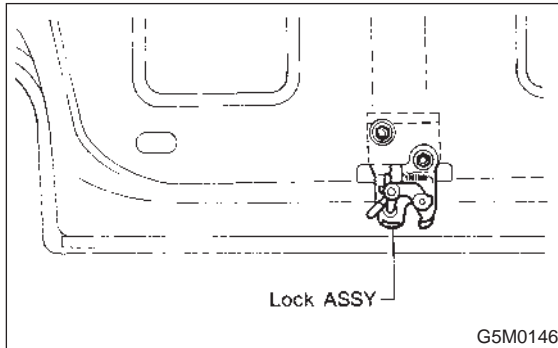
3. TRUNK LID LOCK ASSEMBLY AND KEY CYLINDER

- 1) Remove rod of lock assembly from rod holder of key lock assembly.

- 2) Remove bolts which hold lock assembly and remove lock assembly.

NOTE:

- Always remove rear skirt trim panel beforehand, if so equipped.
- Be careful not to bend opener cable.

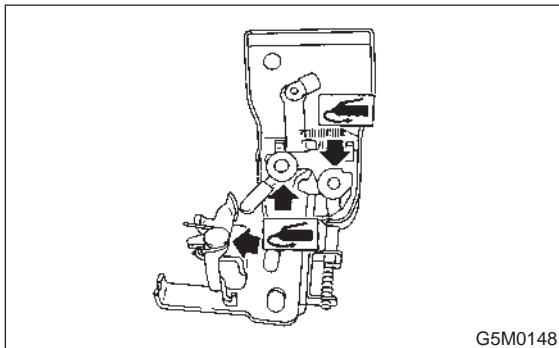


- 3) Remove clip and detach key cylinder from trunk lid.

- 4) Installation is in the reverse order of removal.

NOTE:

Apply grease to sliding surfaces of lock assembly and striker.



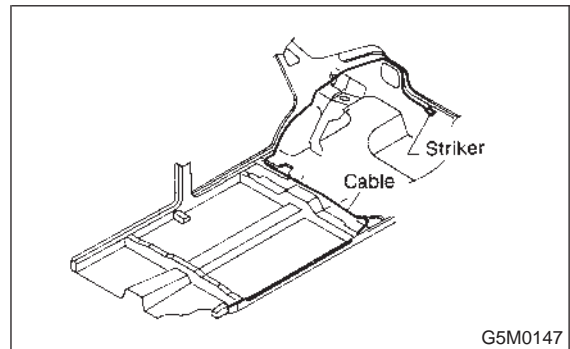
4. TRUNK LID OPENER

- 1) Remove driver's seat, rear seats, center pillar lower cover, floor mat, rear arch cover and side sill cover (on the driver's side).
- 2) Remove all clips which hold cable.
- 3) Disconnect cable from pull handle assembly.
- 4) Remove bolts and detach pull handle assembly.
- 5) Loosen bolts which hold lock assembly, and remove it.
- 6) Remove striker from trunk lid.

- 7) Disconnect cable from striker.

NOTE:

Be careful not to bend or break cable.



- 8) Installation is in the reverse order of removal.

CAUTION:

● When installing cover to pull handle assembly, observe the following:

- Be careful not to catch harness.
- Engage pull handle assembly pawls firmly.

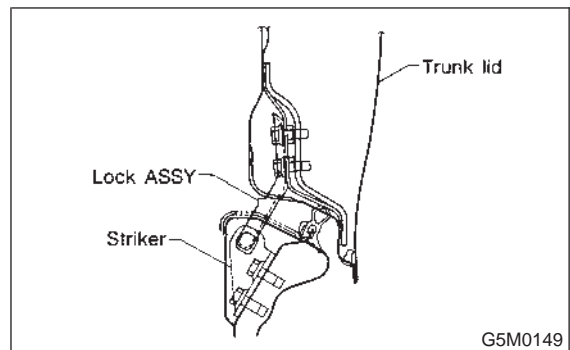
NOTE:

After installing opener cable, ensure it moves smoothly.

B: ADJUSTMENT

1. TRUNK LID

- 1) To adjust left-right lid positioning, loosen bolts which hold trunk lid to hinges.
- 2) To adjust up-down lid alignment, place washer(s) between trunk lid and hinges or move trunk lock assembly up or down.

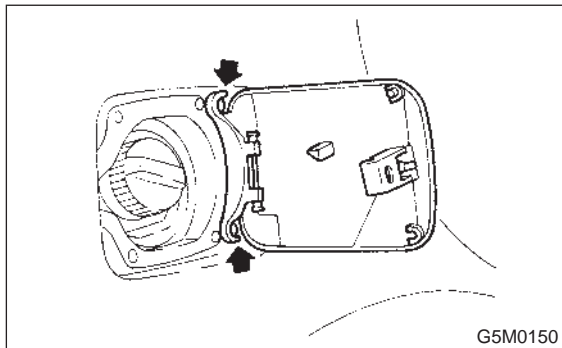


3. Fuel Flap

A: REMOVAL AND INSTALLATION

1. FUEL FLAP

- 1) Remove bolts which hold hinge to car body, and detach fuel flap and hinge as a unit.



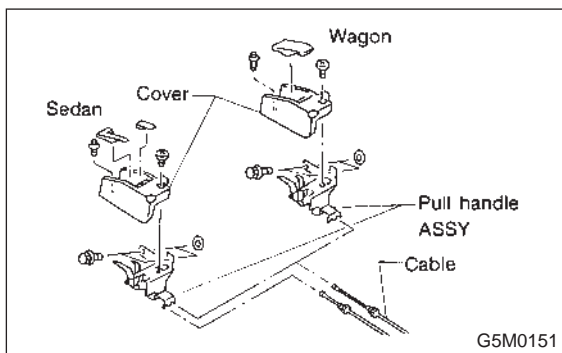
- 2) Installation is in the reverse order of removal.

CAUTION:

Make sure the clearance between fuel flap and car body is equal at all points.

2. FUEL FLAP OPENER

- 1) Remove driver's seat, rear seats, center pillar lower cover, floor mat, rear arch cover/rear quarter trim (wagon), and side sill cover (on the driver's side).
- 2) Remove all clips which hold cable.
- 3) Disconnect cable from pull handle.
- 4) Detach pull handle by removing bolts.



- 5) Detach fuel lock holder by turning it.
- 6) Installation is in the reverse order of removal.

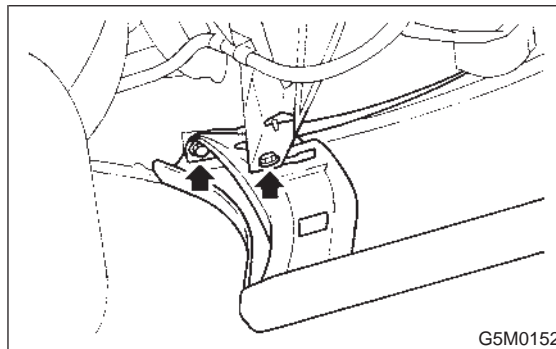
CAUTION:

- When installing cover to pull handle assembly, observe the following:
 - Be careful not to catch harness.
 - Engage pull handle assembly pawls firmly.
- After installing opener cable, ensure it moves smoothly.

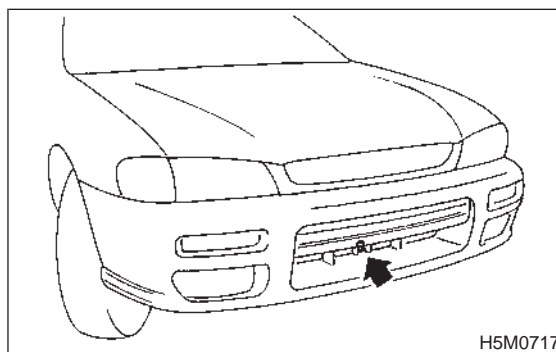
4. Front Bumper

A: REMOVAL AND INSTALLATION

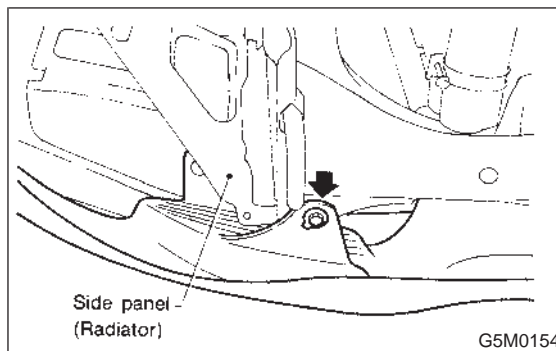
- 1) Disconnect the ground cable from the battery.
- 2) Remove the canister.
- 3) Remove the front grille.
- 4) Remove the parking light and headlight LH.
- 5) Remove the mud guard.
- 6) Remove bolts from side of bumper.



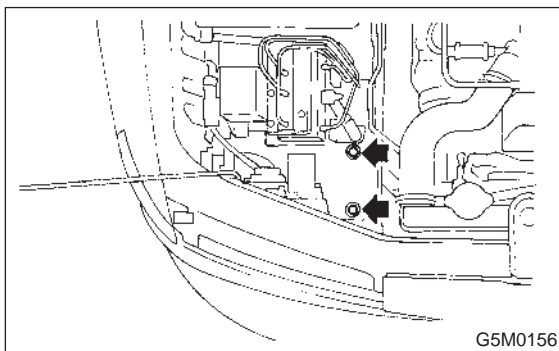
- 7) Remove bolt from lower center of bumper.



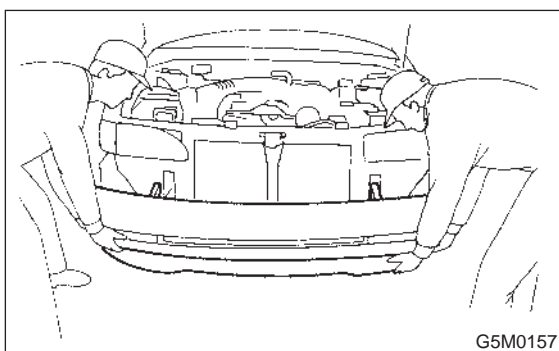
- 8) Remove bolts from lower side of bumper.



- 9) Remove bolts (engine compartment side) from bumper stays.



- 10) Remove turn signal light connector.
11) Remove bumper assembly.



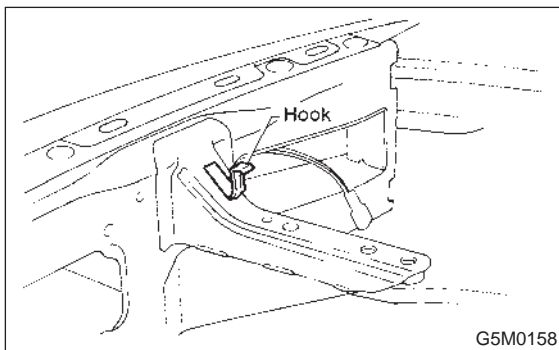
- 12) Installation is in the reverse order of removal.

CAUTION:

- Be extremely careful to prevent scratches on bumper face as it is made of resin.
- Be careful not to scratch the body when removing or installing the bumper.
- When installing canister, insert air vent hose of canister into the hole on body.

NOTE:

To facilitate installation of front bumper, attach hook (located at stay) to body panel.

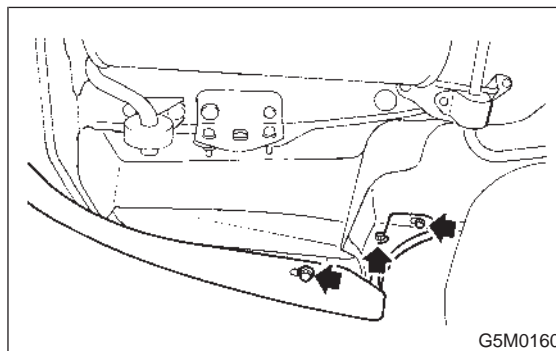


5. Rear Bumper

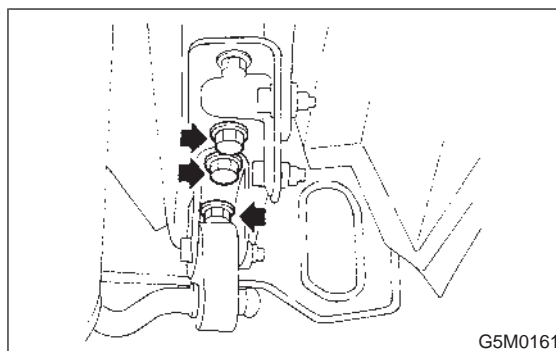
A: REMOVAL AND INSTALLATION

1. SEDAN

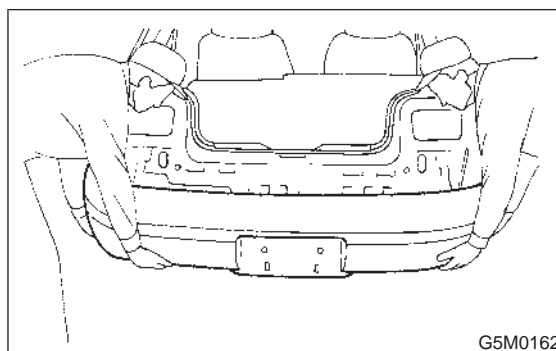
- 1) Open trunk lid. Remove trunk trim panel clips and detach trim.
- 2) Disconnect license plate light connector.
- 3) Remove bolts from side of bumper.



- 4) Remove bolts from bumper stay.



- 5) Remove rear bumper.



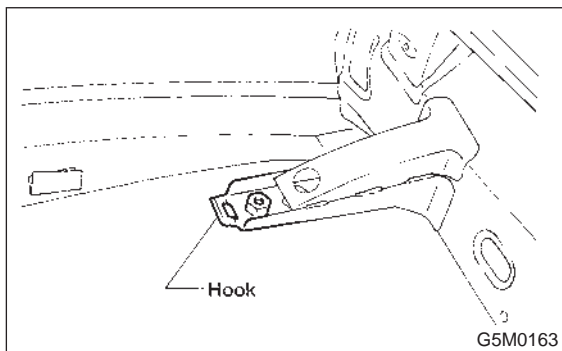
6) Installation is in the reverse order of removal.

CAUTION:

- Be extremely careful to prevent scratches on bumper face as it is made of resin.
- Be careful not to scratch the body when removing or installing bumper.

NOTE:

To facilitate installation of rear bumper, attach hook (located at stay) to body panel.

**2. WAGON**

- 1) Open rear gate and rear quarter trim lid.
- 2) Disconnect license plate light connector.
- 3) Remove bolts from side of bumper.
- 4) Remove bolts from bumper stays.
- 5) Remove bumper assembly.

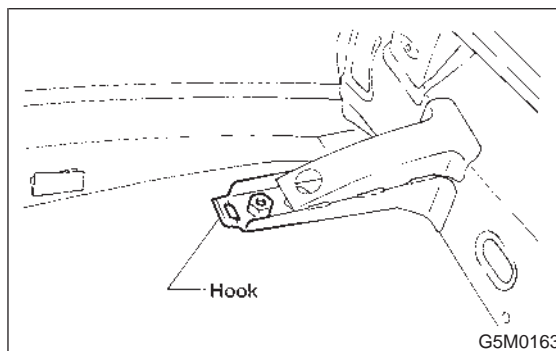
6) Installation is in the reverse order of removal.

CAUTION:

- Be extremely careful to prevent scratches on bumper face as it is made of resin.
- Be careful not to scratch the body when removing or installing bumper.

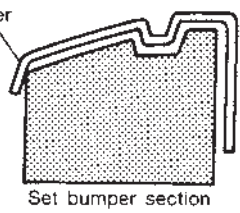
NOTE:

To facilitate installation of rear bumper, attach hook (located at stay) to body panel.



6. Coating Method for PP Bumper

A: PROCESS STEPS

Process No.	Process name	Job contents	
1	Bumper mounting	Set bumper on paint worktable if required. Use paint worktable conforming to inner shape of bumper when possible.	 <p style="text-align: right;">G5M0164</p>
2	Masking	Mask specified part (black base) with masking tape. Use masking tape for PP (example, Nichiban No. 533, etc.).	
3	Degreasing, cleaning	Clean all parts to be painted with white gasoline, normal alcohol, etc. to remove dirt, oil, fat, etc.	
4	Primer paint	Apply primer one to all parts to be painted, using air gun. Use primer (clear).	
5	Drying	Dry at normal temperature [10 to 15 min. at 20°C (68°F)]. In half-dried condition, PP primer paint is dissolved by solvent, e.g. thinner, etc. Therefore, if dust or dirt must be removed, use ordinary alcohol, etc.	
6	Top coat paint (I)	Solid color	Metallic color
		Use section (block) paint for top coat. ● Paint in use (for each color): Solid paint Hardener PB Thinner T-301 ● Mixing ratio: Main agent vs. hardener = 4:1 ● Viscosity: 10 — 13 sec/20°C (68°F) ● Film thickness: 35 — 45μ ● Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm ² , 36 — 50 psi)	Use section (block) paint for top coat. ● Paint in use (for each color): Metallic paint Hardener PB Thinner T-306 ● Mixing ratio: Main agent vs. hardener = 10:1 ● Viscosity: 10 — 13 sec/20°C (68°F) ● Film thickness: 15 — 20μ ● Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm ² , 36 — 50 psi)
7	Drying	Not required.	Dry at normal temperature [10 min. or more at 20°C (68°F)]. In half-dried condition, avoid dust, dirt.
8	Top coat paint (II)	Not required.	Apply a clear coat to parts with top coat paint (I), three times, at 5 — 7 minute intervals. ● Paint in use Metallic paint Hardener PB Thinner T-301 ● Mixing ratio: Clear vs. hardener = 6:1 ● Viscosity: 14 — 16 sec/20°C (68°F) ● Film thickness: 25 — 30μ ● Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm ² , 36 — 50 psi)
9	Drying	60°C (140°F), 60 min. or 80°C (176°F), 30 min. If higher than 80°C (176°F), PP may be deformed. Keep maximum temperature of 80°C (176°F).	
10	Inspection	Paint check.	
11	Masking removal	Remove masking in process No. 2.	

7. Repair Instructions for Colored PP Bumper

All PP bumpers are provided with a grained surface, and if the surface is damaged, it cannot normally be restored to its former condition. Damage limited to shallow scratches that cause only a change in the lustre of the base material or coating, can be almost fully restored. Before repairing a damaged area, explain this point to the customer and get an understanding about the matter. Repair methods are outlined below, based on a classification of the extent of damage.

A: MINOR DAMAGE CAUSING ONLY A CHANGE IN THE LUSTRE OF THE BUMPER DUE TO A LIGHT TOUCH

Almost restorable.

Process No.	Process name	Job contents	
1	Cleaning	Clean the area to be repaired using water.	
2	Sanding	Grind the repairing area with #500 sandpaper in a "feathering" motion.	
3	Finish	Resin section	Coated section
		Repeatedly apply wax to the affected area using a soft cloth (such as flannel). Recommended wax: NITTO KASEI Soft 99 TIRE WAX BLACK, or equivalent.	Perform either the same operation as for the resin section or process No. 18 and subsequent operations in the "(3)" section, depending on the degree and nature of damage.
		Polish the waxed area with a clean cloth after 5 to 10 minutes.	

B: DEEP DAMAGE CAUSED BY SCRATCHING FENCES, ETC.

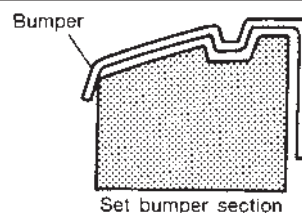
A dent cannot be repaired but a whitened or swelled part can be removed.

Process No.	Process name	Job contents	
1	Cleaning	Clean damaged area with water.	
2	Removal of damaged area	Cut off protruding area, if any, due to collision, using a putty knife.	
3	Sanding	Grind the affected area with #100 to #500 sandpaper.	
4	Finish	Resin section	Coated section
		Same as Process No. 3 in the "(1)" section.	Perform Process No. 12 and subsequent operations in the "(3)" section.

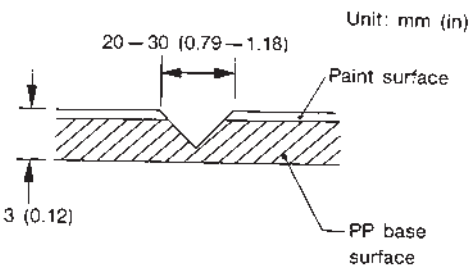
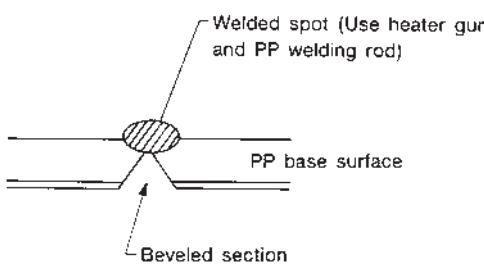
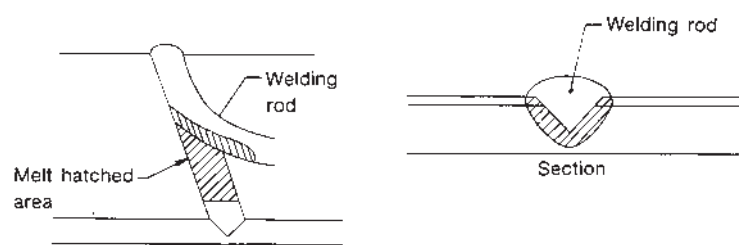
C: DEEP DAMAGE SUCH AS A BREAK OR HOLE THAT REQUIRES FILLING


Much of the peripheral grained surface must be sacrificed for repair, and the degree of restoration is not really worth the expense. (The surface, however, will become almost flush with adjacent areas.)

Recommended repair kit: PP Part Repair Kit (NRM)

Process No.	Process name	Job contents	
1	Job contents	Remove bumper as required.	
2	Part removal	Remove parts built into bumper as required.	
3	Bumper placement	Place bumper on a paint worktable as required. It is recommended that contour of worktable accommodate internal shape of bumper.	
4	Surface preparation	Remove dust, oil, etc. from areas to be repaired and surrounding areas, using a suitable solvent (NRM No. 900 Precleno, white gasoline, or alcohol).	

G5M0164

Process No.	Process name	Job contents
5	Cutting	<p>If nature of damage is cracks or holes, cut a guide slit of 20 to 30 mm (0.79 to 1.18 in) in length along the crack or hole up to the bumper's base surface. Then, bevel or "vee-out" the affected area using a knife or grinder.</p>  <p style="text-align: right;">G5M0165</p>
6	Sanding (I)	Grind beveled surface with sandpaper (#40 to #60) to smooth finish.
7	Cleaning	Clean the sanded surface with the same solvent as used in Process No. 4.
8	Temporary welding	<p>Grind the side just opposite the beveled area with sandpaper (#40 to #60) and clean using a solvent. Temporarily spot-weld the side, using a PP welding rod and heater gun.</p>  <p style="text-align: right;">G5M0166</p> <p>NOTE:</p> <ul style="list-style-type: none"> ● Do not melt welding rod until it flows out. This results in reduced strength. ● Leave the welded spot unattended until it cools completely.
9	Welding	<p>Using a heater gun and PP welding rod, weld the beveled spot while melting the rod and damaged area.</p>  <p style="text-align: right;">G5M0167</p> <p>NOTE:</p> <ul style="list-style-type: none"> ● Melt the sections indicated by hatched area. ● Do not melt welding rod until it flows out, in order to provide strength. ● Always keep the heater gun 1 to 2 cm (0.4 to 0.8 in) away from the welding spot. ● Leave the welded spot unattended until it cools completely.

Process No.	Process name	Job contents				
10	Sanding (II)	Remove excess part of weld with a putty knife. If a drill or disc wheel is used instead of the knife, operate it at a rate lower than 1,500 rpm and grind the excess part little by little. A higher rpm will cause the PP substrate to melt from the heat.				
						
		<div>G5M0168</div> <div>Sand the welded spot smooth with #240 sand paper.</div>				
11	Masking	Mask the black substrate section using masking tape. Recommended masking tape: Nichiban No. 533 or equivalent				
12	Cleaning/ degreasing	Completely clean the entire coated area, using solvent similar to that used in Process No. 4.				
13	Primer coating	Apply a coat of primer to the repaired surface and its surrounding areas. Mask these areas, if necessary. Recommended primer: Mp/ 364 PP Primer NOTE: Be sure to apply one coat of primer at a spraying pressure of 245 to 343 kPa (2.5 to 3.5 kg/cm ² , 36 to 50 psi) with a spray gun.				
14	Leave unattended.	Leave the repaired area unattended at 20°C (68°F) for 10 to 15 minutes until primer is half-dry. NOTE: If dirt or dust comes in contact with the coated area, wipe it off with a cloth damp-ended with alcohol. (Do not use thinner since the coated area tends to melt.)				
15	Primer surfacer coating	Apply a coat of primer surfacer to the repaired area two or three times at an interval of 3 to 5 minutes. Recommended surfacer: <ul style="list-style-type: none">● UPS 300 Flex Primer● No. 303 UPS 300 Exclusive hardener● NPS 725 Exclusive Reducer (thinner)● Mixing ratio: 2 : 1 (UPS 300: No. 303)● Viscosity: 12 — 14 sec/20°C (68°F)● Coated film thickness: 40 — 50μ				
16	Drying	Allow the coated surface to dry for 60 minutes at 20°C (68°F) [or 30 minutes at 60°C (140°F)].				
17	Sanding (III)	Sand the coated surface and its surrounding areas using #400 sandpaper and water.				
18	Cleaning/ degreasing	Same as Process No. 12.				
19	Top coat (I)	<table><tr><th>Solid color</th><th>Metallic color</th></tr><tr><td>Use a “block” coating method.<ul style="list-style-type: none">● Recommended paint: Suncryl (SC)No. 307 Flex HardenerSC Reducer (thinner)● Mixing ratio: 3 : 1 (Suncryl: No. 307)● Viscosity: 11 — 13 sec/20°C (68°F)● Coated film thickness: 40 — 50μ● Spraying thickness: 245 — 343 kPa (2.5 — 3.5 kg/cm², 36 — 50 psi)</td><td>Use a “block” coating method.<ul style="list-style-type: none">● Recommended paint: Suncryl (SC)No. 307 Flex HardenerSC Reducer (thinner)● Mixing ratio: 3 : 1 (Suncryl: No. 307)● Viscosity: 11 — 13 sec/20°C (68°F)● Coated film thickness: 20 — 30μ● Spraying thickness: 245 — 343 kPa (2.5 — 3.5 kg/cm², 36 — 50 psi)</td></tr></table>	Solid color	Metallic color	Use a “block” coating method. <ul style="list-style-type: none">● Recommended paint: Suncryl (SC)No. 307 Flex HardenerSC Reducer (thinner)● Mixing ratio: 3 : 1 (Suncryl: No. 307)● Viscosity: 11 — 13 sec/20°C (68°F)● Coated film thickness: 40 — 50μ● Spraying thickness: 245 — 343 kPa (2.5 — 3.5 kg/cm², 36 — 50 psi)	Use a “block” coating method. <ul style="list-style-type: none">● Recommended paint: Suncryl (SC)No. 307 Flex HardenerSC Reducer (thinner)● Mixing ratio: 3 : 1 (Suncryl: No. 307)● Viscosity: 11 — 13 sec/20°C (68°F)● Coated film thickness: 20 — 30μ● Spraying thickness: 245 — 343 kPa (2.5 — 3.5 kg/cm², 36 — 50 psi)
		Solid color	Metallic color			
Use a “block” coating method. <ul style="list-style-type: none">● Recommended paint: Suncryl (SC)No. 307 Flex HardenerSC Reducer (thinner)● Mixing ratio: 3 : 1 (Suncryl: No. 307)● Viscosity: 11 — 13 sec/20°C (68°F)● Coated film thickness: 40 — 50μ● Spraying thickness: 245 — 343 kPa (2.5 — 3.5 kg/cm², 36 — 50 psi)	Use a “block” coating method. <ul style="list-style-type: none">● Recommended paint: Suncryl (SC)No. 307 Flex HardenerSC Reducer (thinner)● Mixing ratio: 3 : 1 (Suncryl: No. 307)● Viscosity: 11 — 13 sec/20°C (68°F)● Coated film thickness: 20 — 30μ● Spraying thickness: 245 — 343 kPa (2.5 — 3.5 kg/cm², 36 — 50 psi)					

Process No.	Process name	Job contents	
20	Leave unattended.	Not required.	Leave unattended at 20°C (68°F) for at least 10 minutes until the topcoated area is half-dry. NOTE: Be careful to keep dust or dirt from coming in contact with the affected area.
21	Top coat (II)	Not required.	Apply a clear coat three times at an interval of 3 to 5 minutes. ● Recommended paint: SC710 Overlay Clear No. 307 Flex Hardener SC Reducer (thinner) ● Mixing ratio: 3 : 1 (SC710: No. 307) ● Viscosity: 10 — 13 sec/20°C (68°F) ● Coated film thickness: 20 — 30μ ● Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm ² , 36 — 50 psi)
22	Drying	Allow the coated surface to dry at 20°C (68°F) for two hours or 60°C (140°F) for 30 minutes. NOTE: Do not allow the temperature to exceed 80°C (176°F) since this will deform the PP substrate.	
23	Inspection	Carefully check the condition of the repaired area.	
24	Masking removal	Remove masking tape applied in Process No. 11 and 13.	
25	Parts installation	Install parts on bumper in reverse order of removal.	
26	Bumper installation	Install bumper.	

8. Side Protector

A: REMOVAL AND INSTALLATION

NOTE:

Do not re-use protector.

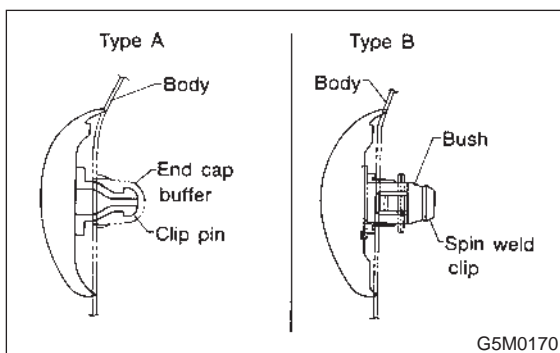
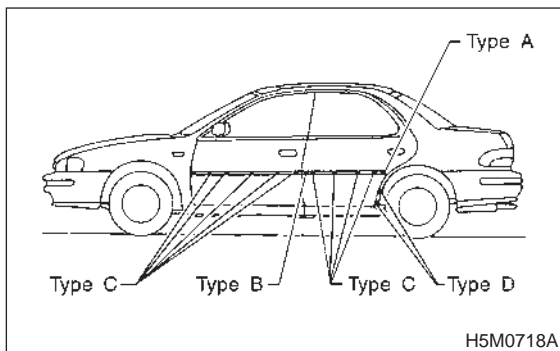
1) Type A and B:

Protector is attached to body with clips.

While holding end of protector by hand, force protector out.

NOTE:

- Type A: Insert clip pins into holes in body, then fit end cap buffers into place.
- Type B: Insert spin weld clips into holes in body, then fit bushings into place.
- Type C and D: Align the clips with holes in body and insert them.
- Install clips in standard holes first.



2) Type C:

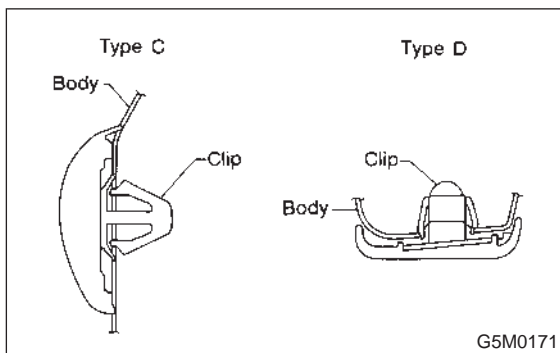
Protector is attached to body with clips.

Remove door inner trim, and detach protector by pushing clip pawl from inside.

3) Type D:

Protector is attached to body with clips.

While holding end of protector by hand, force protector out.

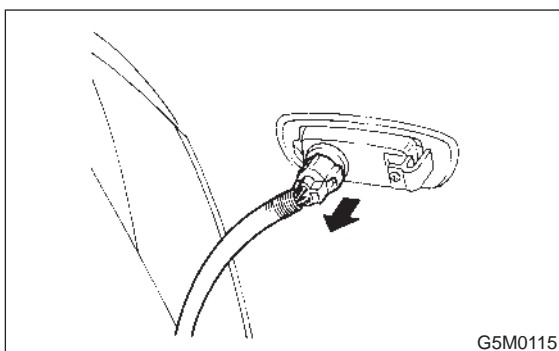
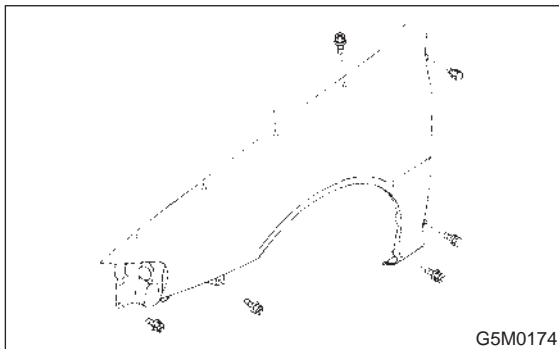


4) Installation is in the reverse order of removal.

9. Front Fender

A: REMOVAL AND INSTALLATION

- 1) Disconnect ground cable from battery.
- 2) Remove mud guard.
- 3) Remove parking light and headlight.
- 4) Remove front bumper.
- 5) Remove bolts which secure fender to radiator panel and turn signal light connector.



- 6) Remove body protector. (This step may be skipped if fender is to be reused.)
- 7) Remove attaching bolt to remove fender.

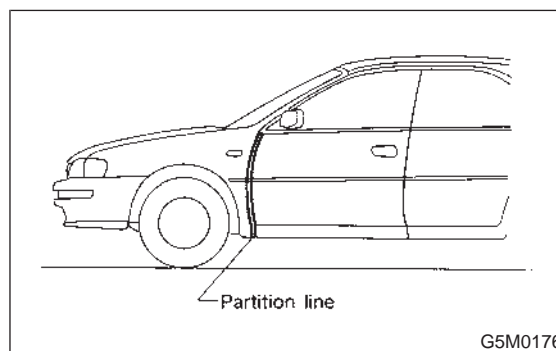
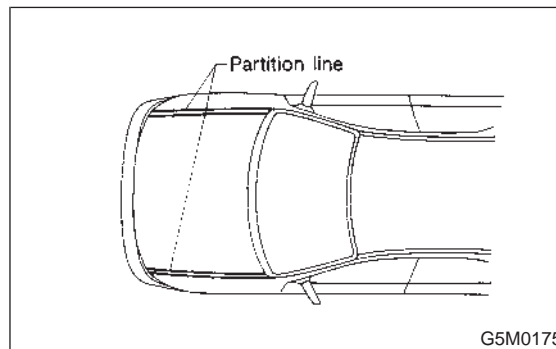
CAUTION:

Be careful not to scratch body panels with fender edges when removing it.

- 8) Installation is in the reverse order of removal.

NOTE:

Check for alignment of front fender with hood and front door with front fender at all points. Adjust, if necessary.

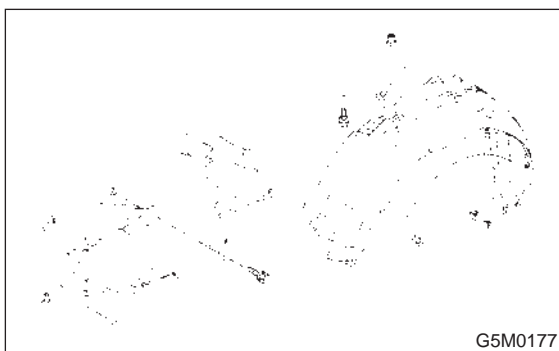


10. Mud Guard and Rear Arch Protector

A: REMOVAL AND INSTALLATION

1. MUD GUARD

- 1) Jack-up vehicle to remove tire.
- 2) Remove screws and clips. Move mud guard toward the center of the body and remove mud guard.



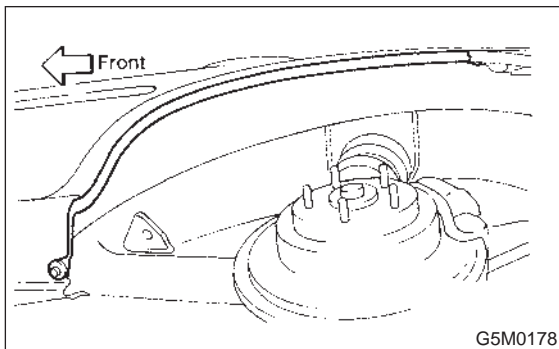
- 3) Installation is in the reverse order of removal.

CAUTION:

Only use new nuts and clips.

2. REAR ARCH PROTECTOR

- 1) Remove clip and screws.



- 2) Remove arch protectors.
- 3) Installation is in the reverse order of removal.

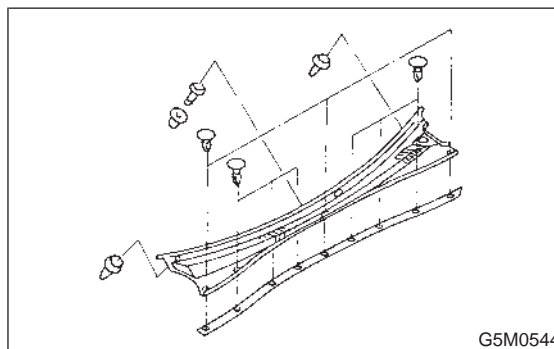
CAUTION:

Only use new nuts and clips.

11. Cowl Panel

A: REMOVAL AND INSTALLATION

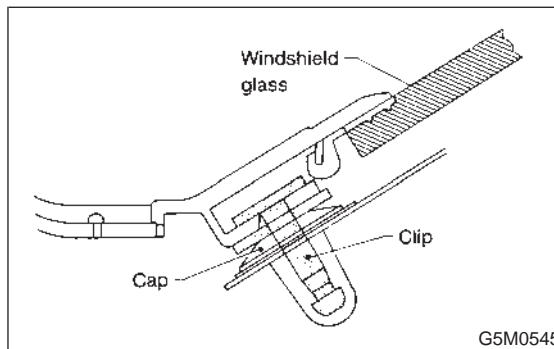
- 1) Remove wiper arms.
- 2) Open front hood.
- 3) Pry clip off front hood seal using a screwdriver.
- 4) Lift cowl panel and remove clips from windshield.



- 5) Installation is in the reverse order of removal.

NOTE:

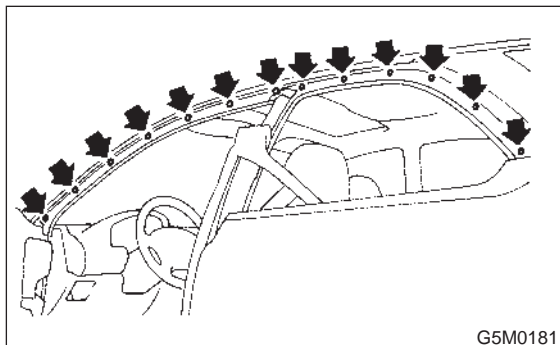
Install middle clip and other clips in that order.



12. Molding and Retainer

A: REMOVAL AND INSTALLATION

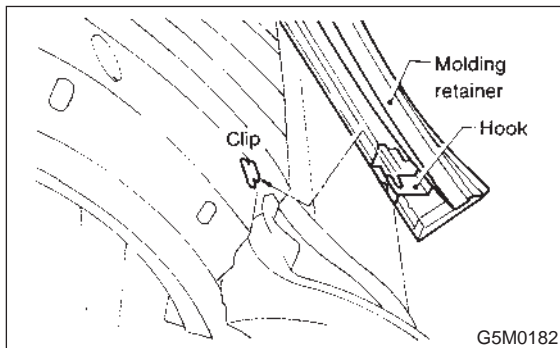
- 1) Remove weatherstrip.
- 2) Remove tapping screws.



- 3) Installation is in the reverse order of removal.

NOTE:

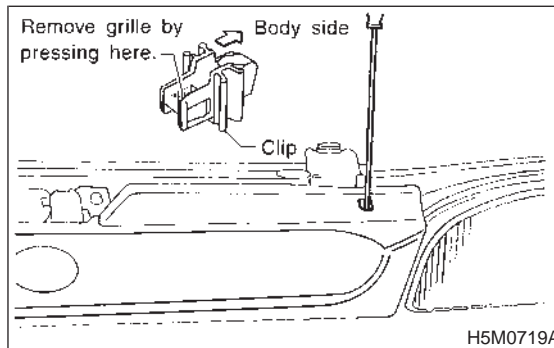
Insert clips onto hooks, then fasten with screws.



13. Front Grille

A: REMOVAL AND INSTALLATION

- 1) Remove two upper clips from body panel. To facilitate removal, press portion shown in figure using screwdriver while lightly pulling front grille.



- 2) Installation is in the reverse order of removal.

NOTE:

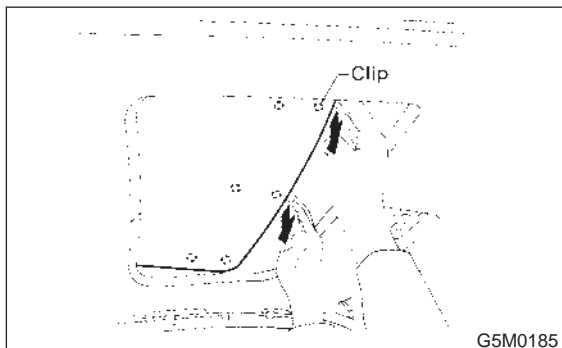
Attach all clips to grille. Align them with clip hole in body and push them into place.

14. Sunroof

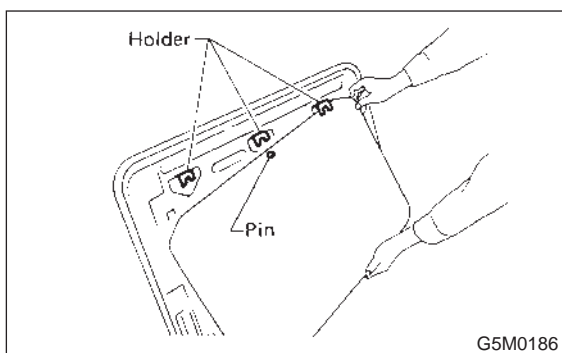
A: REMOVAL

1. SUNROOF PANEL

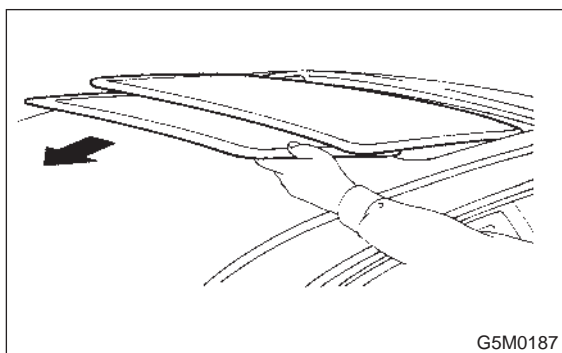
- 1) Open sunroof approx. 1/3.
- 2) Remove clips attached to front side of sunroof trim by pulling trim from inside of compartment.



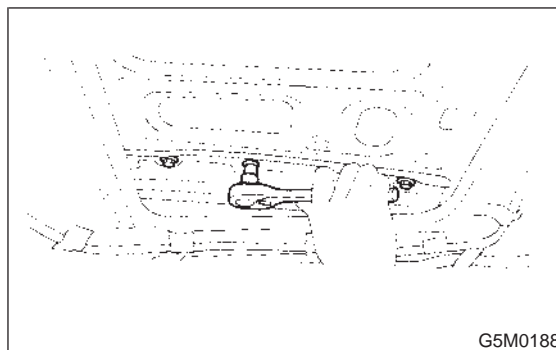
- 3) Move trim forward, and detach trim end from holder.



- 4) Detach trim.



- 5) Close sunroof and remove nuts.



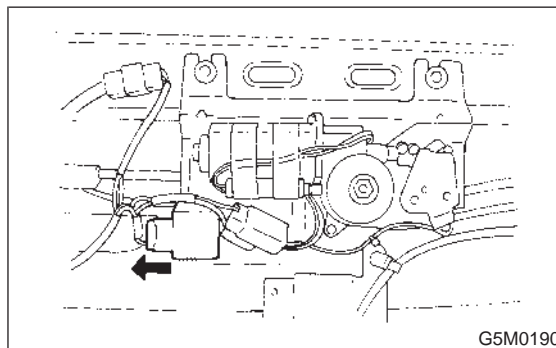
- 6) Remove sunroof panel.
- 7) Installation is in the reverse order of removal.

NOTE:

Sunroof trim reference pin must be fitted in holder notch.

2. SUNROOF MOTOR AND RELAY

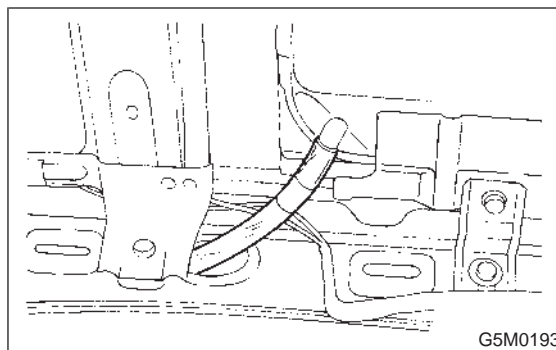
- 1) Remove roof trim, rear quarter trim, pillar trim, etc.
<Ref. to 5-3 [W500].>
- 2) Remove screw.
- 3) Disconnect connector.



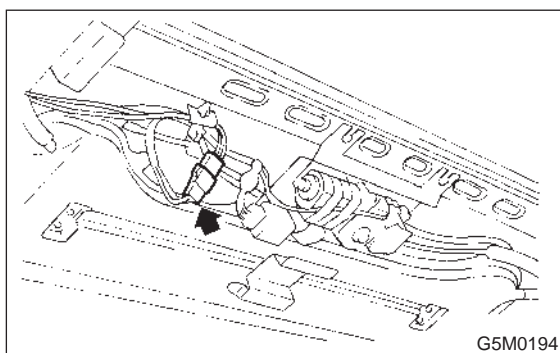
- 4) Remove relay by pulling it out.

3. SUNROOF FRAME

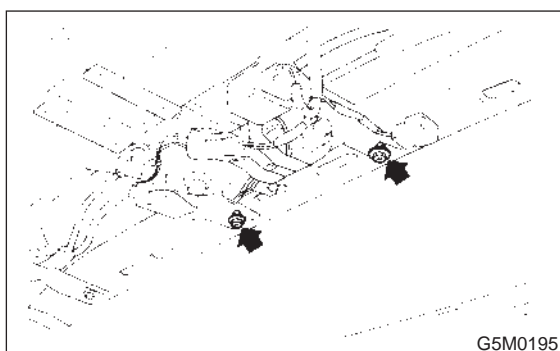
- 1) Remove roof trim, rear quarter trim, pillar trim, etc.
<Ref. to 5-3 [W500].>
- 2) Remove sunroof panel.
- 3) Disconnect front and rear drain tubes.



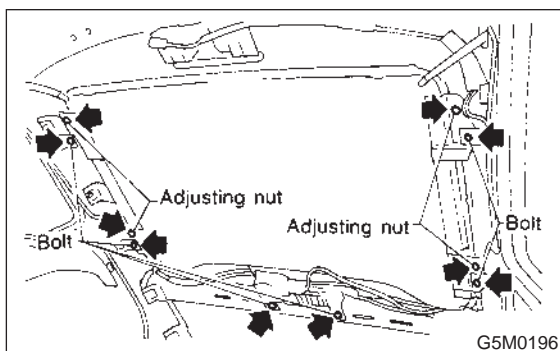
- 4) Disconnect connector between body harness and sunroof harness.



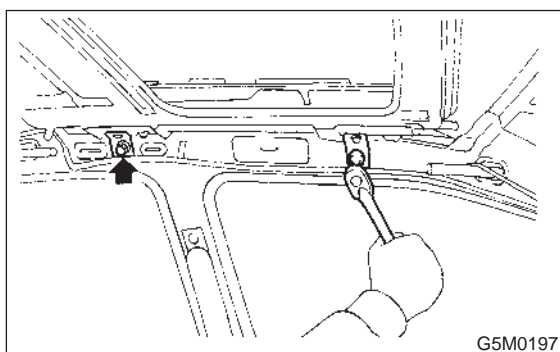
- 5) Loosen two mounting bolts near motor. (Do not remove bolts.)



- 6) Remove six bolts, and four adjusting nuts.

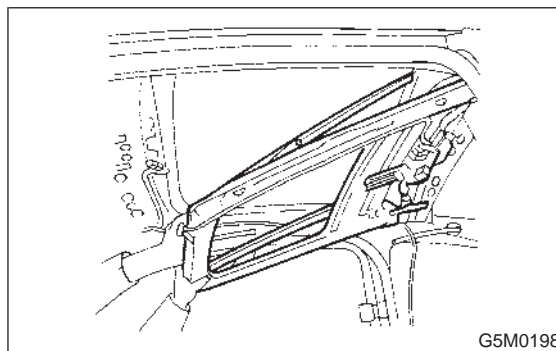


- 7) Remove sunroof frame.
- 8) Loosen set bracket mounting bolt.

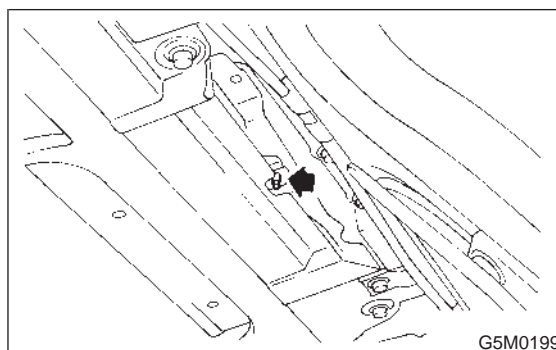


B: INSTALLATION

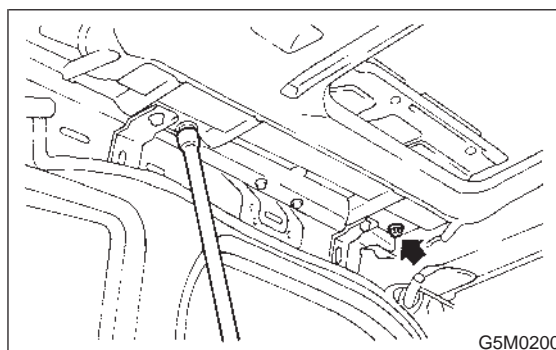
- 1) Insert frame rear end slit to two bolts fitted temporarily to roof brace.



- 2) Align frame to reference pin installed on roof.



- 3) Tighten adjusting nut (that is, set frame at highest position). Temporarily tighten bolts.

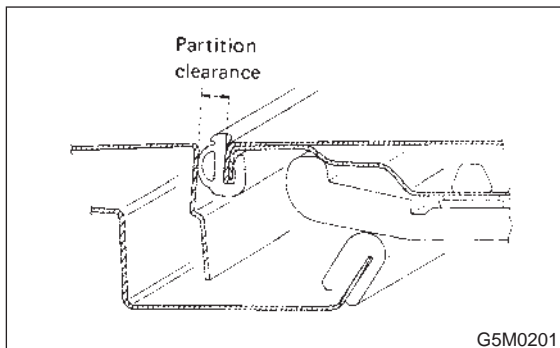


- 4) Install sunroof panel.

- 5) Adjust height by turning adjusting nut.
Also adjust front, rear, right, and left side partitions.

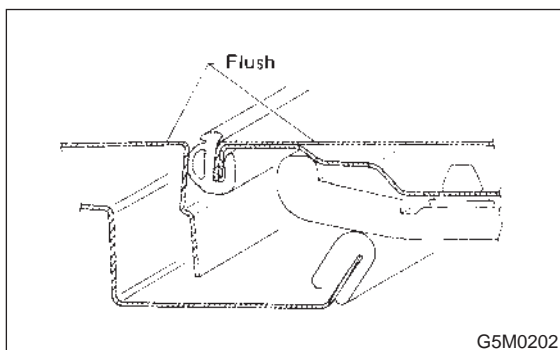
Partition clearance:

$5.9 \pm 0.5 \text{ mm (} 0.232 \pm 0.020 \text{ in)}$

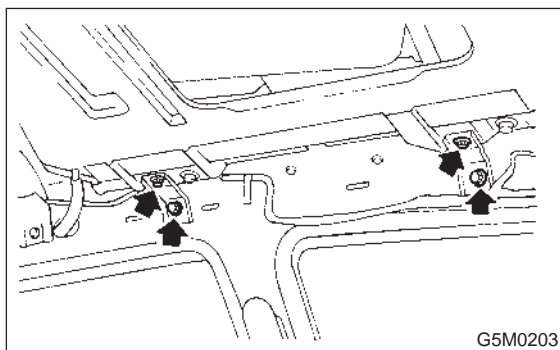


Difference in height between roof panel and sunroof panel:

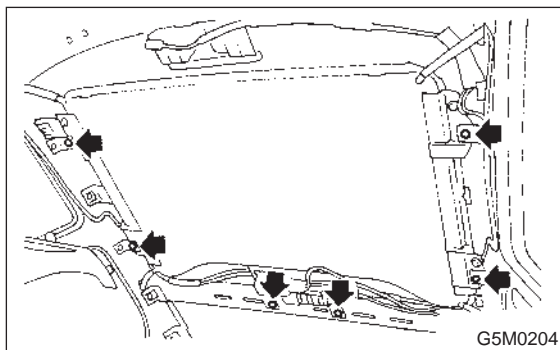
$0 \pm 1.0 \text{ mm (} 0 \pm 0.039 \text{ in)}$



- 6) Tighten set bracket mounting bolts.



- 7) Tighten bolts.



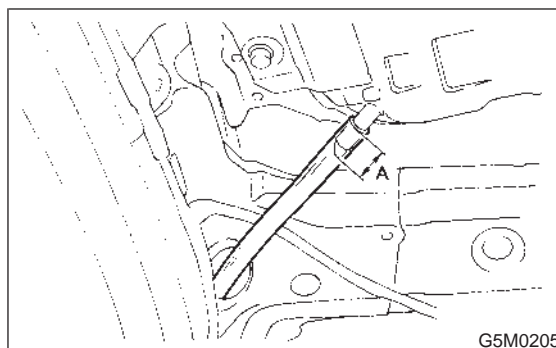
- 8) Install drain tubes.

CAUTION:

Insert drain tube securely into drain pipe.

Length: A

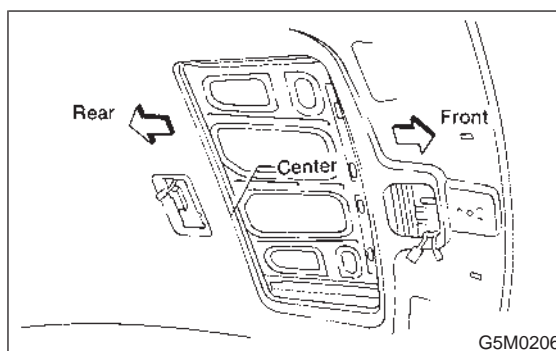
Approx. 20 mm (0.79 in)



- 9) Install roof trim.
10) Install garnish.

NOTE:

Place garnish joint at rear center of body.



- 11) Install sunroof trim, pillar trim, rear quarter trim etc.

- 12) Check the following items after assembling all parts;

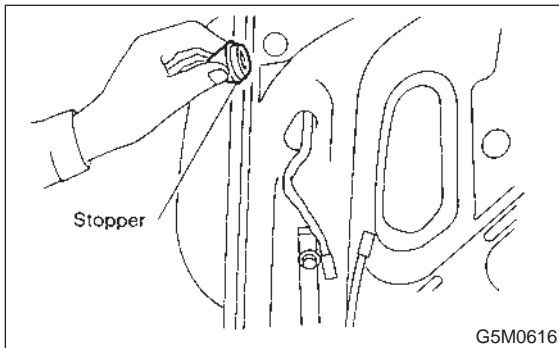
- (1) Garnish must be free from waves.
- (2) When sunroof is fully closed, must be no clearance between garnish and sunroof trim.
- (3) Sunroof must be free from slack and noise when it is fully opened and closed.

15. Rear Spoiler

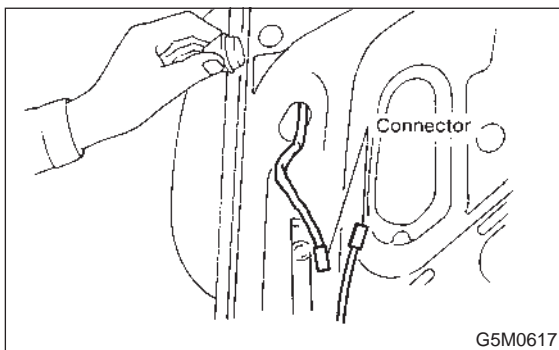
A: REMOVAL AND INSTALLATION

1. COUPE

- 1) Remove stoppers from both sides of trunk lid.



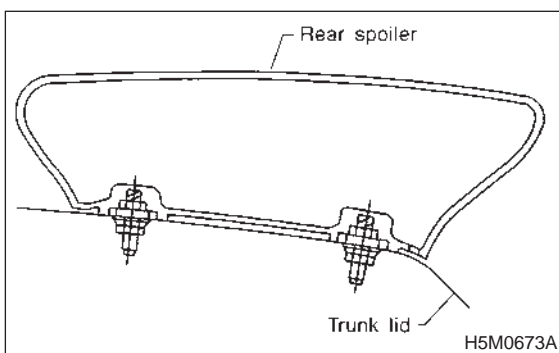
- 2) Disconnect high-mount stop light connector.



- 3) Remove nuts from rear spoiler.

CAUTION:

Be careful not to drop nuts into box section of trunk lid.



- 4) Lift rear spoiler and unfasten clips.
- 5) Remove spoiler from trunk lid.

CAUTION:

Be careful not to damage trunk lid.

- 6) Installation is in the reverse order of removal.

Tightening torque:

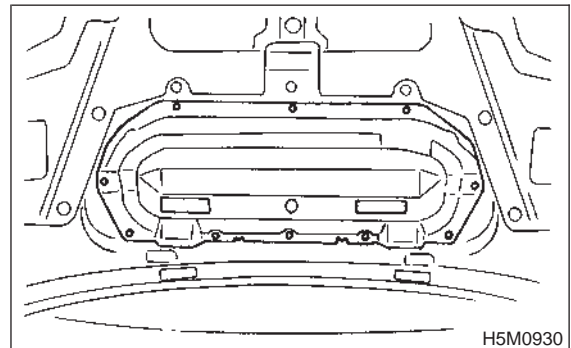
$7.4 \pm 2.0 \text{ N-m}$ ($0.75 \pm 0.2 \text{ kg-m}$, $5.4 \pm 1.4 \text{ ft-lb}$)

16. Hood Duct

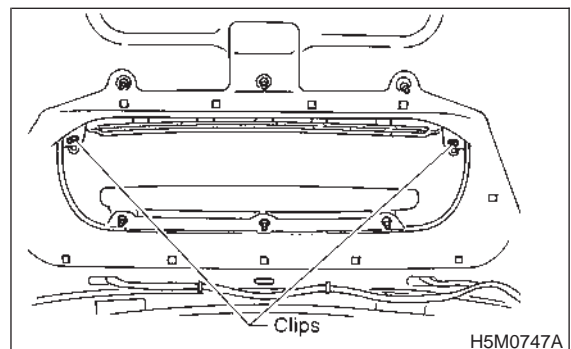
A: REMOVAL AND INSTALLATION

1. CENTER DUCT

- 1) Open the hood.
- 2) Remove clip and screws, then remove brace cover.



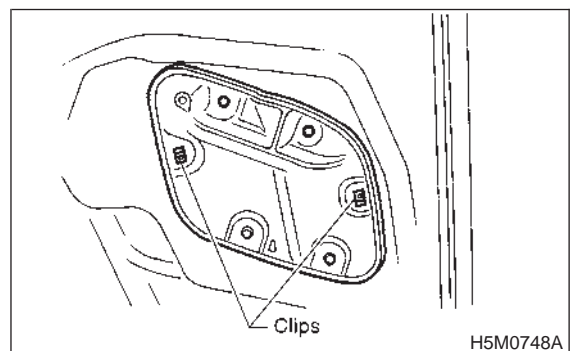
- 3) Remove six nuts.
- 4) Disconnect the two clips from hood, then remove hood duct grille.



- 5) Installation is in the reverse order of removal.

2. SIDE DUCT

- 1) Open the hood.
- 2) Remove four nuts.
- 3) Disconnect the two clips from brace cover, then remove brace cover.



- 4) Remove duct grille.
- 5) Installation is in the reverse order of removal.

1. Sunroof

Entry of water into compartment	(1) Check roof panel and sunroof panel for improper or poor sealing. (2) Check drain tube for clogging. (3) Check sunroof frame seal and body for improper fit.
Booming noise	(1) Check roof panel and roof panel for improper clearance. (2) Check sunroof trim and roof trim for improper clearance.
Abnormal motor noise	(1) Check motor for looseness. (2) Check gears and bearings for wear. (3) Check cable for wear. (4) Check cable pipe for deformities.
Failure of sunroof to operate (Motor operates properly.)	(1) Check guide rail for foreign particles. (2) Check guide rail for improper installation. (3) Check parts for mutual interference. (4) Check cable slider for improper clinching. (5) Check cable for improper installation. (6) Check clutch adjustment nut for improper tightness.
Motor does not rotate or rotates improperly. (Use sunroof wrench to check operation.)	(1) Check fuse for blowout. (2) Check switch for improper function. (3) Check motor for incorrect terminal voltage. (4) Check relay for improper operation. (5) Check poor grounding system. (6) Check cords for discontinuity and terminals for poor connections. (7) Check limit switch for improper operation.

MEMO:

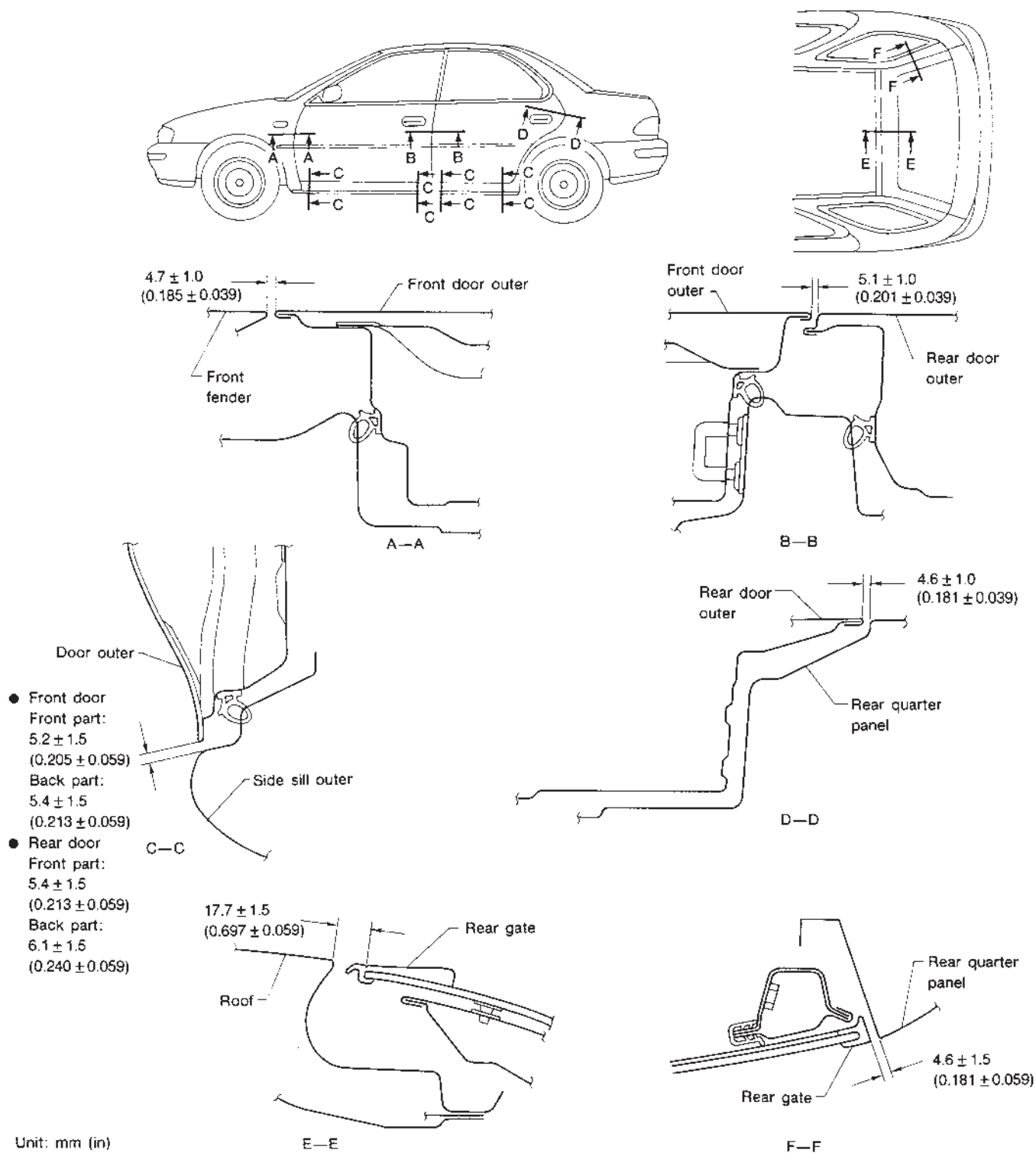
DOORS AND WINDOWS

5-2

	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Door Alignment.....	2
C COMPONENT PARTS	4
1. Front Door	4
2. Rear Door.....	5
3. Fixed Glass	6
4. Front Door Glass.....	7
5. Rear Door Glass	8
6. Rear Gate and Glass	9
7. Door Lock Assembly	10
8. Door Trim.....	12
9. Weatherstrip	13
W SERVICE PROCEDURE	14
1. Procedure Chart for Removing and Installing Door and Related Parts ...	14
2. Door.....	15
3. Rear Gate.....	27
4. Procedure Chart for Removal and Installing Window Glass	31
5. Windshield.....	32
6. Rear Window Glass	35
7. Rear Quarter Glass.....	38
K DIAGNOSTICS	41
1. Door Glass	41
2. Door Lock System.....	44
3. Power Window	44

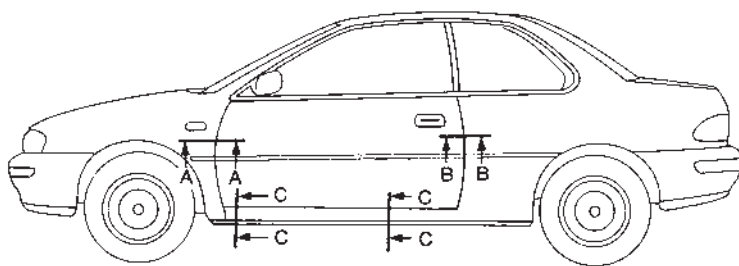
1. Door Alignment

A: SEDAN AND WAGON MODEL

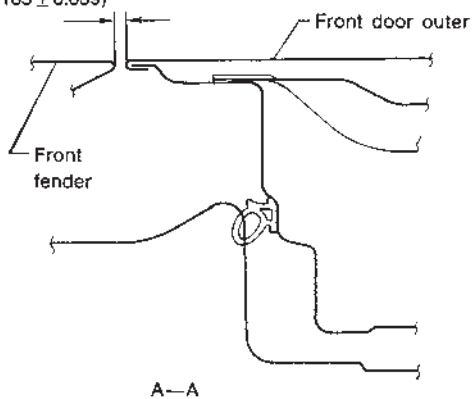


G5M0485

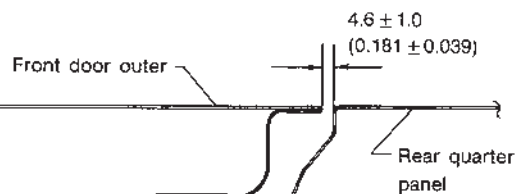
B: COUPE MODEL



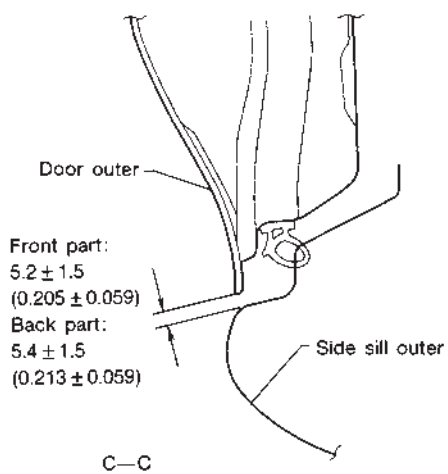
4.7 ± 1.0
(0.185 ± 0.039)



A—A



B—B

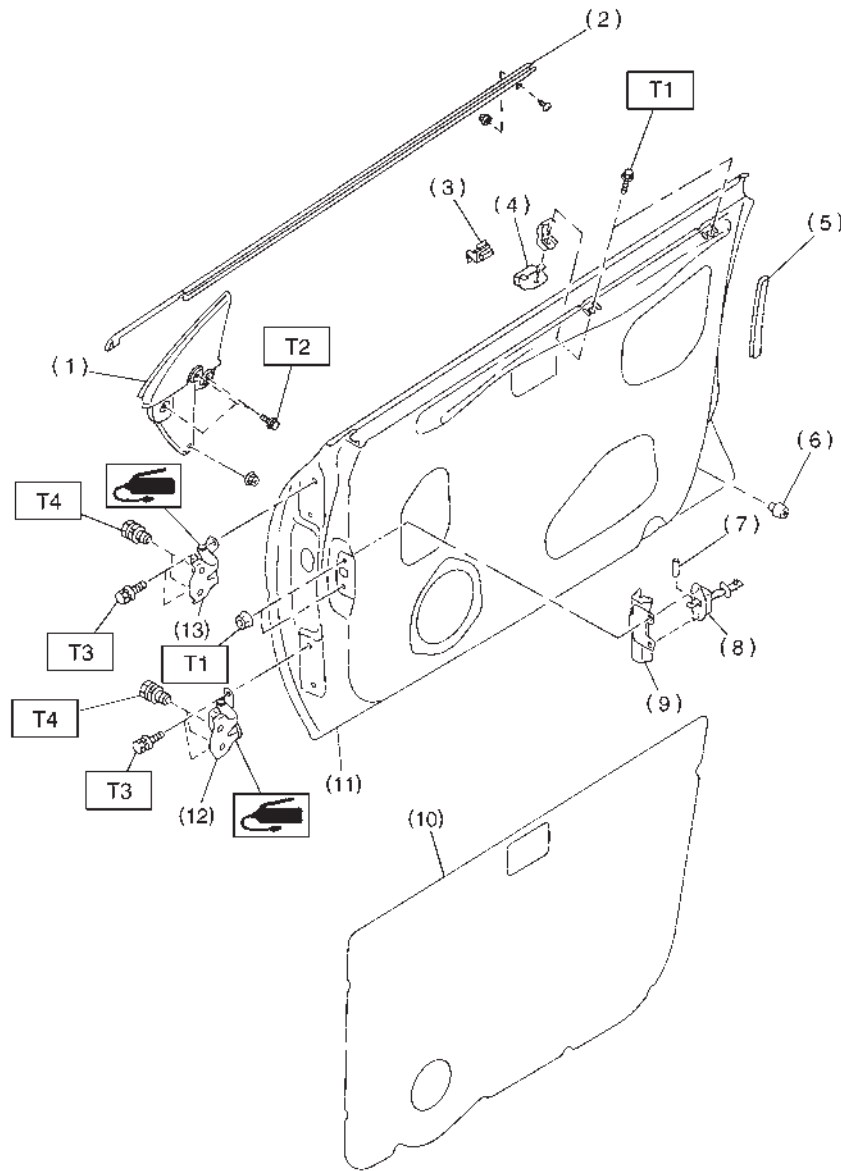


Front part:
 5.2 ± 1.5
(0.205 ± 0.059)
Back part:
 5.4 ± 1.5
(0.213 ± 0.059)

Unit: mm (in)

G5M0637

1. Front Door



H5M0903A

- | | |
|------------------------|--------------------|
| (1) Gusset | (8) Checker |
| (2) Weatherstrip | (9) Guide |
| (3) Stabilizer (Outer) | (10) Sealing cover |
| (4) Stabilizer (Inner) | (11) Door panel |
| (5) Protector | (12) Lower hinge |
| (6) Stopper | (13) Upper hinge |
| (7) Knock pin | |

Tightening torque: N·m (kg·m, ft·lb)

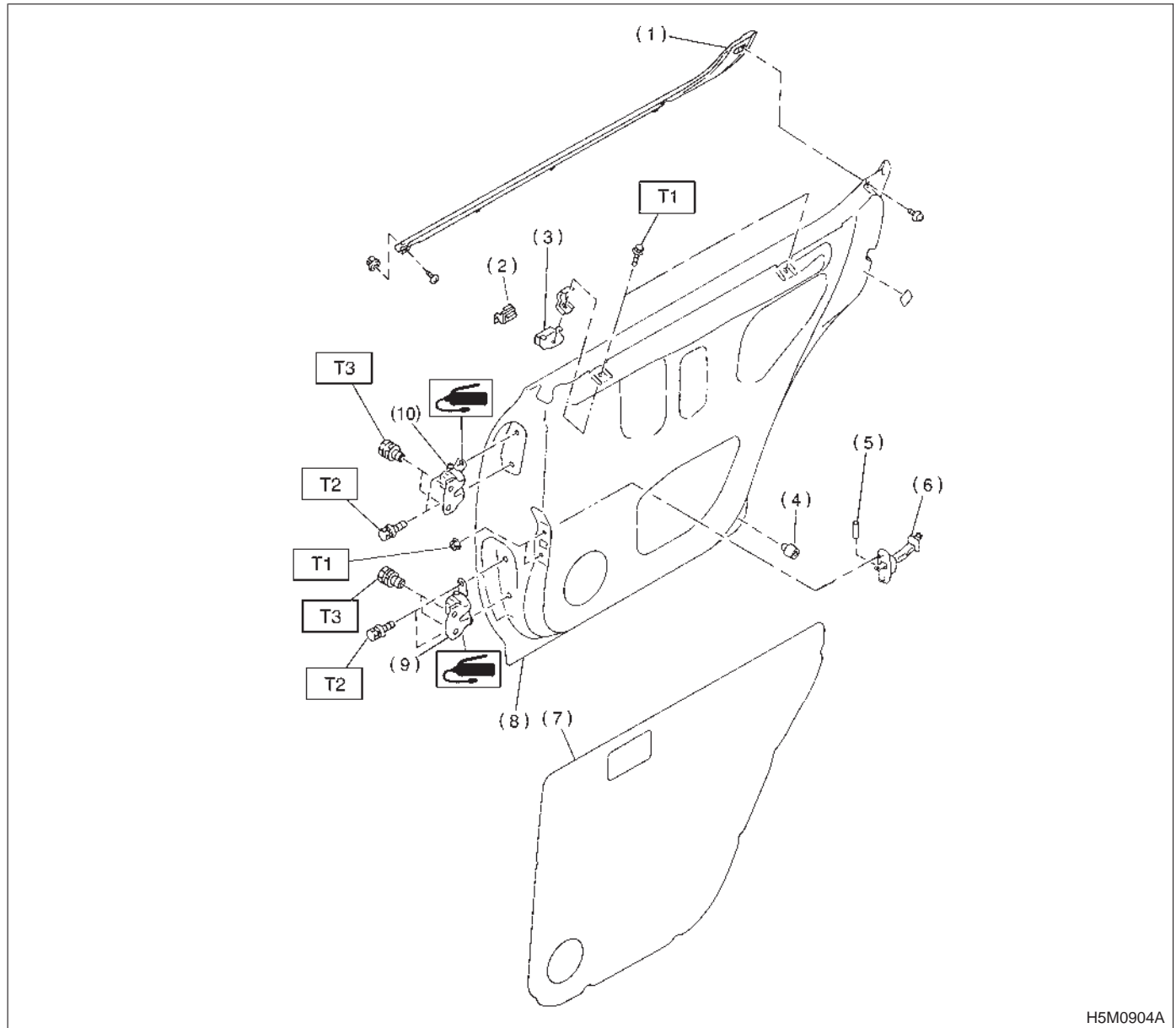
T1: 7.4 ± 2.0 (0.75 ± 0.2 , 5.4 ± 1.4)

T2: 13 ± 3 (1.3 ± 0.3 , 9.4 ± 2.2)

T3: 25 ± 3 (2.5 ± 0.3 , 18.1 ± 2.2)

T4: 29 ± 5 (3.0 ± 0.5 , 21.7 ± 3.6)

2. Rear Door



H5M0904A

- | | |
|------------------------|-------------------|
| (1) Weatherstrip | (7) Seating cover |
| (2) Stabilizer (Outer) | (8) Door panel |
| (3) Stabilizer (Inner) | (9) Lower hinge |
| (4) Stopper | (10) Upper hinge |
| (5) Knock pin | |
| (6) Checker | |

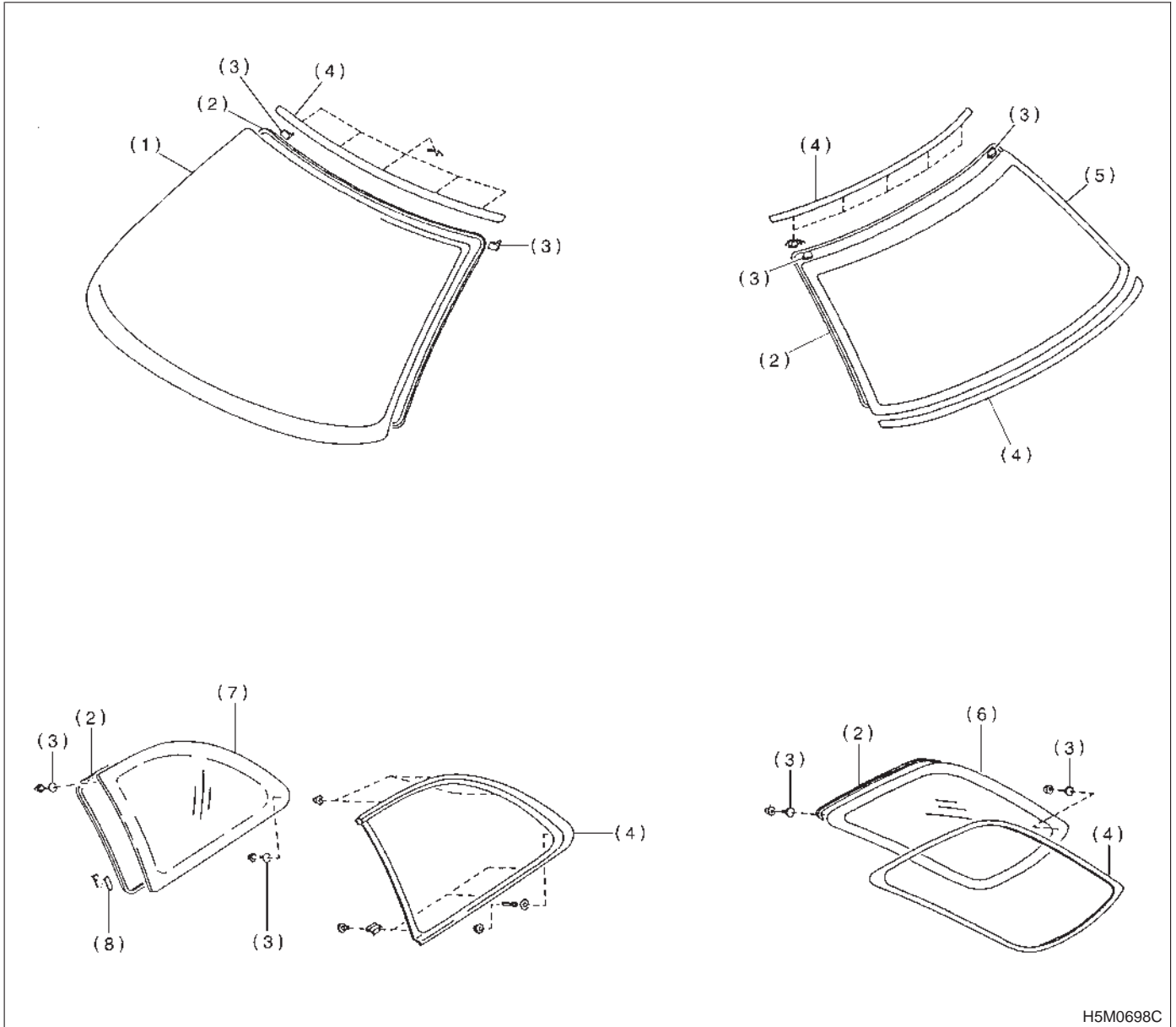
Tightening torque: N·m (kg·m, ft·lb)

T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)

T2: 25±3 (2.5±0.3, 18.1±2.2)

T3: 29±5 (3.0±0.5, 21.7±3.6)

3. Fixed Glass

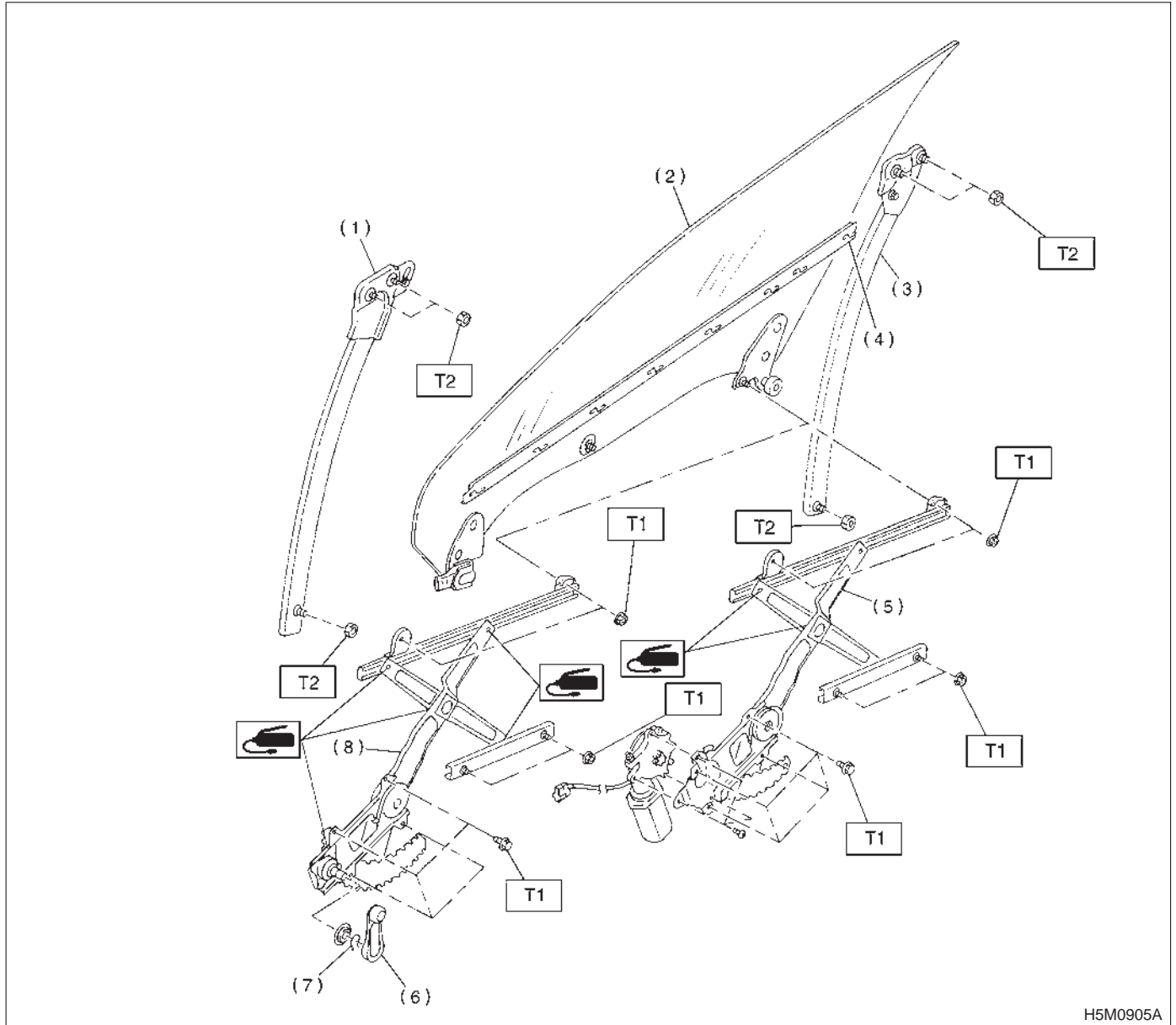


- (1) Windshield glass
- (2) Dam rubber
- (3) Locate pin

- (4) Molding
- (5) Rear window glass
- (6) Rear quarter glass (Wagon)

- (7) Rear quarter glass (Coupe)
- (8) Fastener

4. Front Door Glass



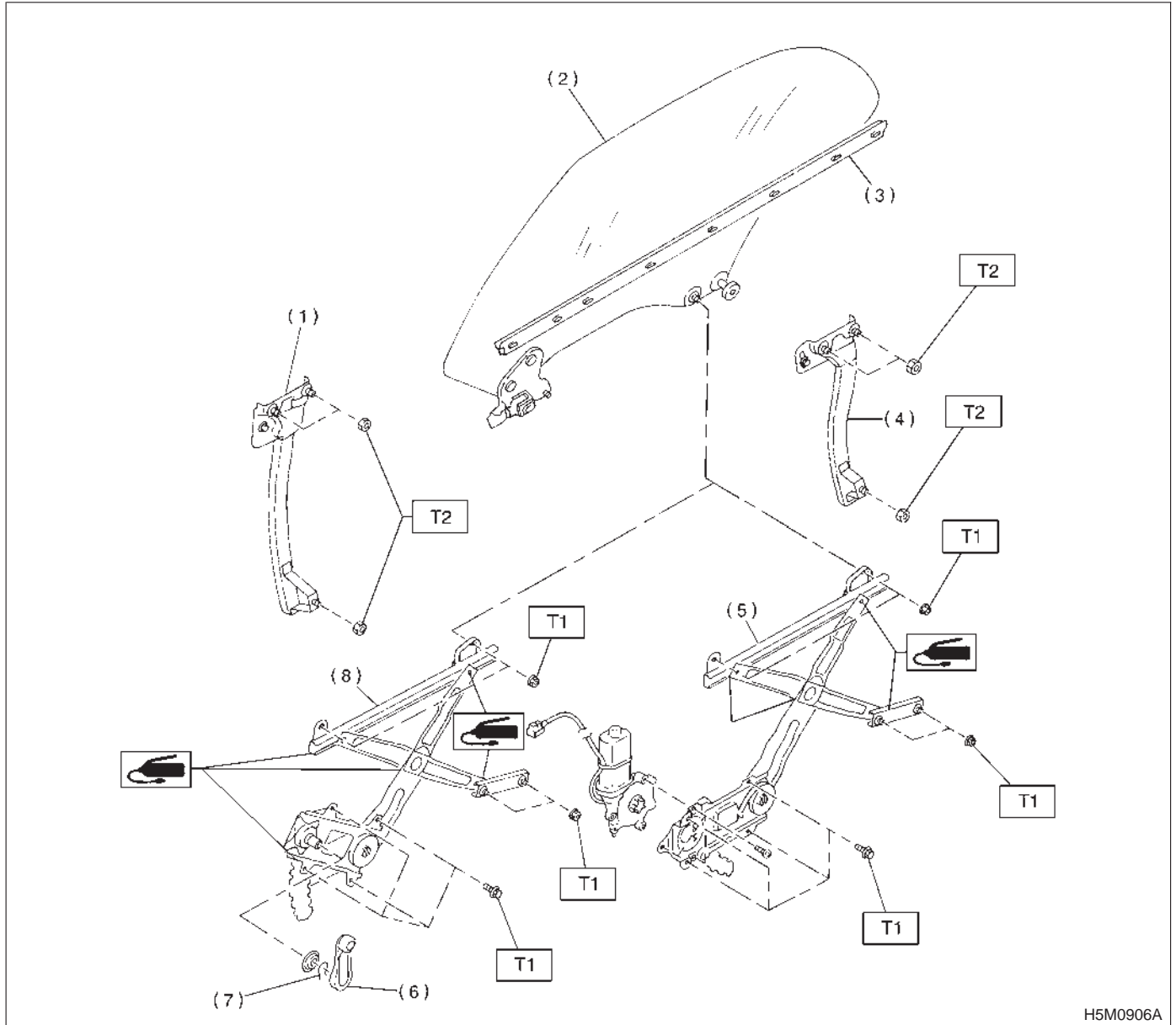
- | | |
|------------------------------|---|
| (1) Door sash (Front) | (6) Regulator handle
(Except power window) |
| (2) Glass | (7) Retainer spring |
| (3) Door sash (Rear) | (8) Regulator ASSY |
| (4) Weatherstrip (Inner) | |
| (5) Regulator and motor ASSY | |

Tightening torque: N·m (kg·m, ft·lb)

T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)

T2: 14±4 (1.4±0.4, 10.1±2.9)

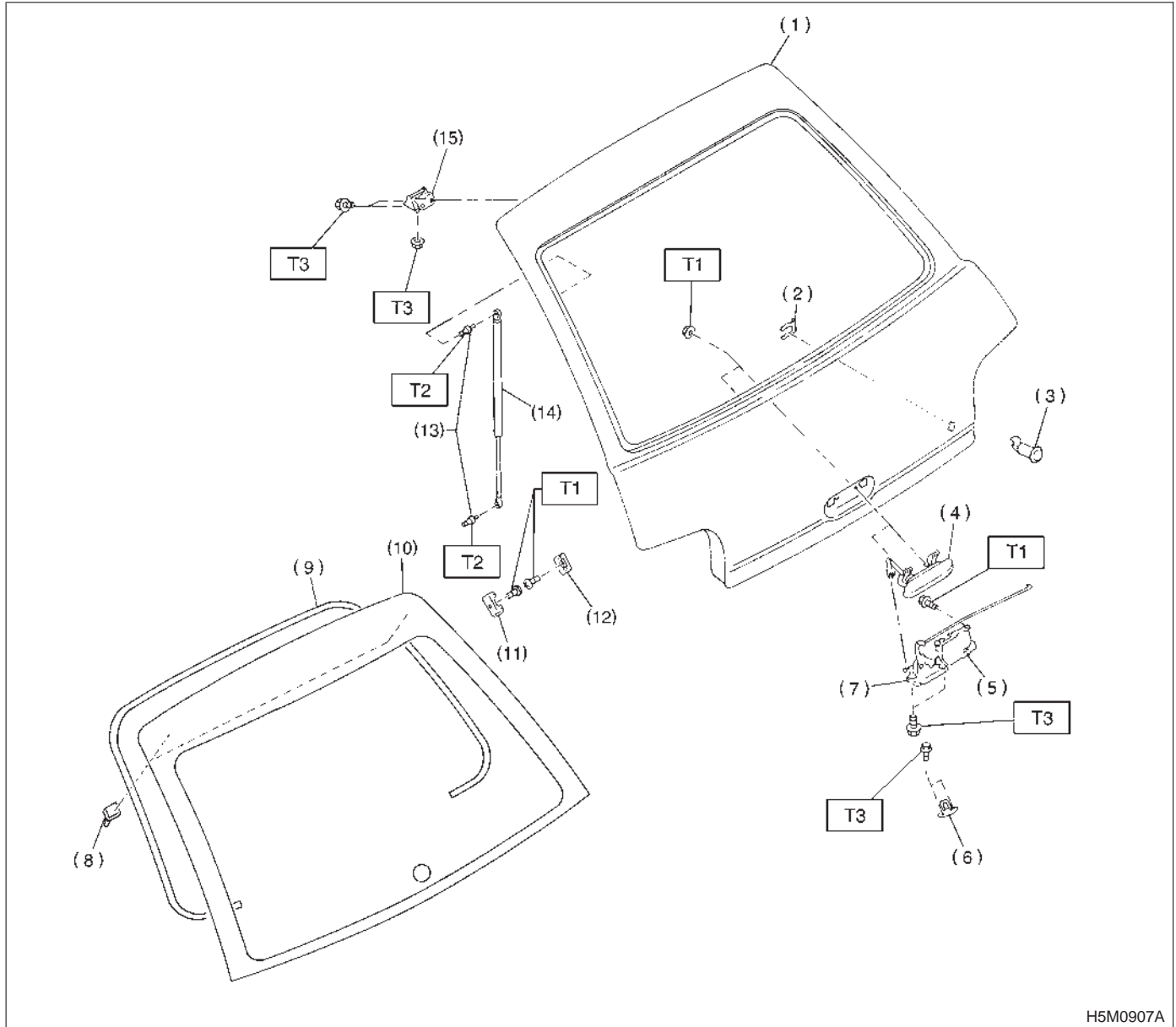
5. Rear Door Glass



- | | |
|------------------------------|---|
| (1) Door sash (Front) | (6) Regulator handle
(Except power window) |
| (2) Glass | (7) Retainer spring |
| (3) Weatherstrip (Inner) | (8) Regulator ASSY |
| (4) Door sash (Rear) | |
| (5) Regulator and motor ASSY | |

Tightening torque: N·m (kg·m, ft·lb)
T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T2: 14±4 (1.4±0.4, 10.1±2.9)

6. Rear Gate and Glass



- | | |
|-----------------------------|----------------------------|
| (1) Rear gate | (8) Glass pin |
| (2) Clip | (9) Trim |
| (3) Key cylinder | (10) Glass |
| (4) Outer handle | (11) Buffer |
| (5) Auto-door lock actuator | (12) Rear gate side buffer |
| (6) Striker | (13) Stud |
| (7) Latch | (14) Gas stay |

- (15) Hinge

Tightening torque: N-m (kg-m, ft-lb)

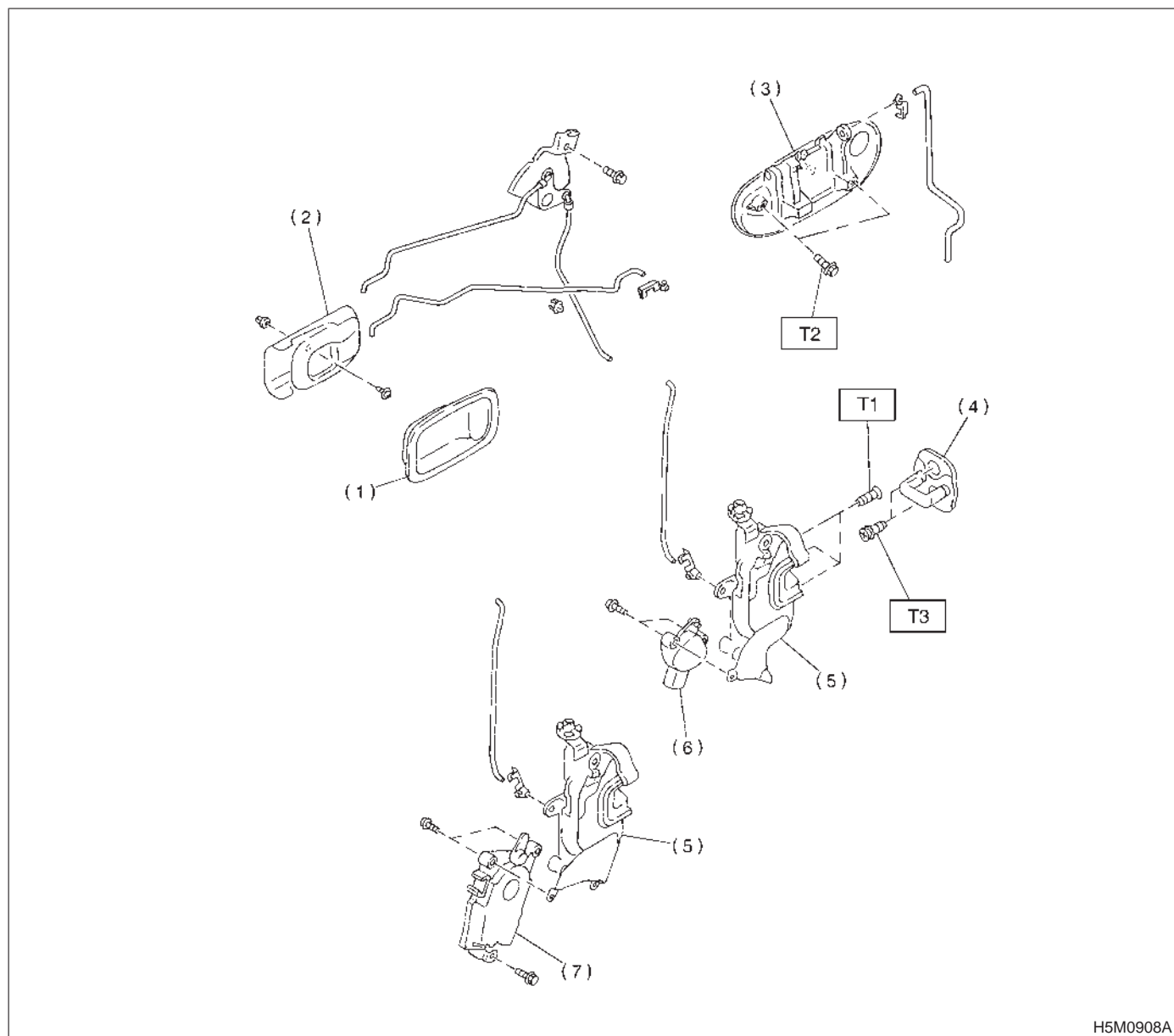
T1: 7.4 ± 2.0 (0.75 ± 0.2 , 5.4 ± 1.4)

T2: 14 ± 4 (1.4 ± 0.4 , 10.1 ± 2.9)

T3: 25 ± 5 (2.5 ± 0.5 , 18.1 ± 3.6)

7. Door Lock Assembly

A: FRONT DOOR



H5M0908A

- | | |
|-----------------------|-----------------------------|
| (1) Cover | (6) Switch ASSY |
| (2) Inner remote ASSY | (7) Auto-door lock actuator |
| (3) Door outer handle | |
| (4) Striker | |
| (5) Door latch | |

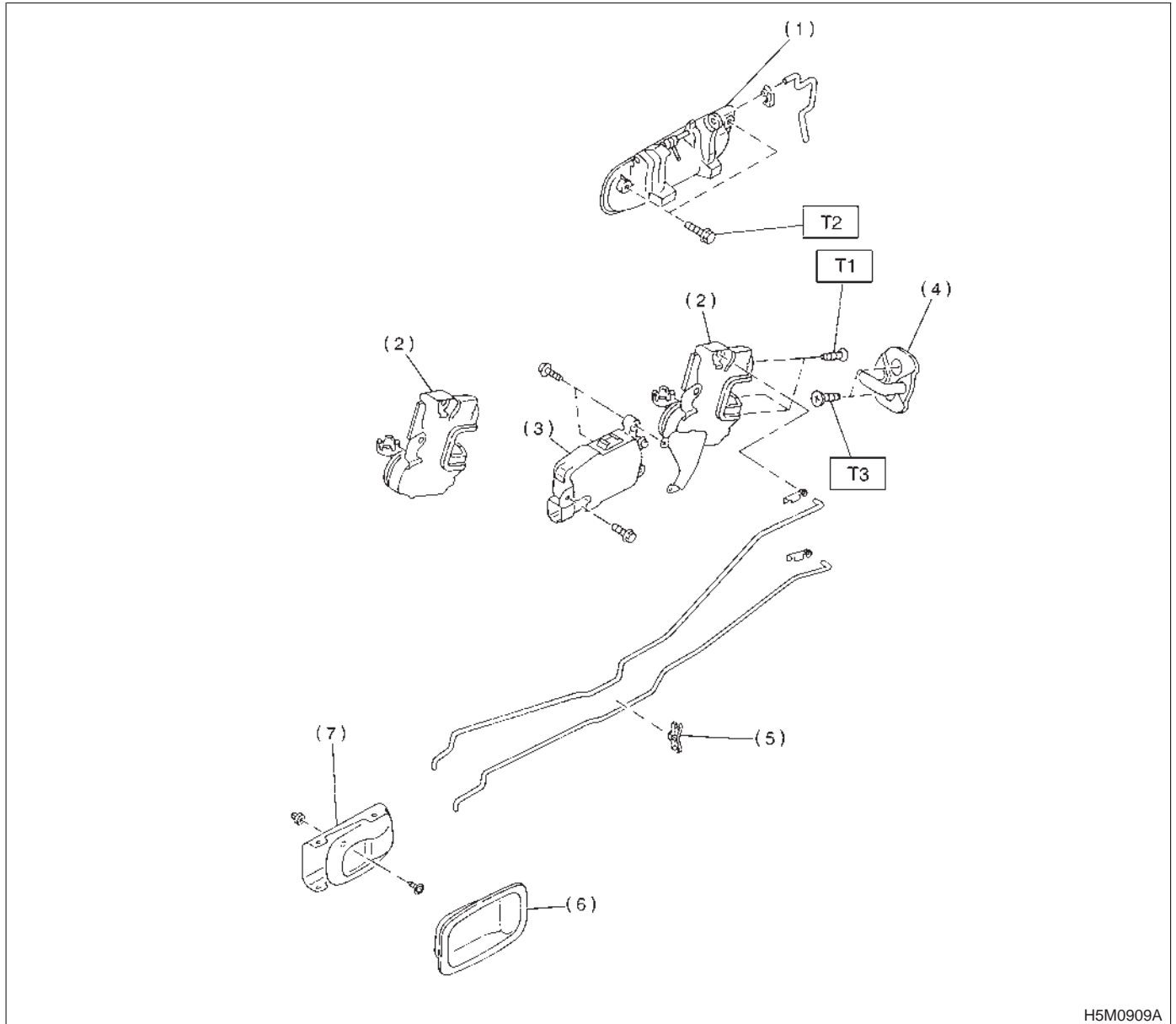
Tightening torque: N·m (kg·m, ft·lb)

T1: 6.4±2.0 (0.65±0.2, 4.7±1.4)

T2: 7.4±2.0 (0.75±0.2, 5.4±1.4)

T3: 14±4 (1.4±0.4, 10.1±2.9)

B: REAR DOOR



- (1) Door outer handle
- (2) Door latch
- (3) Auto-door lock actuator
- (4) Striker
- (5) Rod holder

- (6) Cover
- (7) Inner remote ASSY

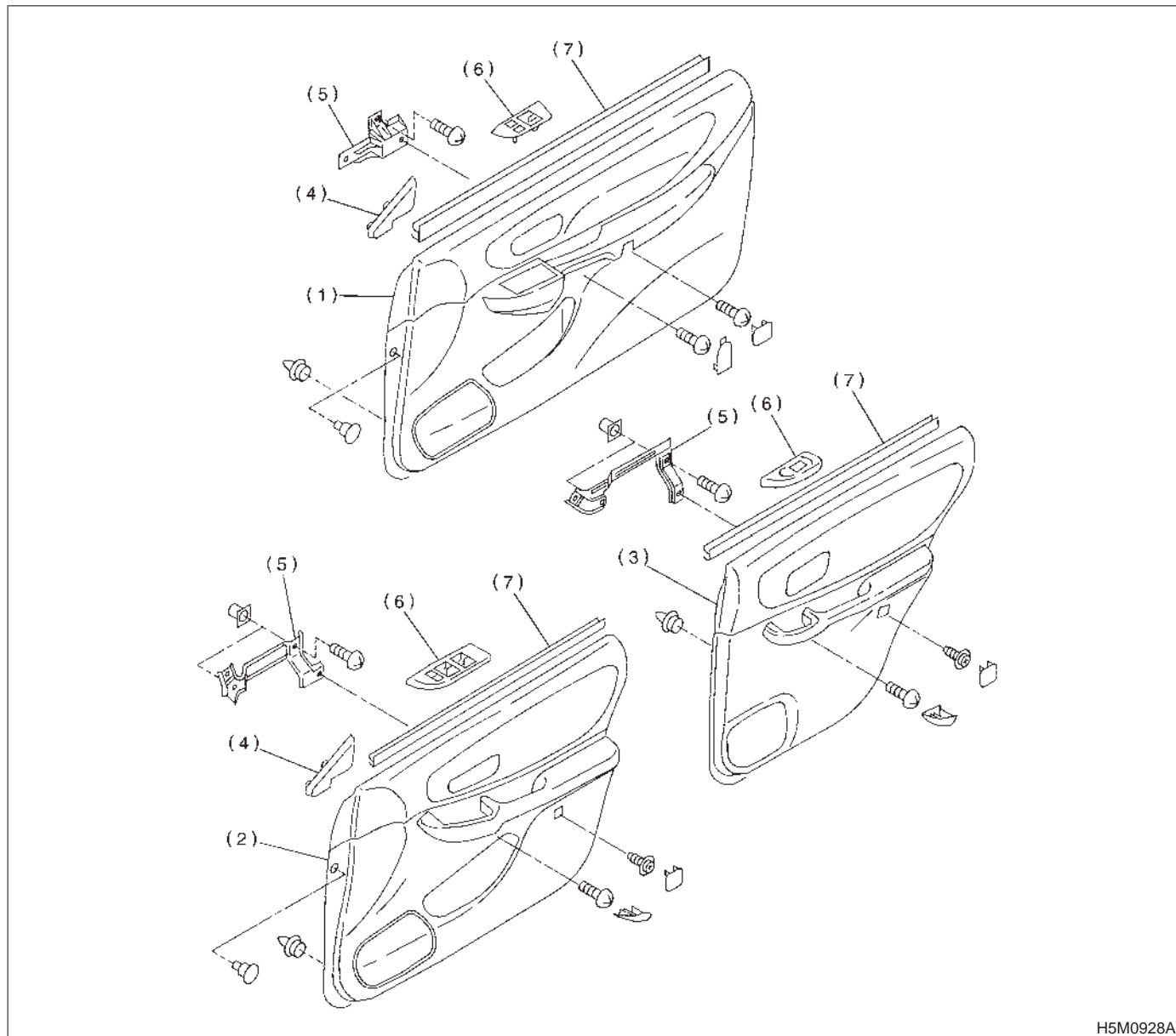
Tightening torque: N-m (kg-m, ft-lb)

T1: 6.4±2.0 (0.65±0.2, 4.7±1.4)

T2: 7.4±2.0 (0.75±0.2, 5.4±1.4)

T3: 14±4 (1.4±0.4, 10.1±2.9)

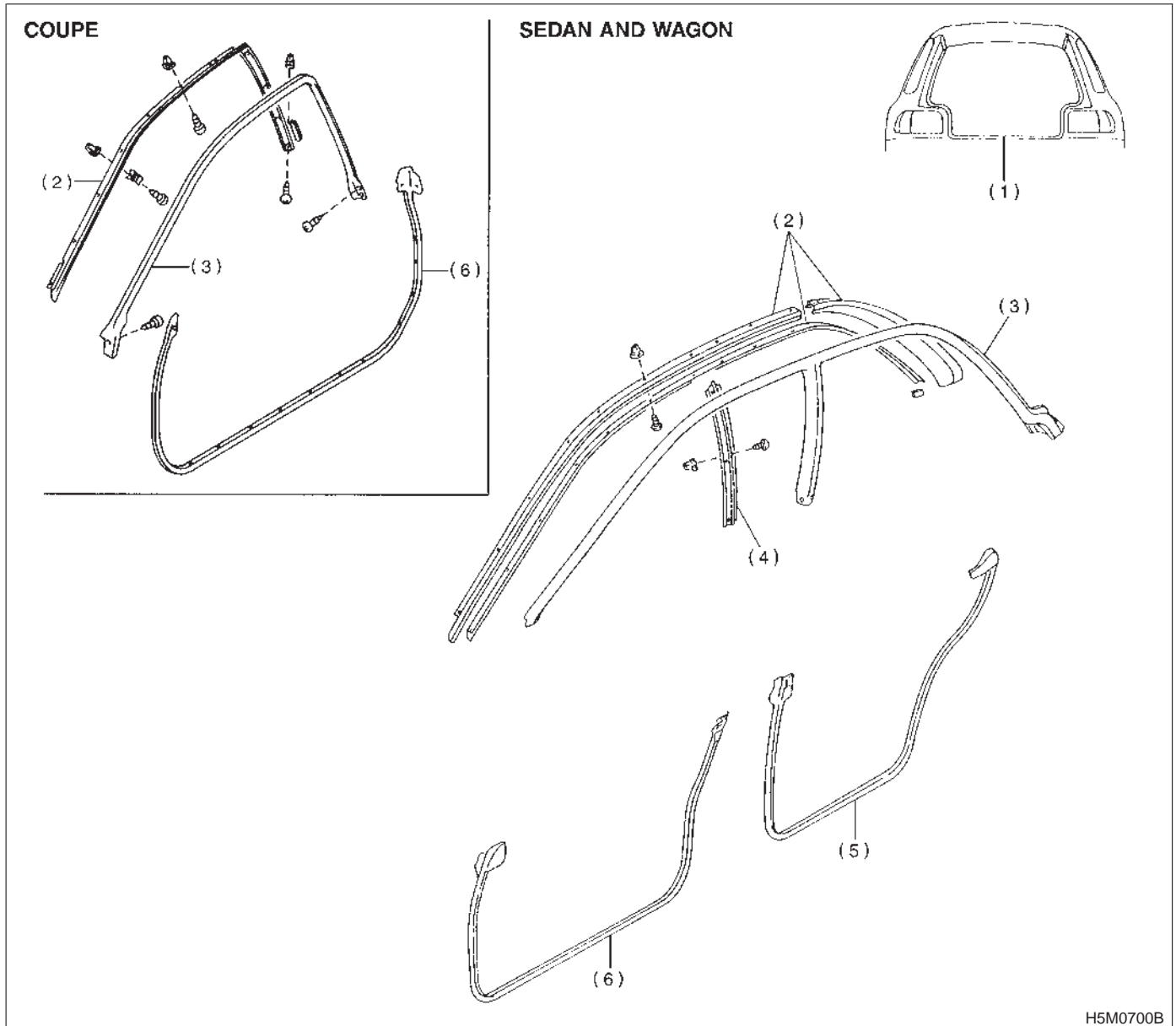
8. Door Trim



H5M0928A

- | | | |
|-------------------------------------|------------------|------------------|
| (1) Trim panel (Coupe) | (4) Gusset cover | (7) Weatherstrip |
| (2) Trim panel (Except coupe/front) | (5) Bracket | |
| (3) Trim panel (Except coupe/rear) | (6) Cover | |

9. Weatherstrip



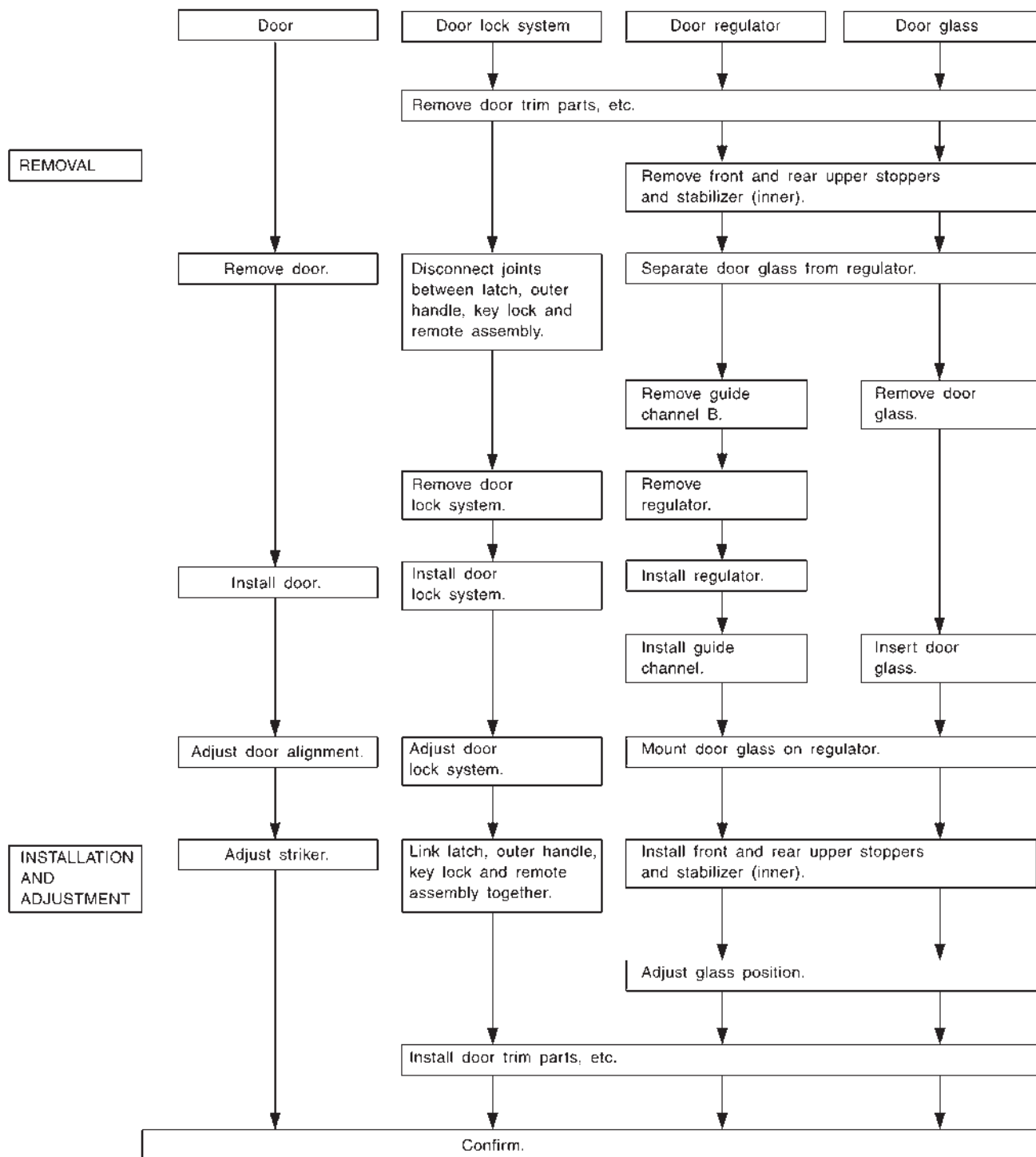
H5M0700B

- | | | |
|--|---------------------------------|-------------------------------|
| (1) Rear gate weatherstrip
(Wagon only) | (3) Upper and side weatherstrip | (6) Weatherstrip (Front door) |
| (2) Retainer and molding | (4) Retainer (Center) | |
| | (5) Weatherstrip (Rear door) | |

1. Procedure Chart for Removing and Installing Door and Related Parts

NOTE:

This flowchart shows the main procedures for removing and installing the door and its related parts. For details, refer to the text.

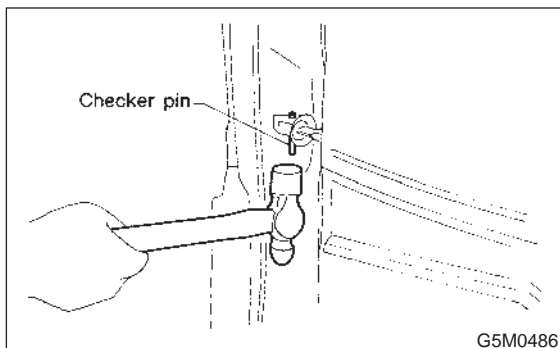


2. Door

A: REMOVAL AND INSTALLATION

1. DOOR ASSEMBLY

- 1) Remove lower trim and disconnect connectors from body harness.
- 2) Place a cloth or a wood block under door to prevent damage, and support it with a jack.
- 3) Remove checker pin by driving it upward. Be careful not to damage door and body.



- 4) Remove bolts (M8) securing upper and lower hinges to door, and remove door from hinges.

Tightening torque:

$25 \pm 3 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.3 \text{ kg}\cdot\text{m}$, $18.1 \pm 2.2 \text{ ft}\cdot\text{lb}$)

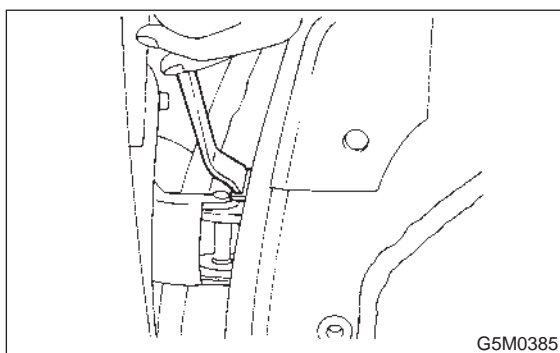
- 5) Remove hinges by loosening hinges mounting bolt (M8) off of body.

Tightening torque:

$29 \pm 5 \text{ N}\cdot\text{m}$ ($3.0 \pm 0.5 \text{ kg}\cdot\text{m}$, $21.7 \pm 3.6 \text{ ft}\cdot\text{lb}$)

CAUTION:

Work carefully to avoid damaging door.



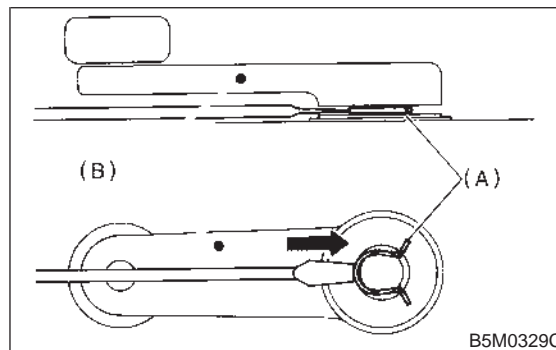
- 6) Installation is in the reverse order of removal.

NOTE:

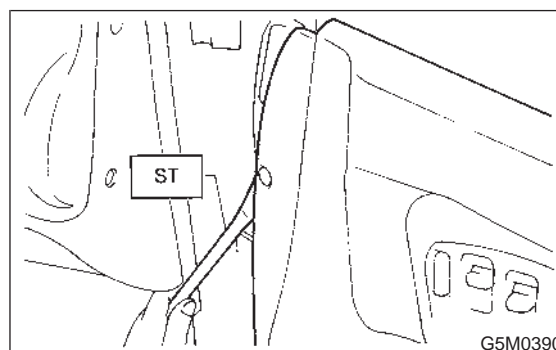
Apply grease to moving parts of door hinges.

2. TRIM PANEL

- 1) Press retainer spring (A) with a thin flat-bladed screwdriver and then remove regulator handle (B). (models without power window)



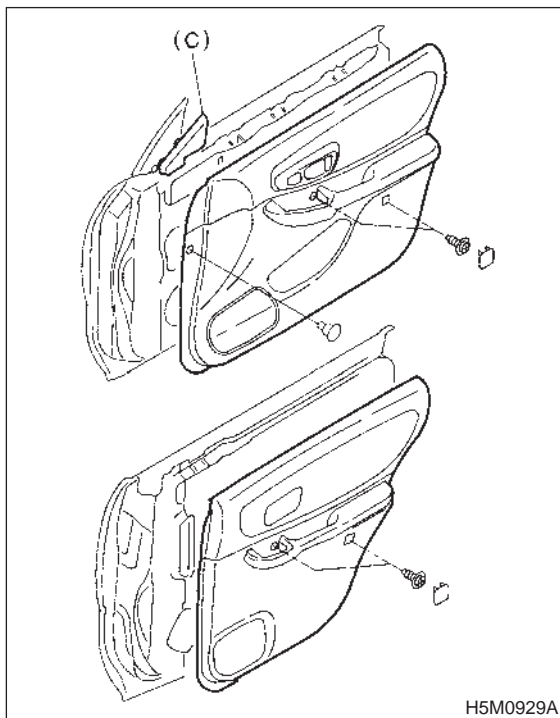
- 2) Using ST, disengage the clip.
ST 925580000 PULLER



- 3) Remove gusset cover (C) and screws.
- 4) Remove trim panel and then disconnect connector. (models with power window)

CAUTION:

Be careful not to break clip by applying undue force.



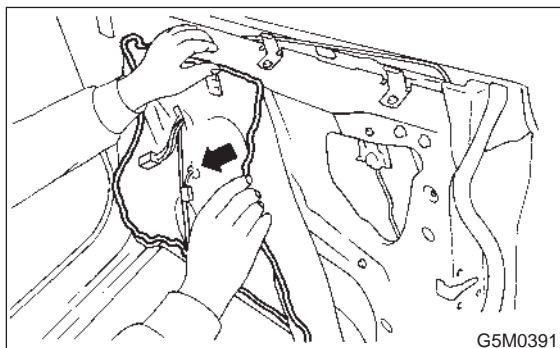
- 5) Installation is in the reverse order of removal.

3. SEALING COVER

- 1) Remove trim panel.
- 2) Remove speaker, trim bracket and remote assembly and disconnect connectors.
- 3) Remove sealer with a spatula.

CAUTION:

Be careful because cover may break if sealer is removed forcefully.



- 4) Installation is in the reverse order of removal.

NOTE:

- Confirm that sealer is properly applied without breaks. Then install sealing cover.

- When repairing or replacing sealing cover, use "CEMEDINE 5430L" as sealer. It may be overlaid on existing sealer.

Sealer:

CEMEDINE 5430L

CAUTION:

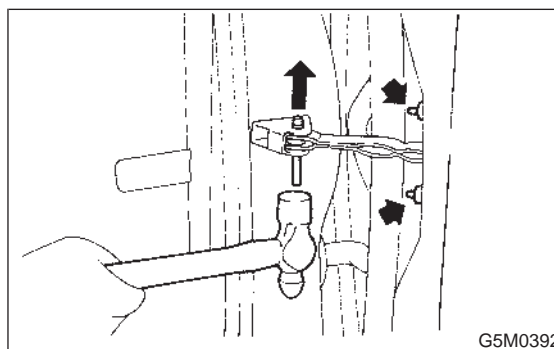
- Any breaks in sealer can cause water leakage or entry of air and dust. Be sure sealer is applied in a continuous line.
- Make sure sealing cover bonded areas are free from wrinkles or openings.

4. CHECKER

- 1) Remove trim panel.
- 2) Remove sealing cover.
- 3) Apply a cloth to door and body to prevent damaging them, and remove checker pin by driving it upward.

CAUTION:

Be careful not to damage door and body.



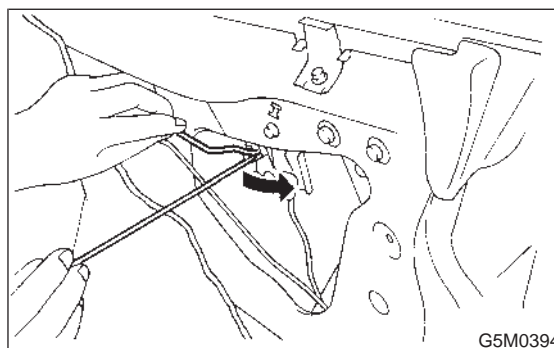
- 4) Completely close door glass.
- 5) Loosen two nuts securing checker, and take out checker through access hole in underside.
- 6) Installation should be made in the reverse order of removal.

Tightening torque:

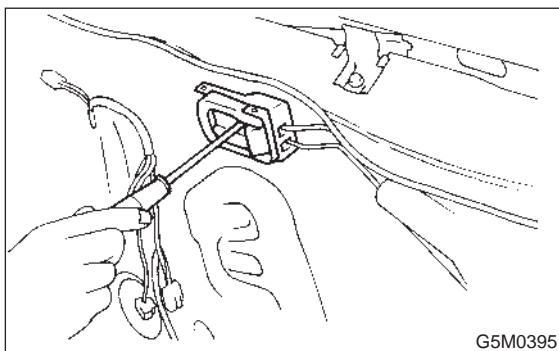
7.5±2.0 N·m (0.75±0.2 kg·m, 5.4±1.4 ft·lb)

5. INNER REMOTE

- 1) Remove trim panel.
- 2) Remove sealing cover.
- 3) Disconnect joints of two rods.



- 4) Unlatch rod holder.
- 5) Remove screws holding remote assembly.



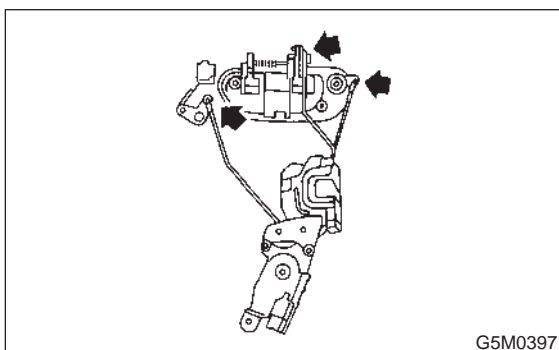
- 6) Installation is in the reverse order of removal.

NOTE:

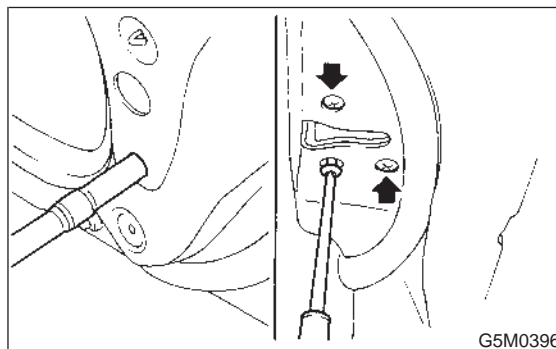
If rear door is equipped with child safety lock, check that child lock lever moves without dragging.

6. DOOR LATCH

- 1) Remove trim panel.
- 2) Remove inner remote assembly.
- 3) Remove sealing cover around latch service hole.
- 4) Completely close door glass.
- 5) Remove latch and actuator assembly:
 - (1) Turn rod holder to disconnect joint between key lock and rod.
 - (2) Turn rod holder to disconnect joint between outer handle and rod.
 - (3) Turn rod holder to disconnect joint between crank and rod.



- 6) Loosen screws securing both latch and actuator, then remove latch and actuator assembly through service hole in bottom.



- 7) Installation is in the reverse order of removal.

Tightening torque (screw):

$6.4 \pm 2.0 \text{ N-m}$ ($0.65 \pm 0.2 \text{ kg-m}$, $4.7 \pm 1.4 \text{ ft-lb}$)

NOTE:

- Check operation of each part.
- Check each sliding part for proper lubrication.

CAUTION:

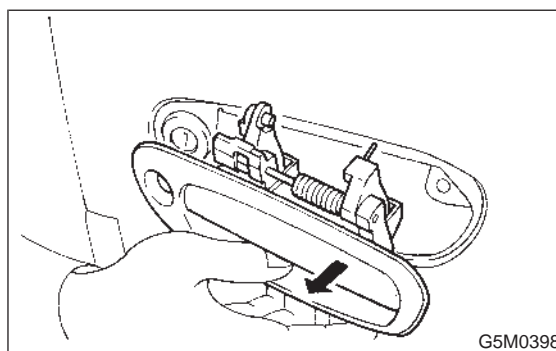
After installation, be sure lock mechanism operates normally.

7. OUTER HANDLE

- 1) Remove trim panel.
- 2) Remove sealing cover.
- 3) Detach door latch rod from outer handle and key lock.
- 4) Loosen nut securing outer handle and then remove outer handle from outside.

CAUTION:

Be careful not to damage door.



- 5) Installation is in the reverse order of removal.

Tightening torque:

$7.4 \pm 2.0 \text{ N-m}$ ($0.75 \pm 0.2 \text{ kg-m}$, $5.4 \pm 1.4 \text{ ft-lb}$)

8. KEY LOCK

- 1) Remove trim panel.
- 2) Remove sealing cover.
- 3) Completely close door glass.
- 4) Remove outer handle.
- 5) Loosen spring securing key lock.

- 6) Remove key lock from outer handle.
- 7) Installation is in the reverse order of removal.

NOTE:

Install so that key slot in key lock comes to center of hole in outer handle.

9. GUSSET

- 1) Be sure window is all the way down.
- 2) Remove gusset cover.
- 3) Remove trim panel.
- 4) Remove door rearview mirror.
- 5) Remove outer weatherstrip.
- 6) Remove sealing cover.

NOTE:

Be careful not to drop nuts on the "IN" side.

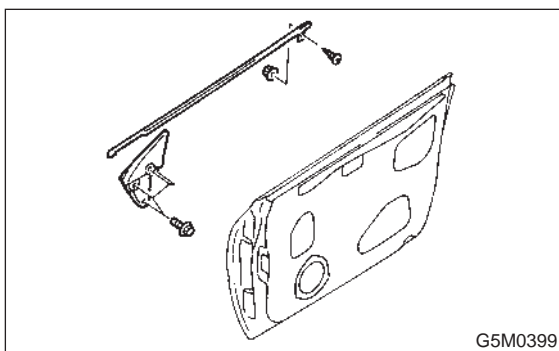
- 7) Remove bolts and nuts which secure gusset.

Tightening torque: Bolt

$3 \pm 3 \text{ N-m}$ ($1.3 \pm 0.3 \text{ kg-m}$, $9.4 \pm 2.2 \text{ ft-lb}$)

Tightening torque: Nut

$7.4 \pm 2.0 \text{ N-m}$ ($0.75 \pm 0.2 \text{ kg-m}$, $5.4 \pm 1.4 \text{ ft-lb}$)

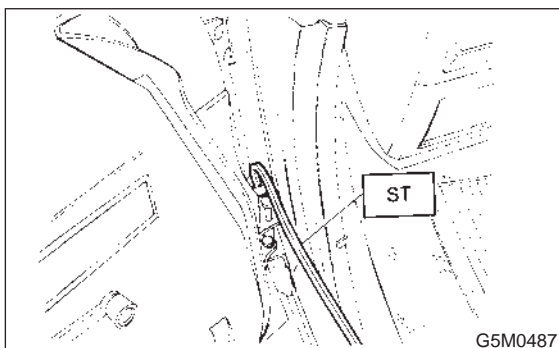


- 8) Lift out gusset.
- 9) Installation is in the reverse order of removal.

B: ADJUSTMENT
1. DOOR ASSEMBLY

- 1) Using ST, loosen bolts securing upper and lower hinges to body, and adjust fore-and-aft and vertical alignment of door.

ST 925610000 DOOR HINGE WRENCH



- 2) Loosen screw one complete rotation, and adjust opening/closing direction of door using a hammer covered with a cloth.

CAUTION:

Be careful not to damage striker.

Hinge tightening torque (body side):

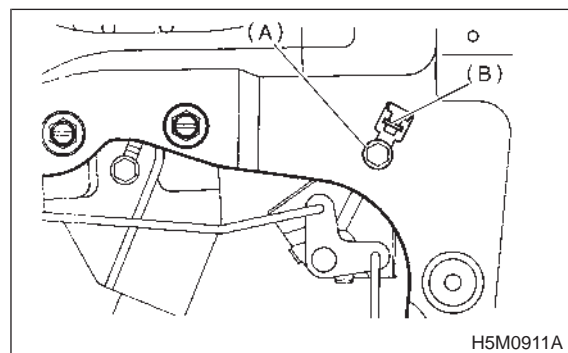
$29 \pm 5 \text{ N-m}$ ($3.0 \pm 0.5 \text{ kg-m}$, $21.7 \pm 3.6 \text{ ft-lb}$)

Striker tightening torque:

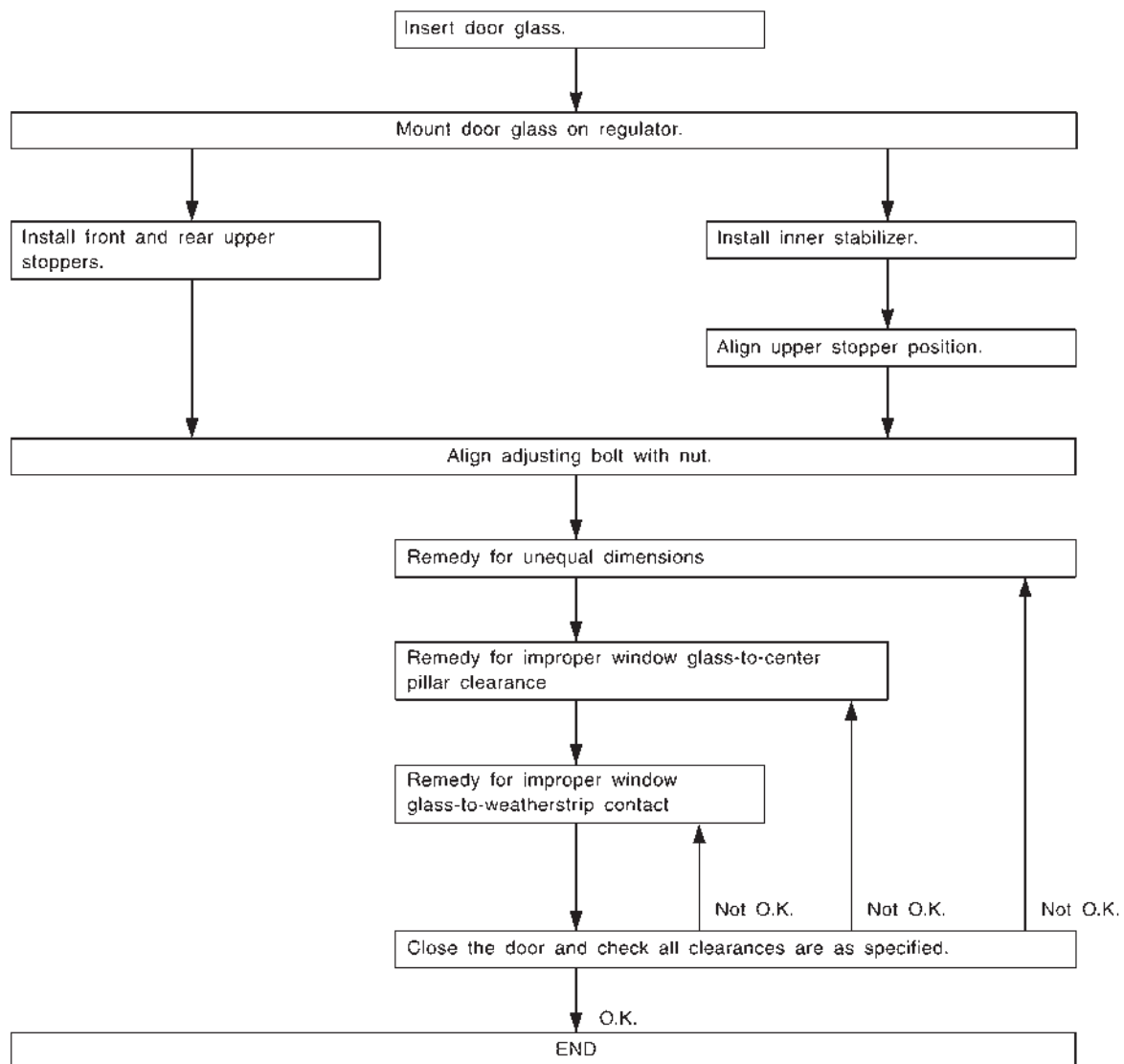
$14 \pm 4 \text{ N-m}$ ($1.4 \pm 0.4 \text{ kg-m}$, $10.1 \pm 2.9 \text{ ft-lb}$)

2. INNER REMOTE

- 1) Lock the door.
- 2) Loosen bolt (A).
- 3) Lower bell crank (B) and then tighten bolt (A).

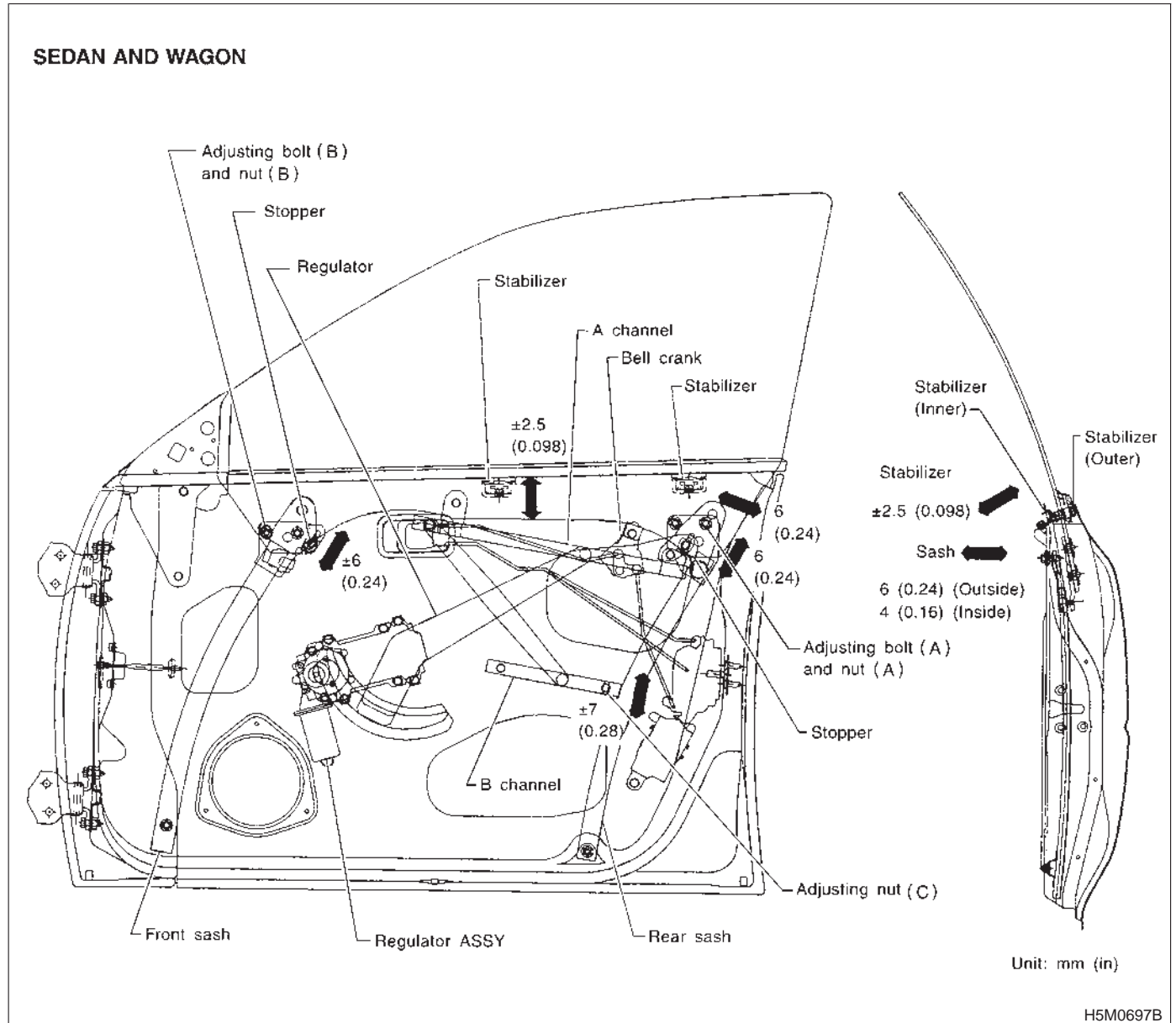


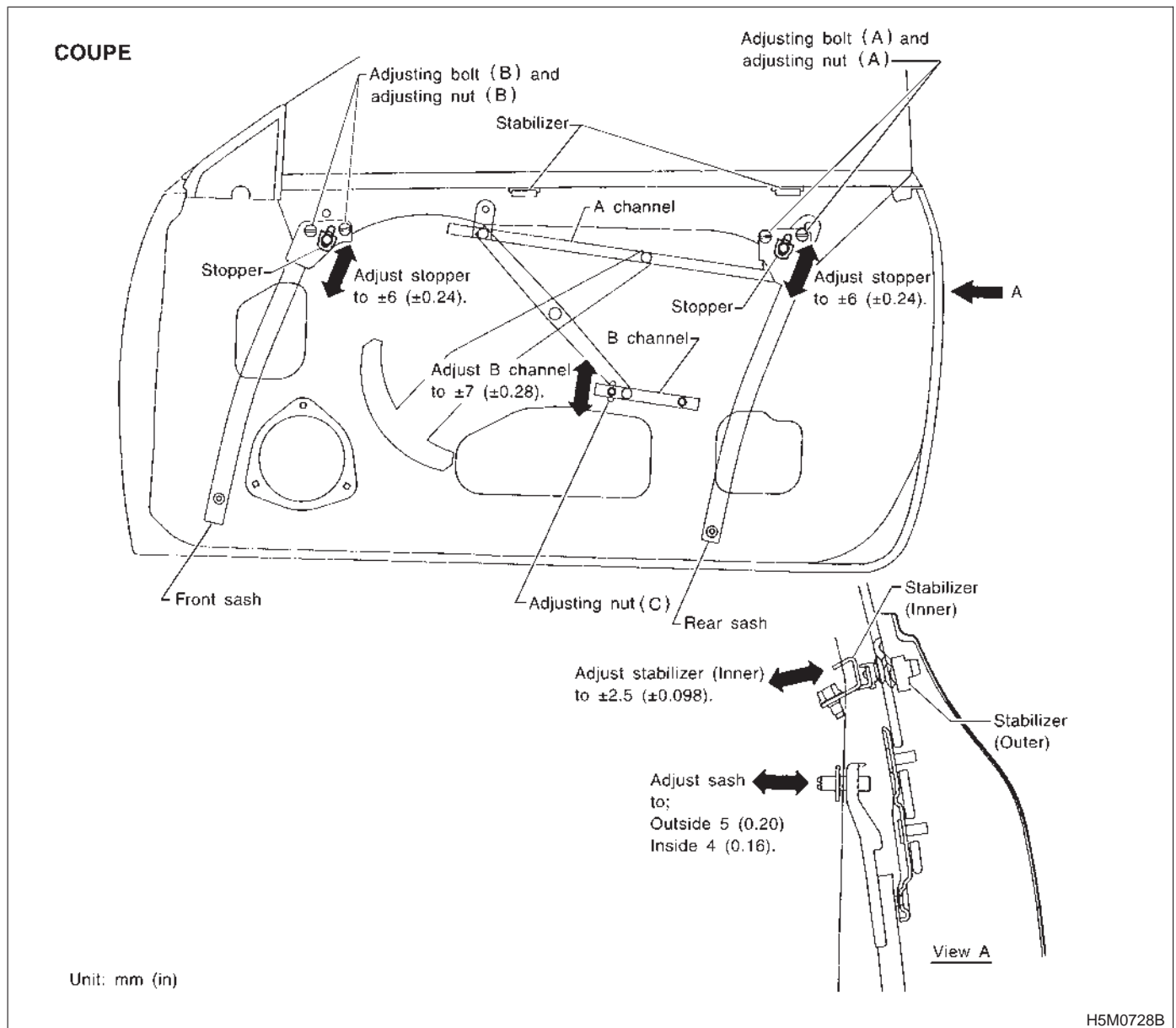
3. PROCEDURE CHART FOR ADJUSTING DOOR GLASS



H5M0912A

4. FRONT DOOR GLASS





● Door glass fit adjustment

Before adjusting door glass alignment, ensure adjusting bolts for stabilizers, upper stoppers and sashes are loose and glass is raised so that it is in contact with upper and side weatherstrip.

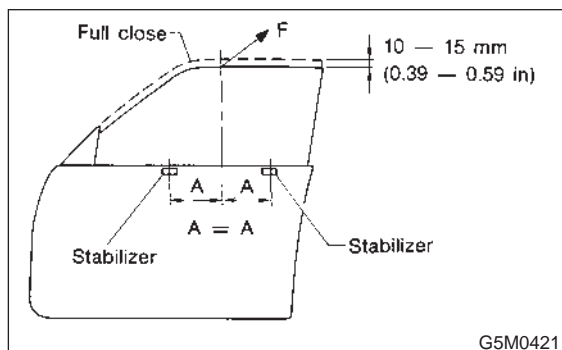
- 1) temporarily tighten one of the two rear sash adjusting bolts, at midpoint of oblong hole on inner panel.
- 2) Temporarily tighten regulator B channel at a position slightly lower than midpoint of oblong hole on inner panel.

3) Lower door glass 10 to 15 mm (0.39 to 0.59 in) from fully closed position. While applying outward pressure (load) to upper edge of glass above mid-point of two outer stabilizers, press inner stabilizer until it just touches the glass, then secure it.

Load: F

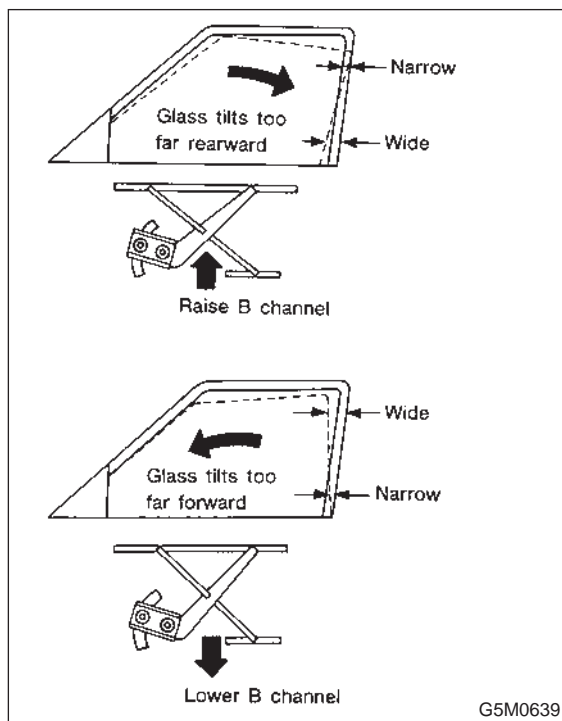
Front door glass 44.1 ± 4.9 N (4.5 ± 0.5 kg, 9.9 ± 1.1 lb)

Rear door glass 44.1 ± 4.9 N (4.5 ± 0.5 kg, 9.9 ± 1.1 lb)



● Remedy for unequal dimensions, between upper, lower and center pillar sides

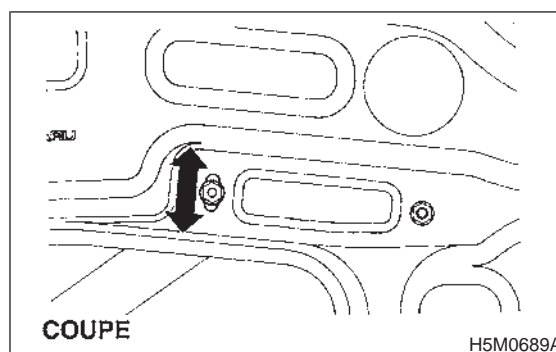
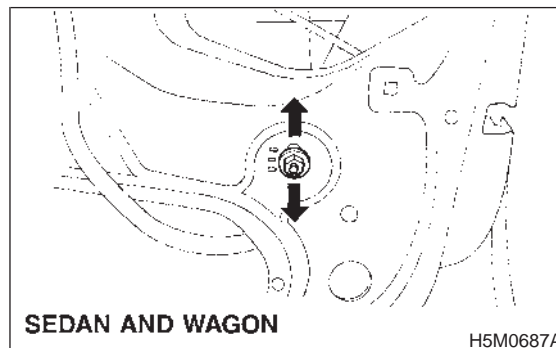
- 1) Close front door and raise door glass.
- 2) Make sure of unequal dimensions.



3) If glass tilts to far rearward, loosen adjusting nut (0C) and adjust glass to be parallel with center pillar, then after adjustment, tighten adjusting nut (0C).

Tightening torque:

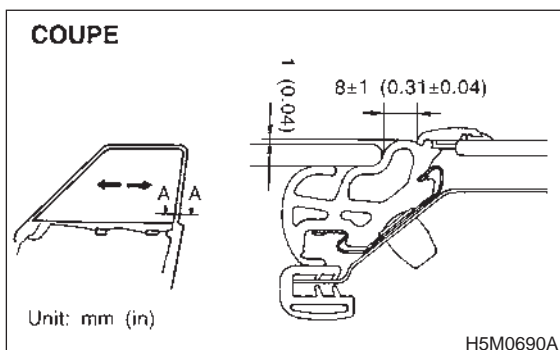
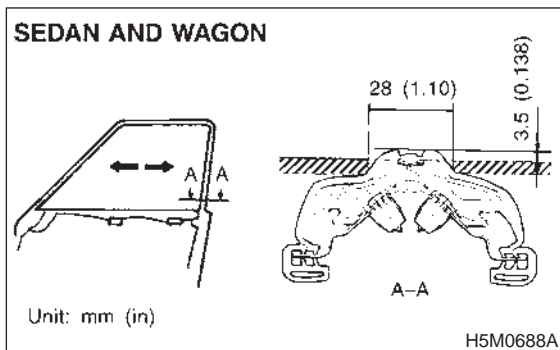
7.4 ± 2.0 N·m (0.75 ± 0.2 kg·m, 5.4 ± 1.4 ft·lb)



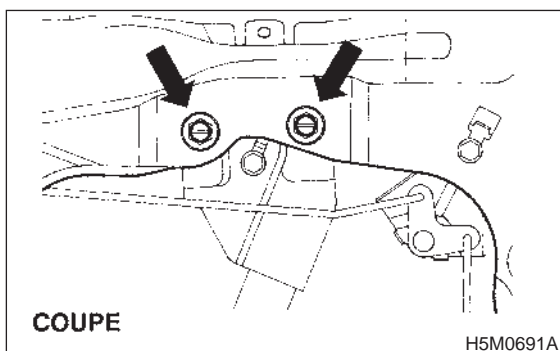
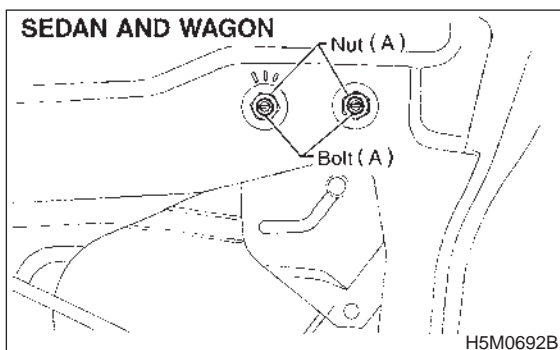
● Remedy for improper glass to center pillar clearance

- 1) Close front door and raise door glass.

- 2) Make sure of improper clearance.



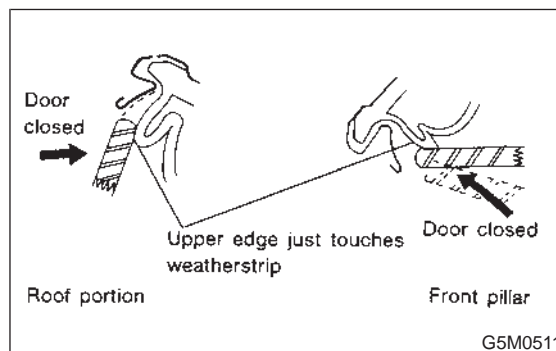
- 3) If clearance is improper, loosen adjusting nut (A), bolt (A) and adjust glass to center pillar.



● Remedy for improper upper stop point of door glass

- 1) Loosen front and rear sash stoppers.

- 2) Increase the upward travel of window glass up to the position where upper edge just touches weatherstrip surface with door closed.



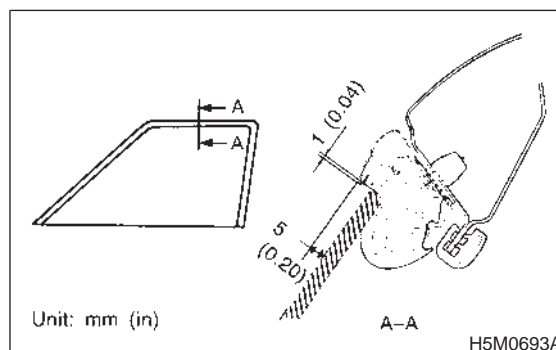
- 3) After adjustment, temporarily tighten stoppers.

NOTE:

Make sure that each glass stopper is touched.

● Remedy for incorrect contact of door glass to weatherstrip

- 1) Close front door and raise door glass.
- 2) If clearance is below specifications, loosen bolt (A) and bolt (B).
- 3) If clearance is over specifications, tighten bolt (A) and bolt (B).



● Fit adjustment

Door glass fit is adjusted by displacing the glass front edge with a stabilizer.

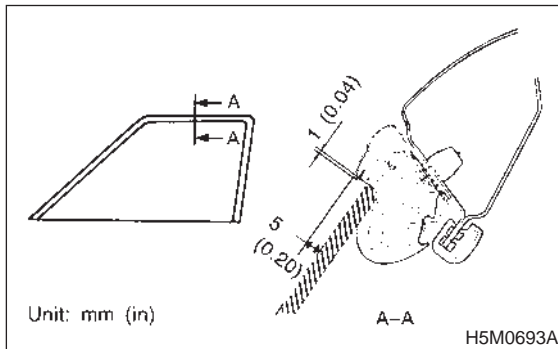
NOTE:

Before adjusting glass fit, visually check to determine relative adjusting positions of retainer and molding (on roof side) and glass surface.

1) Alternately adjust two rear sash adjusting bolts (0A) until dimensions are obtained.

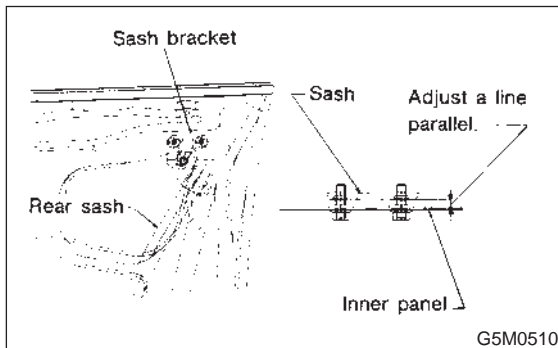
CAUTION:

Do not loosen two adjusting nuts (A) at the same time, as this moves sash fore and aft, creating unequal glass- to-sash clearance. During adjustment, loosen only one nut and keep the other tightened.



NOTE:

Always adjust two rear sash adjusting bolts (0A) by the same amount. Do not adjust the adjusting bolts with sash bracket inclined toward inner panel, as this increases effort required to operate regulator.



2) Adjust front sash fit using rear sash adjustment procedure outlined in the former procedure as a guide. Two adjusting bolts must be adjusted by the same amount.

NOTE:

- Front and rear sash adjustment procedures are basically the same; however, the amount of adjustment is not always the same due to alignment dispersion of individual doors.
- Adjust front and rear sash fit, as equally as possible. Otherwise, effort required to operate regulator may increase.

3) After adjusting front sash-to-glass fit, secure front sash.

Alignment of rear door glass is basically the same as for the front door glass. Due to slight difference in adjustment dimensions for fore-aft, up-down, and in-out alignments, key points for rear door adjustment are described.

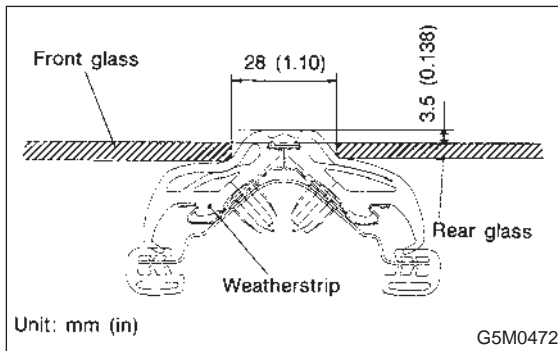


● Fore-aft adjustment

1) Door glass alignment must be adjusted so that glass- to-center pillar fit is equal at all points. Always use dimensions as a guide during adjustment.

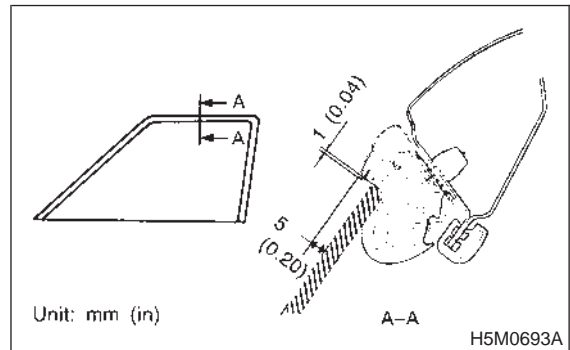
NOTE:

If dimensions are smaller than those indicated, glass will be caught in weatherstrip and may not raise to the fully closed position.



● Fit adjustment

Increasing contact pressure causes rear door glass to be caught in center pillar upper and lower weatherstrip; this will cause premature weatherstrip wear. For this reason, always use dimensions indicated in figure as a guide during glass fit adjustment.

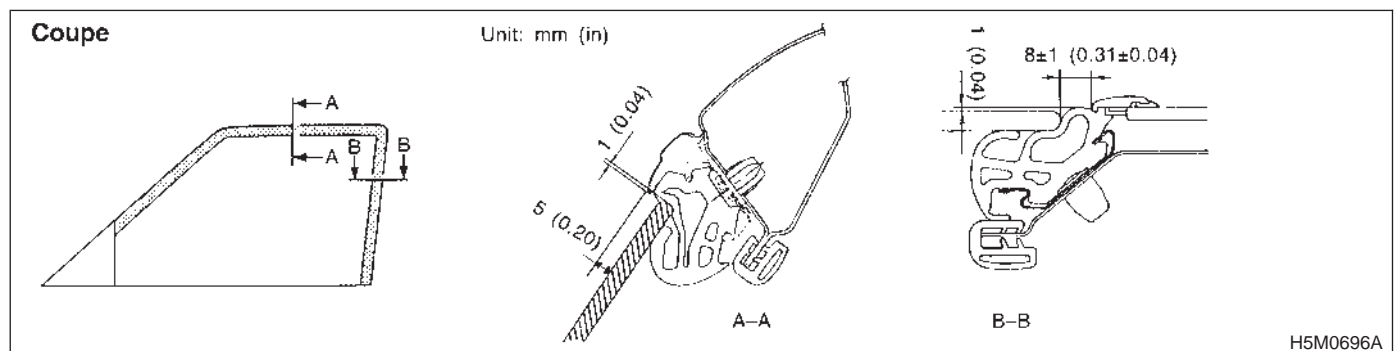
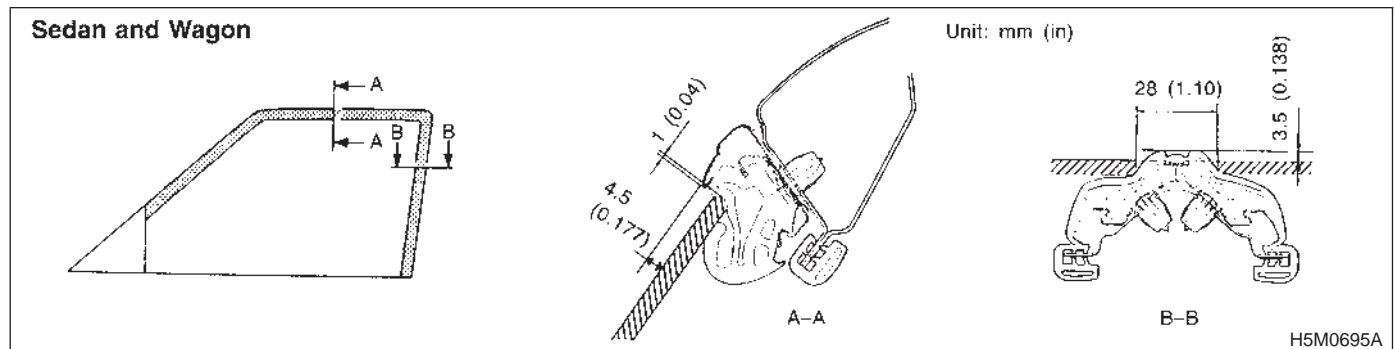


2) After making fore-aft adjustment, raise and lower glass to ensure it is free from any binding.

C: INSPECTION

1. FRONT DOOR GLASS

1) Close front door and make sure of all clearances.



2) If any clearance is not correct, adjust affected parts. Re-check that all clearances are correct.

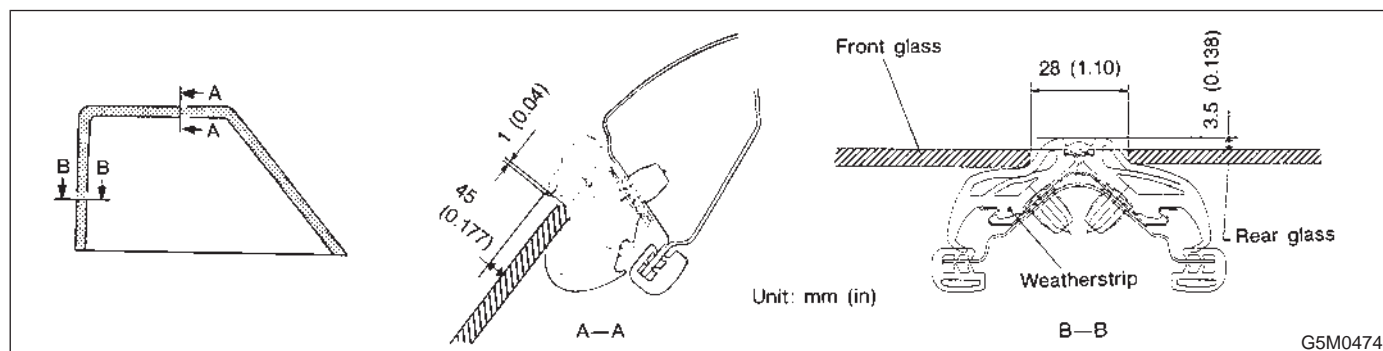
CAUTION:

● Repeatedly adjust parts until all clearances are correct.

● After clearance adjustment, make sure that all adjusting bolts and nuts are tightened.

2. REAR DOOR GLASS

1) Close rear door and make sure of all clearances.



2) If any clearance is not correct, adjust affected parts. Re-check that all clearances are correct.

CAUTION:

- Repeatedly adjust parts until all clearances are correct.
- After clearance adjustment, make sure that all adjusting bolts and nuts are tightened.

3. Rear Gate

A: REMOVAL AND INSTALLATION

CAUTION:

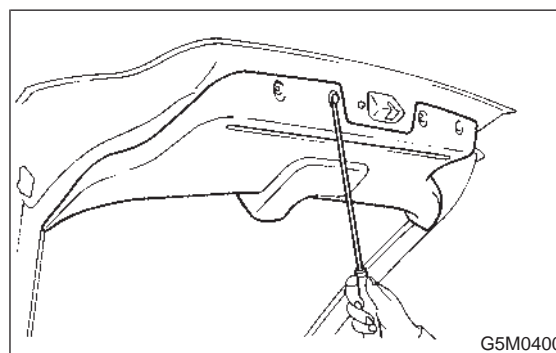
- Be careful not to scratch coated surfaces of vehicle body and window glass during removal. Place a cloth over the affected area.
- Be careful not to damage trim panels.
- Use an assistant when handling heavy parts.
- Be careful not to damage or lose small parts.

1. REAR GATE ASSEMBLY

1) Remove clips from trim panel and detach trim panel.

CAUTION:

Be careful not to damage clips or their holes.

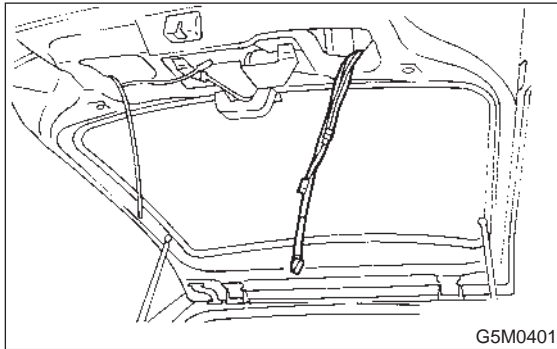


- 2) Disconnect connectors and terminal.
- 3) Disconnect rear washer hose from wiper motor.
- 4) Remove high-mounted stop light.

5) If disconnected harness is re-used, tie connector with a string and place on the upper side of rear gate for ready use.

CAUTION:

o not forcefully pull cords, lead wires, etc. since damage may result; carefully extract them in a wavy motion while holding connectors.



6) Remove rear wiper. <Ref. to 6-2 [W6B0].>

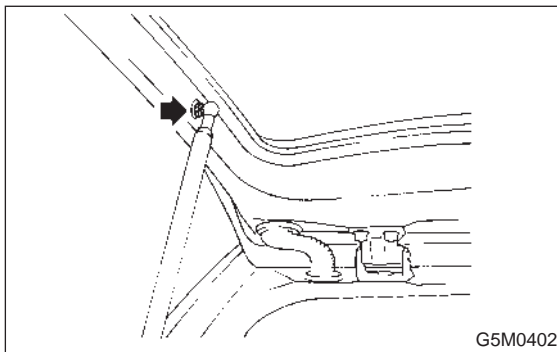
7) Remove both rubber ducts and then extract washer hose and harness connector.

8) Gas stay:

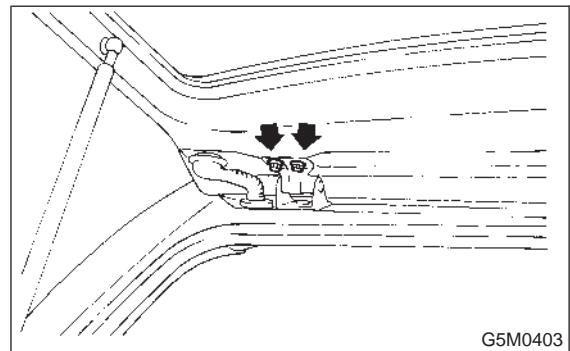
- (1) Completely open rear gate.
- (2) Remove bolts which hold gas stay to rear gate.

CAUTION:

- Be careful because rear gate drops while removing bolts. Have an assistant support it while removing bolts.
- Be sure to place a folded cloth between rear gate and body to prevent scratches.



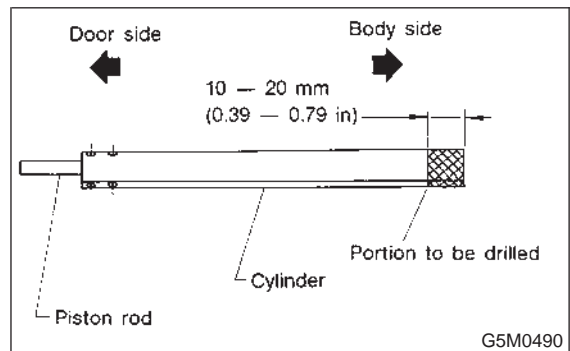
9) Remove the bolts which hold rear gate to hinge and then detach rear gate.



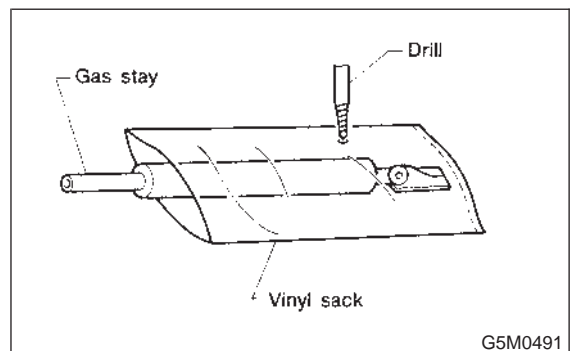
10) General precautions in handling rear gate gas stay

CAUTION:

- Do not attempt to disassemble gas stay because its cylinder is filled with gas.
- Before discarding gas stay, place it at a slight angle with the cylinder body side facing up and drill a 2 to 3 mm (0.08 to 0.12 in) dia. hole to completely discharge the content. (Gas is odorless, colorless and harmless; however, metal powder may come out of the hole.)



- It is good practice to place a vinyl sack over it before drilling the hole because oil may spurt out. Be careful to prevent vinyl cover from becoming entangled on the drill.



- Be careful not to scratch the exposed section of piston rod or allow oil or paint to come in contact with it.

- Do not attempt to rotate the extended piston rod.

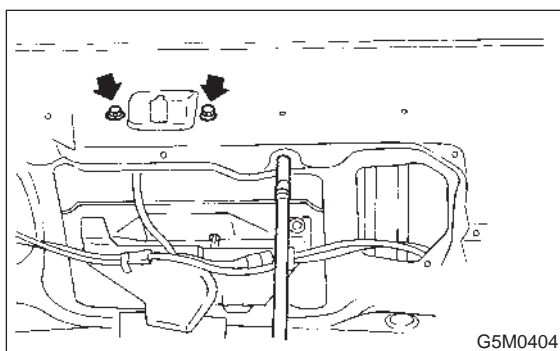
11) Installation is in the reverse order of removal.

CAUTION:

- Be careful not to mistake RH and LH body side buffers.
- Be sure to add sealer to hinge.
- When installing rear gate, be careful not to damage coating on body and rear gate.

2. LATCH

- 1) Remove trim panel.
- 2) Disengage rod from holder (= key cylinder).
- 3) Remove bolts from auto-door lock actuator.
- 4) Remove bolts from latch, and detach latch.



- 5) Disconnect rear gate switch connector.
- 6) Disconnect auto-door lock actuator connector.
- 7) Detach latch.
- 8) Installation is in the reverse order of removal.

CAUTION:

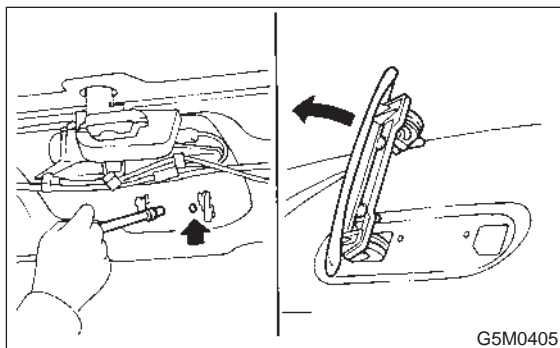
Firmly join latch with key cylinder, and outer handle.

3. OUTER HANDLE

- 1) Remove trim panel.
- 2) Remove latch.
- 3) Remove two nuts used to hold outer handle to the inside of rear gate, and detach outer handle.

CAUTION:

Be careful not to damage packing when removing outer handle.



- 4) Installation is in the reverse order of removal.

CAUTION:

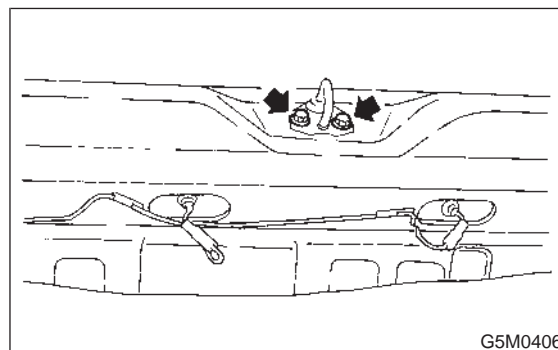
Completely insert latch pin into handle lever.

4. KEY CYLINDER

- 1) Remove trim panel.
- 2) Disengage rod from holder.
- 3) Remove retaining spring from key cylinder, and detach key cylinder from outside.
- 4) Installation is in the reverse order of removal.

5. STRIKER

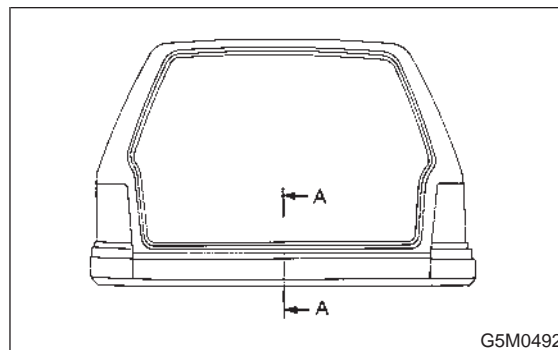
- 1) Remove rear skirt trim.
- 2) Remove two bolts from striker and detach striker.



- 3) Installation is in the reverse order of removal.

6. WEATHERSTRIP

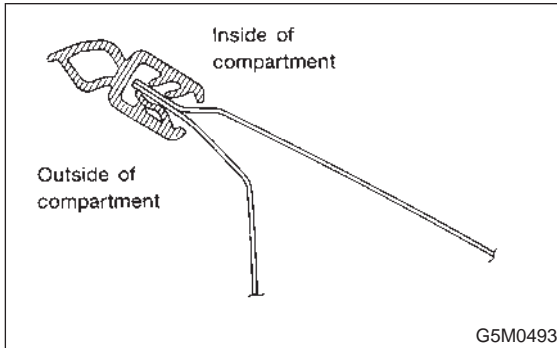
- 1) Place weatherstrip so that its joints meet at lower center of vehicle body, and install by inserting flanged portion from below, as shown in section A—A in figure.



2) Tap along entire length with a rubber hammer to firmly insert body flange into weatherstrip.

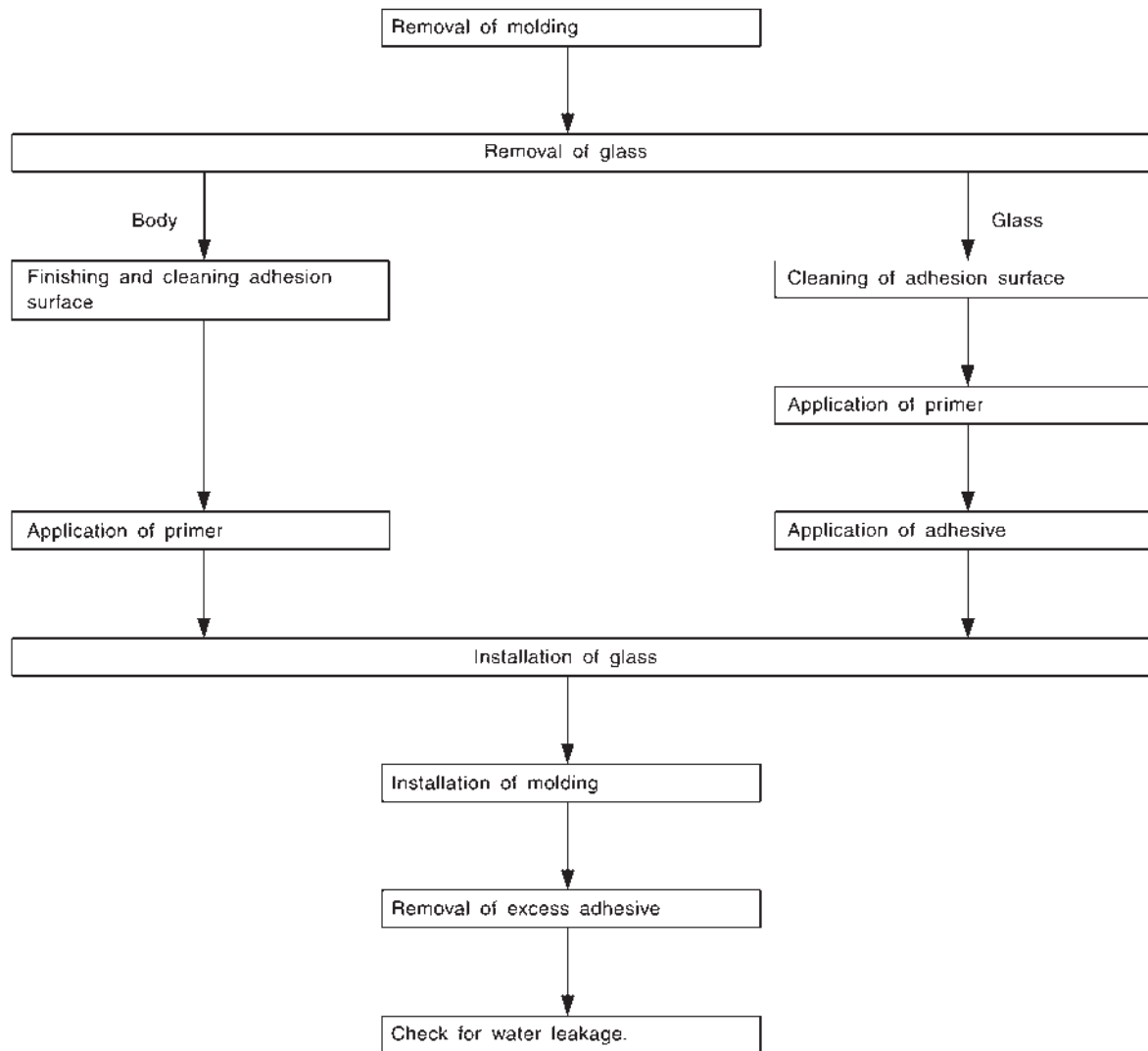
CAUTION:

- Be careful not to install in wrong direction.
- Install weatherstrip carefully and firmly.



4. Procedure Chart for Removal and Installing Window Glass

A: REMOVAL AND INSTALLATION



H5M0914A

1. MATERIALS REQUIRED FOR APPLICATION

Description	Remarks
Repair adhesive set <ul style="list-style-type: none"> ● Cartridge of single-liquid urethane adhesive ● Primer for glass and body 	Sunstar No. 580 or Essex Chemical Corp's Urethane E Sunstar No. 435-580
Windshield knife or piano wire	For cutting windshield
Sealant gun	For applying adhesive
Suction cups	For holding glass
Putty knife	For finishing adhesion surface and cutting spacer
Sponge	For applying primer
Gauze or cloth	For cleaning
Alcohol or white gasoline	For cleaning adhesion surface
Tape	For preventing damage to painted surface

5. Windshield

A: REMOVAL

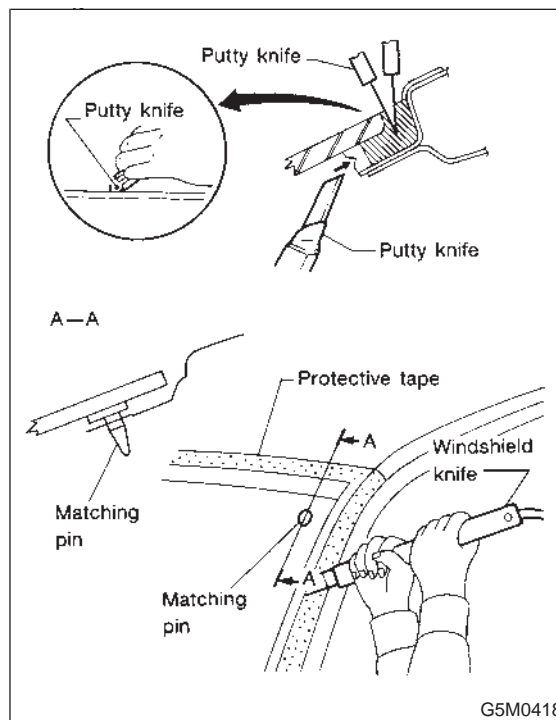
1. USING WINDSHIELD KNIFE

The following procedure for the front windshield can also be applied to other window glass.

- 1) Remove wiper arm and cowl panel.
- 2) Remove roof molding and front window molding upper.
- 3) Remove glass:
 - (1) Put protective tape on body to prevent damage.
 - (2) Apply soapy water to the surface of the adhesive agent so the knife blade slides smoothly.
 - (3) Cut off excess adhesive agent.
 - (4) Put windshield knife into layer of adhesive.
 - (5) Cut adhesive layer with the windshield knife.

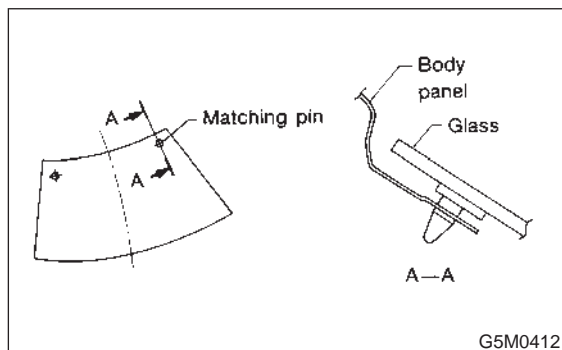
CAUTION:

- Keep knife edge along glass surface and end face.
- When first putting knife into layer of adhesive, select point with wide gap between body and glass.



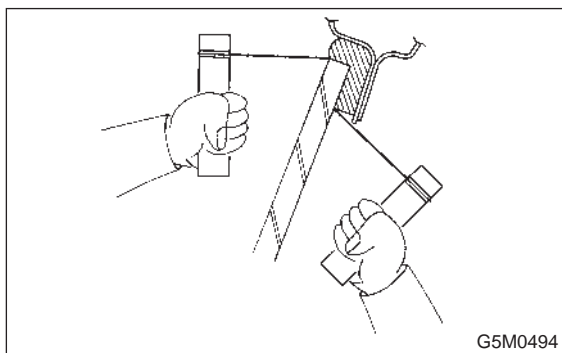
NOTE:

A matching pin is cemented to corners of glass on compartment side. Use a piano wire when cutting each pin.



2. USING PIANO WIRE

- 1) Remove wiper arm and cowl panel.
- 2) Remove roof molding and front window molding upper.
- 3) Remove glass:
 - (1) Put protective tape on body to prevent damage.
 - (2) Using drill or putty knife, make through-hole (one place) in adhesive agent.
 - (3) Pass piano wire through the hole from inside the compartment, and connect both ends of wire securely to wooden blocks.



- (4) Cut adhesive layer with the wire by pulling it back and forth.

CAUTION:

When making through-hole into adhesive layer and cutting the adhesive, be careful not to damage interior and exterior parts.

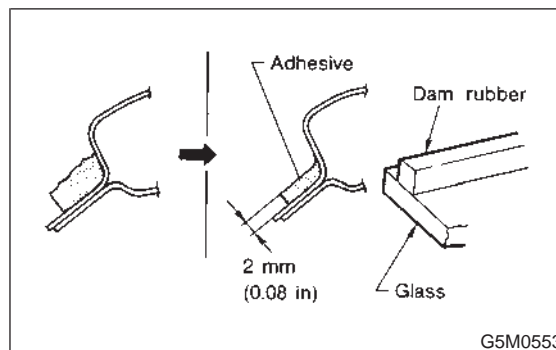
B: INSTALLATION

- 1) After cutting layer of adhesive, remove gum rubber remaining on body.

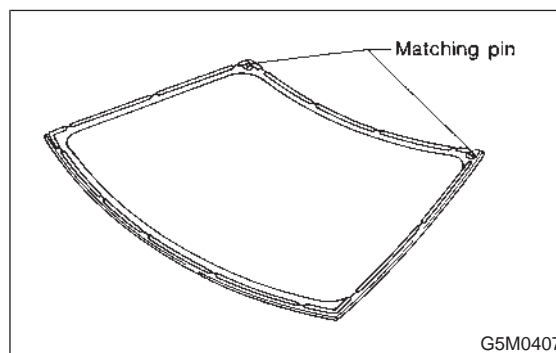
- 2) Finishing adhesion surface on body side: Using a cutter knife etc., cut layer of adhesive sticking firmly to body, and finish it to a smooth surface of about 2 mm (0.08 in) in thickness.

CAUTION:

Take extra care not to cause damage to body paint.



- 3) Cleaning body surface:
 - (1) Thoroughly remove chips, dirt and dust from body surface.
 - (2) Clean body wall surface and upper surface of layer of adhesive with a solvent such as alcohol or white gasoline.
- 4) Positioning glass:
 - (1) Mount glass on body.
 - (2) Adjust position of glass so that gap between body and glass is uniform on all sides.
 - (3) Put matching pin on body and glass in several places.



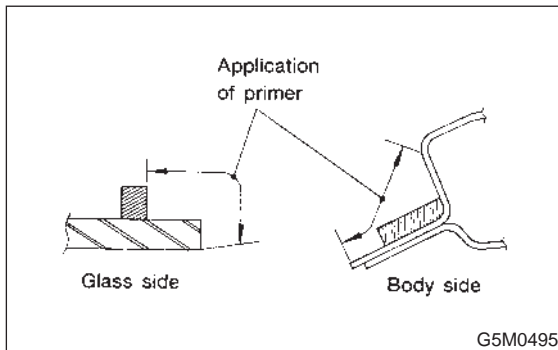
- 5) Cleaning glass:

- (1) Dismount glass from body.
- (2) Clean surface of glass to be adhered with alcohol or white gasoline.

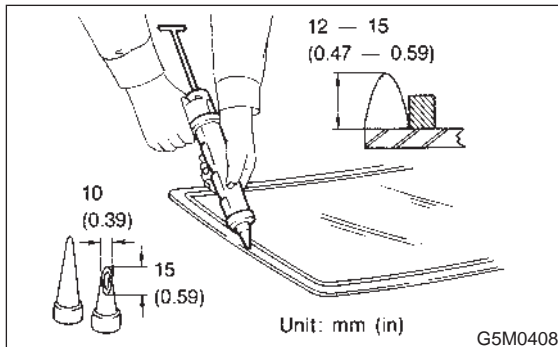
- 6) Application of primer:
- (1) Using a sponge, apply primer to part of glass to be adhered.
 - (2) Apply primer to part of body to be adhered.

CAUTION:

- Primer is hard to wipe off of body paint, instrument panel, inner trim, etc. So put masking around these areas for protection.
- After application, let 1st primer dry spontaneously for about 10 minutes.
- Do not touch primer-coated surface under any circumstances.

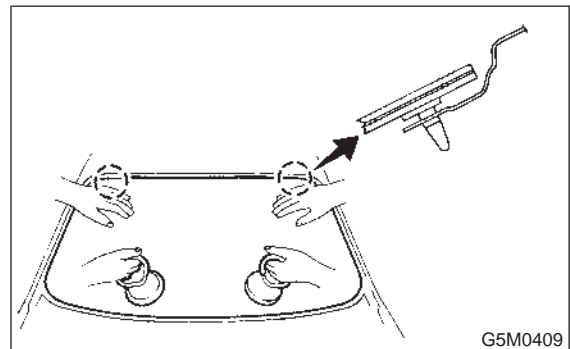


- 7) Application of adhesive:
- (1) Cut nozzle tip of cartridge as shown in figure.



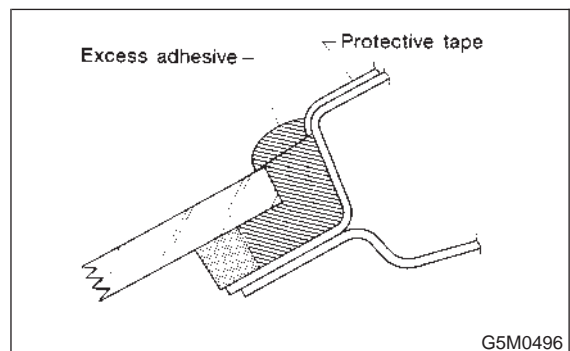
- (2) Open cartridge and put it into a gun with nozzle attached.
 - (3) Apply adhesive uniformly to all sides of adhesion surface while operating gun along glass end face.
- 8) Installation of glass:
- (1) Hold glass with rubber suction cups.

- (2) Mount glass on body with matching pin aligned.



- (3) Stick them fast by pressing all sides lightly.
- 9) Installation of molding:

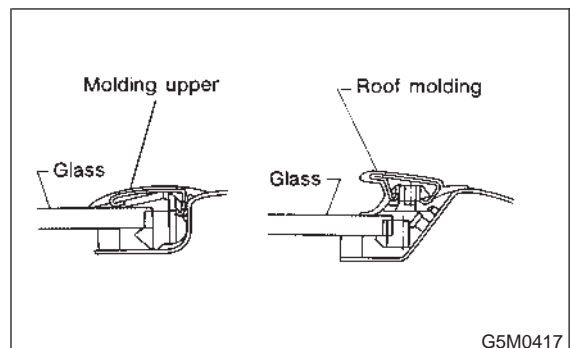
- (1) Remove adhesive overflowing from outside of glass until it becomes level with outer height of glass. Then, add adhesive to portions that need it, and clean with alcohol or white gasoline.



- (2) Firstly, press-fit front window molding upper and lastly, roof molding.

CAUTION:

Do not open and close door after moldings have been installed. When opening and closing door for unavoidable reason, lower door glass and gently move door.



- 10) Water leakage test:
Test for water leakage about one hour after installation.

CAUTION:

- Move vehicle very gently.
- Do not squirt strong hose stream on vehicle.

11) Spontaneous drying:

After completing all operations, leave vehicle alone for 24 hours.

CAUTION:

When delivering vehicle to user, tell him that vehicle should not be subjected to heavy shocks for at least three days.

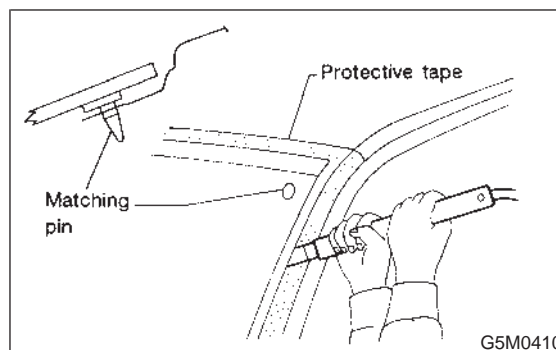
12) Install cowl panel and wiper arm.

6. Rear Window Glass

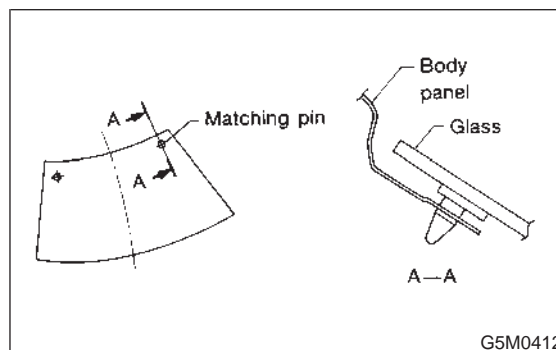
A: REMOVAL

1. SEDAN AND COUPE MODEL

- 1) Remove roof molding.
- 2) Remove rear window molding upper and lower.
- 3) Disconnect connector from rear defogger terminal.
- 4) Remove glass in same manner as in windshield.

**NOTE:**

A matching pin is cemented to the corners of glass on compartment side. Use a piano wire when cutting each pin.



2. WAGON MODEL

NOTE:

It is impossible to remove the molding from the glass. If molding is broken, replace rear glass.

- 1) Remove rear wiper and rear gate trim.
- 2) Disconnect connector from rear defogger terminal.
- 3) Remove high mount stop light.
- 4) Remove glass in same manner as for windshield.

CAUTION:

Be careful not to damage molding re-installing the old rear window glass using a piano wire.

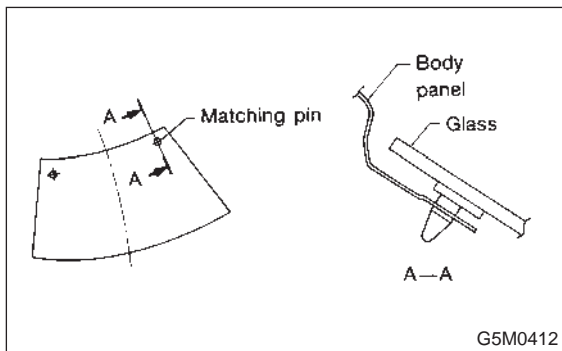
6. Rear Window Glass

NOTE:

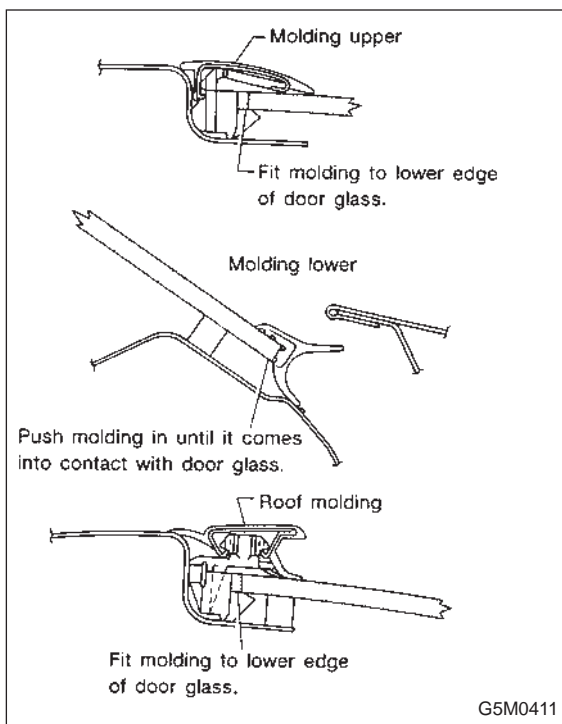
A matching pin is cemented to corners of glass on compartment side. Use a piano wire when cutting each pin.

3) After installation, test for water leakage after about one hour, and leave vehicle alone for 24 hours.

4) Make rear defogger connections.

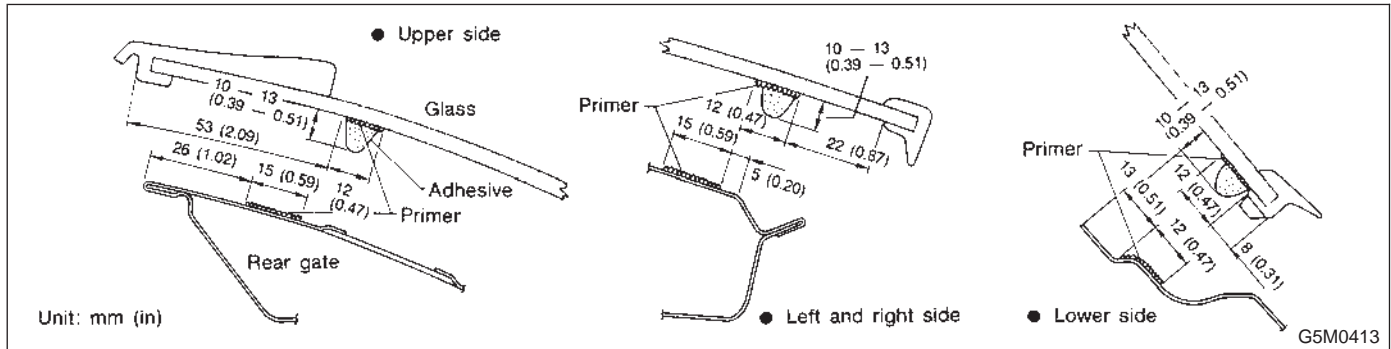
**B: INSTALLATION****1. SEDAN AND COUPE MODEL**

- 1) Install glass in same manner as in windshield.
- 2) Firstly, press-fit molding upper, then lower and lastly, roof molding.



2. WAGON MODEL

- 1) Install rear gate trim.
- 2) Install glass in same manner as windshield.



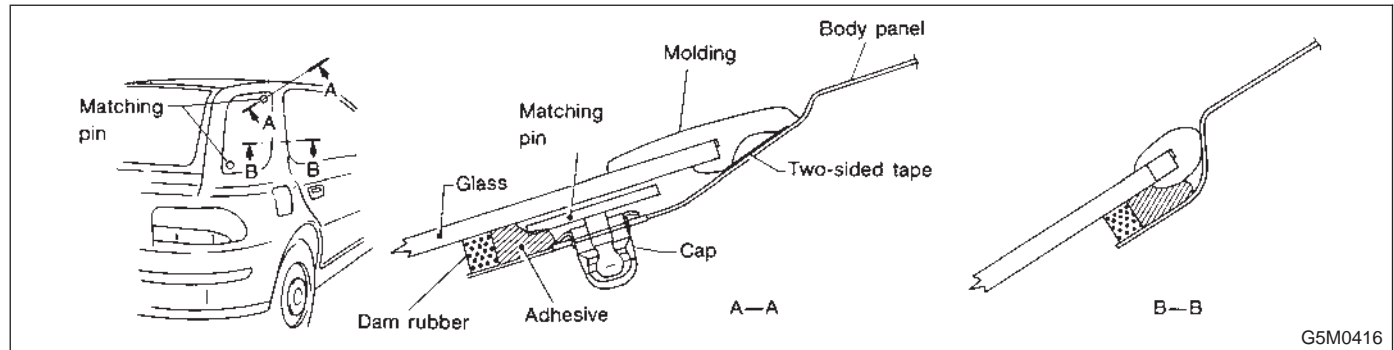
- 3) About one hour after installation, test for water leakage. Leave vehicle for 24 hours before using it.
- 4) Connect rear defogger connections.
- 5) Install high mount stop light and rear wiper.

7. Rear Quarter Glass

A: REMOVAL

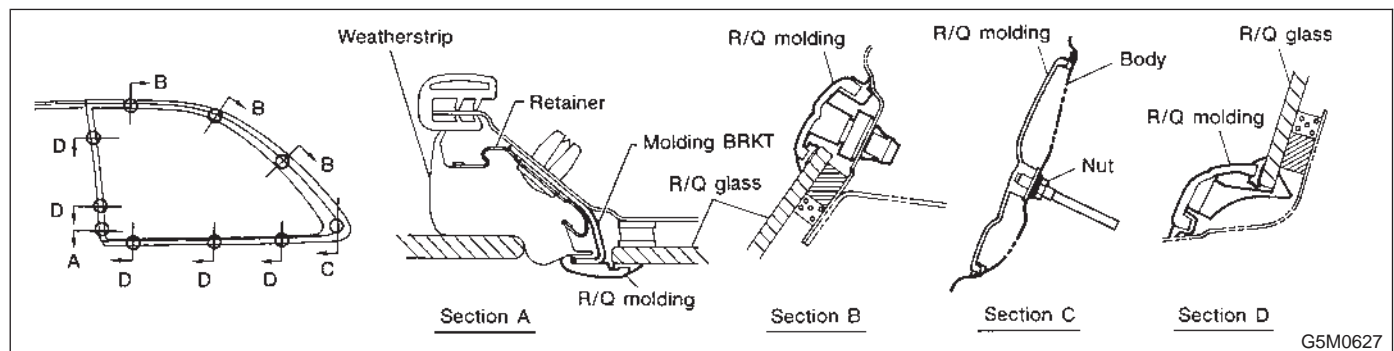
1. WAGON MODEL

- 1) Remove rear quarter molding on corner.
- 2) Remove glass in same manner as in windshield.

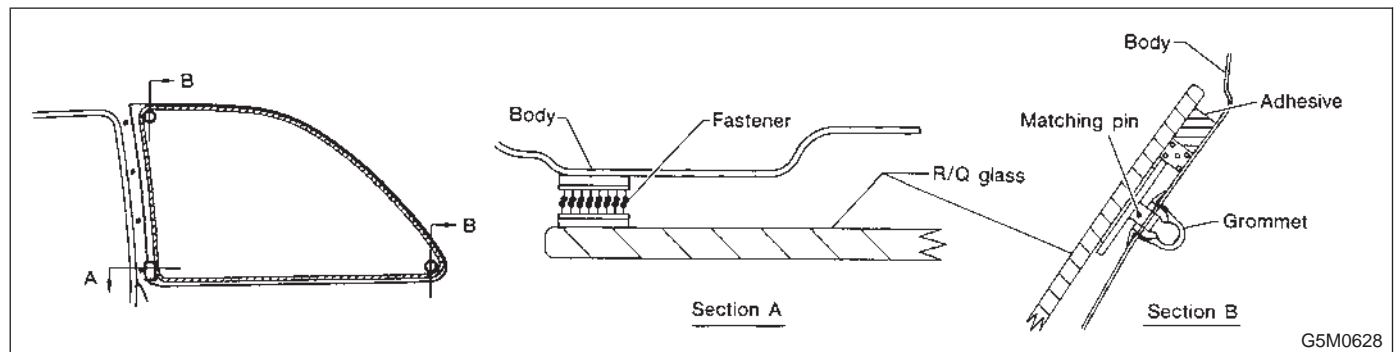


2. COUPE MODEL

- 1) Remove rear quarter molding.



- 2) Remove glass in same manner as in windshield.

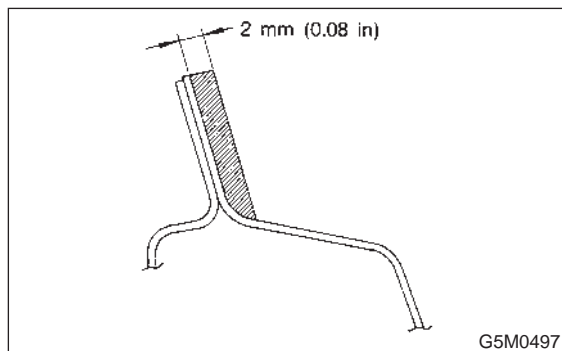


B: INSTALLATION**1. WAGON MODEL**

1) Finish surface of adhesive layer on body: Using a putty knife, etc., cut layer of adhesive stick firmly to body and finish it into a smooth surface of about 2 mm (0.08 in) in thickness.

CAUTION:

Be careful not to damage body finish.



2) Cleaning of body surface:

(1) Remove chips, dirt and dust from body surface.

(2) Clean body wall surface and upper surface of adhesive layer with a solvent such as alcohol or white gasoline.

3) Cleaning glass:

(1) Remove dirt and dust from surface of glass to be adhered.

(2) Clean surface of glass to be adhered with alcohol or white gasoline.

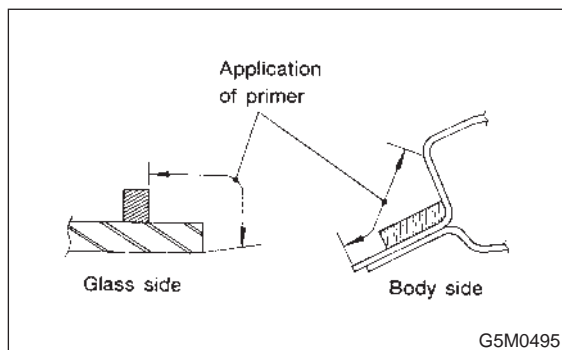
4) Application of primer:

(1) Using a sponge, apply primer to surface of glass to be adhered.

(2) Apply primer to surface of body to be adhered.

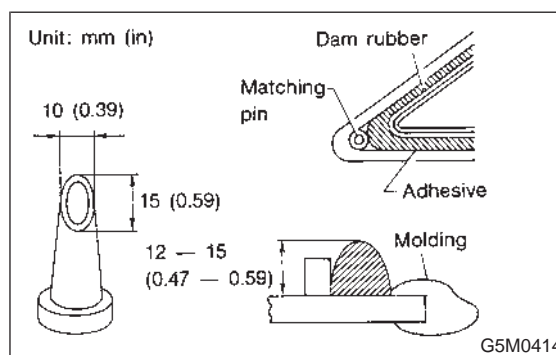
CAUTION:

- If primer has dropped on body finish, it is hard to wipe it off. So protect with masking.
- Primer must not project from black frame of glass.
- After applying primer, let it dry spontaneously for about 10 minutes.



5) Application of adhesive:

(1) Cut nozzle tip as shown in figure.



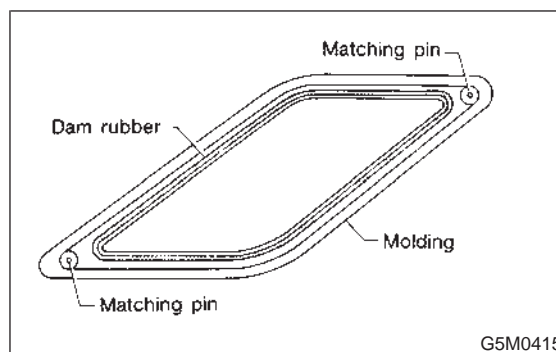
(2) Open cartridge and put it into a gun with nozzle attached.

(3) Apply adhesive uniformly to all sides of adhesion surface while operating gun along glass end face.

6) Installation of glass:

(1) Hold glass with rubber suction cups.

(2) Mount glass on body with matching pin aligned.



(3) Stick them fast by pressing all sides lightly.

7) Water leakage test:

After installing glass, test for water leakage after about one hour.

CAUTION:

- Move vehicle slowly.
- When opening and closing door, lower door glass and move door gently.
- Do not squirt strong hose stream on vehicle.

8) Spontaneous drying:

After completing all operations, leave vehicle alone for 24 hours.

CAUTION:

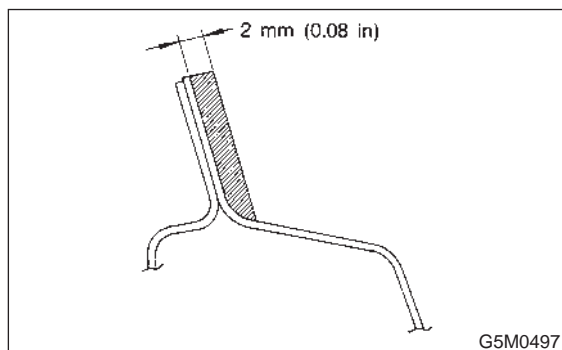
When delivering vehicle to user, tell him or her that vehicle should not be subjected to heavy shocks for at least three days.

2. COUPE MODEL

1) Finish surface of adhesive layer on body: Using a putty knife, etc., cut layer of adhesive stick firmly to body and finish it into a smooth surface of about 2 mm (0.08 in) in thickness.

CAUTION:

Be careful not to damage body finish.



2) Cleaning of body surface:

- (1) Remove chips, dirt and dust from body surface.
- (2) Clean body wall surface and upper surface of adhesive layer with a solvent such as alcohol or white gasoline.

3) Cleaning glass:

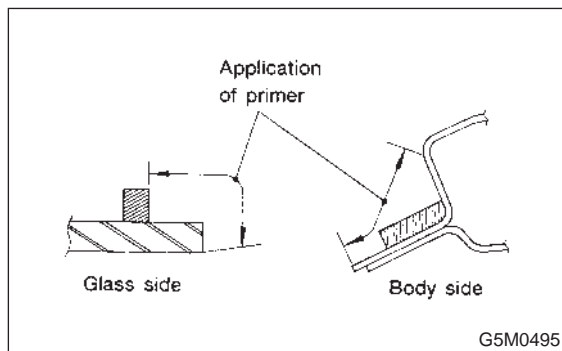
- (1) Remove dirt and dust from surface of glass to be adhered.
- (2) Clean surface of glass to be adhered with alcohol or white gasoline.

4) Application of primer:

- (1) Using a sponge, apply primer to surface of glass to be adhered.
- (2) Apply primer to surface of body to be adhered.

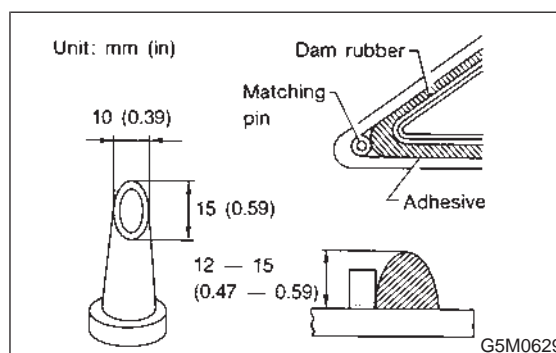
CAUTION:

- If primer has dropped on body finish, it is hard to wipe it off. So protect with masking.
- Primer must not project from black frame of glass.
- After applying primer, let it dry spontaneously for about 10 minutes.



5) Application of adhesive:

- (1) Cut nozzle tip as shown in figure.

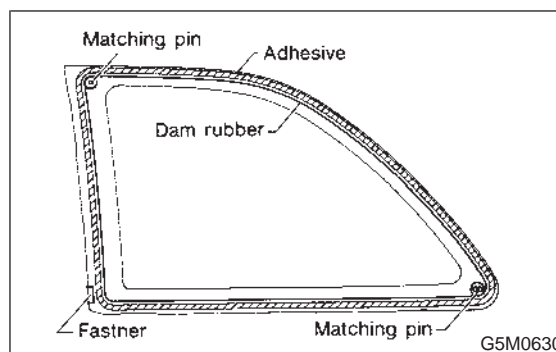


(2) Open cartridge and put it into a gun with nozzle attached.

(3) Apply adhesive uniformly to all sides of adhesion surface while operating gun along glass end face.

6) Installation of glass:

- (1) Hold glass with rubber suction cups.
- (2) Mount glass on body with matching pin aligned.



(3) Stick them fast by pressing all sides lightly.

7) Water leakage test:

After installing glass, test for water leakage after about one hour.

CAUTION:

- Move vehicle slowly.
- When opening and closing door, lower door glass and move door gently.
- Do not squirt strong hose stream on vehicle.

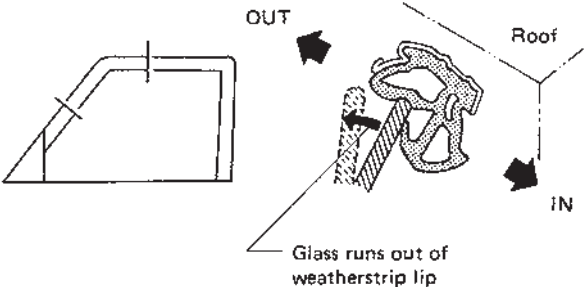
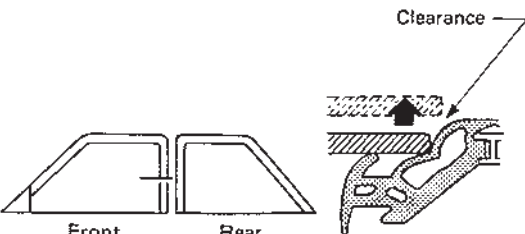
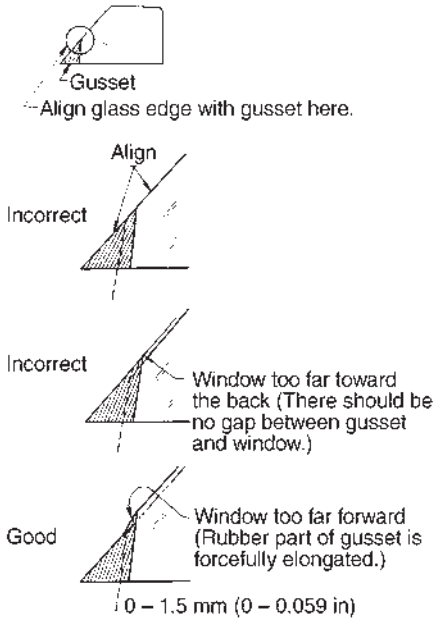
8) Spontaneous drying:

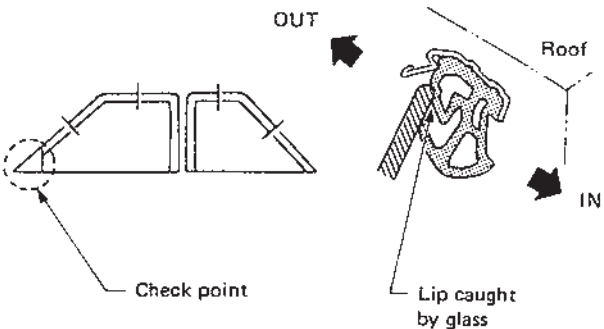
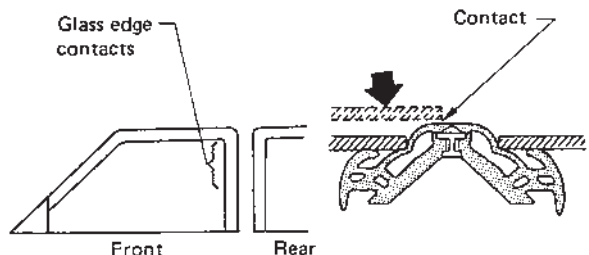
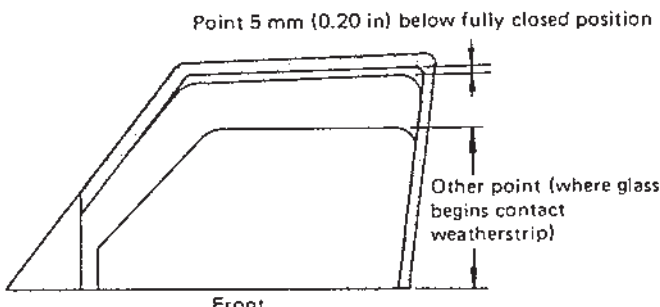
After completing all operations, leave vehicle alone for 24 hours.

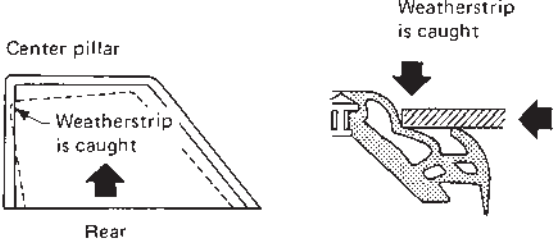
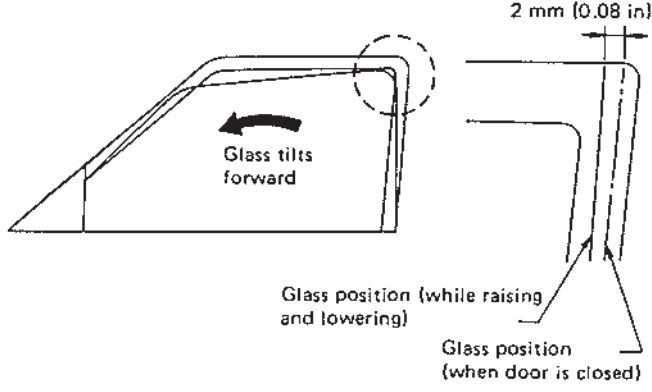
CAUTION:

When delivering vehicle to user, tell him or her that vehicle should not be subjected to heavy shocks for at least three days.

1. Door Glass

	Condition	Apparent cause/Correction
Glass in fully closed position	<p>1) Glass runs out of weatherstrip lip when considerable hand pressure is applied to it from inside.</p>  <p style="text-align: right;">G5M0502</p> <p>(This condition may cause wind/booming noise during high- speed operation.)</p>	<ul style="list-style-type: none"> ● Insufficient upward travel of glass Increase upward travel of glass.
	<p>2) Clearance exists between glass and weatherstrip when light hand pressure is applied to it at center and rear pillar locations.</p>  <p style="text-align: right;">G5M0503</p> <p>(This condition may cause wind noise and/or water leakage.)</p>	<ul style="list-style-type: none"> ● Insufficient glass-to-door weatherstrip contact Check stabilizer and glass for proper contact. Increase contact using upper sash adjustment bolt. ● Insufficient glass-to-door weatherstrip contact Check stabilizer and glass for proper contact. Increase contact using upper sash adjustment bolt.
	<p>3) Adjust door glass so that it is aligned with door rearview mirror gusset</p>  <p style="text-align: right;">H5M0672A</p>	<ul style="list-style-type: none"> ● Window is not properly adjusted in up-down/fore-aft direction. Adjust window. If necessary, move "B" channel for regulator to eliminate window "tilt". ● Gusset is not properly adjusted in fore-aft direction. Adjust gusset after loosening all bolts and nuts with tightening it.

	Condition	Apparent cause/Correction
Door in fully closed/ open position	<p>1) Glass rides over weatherstrip lip when door is closed.</p>  <p style="text-align: right;">G5M0505</p> <p>(This condition increases wind/booming noise, leakage and/or effort required to close door.)</p>	<ul style="list-style-type: none"> Improper up-down and in-out glass alignments <p>Adjust glass for up-down and in-out alignments (incl. rear sash, upper stopper adjustment, etc.). If necessary, correct glass tilt by moving regulator "B" channel.</p>
	<p>2) Edge of glass contacts retainer when door is fully closed.</p>  <p style="text-align: right;">G5M0506</p>	<ul style="list-style-type: none"> Improper glass-to-center pillar weatherstrip or excessive glass contact to weatherstrip <p>Excessive adjusting in contact to weatherstrip causes rear edge of glass to tilt inboard closer to center pillar. Adjust rear sash adjustment bolt to reduce glass contact to weatherstrip.</p>
Raise or lower window glass	<p>1) Considerable effort or time is required to operate regulator. Standard operating effort:</p> <ul style="list-style-type: none"> Entire up-down travel except for point 5 mm (0.20 in) below fully closed position: 29.4 N (3.0 kg, 6.6 lb) Point 5 mm (0.20 in) below fully closed position: 45.0 N (4.5 kg, 10.12 lb)  <p style="text-align: right;">G5M0507</p>	<ul style="list-style-type: none"> Sliding resistance increased due to high stabilizer-to-glass contact pressure High glass-to-windshield contact pressure Unequal contact adjustment stroke between front and rear sashes Tilt of rear sash adjustment bolt mounting bracket <p>Reduce contact by mounting inner stabilizer to inside of the car. Reduce contact using upper sash adjustment bolt. Set to equal stroke. Correct tilt of bracket so it is parallel to inner panel.</p>

	Condition	Apparent cause/Correction
Raise or lower window glass	2) Center pillar weatherstrip is caught by rear window glass when glass is raised.  <p style="text-align: right;">G5M0508</p>	<ul style="list-style-type: none"> Improper fore-aft or in-out alignment of window glass Lower regulator "B" channel to tilt window glass back.
	3) Glass tilts forward by more than 2 mm (0.08 in).  <p style="text-align: right;">G5M0509</p> <p>(Excessive tilt of glass forward is due to excessive glass "contact" which causes reaction of center pillar weatherstrip.) Glass can be tilted forward due to increase in reaction of shoulder weatherstrip or free play between sash and roller. Taking these symptoms into account, glass should be aligned.</p>	<ul style="list-style-type: none"> Excessive glass contact pressure or improper in-out alignment 1) Lower regulator "B" channel to tilt glass rearward. 2) Reduce contact pressure using upper sash adjustment bolt.

2. Door Lock System

No.	Trouble	Possible cause	Remedy
1	Door cannot be opened by outer handle. (Door can be opened by inner handle.)	Disconnect outer handle rod.	Connect firmly.
2	Door cannot be opened by inner handle. (Door can be opened by outer handle.)	a. Joint of upper rod is disconnected. b. Rear door child lock lever is set to lock side.	Connect firmly. Functionally normal.
3	Door does not open when outer or inner handle is operated with inner lock knob set to unlock position.	a. Joint of lower rod is disconnected. b. Lock is not released due to improper adjustment of lower rod.	Connect firmly. Remove rod from latch. Adjust rod so that lock knob is set in "lock" position is locked.
4	Door opens even when inner lock knob is set to lock position. (Keyless locking is impossible.)	a. Lower rod joint is separated. b. Door is not locked due to improperly adjusted lower rod.	Same as a in No. 3. Same as a in No. 3.
5	Child lock lever will not come up.	a. Inner handle fails to return completely. b. Joint of upper rod is disconnected.	Refer to No. 6.
6	Inner handle stops halfway.	Contact of upper rod with inner handle mounting case.	Eliminate contact by bending upper rod properly.
7	Door cannot be locked or unlocked by key.	Joint of key lock rod is disconnected.	Connect firmly.
8	Auto door-lock switch does not act when inner lock knob is pushed.	Auto door-lock switch does not act due to improperly adjusted lower rod.	Same as a in No. 3.

3. Power Window

	Symptom			
	All windows do not move.	The window of driver side does not move.	The window of driver side does not move "AUTO" down.	The window of each passenger sides does not move.
Battery	(1)			
Fuse in fuse box	(2)			
Circuit breaker and relay	(3)			
Main switch	(4)	(1)	(1)	(1)
Sub switch of each passenger sides				(2)
Motor of driver side		(2)	(2)	
Motor of each passenger sides				(3)
Regulator assembly of each windows				(4)
Power supply line of main switch	(5)	(3)	(3)	
Ground line	(6)			
Harness and connector	(7)	(4)	(4)	(5)

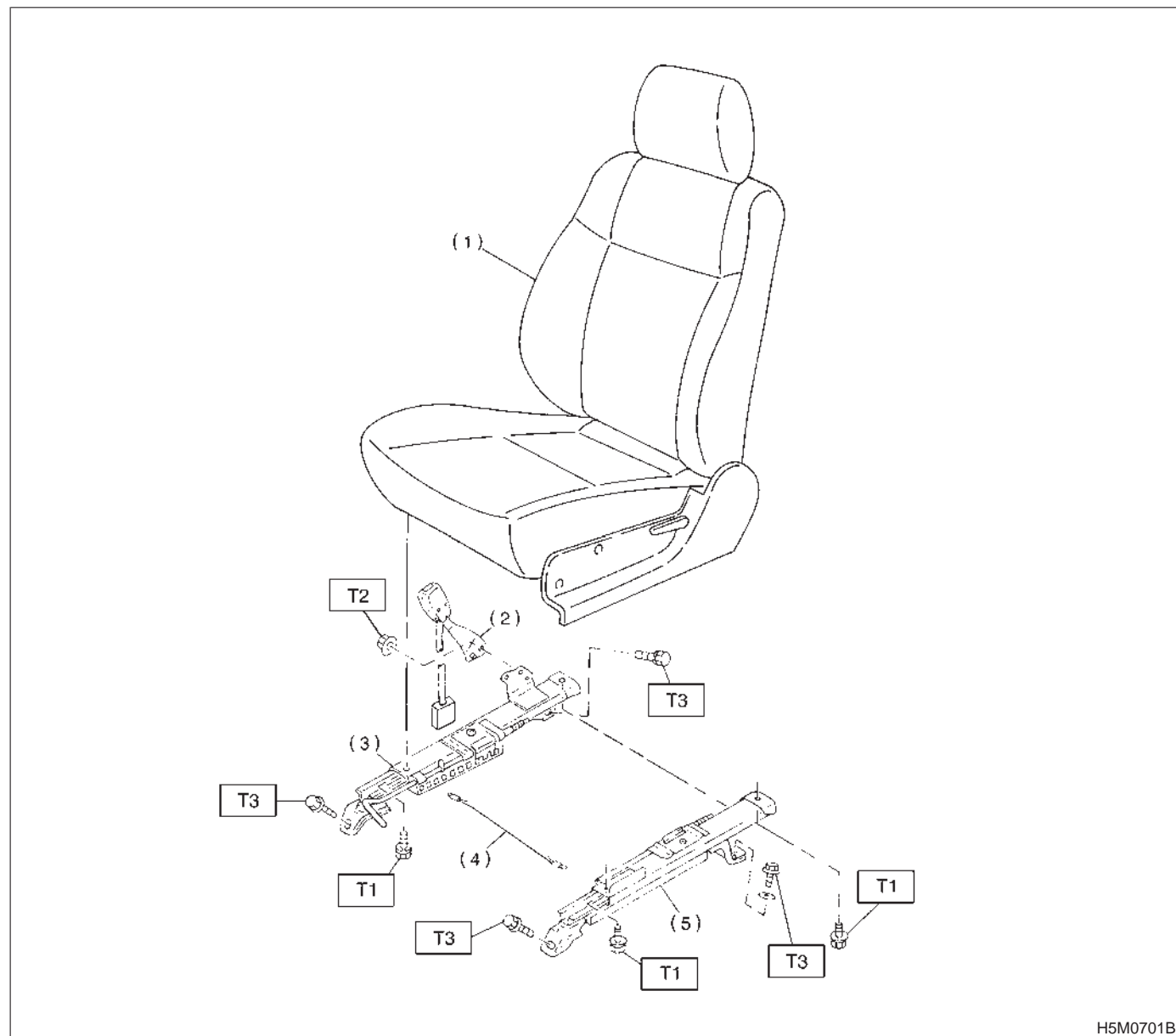
(): Figures in a parenthesis refer to diagnostics procedures.

SEAT, SEAT BELTS AND INTERIOR

5-3

	Page
C COMPONENT PARTS	2
1. Front Seat.....	2
2. Rear Seat	3
3. Front Seat Belt	5
4. Rear Seat Belt.....	6
5. Inner Accessories	7
6. Inner Trim	8
W SERVICE PROCEDURE	9
1. Front Seat.....	9
2. Rear Seat	10
3. Front Seat Belt	12
4. Rear Seat Belt.....	13
5. Inner Trim Panel.....	15

1. Front Seat



H5M0701B

- (1) Front seat ASSY
- (2) Inner belt ASSY
- (3) Inner slide rail ASSY
- (4) Connect wire

- (5) Outer slide rail ASSY

Tightening torque: N-m (kg-m, ft-lb)

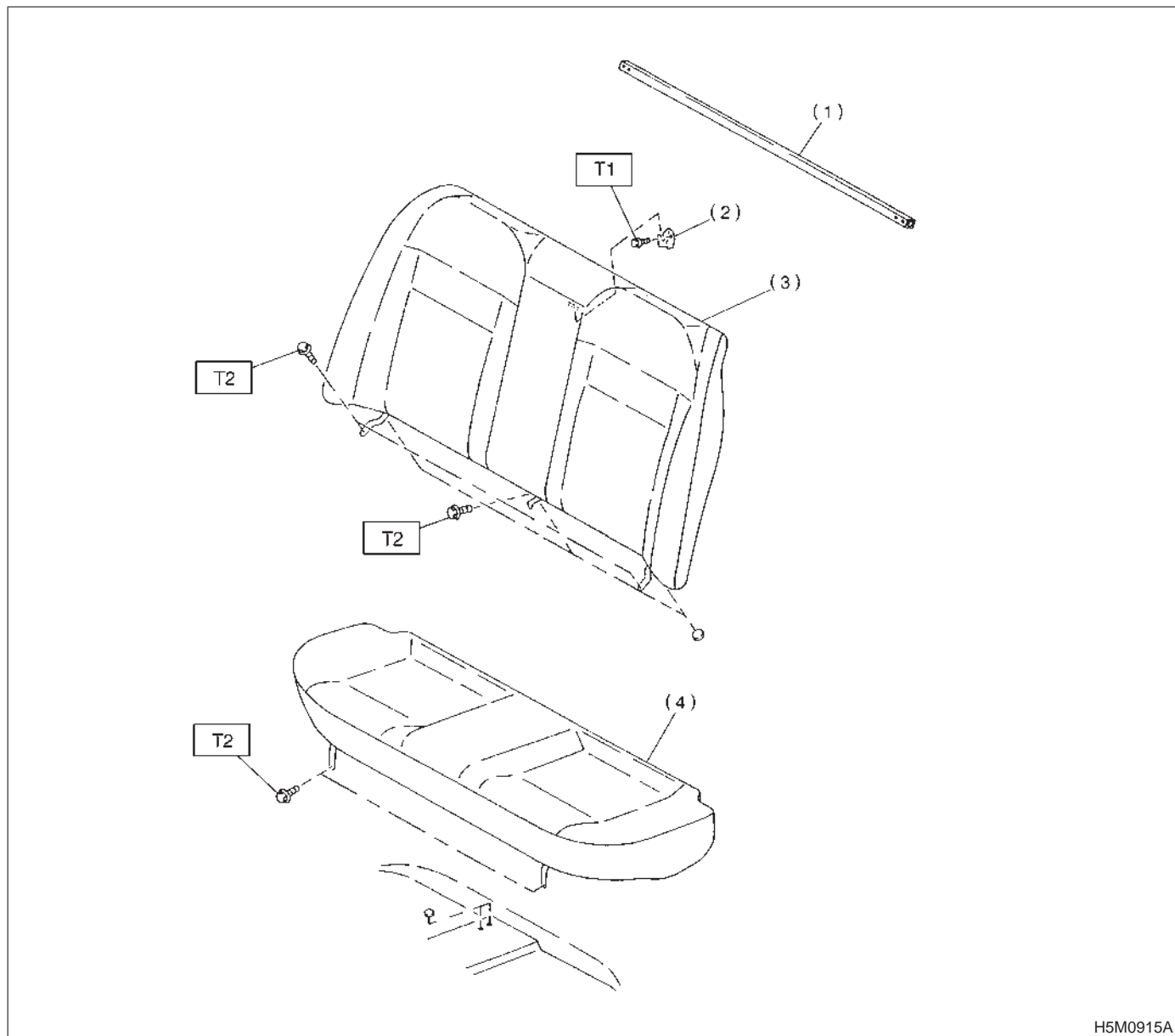
T1: 23±5 (2.3±0.5, 16.6±3.6)

T2: 29±7 (3.0±0.7, 21.7±5.1)

T3: 52±10 (5.3±1.0, 38±7)

2. Rear Seat

A: SEDAN AND COUPE MODEL



H5M0915A

- (1) Rear seat reinforcement
- (2) Hook
- (3) Backrest

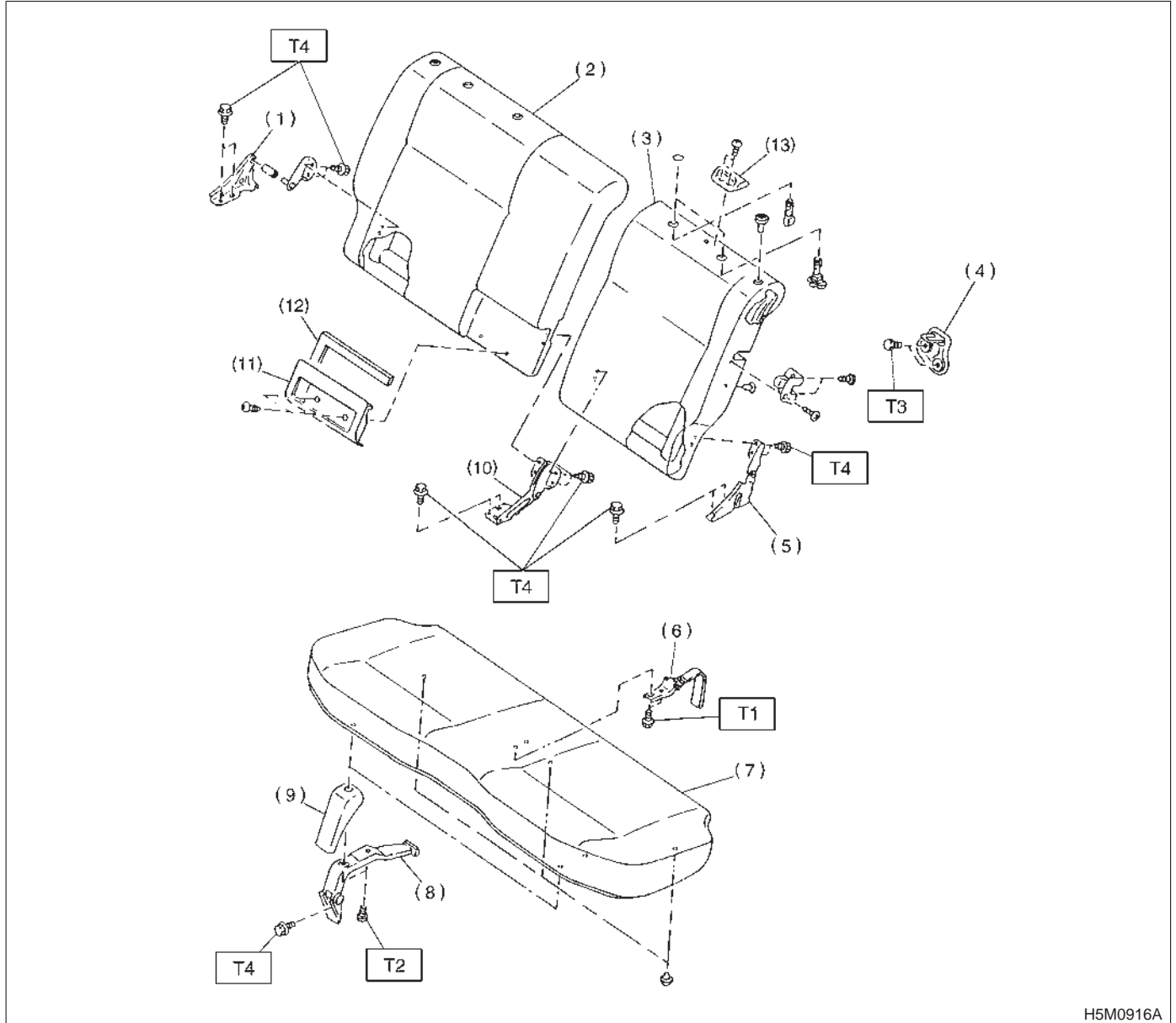
- (4) Rear cushion

Tightening torque: N·m (kg·m, ft·lb)

T1: 10±3 (1.0±0.3, 7.2±2.2)

T2: 25±7 (2.5±0.7, 18.1±5.1)

B: WAGON MODEL



H5M0916A

- | | |
|------------------------|----------------------------|
| (1) Hinge bracket (RH) | (8) Hinge |
| (2) Hinge bracket (RH) | (9) Hinge cover |
| (3) Backrest (LH) | (10) Backrest center hinge |
| (4) Striker | (11) Belt pocket |
| (5) Hinge bracket (LH) | (12) Pad ASSY pocket |
| (6) Lock hinge | (13) Hook |
| (7) Rear cushion | |

Tightening torque: N·m (kg·m, ft·lb)

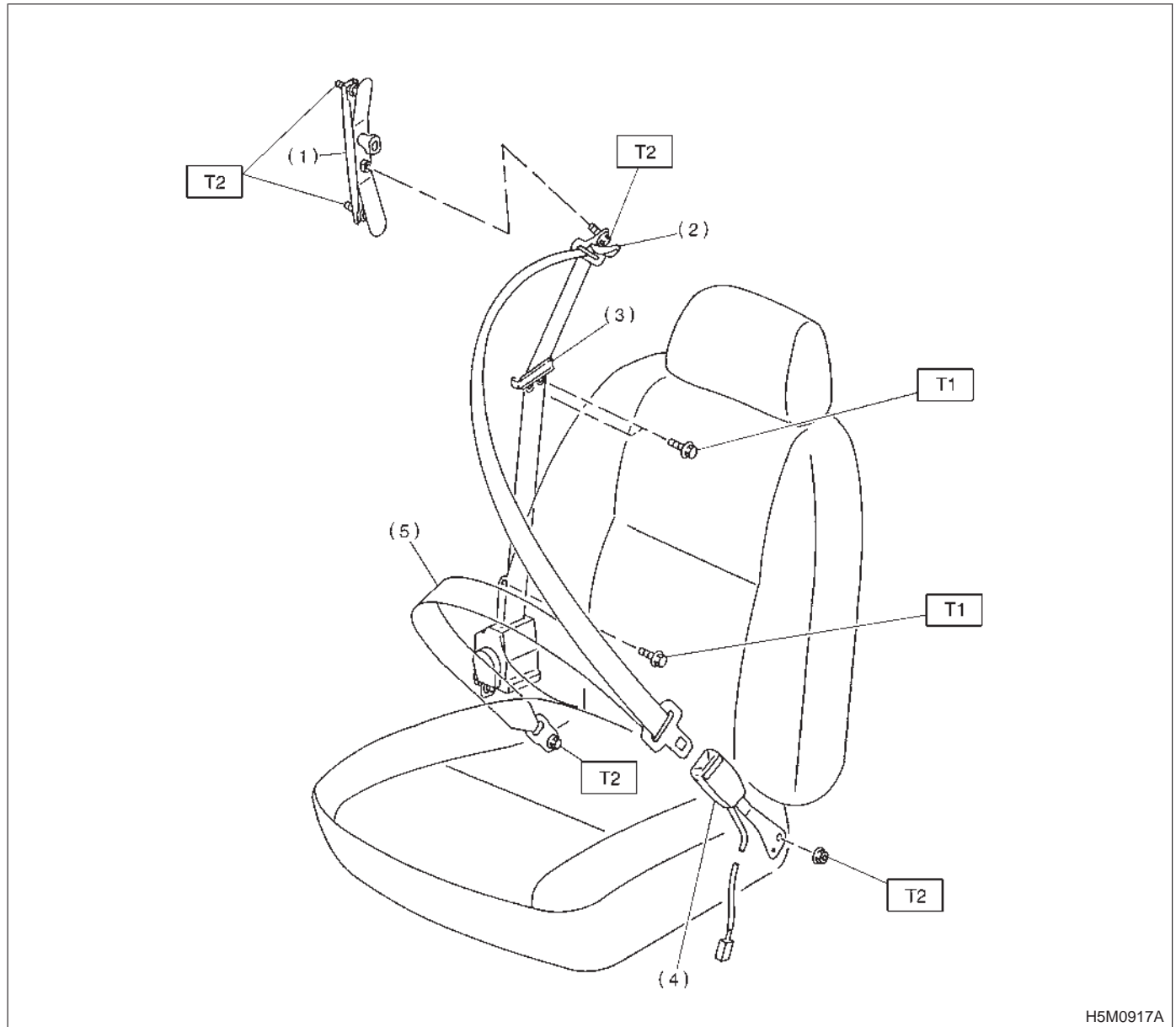
T1: 2±1 (0.2±0.1, 1.4±0.7)

T2: 5.9±1.5 (0.6±0.15, 4.3±1.1)

T3: 10±3 (1.0±0.3, 7.2±2.2)

T4: 25±7 (2.5±0.7, 18.1±5.1)

3. Front Seat Belt



- (1) Adjuster anchor ASSY
- (2) Through cover
- (3) Webbing guide
- (4) Inner belt ASSY

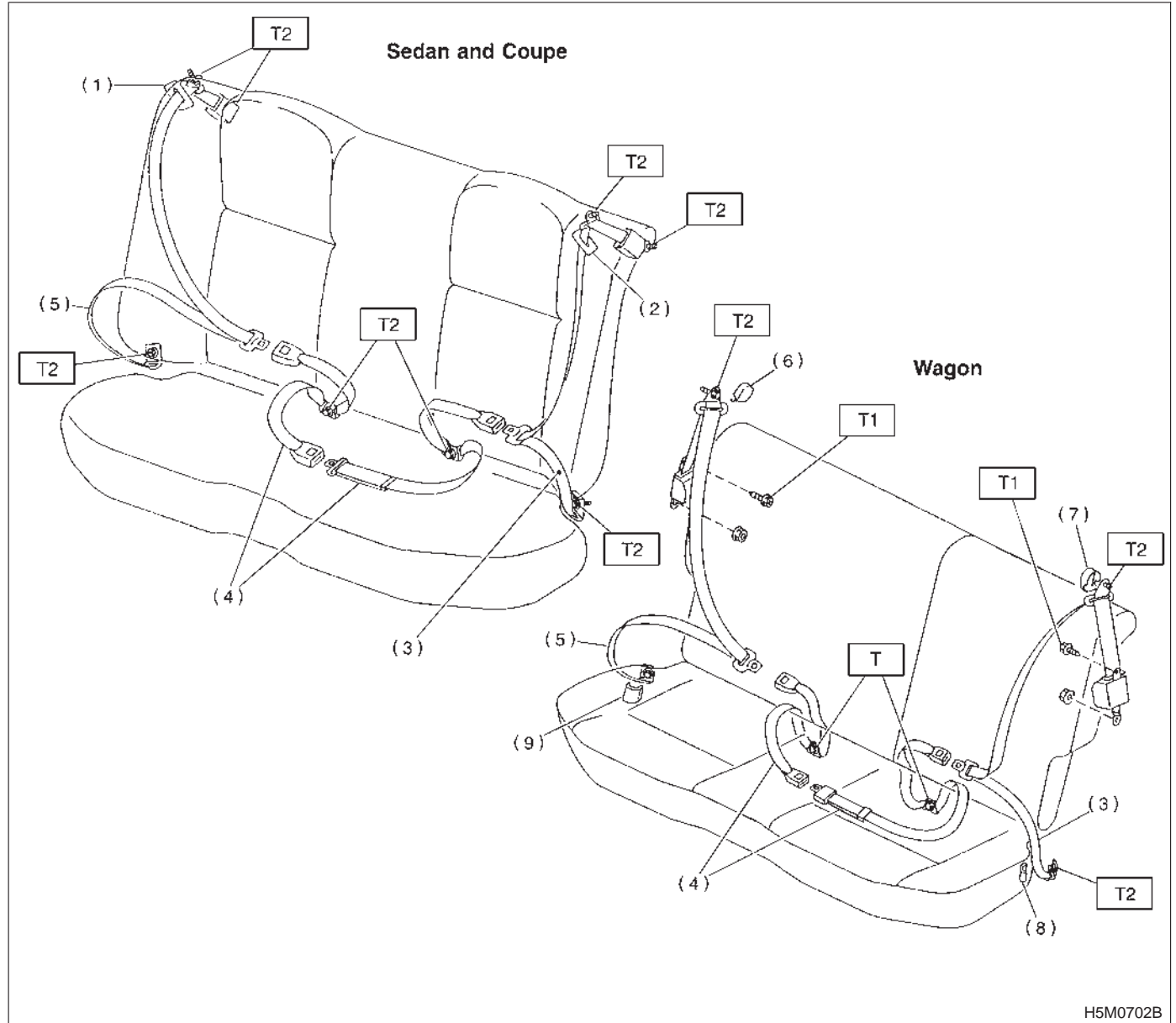
- (5) Outer belt ASSY

Tightening torque: N·m (kg·m, ft·lb)

T1: 13±3 (1.3±0.3, 9.4±2.2)

T2: 35±13 (3.6±1.3, 26±9)

4. Rear Seat Belt



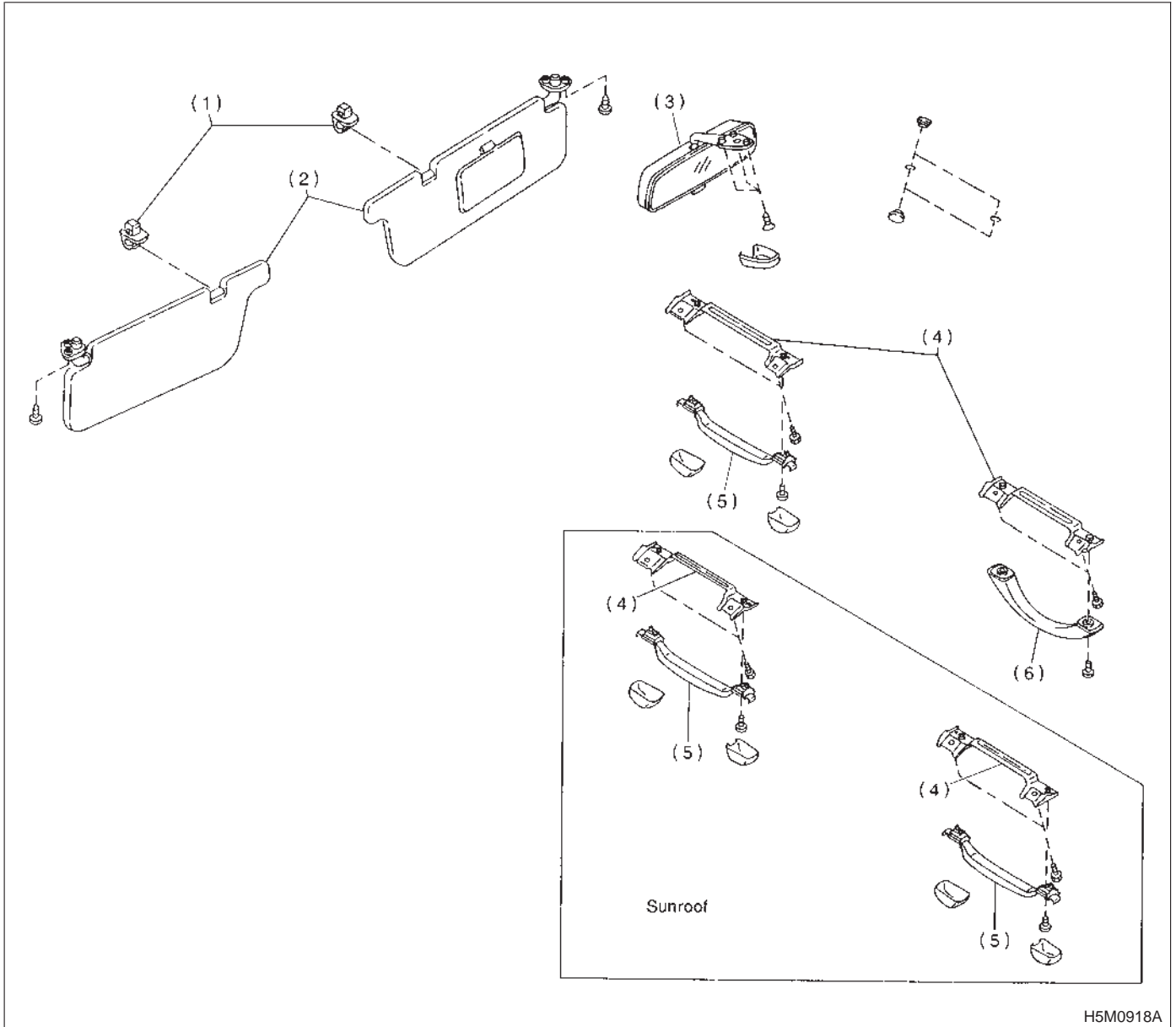
- | | |
|--------------------------|---------------------------|
| (1) Webbing cover (RH) | (6) Through cap (RH) |
| (2) Webbing cover (LH) | (7) Through cap (LH) |
| (3) Outer seat belt (LH) | (8) Lap anchor cover (LH) |
| (4) Center seat belt | (9) Lap anchor cover (RH) |
| (5) Outer seat belt (RH) | |

Tightening torque: N-m (kg-m, ft-lb)

T1: 13±3 (1.3±0.3, 9.4±2.2)

T2: 35±13 (3.6±1.3, 26±9)

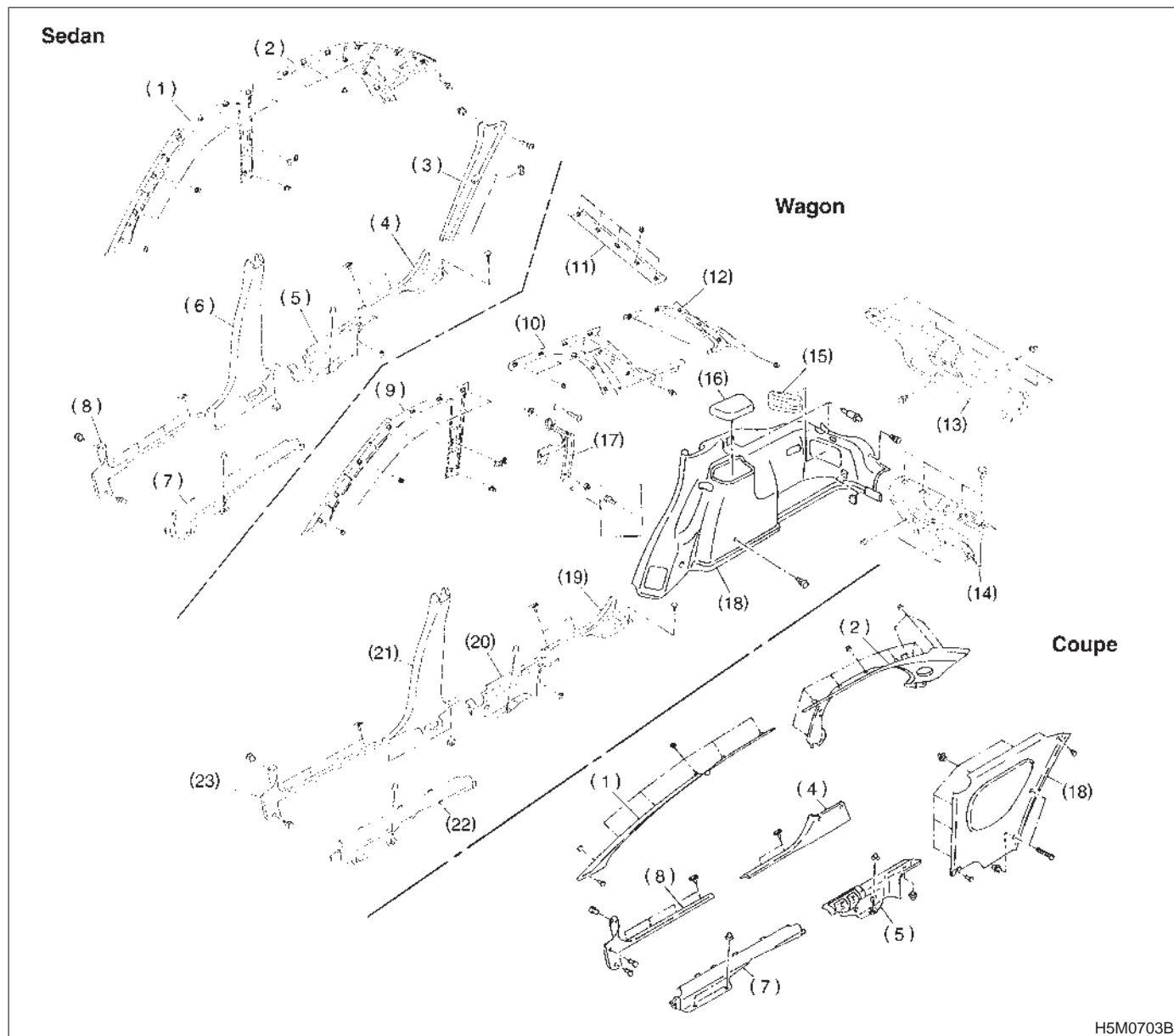
5. Inner Accessories



H5M0918A

- | | | |
|---------------|-------------------------|-------------------------------|
| (1) Hook | (3) Rearview mirror | (5) Assist grip (retractable) |
| (2) Sun visor | (4) Assist rail bracket | (6) Assist grip (fixed) |

6. Inner Trim

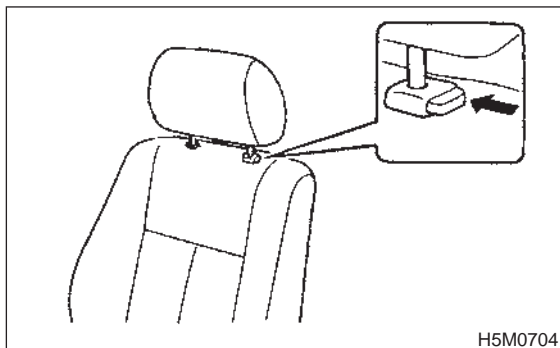


- | | | |
|---------------------------------|------------------------------------|----------------------------------|
| (1) Front pillar upper trim | (9) Front pillar upper trim | (17) Trim bracket |
| (2) Rear pillar upper trim | (10) Rear quarter upper front trim | (18) Rear quarter lower trim |
| (3) Rear pillar lower trim | (11) Rear rail trim | (19) Side sill rear upper cover |
| (4) Side sill rear upper cover | (12) Rear quarter upper rear trim | (20) Side sill rear lower cover |
| (5) Side sill rear lower cover | (13) Rear gate trim | (21) Center pillar lower trim |
| (6) Center pillar lower trim | (14) Rear skirt trim | (22) Side sill front lower cover |
| (7) Side sill front lower cover | (15) Lamp cover | (23) Front pillar lower trim |
| (8) Front pillar lower trim | (16) Cover | |

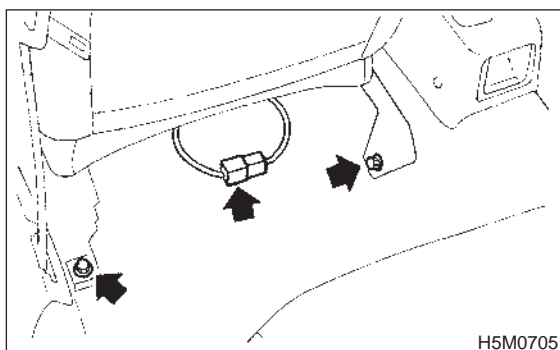
1. Front Seat

A: REMOVAL

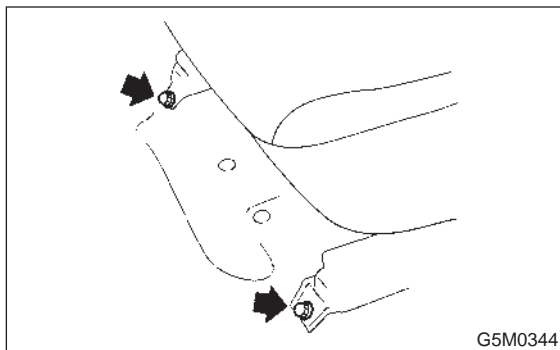
1) While operating button (located on top of backrest), lift headrest out with hand placed between backrest and headrest.



- 2) Pull reclining lever back to fold backrest all the way forward. While pulling slide adjuster lever, move seat all the way forward.
- 3) Disconnect connector under driver's seat.
- 4) Remove bolt cover at rear end of slide rail.
- 5) Remove bolts securing seat rear.



- 6) While pulling slide adjuster lever, slide seat all the way back.
- 7) Remove bolts securing front of seat.



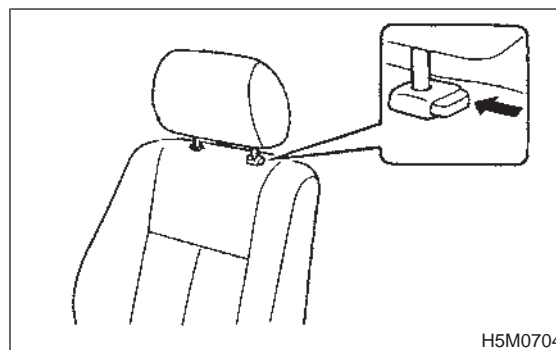
- 8) Remove front seat from vehicle.

CAUTION:

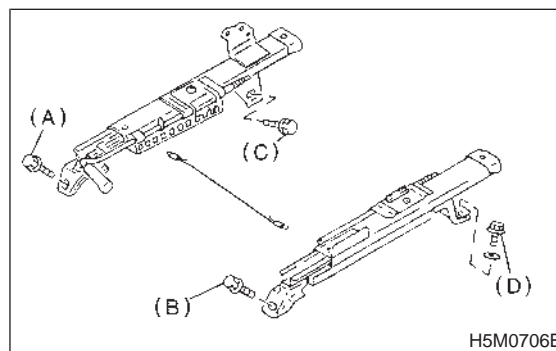
Be careful not to scratch seat when removing it from vehicle.

B: INSTALLATION

1) While operating button (located on top of backrest), lift headrest out by placing your hand between backrest and headrest.



- 2) Pull reclining lever back to fold backrest all the way forward. Pull slide adjuster lever and move lower slide rail all the way backward.
- 3) Position seat in compartment and align the holes on the seat with the holes on the car body side.
- 4) Secure the front of seat using inward and outward bolts (A) and (B) in that order.
- 5) While pulling slide adjuster lever, move seat all the way forward.
- 6) Secure the rear of seat using inward and outward bolts (C) and (D).



- 7) Connect connector under driver's seat.

CAUTION:

Check that all lock plate pawls are completely and equally inserted into the holes in the slide rail brackets.

- 8) After installation, ensure that all mechanisms operate properly and lock.
- 9) If any mechanism does not function properly, loosen bolts (C) and (D), slide seat as required, insert all lock plate pawls into holes in slide rail brackets, and tighten bolts (C) and (D) in that order.
- 10) Install bolt cover on rear end of slide rail.
- 11) Install headrest on backrest.

NOTE:

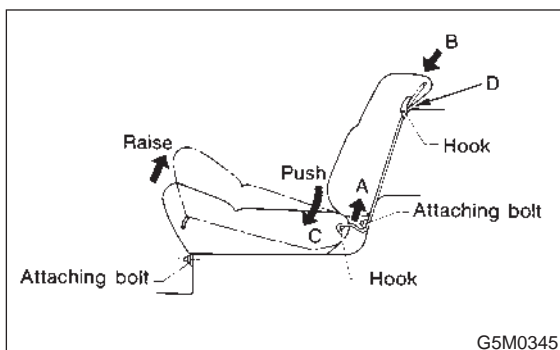
Tighten bolts in the designated order.

2. Rear Seat

A: REMOVAL

1. SEDAN AND COUPE MODEL

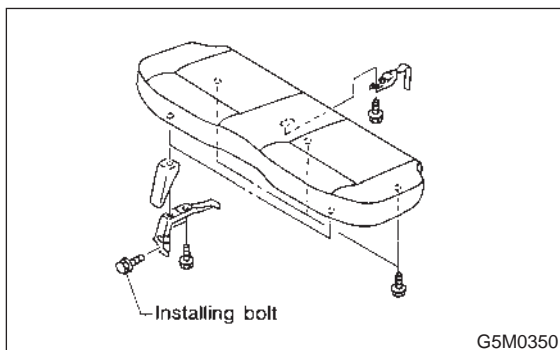
- 1) Remove bolts securing hinges (located at front of cushion) to body.
- 2) Slightly raise front of cushion while pushing down on cushion in the direction of "C". With cushion held in that position, move it forward until it is unhooked.



- 3) Remove bolts securing lower portion of backrest to body.
- 4) Lift rear seat backrest in direction "A" until it is released from upper hooks.

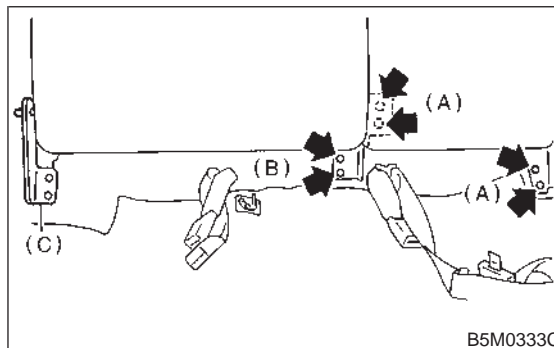
2. WAGON MODEL

- 1) Remove bolts securing hinges (located at front of seat) to body.



- 2) Pull strap (located in middle rear portion of cushion) to release lock. Lift cushion out and away from body.
- 3) Pull knobs (located at each side of backrest's upper portion) up to release lock, and fold backrest all the way forward.

- 4) Remove the bolt and then remove backrest (LH side).
- 5) Remove the bolt and then remove backrest (RH side) from hinge bracket.

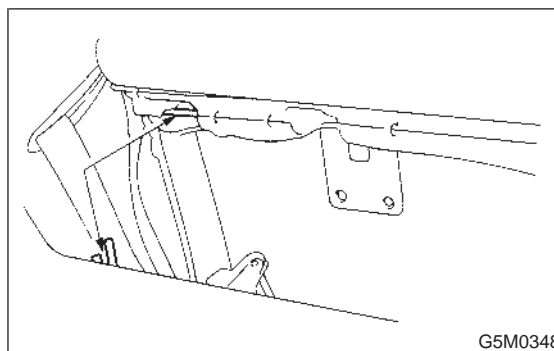


- (A) Bolt (LH side)
(B) Bolt (Rh side)
(C) Hinge bracket

B: INSTALLATION

1. SEDAN AND COUPE MODEL

- 1) Before installing backrest, ensure that trim panel, insulator and seat belt are properly installed.
- 2) Transfer outer seat belt webbing to front of backrest and fold backrest forward. Attach seat belt webbing to upper hooks (2 places), and move pillow in the direction of "B" until backrest is aligned with lower mounting holes in body.

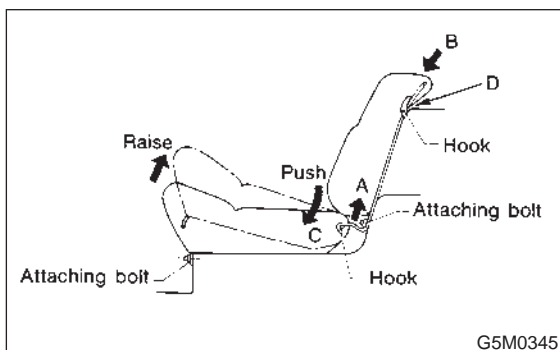


- 3) Secure lower center and both sides of backrest to body with bolts.

- 4) Slightly raise front section of cushion while pushing down on cushion in the direction of "C". With cushion held in that position, attach rear section of cushion to hooks at lower frame location.
- 5) Secure front of cushion to body with bolts.

CAUTION:

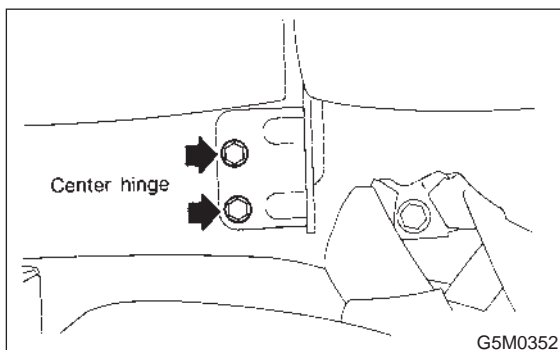
- Before installing seat, ensure that seat belt is placed on cushion.
- Confirm that winding of three-point type seat belt can operate regularly.



G5M0345

2. WAGON MODEL

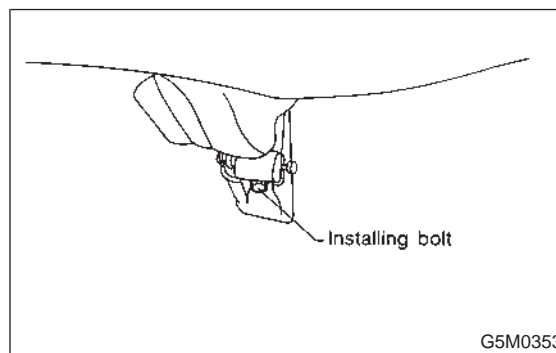
- 1) Install hinge bracket to body.
- 2) Insert right backrest hinge pin into hole in bracket. Tilt backrest backward until striker engages with lock.
- 3) Secure right backrest center hinge to body using a bolt.



G5M0352

- 4) Temporarily install left backrest side hinge to body using a bolt, and fold backrest forward to the floor.
- 5) Roll up mat (located at rear of left backrest), and install center hinge using a bolt.
- 6) Tilt left backrest until striker engages with lock, and tighten bolt.

- 7) Install hinges to front of cushion and tighten with bolts. Check that lock properly engages.



G5M0353

- 8) Fold backrest onto cushion and overlap trunk mat and mat at rear of backrest.

CAUTION:

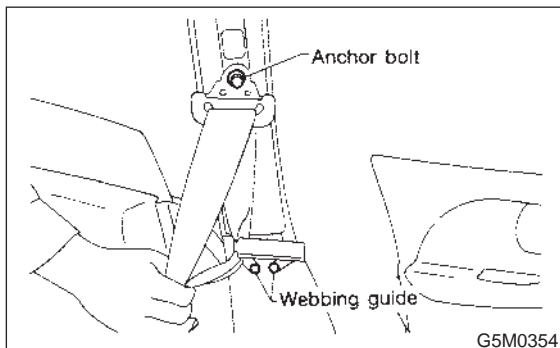
- Do not allow center seat belt to get under cushion when folding cushion.
- Ensure that side seat belt tongue is free from cushion and trim panel.
- Lift front of cushion to ensure that cushion is properly locked.

3. Front Seat Belt

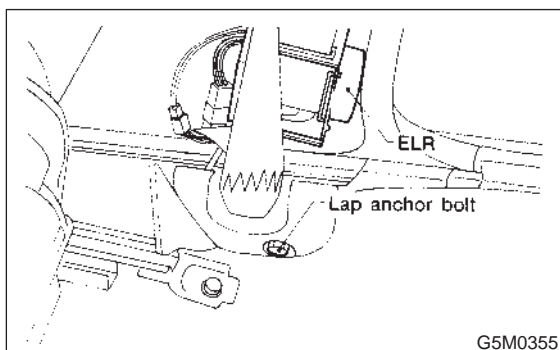
A: REMOVAL AND INSTALLATION

1. OUTER BELT (sedan and wagon)

- 1) Remove through-anchor cover cap.
- 2) Remove shoulder anchor bolt.
- 3) Remove webbing guide.



- 4) Remove center lower pillar trim panel.
- 5) Remove front cover side plate.
- 6) Roll up floor mat at the bottom of center pillar.
- 7) Remove lap anchor bolt.



- 8) Remove belt retractor and outer belt.
- 9) Installation is in the reverse order of removal.

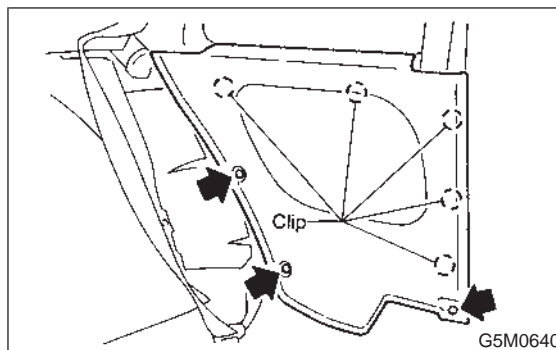
CAUTION:

- The left and right ELR's are not mutually interchangeable because different sensors are used.
- Be careful not to twist belts during installation.

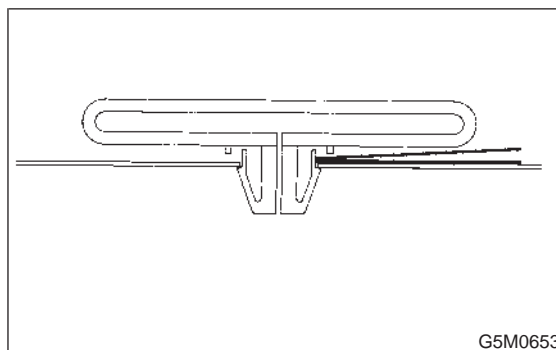
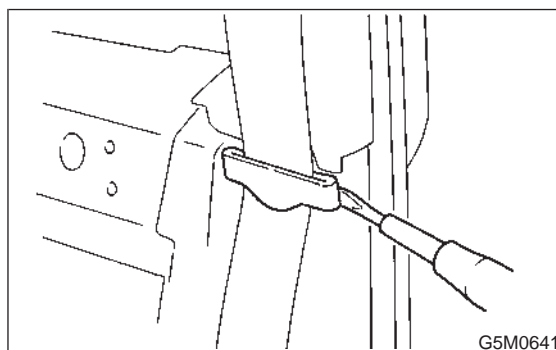
2. OUTER BELT (coupe)

- 1) Remove rear seat cushion and backrest.
<Ref. to 5-3 [W2A1].>

- 2) Remove rear quarter trim.



- 3) Remove webbing guide.

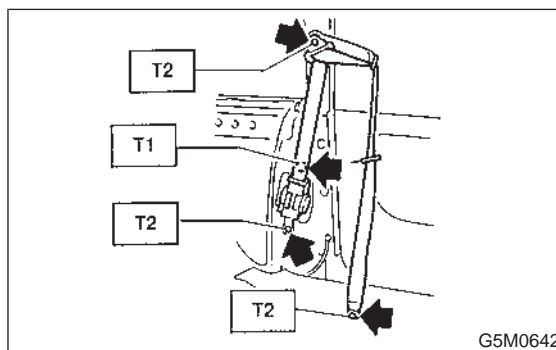


- 4) Remove anchor cover cap.
- 5) Remove four bolts and then belt retractor and outer belt. Tightening torque:
- 6) Installation is in the reverse order of removal.

Tightening torque:

T1: 13±3 N·m (1.3±0.3 kg-m, 9.4±2.2 ft-lb)

T2: 35±13 N·m (3.6±1.3 kg-m, 26±9 ft-lb)

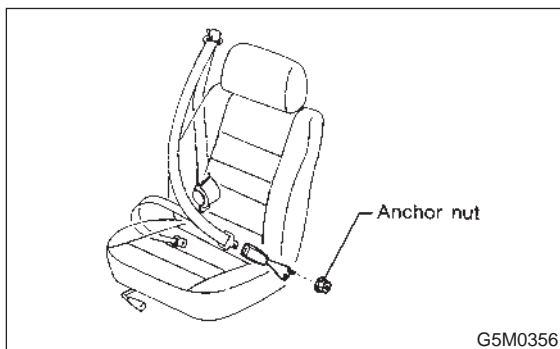


CAUTION:

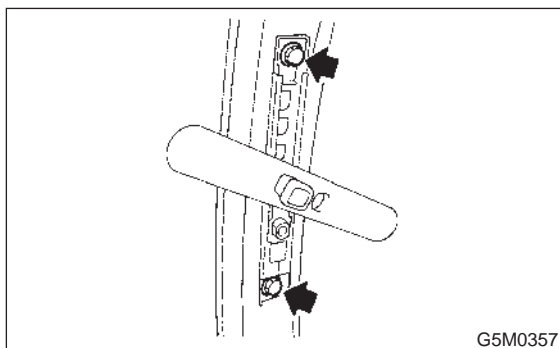
- The left and right ELR's are not mutually interchangeable because different sensors are used.
- Be careful not to twist belts during installation.

3. INNER BELT

Remove anchor nut.

**4. ADJUSTABLE SHOULDER ANCHOR**

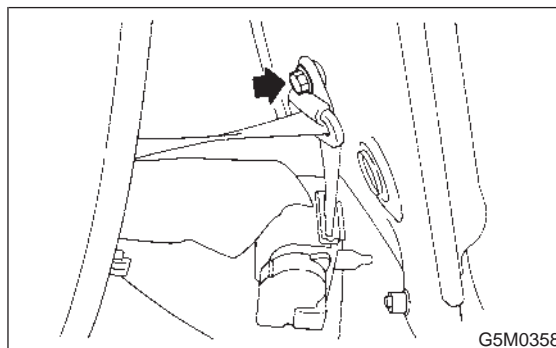
- 1) Remove shoulder anchor bolt.
- 2) Remove lower center pillar trim.
- 3) Remove front and front pillar trim panel.
- 4) Remove adjustable shoulder anchor assembly.



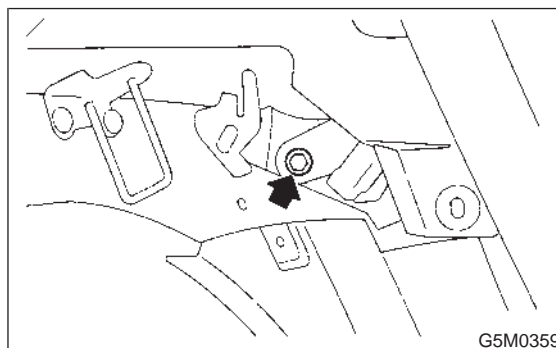
- 5) Installation is in the reverse order of removal.

4. Rear Seat Belt**A: REMOVAL AND INSTALLATION****1. SEDAN AND COUPE MODEL**

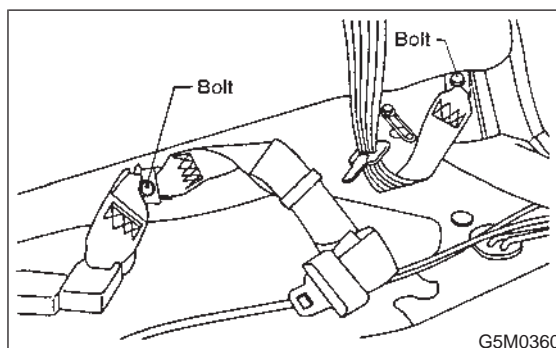
- 1) Remove rear cushion from body.
- 2) Remove rear backrest from body.
- 3) Remove screw from lower side of rear quarter trim, and lift-up lower side of rear quarter trim.
- 4) Remove trim panel rear bracket upper.
- 5) Remove rear quarter trim.
- 6) Remove outer anchor bolts.



- 7) Remove rear bolt from ELR.



- 8) Remove belt from outlet in rear quarter along slit.
- 9) Remove inner bolts which secure outer seat.
- 10) Remove washer from bolt, then remove bolt, belt assembly, and anchor plate bracket.
- 11) Remove inner bolts (2 places) from center seat.



- 12) Remove washer from bolt, and remove bolt, belt assembly and anchor plate bracket.

4. Rear Seat Belt

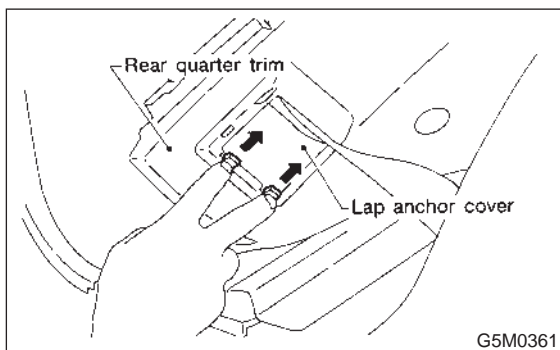
13) Installation is in the reverse order of removal. Ensure that seat belt is properly reeled on and off after installation of ELR.

CAUTION:

- Be extremely careful not to confuse center seat anchor plate with outer seat anchor plate during installation.
- Ensure that seat belts are free from twisting after installation.
- Ensure that tongues, buckles and belts are properly placed on seat.

2. WAGON MODEL

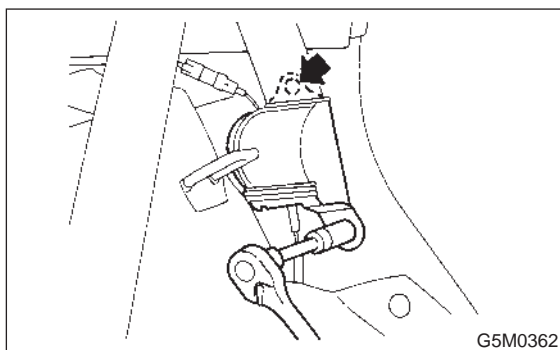
- 1) Raise rear cushion.
- 2) Remove rear backrest from body.
- 3) Remove shoulder anchor cover and anchor bolt.
- 4) Remove lower portion of rear quarter trim.
- 5) Remove lap anchor cover and bolt.



- 6) Remove 7/16-20 UNF nuts which secure ELR and remove ELR.

CAUTION:

Remove outer seat belt and center seat belt in similar manner used to remove those from Sedan.



- 7) Installation is in the reverse order of removal. Ensure that seat belt is properly reeled on and off after installation of ELR.

CAUTION:

- Be extremely careful not to confuse center seat anchor plate with outer seat anchor plate during installation.

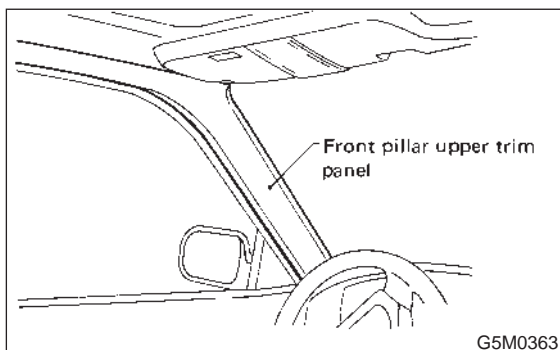
- Ensure that seat belts are free from twisting after installation.
- Ensure that tongues, buckles and belts are properly placed on seat.

5. Inner Trim Panel

A: REMOVAL AND INSTALLATION

1. FRONT PILLAR UPPER TRIM PANEL

- 1) Remove center pillar lower trim panel.
- 2) Remove seat belt anchor bolts.
- 3) Pry pawls off body flange of front pillar upper trim panel using screwdriver.
- 4) Remove clips which hold front pillar upper trim panel, and lift trim panel out by moving it toward the compartment.



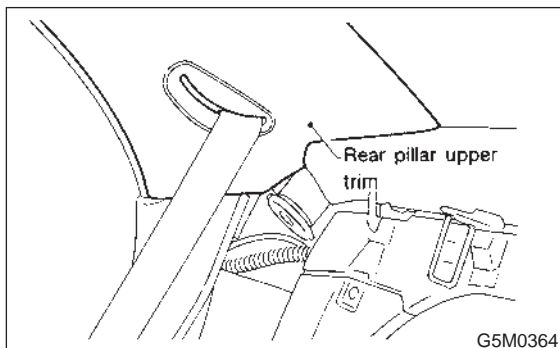
- 5) Installation is in the reverse order of removal.

CAUTION:

Be sure to securely hook pawls of front pillar upper trim panel on body flange.

2. REAR PILLAR UPPER TRIM PANEL (SEDAN)

- 1) Remove rear seat cushion and backrest.
- 2) Remove tapping screw from rear pillar lower trim panel, and remove trim panel by sliding it forward.
- 3) Remove front pillar upper trim end.
- 4) Pry the pawl off front end using screwdriver.
- 5) Remove clips which hold rear pillar upper trim, and remove trim panel by sliding it forward.



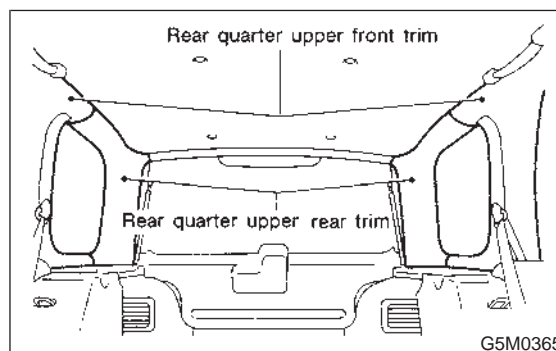
- 6) Installation is in the reverse order of removal.

CAUTION:

Be sure to securely hook pawls of rear pillar upper trim panel on body flange.

3. REAR QUARTER PILLAR UPPER TRIM PANEL (WAGON)

- 1) Set rear seat cushion up.
- 2) Remove rear seat backrest.
- 3) Remove rear quarter lower trim.
- 4) Remove rear rail trim.
- 5) Remove rear quarter upper front trim.
- 6) Remove rear quarter upper rear trim.



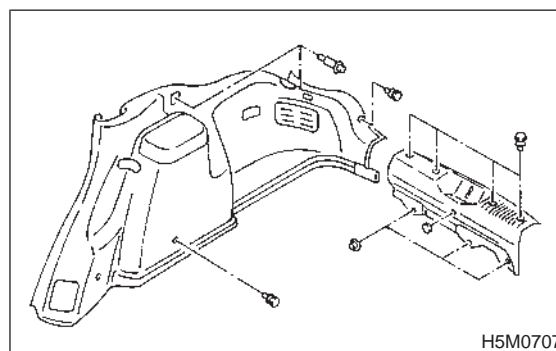
- 7) Installation is in the reverse order of removal.

CAUTION:

Be sure to securely hook pawls of rear quarter pillar trim panel on body flange.

4. REAR QUARTER LOWER TRIM PANEL (WAGON)

- 1) Remove luggage cover.
- 2) Set rear seat cushion up.
- 3) Remove rear seat backrest.
- 4) Remove rear skirt trim.
- 5) Remove clip and screw then disconnect connector (RH side).
- 6) Remove rear seat belt lower anchor then remove rear quarter lower trim.



- 7) Installation is in the reverse order of removal.

CAUTION:

Be careful not to ride trim panel over harness, insulators, etc.

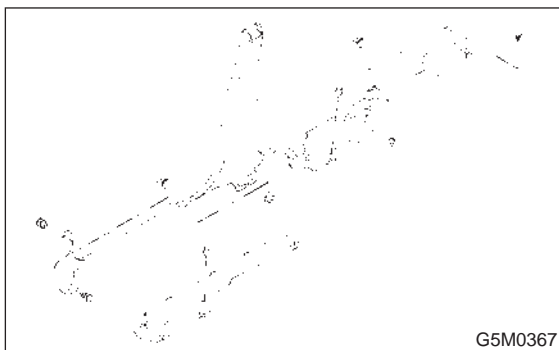
5. FLOOR MAT **AIRBAG**

Supplemental Restraint System "Airbag" Airbag system wiring harness is routed near floor mat.

CAUTION:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage Airbag system wiring harness when servicing floor mat.

- 1) Remove front seats.
- 2) Remove rear seat cushion.
- 3) Remove center tray, indicator cover, cover assembly, and console box, depending on the specifications.
- 4) Remove front pillar lower trim panel.
- 5) Remove center pillar lower trim panel.
- 6) Remove three clips under rear seat cushion.
- 7) Remove rear cover side plate and rear pillar lower trim.
- 8) Pull out edge in the groove of side sill cover.



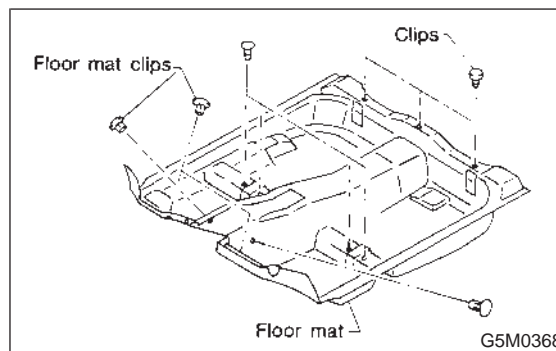
G5M0367

- 9) Remove four clips under front seat.
- 10) Remove four clips in toe board area.

NOTE:

When pulling out edge, do not pull mat alone; pull mat together with edge. Pry off two steel clips on side sill front cover and one on side sill rear cover using screwdriver.

- 11) Remove mat hook.
- 12) Remove mat from toe board area.



G5M0368

- 13) Remove mat from heater unit.
- 14) Roll mat, and take it out of opened rear door.
- 15) Installation is in the reverse order of removal.

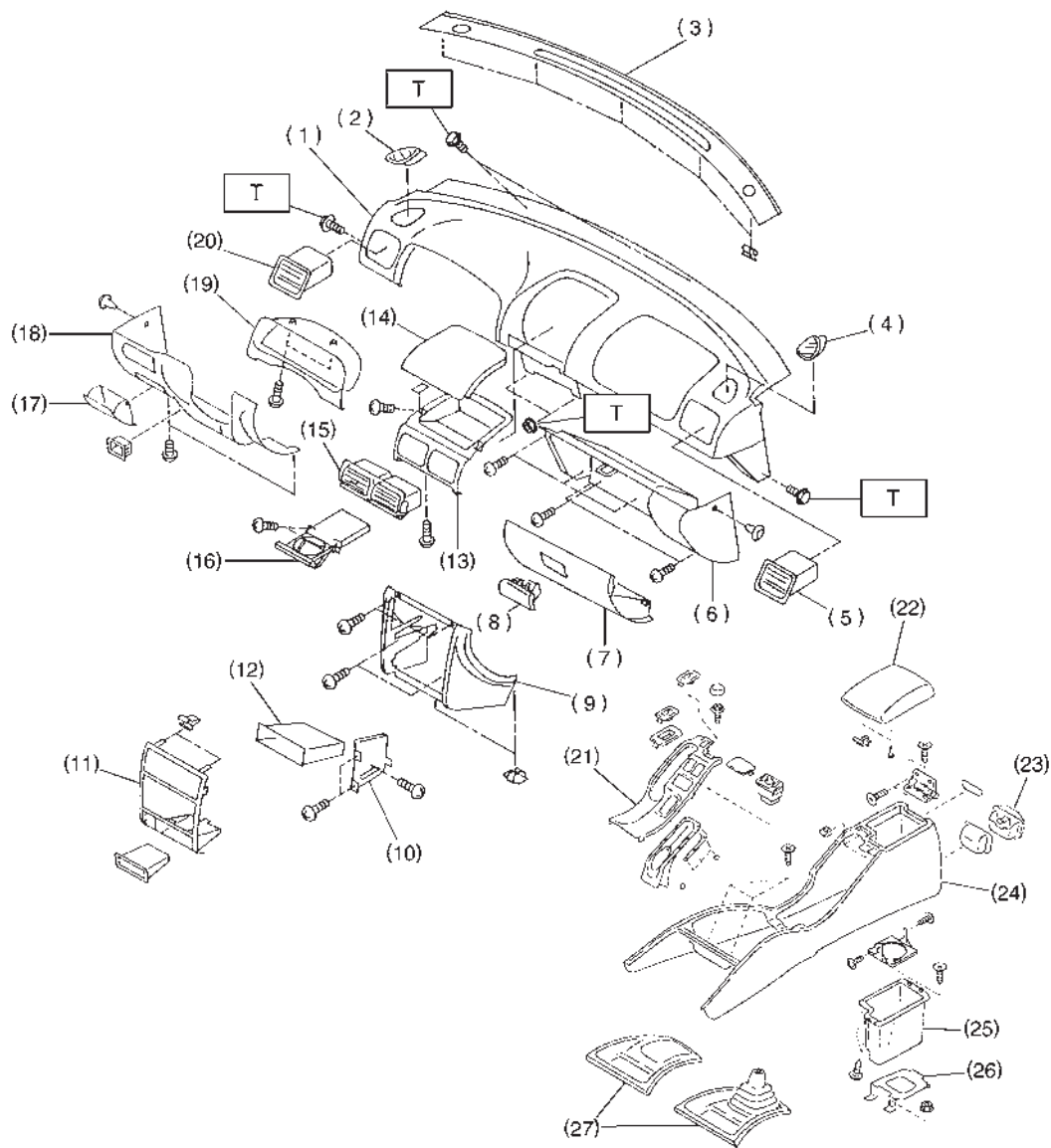
NOTE:

- Secure mat firmly with hook and velcro tape.
- Insert mat edge firmly into the groove of side sill cover.

INSTRUMENT PANEL **5-4**

	Page
C COMPONENT PARTS	2
1. Instrument Panel	2
W SERVICE PROCEDURE	3
1. Instrument Panel AIRBAG	3

1. Instrument Panel



H5M0931A

- | | | |
|-------------------------------------|------------------------|------------------------|
| (1) Pad & frame | (12) Pocket | (23) Ash tray |
| (2) Grille side (D) | (13) Panel center | (24) Console box |
| (3) Front def. grille | (14) Center pocket lid | (25) Console pocket |
| (4) Grille side (P) | (15) Grille center | (26) Rear console BRKT |
| (5) Grille vent (P) | (16) Cup holder | (27) Front cover |
| (6) Glove box panel | (17) Side pocket | |
| (7) Glove box lid | (18) Lower cover ASSY | |
| (8) Knob | (19) Meter visor | |
| (9) Instrument panel center console | (20) Grille vent (D) | |
| (10) BRKT (Radio) | (21) Console cover | |
| (11) Center console cover | (22) Console lid | |

Tightening torque: N·m (kg·m, ft·lb)
T: 7±1 (0.7±0.1, 5.1±0.7)

1. Instrument Panel **AIRBAG**

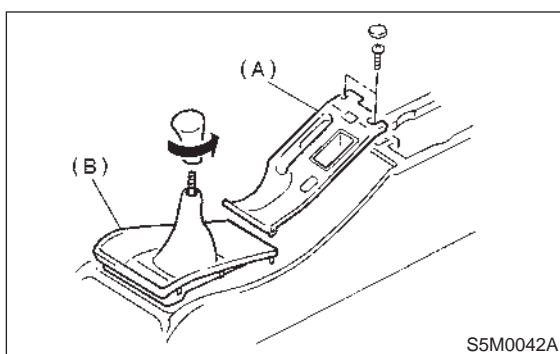
A: REMOVAL

Airbag system wiring harness is routed on steering support beam.

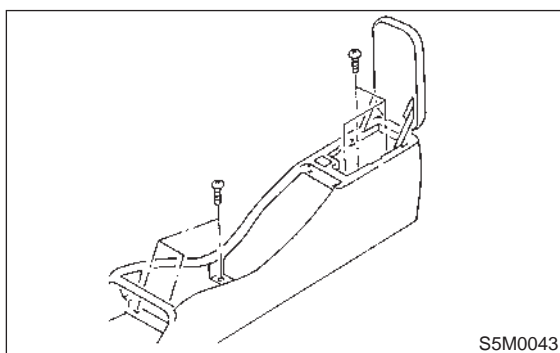
CAUTION:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
- Be careful not to damage Airbag system wiring harness when servicing the instrument panel.

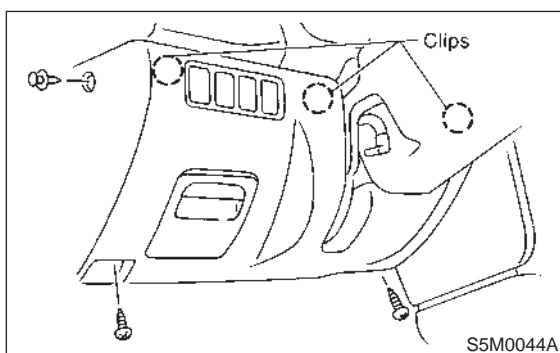
- 1) Disconnect GND cable from battery.
- 2) Remove shift knob (MT model).
- 3) Remove console cover (A) and front cover (B).



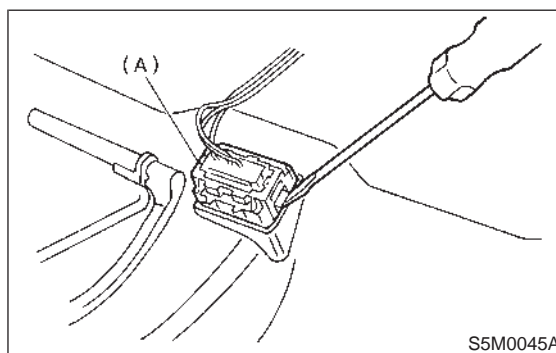
- 4) Remove console box.



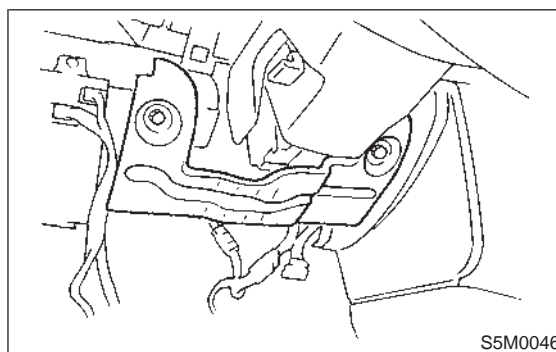
- 5) Remove lower cover and then disconnect connector.



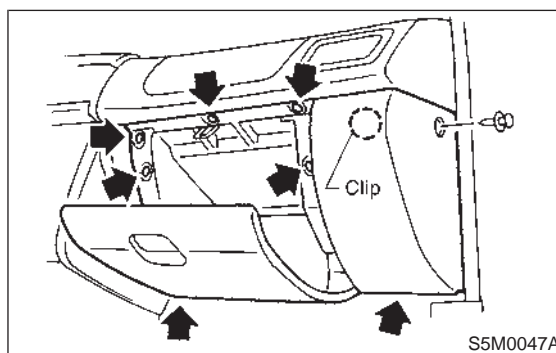
- 6) Disconnect data link connector (A) from lower cover.



- 7) Remove knee panel.

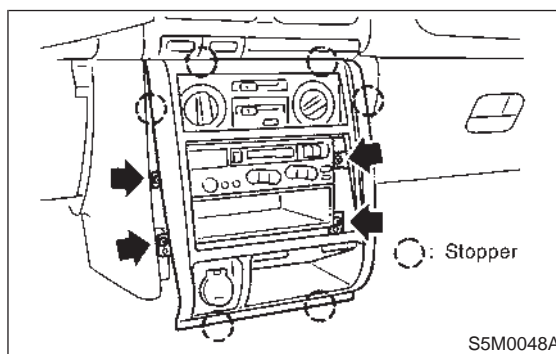


- 8) Remove glove box.

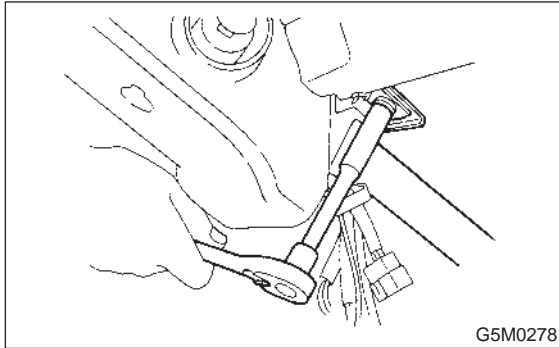


- 9) Remove center panel and disconnect connector.

- 10) Remove audio.



- 11) Remove two bolts and lower steering column.

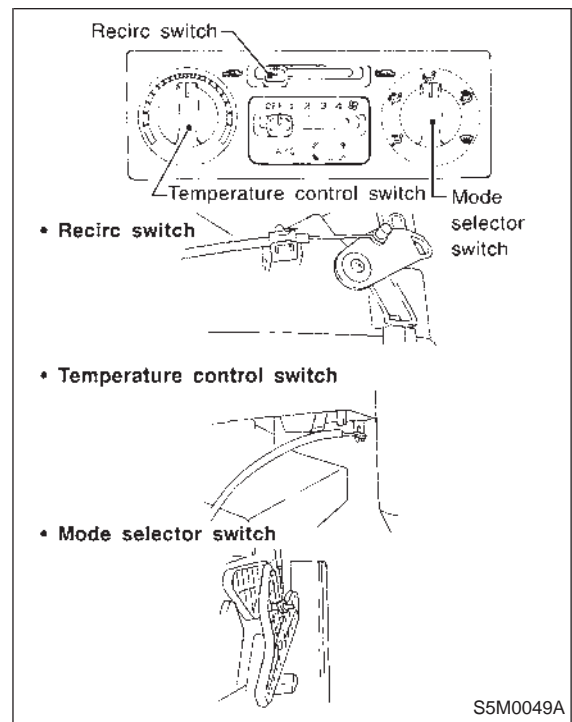


- 12) Set temperature control switch to "FULL HOT", mode selector switch to "DEF" position and recirc switch to "FRESH" position.

- 13) Disconnect temperature control cable and mode control cable from heater unit then disconnect recirc control cable from intake unit.

NOTE:

Do not move switch and link when installing.



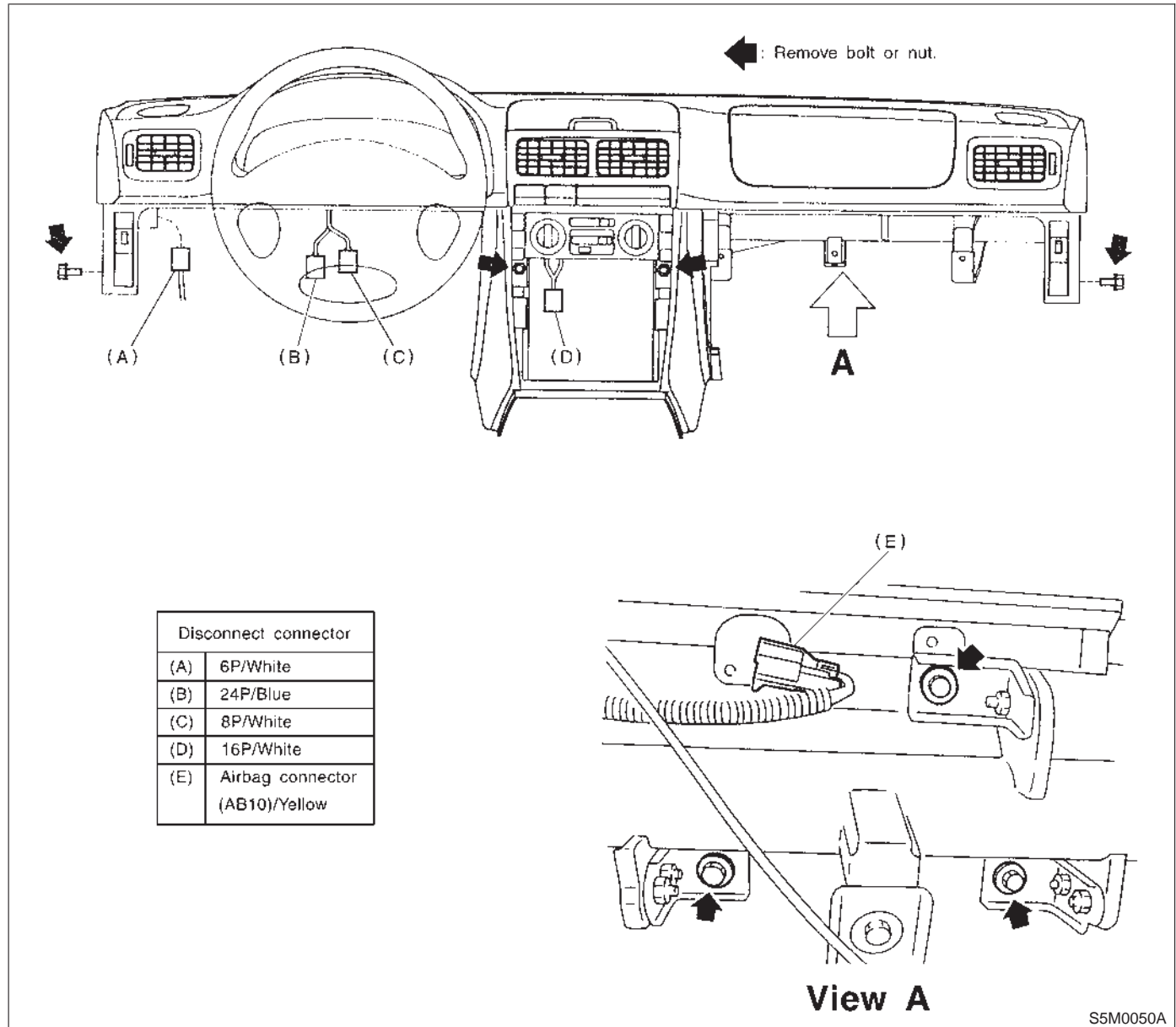
14) Disconnect harness connectors and then remove the installing bolts and nuts.

CAUTION:

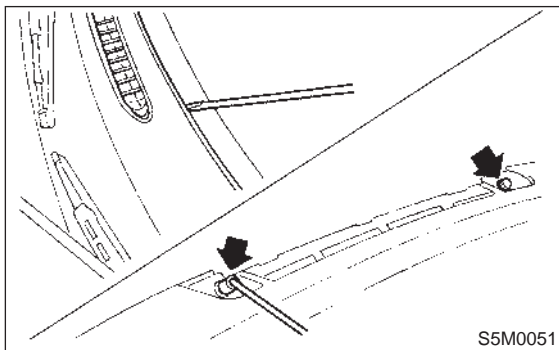
Be sure to hold socket section and not harness when disconnecting.

NOTE:

Put matching mark, if necessary, for easy reassembly.



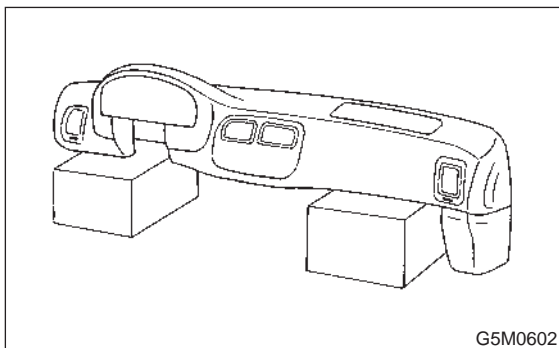
15) Remove front defroster grille and two bolts.



16) Remove instrument panel carefully from the body.

CAUTION:

- Take care not to scratch the instrument panel and related parts.
- When storing removed instrument panel with passenger airbag module, place it standing up on the floor.



B: INSTALLATION

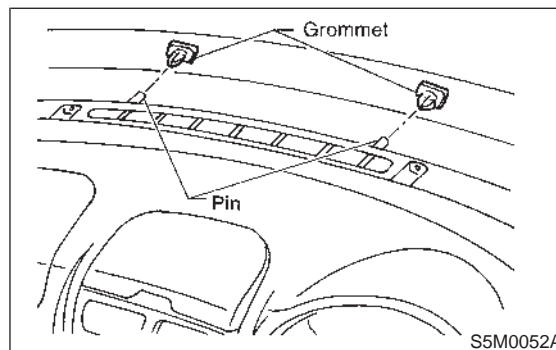
Installation is in the reverse order of removal.

CAUTION:

- Be careful not to snag the harness.
- Make sure to connect harness connectors.
- Take care not to scratch the instrument panel and related parts.

NOTE:

When setting instrument panel into position, push two pins into grommet on body panel.

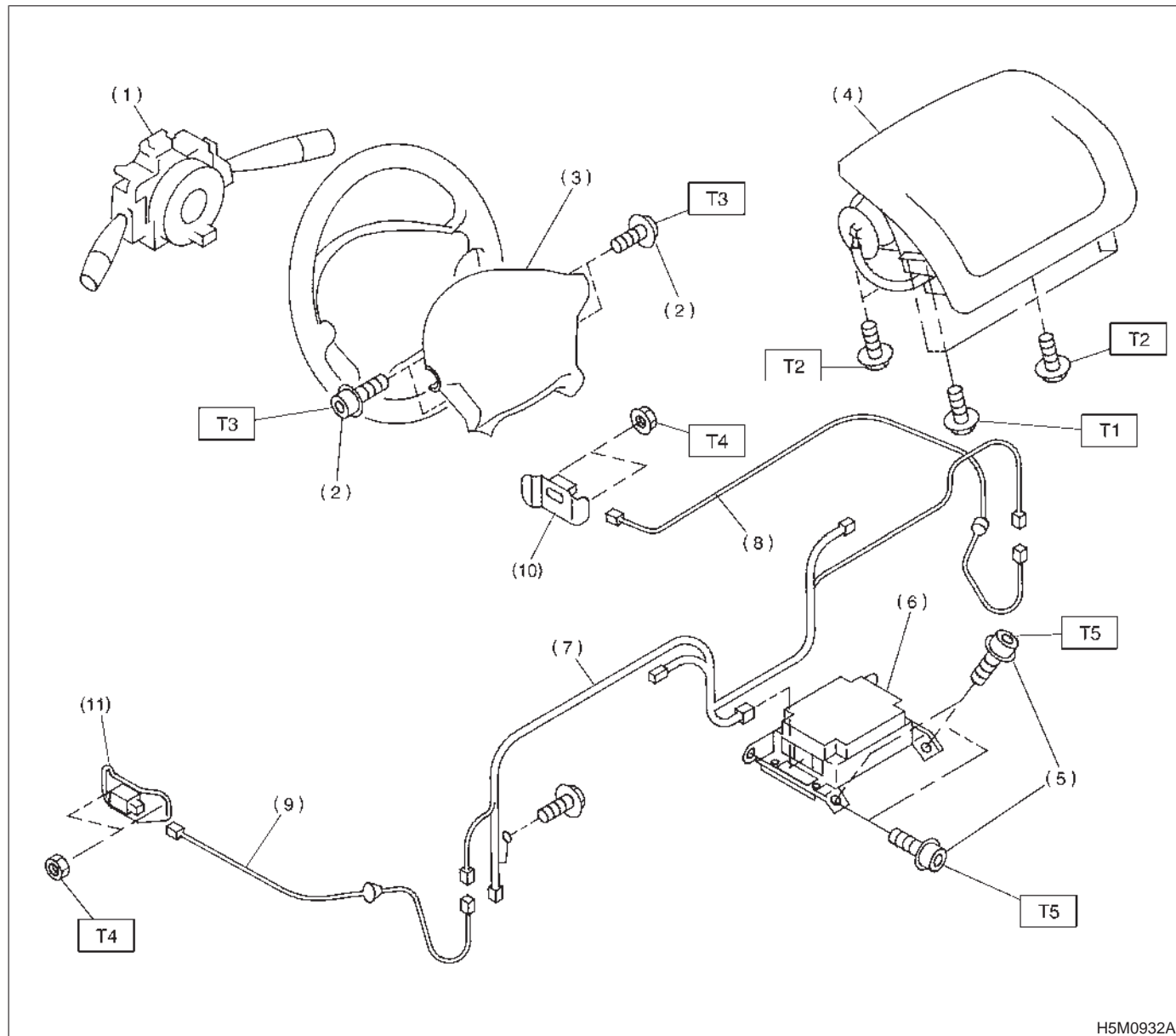


SUPPLEMENTAL RESTRAINT SYSTEM

5-5

	Page
C COMPONENT PARTS	2
1. SRS Airbag.....	2
W SERVICE PROCEDURE	3
1. General.....	3
2. Inspection and Replacement Standards.....	5
3. Airbag Module	7
4. Main Harness	10
5. Airbag Control Module.....	11
6. Combination Switch.....	12
7. Front Sub Sensor	13

1. SRS Airbag



- | | |
|---|-----------------------------------|
| (1) Combination switch ASSY with roll connector | (6) Airbag control module |
| (2) TORX® bolt T30 | (7) Airbag main harness |
| (3) Airbag module ASSY (Driver) | (8) Front sub sensor harness (RH) |
| (4) Airbag module ASSY (Passenger) | (9) Front sub sensor harness (LH) |
| (5) TORX® bolt T40 | (10) Front sub sensor (RH) |
| | (11) Front sub sensor (LH) |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 4.4±1.5 (0.45±0.15, 3.3±1.1)

T2: 7.4±2.0 (0.75±0.2, 5.4±1.4)

T3: 10±2 (1.0±0.2, 7.2±1.4)

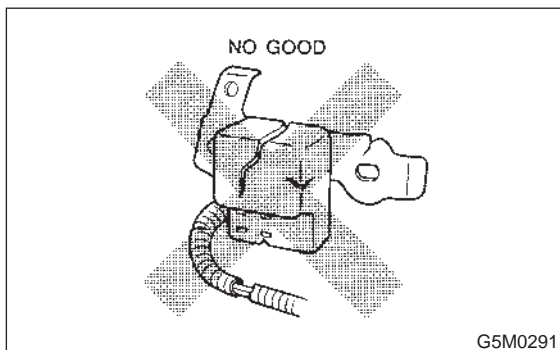
T4: 20±4 (2.0±0.4, 14.5±2.9)

T5: 25±2 (2.5±0.2, 18.1±1.4)

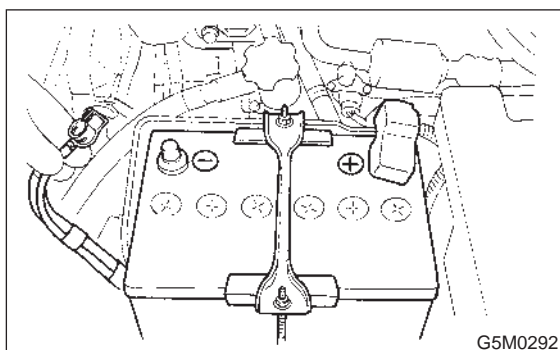
1. General

A: PRECAUTION

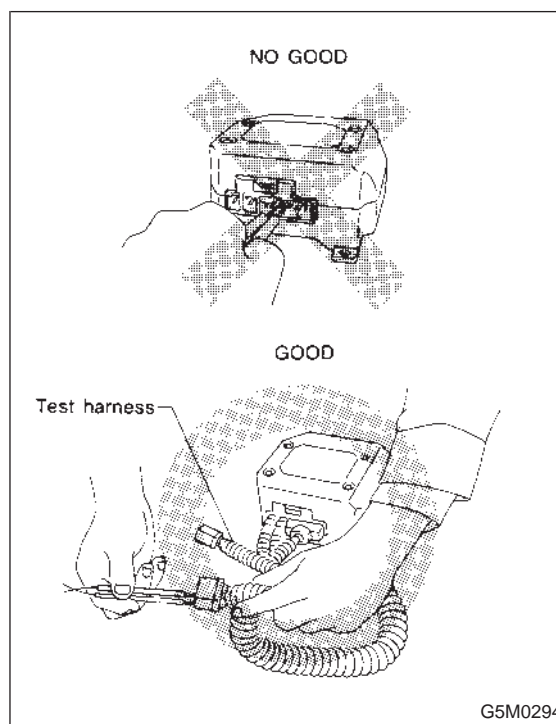
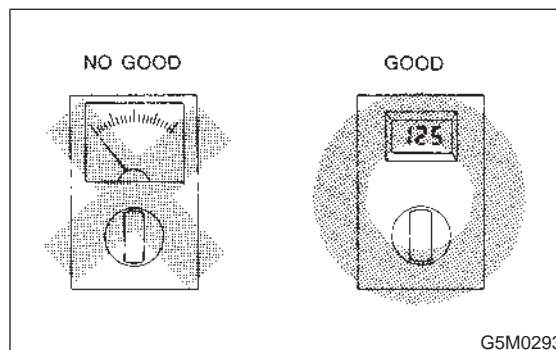
- If any of the airbag system parts such as sensors, airbag module, airbag control module and harness are damaged or deformed, replace with new genuine parts.



- When servicing, be sure to turn the ignition switch off, disconnect the negative (–) battery terminal then the positive (+) terminal in advance, and wait for more than 20 seconds before starting work.

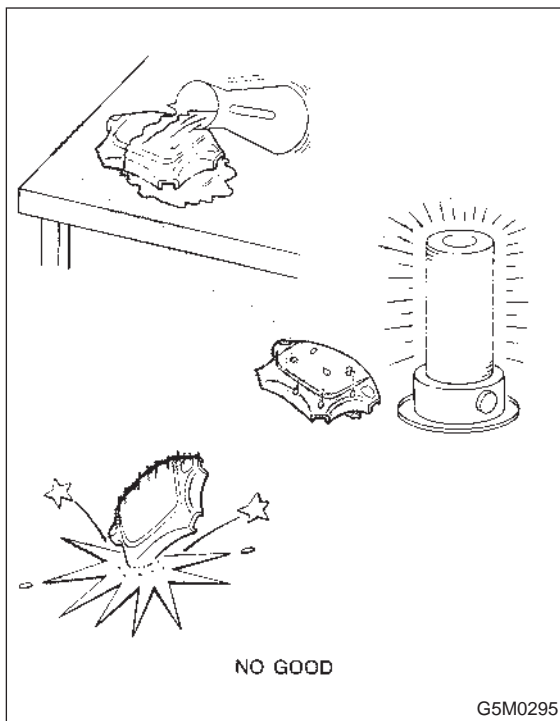


- When checking the system, be sure to use a digital circuit tester. Use of an analog circuit tester may cause the airbag to activate erroneously. Do not directly apply the tester probe to any connector terminal of the airbag. When checking, use a test harness.

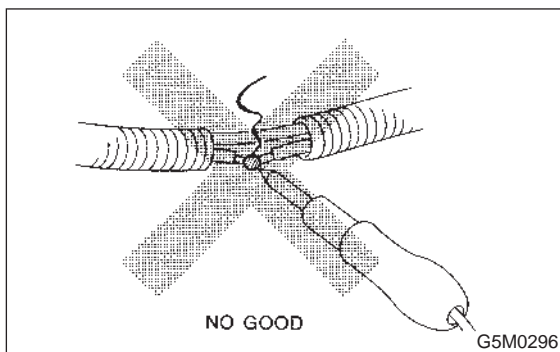


1. General

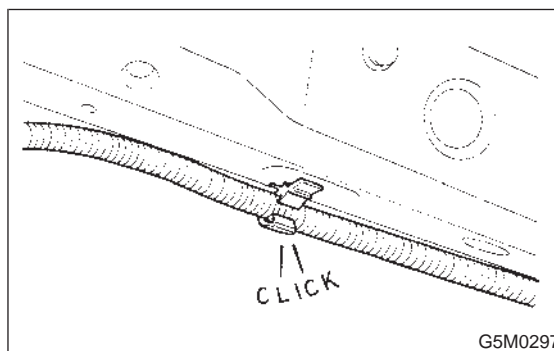
- Do not drop the airbag modulator parts, subject it to high temperatures over 90°C (194°F), or apply oil, grease, or water to it; otherwise, the internal parts may be damaged and its reliability greatly lowered.



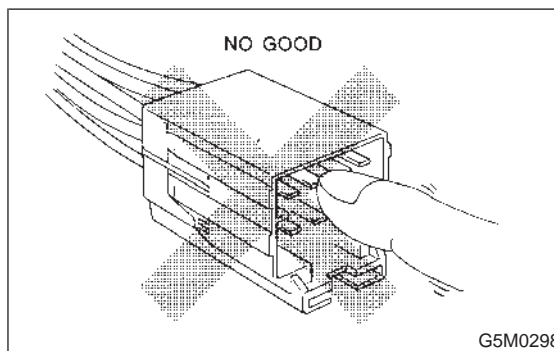
- If any damage or open is found on the SRS airbag system wire harness, do not attempt to repair using soldering, etc. Be sure to replace the faulty harness with a new genuine part.



- Install the wire harness securely with the specified clips so as to avoid interference or jamming with other parts.



- Before connecting the airbag system to ground, make sure that the grounding terminal is free from paint and contamination.
- Do not allow water or oil to come in contact with the connector terminals. Do not touch the connector terminals.



- When connecting or disconnecting airbag connector, make sure ignition switch is OFF.

2. Inspection and Replacement Standards

A: VEHICLES WHICH BECOME INVOLVED IN A COLLISION

If the vehicle equipped with an SRS airbag system is damaged in a collision, the airbag system parts must be checked and replaced in accordance with the following standards:

- After faulty parts are replaced, the warning light operation must be checked.
- When the ignition switch is turned ON, it lights up for 8 seconds and then it goes out for at least 30 seconds.
- The trouble code stored in memory must be erased after the check.

B: AIRBAG MODULE (DRIVER AND PASSENGER)

1. INSPECTION STANDARD

- The vehicle damaged in a collision (regardless of whether or not airbag is deployed).
- The designated trouble code is output during self-diagnosis. <Ref. to 5-5 [T4A0].>

2. REPLACEMENT STANDARD

- Airbag is deployed.
- The pad surface is scratched or cracked.
- Harness and/or connector is deformed or cracked, their circuits are broken, lead wire is exposed, etc.
- Mounting bracket is cracked or deformed.
- The module surface is fouled with foreign matter. (grease, oil, water, cleaning solvent, etc.)
- Airbag module dropped to the floor/ground.
- Airbag module determined as faulty during self-diagnosis.

C: MAIN HARNESS

1. INSPECTION STANDARD

- A vehicle damaged in a collision (regardless of whether or not airbag is deployed).
- The designated trouble code is output during self-diagnosis. <Ref. to 5-5 [T4A0].>

2. REPLACEMENT STANDARD

- Harness circuit is broken, lead wire is exposed, corrugated tube is cracked, etc.
- Connector is scratched or cracked.
- The designated trouble code is output during self-diagnosis.

D: AIRBAG CONTROL MODULE

1. INSPECTION STANDARD

- A vehicle damaged in a collision (regardless of whether or not airbag is deployed).
- The designated trouble code is output during self-diagnosis. <Ref. to 5-5 [T4A0].>

2. REPLACEMENT STANDARD

- Control module is cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched or cracked.
- Control module dropped to the floor/ground.
- Control module determined as faulty during diagnostics.
- Airbag is deployed.

E: COMBINATION SWITCH

1. INSPECTION STANDARD

- A vehicle damaged in a collision (regardless of whether or not airbag is deployed).
- The designated trouble code is output during self-diagnosis. <Ref. to 5-5 [T4A0].>

2. REPLACEMENT STANDARD

- Combination switch or steering roll connector is deformed or cracked.

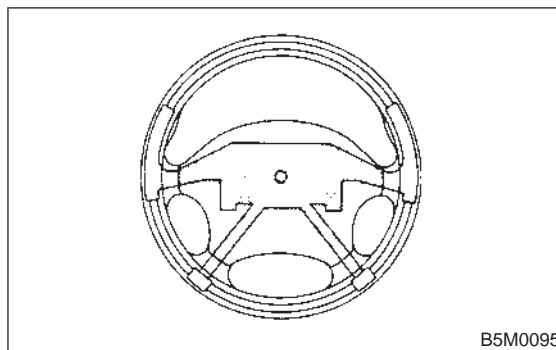
F: STEERING WHEEL

1. INSPECTION STANDARD

- A vehicle damaged in a collision (regardless of whether or not airbag is deployed).

2. REPLACEMENT STANDARD

- Check steering wheel insert for cracks or deformities.
- Check to ensure that new airbag module is properly installed in steering wheel
- After installing airbag module, check to ensure that it is free of interference with steering wheel and that clearance between the two is equal at all points.



B5M0095

G: STEERING COLUMN ASSEMBLY

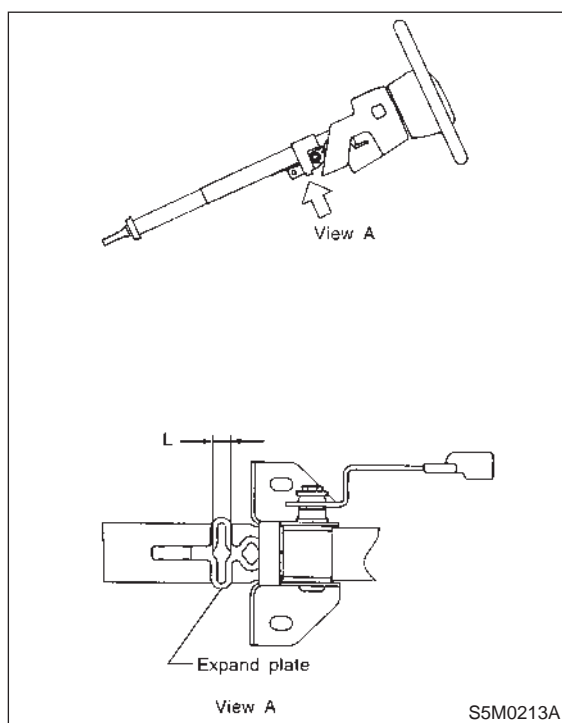
1. INSPECTION STANDARD

- A vehicle damaged in a collision (regardless of whether or not airbag is deployed).

2. REPLACEMENT STANDARD

- Check to ensure that clearance of expand plate on steering column under side is within specifications.

Clearance of expand plate: L
More than 15 mm (0.59 in)



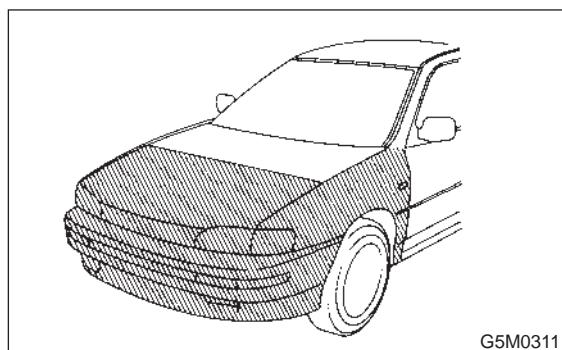
2. REPLACEMENT STANDARD

- Bracket is deformed.
- Housing is cracked or deformed.
- The label (that identifies the manufacturing number) is peeled or deteriorated.
- Harness circuit is broken, lead wire is exposed, corrugated tube is cracked, etc.
- Front sub sensor determined as faulty as a result of Diagnostics.
- Airbag is deployed.
- Front sub sensor dropped to the floor/ground.

H: FRONT SUB SENSOR

1. INSPECTION STANDARD

- Check the front section (Refer to shaded area of vehicle in figure) for damage, regardless of whether or not airbag is deployed.



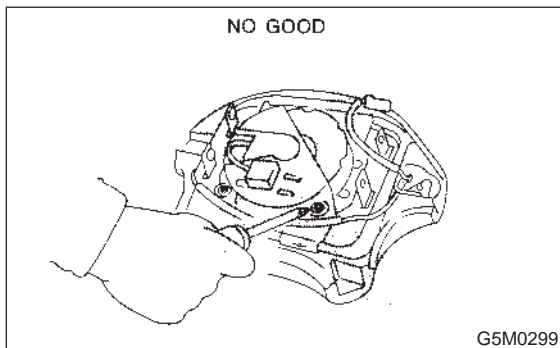
- The designated trouble code is output during self-diagnosis. <Ref. to 5-5 [T4A0].>

3. Airbag Module

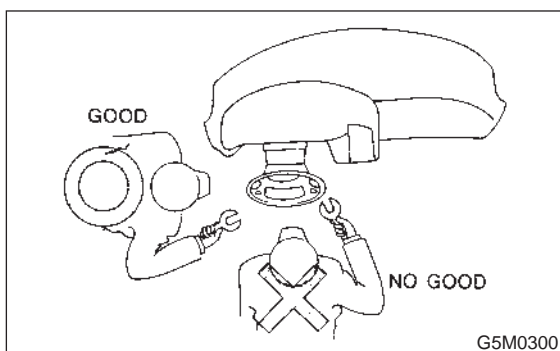
A: REMOVAL AND INSTALLATION

CAUTION:

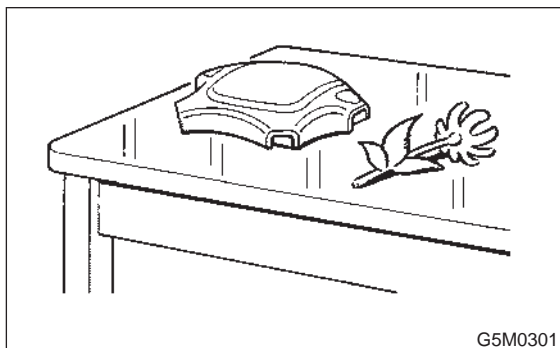
- The airbag module (driver side and passenger side) must not be disassembled. The airbag module cannot be used again once inflated.



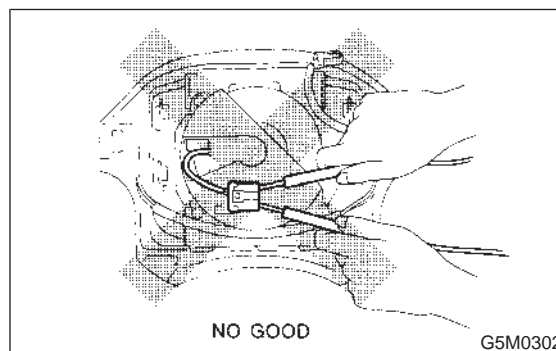
- When removing and installing the airbag module (driver side and passenger side), the operator should stand, as much as possible, on the side of the airbag module.



- After removal, the airbag module (driver side and passenger side) should be kept away from heat and light sources, and stored on a clean, flat surface to prevent from any damage to its lower structure.



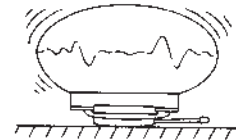
- Do not check airbag module (driver side and passenger side) continuity with airbag removed from the vehicle body.



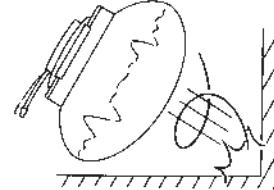
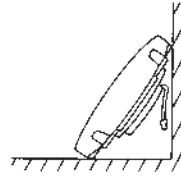
- Replace airbag module (driver side and passenger side) with a new one, should any of the following conditions develop:
 - Pad surface is scratched or cracked.
 - Connector harness is damaged.
 - Inflator side structure of module is cracked or deformed.
 - Module is excessively stained with water, oil, etc.
 - Module was accidentally dropped.
- When storing a removed airbag module (driver side and passenger side), be sure to place it in parallel with floor with the pad facing up. Do not place it against a wall, or place anything on the pad; otherwise, a dangerous condition may be created if the module malfunctions.

Driver side

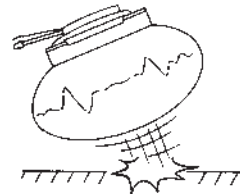
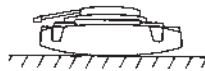
GOOD



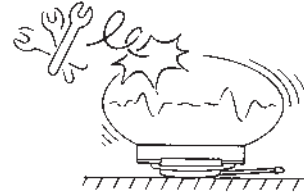
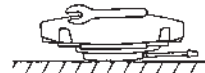
NO GOOD



NO GOOD

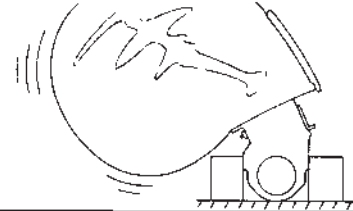
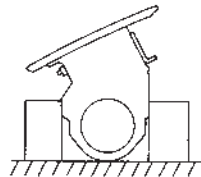


NO GOOD

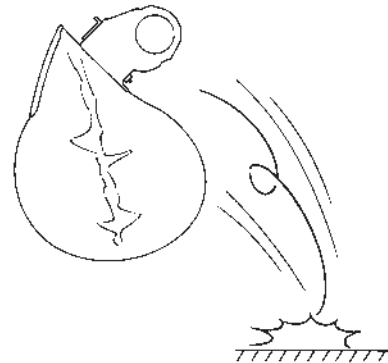
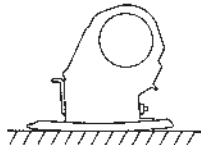


Passenger side

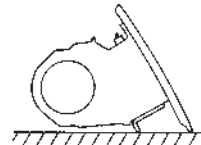
GOOD



NO GOOD



NO GOOD

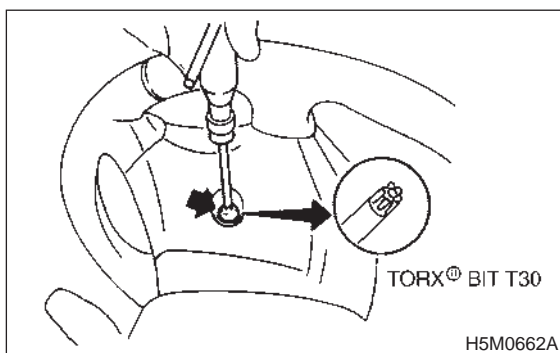


G5M0604

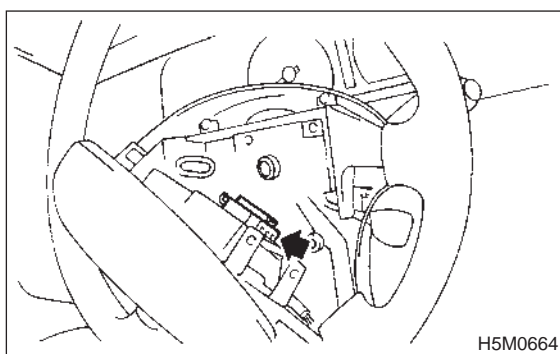
1. DRIVER SIDE

- 1) Set front wheels in straight ahead position.
- 2) Turn ignition switch off.
- 3) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.

- 4) Using TORX® BIT T30, remove two TORX® bolts.



- 5) Disconnect airbag connector on back of airbag module. <Ref. to 5-5 [M2F2].>



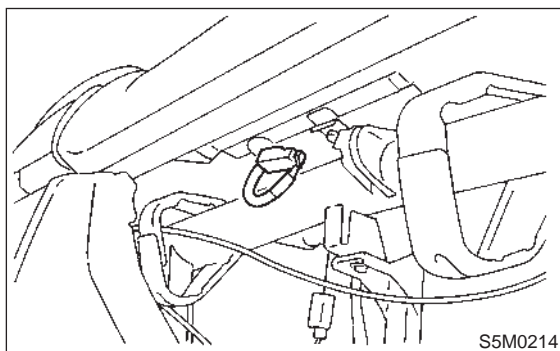
- 6) Refer to “CAUTION:” for handling of a removed airbag module. <Ref. to 5-5 [W3A0].>
7) Installation is in the reverse order of removal.

CAUTION:

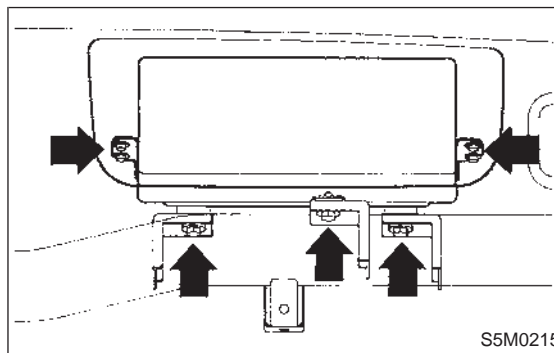
Do not allow harness and connectors to interfere or get caught with other parts.

2. PASSENGER SIDE

- 1) Turn ignition switch off.
2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove glove box. <Ref. to 5-4 [W1A0].>
4) Disconnect airbag connector. <Ref. to 5-5 [M2F2].>



- 5) Remove seven bolts and then carefully remove airbag module.



- 6) Refer to “CAUTION:” for handling of a removed airbag module. <Ref. to 5-5 [W3A0].>
7) Installation is in the reverse order of removal.

CAUTION:

Do not allow harness and connectors to interfere or get caught with other parts.

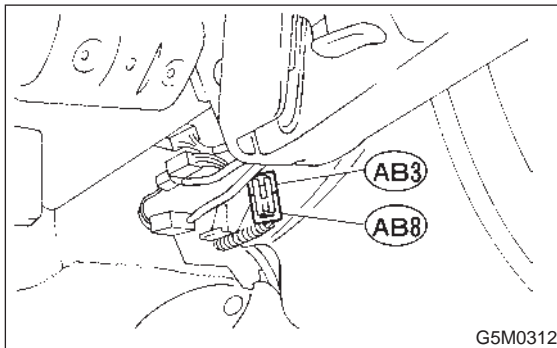
4. Main Harness

A: REMOVAL AND INSTALLATION

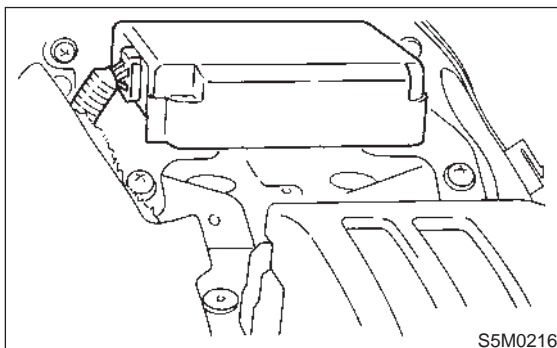
- 1) Turn ignition switch off.
- 2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
- 3) Remove lower cover. <Ref. to 5-4 [W1A0].>
- 4) Disconnect airbag connector (AB3) and (AB8) below steering column. <Ref. to 5-5 [M2F2].>

CAUTION:

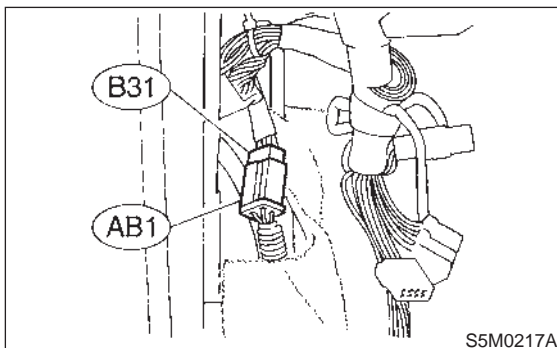
Do not reconnect airbag connector at steering column until main harness are securely re-installed.



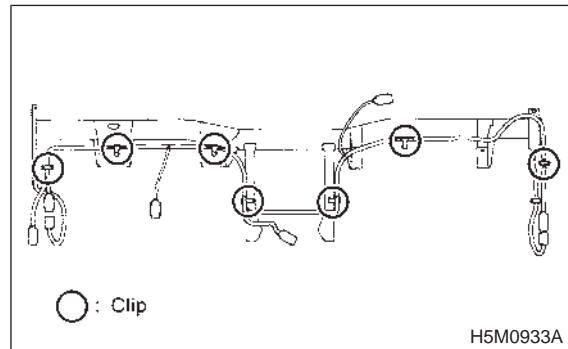
- 5) Remove instrument panel. <Ref. to 5-4 [W1A0].>
- 6) Disconnect connector from airbag control module.



- 7) Disconnect body harness connector (B31) from connector (AB1).



- 8) Disconnect front sub sensor connector from airbag main harness.
- 9) Detach clips from steering support beam and remove main harness.



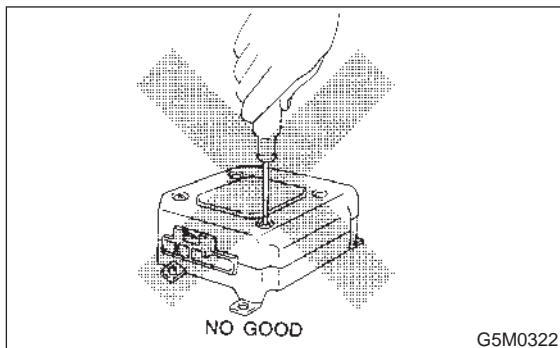
- 10) Installation is in the reverse order of removal.

5. Airbag Control Module

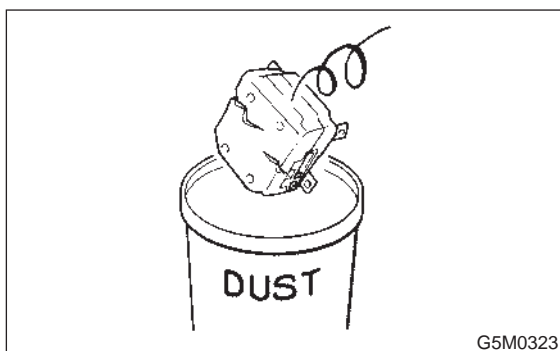
A: REMOVAL AND INSTALLATION

CAUTION:

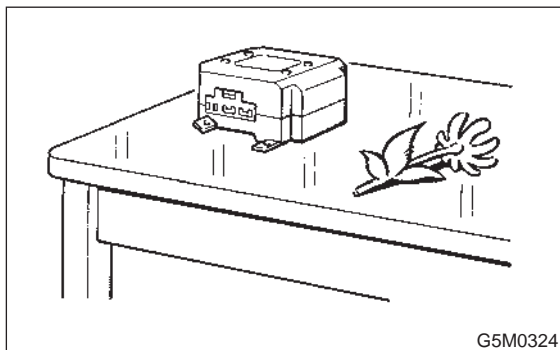
- Do not disassemble the airbag control module.



- If the airbag control module is deformed, or if water damage is suspected, replace the airbag control module with a new genuine part.



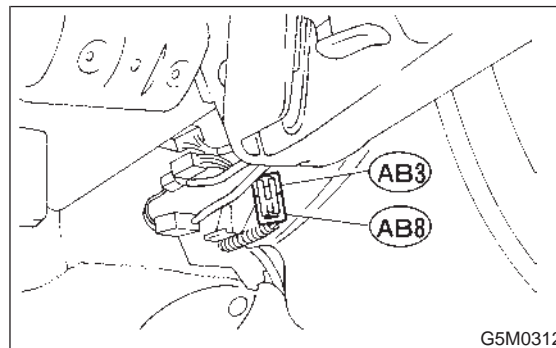
- After removal, keep the airbag control module on a dry, clean surface away from heat and light sources, and moisture and dust.



- 3) Remove lower cover. <Ref. to 5-4 [W1A0].>
- 4) Disconnect airbag connector (AB3) and (AB8) below steering column.

CAUTION:

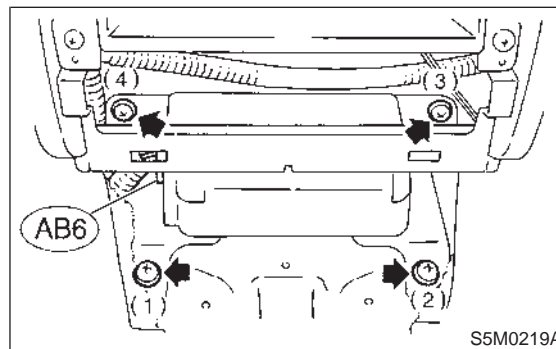
Do not reconnect airbag connector at steering column until airbag control module is securely re-installed.



- 5) Remove instrument panel console. <Ref. to 5-4 [W1A0].>
- 6) Disconnect connector from airbag control module.
- 7) Using T40 TORX® bit (Tamper resistant type), remove four TORX® bolts in numerical sequence shown in figure. Discard the old TORX® bolts.

CAUTION:

Use new TORX® bolts during re-assembly.



- 8) Installation is in the reverse order of removal.

- 1) Turn ignition switch off.
- 2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.

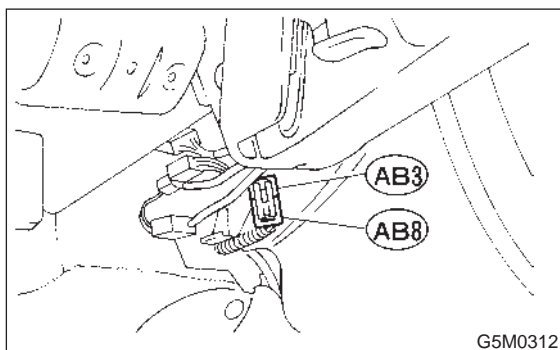
6. Combination Switch

A: REMOVAL

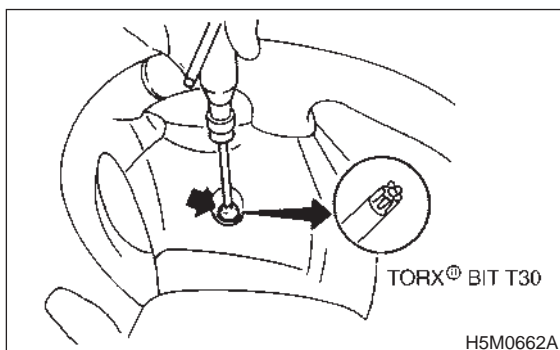
- 1) Turn ignition switch off.
- 2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
- 3) Remove lower cover. <Ref. to 5-4 [W1A0].> Disconnect airbag connector (AB3) and (AB8) below steering column.

CAUTION:

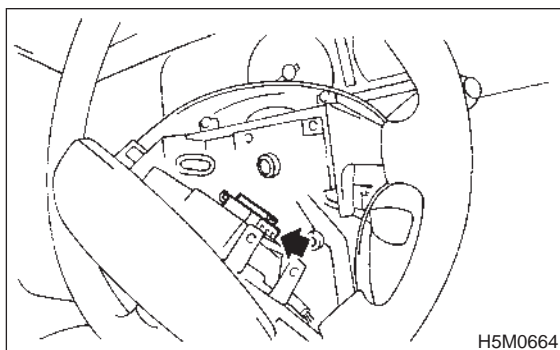
Do not reconnect airbag connector at steering column until combination switch is securely re-installed.



- 4) Disconnect combination switch connectors from body harness connector.
- 5) Set front wheels in straight ahead position. Using T30 TORX® bit, remove two TORX® bolts.



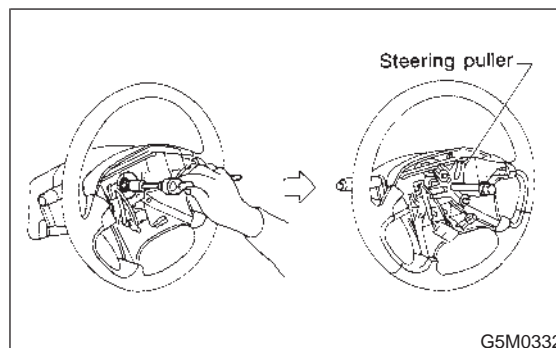
- 6) Disconnect airbag connector on back of airbag module. Remove airbag module, and place it with pad side facing upward. <Ref. to 5-5 [W3A0].>



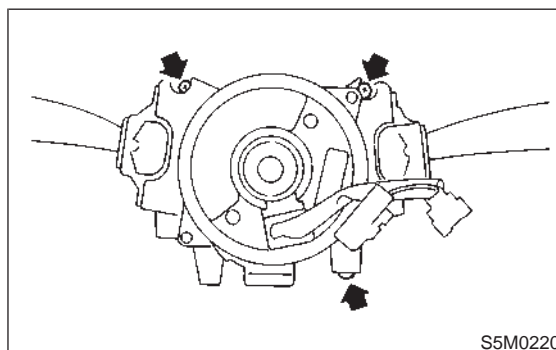
- 7) Using steering puller, remove steering wheel.

CAUTION:

Do not allow connector to interfere when removing steering wheel.



- 8) Remove steering column covers.
- 9) Removing three retaining screws, remove combination switch.

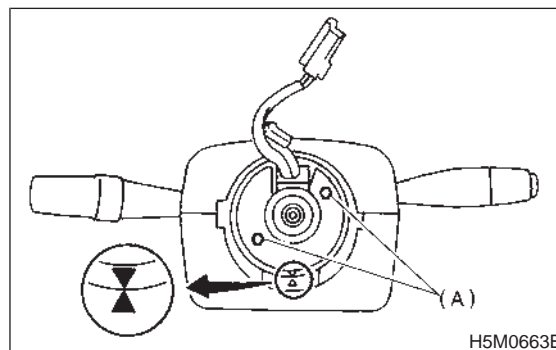


B: ADJUSTMENT

1. CENTERING ROLL CONNECTOR

Before installing steering wheel, make sure to center roll connector built into combination switch.

- 1) Make sure that front wheels are positioned straight ahead.
- 2) Install steering gearbox, steering shaft and combination switch properly. Turn roll connector pin (A) clockwise until it stops.
- 3) Then, back off roll connector pin (A) approximately 2.65 turns until "▲" marks aligned.



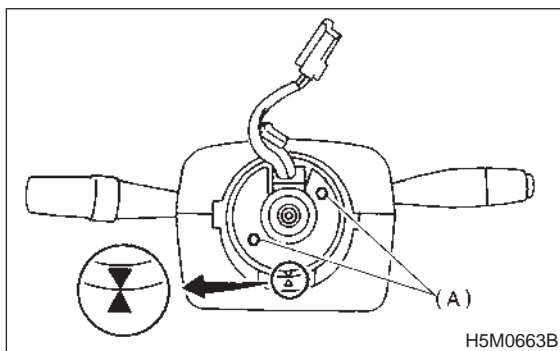
C: INSTALLATION**CAUTION:**

Failure to do this might damage roll connector.

- 1) Before installing combination switch, check to ensure that combination switch is off and front wheels are set in the straight ahead position.
- 2) Install column cover and center roll connector. <Ref. to 5-5 [W6B1].>
- 3) Install steering wheel in neutral position. Carefully insert roll connector pin (A) into hole on steering wheel.

NOTE:

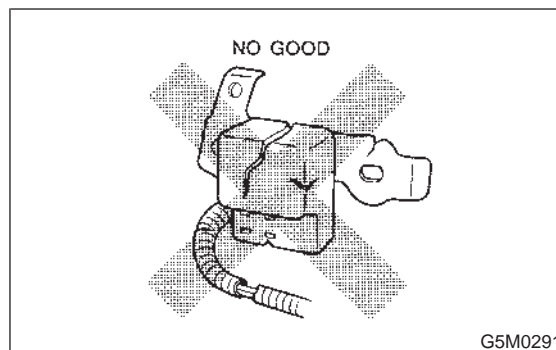
If steering wheel angle requires fine adjustment, adjust tie-rod. <Ref. to 4-3 [W3F0].>



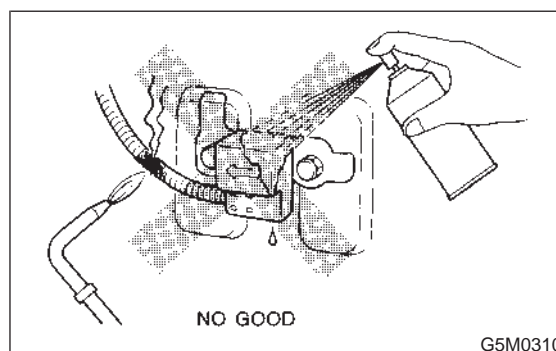
- 4) Install airbag module and lower cover in the reverse order of removal.

7. Front Sub Sensor**A: REMOVAL AND INSTALLATION****CAUTION:**

- If the front end of the vehicle body is damaged by a collision, be sure to check the left and right front sub sensors, even if the airbag was not inflated. If any damage to the sensor or any deformation of the sensor mount is found, replace with a new genuine part.



- When painting or performing sheet metal work on the front part of vehicle body, including the front wheel apron, front fender and front side frame, take utmost care not to apply dryer heat, painting mist, or the flame of the welding burner directly to the front sub sensors and wire harness of the airbag system.

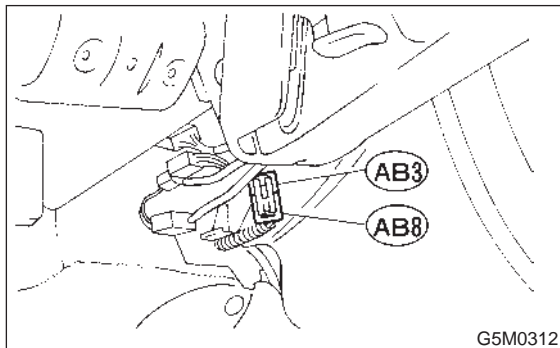
**1. FRONT SUB SENSOR HARNESS**

- 1) Turn ignition switch off.
- 2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
- 3) Remove lower cover. <Ref. to 5-4 [W1A0].>

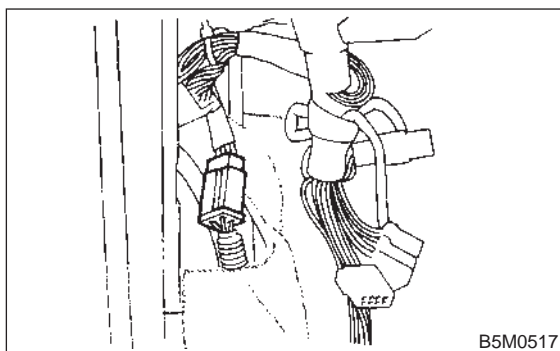
- 4) Disconnect airbag connector (AB3) and (AB8) below steering column.

CAUTION:

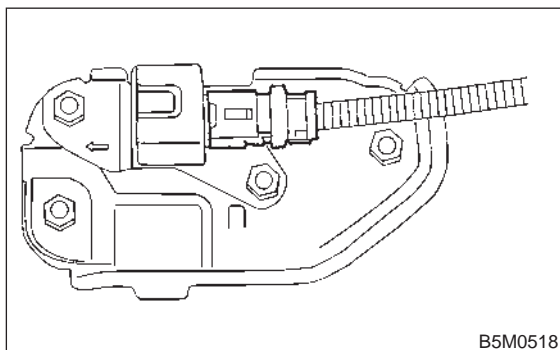
Do not reconnect airbag connector at steering column until front sub sensors are securely re-installed.



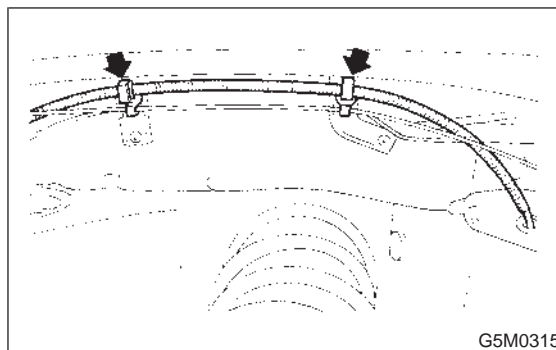
- 5) Remove front side sill cover and then disconnect front sub sensor connector. <Ref. to 5-5 [M2F2].>



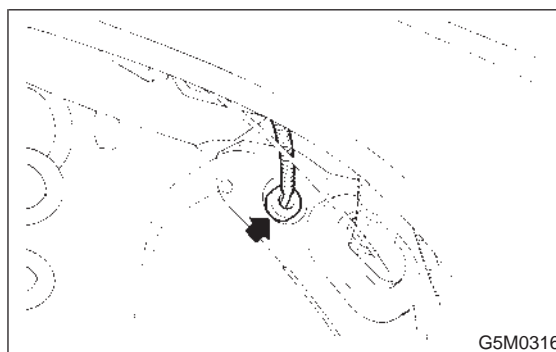
- 6) Remove front wheel and mud guard.
7) Disconnect connector from front sub sensor assembly. <Ref. to 5-5 [M2F3].>



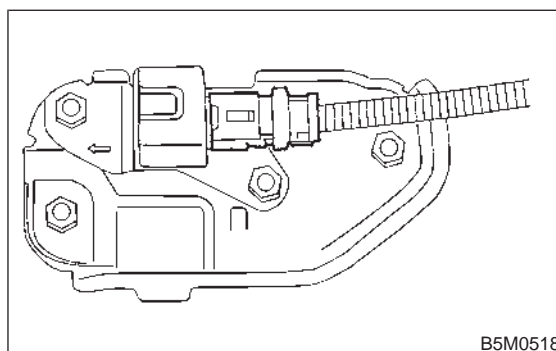
- 8) Remove wiring harness clips.



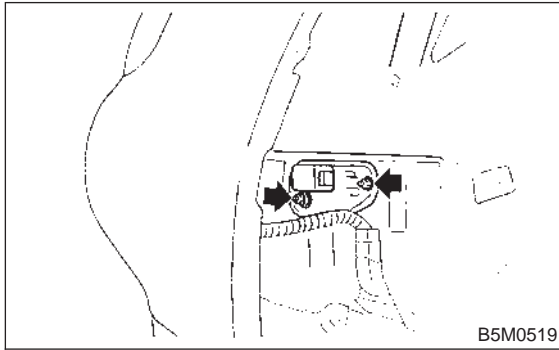
- 9) Remove grommet and then detach front sub sensor harness.

**2. FRONT SUB SENSOR ASSEMBLY**

- 1) Turn ignition switch off.
- 2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
- 3) Remove front wheel and mud guard.
- 4) Disconnect connector from front sub sensor assembly. <Ref. to 5-5 [M2F3].>



5) Remove front sub sensor.



6) Installation is in the reverse order of removal.

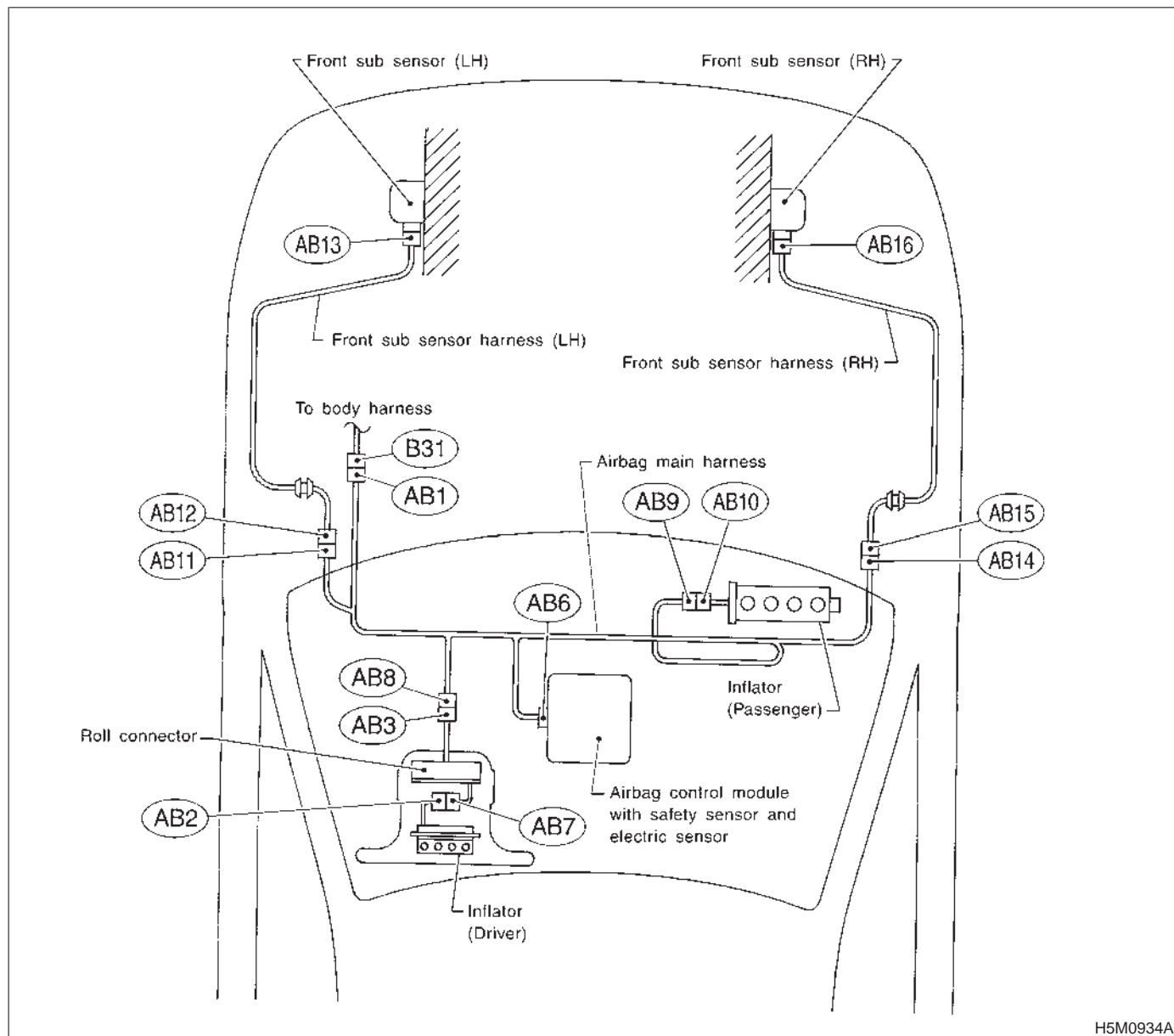
MEMO:

SUPPLEMENTAL RESTRAINT SYSTEM

5-5

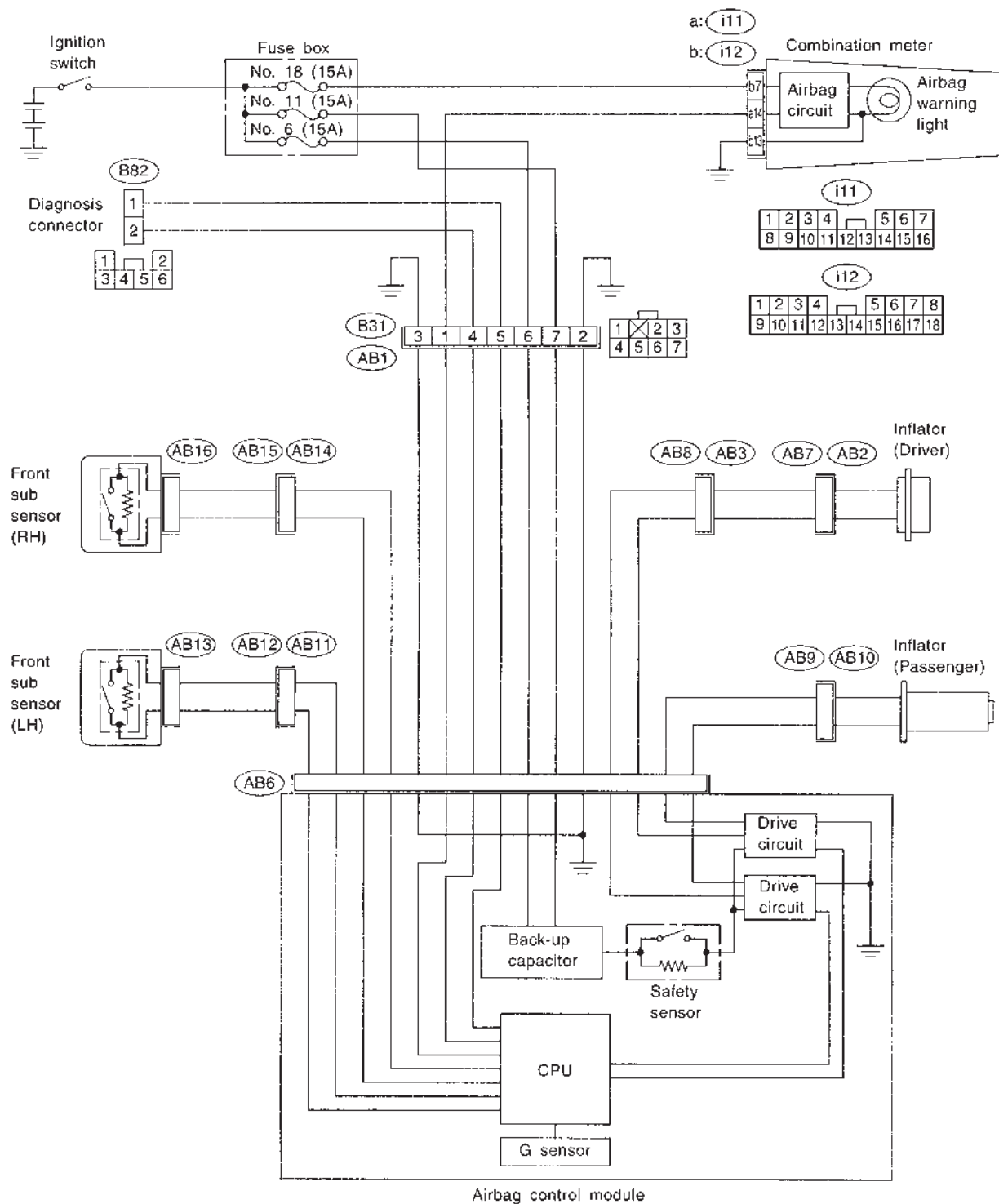
	Page
T DIAGNOSTICS	2
1. Electrical Components Location.....	2
2. Schematic.....	3
3. Tools for Diagnostics.....	4
4. Diagnostics Chart for On-board Diagnostic System	9
5. Diagnostics Chart with Trouble Code	13

1. Electrical Components Location



Connector No.	(AB1)	(AB2)	(AB3)	(AB6)	(AB7)	(AB8)	(AB9)
Pole	7	2	2	28	2	2	2
Color	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Male/Female	Male	Male	Male	Female	Female	Female	Female
Connector No.	(AB10)	(AB11)	(AB12)	(AB13)	(AB14)	(AB15)	(AB16)
Pole	2	2	2	2	2	2	2
Color	Yellow	Blue	Blue	Yellow	Blue	Blue	Yellow
Male/Female	Male	Female	Male	Female	Female	Male	Female

2. Schematic



H5M0942A

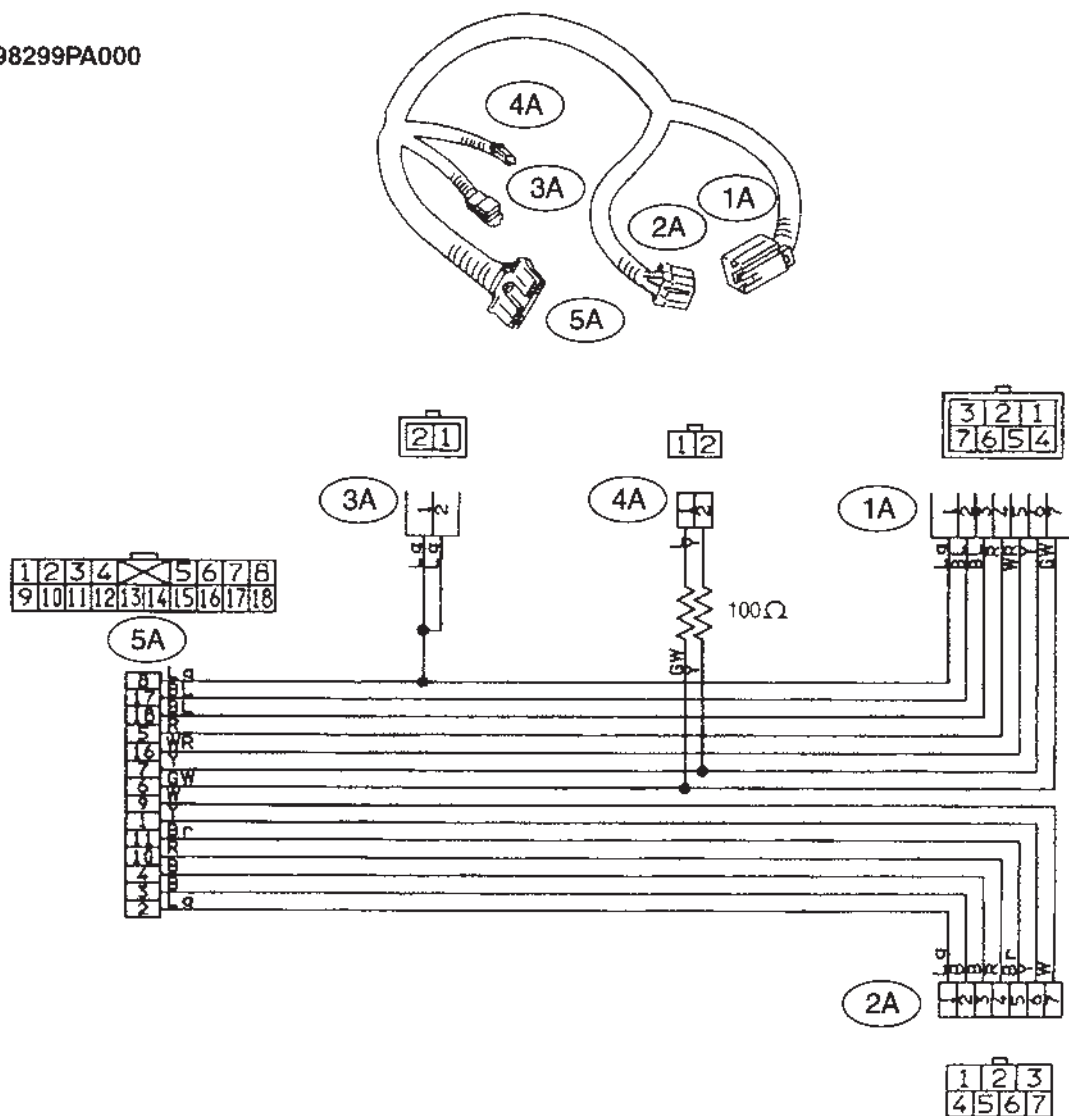
3. Tools for Diagnostics

CAUTION:

Be sure to use specified test harness A, E, F and H when measuring voltage, resistance, etc. of AIRBAG system component parts.

A: TEST HARNESS A

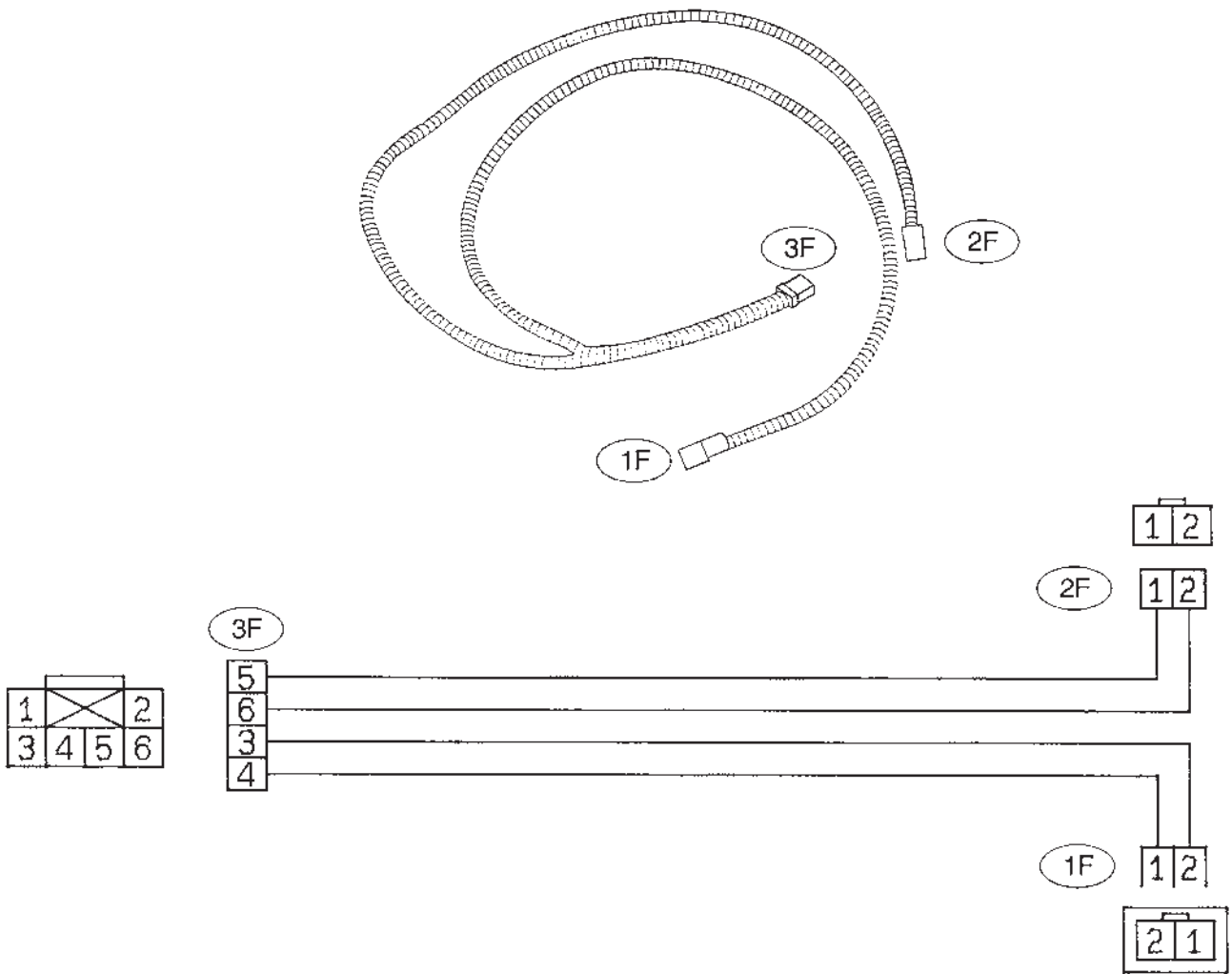
PN 98299PA000



B5M0112A

C: TEST HARNESS F

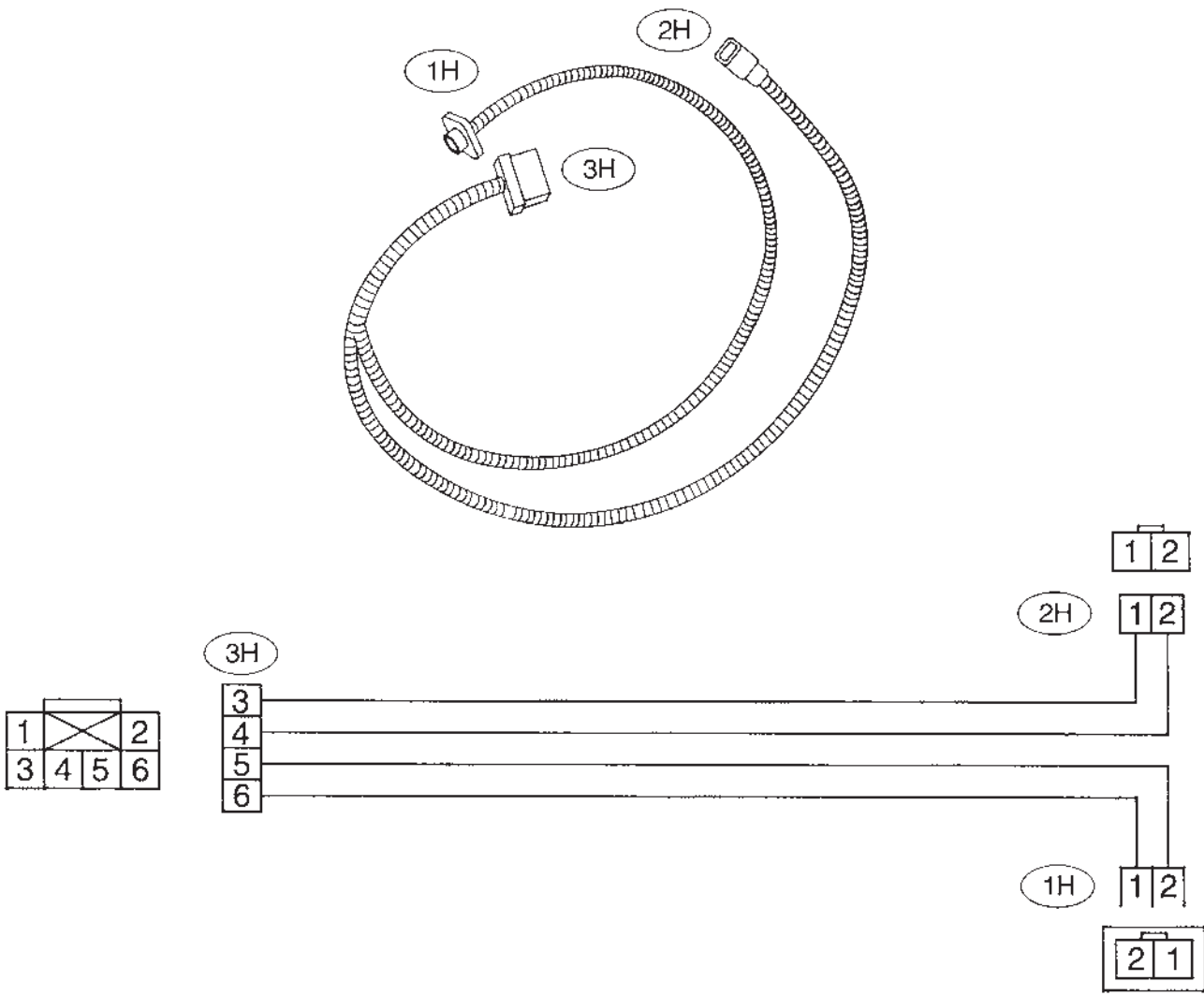
PN 98299FC010



S5M0247A

D: TEST HARNESS H

PN 98299FC030

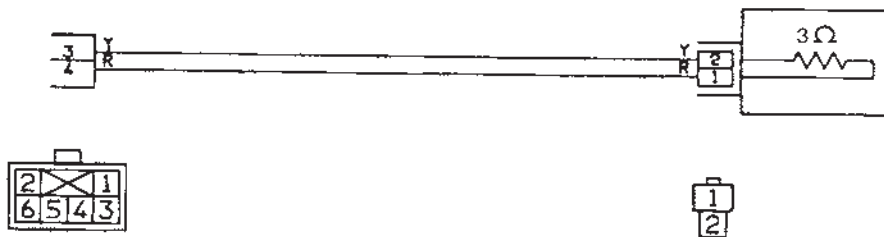
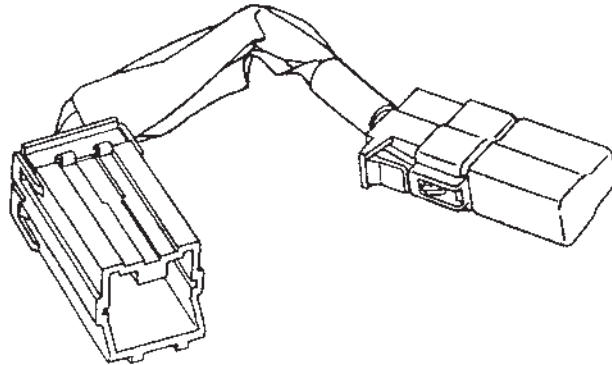


B5M0553A

E: AIRBAG RESISTOR

The airbag resistor is used during diagnostics. The airbag resistor has the same resistance as the airbag module and thus provides safety when used instead of the airbag module. It also makes it possible to finish, diagnostics in less time.

PN 98299PA040



B5M0114A

4. Diagnostics Chart for On-board Diagnostic System

A: BASIC DIAGNOSTICS PROCEDURE

4A1 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

- 1) Airbag warning light comes ON.
- 2) Turn ignition switch to ON (engine OFF).
- 3) Check airbag warning light illuminates.

CHECK : *Does airbag warning light stay ON after about 7 seconds or remain OFF, or come back ON after 30 seconds?*

YES : Repair and replace. <Ref. to 5-5 [T4D0].>

NO : Go to step 4A2.

4A2 : CHECK TROUBLE CODE INDICATES.

Perform ON-BOARD DIAGNOSTICS. <Ref. to 5-5 [T4B0].>

CHECK : *Does trouble code indicate? <Ref. to 5-5 [T5A0].>*

YES : Repair and replace. <Ref. to 5-5 [T5O0].> Go to step 4A3.

NO : Repair and replace. <Ref. to 5-5 [T5P0].> Go to step 4A3.

4A3 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

- 1) Turn ignition switch to ON (engine OFF).
- 2) Check airbag warning light illuminates.

CHECK : *Does airbag warning light stay ON after about 7 seconds or come back ON after 30 seconds?*

YES : Repair and replace. <Ref. to 5-5 [T4D0].>

NO : Go to step 4A4.

4A4 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

Check airbag warning light illuminates.

CHECK : *Does airbag warning light come ON for about 7 seconds, then go out and stay out?*

YES : Perform clear memory. <Ref. to 5-5 [T4C0].>

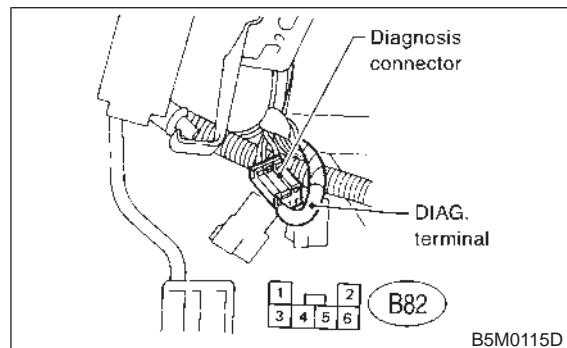
NO : Go to step 4A1.

B: ON-BOARD DIAGNOSTIC

When the airbag system is in functioning condition, the airbag warning light will remain on for about 7 seconds and go out when the ignition switch is set to ON.

If there is any malfunction, the airbag warning light will either stay on or off continuously. In such cases, perform on-board diagnostic in accordance with the specified procedure to determine trouble codes.

- 1) Turn ignition switch ON (with engine OFF).
- 2) Connect DIAG. terminal to No. 1 terminal of diagnosis connector located inside lower cover.



- 3) Check in accordance with the trouble code indicated by the AIRBAG warning light, and record the trouble codes.

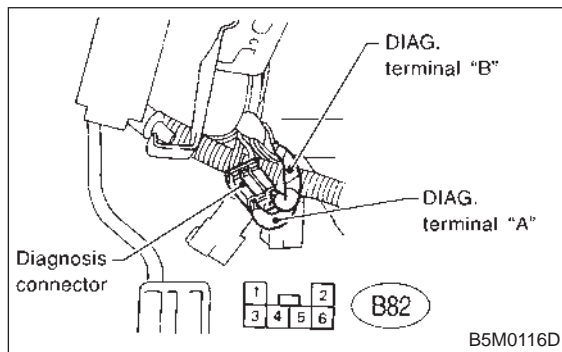
- 4) Turn the ignition switch "OFF" and remove the DIAG. terminal from No.1 terminal of diagnosis connector.

C: CLEAR MEMORY

After eliminating problem as per trouble code, clear memory as follows:

1) Make sure ignition switch is ON (and engine off). Connect one DIAG. terminal "A" on diagnosis connector terminal No. 1.

While warning light is flashing, connect the other DIAG. terminal "B" on terminal No. 2 for at least three seconds.



2) After memory is cleared, normal warning light flashing rate resumes. (Warning light flashes every 0.6 seconds ON-OFF operation.) Memory cannot be cleared if any problem exists.

3) After clear memory and then DIAG. terminals "A" and "B", extract from diagnosis connector.

D: DIAGNOSTICS PROCEDURE

4D1 : CHECK TROUBLE CODE INDICATES.

1) Perform on-board diagnostic. <Ref. to 5-5 [T4B0].>

2) Check trouble code indicates.

CHECK : **Are trouble codes 11, 12, 15 or 16 indicated?** <Ref. to 5-5 [T5A2].>

YES : Go to step 4D2.

NO : Perform diagnostics and repair according to indicated trouble code. <Ref. to 5-5 [T5A0].>

4D2 : CHECK TROUBLE CODE INDICATES.

Check trouble code indicates.

CHECK : **Are trouble codes 12, 16 indicated?** <Ref. to 5-5 [T5A2].>

YES : Go to step 4D3.

NO : Go to step 4D4.

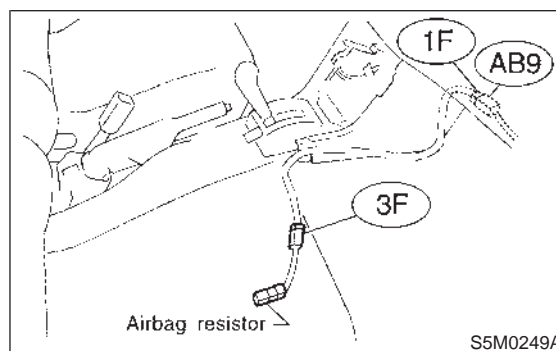
4D3 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

1) Turn ignition switch to OFF. Disconnect battery ground cable, and wait 20 seconds.

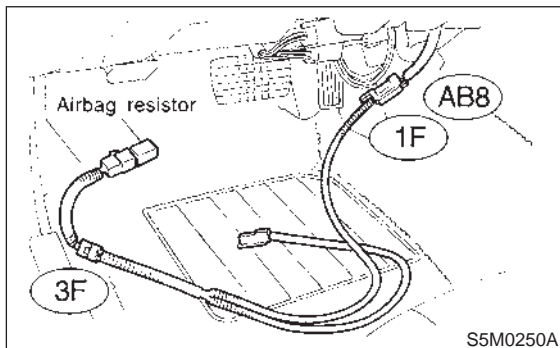
2) Remove glove box <Ref. to 5-4 [W1A0].> and disconnect passenger's airbag module connector (AB9) to (AB10). <Ref. to 5-5 [W3A2].>

3) Connect test harness F connector (1F) to (AB9).

4) Connect airbag resistor to test harness F connector (3F).



5) Remove lower cover panel <Ref. to 5-4 [W1A0].> and connect test harness F connector (1F) to (AB8) with airbag resistor attached to test harness F connector (3F).



6) Connect battery ground cable and turn ignition switch to ON.
7) Check airbag warning light illuminates.

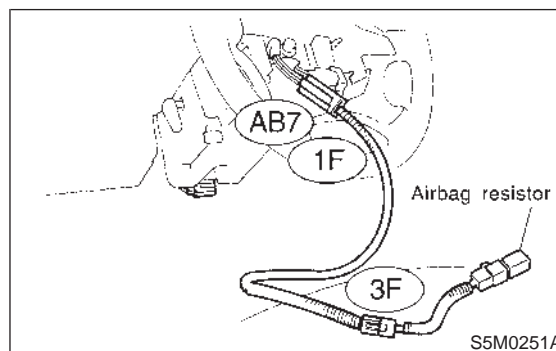
NOTE:

In some cases the airbag warning light will go OFF after about 7 seconds but will turn ON again within 30 seconds. In this case continue diagnostics with the basic diagnostics procedures or trouble code procedures.

- CHECK** : **Does airbag warning light go off after about 7 seconds and remain off for more than 30 seconds?**
- YES** : Replace with a new passenger's airbag module. <Ref. to 5-5 [W3A2].> Go to step 4D6.
- NO** : Perform diagnostics and repair according to indicated trouble code. <Ref. to 5-5 [T5A0].>

4D4 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

- 1) Turn ignition switch to "OFF". Disconnect battery ground cable, and wait 20 seconds.
- 2) Connect connector (AB8) to (AB3).
- 3) Remove driver's airbag module and connect test harness F connector (1F) to (AB7). <Ref. to 5-5 [W3A1].>
- 4) Connect airbag resistor to test harness F connector (3F).



- 5) Connect battery ground cable and turn ignition switch to ON.
- 6) Check airbag warning light illuminates.

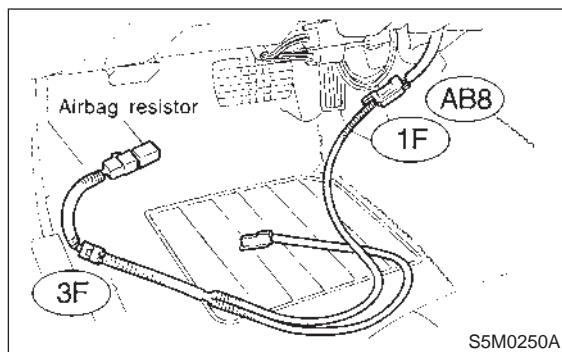
NOTE:

In some cases the airbag warning light will go OFF after about 7 seconds but will turn ON again within 30 seconds. In this case continue diagnostics with the basic diagnostics procedures or trouble code procedures.

- CHECK** : **Does airbag warning light go off after about 7 seconds and remain off for more than 30 seconds?**
- YES** : Replace with a new driver's airbag module. <Ref. to 5-5 [W3A1].> Go to step 4D6.
- NO** : Go to step 4D5.

4D5 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

- 1) Turn ignition switch to OFF. Disconnect battery ground cable, and wait 20 seconds.
- 2) Remove lower cover panel and connect test harness F connector (1F) to (AB8) <Ref. to 5-4 [W1A0].> with airbag resistor attached to test harness F connector (3F).



- 3) Connect battery ground cable and turn ignition switch to ON.
- 4) Check airbag warning light illuminates.

NOTE:

In some cases the airbag warning light will go OFF after about 7 seconds but will turn ON again within 30 seconds. In this case continue diagnostics with the basic diagnostics procedures or trouble code procedures.

- CHECK** : ***Does airbag warning light go off after about 7 seconds and remain off for more than 30 seconds?***
- YES** : Replace with a new combination switch. <Ref. to 5-5 [W600].> Go to step **4D6**.
- NO** : Perform diagnostics and repair according to indicated trouble code. <Ref. to 5-5 [T5A0].>

4D6 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

- 1) Connect battery ground cable and turn ignition switch to ON.
- 2) Check airbag warning light illuminates.

NOTE:

In some cases the airbag warning light will go OFF after about 7 seconds but will turn ON again within 30 seconds. In this case continue diagnostics with the basic diagnostics procedures or trouble code procedures.

- CHECK** : ***Does airbag warning light go off after about 7 seconds and remain off for more than 30 seconds?***
- YES** : Perform clear memory. <Ref. to 5-5 [T4C0].>
- NO** : Go to step **4D1**.

5. Diagnostics Chart with Trouble Code

A: TROUBLE CODES

1. LIST OF TROUBLE CODES

Trouble code/ Contents of troubles	Memory function	Contents of diagnosis	Index No.
11	Provided.	<ul style="list-style-type: none"> ● Airbag main harness circuit is open, shorted or shorted to ground. ● Airbag module harness (driver) circuit is open, shorted or shorted to ground. ● Roll connector circuit is open, shorted or shorted to ground. ● Airbag control module is faulty. 	<Ref. to 5-5 [T5B0].>
12	Provided.	<ul style="list-style-type: none"> ● Airbag main harness circuit is open, shorted or shorted to ground. ● Airbag module harness (passenger) circuit is open, shorted or shorted to ground. ● Airbag control module is faulty. 	<Ref. to 5-5 [T5C0].>
15	Provided.	<ul style="list-style-type: none"> ● Airbag main harness circuit (driver) is shorted to power supply. ● Airbag module harness (driver) is shorted to power supply. ● Roll connector is shorted to power supply. ● Airbag control module is faulty. 	<Ref. to 5-5 [T5D0].>
16	Provided.	<ul style="list-style-type: none"> ● Airbag main harness circuit (passenger) is shorted to power supply. ● Airbag module harness (passenger) is shorted to power supply. ● Airbag control module is faulty. 	<Ref. to 5-5 [T5E0].>
21	Provided.	Airbag control module is faulty.	<Ref. to 5-5 [T5F0].>
22	Provided.	Front airbag module is inflated.	<Ref. to 5-5 [T5G0].>
23	Not provided.	(AB6) is not connected properly to airbag control module.	<Ref. to 5-5 [T5H0].>
24	Not provided.	<ul style="list-style-type: none"> ● Airbag control module is faulty. ● Airbag main harness circuit is open. ● Fuse No. 11 (in joint box) is blown. ● Body harness circuit is open. 	<Ref. to 5-5 [T5I0].>
25	Provided.	<ul style="list-style-type: none"> ● Airbag control module is faulty. ● Airbag main harness circuit is open. ● Fuse No. 6 (in joint box) is blown. ● Body harness circuit is open. 	<Ref. to 5-5 [T5J0].>
31	Provided.	<ul style="list-style-type: none"> ● Front sub sensor harness (RH) circuit is shorted. ● Front sub sensor harness (RH) circuit is open. ● Front sub sensor (RH) is faulty. ● Airbag control module is faulty. 	<Ref. to 5-5 [T5K0].>
32	Provided.	<ul style="list-style-type: none"> ● Front sub sensor harness (LH) circuit is shorted. ● Front sub sensor harness (LH) circuit is open. ● Front sub sensor (LH) is faulty. ● Airbag control module is faulty. 	<Ref. to 5-5 [T5L0].>
Airbag warning light remains on.	Not provided.	<ul style="list-style-type: none"> ● Airbag warning light is faulty. ● Airbag control module to airbag warning light harness circuit is shorted or open. ● Grounding circuit is faulty. ● Airbag control module is faulty. ● (AB1) and (B31) are not connected properly. ● (AB6) is not connected properly to airbag control module. 	<Ref. to 5-5 [T5M0].>

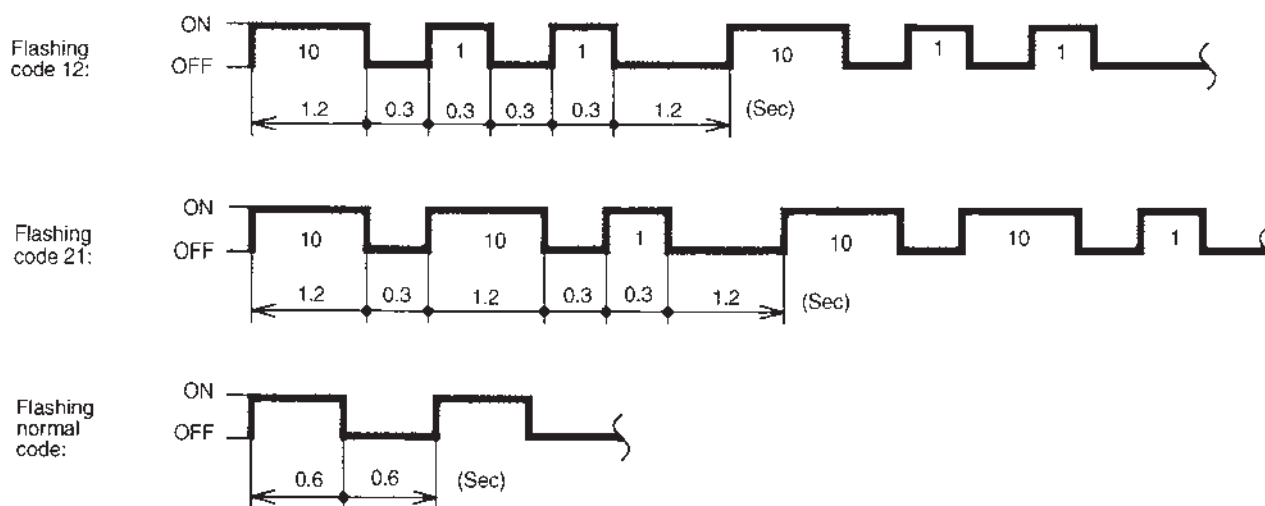
Trouble code/ Contents of troubles	Memory function	Contents of diagnosis	Index No.
Airbag warning light remains off.	Not provided.	<ul style="list-style-type: none"> ● Fuse No. 18 (in joint box) is blown. ● Body harness circuit is open. ● Airbag warning light is faulty. ● Airbag main harness is faulty. ● Airbag control module is faulty. 	<Ref. to 5-5 [T5N0].>
Warning light indicates trouble code, then nor- mal code. (Flashing trouble code.)	Provided.	Airbag system component parts are faulty.	<Ref. to 5-5 [T5O0].>
Warning light indicates trouble code, then nor- mal code. (Flashing nor- mal code.)	Not provided.	<ul style="list-style-type: none"> ● Airbag connector is faulty. ● Fuse No. 11 (in joint box) is blown. ● Airbag main harness is faulty. ● Airbag control module is faulty. ● Body harness is faulty. 	<Ref. to 5-5 [T5P0].>

2. HOW TO READ TROUBLE CODES

The AIRBAG warning light flashes a code corresponding to the faulty parts.

The long segment (1.2 sec on) indicates a “ten”, and the short segment (0.3 sec on) indicates a “one”.

Example:



B5M0117A

B: TROUBLE CODE 11

DIAGNOSIS:

- Airbag main harness circuit is open, shorted or shorted to ground.
- Airbag module harness (Driver) circuit is open, shorted or shorted to ground.
- Roll connector circuit is open, shorted or shorted to ground.
- Airbag control module is faulty.

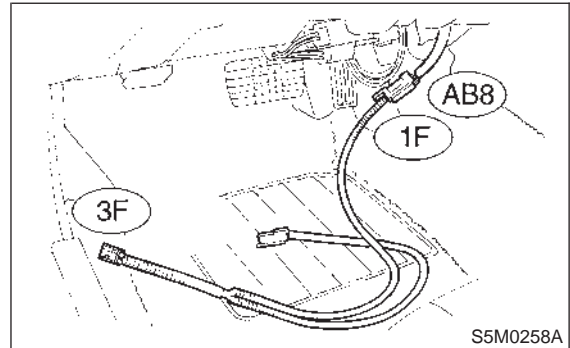
CAUTION:

Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.

After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5B1 : AIRBAG MAIN HARNESS INSPECTION

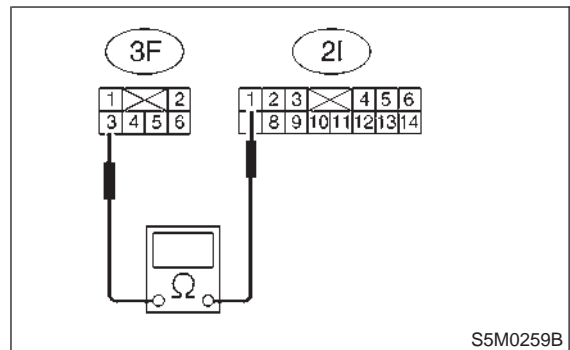
- 1) Remove lower cover panel <Ref. to 5-4 [W1A0].>, and connect connector (AB8) below steering column to test harness F connector (1F).



- 2) Disconnect connector (AB6) <Ref. to 5-5 [W5A0].> from airbag control module, and connect it to test harness I connector (1I) terminal.
- 3) Measure resistance between test harness I connector (2I) and test harness F connector (3F) terminals.

Connector & terminal

(2I) No. 1 — (3F) No. 3:



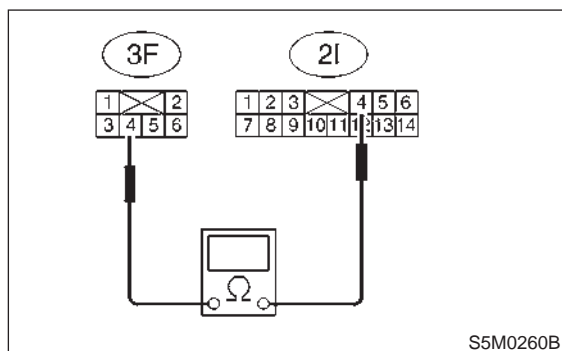
- CHECK** : Is resistance less than 10 Ω?
- YES** : Go to step 5B2.
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5B2 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between test harness I connector (2I) and test harness F connector (3F) terminals.

Connector & terminal

(2I) No. 4 — (3F) No. 4:



CHECK : Is resistance less than 10 Ω?

YES : Go to step 5B3.

NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

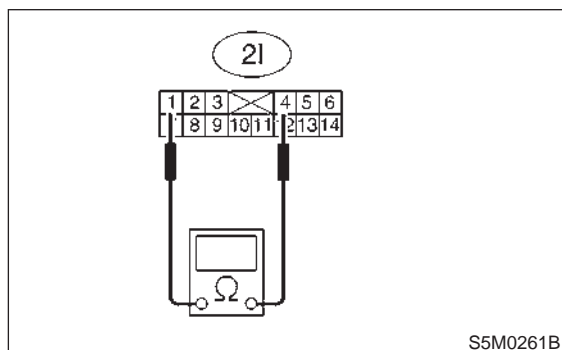
5B3 : AIRBAG MAIN HARNESS INSPECTION

1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness I connector (1I).

2) Measure resistance between test harness I connector (2I) terminal.

Connector & terminal

(2I) No. 1 — No. 4:



CHECK : Is resistance more than 10 kΩ?

YES : Go to step 5B4.

NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

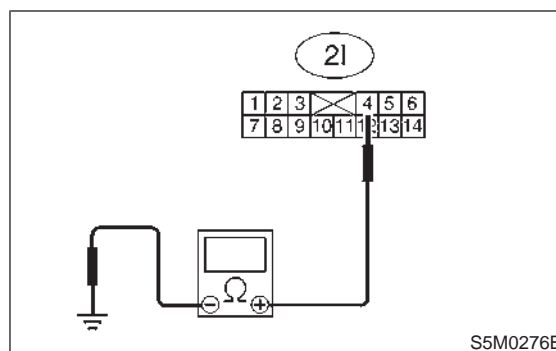
5B4 : AIRBAG MAIN HARNESS INSPECTION

1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness I connector (1I).

2) Measure resistance between test harness I connector (2I) terminals and chassis ground.

Connector & terminal

(2I) No. 4 (+) — Chassis ground (-):



CHECK : Is resistance more than 200 Ω?

YES : Go to step 5B5.

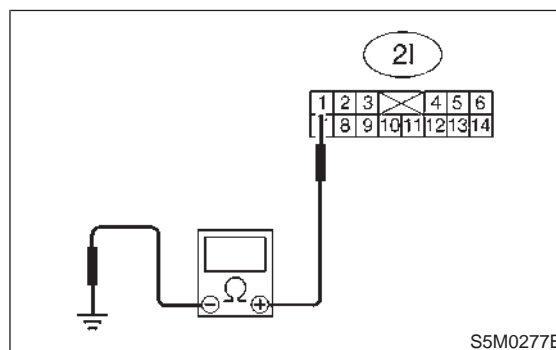
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5B5 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between test harness I connector (2I) terminals and chassis ground.

Connector & terminal

(2I) No. 1 (+) — Chassis ground (-):



CHECK : Is resistance more than 200 Ω?

YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>

NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

C: TROUBLE CODE 12

DIAGNOSIS:

- Airbag main harness circuit is open, shorted or shorted to ground.
- Airbag module harness (Passenger) circuit is open, shorted or shorted to ground.
- Airbag control module is faulty.

CAUTION:

Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.

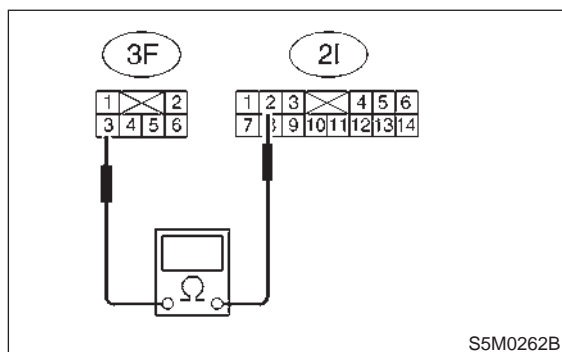
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5C1 : AIRBAG MAIN HARNESS INSPECTION

- 1) Remove glove box. <Ref. to 5-4 [W1A0].>
- 2) Disconnect connector (AB9) and (AB10) <Ref. to 5-5 [W3A2].> and connect connector (AB9) to test harness F connector (1F).
- 3) Disconnect connector (AB6) <Ref. to 5-5 [W5A0].> from airbag control module, and connect it to test harness I connector (1I) terminal.
- 4) Measure resistance between test harness I connector (2I) and test harness F connector (3F) terminals.

Connector & terminal

(2I) No. 2 — (3F) No. 3:



CHECK : Is resistance less than 10 Ω?

YES : Go to step 5C2.

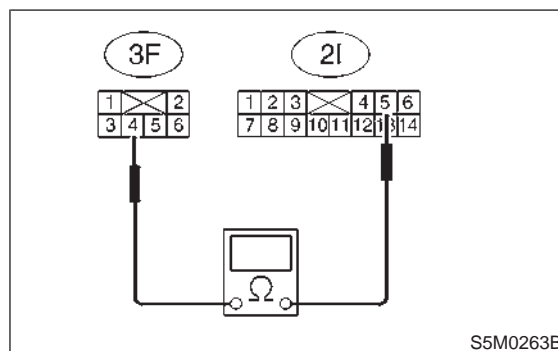
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5C2 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between test harness I connector (2I) and test harness F connector (3F) terminals.

Connector & terminal

(2I) No. 5 — (3F) No. 4:



CHECK : Is resistance less than 10 Ω?

YES : Go to step 5C3.

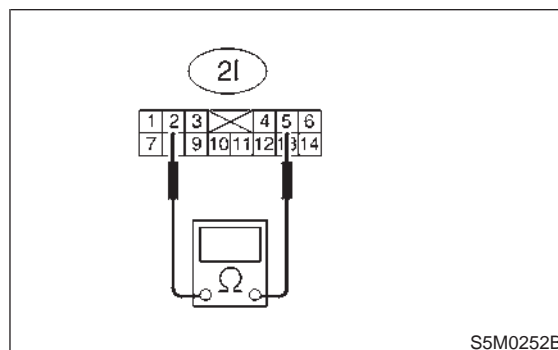
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5C3 : AIRBAG MAIN HARNESS INSPECTION

- 1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness I connector (1I).
- 2) Measure resistance between test harness I connector (2I) terminal.

Connector & terminal

(2I) No. 2 — No. 5:



CHECK : Is resistance more than 10 kΩ?

YES : Go to step 5C4.

NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

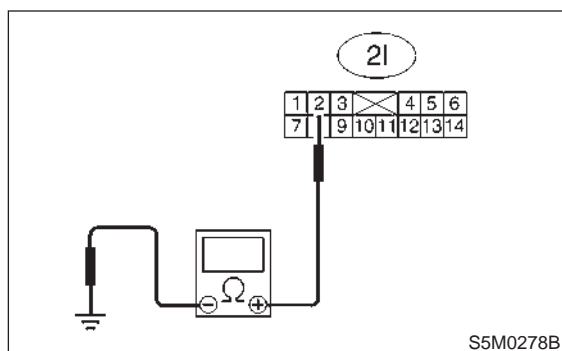
5C4 : AIRBAG MAIN HARNESS INSPECTION

1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness I connector (1I).

2) Measure resistance between test harness I connector (2I) terminals and chassis ground.

Connector & terminal

(2I) No. 2 (+) — Chassis ground (-):



CHECK : Is resistance more than 200 Ω ?

YES : Go to step 5C5.

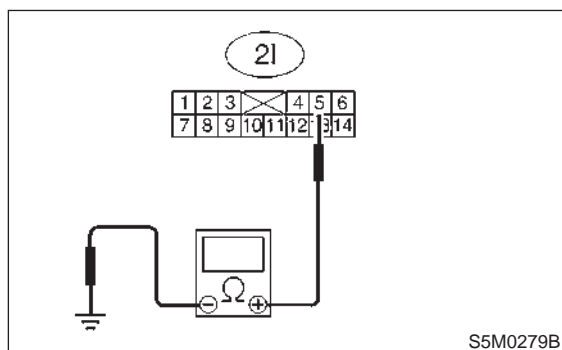
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5C5 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between test harness I connector (2I) terminals and chassis ground.

Connector & terminal

(2I) No. 5 (+) — Chassis ground (-):



CHECK : Is resistance more than 200 Ω ?

YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>

NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

D: TROUBLE CODE 15**DIAGNOSIS:**

- Airbag main harness circuit (Driver) is shorted to power supply.
- Airbag module harness (Driver) is shorted to power supply.
- Roll connector is shorted to power supply.
- Airbag control module is faulty.

CAUTION:

Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground terminal and then wait at least 20 seconds.

After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5D1 : AIRBAG MAIN HARNESS INSPECTION

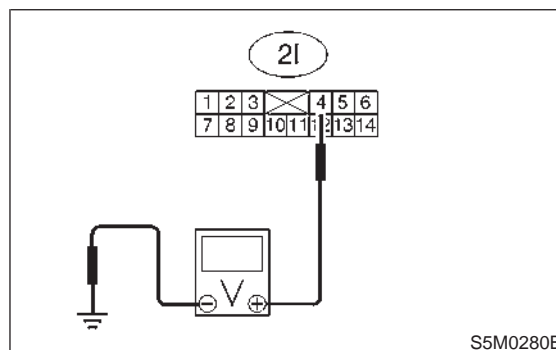
1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness I connector (1I).

2) Connect battery ground cable and turn ignition switch "ON" (engine off).

3) Measure voltage across each test harness I connector (2I) terminal and chassis ground.

Connector & terminal

(2I) No. 4 (+) — Chassis ground (-):



CHECK : Is voltage less than 1 V?

YES : Go to step 5D2.

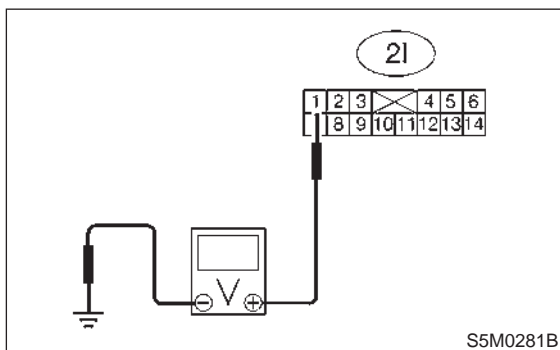
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5D2 : AIRBAG MAIN HARNESS INSPECTION

Measure voltage across each test harness I connector (2I) terminal and chassis ground.

Connector & terminal

(2I) No. 1 (+) — Chassis ground (-):



- CHECK** : Is voltage less than 1 V?
- YES** : Replace airbag control module. <Ref. to 5-5 [W5A0].>
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

E: TROUBLE CODE 16

DIAGNOSIS:

- Airbag main harness circuit (Passenger) is shorted to power supply.
- Airbag module harness (Passenger) is shorted to power supply.
- Airbag control module is faulty.

CAUTION:

Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground terminal and then wait at least 20 seconds.

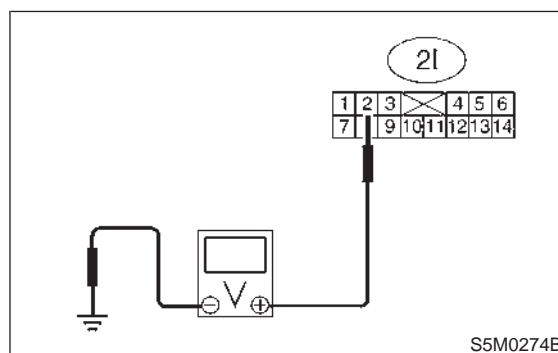
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5E1 : AIRBAG MAIN HARNESS INSPECTION

- 1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness I connector (1I).
- 2) Connect battery ground cable and turn ignition switch "ON" (engine off).
- 3) Measure voltage across each test harness I connector (2I) terminal and chassis ground.

Connector & terminal

(2I) No. 2 (+) — Chassis ground (-):



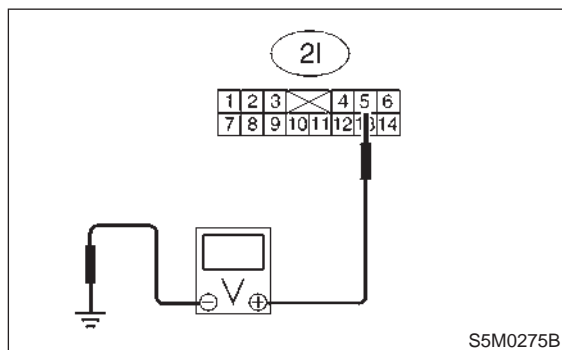
- CHECK** : Is voltage less than 1 V?
- YES** : Go to step 5E2.
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5E2 : AIRBAG MAIN HARNESS INSPECTION

Measure voltage across each test harness I connector (2I) terminal and chassis ground.

Connector & terminal

(2I) No. 5 (+) — Chassis ground (-):



- CHECK** : **Is voltage less than 1 V?**
- YES** : Replace airbag control module. <Ref. to 5-5 [W5A0].>
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

F: TROUBLE CODE 21**DIAGNOSIS:**

Airbag control module is faulty.

CAUTION:

Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground terminal, and then wait at least 20 seconds.

5F1 : CHECK IF TROUBLE CODE 21 IS INDICATED.

Confirm flashing trouble code according to "BASIC DIAGNOSTICS PROCEDURE". <Ref. to 5-5 [T4A0].>

- CHECK** : **Is airbag warning light trouble code 21 indicated?**
- YES** : Replace airbag control module. <Ref. to 5-5 [W5A0].>
- NO** : Perform clear memory. <Ref. to 5-5 [T4C0].>

G: TROUBLE CODE 22**DIAGNOSIS:**

Front airbag module is inflated.

CAUTION:

Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground terminal, and then wait at least 20 seconds.

5G1 : CHECK IF TROUBLE CODE 22 IS INDICATED.

Confirm flashing trouble code according to "BASIC DIAGNOSTICS PROCEDURE". <Ref. to 5-5 [T4A0].>

- CHECK** : *Is airbag warning light trouble code 22 indicated?*
- YES** : Replace airbag control module <Ref. to 5-5 [W5A0].>, front sub sensor <Ref. to 5-5 [W7A0].>, driver's airbag module <Ref. to 5-5 [W3A1].> and passenger's airbag module. <Ref. to 5-5 [W3A2].>
- NO** : Perform clear memory. <Ref. to 5-5 [T4C0].>

H: TROUBLE CODE 23**DIAGNOSIS:**

(AB6) is not connected properly to airbag control module.

CAUTION:

Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.

5H1 : CHECK POOR CONTACT IN CONNECTOR (AB6).

Check connector (AB6) connected to airbag control module. <Ref. to 5-5 [W5A0].>

- CHECK** : *Is there poor contact in connector (AB6)?*
- YES** : Repair poor contact in connector (AB6).
- NO** : Replace airbag control module. <Ref. to 5-5 [W5A0].>

I: TROUBLE CODE 24**DIAGNOSIS:**

- Airbag control module is faulty.
- Airbag main harness circuit is open.
- Fuse No. 11 (in joint box) is blown.
- Body harness circuit is open.

CAUTION:

Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.

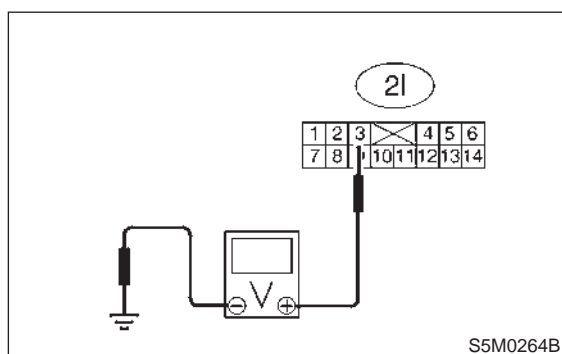
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5I1 : AIRBAG CONTROL MODULE INSPECTION

- 1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness I connector (1I).
- 2) Connect battery ground cable and turn ignition switch "ON" (engine off).
- 3) Measure voltage across connector (2I) terminal and chassis ground.

Connector & terminal

(2I) No. 3 (+) — Chassis ground (-):



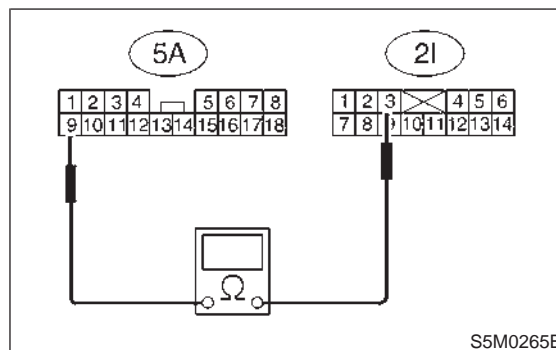
- CHECK** : **Is voltage more than 10 V?**
- YES** : Replace airbag control module. <Ref. to 5-5 [W5A0].>
- NO** : Go to step **5I2**.

5I2 : AIRBAG MAIN HARNESS INSPECTION

- 1) Go to following procedure after performing diagnostics on airbag system as per diagnosis procedure under "5I1 AIRBAG CONTROL MODULE INSPECTION" <Ref. to 5-5 [T511].> previously outlined.
- 2) Turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.
- 3) Disconnect connector (AB1) from body harness connector (B31) at front lower pillar (driver side), and connect connector (AB1) to test harness A connector (2A).
- 4) Measure resistance between test harness A connector (5A) and test harness I connector (2I) terminals.

Connector & terminal

(5A) No. 9 — (2I) No. 3:



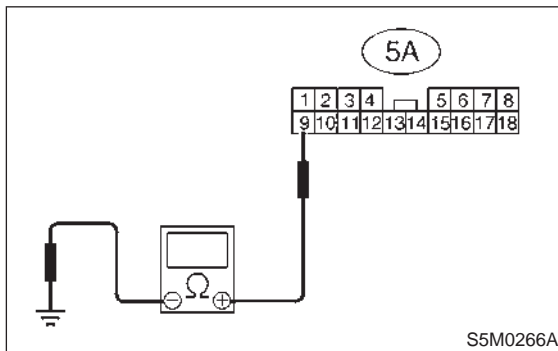
- CHECK** : **Is resistance less than 10 Ω?**
- YES** : Go to step **5I3**.
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5I3 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between each terminal of connectors (5A) and chassis ground.

Connector & terminal

(5A) No. 9 (+) — Chassis ground (-):



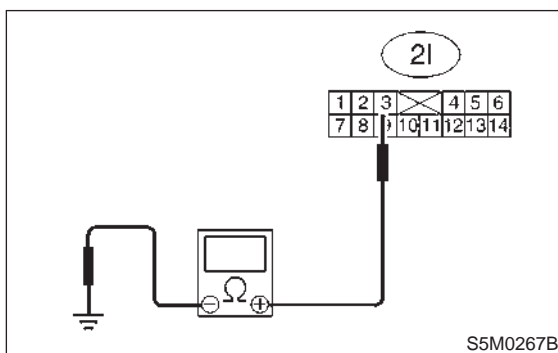
- CHECK** : Is resistance more than 10 kΩ?
- YES** : Go to step 5I4.
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5I4 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between each terminal of connectors (2I) and chassis ground.

Connector & terminal

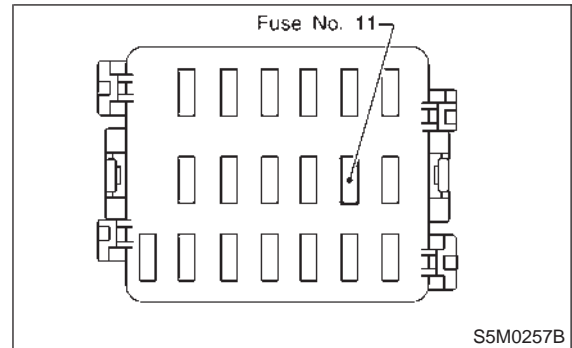
(2I) No. 3 (+) — Chassis ground (-):



- CHECK** : Is resistance more than 10 kΩ?
- YES** : Go to step 5I5.
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5I5 : FUSE NO. 11 (IN JOINT BOX) INSPECTION

Make sure ignition switch is turned "OFF", then remove and visually check fuse No. 11 (in joint box).



- CHECK** : Is fuse No. 11 blown?
- YES** : Replace fuse No. 11. If fuse No. 11 blows again, repair body harness.
- NO** : Repair body harness.

J: TROUBLE CODE 25**DIAGNOSIS:**

- Airbag control module is faulty.
- Airbag main harness circuit is open.
- Fuse No. 6 (in joint box) is blown.
- Body harness circuit is open.

CAUTION:

Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.

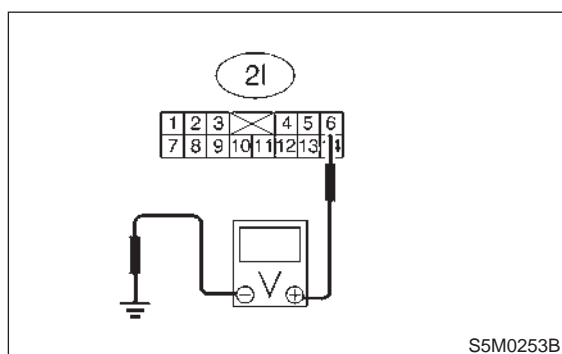
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5J1 : AIRBAG CONTROL MODULE INSPECTION

- 1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].> and connect it to test harness I connector (1I).
- 2) Connect battery ground cable and turn ignition switch "ON". (engine off)
- 3) Measure voltage across connector (2I) terminal and chassis ground.

Connector & terminal

(2I) No. 6 (+) — Chassis ground (-):



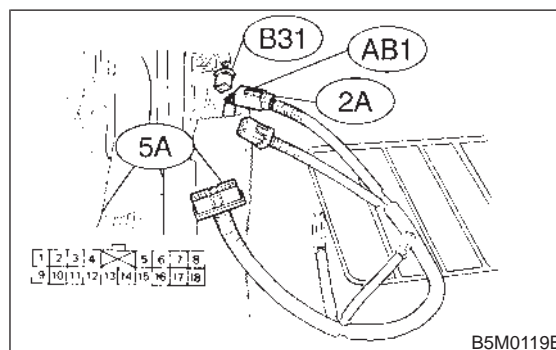
- CHECK** : **Is voltage more than 10 V?**
- YES** : Replace airbag control module. <Ref. to 5-5 [W5A0].>
- NO** : Go to step **5J2**.

5J2 : AIRBAG MAIN HARNESS INSPECTION

1) Go to following procedure after performing diagnostics on airbag system as per diagnosis procedure under "5J1 AIRBAG CONTROL MODULE INSPECTION" <Ref. to 5-5 [T5J1].> previously outlined.

2) Turn ignition switch "OFF", disconnect battery ground terminal and then wait at least 20 seconds.

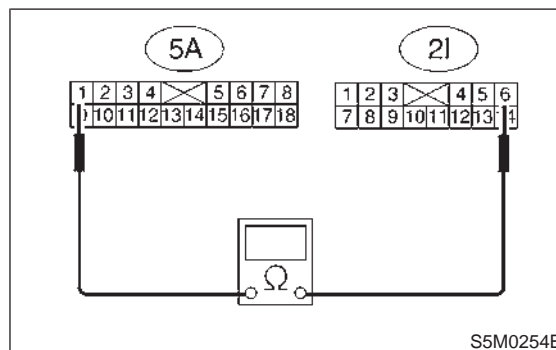
3) Disconnect body harness connector (B31) from connector (AB1) at front lower pillar, and connect connector (AB1) to test harness A connector (2A).



4) Measure resistance between test harness A connector (5A) terminal and test harness I connector (2I) terminal.

Connector & terminal

(5A) No. 1 — (2I) No. 6:



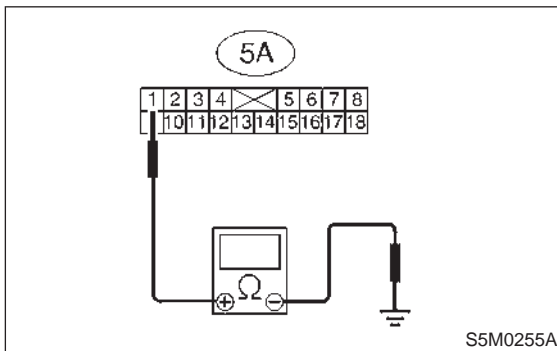
- CHECK** : **Is resistance less than 10 Ω?**
- YES** : Go to step **5J3**.
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5J3 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between (5A) connector terminal and chassis ground.

Connector & terminal

(5A) No. 1 (+) — Chassis ground (-):



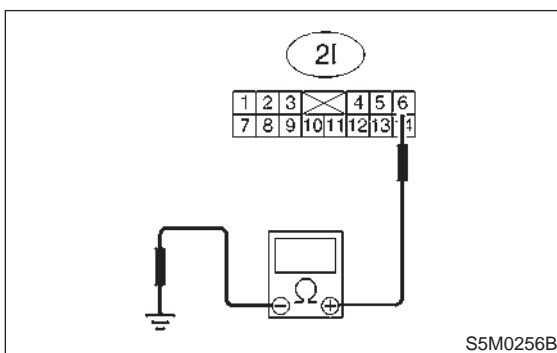
- CHECK** : Is resistance more than 10 k Ω ?
YES : Go to step 5J4.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5J4 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between (2I) connector terminal and chassis ground.

Connector & terminal

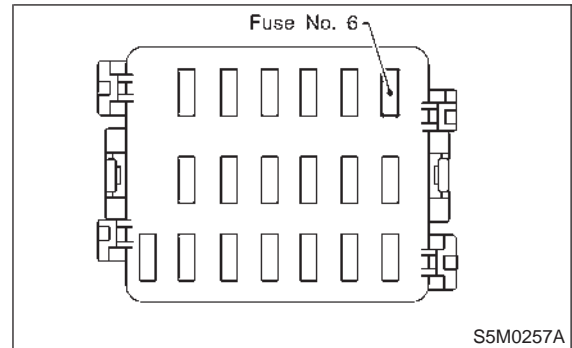
(2I) No. 6 (+) — Chassis ground (-):



- CHECK** : Is resistance more than 10 k Ω ?
YES : Go to step 5J5.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5J5 : FUSE NO. 6 (IN JOINT BOX) INSPECTION

- 1) Turn ignition switch "OFF".
- 2) Remove and visually check fuse No. 6 (in joint box).



- CHECK** : Is fuse No. 6 blown?
YES : Replace fuse No. 6 if fuse No. 6 blows again, repair body harness.
NO : Repair body harness.

K: TROUBLE CODE 31**DIAGNOSIS:**

- Front sub sensor harness (RH) circuit is shorted.
- Front sub sensor harness (RH) circuit is open.
- Front sub sensor (RH) is faulty.
- Airbag control module is faulty.

CAUTION:

Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground terminal, and then wait at least 20 seconds.

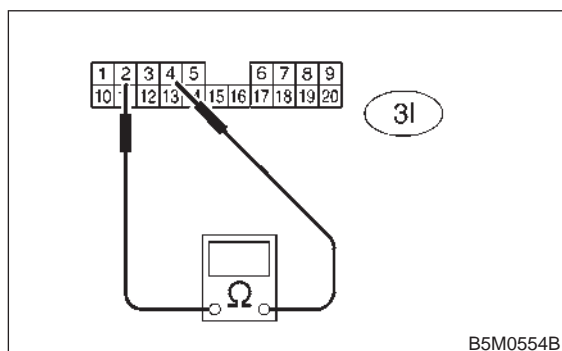
**5K1 : FRONT SUB SENSOR (RH) AND
FRONT SUB SENSOR HARNESS
(RH) INSPECTION**

1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness I connector (1I).

2) Measure resistance between test harness I connector (3I) terminal.

Connector & terminal

(3I) No. 2 — No. 4:



CHECK : **Is the resistance between 750 Ω and 1 k Ω ?**

YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>

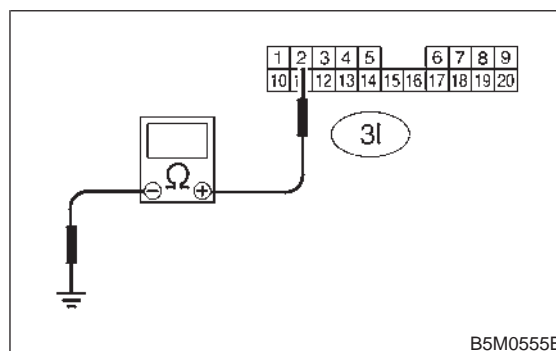
NO : Go to step **5K2**.

**5K2 : FRONT SUB SENSOR (RH) AND
FRONT SUB SENSOR HARNESS
(RH) INSPECTION**

Measure resistance across test harness I connector (3I) terminal and chassis ground.

Connector & terminal

(3I) No. 2 (+) — Chassis ground (-):



CHECK : **Is the resistance more than 10 k Ω ?**

YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>

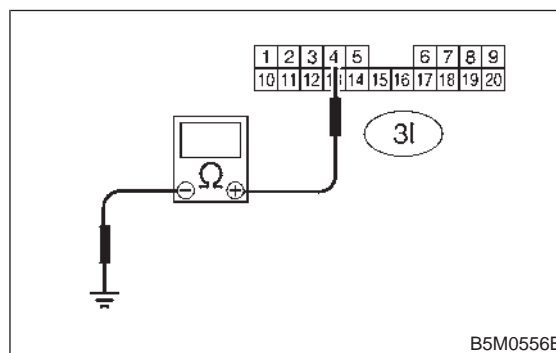
NO : Go to step **5K3**.

**5K3 : FRONT SUB SENSOR (RH) AND
FRONT SUB SENSOR HARNESS
(RH) INSPECTION**

Measure resistance across test harness I connector (3I) terminal and chassis ground.

Connector & terminal

(3I) No. 4 (+) — Chassis ground (-):



CHECK : **Is the resistance more than 10 k Ω ?**

YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>

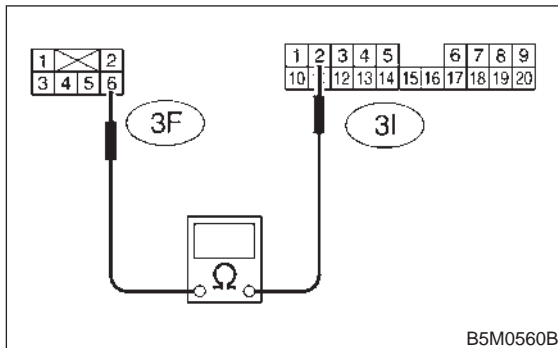
NO : Go to step **5K4**.

5K4 : AIRBAG MAIN HARNESS INSPECTION

- 1) Disconnect connector (AB14) and (AB15), then connect test harness F connector (2F) and connector (AB14).
- 2) Measure resistance between test harness I connector (3I) terminal and test harness F connector (3F) terminal.

Connector & terminal

(3I) No. 2 — (3F) No. 6:



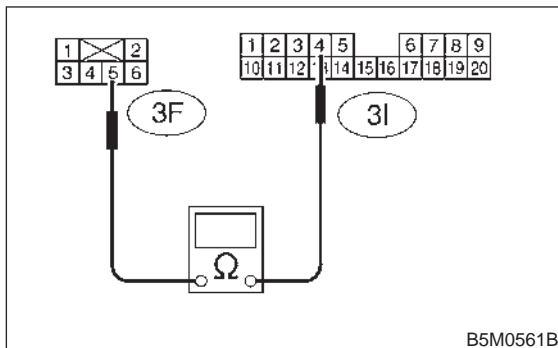
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Go to step 5K5.
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5K5 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between test harness I connector (3I) terminal and test harness F connector (3F) terminal.

Connector & terminal

(3I) No. 4 — (3F) No. 5:



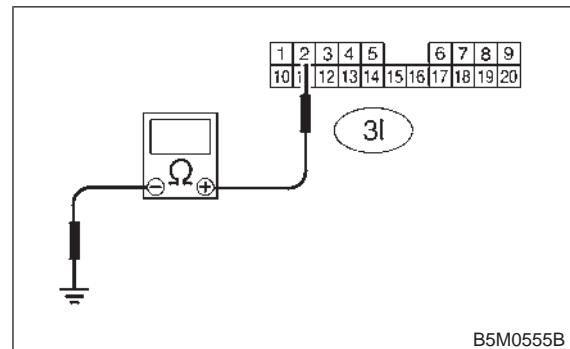
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Go to step 5K6.
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5K6 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance across test harness I connector (3I) terminal and chassis ground.

Connector & terminal

(3I) No. 2 (+) — Chassis ground (-):



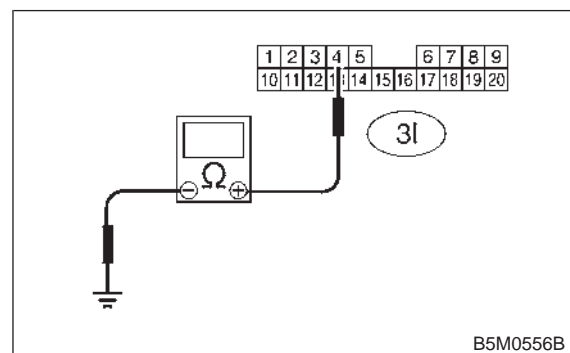
- CHECK** : Is the resistance more than 10 kΩ?
- YES** : Go to step 5K7.
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5K7 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance across test harness I connector (3I) terminal and chassis ground.

Connector & terminal

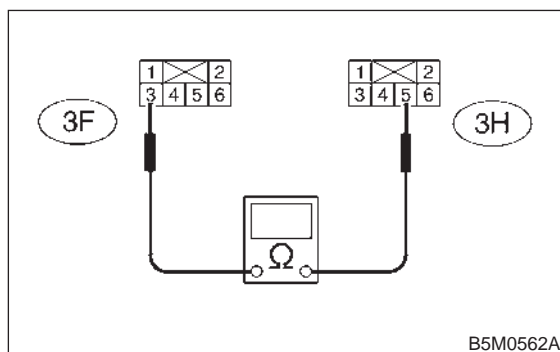
(3I) No. 4 (+) — Chassis ground (-):



- CHECK** : Is the resistance more than 10 kΩ?
- YES** : Go to step 5K8.
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5K8 : FRONT SUB SENSOR HARNESS (RH) INSPECTION

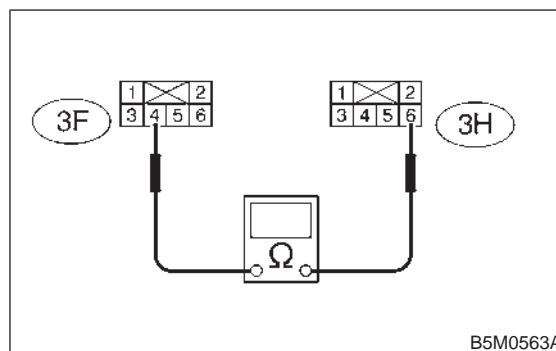
- 1) Connect test harness F connector (1F) and connector (AB15).
- 2) Disconnect connector (AB16) from front sub sensor (RH) <Ref. to 5-5 [W7A0].> and then test harness H connector (1H) and connector (AB16).
- 3) Measure resistance between test harness F connector (3F) terminal and test harness H connector (3H) terminal.

Connector & terminal**(3F) No. 3 — (3H) No. 5:**

- CHECK** : Is the resistance less than 10 Ω?
- YES** : Go to step 5K9.
- NO** : Replace front sub sensor harness (RH).
<Ref. to 5-5 [W7A0].>

5K9 : FRONT SUB SENSOR HARNESS (RH) INSPECTION

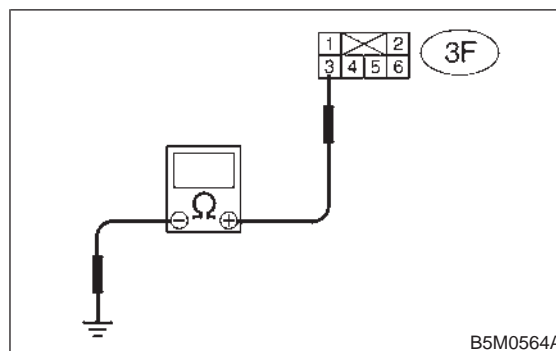
Measure resistance between test harness F connector (3F) terminal and test harness H connector (3H) terminal.

Connector & terminal**(3F) No. 4 — (3H) No. 6:**

- CHECK** : Is the resistance less than 10 Ω?
- YES** : Go to step 5K10.
- NO** : Replace front sub sensor harness (RH).
<Ref. to 5-5 [W7A0].>

5K10 : FRONT SUB SENSOR HARNESS (RH) INSPECTION

Measure resistance across test harness F connector (3F) terminal and chassis ground.

Connector & terminal**(3F) No. 3 (+) — Chassis ground (-):**

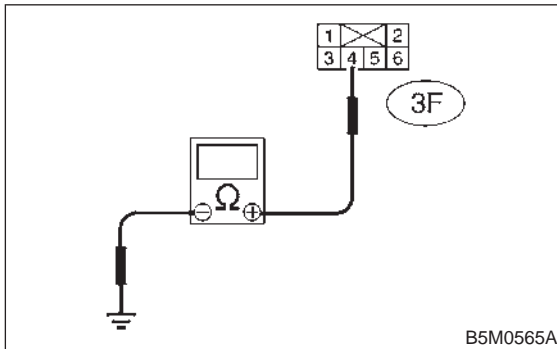
- CHECK** : Is the resistance more than 10 kΩ?
- YES** : Go to step 5K11.
- NO** : Replace front sub sensor harness (RH).
<Ref. to 5-5 [W7A0].>

5K11 : FRONT SUB SENSOR HARNESS (RH) INSPECTION

Measure resistance across test harness F connector (3F) terminal and chassis ground.

Connector & terminal

(3F) No. 4 (+) — Chassis ground (-):



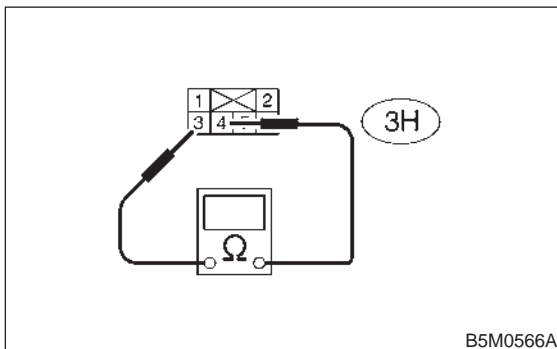
- CHECK** : Is the resistance more than 10 k Ω ?
YES : Go to step 5K12.
NO : Replace front sub sensor harness (RH). <Ref. to 5-5 [W7A0].>

5K12 : FRONT SUB SENSOR (RH) INSPECTION

- 1) Connect test harness H connector (2H) and front sub sensor (RH).
- 2) Measure resistance between test harness H connector (3H) terminal.

Connector & terminal

(3H) No. 3 — No. 4:



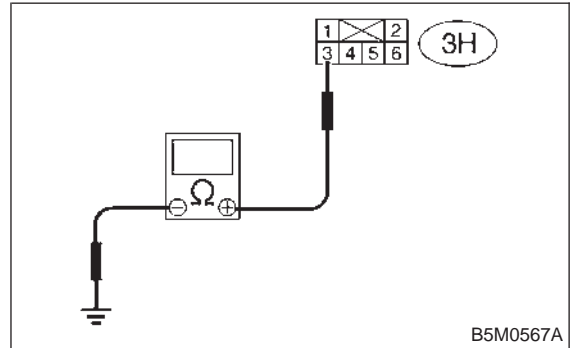
- CHECK** : Is the resistance between 750 Ω and 1 k Ω ?
YES : Go to step 5K13.
NO : Replace front sub sensor (RH). <Ref. to 5-5 [W7A0].>

5K13 : FRONT SUB SENSOR (RH) INSPECTION

Measure resistance across test harness H connector (3H) terminal and chassis ground.

Connector & terminal

(3H) No. 3 (+) — Chassis ground (-):



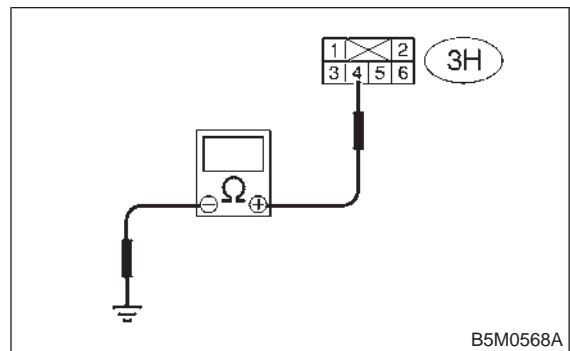
- CHECK** : Is the resistance less than 10 k Ω ?
YES : Go to step 5K14.
NO : Replace front sub sensor (RH). <Ref. to 5-5 [W7A0].>

5K14 : FRONT SUB SENSOR (RH) INSPECTION

Measure resistance across test harness H connector (3H) terminal and chassis ground.

Connector & terminal

(3H) No. 4 (+) — Chassis ground (-):



- CHECK** : Is the resistance less than 10 k Ω ?
YES : Perform clear memory. <Ref. to 5-5 [T4C0].>
NO : Replace front sub sensor (RH). <Ref. to 5-5 [W7A0].>

L: TROUBLE CODE 32**DIAGNOSIS:**

- Front sub sensor harness (LH) circuit is shorted.
- Front sub sensor harness (LH) circuit is open.
- Front sub sensor (LH) is faulty.
- Airbag control module is faulty.

CAUTION:

Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground terminal, and then wait at least 20 seconds.

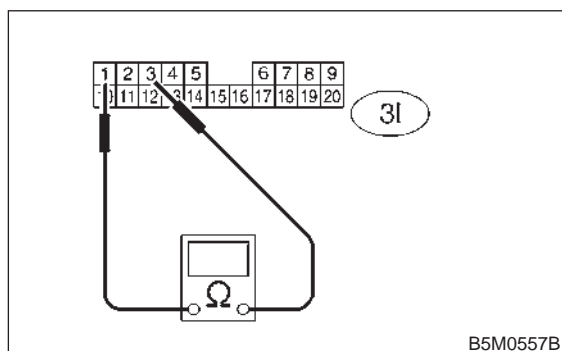
**5L1 : FRONT SUB SENSOR (LH) AND
FRONT SUB SENSOR HARNESS (LH)
INSPECTION**

1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness I connector (1I).

2) Measure resistance between test harness I connector (3I) terminal.

Connector & terminal

(3I) No. 1 — No. 3:



CHECK : **Is the resistance between 750 Ω and 1 kΩ?**

YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>

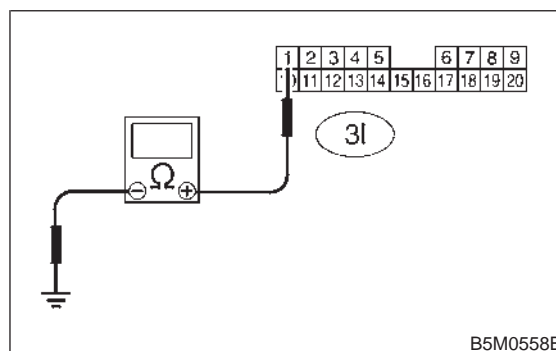
NO : Go to step 5L2.

**5L2 : FRONT SUB SENSOR (LH) AND
FRONT SUB SENSOR HARNESS (LH)
INSPECTION**

Measure resistance across test harness I connector (3I) terminal and chassis ground.

Connector & terminal

(3I) No. 1 (+) — Chassis ground (-):



CHECK : **Is the resistance more than 10 kΩ?**

YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>

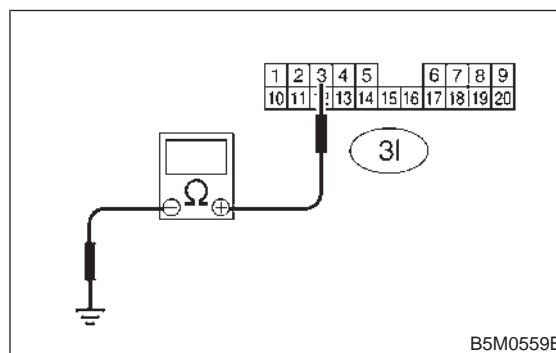
NO : Go to step 5L3.

**5L3 : FRONT SUB SENSOR (LH) AND
FRONT SUB SENSOR HARNESS (LH)
INSPECTION**

Measure resistance across test harness I connector (3I) terminal and chassis ground.

Connector & terminal

(3I) No. 3 (+) — Chassis ground (-):



CHECK : **Is the resistance more than 10 kΩ?**

YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>

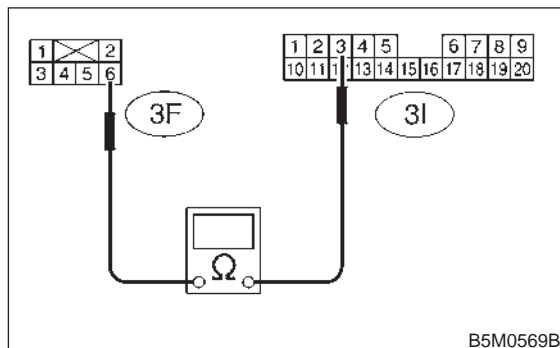
NO : Go to step 5L4.

5L4 : AIRBAG MAIN HARNESS INSPECTION

- 1) Disconnect connector (AB11) and (AB12), then connect test harness F connector (2F) and connector (AB11).
- 2) Measure resistance between test harness I connector (3I) terminal and test harness F connector (3F) terminal.

Connector & terminal

(3I) No. 3 — (3F) No. 6:



CHECK : Is the resistance less than 10 Ω?

YES : Go to step 5L5.

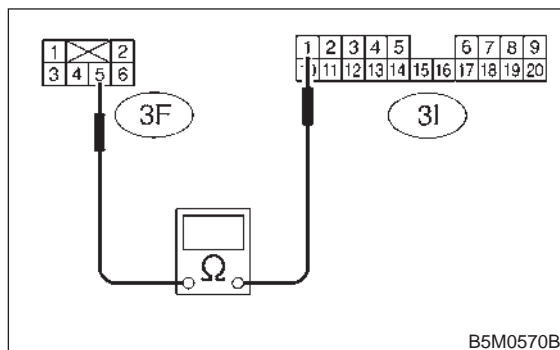
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5L5 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between test harness I connector (3I) terminal and test harness F connector (3F) terminal.

Connector & terminal

(3I) No. 1 — (3F) No. 5:



CHECK : Is the resistance less than 10 Ω?

YES : Go to step 5L6.

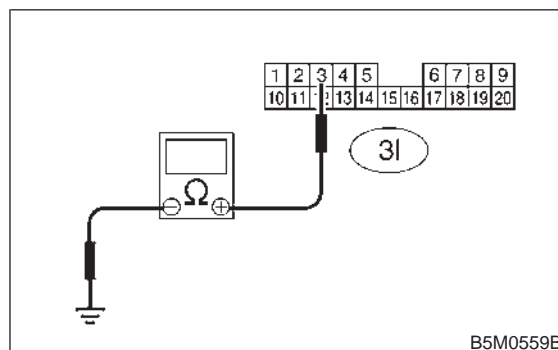
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5L6 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance across test harness I connector (3I) terminal and chassis ground.

Connector & terminal

(3I) No. 3 (+) — Chassis ground (-):



CHECK : Is the resistance more than 10 kΩ?

YES : Go to step 5L7.

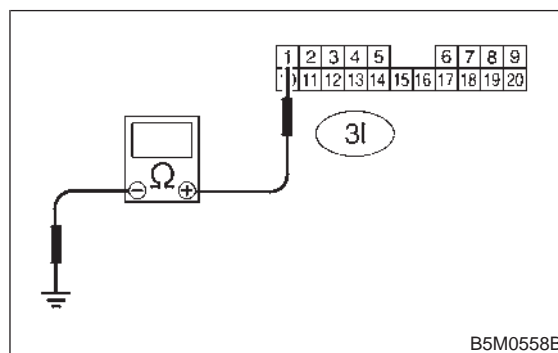
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5L7 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance across test harness I connector (3I) terminal and chassis ground.

Connector & terminal

(3I) No. 1 (+) — Chassis ground (-):



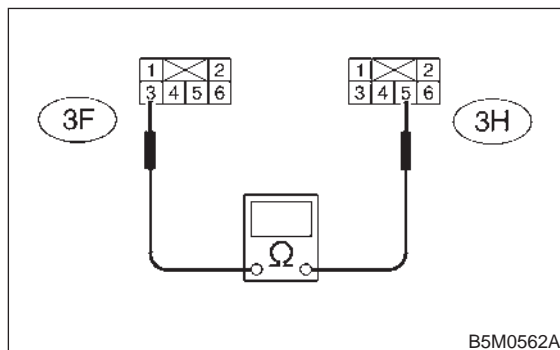
CHECK : Is the resistance more than 10 kΩ?

YES : Go to step 5L8.

NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5L8 : FRONT SUB SENSOR HARNESS (LH) INSPECTION

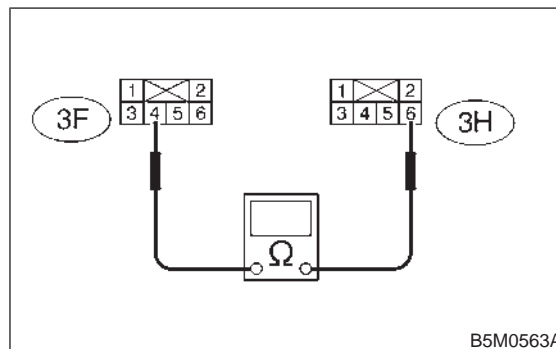
- 1) Connect test harness F connector (1F) and connector (AB12).
- 2) Disconnect connector (AB13) from front sub sensor (LH) <Ref. to 5-5 [W7A0].> and then test harness H connector (1H) and connector (AB13).
- 3) Measure resistance between test harness F connector (3F) terminal and test harness H connector (3H) terminal.

Connector & terminal**(3F) No. 3 — (3H) No. 5:**

- CHECK** : Is the resistance less than 10 Ω?
- YES** : Go to step 5L9.
- NO** : Replace front sub sensor harness (LH).
<Ref. to 5-5 [W7A0].>

5L9 : FRONT SUB SENSOR HARNESS (LH) INSPECTION

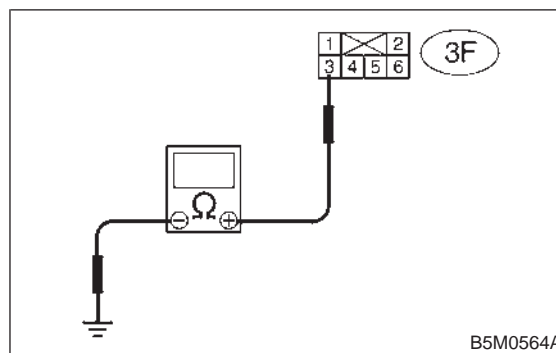
Measure resistance between test harness F connector (3F) terminal and test harness H connector (3H) terminal.

Connector & terminal**(3F) No. 4 — (3H) No. 6:**

- CHECK** : Is the resistance less than 10 Ω?
- YES** : Go to step 5L10.
- NO** : Replace front sub sensor harness (LH).
<Ref. to 5-5 [W7A0].>

5L10 : FRONT SUB SENSOR HARNESS (LH) INSPECTION

Measure resistance across test harness F connector (3F) terminal and chassis ground.

Connector & terminal**(3F) No. 3 (+) — Chassis ground (-):**

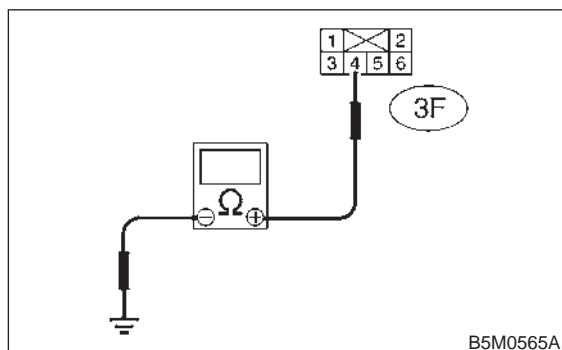
- CHECK** : Is the resistance more than 10 kΩ?
- YES** : Go to step 5L11.
- NO** : Replace front sub sensor harness (LH).
<Ref. to 5-5 [W7A0].>

5L11 : FRONT SUB SENSOR HARNESS (LH) INSPECTION

Measure resistance across test harness F connector (3F) terminal and chassis ground.

Connector & terminal

(3F) No. 4 (+) — Chassis ground (-):



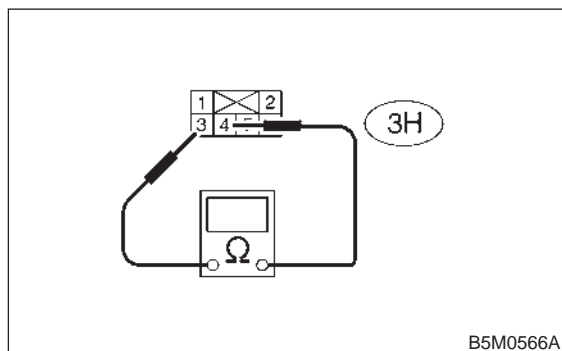
- CHECK** : Is the resistance more than 10 k Ω ?
YES : Go to step 5L12.
NO : Replace front sub sensor harness (LH). <Ref. to 5-5 [W7A0].>

5L12 : FRONT SUB SENSOR (LH) INSPECTION

- 1) Connect test harness H connector (2H) and front sub sensor (LH).
- 2) Measure resistance between test harness H connector (3H) terminal.

Connector & terminal

(3H) No. 3 — No. 4:



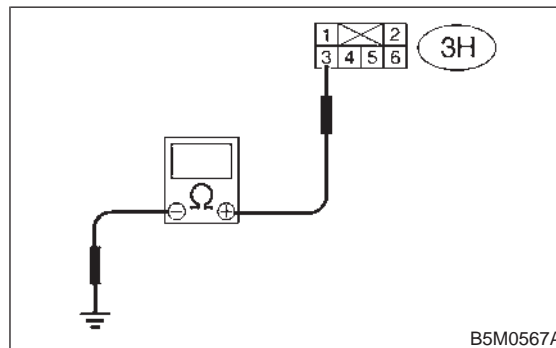
- CHECK** : Is the resistance between 750 Ω and 1 k Ω ?
YES : Go to step 5L13.
NO : Replace front sub sensor (LH). <Ref. to 5-5 [W7A0].>

5L13 : FRONT SUB SENSOR (LH) INSPECTION

Measure resistance across test harness H connector (3H) terminal and chassis ground.

Connector & terminal

(3H) No. 3 (+) — Chassis ground (-):



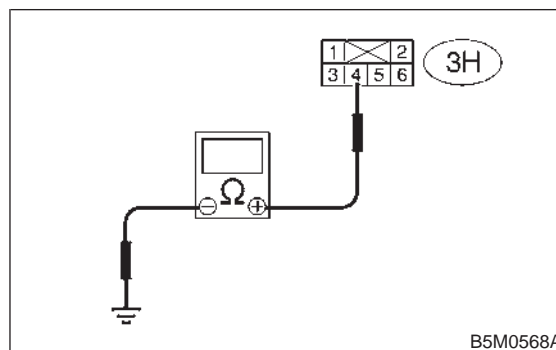
- CHECK** : Is the resistance less than 10 k Ω ?
YES : Go to step 5L14.
NO : Replace front sub sensor (LH). <Ref. to 5-5 [W7A0].>

5L14 : FRONT SUB SENSOR (LH) INSPECTION

Measure resistance across test harness H connector (3H) terminal and chassis ground.

Connector & terminal

(3H) No. 4 (+) — Chassis ground (-):



- CHECK** : Is the resistance less than 10 k Ω ?
YES : Perform clear memory. <Ref. to 5-5 [T4C0].>
NO : Replace front sub sensor (LH). <Ref. to 5-5 [W7A0].>

M: AIRBAG WARNING LIGHT REMAINS ON.

DIAGNOSIS:

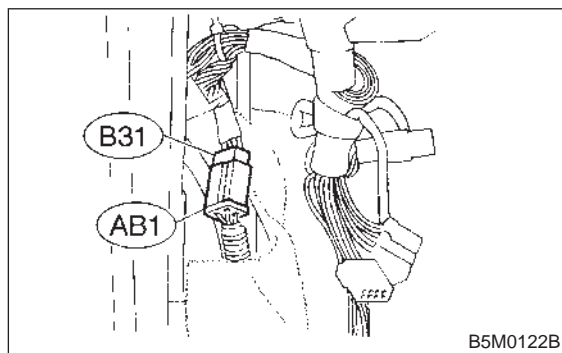
- Airbag warning light is faulty.
- Airbag control module to airbag warning light harness circuit is shorted or open.
- Grounding circuit is faulty.
- Airbag control module is faulty.
- (AB1) and (B31) are not connected properly.
- (AB6) is not connected properly to airbag control module.

CAUTION:

Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.

5M1 : CHECK POOR CONTACT IN CONNECTORS (AB1) AND (B31).

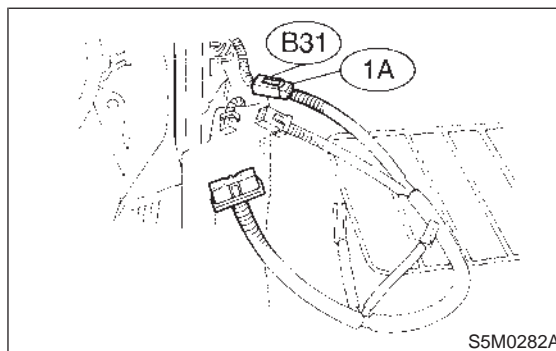
- 1) Remove front pillar lower trim (Driver side).
- 2) Check poor contact in connectors (AB1) and (B31).



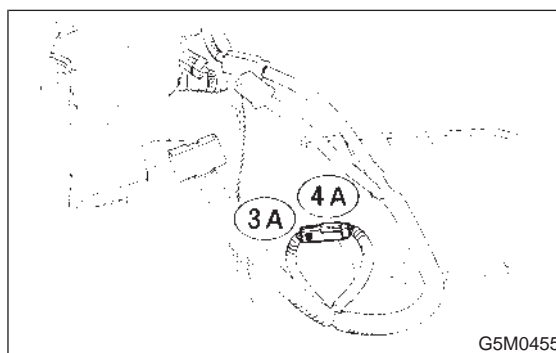
- CHECK** : Is there poor contact in double lock of connectors (AB1) and (B31)?
- YES** : Repair poor contact in double lock of connectors (AB1) and (B31).
- NO** : Go to step **5M2**.

5M2 : INSPECTION OF AIRBAG WARNING LIGHT

- 1) Turn ignition switch "OFF" and connect body harness connector (B31) to test connector A connector (1A).



- 2) Connect battery ground cable and turn ignition switch "ON", (engine off) and connect connectors (3A) and (4A).



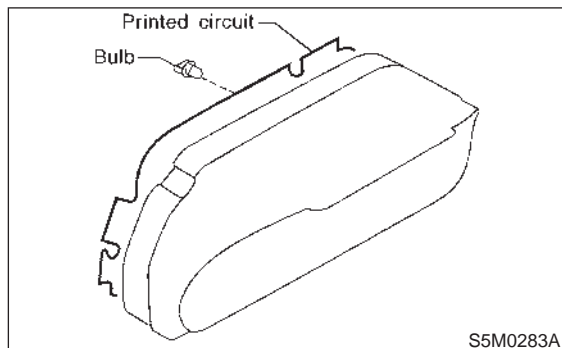
- CHECK** : Does the airbag warning light come off?
- YES** : Go to step **5M4**.
- NO** : Go to step **5M3**.

5M3 : INSPECTION OF BODY HARNESS

Check body harness.

NOTE:

After problem has been eliminated, disconnect connectors (3A) and (4A).



- CHECK** : *Is there anything unusual to body harness?*
- YES** : Repair body harness.
- NO** : Replace airbag warning light bulb <Ref. to 6-2 [W8B0].> or combination meter printed circuit.

5M4 : CHECK POOR CONTACT IN CONNECTOR (AB6).

Check connector (AB6) connected to airbag control module. <Ref. to 5-5 [W5A0].>

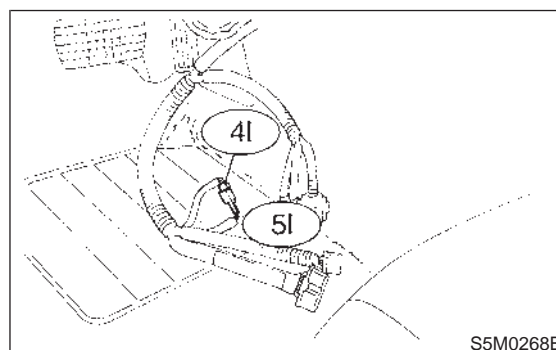
- CHECK** : *Is there poor contact in connector (AB6)?*
- YES** : Repair poor contact in connector (AB6).
- NO** : Go to step **5M5**.

5M5 : INSPECTION OF AIRBAG MAIN HARNESS

- 1) Turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds, and re-connect connectors (AB1) and (B31).
- 2) Remove instrument panel lower cover and disconnect (AB3) with (AB8), then disconnect connector (AB6) from airbag control module, <Ref. to 5-5 [W5A0].> and connect it to test harness I connector (1I).
- 3) Connect battery ground cable and turn ignition switch "ON", (engine off) and connect connectors (4I) and (5I).

NOTE:

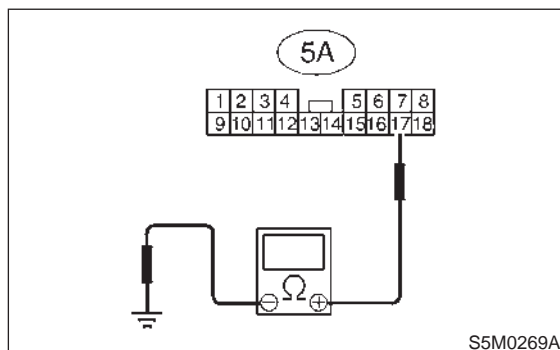
After problem has been eliminated, disconnect connectors (4I) and (5I).



- CHECK** : *Does the airbag warning light come on?*
- YES** : Go to step **5M6**.
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5M6 : GROUNDING CIRCUIT INSPECTION

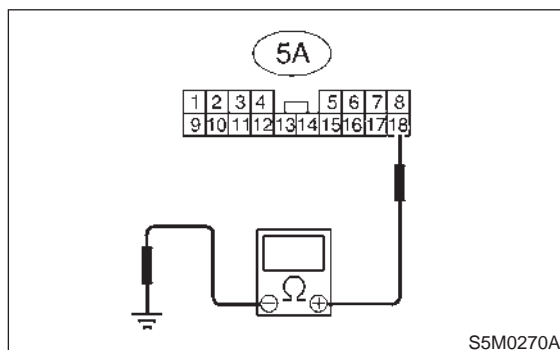
- 1) Turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.
- 2) Disconnect connector (AB1) from body harness connector (B31), and connect connector (B31) to test harness A connector (1A).
- 3) Measure resistance between connector (5A) terminal and chassis ground.

Connector & terminal
(5A) No. 17 (+) — Chassis ground (-):


- CHECK** : Is resistance less than 10 Ω?
- YES** : Go to step 5M7.
- NO** : Repair body grounding circuit.

5M7 : GROUNDING CIRCUIT INSPECTION

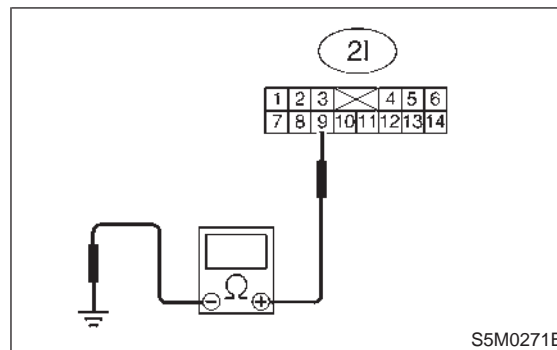
Measure resistance between connector (5A) terminal and chassis ground.

Connector & terminal
(5A) No. 18 (+) — Chassis ground (-):


- CHECK** : Is resistance less than 10 Ω?
- YES** : Go to step 5M8.
- NO** : Repair body grounding circuit.

5M8 : INSPECTION OF AIRBAG MAIN HARNESS

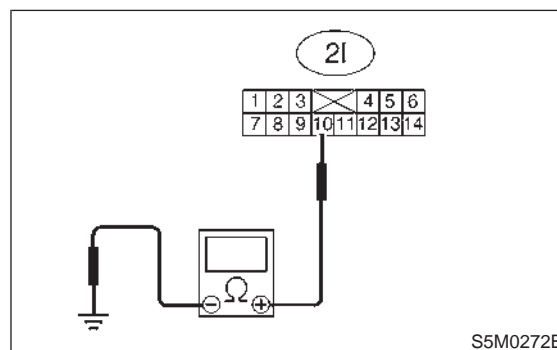
- 1) Connect connectors (AB1) and (B31). Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness I connector (1I).
- 2) Measure resistance between each test harness I connector (2I) terminal and chassis ground.

Connector & terminal
(2I) No. 9 (+) — Chassis ground (-):


- CHECK** : Is resistance less than 10 Ω?
- YES** : Go to step 5M9.
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5M9 : INSPECTION OF AIRBAG MAIN HARNESS

Measure resistance between each test harness I connector (2I) terminal and chassis ground.

Connector & terminal
(2I) No. 10 (+) — Chassis ground (-):


- CHECK** : Is resistance less than 10 Ω?
- YES** : Replace airbag control module. <Ref. to 5-5 [W5A0].>
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

N: AIRBAG WARNING LIGHT REMAINS OFF.

DIAGNOSIS:

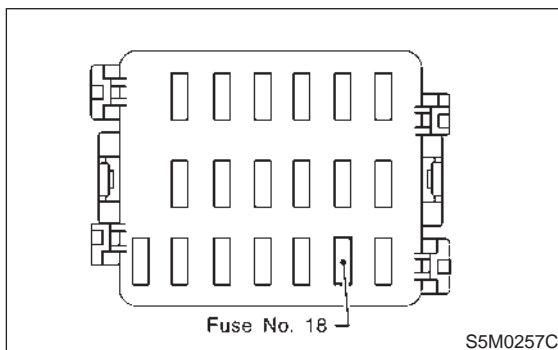
- Fuse No. 18 (in joint box) is blown.
- Body harness circuit is open.
- Airbag warning light is faulty.
- Airbag main harness is faulty.
- Airbag control module is faulty.

CAUTION:

Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground terminal, and then wait at least 20 seconds.

5N1 : FUSE NO. 18 (IN JOINT BOX) INSPECTION

Remove and visually check fuse No. 5 (In joint box).



- CHECK** : *Is fuse No. 18 blown?*
- YES** : Replace fuse No. 18. If fuse No. 18 blows again, Go to step **5N2**.
- NO** : Go to step **5N2**.

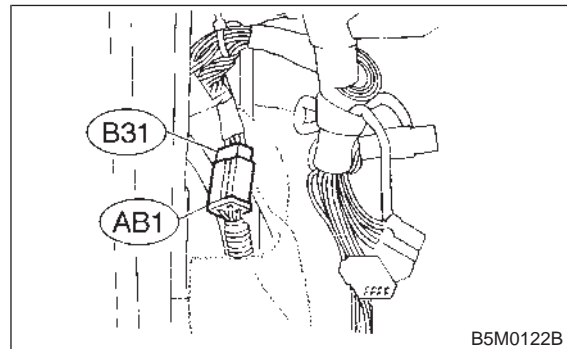
5N2 : BODY HARNESS INSPECTION

Turn ignition switch "ON" (engine off) to make sure other warning lights (in combination meter) illuminate.

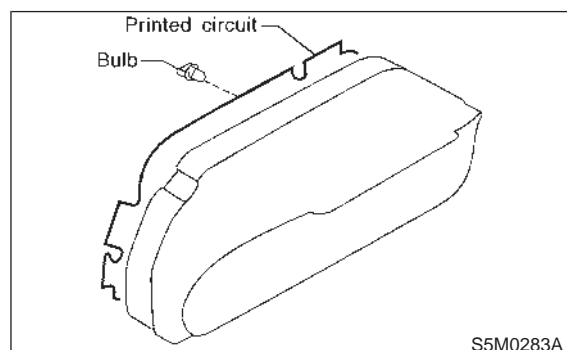
- CHECK** : *Do all the warning lights (in combination meter) except airbag warning light come on?*
- YES** : Go to step **5N3**.
- NO** : Repair body harness.

5N3 : AIRBAG WARNING LIGHT MODULE (IN COMBINATION METER) INSPECTION

- 1) Turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.
- 2) Disconnect body harness connector (B31) from connector (AB1).



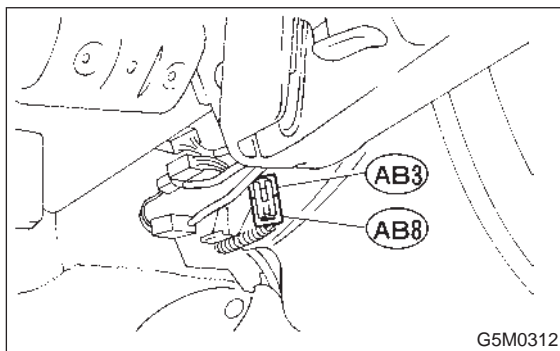
- 3) Connect battery ground cable and turn ignition switch "ON" (engine off) to make sure airbag warning light illuminates.



- CHECK** : *Does the airbag warning light come on?*
- YES** : Go to step **5N4**.
- NO** : Replace airbag warning light bulb <Ref. to 6-2 [W8B0].> or combination meter printed circuit.

5N4 : AIRBAG MAIN HARNESS INSPECTION

- 1) Turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.
- 2) Connect body harness connector (B31) and connector (AB1).
- 3) Disconnect connectors (AB3) and (AB8) below steering column. <Ref. to 5-5 [M2F2].>



- 4) Disconnect connector (AB6) from airbag control module. <Ref. to 5-5 [W5A0].>
- 5) Connect battery ground cable and turn ignition switch "ON" to make sure airbag warning light illuminates.

- CHECK** : ***Does the airbag warning light come on?***
- YES** : Replace airbag control module. <Ref. to 5-5 [W5A0].>
- NO** : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

O: WARNING LIGHT INDICATES TROUBLE CODE, THEN NORMAL CODE. (FLASHING TROUBLE CODE.)

DIAGNOSIS:

Airbag system component parts are faulty.

CAUTION:

Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable, and then wait at least 20 seconds.

501 : AIRBAG COMPONENT PARTS APPEARANCE INSPECTION

1) Conduct on-board diagnostic and call up trouble codes stored in memory. <Ref. to 5-5 [T4B0].>

2) Select trouble code required to check airbag component parts from those listed in table and reproduce symptom.

Trouble codes	Check parts	Index. No.
5	<ul style="list-style-type: none"> ● Airbag module (Driver) ● Roll connector ● Airbag main harness ● Airbag control module 	<Ref. to 5-5 [W3A1].> <Ref. to 5-5 [W600].> <Ref. to 5-5 [W4A0].> <Ref. to 5-5 [W5A0].>
11	<ul style="list-style-type: none"> ● Roll connector ● Airbag module (Driver) ● Airbag main harness ● Airbag control module 	<Ref. to 5-5 [W600].> <Ref. to 5-5 [W3A1].> <Ref. to 5-5 [W4A0].> <Ref. to 5-5 [W5A0].>
12	<ul style="list-style-type: none"> ● Airbag module (Passenger) ● Airbag main harness ● Airbag control module 	<Ref. to 5-5 [W3A2].> <Ref. to 5-5 [W4A0].> <Ref. to 5-5 [W500].>
15	<ul style="list-style-type: none"> ● Airbag module (Driver) ● Roll connector ● Airbag main harness ● Airbag control module 	<Ref. to 5-5 [W3A1].> <Ref. to 5-5 [W600].> <Ref. to 5-5 [W4A0].> <Ref. to 5-5 [W5A0].>
16	<ul style="list-style-type: none"> ● Airbag main harness ● Airbag module (Passenger) ● Airbag control module 	<Ref. to 5-5 [W4A0].> <Ref. to 5-5 [W3A2].> <Ref. to 5-5 [W5A0].>
21	Airbag control module	<Ref. to 5-5 [W5A0].>
22	Airbag control module	<Ref. to 5-5 [W5A0].>
25	<ul style="list-style-type: none"> ● Fuse No. 6 ● Airbag main harness ● Airbag control module ● Body harness 	<Ref. to 5-5 [T5J5].> <Ref. to 5-5 [W4A0].> <Ref. to 5-5 [W5A0].> <Ref. to 5-5 [W4A0].>
31	<ul style="list-style-type: none"> ● Airbag main harness ● Front sub sensor and front sub sensor harness (RH) 	<Ref. to 5-5 [W4A0].> <Ref. to 5-5 [W7A0].>
32	<ul style="list-style-type: none"> ● Airbag main harness ● Front sub sensor and front sub sensor harness (LH) 	<Ref. to 5-5 [W4A0].> <Ref. to 5-5 [W7A0].>

3) Conduct appearance inspection on parts selected.

NOTE:

Also check connector terminals, wiring harness, case, etc. for damage.

CHECK : *Is there anything unusual about the appearance of airbag component parts?*

YES : Replace faulty airbag component parts.

NO : Go to step **502**.

502 : AIRBAG COMPONENT PARTS VIBRATION INSPECTION

- 1) Gently shake check parts (to determine faults).
- 2) To check airbag module or roll connector, turn and tilt steering wheel.

CAUTION:

Do not shake or vibrate airbag control module.

CHECK : *Does the component malfunction again when shaking?*

YES : Replace faulty airbag component parts.

NO : Go to step 503.

503 : SHOWERING INSPECTION TO BODY

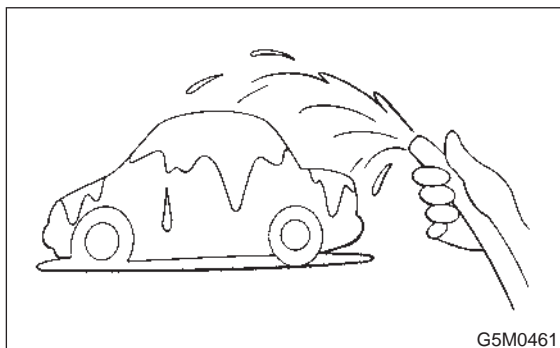
Spray water on vehicle body.

CAUTION:

Do not directly spray water on airbag components.

NOTE:

Also check wiring harnesses as water may leak along them and get airbag component parts wet.



CHECK : *Does water leak into the passenger compartment when showering vehicle?*

YES : Replace faulty airbag component parts.

NO : Perform clear memory. <Ref. to 5-5 [T4C0].>

P: WARNING LIGHT INDICATES TROUBLE CODE, THEN NORMAL CODE. (FLASHING NORMAL CODE.)

DIAGNOSIS:

- Airbag connector is faulty.
- Fuse No. 11 (in joint box) is blown.
- Airbag main harness is faulty.
- Airbag control module is faulty.
- Body harness is faulty.

CAUTION:

Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable, and then wait at least 20 seconds.

5P1 : AIRBAG CONNECTOR APPEARANCE INSPECTION

Conduct appearance inspection on airbag connectors (AB2) through (AB8). <Ref. to 5-5 [T100].>

NOTE:

Check terminals, case and wiring harnesses for damage.

CHECK : *Is there anything unusual about the appearance of connectors (AB2) through (AB8)?*

YES : Replace faulty airbag component parts.

NO : Go to step 5P2.

5P2 : AIRBAG CONNECTOR VIBRATION INSPECTION

Conduct vibration inspection on airbag connectors (AB2) through (AB8). <Ref. to 5-5 [T100].>

NOTE:

Gently shake each airbag connector.

CHECK : *Do the connectors (AB2) through (AB8) malfunction again when shaking?*

YES : Replace faulty airbag component parts.

NO : Go to step 5P3.

5P3 : SHOWERING INSPECTION TO BODY

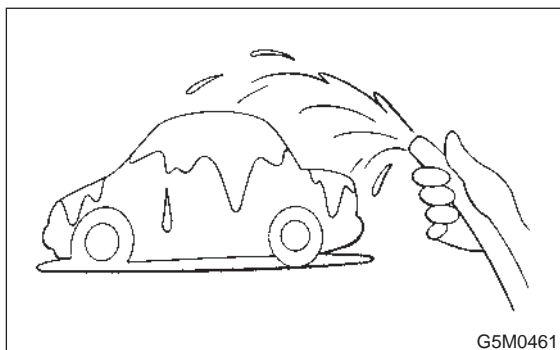
Spray water on vehicle body.

CAUTION:

Do not directly spray water on airbag components.

NOTE:

If leaks are noted, also check wiring harnesses as water may leak along them and wet airbag connectors.



CHECK : *Does water leak into the passenger compartment when showering vehicle?*

YES : Replace faulty airbag component parts.

NO : Go to step **5P4**.

5P4 : FUSE NO. 11 (IN JOINT BOX), AIRBAG MAIN HARNESS, AIRBAG CONTROL MODULE, BODY HARNESS APPEARANCE INSPECTION

Conduct appearance inspection on fuse No. 11 <Ref. to 5-5 [T5I5].>, airbag main harness <Ref. to 5-5 [W4A0].>, airbag control module <Ref. to 5-5 [W5A0].> and body harness.

NOTE:

Also check connectors, terminals, wiring harness and case for damage.

CHECK : *Is there anything unusual about the appearance of fuse No. 11, airbag main harness, airbag control module or body harness?*

YES : Replace faulty airbag component parts.

NO : Go to step **5P5**.

5P5 : FUSE NO. 11 (IN JOINT BOX), AIRBAG MAIN HARNESS, BODY HARNESS VIBRATION INSPECTION

Conduct vibration inspection on fuse No. 11, airbag main harness and body harness.

CAUTION:

Do not shake or vibrate airbag control module.

NOTE:

Gently shake each part.

CHECK : *Do fuse No. 11, airbag main harness or body harness malfunction again when shaking?*

YES : Replace faulty airbag component parts.

NO : Go to step **5P6**.

5P6 : SHOWERING INSPECTION TO BODY

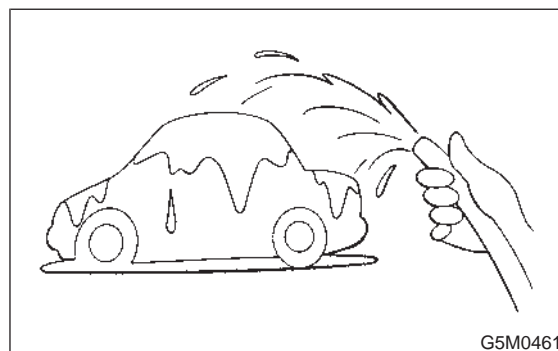
Spray water on vehicle body.

CAUTION:

Do not directly spray water on each part.

NOTE:

If leaks are noted, check wiring harnesses as water may leak along them and get parts wet.



CHECK : *Does water leak into the passenger compartment when showering vehicle?*

YES : Replace faulty airbag component parts.

NO : Go to step **5P7**.

**5P7 : WARNING LIGHT ILLUMINATION
CHECK**

Turn ignition switch "ON" (engine off) and observe airbag warning light.

- CHECK** : ***Does the airbag warning light come on for about 7 seconds, then go out and stay out?***
- YES** : Perform clear memory. <Ref. to 5-5 [T4C0].>
- NO** : Go to "DIAGNOSTICS PROCEDURE". <Ref. to 5-5 [T4D0].>

ENGINE ELECTRICAL SYSTEM

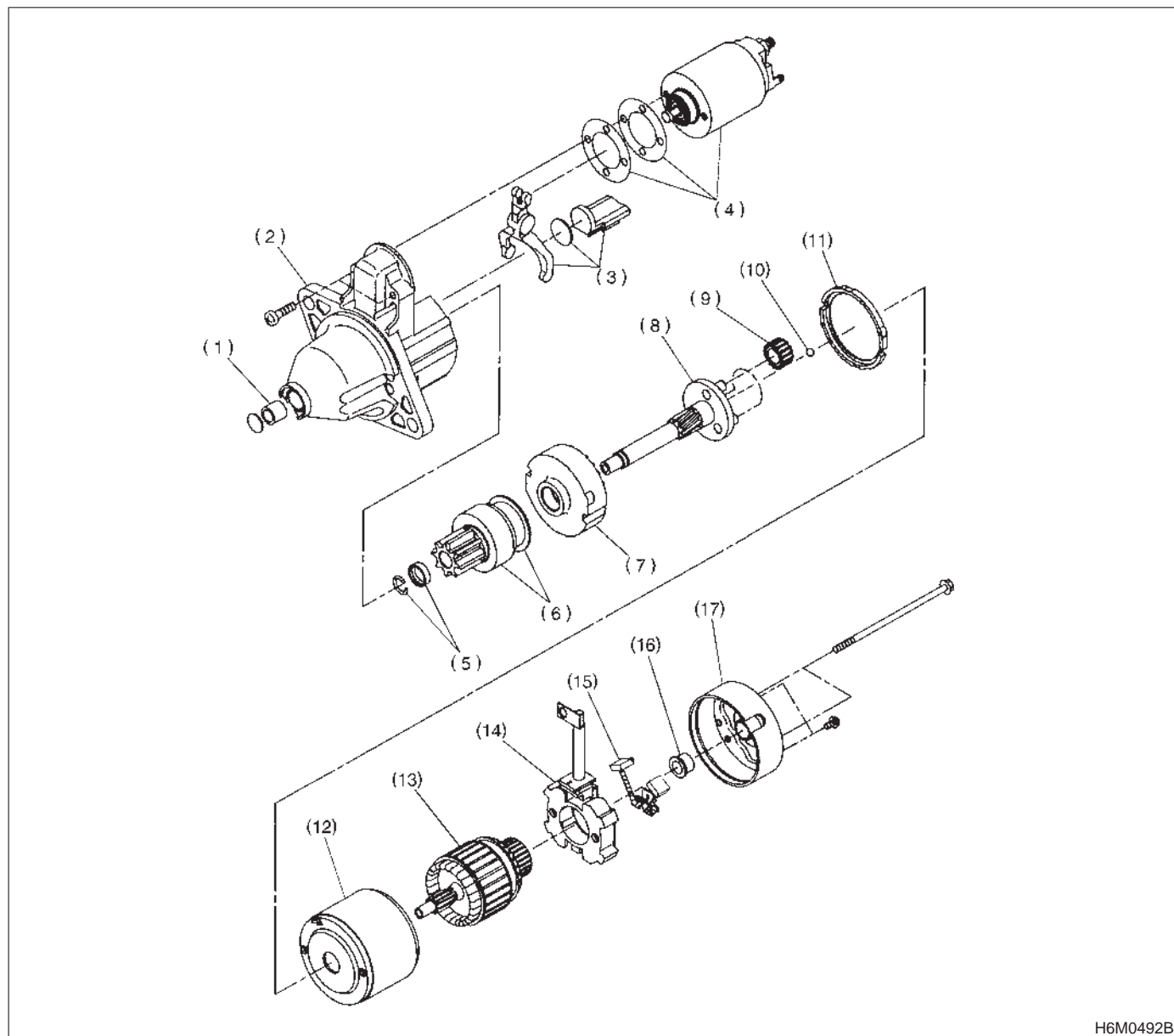
6-1

	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Specifications	2
C COMPONENT PARTS	3
1. Starter	3
2. Generator	4
3. Ignition System	5
W SERVICE PROCEDURE	6
1. Starter	6
2. Generator	12
3. Spark Plug.....	17
4. Ignition Coil and Ignitor Assembly.....	23
5. Spark Plug Cord.....	24
K DIAGNOSTICS	25
1. Starter	25
2. Generator	26

1. Specifications

Item			Designation	
Starter	Type		Reduction type	
	Model		MT M000T81681	AT M001T84481
	Manufacturer		MITSUBISHI	
	Voltage and output		12 V — 1.0 kW	12 V — 1.4 kW
	Direction of rotation		Counterclockwise (when observed from pinion)	
	Number of pinion teeth		8	9
	No-load characteristics	Voltage	11 V	
		Current	90 A or less	
		Rotating speed	3,000 rpm or more	
	Load characteristics	Voltage	8 V	7.7 V
		Current	280 A or less	300 A or less
		Torque	8.5 N·m (0.87 kg-m, 6.27 ft-lb)	9.8 N·m (1.00 kg-m, 7.24 ft-lb)
		Rotating speed	980 rpm or more	1,000 rpm or more
	Lock characteristics	Voltage	4 V	
		Current	780 A or less	980 A or less
		Torque	17.6 N·m (1.80 kg-m, 13.0 ft-lb) or more	23 N·m (2.3 kg-m, 17 ft-lb) or more
Generator	Type		Rotating-field three-phase type, Voltage regulator built-in type	
	Model		A2TB2991	
	Manufacturer		MITSUBISHI	
	Voltage and output		12 V — 75 A	
	Polarity on ground side		Negative	
	Rotating direction		Clockwise (when observed from pulley side)	
	Armature connection		3-phase Y-type	
	Output current		1,500 rpm — 30 A or more 2,500 rpm — 64 A or more 5,000 rpm — 76 A or more	
	Regulated voltage		14.5 ^{+0.3} / _{-0.4} V [20°C (68°F)]	
Ignition coil and ignitor assembly	Model		FH0137-01R	
	Manufacturer		DEMCO	
	Primary coil resistance		0.73 Ω±10%	
	Secondary coil resistance		12.8 kΩ±15%	
	Insulation resistance between primary terminal and case		More than 10 MΩ	
Spark plug	Type and manufacturer	Standard	RC10YC4 CHAMPION	
		Alternate	BKR5E-11 NGK	
	Thread size mm		14, P = 1.25	
	Spark gap mm (in)		1.0 — 1.1 (0.039 — 0.043)	

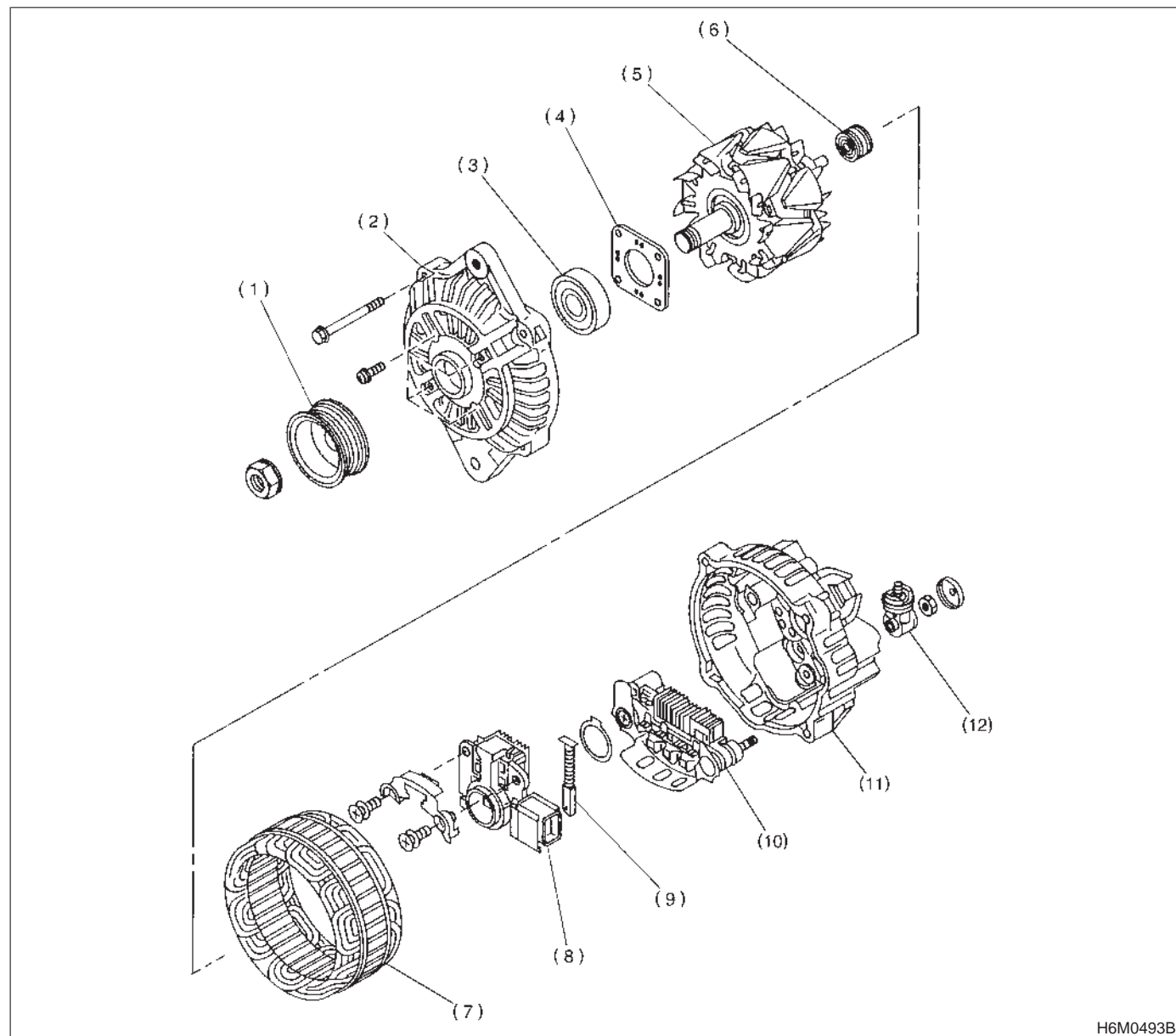
1. Starter



H6M0492B

- | | | |
|-------------------------|------------------------|---------------------|
| (1) Sleeve bearing | (7) Internal gear ASSY | (13) Armature |
| (2) Front bracket | (8) Shaft ASSY | (14) Brush holder |
| (3) Lever set | (9) Gear ASSY | (15) Brush |
| (4) Magnet switch ASSY | (10) Ball | (16) Sleeve bearing |
| (5) Stopper set | (11) Packing | (17) Rear bracket |
| (6) Over running clutch | (12) Yoke | |

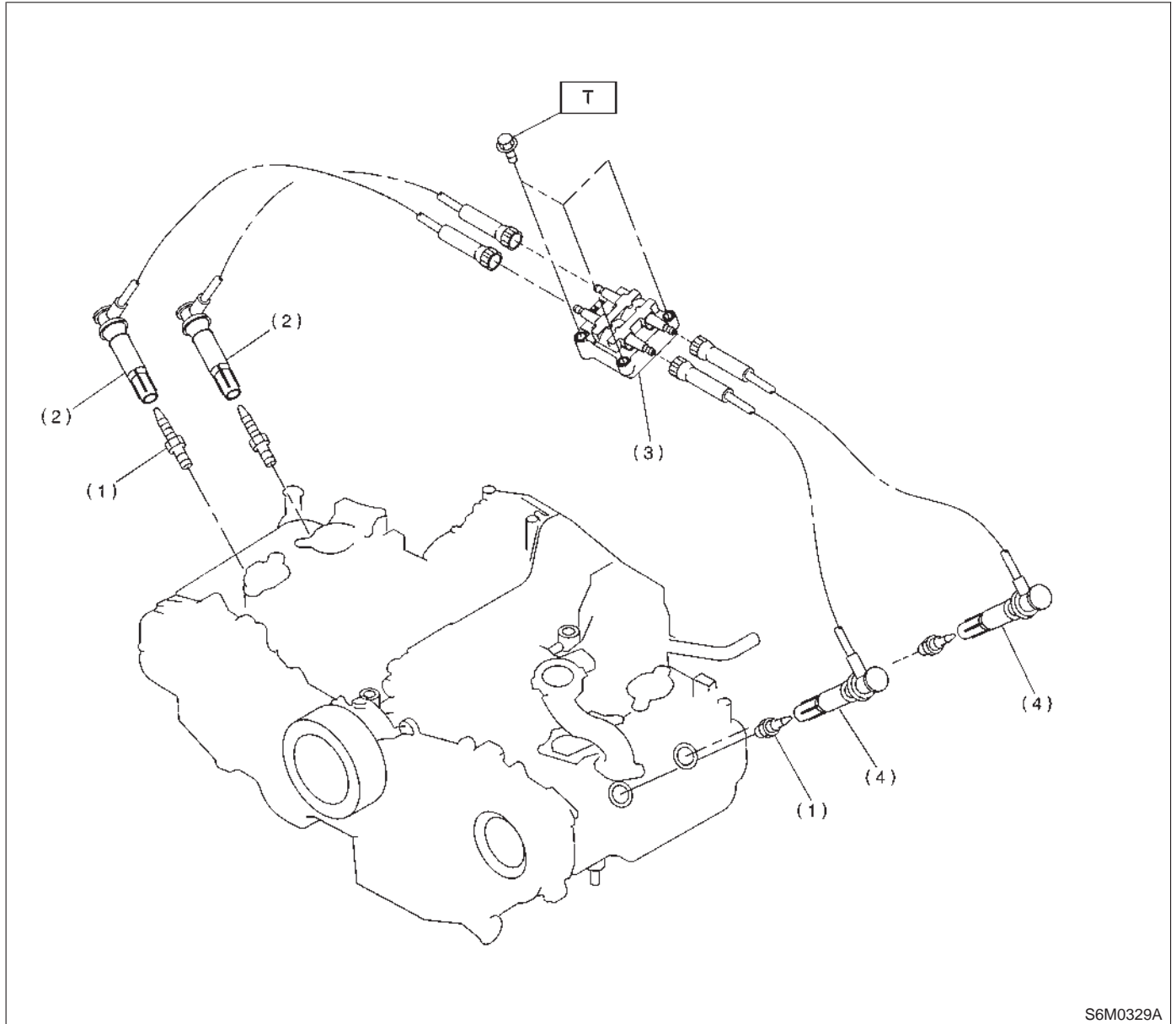
2. Generator



H6M0493B

- | | | |
|----------------------|-----------------------------|-----------------|
| (1) Pulley | (5) Rotor | (9) Brush |
| (2) Front cover | (6) Bearing | (10) Rectifier |
| (3) Ball bearing | (7) Stator coil | (11) Rear cover |
| (4) Bearing retainer | (8) IC regulator with brush | (12) Terminal |

3. Ignition System



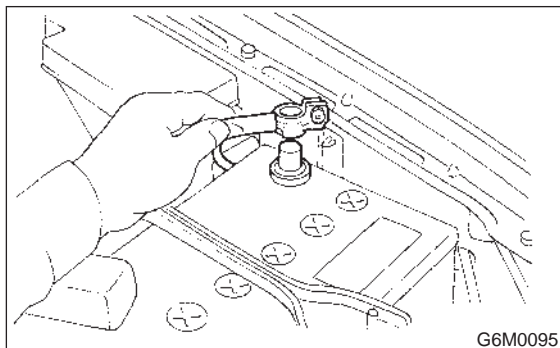
S6M0329A

- (1) Spark plug
- (2) Spark plug cord (#1, #3)
- (3) Ignition coil and ignitor ASSY
- (4) Spark plug cord (#2, #4)

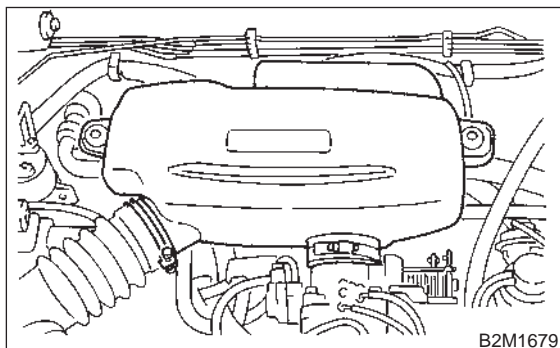
Tightening torque: N-m (kg-m, ft-lb)
T: 22±2 (2.2±0.2, 15.9±1.4)

1. Starter**A: REMOVAL AND INSTALLATION****1. 2200 cc MODEL**

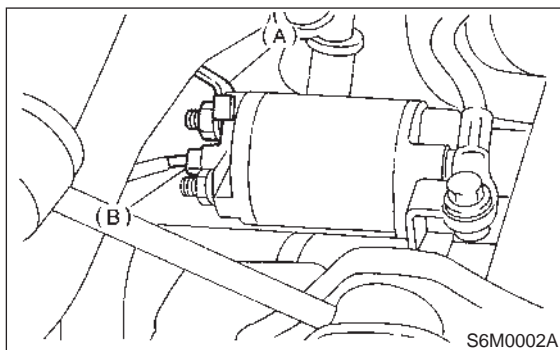
- 1) Disconnect battery ground cable.



- 2) Remove air intake chamber. <Ref. to 2-7 [W18A0].>

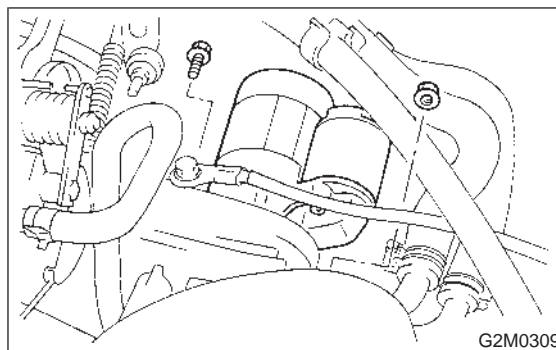


- 3) Disconnect connector and terminal from starter.



- (A) Terminal
(B) Connector

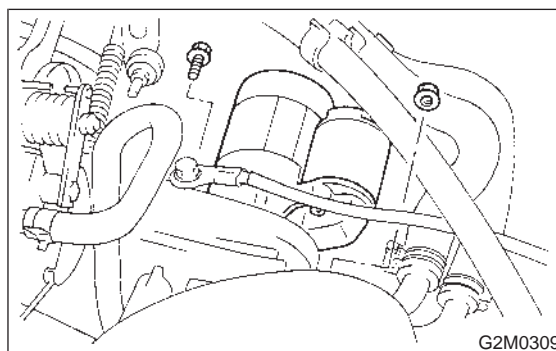
- 4) Remove starter from transmission.



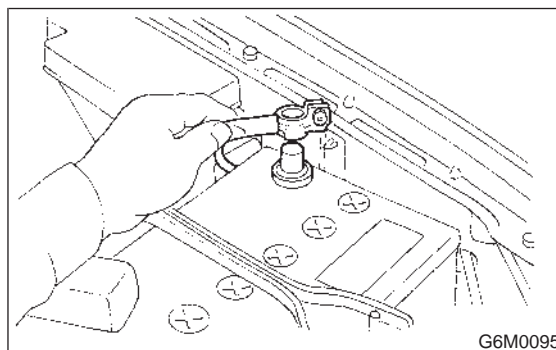
- 5) Installation is in the reverse order of removal.

Tightening torque:

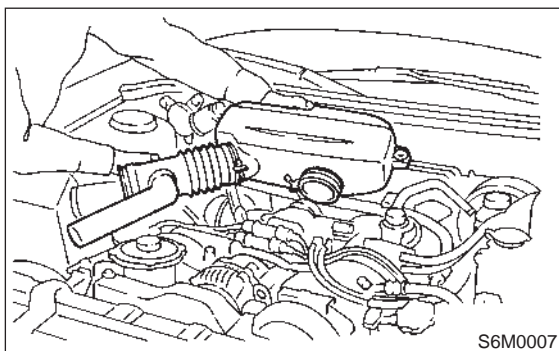
$50 \pm 4 \text{ N}\cdot\text{m}$ ($5.1 \pm 0.4 \text{ kg}\cdot\text{m}$, $36.9 \pm 2.9 \text{ ft}\cdot\text{lb}$)

**2. 2500 cc MODEL**

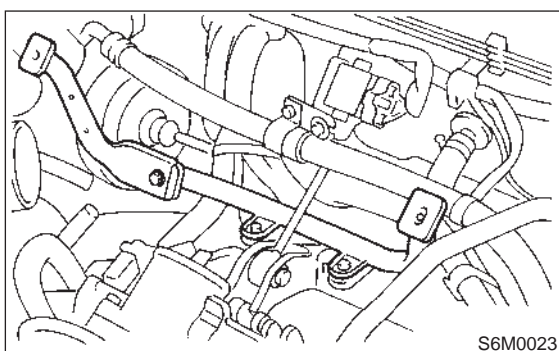
- 1) Disconnect battery ground cable.



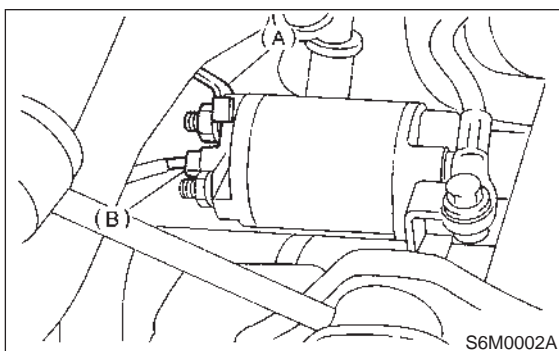
- 2) Remove air intake chamber. <Ref. to 2-7 [W18A0].>



- 3) Remove air intake chamber stay. (AT vehicles only)

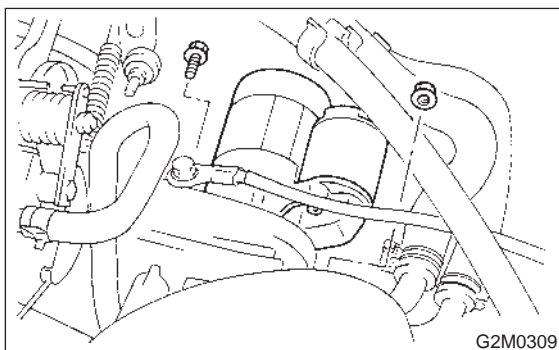


- 4) Disconnect connector and terminal from starter.



- (A) Terminal
(B) Connector

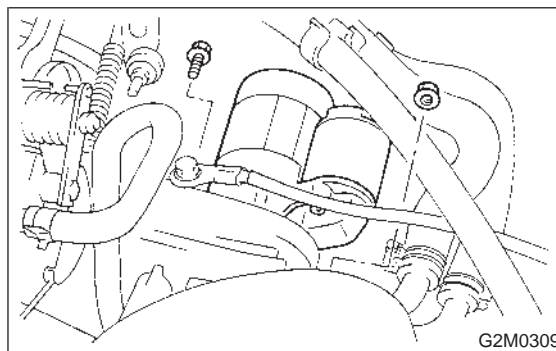
- 5) Remove starter from transmission.



- 6) Installation is in the reverse order of removal.

Tightening torque:

50±4 N·m (5.1±0.4 kg-m, 36.9±2.9 ft-lb)



B: TEST

1. SWITCH ASSEMBLY OPERATION

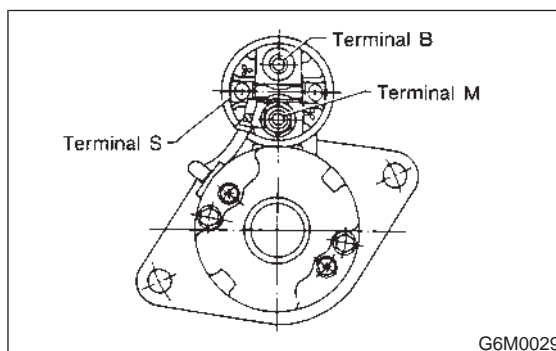
- 1) Connect terminal S of switch assembly to positive terminal of battery with a lead wire, and starter body to ground terminal of battery. Pinion should be forced endwise on shaft.

CAUTION:

With pinion forced endwise on shaft, starter motor can sometimes rotate because current flows, through pull-in coil, to motor. This is not a problem.

- 2) Disconnect connector from terminal M, and connect positive terminal of battery and terminal M using a lead wire and ground terminal to starter body.

In this test set up, pinion should return to its original position even when it is pulled out with a screwdriver.



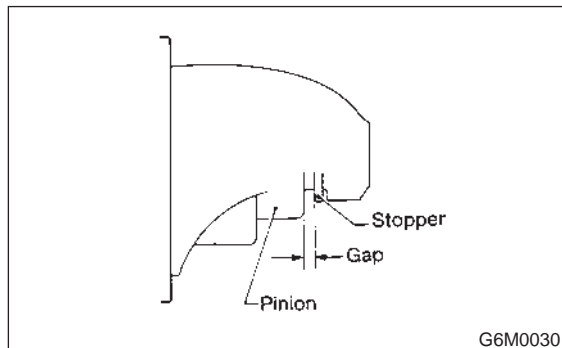
1. Starter

2. PINION GAP

1) With pinion forced endwise on shaft, as outlined in step 1) before <Ref. to 6-1 [W1B1]>, measure pinion gap.

Pinion gap:

0.5 — 2.0 mm (0.020 — 0.079 in)



2) If motor is running with the pinion forced endwise on the shaft, disconnect connector from terminal M of switch assembly and connect terminal M to ground terminal (–) of battery with a lead wire. Next, gently push pinion back with your fingertips and measure pinion gap.

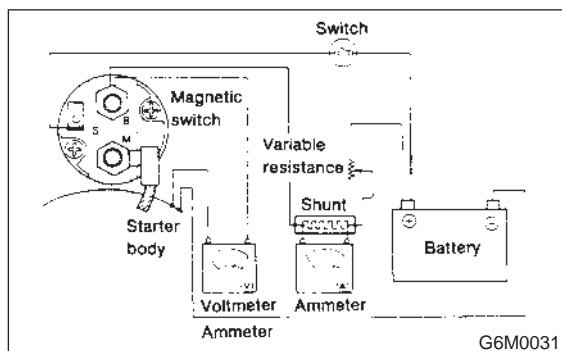
3) If pinion gap is outside specified range, remove or add number of adjustment washers used on the mounting surface of switch assembly until correct pinion gap is obtained.

3. PERFORMANCE TEST

The starter should be submitted to performance tests whenever it has been overhauled, to assure its satisfactory performance when installed on the engine.

Three performance tests, no-load test, load test, and lock test, are presented here; however, if the load test and lock test cannot be performed, carry out at least the no-load test.

For these performance tests, use the circuit shown in figure.



1) No-load test

With switch on, adjust the variable resistance to obtain 11 V, take the ammeter reading and measure the starter speed. Compare these values with the specifications.

No-load test (Standard):**Voltage / Current**

11 V / 90 A or less

Rotating speed

• **MT vehicles 2,800 rpm or more**

• **AT vehicles 2,400 rpm or more**

2) Load test

Apply the specified braking torque to starter. The condition is satisfactory if the current draw and starter speed are within specifications.

Load test (Standard):• **MT vehicles****Voltage / Load**

7.5 V / 8.73 N·m (0.89 kg-m, 6.4 ft-lb)

Current / Speed

300 A / 890 rpm or more

• **AT vehicles****Voltage / Load**

7.7 V / 16.00 N·m (1.63 kg-m, 11.8 ft-lb)

Current / Speed

400 A max. / 740 rpm or more

3) Lock test

With starter stalled, or not rotating, measure the torque developed and current draw when the voltage is adjusted to the specified voltage.

Lock test (Standard):• **MT vehicles****Voltage / Load**

4 V / 780 A or less

Torque

15.7 N·m (1.60 kg-m, 11.6 ft-lb) or more

• **AT vehicles****Voltage / Current**

3.5 V / 940 A or less

Torque

28.9 N·m (2.95 kg-m, 21.3 ft-lb) or more

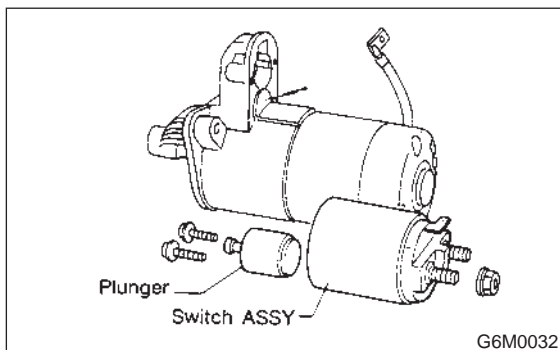
C: DISASSEMBLY

1. STARTER ASSEMBLY

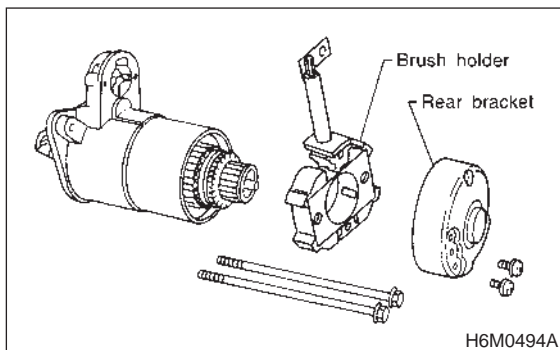
- 1) Loosen nut which holds terminal M of switch assembly, and disconnect connector.
- 2) Remove bolts which hold switch assembly, and remove switch assembly, plunger and plunger spring from starter as a unit.

CAUTION:

Be careful because pinion gap adjustment washer may sometimes be used on the mounting surface of switch assembly.



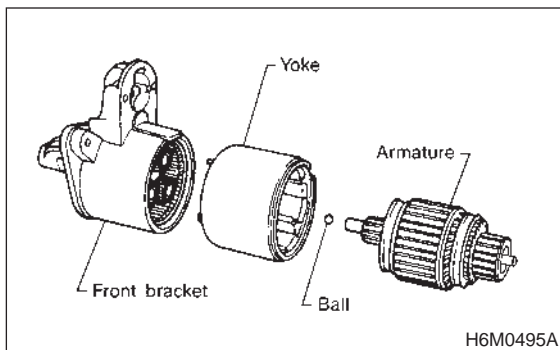
- 3) Remove both through-bolts and brush holder screws, and detach rear bracket and brush holder.



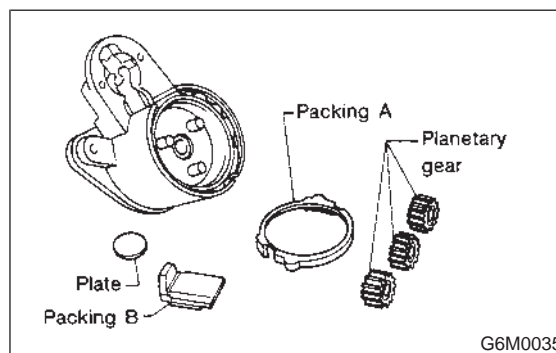
- 4) Remove armature and yoke. Ball used as a bearing will then be removed from the end of armature.

CAUTION:

Be sure to mark an alignment mark on yoke and front bracket before removing yoke.



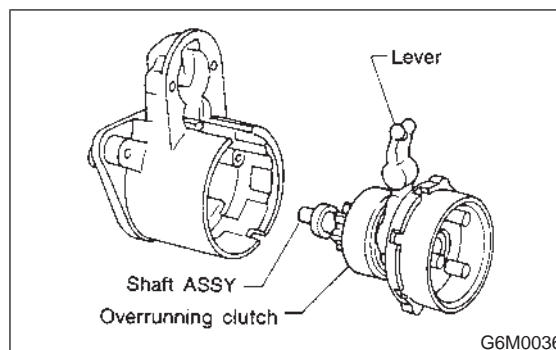
- 5) Remove packing A, three planetary gears, packing B and plate.



- 6) Remove shaft assembly and overrunning clutch as a unit.

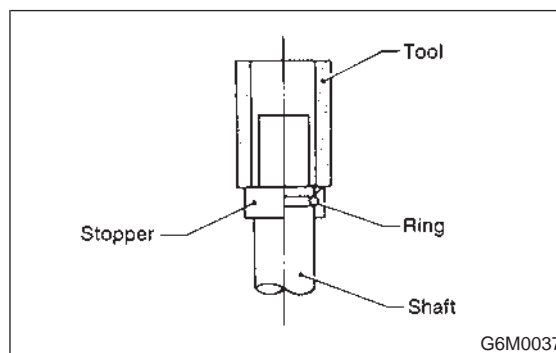
CAUTION:

Record the direction of lever before removing.



- 7) Remove overrunning clutch from shaft assembly as follows:

- (1) Remove stopper from ring by lightly tapping a fit tool placed on stopper.
- (2) Remove ring, stopper and clutch from shaft.



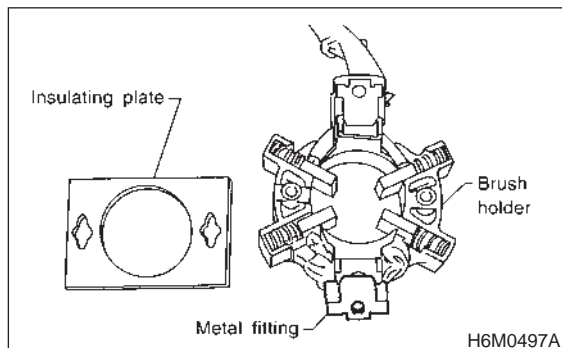
1. Starter

2. BRUSH HOLDER

Slightly open the metal fitting holding the insulating plate to the brush holder. Remove the insulating plate.

NOTE:

The brush and spring can be easily removed from the brush holder at this time.



D: INSPECTION

1. ARMATURE

1) Check commutator for any sign of burns or rough surfaces or stepped wear. If wear is of a minor nature, correct it by using sand paper.

2) Run-out test

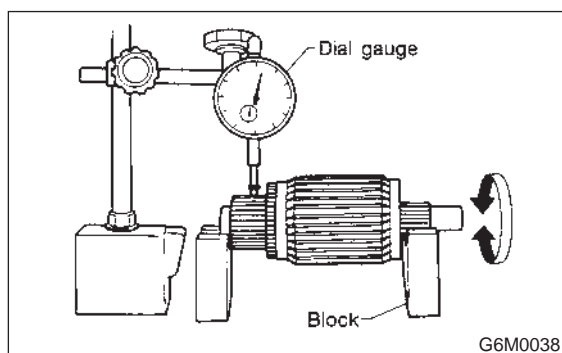
Check the commutator run-out and replace if it exceeds the limit.

Commutator run-out:**Standard**

0.05 mm (0.0020 in)

Service limit

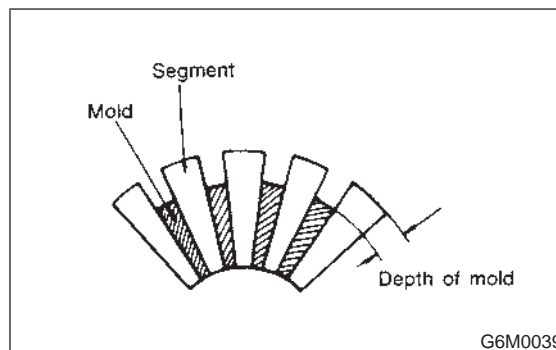
Less than 0.10 mm (0.0039 in)



3) Depth of segment mold
Check the depth of segment mold.

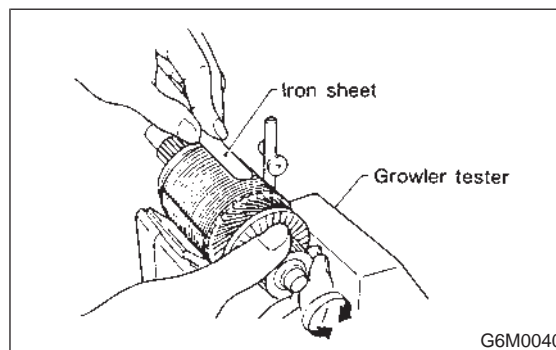
Depth of segment mold:

0.5 mm (0.020 in)



4) Armature short-circuit test

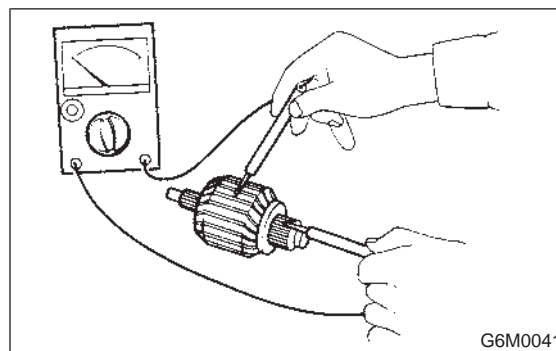
Check armature for short-circuit by placing it on growler tester. Hold a hacksaw blade against armature core while slowly rotating armature. A short-circuited armature will cause the blade to vibrate and to be attracted to core. If the hacksaw blade is attracted or vibrates, the armature, which is short-circuited, must be replaced or repaired.



5) Armature ground test

Using circuit tester, touch one probe to the commutator segment and the other to shaft. There should be no continuity. If there is a continuity, armature is grounded.

Replace armature if it is grounded.



2. YOKE

Make sure pole is set in position.

3. OVERRUNNING CLUTCH

Inspect teeth of pinion for wear and damage. Replace if it damaged. Rotate pinion in direction of rotation (clockwise). It should rotate smoothly. But in opposite direction, it should be locked.

CAUTION:

Do not clean overrunning clutch with oil to prevent grease from flowing out.

4. BRUSH AND BRUSH HOLDER

1) Brush length

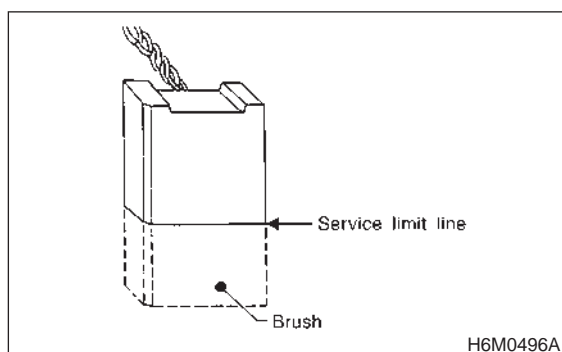
Measure the brush length and replace if it exceeds the service limit.

Replace if abnormal wear or cracks are noticed.

Brush length:

Standard 17.0 mm (0.669 in)

Service limit 11.5 mm (0.453 in)



2) Brush movement

Be sure brush moves smoothly inside brush holder.

3) Brush spring force

Measure brush spring force with a spring scale. If it is less than the service limit, replace brush spring.

Brush spring force:

Standard

21.6 N (2.2 kg, 4.9 lb) (when new)

Service limit

5.9 N (0.6 kg, 1.3 lb)

5. SWITCH ASSEMBLY

Be sure there is continuity between terminals S and M, and between terminal S and ground. Use a circuit tester (set in "ohm").

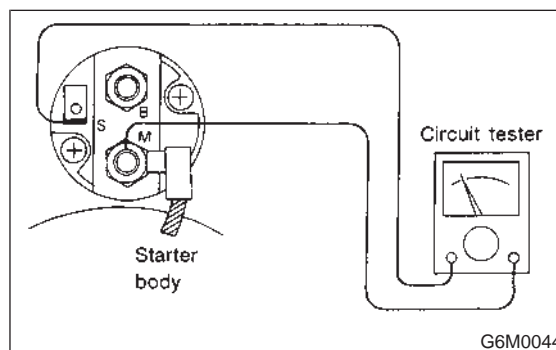
Also check to be sure there is no continuity between terminal M and B.

Terminal / Specified resistance:

S—M / Continuity

S—Ground / Continuity

M—B / No continuity



E: ASSEMBLY

Assembly is in the reverse order of disassembly procedures. Observe the following:

1) Carefully assemble all parts in the order of assembly and occasionally inspect nothing has been overlooked.

2) Apply grease to the following parts during assembly.

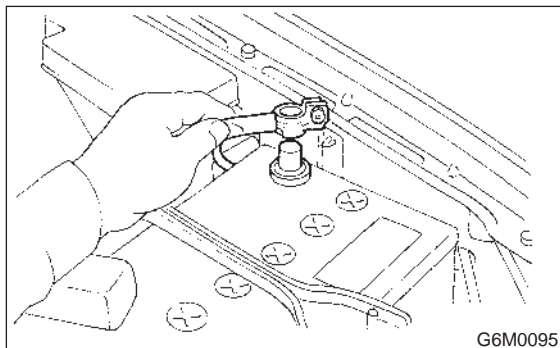
- Front bracket sleeve bearing
- Armature shaft gear
- Outer periphery of plunger
- Mating surface of plunger and lever
- Gear shaft splines
- Mating surface of lever and clutch
- Ball at the armature shaft end
- Internal and planetary gears

3) After assembling parts correctly, check to be sure starter operates properly.

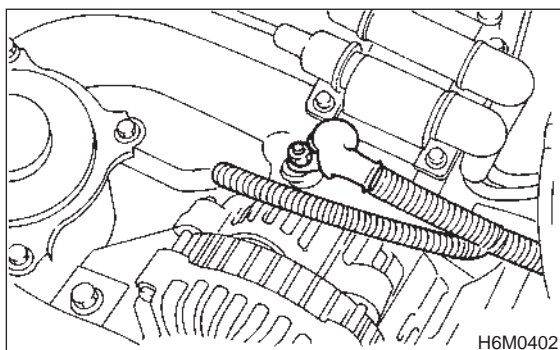
2. Generator

A: REMOVAL AND INSTALLATION

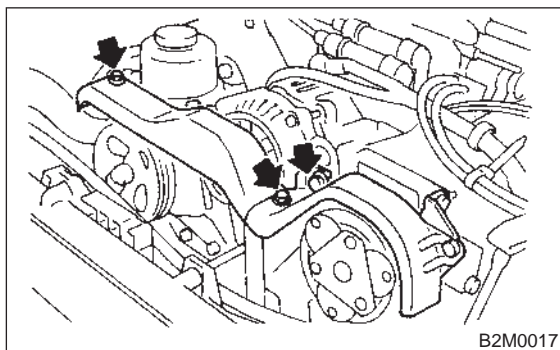
- 1) Disconnect battery ground cable.



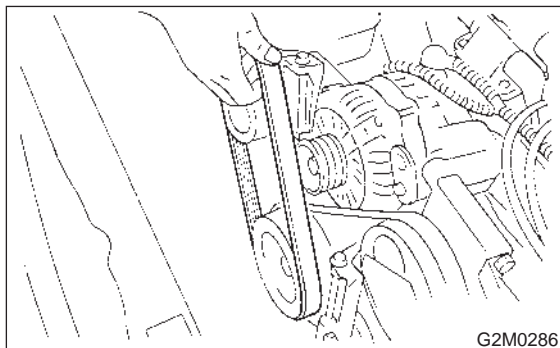
- 2) Disconnect connector and terminal from generator.



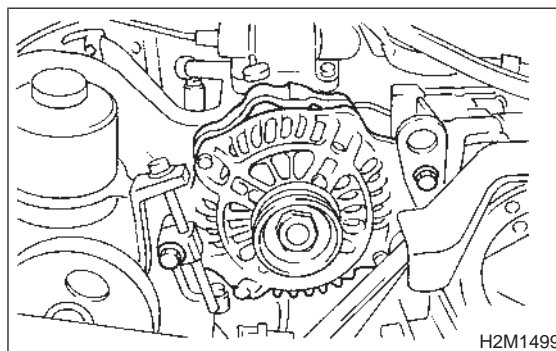
- 3) Remove V-belt cover.



- 4) Remove front side V-belt.



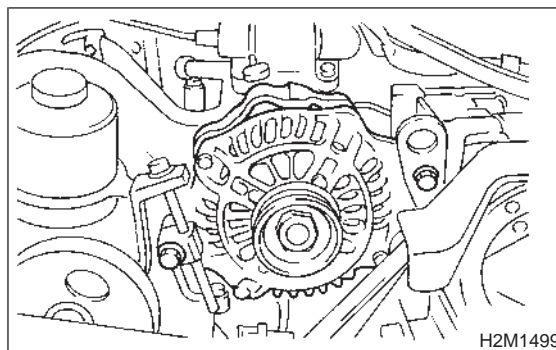
- 5) Remove bolts which install generator onto bracket.



- 6) Installation is in the reverse order of removal.

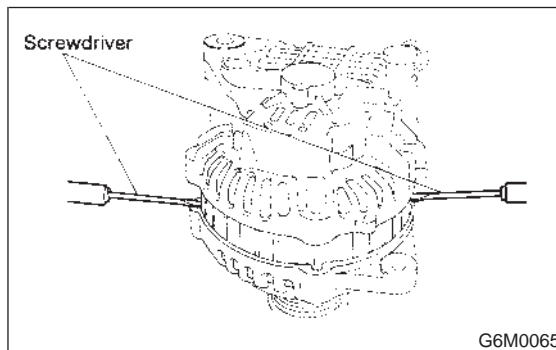
CAUTION:

Check and adjust V-belt tension. <Ref. to 1-5 [G2A0].>

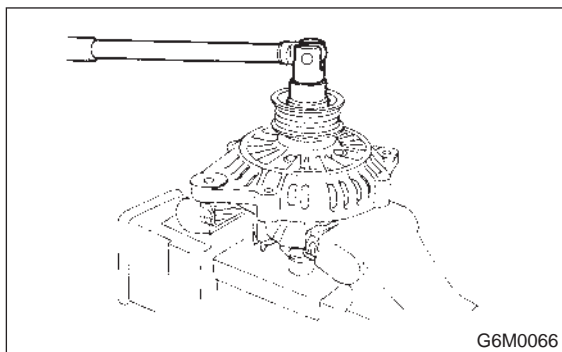


B: DISASSEMBLY

- 1) Remove the four through bolts. Then insert the tip of a flat-head screwdriver into the gap between the stator core and front bracket. Pry then apart to disassemble.

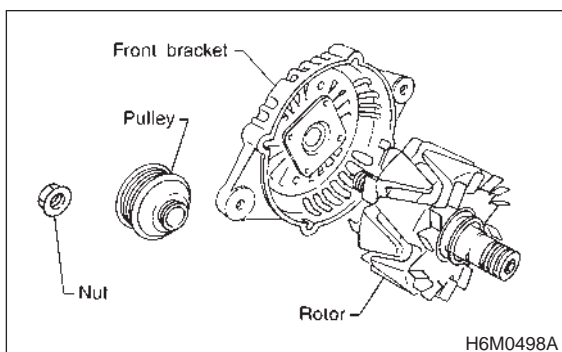


- 2) Hold rotor with a vise and remove pulley nut.



CAUTION:

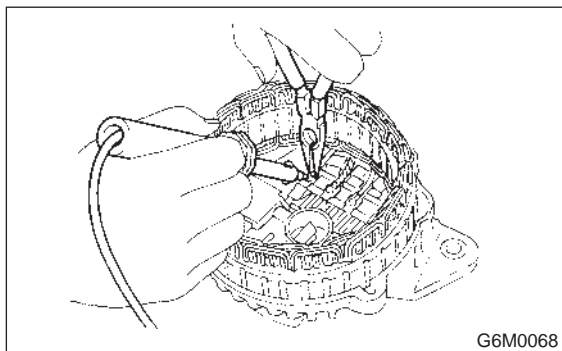
When holding rotor with vise, insert aluminum plates or wood pieces on the contact surfaces of the vise to prevent rotor from damage.



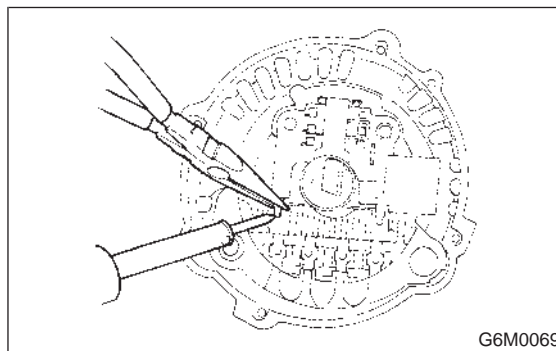
- 3) Unsolder connection between rectifier and stator coil to remove stator coil.

CAUTION:

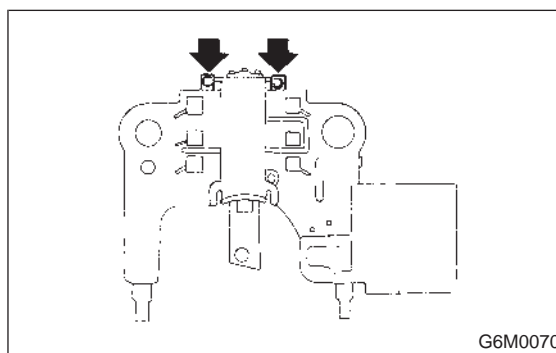
Finish the work rapidly (less than three seconds) because the rectifier cannot withstand heat very well.



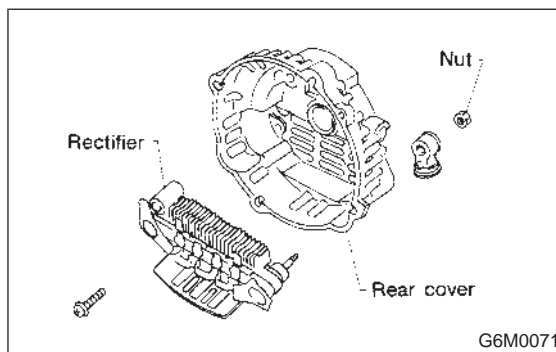
- 4) Remove screws which secure IC regulator to rear cover, and unsolder connection between IC regulator and rectifier to remove IC regulator.



- 5) Remove the brushes by unsoldering at the pig-tails.



- 6) Remove the nut and insulating bushing at terminal B. Remove rectifier.



C: INSPECTION AND REPAIR

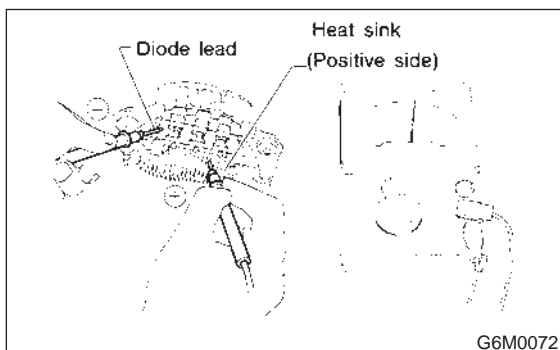
1. DIODE

CAUTION:

Never use a megger tester (measuring use for high voltage) or any other similar measure for this test; otherwise, the diodes may be damaged.

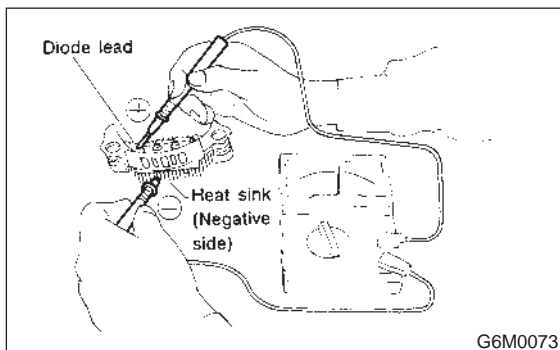
1) Checking positive diode

Check for continuity between the diode lead and the positive side heat sink. The positive diode is in good condition if continuity exists only in the direction from the diode lead to the heat sink.



2) Checking negative diode

Check for continuity between the negative side heat sink and diode lead. The negative diode is in good condition if continuity exists only in the direction from the heat sink to the diode lead.



2. ROTOR

1) Slip ring surface

Inspect slip rings for contamination or any roughness of the sliding surface. Repair slip ring surface using a lathe or sand paper.

2) Slip ring outer diameter

Measure slip ring outer diameter. If slip ring is worn replace rotor assembly.

Slip ring outer diameter:

Standard

22.7 mm (0.894 in)

Limit

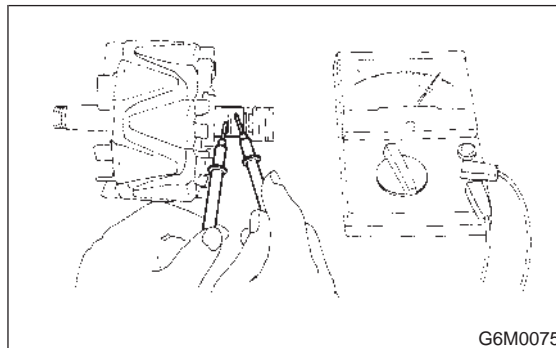
22.1 mm (0.870 in)

3) Continuity test

Check resistance between slip rings using circuit tester. If the resistance is not within specification, replace rotor assembly.

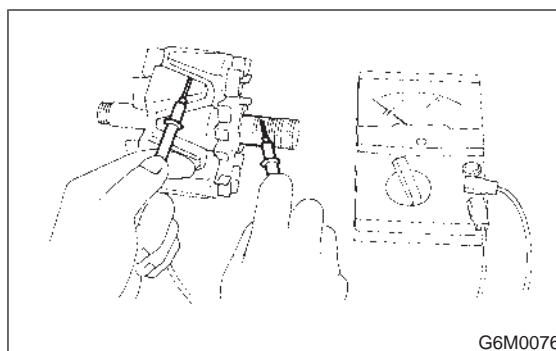
Specified resistance:

Approx. 2.7 — 3.2 Ω



4) Insulation test

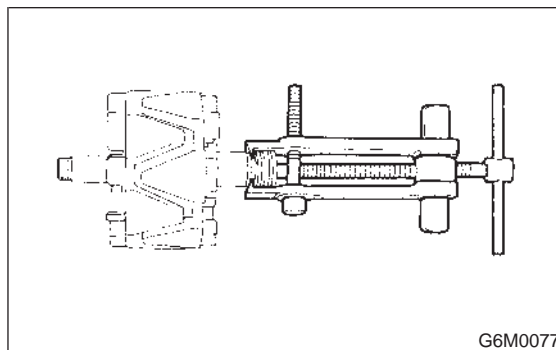
Check continuity between slip ring and rotor core or shaft. If continuity exists, the rotor coil is short-circuited, and so replace rotor assembly.



5) Ball bearing (rear side)

(1) Check rear ball bearing. Replace if it is noisy or if rotor does not turn smoothly.

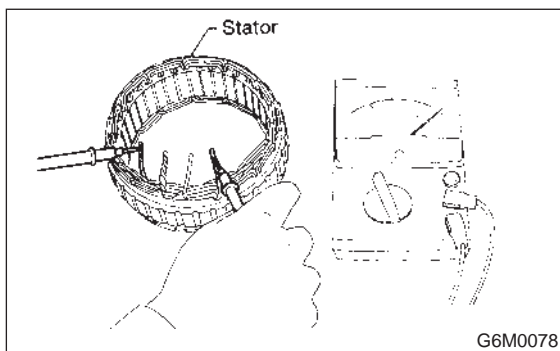
(2) The rear bearing can be removed by using common bearing puller.



3. STATOR

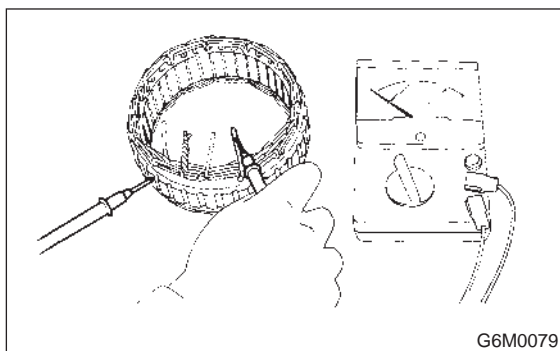
1) Continuity test

Inspect stator coil for continuity between each end of the lead wires. If there is no continuity between individual lead wires, the lead wire is broken, and so replace stator assembly.



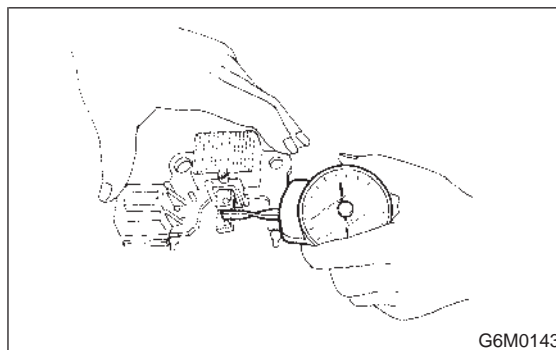
2) Insulation test

Inspect stator coil for continuity between stator core and each end of the lead wire. If there is continuity, the stator coil is short-circuited, and so replace stator assembly.



2) Checking brush spring for proper pressure

Using a spring pressure indicator, push the brush into the brush holder until its tip protrudes 2 mm (0.08 in). Then measure the pressure of the brush spring. If the pressure is less than 2.648 N (270 g, 9.52 oz), replace the brush spring with a new one. The new spring must have a pressure of 4.609 to 5.786 N (470 to 590 g, 16.58 to 20.81 oz).



4. BRUSH

1) Measure the length of each brush. If wear exceeds the service limit, replace the brush. Each brush has the service limit mark on it.

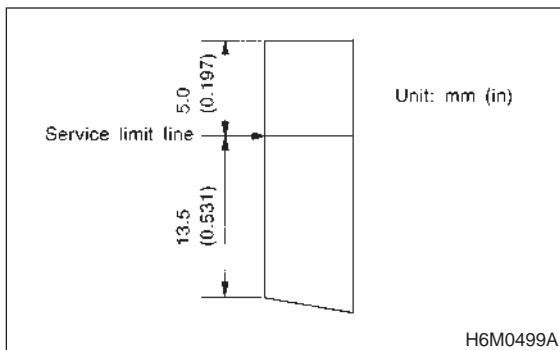
Brush length:

Standard

18.5 mm (0.728 in)

Service limit

5.0 mm (0.197 in)



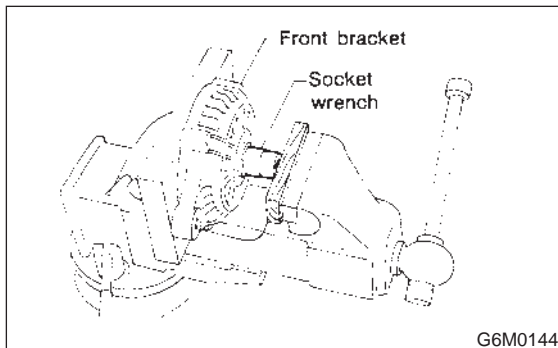
5. BEARING (FRONT SIDE)

1) Check front ball bearing. If resistance is felt while rotating, or if abnormal noise is heard, replace the ball bearing.

2) Replacing front bearing

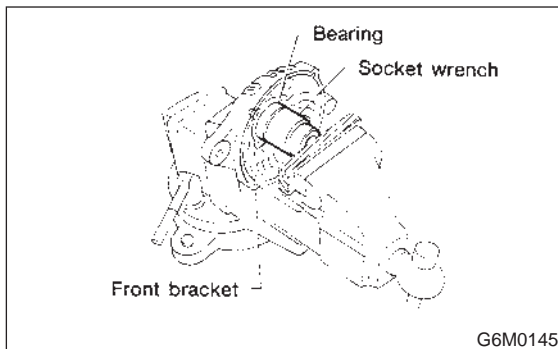
(1) Remove front bearing retainer.

(2) Closely install a fit tool on the bearing inner race. Press the bearing down out of front bracket with a hand press or vise. A socket wrench can serve as the tool.



(3) Set a new bearing and closely install a fit tool on the bearing outer race. Press the bearing down into place with a hand press or vise. A socket wrench can serve as the tool.

(4) Install front bearing retainer.



D: ASSEMBLY

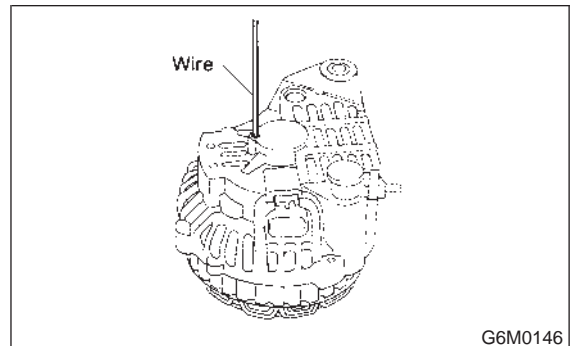
To assemble, reverse order of disassembly.

1) Pulling up brush

Before assembling, press the brush down into the brush holder with your finger and secure in that position by passing a [2 mm (0.08 in) dia. length 4 to 5 cm (1.6 to 2.0 in)] wire through the hole shown in the figure.

CAUTION:

Be sure to remove the wire after reassembly.



2) Heat the rear bracket [50 to 60°C (122 to 140°F)] and press the rear bearing into the rear bracket. Then lubricate the rear bracket.

CAUTION:

Grease should not be applied for the rear bearing.

Remove oil completely if it is found on the bearing box.

3) After reassembly, turn the pulley by hand to check that the rotor turns smoothly.

3. Spark Plug

A: REMOVAL AND INSTALLATION

CAUTION:

All spark plugs installed on an engine, must be of the same heat range.

Spark plug:

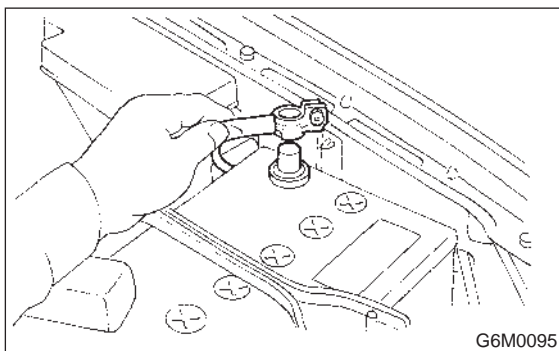
NGK: BKR5E-11

(Alternate)

CHAMPION: RC10YC4

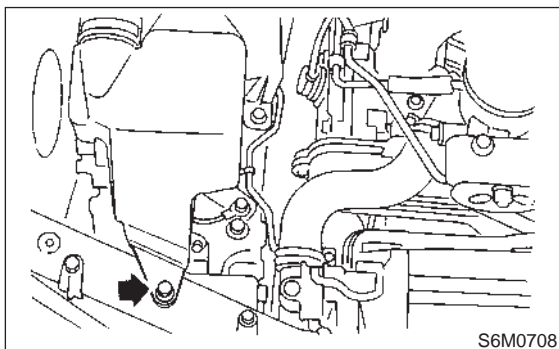
1. #1 SPARK PLUG

- 1) Disconnect battery ground cable.

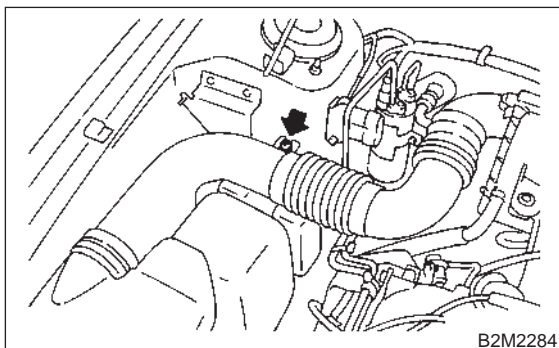


- 2) Remove air intake duct and resonator chamber. (2200 cc California SPEC. vehicle)

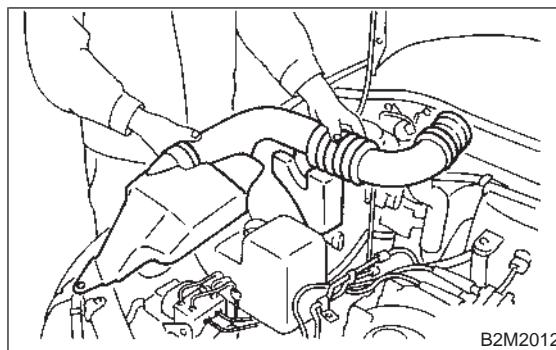
- (1) Remove bolt which installs air intake duct on the front side of body.



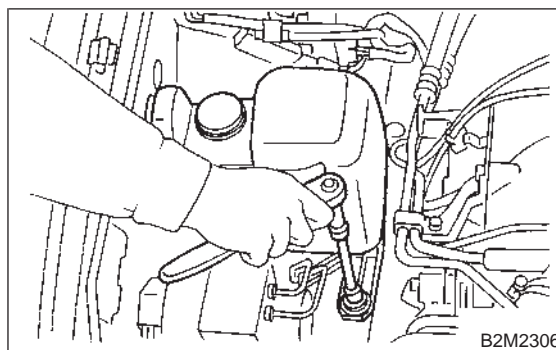
- (2) Remove bolt which installs air intake duct on body.



- (3) Remove air intake duct as a unit.

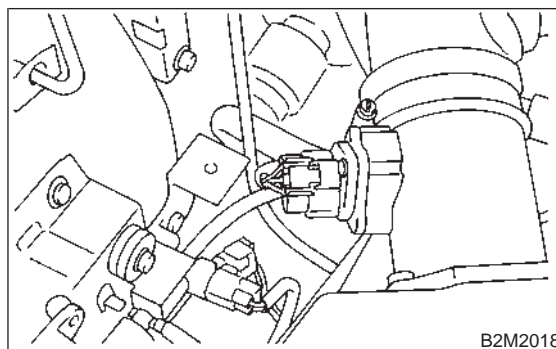


- (4) Remove resonator chamber.



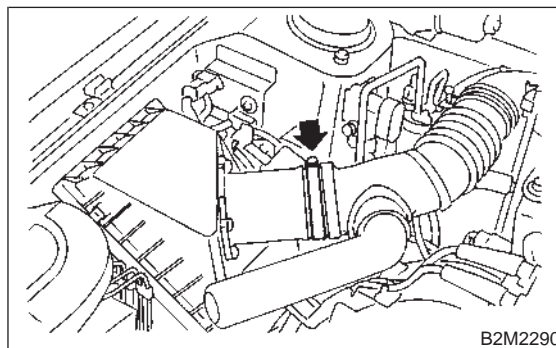
- 3) Remove air cleaner upper case and air cleaner element. (Except 2200 cc California SPEC. vehicle)

- (1) Disconnect mass air flow sensor connector.

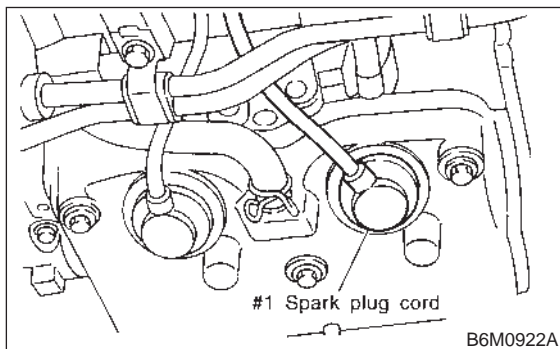


- (2) Remove two clips securing air cleaner upper cover.

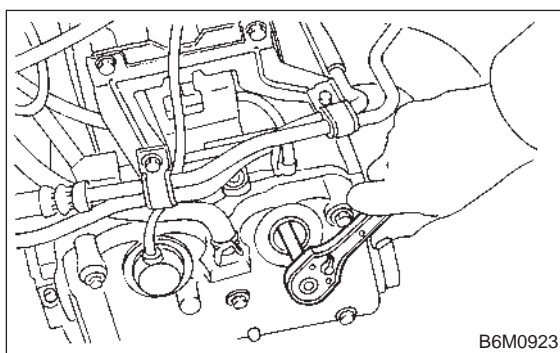
- (3) Loosen the clamp screw and separate air cleaner upper cover from air intake duct.



- (4) Remove air cleaner element.
- 4) Remove #1 spark plug cord by pulling boot, not cord itself.



- 5) Remove spark plug with the spark plug socket.



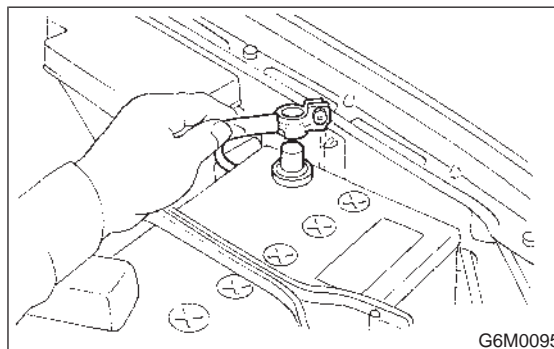
- 6) Installation is in the reverse order of removal.

Tightening torque (Spark plug):

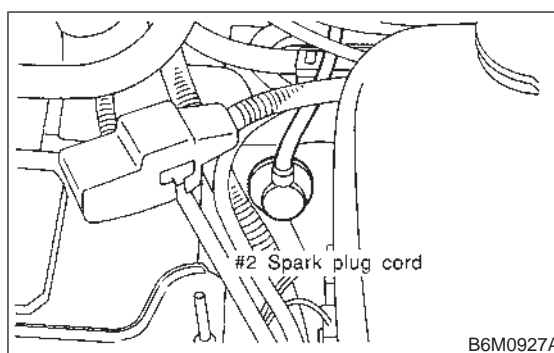
20.6 ± 2.9 N·m (2.10 ± 0.30 kg-m, 15.19 ± 2.14 ft-lb)

2. #2 SPARK PLUG

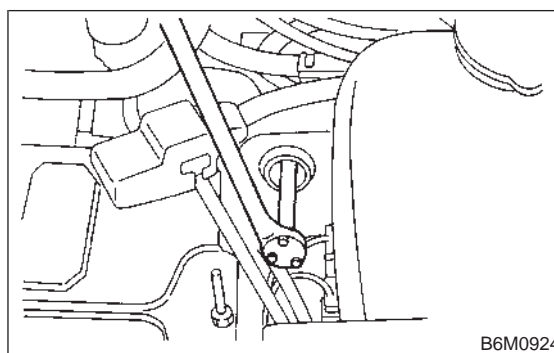
- 1) Disconnect battery ground cable.



- 2) Remove #2 spark plug cord by pulling boot, not cord itself.



- 3) Remove spark plug with the spark plug socket.



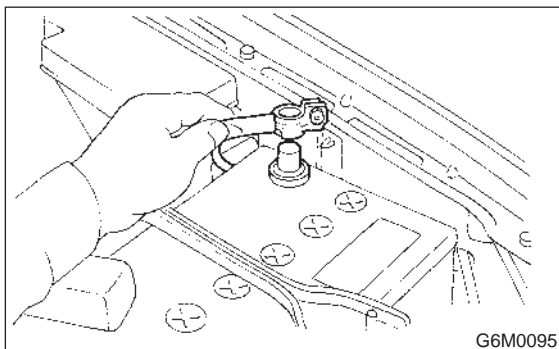
- 4) Installation is in the reverse order of removal.

Tightening torque (Spark plug):

20.6 ± 2.9 N·m (2.10 ± 0.30 kg-m, 15.19 ± 2.14 ft-lb)

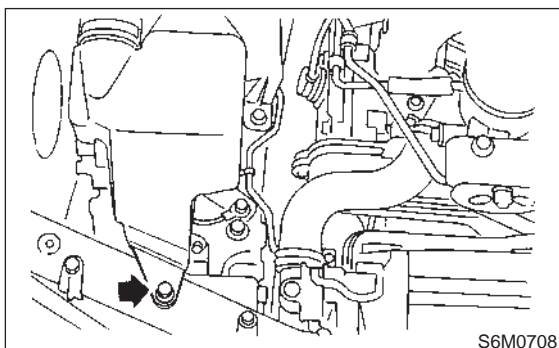
3. #3 SPARK PLUG

- 1) Disconnect battery ground cable.

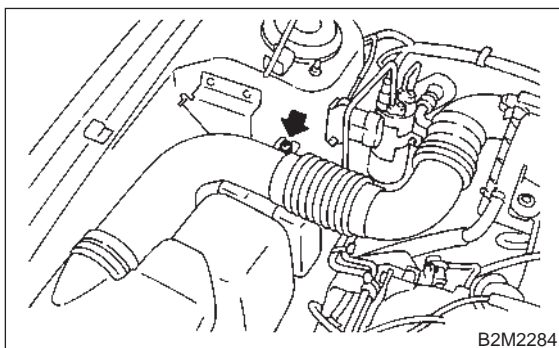


- 2) Remove air intake duct and air chamber. (2200 cc California SPEC. vehicle)

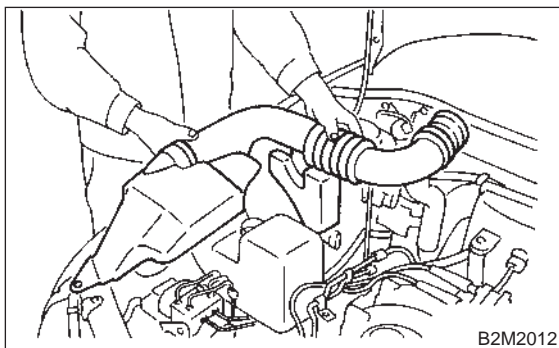
- (1) Remove bolt which installs air intake duct on the front side of body.



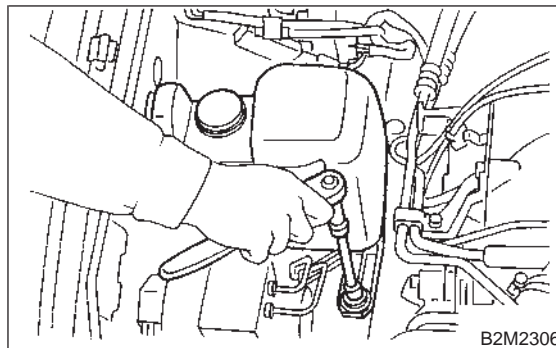
- (2) Remove bolt which installs air intake duct on body.



- (3) Remove air intake duct as a unit.

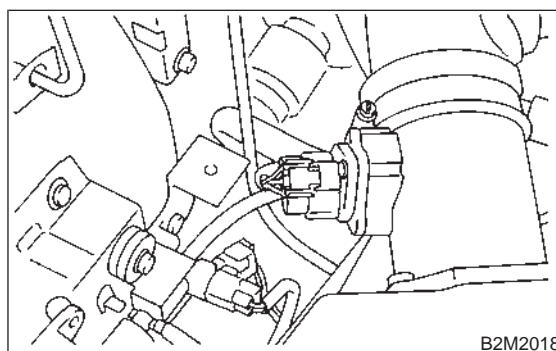


- (4) Remove resonator chamber.



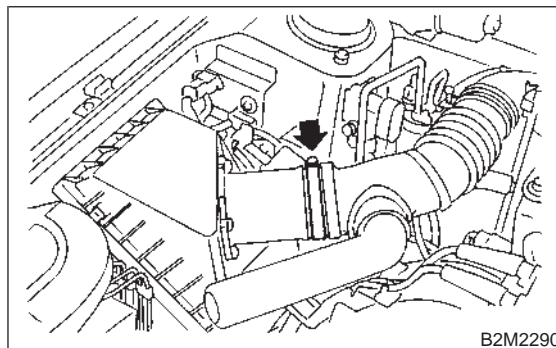
- 3) Remove air cleaner upper case and air cleaner element. (Except 2200 cc California SPEC. vehicle)

- (1) Disconnect mass air flow sensor connector.



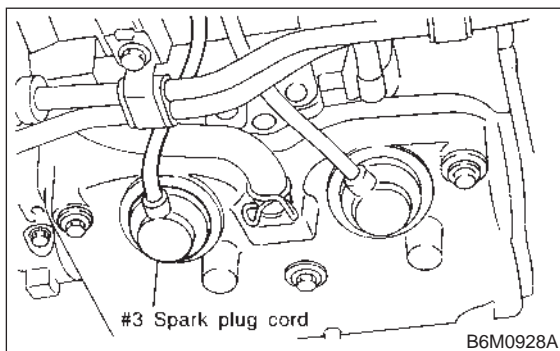
- (2) Remove two clips securing air cleaner upper cover.

- (3) Loosen the clamp screw and separate air cleaner upper cover from air intake duct.

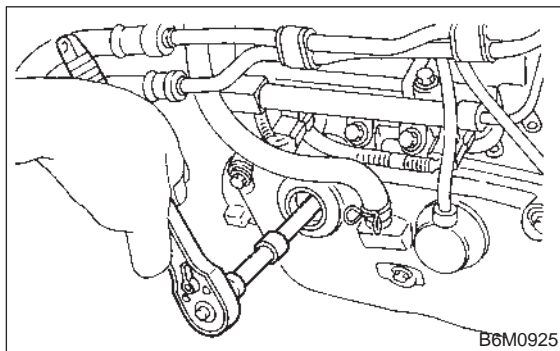


- (4) Remove air cleaner element.

- 4) Remove #3 spark plug cord by pulling boot, not cord itself.



- 5) Remove spark plug with the spark plug socket.



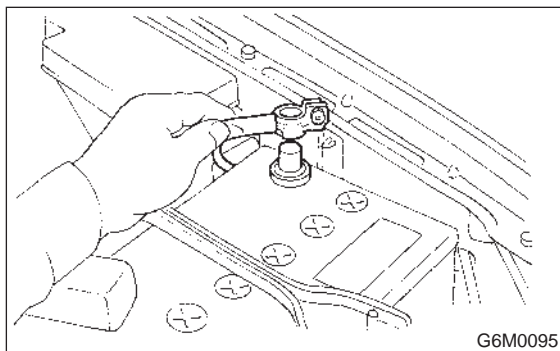
- 6) Installation is in the reverse order of removal.

Tightening torque (Spark plug):

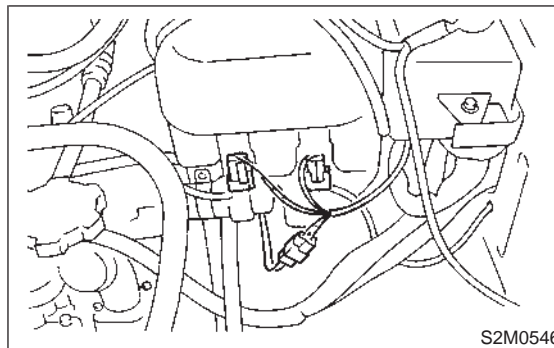
20.6 ± 2.9 N·m (2.10 ± 0.30 kg·m, 15.19 ± 2.14 ft·lb)

4. #4 SPARK PLUG

- 1) Disconnect battery ground cable.

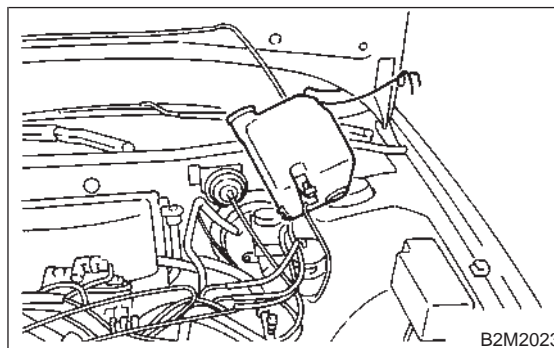


- 2) Disconnect washer motor connector.

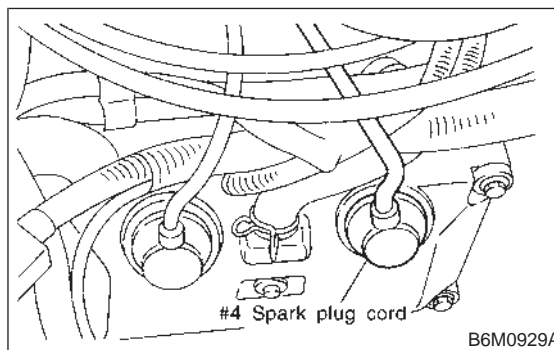


- 3) Disconnect rear window glass washer hose from washer motor, then plug connection with a suitable cap.

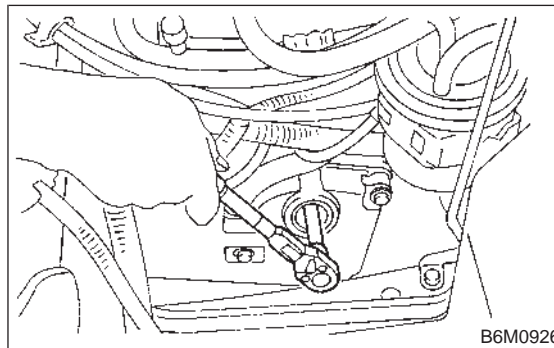
- 4) Remove the two bolts which hold the washer tank, then take the tank away from the working area.



- 5) Remove #4 spark plug cord by pulling boot, not cord itself.



- 6) Remove spark plug with the spark plug socket.



7) Installation is in the reverse order of removal.

Tightening torque (Spark plug):

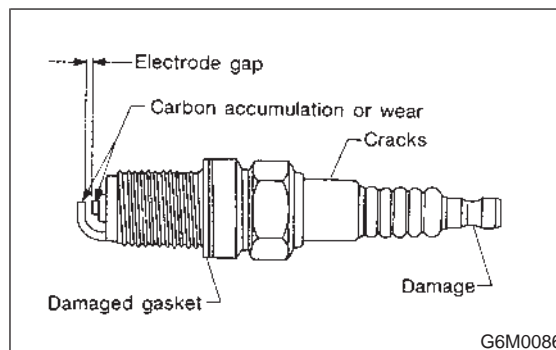
20.6 ± 2.9 N·m (2.10 ± 0.30 kg-m, 15.19 ± 2.14 ft-lb)

CAUTION:

The above torque should be only applied to new spark plugs without oil on their threads. In case their threads are lubricated, the torque should be reduced by approximately 1/3 of the specified torque in order to avoid over-stressing.

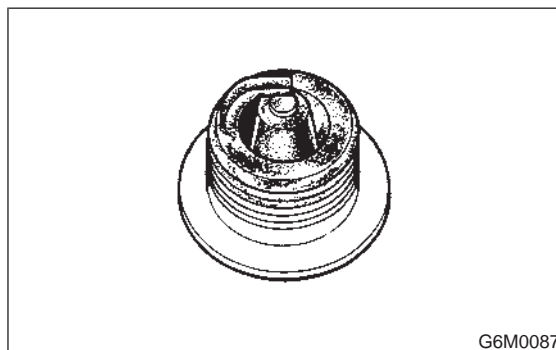
B: INSPECTION

Check electrodes and inner and outer porcelain of plugs, noting the type of deposits and the degree of electrode erosion.



1) Normal

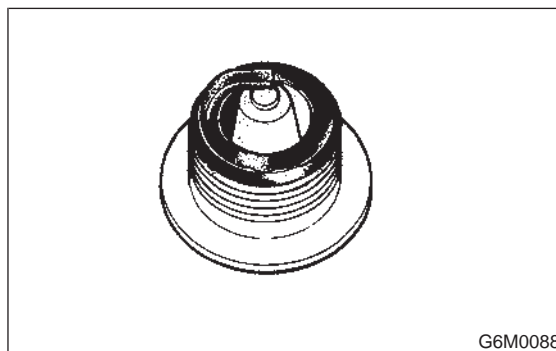
Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.



2) Carbon fouled

Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.

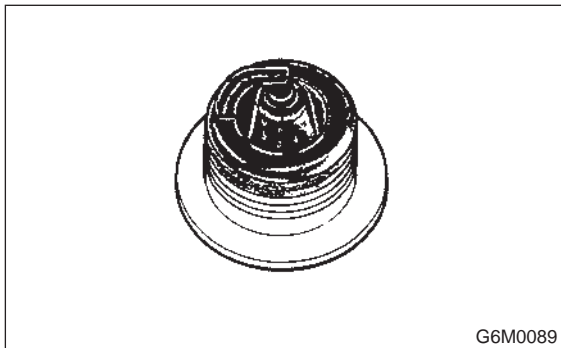
It is advisable to replace with plugs having hotter heat range.



3. Spark Plug

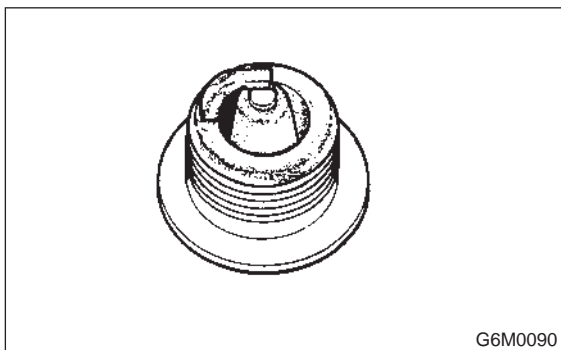
3) Oil fouled

Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems. If same condition remains after repair, use a hotter plug.



4) Overheating

White or light gray insulator with black or gray brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc. It is advisable to replace with plugs having colder heat range.



C: CLEANING AND REGAPPING

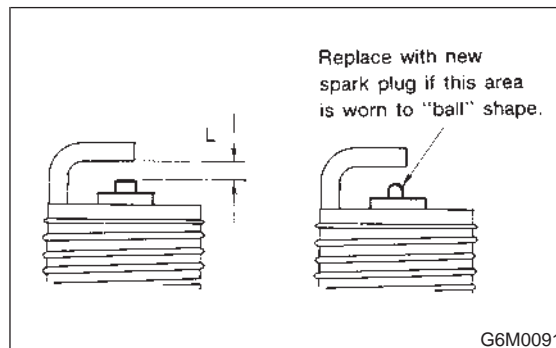
Clean spark plugs in a sand blast type cleaner. Avoid excessive blasting. Clean and remove carbon or oxide deposits, but do not wear away porcelain.

If deposits are too stubborn, discard plugs.

After cleaning spark plugs, recondition firing surface of electrodes with file. Then correct the spark plug gap using a gap gauge.

Spark plug gap: L

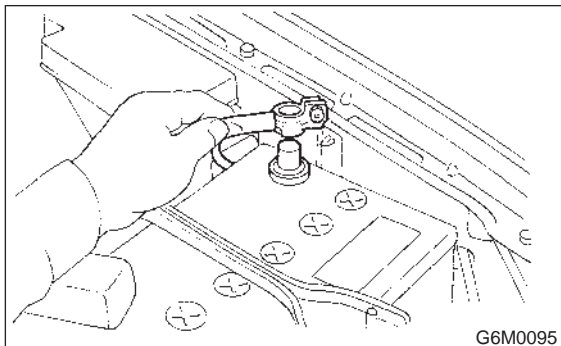
1.0 — 1.1 mm (0.039 — 0.043 in)



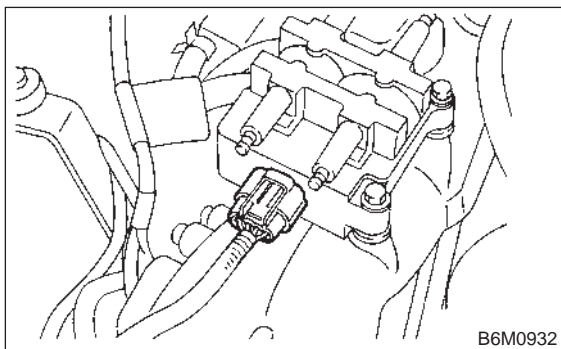
4. Ignition Coil and Ignitor Assembly

A: REMOVAL AND INSTALLATION

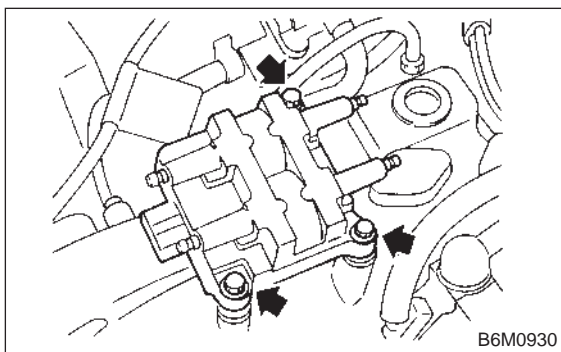
- 1) Disconnect battery ground cable.



- 2) Disconnect spark plug cords from ignition coil and ignitor assembly.
- 3) Disconnect connector from ignition coil and ignitor assembly.



- 4) Remove ignition coil and ignitor assembly.



- 5) Installation is in the reverse order of removal.

CAUTION:

Be sure to connect wires to their proper positions. Failure to do so will damage unit.

B: INSPECTION

Using accurate tester, inspect the following items, and replace if defective.

- 1) Primary resistance
- 2) Secondary coil resistance

CAUTION:

If the resistance is extremely low, this indicates the presence of a short-circuit.

Specified resistance:

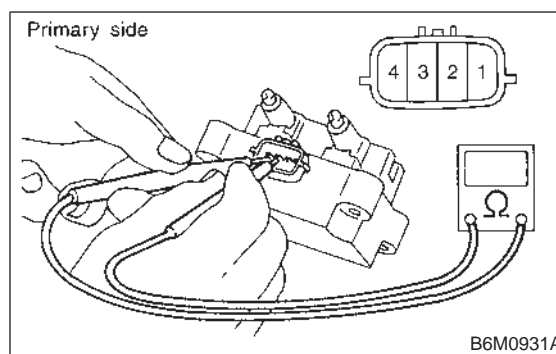
[Primary side]

Between terminal No. 1 and No. 2

$0.73 \Omega \pm 10\%$

Between terminal No. 2 and No. 4

$0.73 \Omega \pm 10\%$



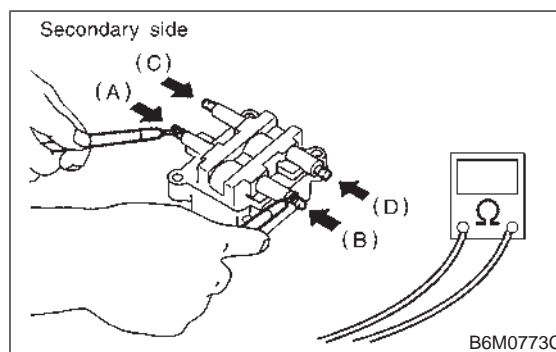
[Secondary side]

Between (A) and (B)

$12.8 \text{ k}\Omega \pm 15\%$

Between (C) and (D)

$12.8 \text{ k}\Omega \pm 15\%$



- 3) Insulation between primary terminal and case: $10 \text{ M}\Omega$ or more.

5. Spark Plug Cord

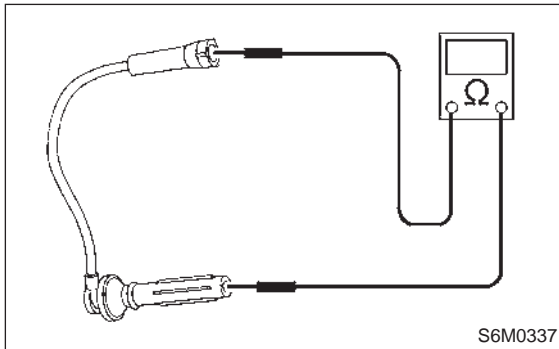
A: INSPECTION

Check for:

- 1) Damage to cords, deformation, burning or rust formation of terminals
- 2) Resistance values of cords

Resistance value:

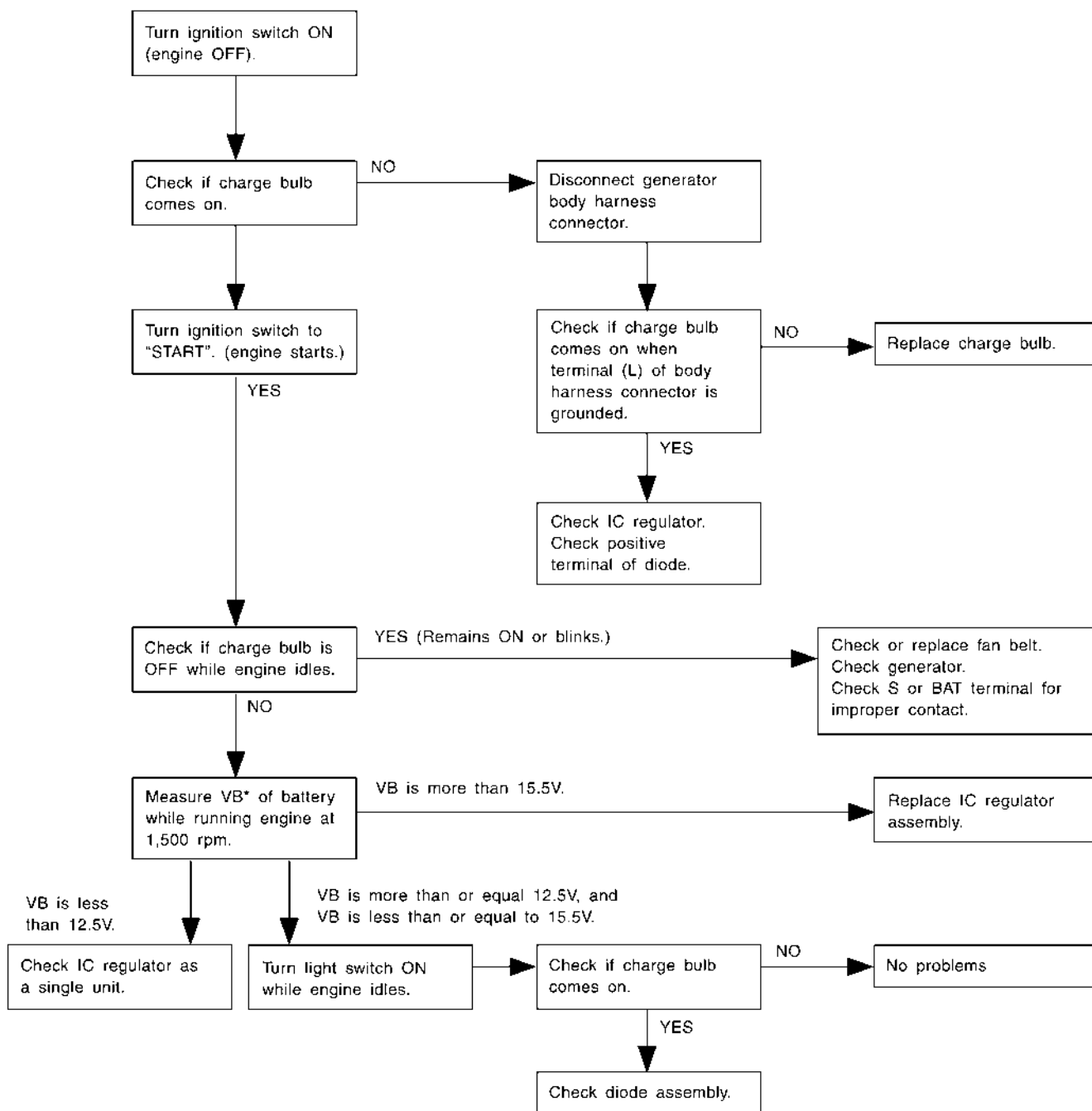
5.12 — 12.34 k Ω



1. Starter

Trouble		Probable cause
Starter does not start.	Magnet switch does not operate. (no clicks are heard.)	Magnet switch poor contact or discontinuity of pull-in coil circuit
		Improper sliding of magnet switch plunger
	Magnet switch operates. (clicks are issued.)	Poor contact of magnet switch's main contact point
		Layer short of armature
		Contaminants on armature commutator
		High armature mica
		Improper grounding of yoke field coil
		Insufficient carbon brush length
		Insufficient brush spring pressure
Starter starts but does not crank engine.	Failure of pinion gear to engage ring gear	Worn pinion teeth
		Improper sliding of overrunning clutch
	Clutch slippage	Improper adjustment of stud bolt
Starter starts but engine cranks too slowly.		Faulty clutch roller spring
		Poor contact of magnet switch's main contact point
		Layer short of armature
		Discontinuity, burning or wear of armature commutator
		Poor grounding of yoke field coil
		Insufficient brush length
		Insufficient brush spring pressure
Starter overruns.		Abnormal brush wear
		Magnet switch coil is a layer short.

2. Generator



*: Terminal voltage

BODY ELECTRICAL SYSTEM

6-2

	Page
S SPECIFICATIONS AND SERVICE DATA	2
1. Body Electrical.....	2
W SERVICE PROCEDURE	3
1. Precautions.....	3
2. Battery	3
3. Ignition Switch	5
4. Lighting	5
5. Front Wiper and Washer.....	9
6. Rear Wiper and Washer	12
7. Rear Window Defogger.....	15
8. Combination Meter	17
9. Radio, Speaker and Antenna	18
10. Front Fog Light.....	18
11. Cruise Control	19
K DIAGNOSTICS	23
1. AT Shift Lock System.....	23
2. Combination Meter	29

1. Body Electrical

Battery	Type		MT model: 55D23L (MF)	AT model: 75D23L (MF)
	Capacity	Reverse capacity	MT model: 100 minutes	AT model: 120 minutes
		Cold cranking ampere	MT model: 430 amperes	AT model: 520 amperes
Combination meter	Speedometer		Electric pulse type	
	Temperature gauge		Thermistor cross coil type	
	Fuel gauge		Resistance cross coil type	
	Tachometer		Electric impulse type	
	Turn signal indicator light		12 V — 1.4 W	
	Charge indicator light		12 V — 1.4 W	
	Oil pressure indicator light		12 V — 1.4 W	
	ABS warning light		12 V — 1.4 W	
	CHECK ENGINE warning light (Malfunction indicator light)		12 V — 1.4 W	
	HI-beam indicator light		12 V — 3.4 W	
	Door open warning light		12 V — 1.4 W	
	Seat belt warning light		12 V — 1.4 W	
	Brake fluid and parking brake warning light		12 V — 3.4 W	
	FWD indicator light		12 V — 1.4 W	
	AIRBAG warning light		12 V — 1.4 W	
	Meter illumination light		12 V — 3.4 W	
	AT OIL TEMP. warning light		12 V — 1.4 W	
Headlight			12 V — 60/55 W (Halogen)	
Front fog light			12 V — 55 W	
Front turn signal light			12 V — 27 W	
Side turn signal light			12 V — 3.8 W	
Side marker/Parking light			12 V — 3.8 W	
Rear combination light		Tail/Stop light	12 V — 8/27 W	
		Turn signal light	12 V — 27 W	
		Back-up light	12 V — 27 W	
License plate light			12 V — 3.8 W	
High-mount stop light			Sedan: 12 V — 18 W	Wagon: 12 V — 13 W
Room light			12 V — 8 W	
Spot light			12 V — 8 W	
Trunk room light			12 V — 5 W	
Luggage room light			12 V — 5 W	
Front wiper motor	Input		12 V — 54 W or less	
Rear wiper motor	Input		12 V — 42 W or less	
Front washer motor	Pump type		Centrifugal	
	Input		12 V — 36 W or less	
Rear washer motor	Pump type		Centrifugal	
	Input		12 V — 36 W or less	
Horn			12 V — 350 Hz	
Accessory socket	Input		12 V — 120 W	
Rear window defogger	Input		12 V — 160 W	
	Indicator light		12 V — 50 mA	
Cargo socket	Input		12 V — 120 W	

1. Precautions

- Before disassembling or reassembling parts, always disconnect battery ground cable. When repairing radio, control units, etc. which are provided with memory functions, record memory contents before disconnecting battery ground cable. Otherwise, these contents are cancelled upon disconnection.
- Reassemble parts in reverse order of disassembly procedure unless otherwise indicated.
- Adjust parts to specifications contained in this manual if so designated.
- Connect connectors and hoses securely during reassembly.
- After reassembly, ensure functional parts operate smoothly.

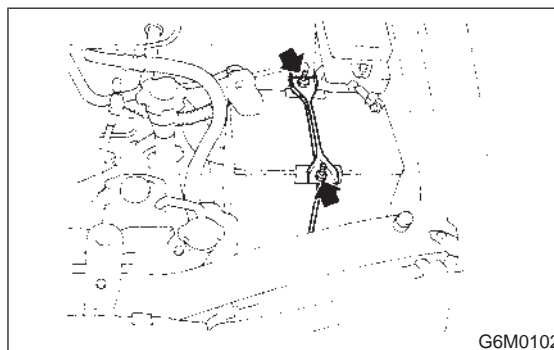
CAUTION:

- Airbag system wiring harness is routed near the electrical parts and switch.
- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
- Be careful not to damage Airbag system wiring harness when servicing the ignition key cylinder.

2. Battery

A: REMOVAL AND INSTALLATION

- 1) Disconnect the positive (+) terminal after disconnecting the negative (–) terminal of battery.
- 2) Remove flange nuts from battery rods and take off battery holder.



- 3) Remove battery.
- 4) Installation is in the reverse order of removal.

Tightening torque:

$3.4 \pm 1.0 \text{ N}\cdot\text{m}$ ($0.35 \pm 0.1 \text{ kg}\cdot\text{m}$, $2.5 \pm 0.7 \text{ ft}\cdot\text{lb}$)

NOTE:

- Clean battery cable terminals and apply grease to retard the formation of corrosion.
- Connect the positive (+) terminal of battery and then the negative (–) terminal of the battery.

B: INSPECTION

WARNING:

- Electrolyte has toxicity; be careful handling the fluid.
- Avoid contact with skin, eyes or clothing. Especially at contact with eyes, flush with water for 15 minutes and get prompt medical attention.
- Batteries produce explosive gasses. Keep sparks, flame, cigarettes away.
- Ventilate when charging or using in enclosed space.
- For safety, in case an explosion does occur, wear eye protection or shield your eyes when working near any battery. Never lean over a battery.
- Do not let battery fluid contact eyes, skin, fabrics, or paint-work because battery fluid is corrosive acid.
- To lessen the risk of sparks, remove rings, metal watch-bands, and other metal jewelry. Never allow metal tools to contact the positive battery terminal and anything connected to it while you are at the same time in contact with any other metallic portion of the vehicle because a short circuit will be caused.

1. BATTERY

1) External parts:

Check for the existence of dirt or cracks on the battery case, top cover, vent plugs, and terminal posts. If necessary, clean with water and wipe with a dry cloth. Apply a thin coat of grease on the terminal posts to prevent corrosion.

2) Electrolyte level:

Check the electrolyte level in each cell. If the level is below MIN LEVEL, bring the level to MAX LEVEL by pouring distilled water into the battery cell. Do not fill beyond MAX LEVEL.

3) Specific gravity of electrolyte:

(1) Measure specific gravity of electrolyte using a hydrometer and a thermometer. Specific gravity varies with temperature of electrolyte so that it must be corrected at 20°C (68°F) using the following Equation:

$$S_{20} = St + 0.0007 \times (t - 20)$$

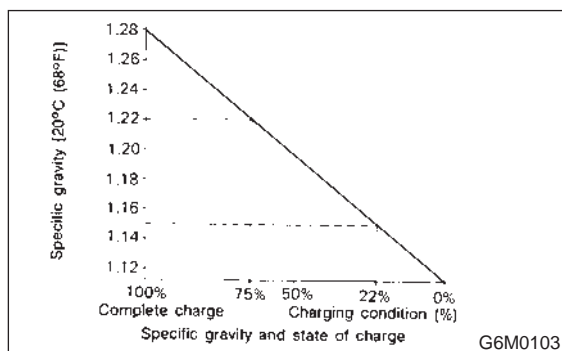
S_{20} : Specific gravity corrected at electrolyte temperature of 20°C

St : Measured specific gravity

t : Measured temperature (°C)

Determine whether or not battery must be charged, according to corrected specific gravity.

Standard specific gravity: 1.220 — 1.290 [at 20°C (68°F)]



(2) Measuring the specific gravity of the electrolyte in the battery will disclose the state of charge of the battery. The relation between the specific gravity and the state of charge is as shown in figure.

C: CHARGING

WARNING:

● Do not bring an open flame close to the battery at this time.

CAUTION:

● Prior to charging, corroded terminals should be cleaned with a brush and common baking soda solution.

● Be careful since battery electrolyte overflows while charging the battery.

● Observe instructions when handling battery charger.

● Before charging the battery on vehicle, disconnect battery ground terminal. Failure to follow this rule may damage alternator's diodes or other electrical units.

1. NORMAL CHARGING

Charge the battery at current value specified by manufacturer or at approximately 1/10 of battery's ampere-hour rating.

2. QUICK CHARGING

Quick charging is a method in which the battery is charged in a short period of time with a relatively large current by using a quick charger. Since a large current flow raises electrolyte temperature, the battery is subject to damage if the large current is used for prolonged time. For this reason, the quick charging must be carried out within a current range that will not increase the electrolyte temperature above 40°C (104°F). It should be also remembered that the quick charging is a temporary means to bring battery voltage up to a fair value and, as a rule, a battery should be charged slowly with a low current.

CAUTION:

● Observe the items in 1. NORMAL CHARGING.

● Never use more than 10 amperes when charging the battery because that will shorten battery life.

3. JUDGMENT OF BATTERY IN CHARGED CONDITION

1) Specific gravity of electrolyte is held at a specific value in a range from 1.250 to 1.290 for more than one hour.

2) Voltage per battery cell is held at a specific value in a range from 2.5 to 2.8 volts for more than one hour.

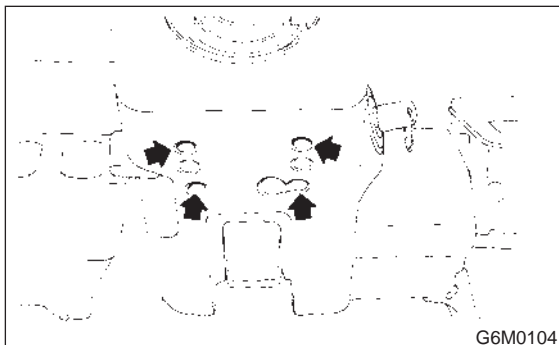
4. CHECK HYDROMETER FOR STATE OF CHARGE

Hydrometer indicator	State of charge	Required action
Green dot	Above 65%	Load test
Dark dot	Below 65%	Charge battery
Clear dot	Low electrolyte	Replace battery* (If cranking complaint)
*: Check electrical system before replacement.		

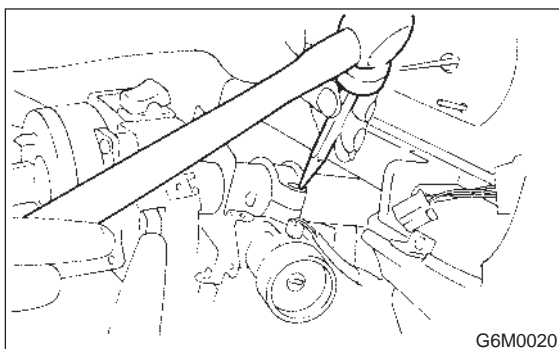
3. Ignition Switch

A: REMOVAL AND INSTALLATION

- 1) Remove screws, separate upper column cover and lower column cover.



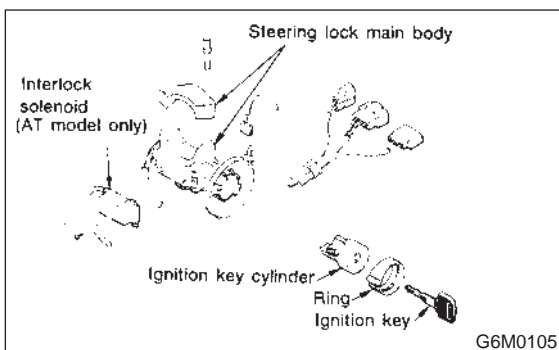
- 2) Remove knee protector.
- 3) Remove meter visor.
- 4) Disconnect ignition switch connector from body harness.
- 5) Using a drift and hammer, hit the torn bolt head to loosen and remove the ignition switch.



- 6) Installation is in the reverse order of removal.

NOTE:

When installing, tighten the connecting bolt until its head twists off.



4. Lighting

A: ADJUSTMENT

1. HEADLIGHT AIMING

CAUTION:

Turn off the light before adjusting headlight aiming. If the light is necessary to check aiming, do not turn on for more than two minutes.

NOTE:

Before checking the headlight aiming, be sure of the following:

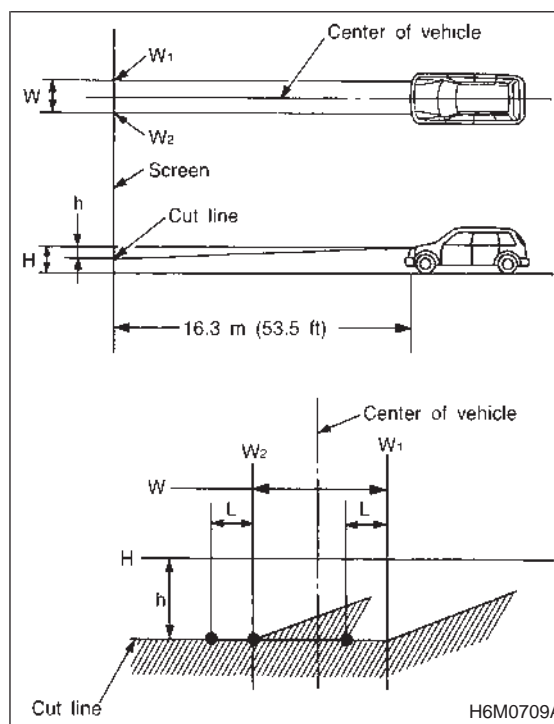
- The area around the headlight has not sustained any accident, damage or other type of deformation.
- Vehicle is parked on level ground.
- The inflation pressure of tires is correct.
- Vehicle's gas tank is fully charged.
- Bounce the vehicle several times to normalize the suspension.
- Make certain that someone is seated in the driver's seat.

- 1) Place a cloth over the headlight that does not require aiming adjustment.

- 2) Turn the headlights on. Perform the aiming adjustment for the other headlight as follows:

CAUTION:

Do not perform lateral headlight aiming adjustment.



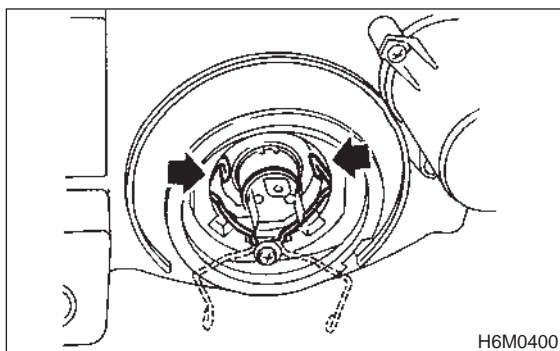
	W	H	L	h
Except OUTBACK	1,070 (42.13)	630 (24.80)	569 (22.40)	114 (4.49)
OUTBACK	1,070 (42.13)	650 (25.59)	569 (22.40)	114 (4.49)

Unit: mm (in)

B: REMOVAL AND INSTALLATION

1. HEADLIGHT BULB

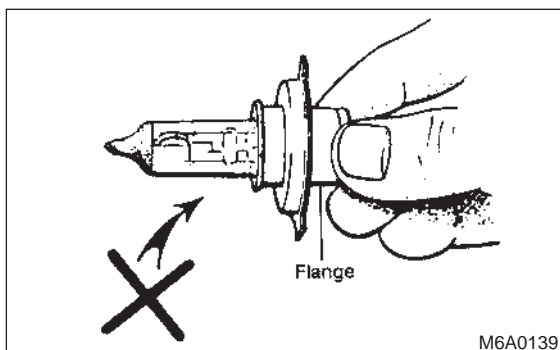
- 1) Disconnect the connector from inside of the engine compartment.
- 2) Remove rubber cap.
- 3) Remove the light bulb retaining spring to remove the bulb.



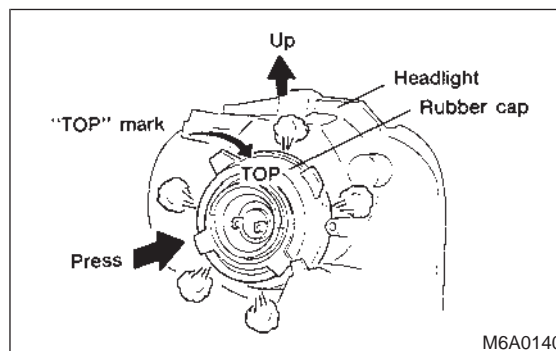
- 4) Replace the bulb with a new one and hook the spring.
- 5) Attach the rubber cap and connect the connector.

CAUTION:

- Since the tungsten halogen bulb operates at high temperature, dirt and oil on the bulb surface decreases the bulb's useful life. When replacing the bulb, hold the flange portion and do not touch the glass portion.



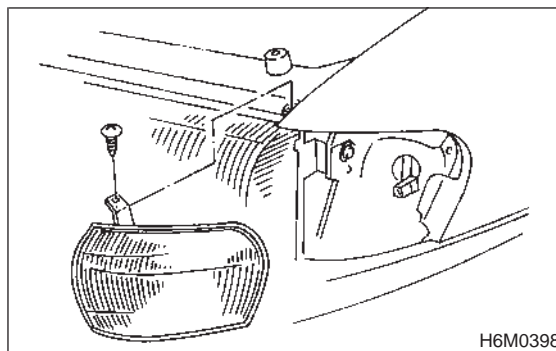
- Attach the rubber cap with letters TOP on the top so that the drain hole will be on the lower side.



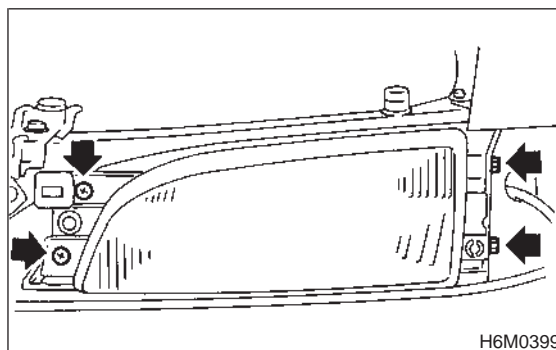
- To keep water out, correctly engage the groove portion of the rubber cap.

2. HEADLIGHT AND SIDE MARKER LIGHT

- 1) Remove front grille and disconnect connector from headlight.
- 2) Remove screw then remove side marker light while disconnecting connector.



- 3) Remove screws and bolts which secure headlight and remove headlight.



- 4) Installation is in the reverse order of removal.

Tightening torque:

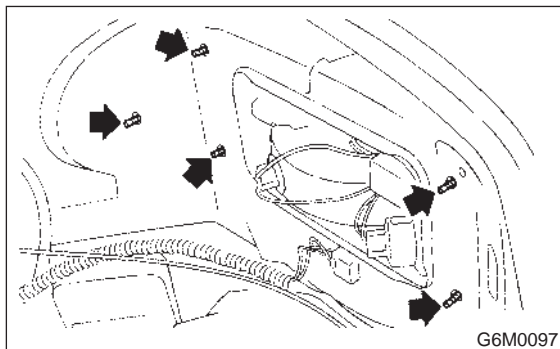
$6.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.65 \pm 0.05 \text{ kg}\cdot\text{m}$, $4.7 \pm 0.4 \text{ ft}\cdot\text{lb}$)

NOTE:

When installing, securely fit clip (on fender side) into locating (on side marker light side).

3. REAR COMBINATION LIGHT

- 1) Remove rear trim.
- 2) Remove nuts and disconnect connector.



- 3) Attach adhesive cloth tape to body area around rear combination light.
- 4) Using a standard screwdriver, carefully pry rear combination light off and away from the front of vehicle.
- 5) Installation is in the reverse order of removal.

Tightening torque:

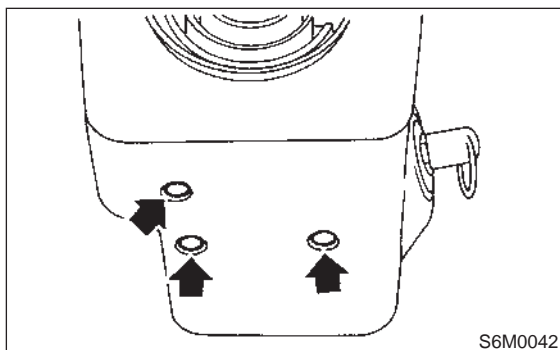
$6.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.65 \pm 0.05 \text{ kg}\cdot\text{m}$, $4.7 \pm 0.4 \text{ ft}\cdot\text{lb}$)

CAUTION:

- Do not pry rear combination light forcefully as this may scratch vehicle body.
- Remove all traces of adhesive tape from body before installation.
- Attach butyl rubber tape to back of rear combination light before installing rear combination light on body for sealing purposes.

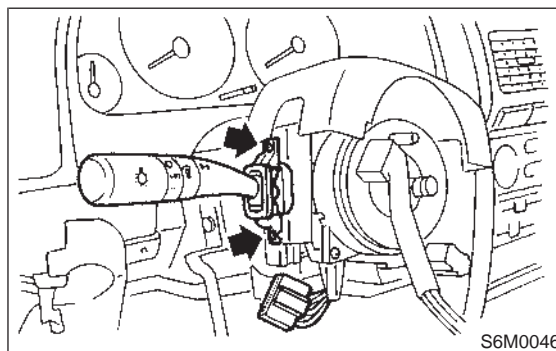
4. COMBINATION SWITCH

- 1) Remove instrument panel lower cover. <Ref. to 5-4 [W1A0].>
- 2) Remove screws which secure upper column cover to lower column cover.



- 3) Disconnect connector from combination switch.

- 4) Remove screws which secure switch and remove switch.



- 5) Installation is in the reverse order of removal.

C: INSPECTION**1. COMBINATION SWITCH (LIGHTING)**

Move combination switch to respective positions and check continuity between terminals.

• LIGHTING SWITCH

Terminal Switch position	16	14	13
OFF			
Tail	○	○	
Head	○	○	○

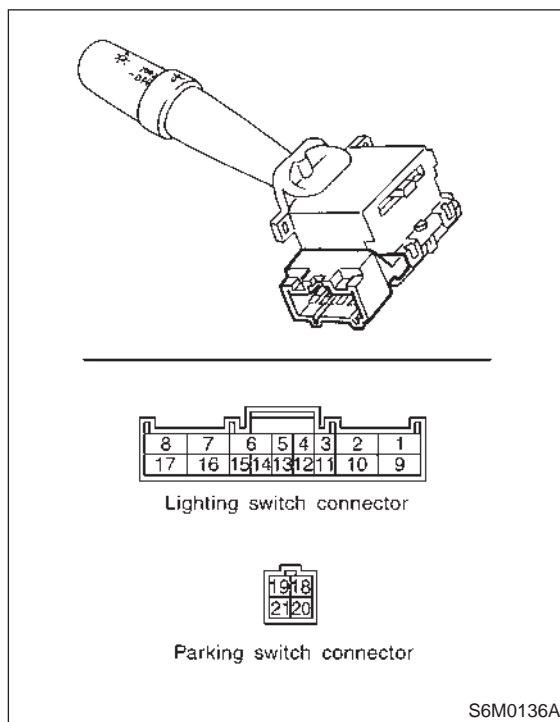
• PARKING SWITCH

Terminal Switch position	19	21	18
OFF	○	○	
ON		○	○

• DIMMER AND PASSING SWITCH

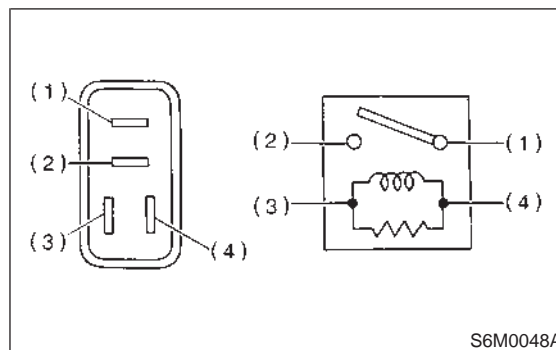
Terminal Switch position	16	17	7	8
Flash	○		○	○
Low beam	○	○		
HI-beam	○		○	

H6M0500B

**2. HEADLIGHT RELAY**

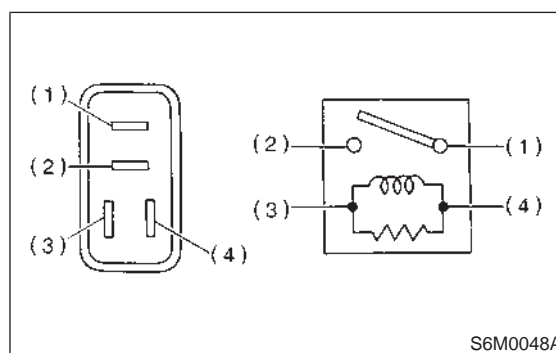
Check continuity between terminals when terminal No. 4 is connected to battery and terminal No. 3 is grounded.

When current flows.	Between terminals No. 1 and No. 2	Continuity exists.
When current does not flow.	Between terminals No. 1 and No. 2	Continuity does not exist.
	Between terminals No. 3 and No. 4	Continuity exists.

**3. TAIL AND ILLUMINATION RELAY**

Check continuity between terminals (indicated in table) when terminal No. 4 is connected to battery and terminal No. 3 is grounded.

When current flows.	Between terminals No. 1 and No. 2	Continuity exists.
When current does not flow.	Between terminals No. 1 and No. 2	Continuity does not exist.
	Between terminals No. 3 and No. 4	Continuity exists.



5. Front Wiper and Washer

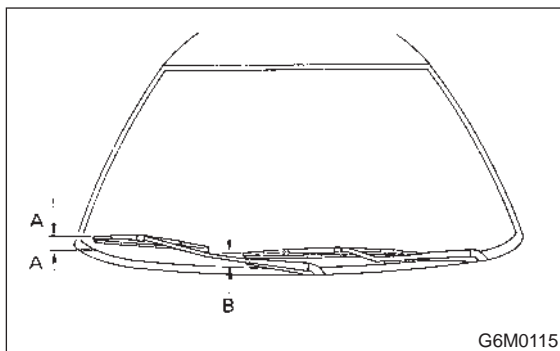
A: ADJUSTMENT

- 1) Turn the wiper switch to OFF position.
- 2) Adjust blades in original position as shown in figure by changing wiper arm installation.

Original position:

A: 22.5 ± 7.5 mm (0.886 ± 0.295 in)

B: 32.5 ± 7.5 mm (1.280 ± 0.295 in)



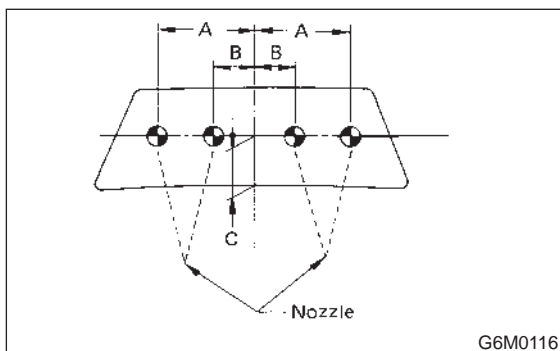
- 3) Adjust washer ejecting point on windshield glass as shown in figure when vehicle stops.

Ejecting point:

A: 375 mm (14.76 in)

B: 150 mm (5.91 in)

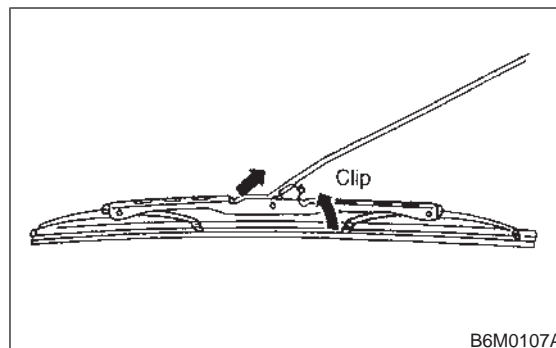
C: 350 mm (13.78 in)



B: REMOVAL AND INSTALLATION

1. BLADE

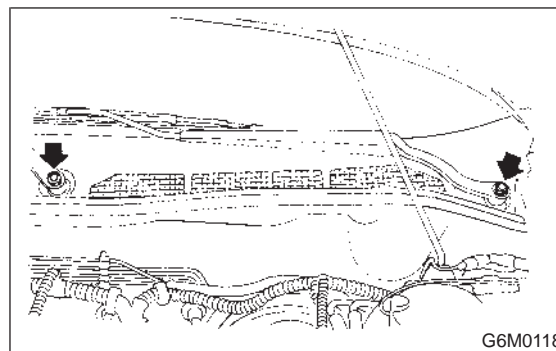
- 1) Pull out blade following the arrow direction, from arm while pushing up locking clip.



- 2) Installation is in the reverse order of removal.

2. WIPER ARM

- 1) Open front hood.
- 2) Remove cap. Remove the nut which secure wiper arm, and remove wiper arm.



- 3) Installation is in the reverse order of removal.

Tightening torque:

14 ± 2 N·m (1.4 ± 0.2 kg·m, 10.1 ± 1.4 ft·lb)

3. WIPER MOTOR AND LINK

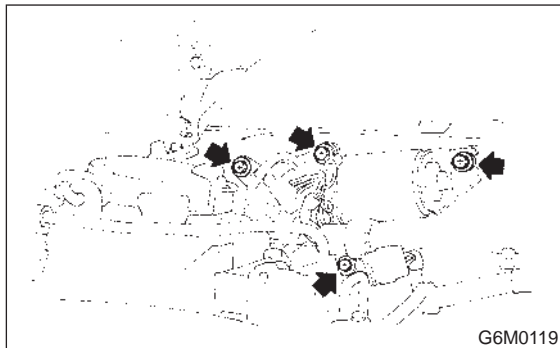
- 1) Detach weatherstrip and cowl panel. <Ref. to 5-1 [W11A0].>

NOTE:

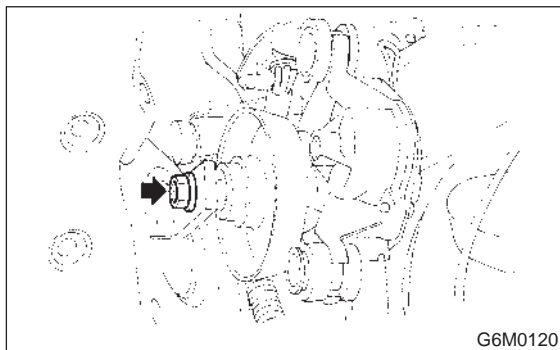
Apply silicone oil or soap water to both sides of cowl net to facilitate removal.

5. Front Wiper and Washer

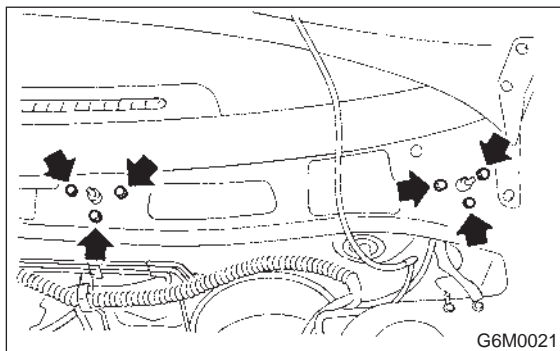
- 2) Disconnect electric connector, and remove motor attaching bolts.

Tightening torque: **$5.9 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.6 \pm 0.15 \text{ kg}\cdot\text{m}$, $4.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)**

- 3) Remove nut securing motor link on the back side of motor.

Tightening torque: **$15 \pm 3 \text{ N}\cdot\text{m}$ ($1.5 \pm 0.3 \text{ kg}\cdot\text{m}$, $10.8 \pm 2.2 \text{ ft}\cdot\text{lb}$)**

- 4) Remove nuts which secure sleeve unit.

Tightening torque: **$5.9 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.6 \pm 0.15 \text{ kg}\cdot\text{m}$, $4.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)**

- 5) Remove wiper link from service hole in front panel.



- 6) Installation is in the reverse order of removal.

C: INSPECTION

1. COMBINATION SWITCH (ON-CAR)

Set wiper switch to each position and check continuity between terminals.

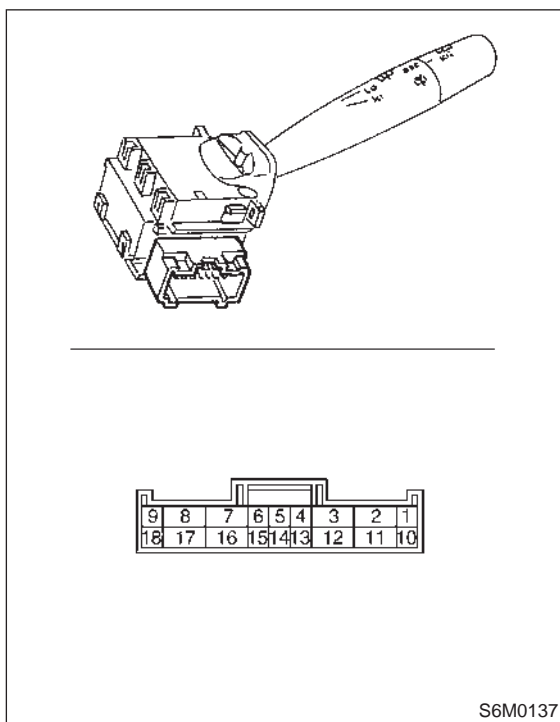
• Wiper switch

Terminal Switch position	16	7	17	8	INT1	INT2
OFF	OFF	○—○				
	MIST	×	×			
INT	OFF	○—○			○—○	
	MIST	×	×		○—○	
		×	×			
LO	OFF	○—○				
	MIST	○—○				
HI	OFF		○—○			
	MIST		○—○	○—○		

• Washer switch

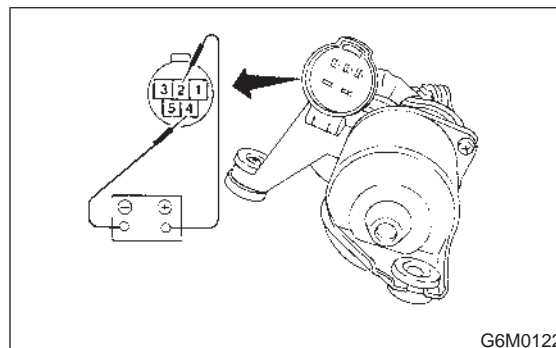
Terminal Switch position	11	2
OFF		
ON	○—○	○—○

H6M0501B

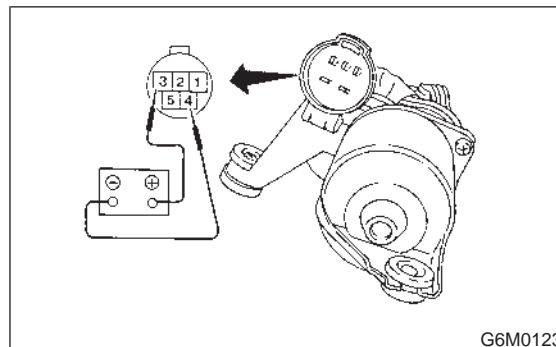


2. WIPER MOTOR

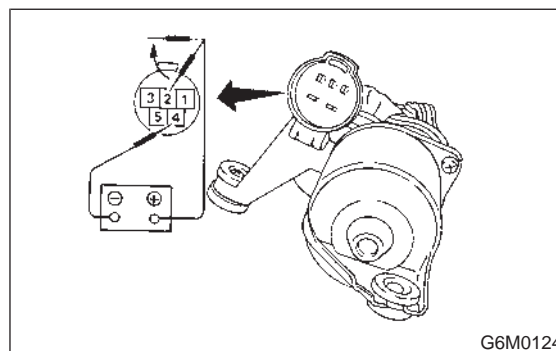
1) Check wiper motor operation at low speed: Connect battery to wiper motor. Check wiper motor for proper operation at low speed.



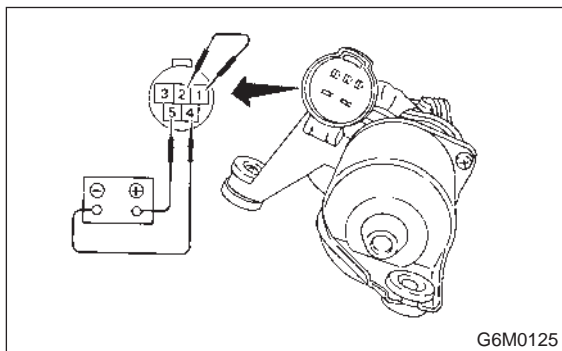
2) Check wiper motor operation at high speed: Connect battery wiper motor. Check wiper motor for proper operation at high speed.



3) Check wiper motor for proper stoppage: Connect battery to wiper motor. After operating wiper motor at low speed, disconnect battery to stop it.



- 4) Reconnect battery and ensure that wiper motor stops at "AUTO STOP" after operating at low speed.



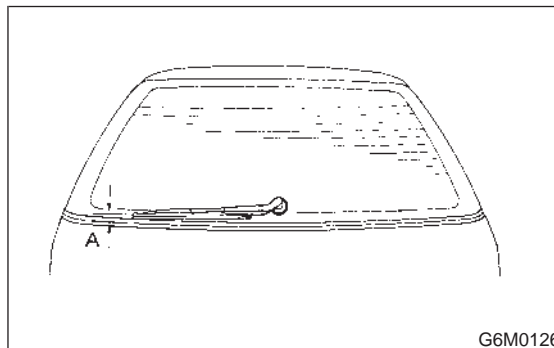
6. Rear Wiper and Washer

A: ADJUSTMENT

- 1) Adjust wiper blade in original position as shown in figure by changing wiper arm installation.

Original position:

A: 30 ± 5 mm (1.18 ± 0.20 in)

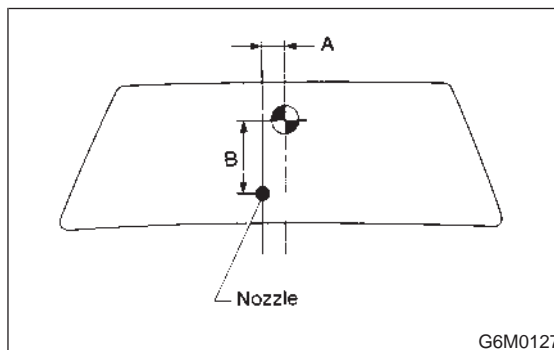


- 2) Adjust washer ejecting point on rear gate window as shown in figure when the vehicle stops.

Ejecting point:

A: 25 mm (0.98 in)

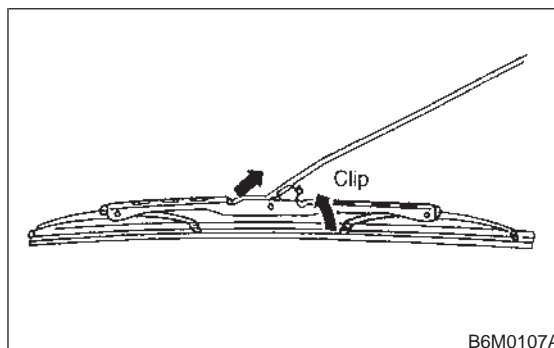
B: 200 — 300 mm (7.87 — 11.81 in)



B: REMOVAL AND INSTALLATION

1. BLADE

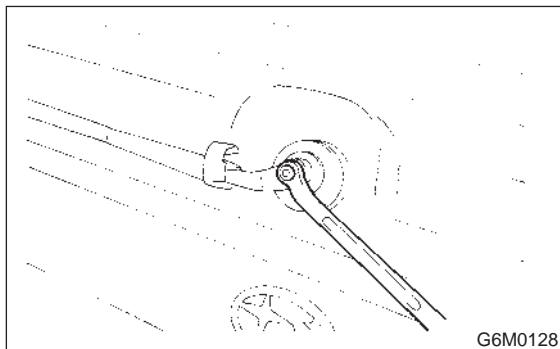
- 1) Pull out blade following the arrow direction, from arm while pushing up locking clip.



- 2) Installation is in the reverse order of removal.

2. WIPER ARM

- 1) Remove head cover.
- 2) Remove nut and wiper arm.



- 3) Installation is in the reverse order of removal.

Tightening torque:

$5.9 \pm 1.5 \text{ N-m}$ ($0.6 \pm 0.15 \text{ kg-m}$, $4.3 \pm 1.1 \text{ ft-lb}$)

3. WIPER MOTOR

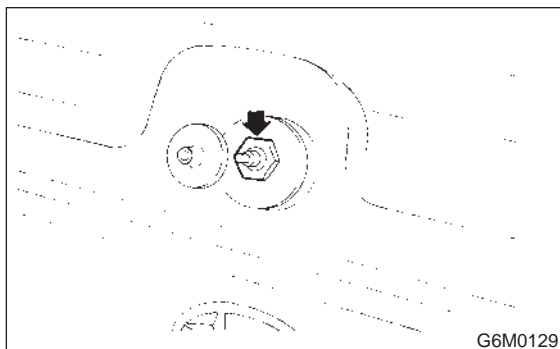
- 1) Remove cap and special nut.

CAUTION:

Be careful not to strike service tool against nozzle during removal.

Tightening torque:

$7.4 \pm 1.5 \text{ N-m}$ ($0.75 \pm 0.15 \text{ kg-m}$, $5.4 \pm 1.1 \text{ ft-lb}$)

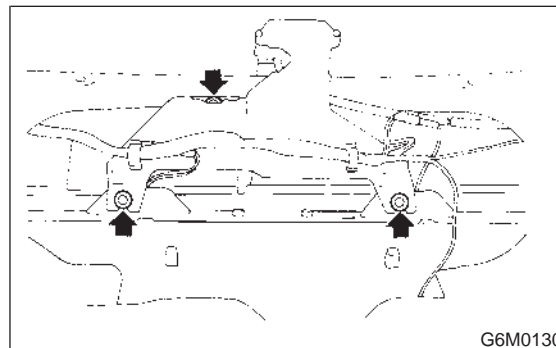


- 2) Remove rear gate trim. <Ref. to 5-2 [W3A0].>
- 3) Undo clips which secure harness, and disconnect connector of wiper motor.
- 4) Separate washer hoses at joint.

- 5) Remove attaching screws and take out wiper motor assembly.

CAUTION:

Be careful not to damage O-ring when removing wiper motor assembly.



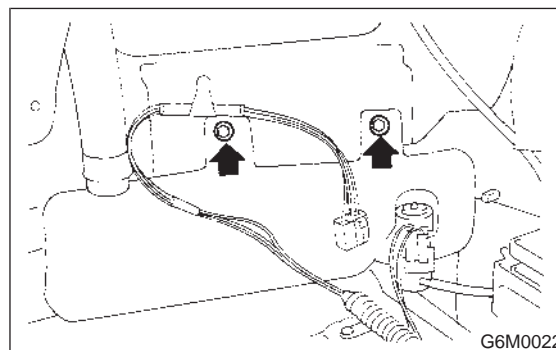
- 6) Installation is in the reverse order of removal.

Tightening torque:

$5.9 \pm 1.5 \text{ N-m}$ ($0.6 \pm 0.15 \text{ kg-m}$, $4.3 \pm 1.1 \text{ ft-lb}$)

4. WASHER TANK

- 1) Remove rear quarter trim.
- 2) Disconnect washer hose and connector.
- 3) Remove attaching bolts.



- 4) Installation is in the reverse order of removal.

Tightening torque:

$5.9 \pm 1.5 \text{ N-m}$ ($0.6 \pm 0.15 \text{ kg-m}$, $4.3 \pm 1.1 \text{ ft-lb}$)

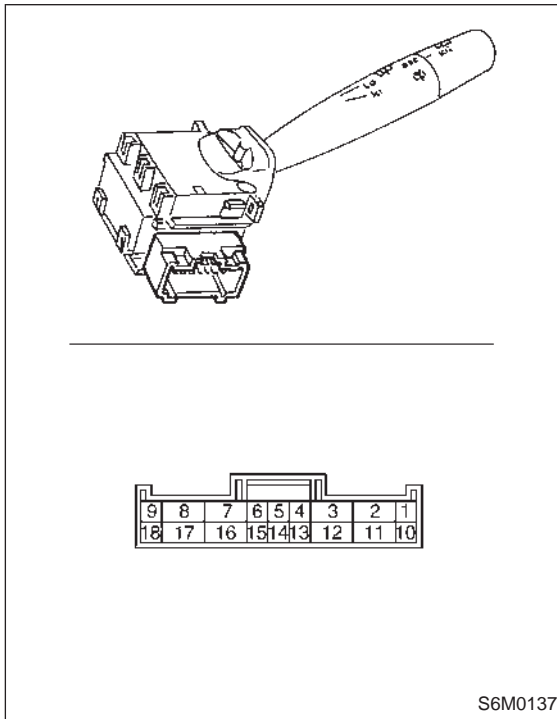
C: INSPECTION**1. COMBINATION SWITCH (ON-CAR)**

Set rear wiper and washer switch to each position and check continuity between terminals.

• WITHOUT INTERMITTENT REAR WIPER

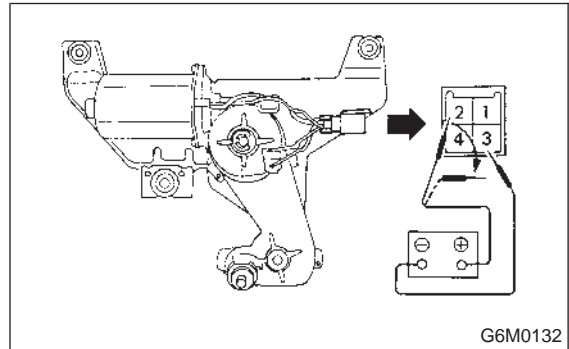
Terminal Switch position	10	12		2
WASH	○	○	—	○
OFF				
ON	○			○
WASH	○	○		○

H6M0502B



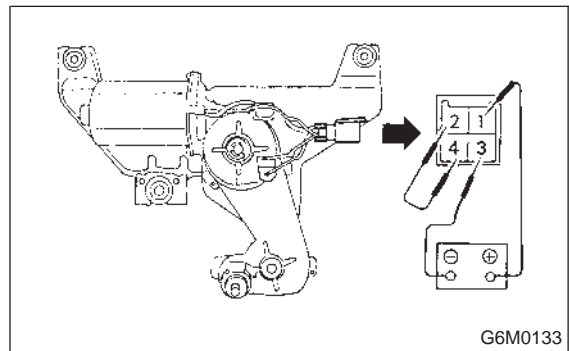
S6M0137

- 2) Check wiper motor for proper stoppage:
After operating wiper motor, disconnect battery from wiper motor.



G6M0132

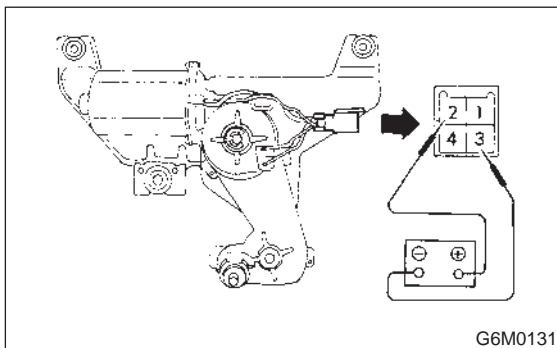
- 3) Reconnect battery and ensure that wiper motor stops at "AUTO STOP" after it has been operated.



G6M0133

2. WIPER MOTOR

- 1) Operational check:
Connect battery to wiper motor and check operation of wiper motor.

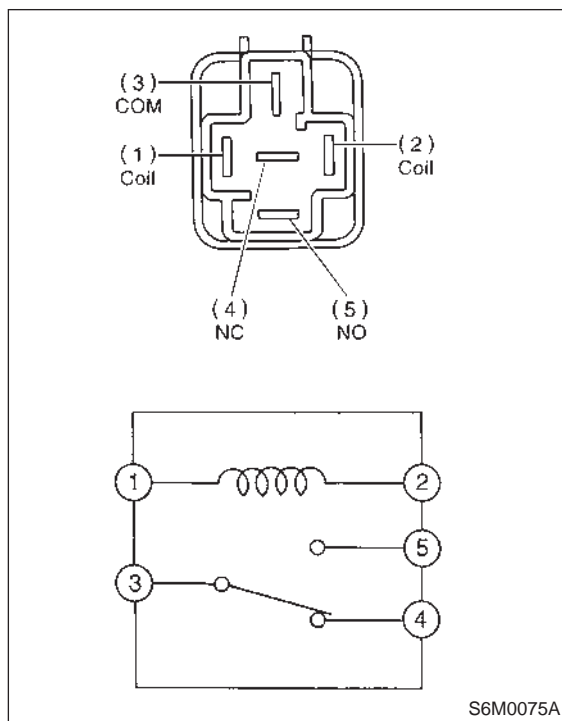


G6M0131

3. REAR WIPER RELAY

- 1) Connect battery to terminal No. 1 and ground terminal No. 2.
- 2) Check continuity between terminals.

When current flows.	Between terminals No. 3 and No. 4	Continuity does not exist.
	Between terminals No. 3 and No. 5	Continuity exists.
When current does not flow.	Between terminals No. 3 and No. 4	Continuity exists.
	Between terminals No. 3 and No. 5	Continuity does not exist.
	Between terminals No. 1 and No. 2	Continuity exists.



7. Rear Window Defogger

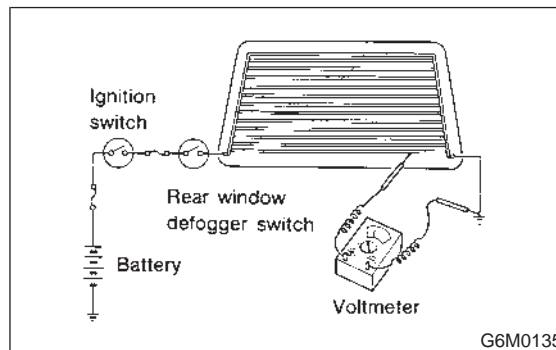
A: INSPECTION

1. HEAT WIRES

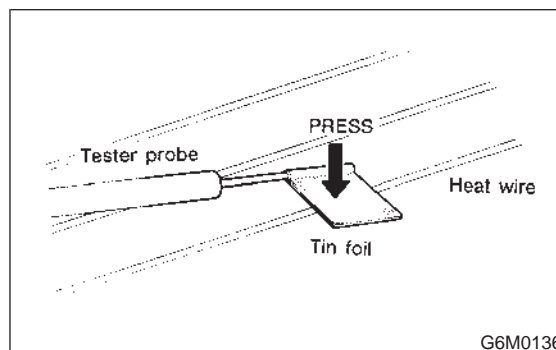
- 1) Start the engine so that battery is being charged.
- 2) Turn defogger switch ON.
- 3) Check each heat wire at its center position for discontinuity by setting direct current voltmeter.

NOTE:

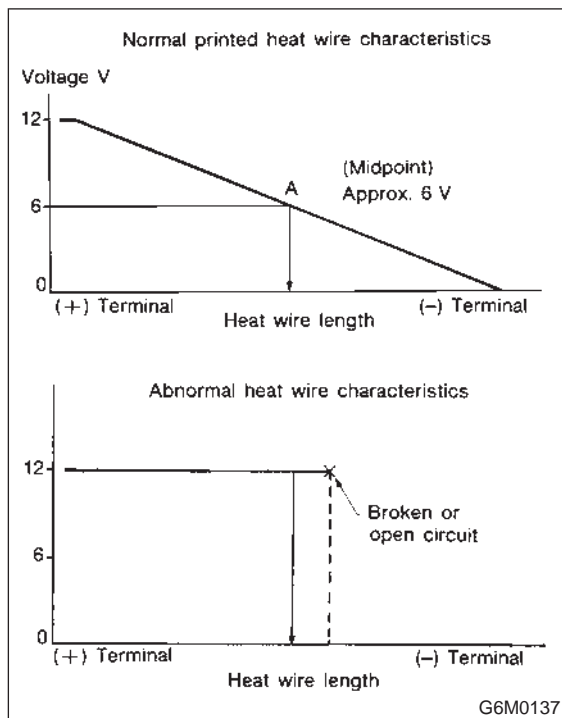
- Normal indication is about 6 volts.



- When measuring voltage, wind a piece of tin foil around the tip of the tester probe and press the foil against the wire with your finger.

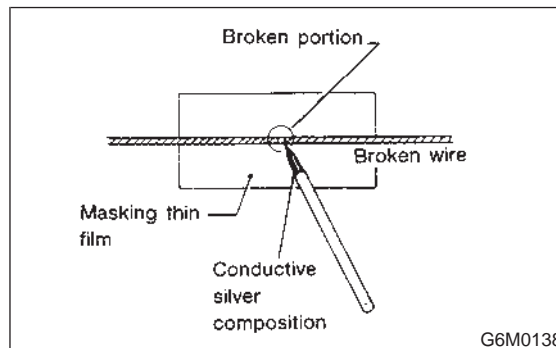


4) When tester indicates 12 volts when its probe reaches point "A", a broken circuit occurs between point "A" and the negative terminal. Slowly move tester probe toward the negative terminal while contacting it on heat wire to locate point where tester indication changes abruptly (0 volts). This is the point where a broken circuit occurs. When tester indicates 0 volts when its probe reaches point "A", a broken circuit occurs between point "A" and the positive terminal. Locate a point where tester indication changes abruptly (12 volts) while slowly moving tester probe toward the positive terminal.



B: REPAIR

- 1) Clean broken wire and its surrounding area.
- 2) Cut off slit on (used) thin film by 0.5 mm (0.020 in) width and 10 mm (0.39 in) length.
- 3) Place the slit on glass along the broken wire, and deposit conductive silver composition (DUPONT No. 4817) on the broken portion.

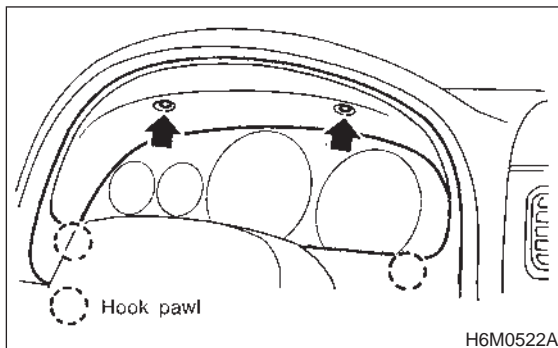


- 4) Dry out the deposited portion.
- 5) Inspect the repaired wire for continuity.

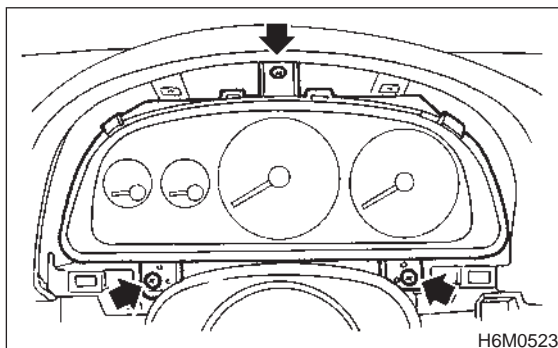
8. Combination Meter

A: REMOVAL AND INSTALLATION

- 1) Move steering wheel most down.
- 2) Remove screws which secure visor and remove visor.



- 3) Remove screws which secure combination meter, and pull combination meter out.

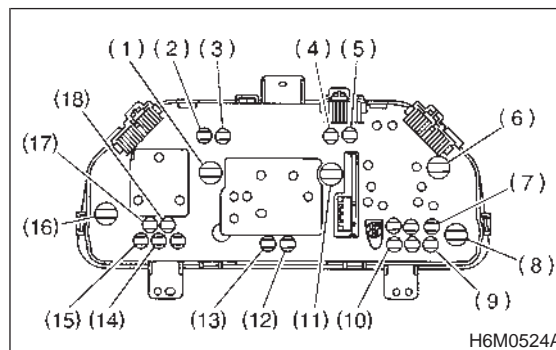


- 4) Disconnect connector from back of combination meter.
- 5) Installation is in the reverse order of removal.

CAUTION:

When installing combination meter, be sure to connect connectors to backside of combination meter.

B: BULB REPLACEMENT



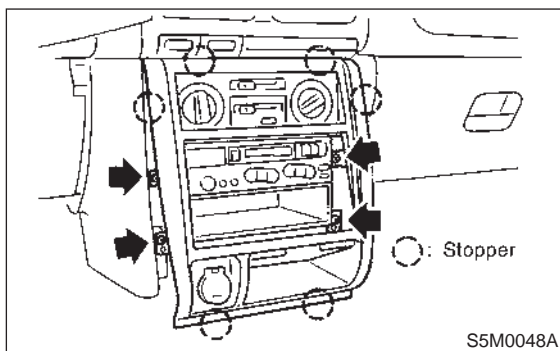
- (1) Speedometer and tachometer
- (2) HI-beam
- (3) Turn RH
- (4) Turn LH
- (5) Airbag
- (6) Temperature gauge
- (7) ABS
- (8) Low fuel
- (9) FWD
- (10) AT oil temp.
- (11) Speedometer and temperature gauge
- (12) Seat belt
- (13) Door open
- (14) Check engine
- (15) Charge
- (16) Tachometer
- (17) Brake
- (18) Oil pressure

9. Radio, Speaker and Antenna

A: REMOVAL AND INSTALLATION

1. RADIO BODY

- 1) Remove console box. <Ref. to 5-4 [W1A0].>
- 2) Remove AT cover (AT model).
- 3) Remove center panel.
- 4) Remove fitting screws, and slightly pull radio out from center console.



- 5) Disconnect electric connectors and antenna feeder cord.
- 6) Installation is in the reverse order of removal.

2. FRONT SPEAKER

- 1) Remove front door trim and disconnect connector. <Ref. to 5-2 [W2A2].>
- 2) Remove screws which secure front speaker.
- 3) Remove speaker and disconnect connector.
- 4) Installation is in the reverse order of removal.

3. REAR SPEAKER (SEDAN)

- 1) Remove rear shelf trim panels.
- 2) Remove screws which secure rear speakers.
- 3) Disconnect connector and remove speakers.
- 4) Installation is in the reverse order of removal.

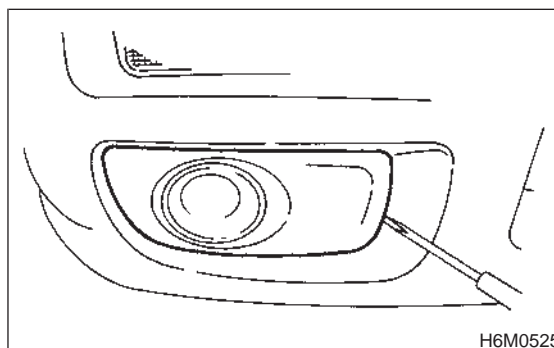
4. REAR SPEAKER (WAGON)

- 1) Remove rear door trim and disconnect connector. <Ref. to 5-2 [W2A2].>
- 2) Remove screws which secure rear speaker.
- 3) Remove speaker and disconnect connector.
- 4) Installation is in the reverse order of removal.

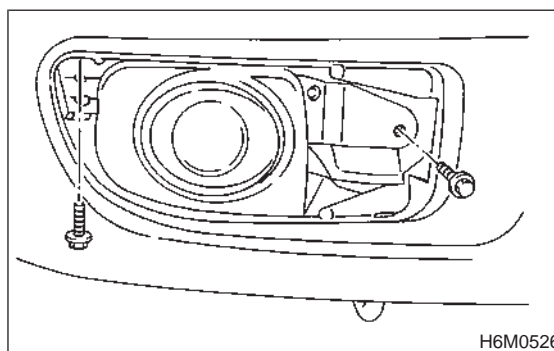
10. Front Fog Light

A: REMOVAL AND INSTALLATION

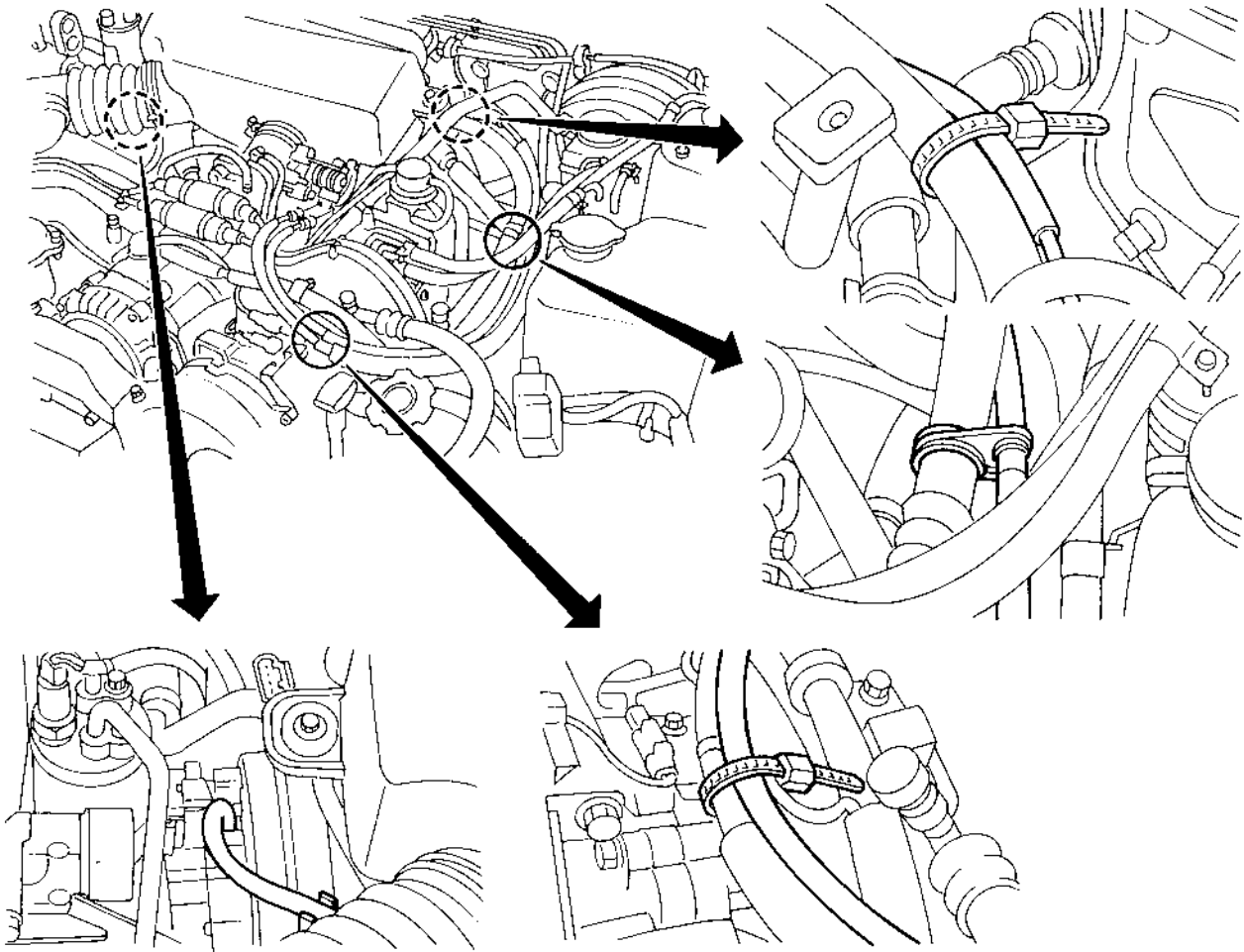
- 1) Disconnect ground cable from battery.
- 2) Remove front fog light cover.



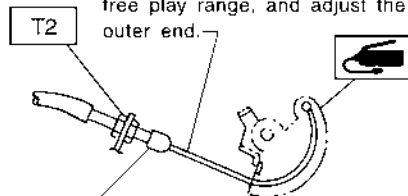
- 3) Remove the two screws, then draw out the front fog light from front bumper.



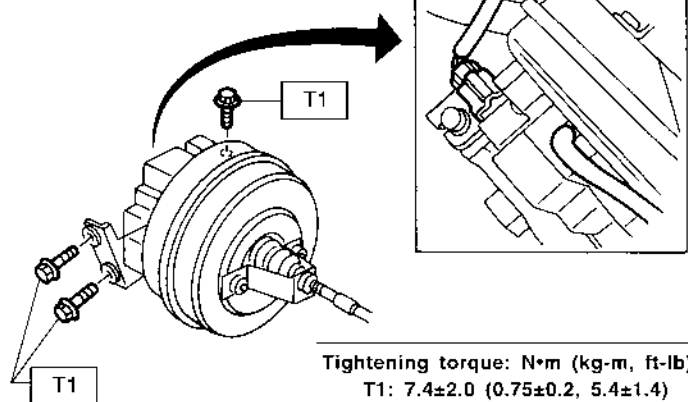
- 4) Disconnect the connector.
- 5) Installation is in the reverse order of removal.

11. Cruise Control**A: ADJUSTMENT**

Adjust so that cable deflects
1 - 8 mm (0.04 - 0.31 in)
within the specified throttle link
free play range, and adjust the
outer end.



Cover must be inserted securely,
until top of cable touches cover
stopper.



Tightening torque: N·m (kg-m, ft-lb)

T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)

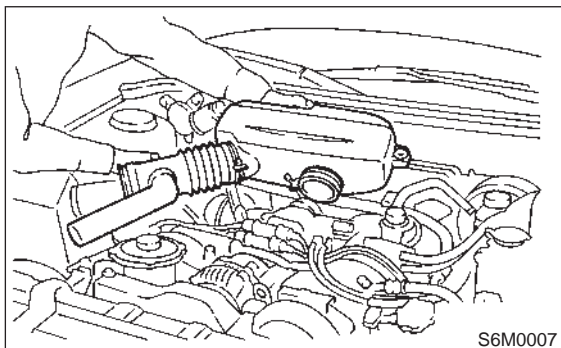
T2: 13±3 (1.3±0.3, 9.4±2.2)

S6M0138A

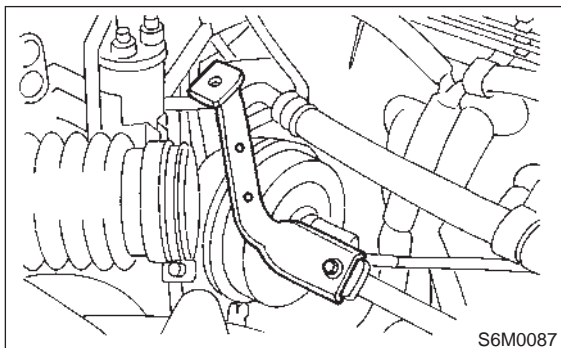
B: REMOVAL AND INSTALLATION

1. ACTUATOR

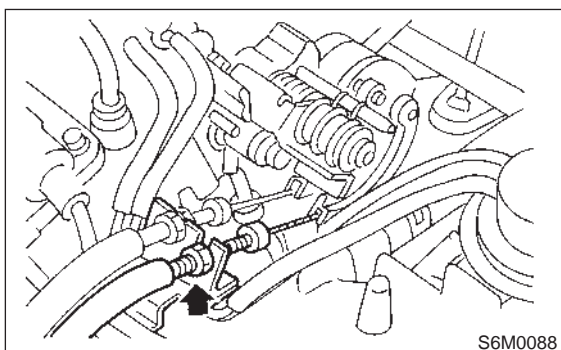
- 1) Remove air intake chamber.



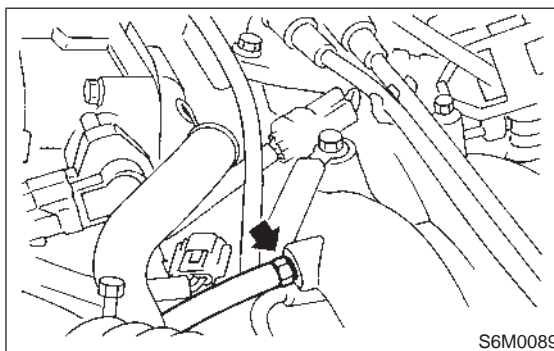
- 2) Remove air intake chamber stay.
3) Remove clip bands from cruise control cable.



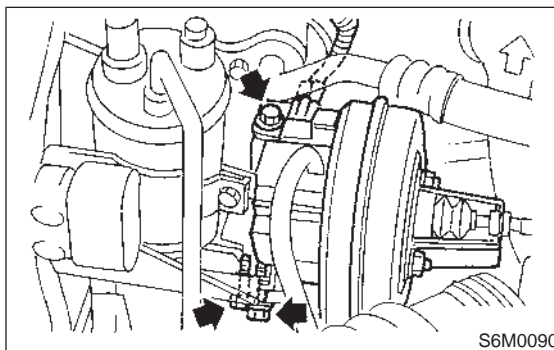
- 4) Remove cruise control cable end from throttle cam.



- 5) Disconnect cruise control vacuum hose from intake manifold.



- 6) Remove actuator attaching bolts.
7) Disconnect connector from actuator, then remove the actuator.



- 8) Installation is in the reverse order of removal.

Tightening torque:

7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)

CAUTION:

When inserting vacuum hose to intake manifold, apply sealant to the fitting hose.

Fluid packing:

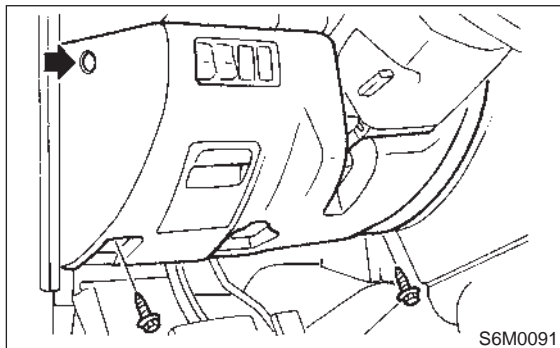
THREE BOND 1105 or equivalent

CAUTION:

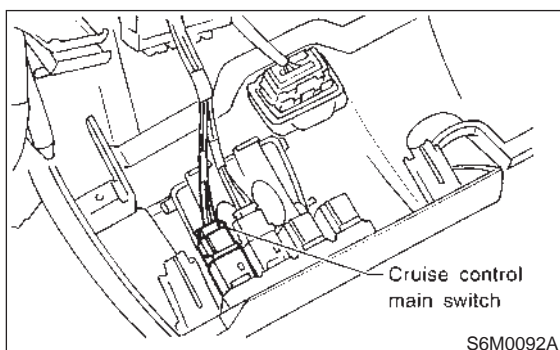
- Be careful not to apply excessive load to the wire cable when adjusting and/or installing; otherwise, the actuator may be deformed or damaged.
- Do not bend cable sharply with a radius less than 100 mm (3.94 in); otherwise, cable may bend permanently, resulting in poor performance.
- When installing cable, be careful not to sharply bend or pinch the inner cable; otherwise, the cable may break.

2. CRUISE CONTROL MAIN SWITCH

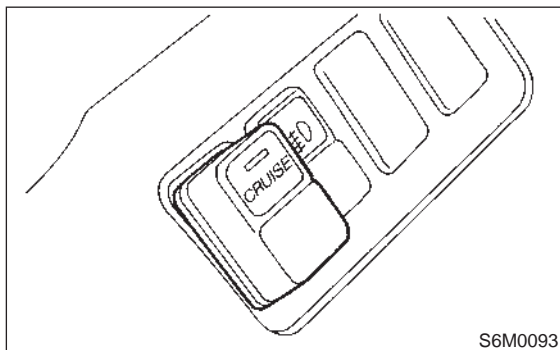
- 1) Remove screws and clip from instrument panel lower cover.
- 2) Remove panel lower cover.



- 3) Disconnect connector from cruise control main switch.



- 4) Remove main switch by pushing it outward.



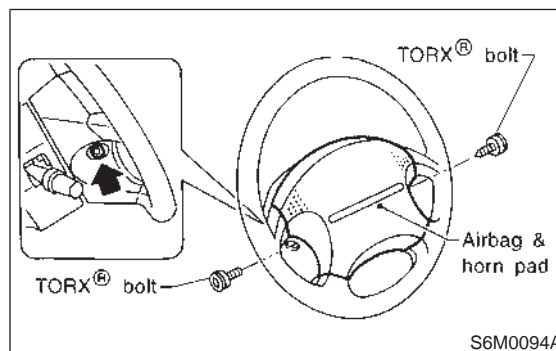
- 5) Installation is in the reverse order of removal.

3. CRUISE CONTROL COMMAND SWITCH**CAUTION:**

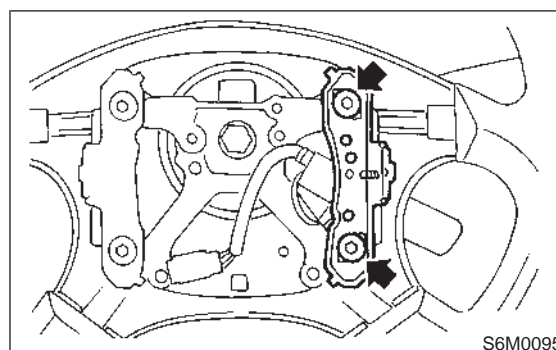
Before starting operation carefully read the notes given in Chapter 5-5 for proper handling of the airbag module. <Ref. to 5-5 [W3A0].>

- 1) Set front wheels in straight ahead position.
- 2) Turn ignition switch OFF.
- 3) Disconnect battery ground cable from battery and wait for at least 20 seconds before starting work.

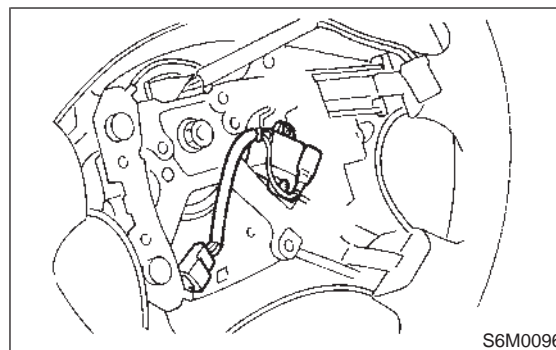
- 4) Using TORX® BIT T30 (Tamper resistant type), remove two TORX® bolts which secure driver's airbag module.



- 5) Disconnect airbag module connector on back of airbag module.
- 6) Remove horn switch from steering wheel as shown.



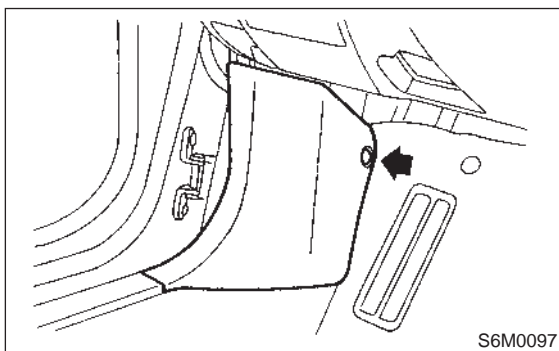
- 7) Disconnect horn and cruise control command switch connector, then remove cruise control command switch.



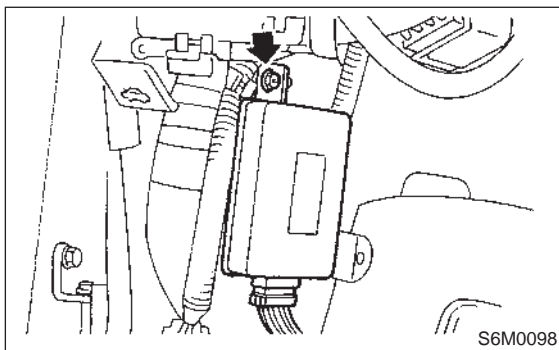
- 8) Installation is in the reverse order of removal.

4. CRUISE CONTROL MODULE

- 1) Remove front pillar lower trim.



- 2) Disconnect connector from cruise control module.
- 3) Remove bolt, then remove cruise control module.



- 4) Installation is in the reverse order of removal.

5. STOP AND BRAKE SWITCH

Disconnect connector from switch, then remove the switch. <Ref. to 4-5 [C100].>

6. CLUTCH SWITCH

Disconnect connector from switch, then remove the switch. <Ref. to 4-5 [C100].>

BODY ELECTRICAL SYSTEM (CRUISE CONTROL)

6-2

	Page
T DIAGNOSTICS	2
1. Precaution	2
2. Pre-inspection.....	2
3. Electrical Components Location.....	7
4. Schematic.....	8
5. Control Module I/O Signal.....	10
6. Diagnostics Chart for On-board Diagnosis System	12
7. Diagnostics Chart for Power Line	14
8. Diagnostics Chart with Diagnostic Code.....	19
9. Diagnostics Chart with Select Monitor	42

1. Precaution

A: SUPPLEMENTAL RESTRAINT SYSTEM “AIRBAG”

Airbag system wiring harness is routed near the cruise control module and cruise control command switch.

CAUTION:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
- Be careful not to damage Airbag system wiring harness when servicing the cruise control module and cruise control command switch.

2. Pre-inspection

A: FUNCTION TESTS

Conduct road tests by selecting a smooth, flat road or use free rollers for road test simulation.

1. CRUISE CONTROL MAIN SWITCH

- 1) Turn ignition switch to ON.
- 2) Check that cruise control main switch indicator light comes on when main switch is pressed (ON).
- 3) Check that main switch indicator light goes out when main switch is pressed again (OFF).
- 4) Turn ignition switch to OFF with main switch ON (indicated by illumination). Turn ignition switch ON again to ensure that main switch indicator light remains OFF.

2. CRUISE CONTROL COMMAND SWITCH

- 1) Check that cruise control command switch is properly set in “SET/COAST”, “RESUME/ACCEL”, or “CANCEL” mode.
- 2) Also check that command switch returns to the original position when released.

3. CONSTANT SPEED TEST

- 1) Turn cruise control main switch to ON.
- 2) Drive the vehicle at a speed greater than 40 km/h (25 MPH).
- 3) Press command switch to set in “SET/COAST” mode.
- 4) Ensure that vehicle is maintained at the speed set when command switch was pressed.

4. ACCELERATION TEST

- 1) Set vehicle speed at a speed greater than 40 km/h (25 MPH).
- 2) Ensure that vehicle continues to accelerate while holding command switch in “RESUME/ACCEL” mode, and that vehicle maintains that optional speed when command switch is released.

5. DECELERATION TEST

- 1) Set vehicle speed at an optional speed greater than 40 km/h (25 MPH).
- 2) Ensure that vehicle continues to decelerate while holding command switch in “SET/COAST” mode, and that it maintains that optional speed when command switch is released.

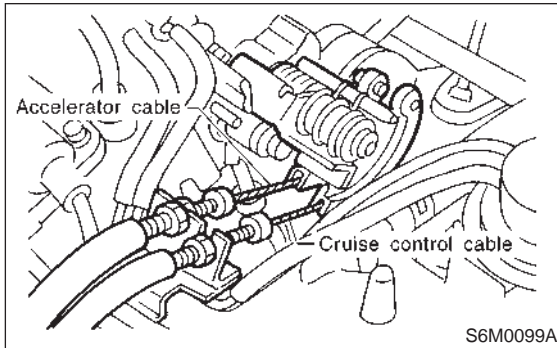
NOTE:

When vehicle speed reaches the lower speed limit of 30 km/h (19 MPH) during deceleration, cruise control will be released.

B: CRUISE CONTROL CABLE

2B1 : CHECK CRUISE CONTROL CABLE.

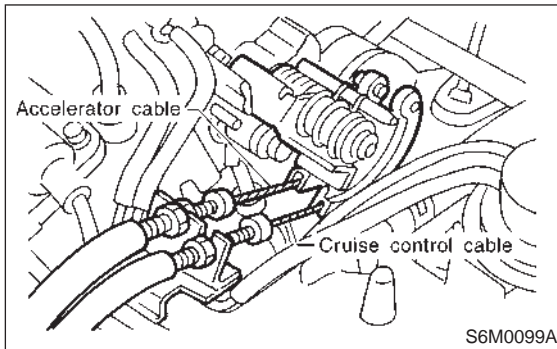
Check cruise control cable installation.



- CHECK** : *Is the cruise control cable securely installed to the left of the accelerator cable?*
- YES** : Go to step 2B2.
- NO** : Install cruise control cable securely. Go to step 2B2.

2B2 : CHECK ACCELERATOR CABLE.

Check function of accelerator cable.



- CHECK** : *Does the accelerator cable throttle cam move when the cruise control throttle is moved by hand?*
- YES** : Repair accelerator cable throttle cam. Go to step 2B3.
- NO** : Go to step 2B3.

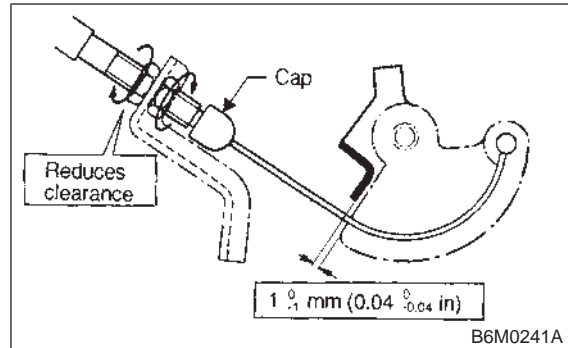
2B3 : CHECK THROTTLE CAM.

Check function of throttle cam.

- CHECK** : *Does the throttle cam move smoothly?*
- YES** : Go to step 2B4.
- NO** : Repair throttle cam. Go to step 2B4.

2B4 : CHECK CABLE FREE PLAY.

Ensure that throttle cam-to-lever clearance is within specifications.



- CHECK** : *Is throttle cam-to-lever clearance between 0 and 1 mm (0 and 0.04 in)?*
- YES** : Go to step 2C1.
- NO** : Adjust cable end by adjusting nuts. Go to step 2C1.

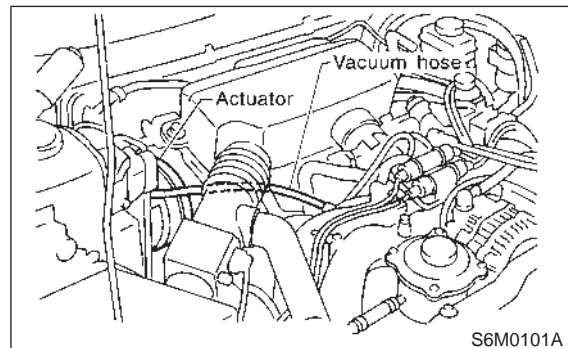
NOTE:

Ensure that cap is positioned in groove.

C: VACUUM HOSE

2C1 : CHECK VACUUM HOSE VISUALLY.

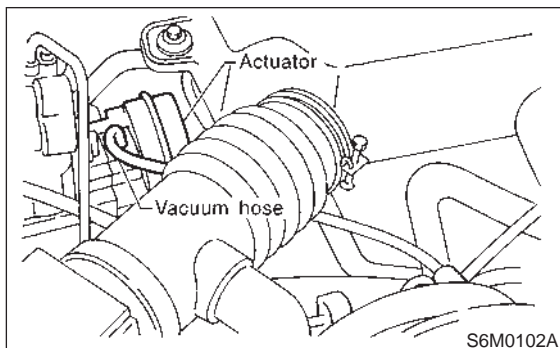
Check vacuum hose (which connects actuator and intake manifold).



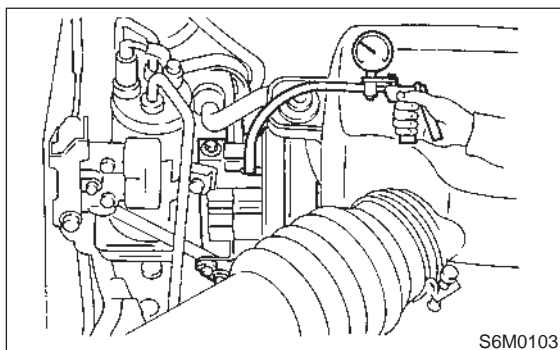
- CHECK** : *Is there disconnection or cracks in vacuum hose?*
- YES** : Replace vacuum hose. Go to step 2D1.
- NO** : Go to step 2D1.

D: ACTUATOR**2D1 : CHECK FUNCTION OF ACTUATOR.**

- 1) Disconnect vacuum hose from actuator.



- 2) Connect vacuum pump as shown in figure.



- 3) Make sure that cruise control cable moves smoothly and quickly when a vacuum pressure of 40.0 kPa (300 mmHg, 11.81 inHg) is applied to actuator.

CHECK : Does cruise control cable have a stroke of 35 mm (1.38 in)?

YES : Go to step 2D2.

NO : Replace actuator. <Ref. to 6-2 [W11B1].> Go to step 2D2.

NOTE:

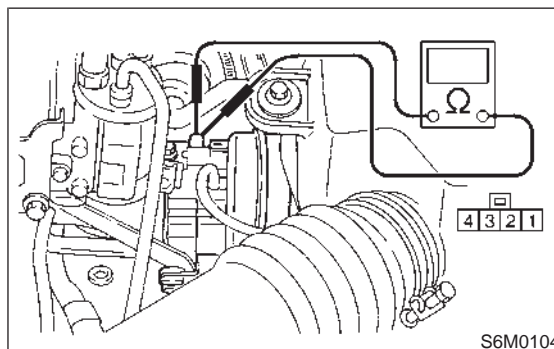
- When vacuum pressure is released from condition 3) above, make sure the cable returns to its original position smoothly and quickly.
- After inspection, disconnect vacuum pump and connect vacuum hose.

2D2 : MEASURE RESISTANCE OF VALVE.

- 1) Disconnect connector from actuator.
- 2) Measure resistance between terminals of actuator.

Terminals

No. 2 — No. 3:



CHECK : Is resistance less than 100 Ω ?

YES : Go to step 2D3.

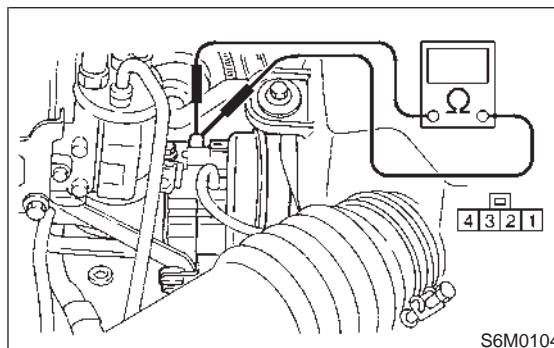
NO : Replace actuator. <Ref. to 6-2 [W11B1].>

2D3 : MEASURE RESISTANCE OF VALVE.

Measure resistance between terminals of actuator.

Terminals

No. 2 — No. 1:



CHECK : Is resistance less than 69 Ω ?

YES : Go to step 2D4.

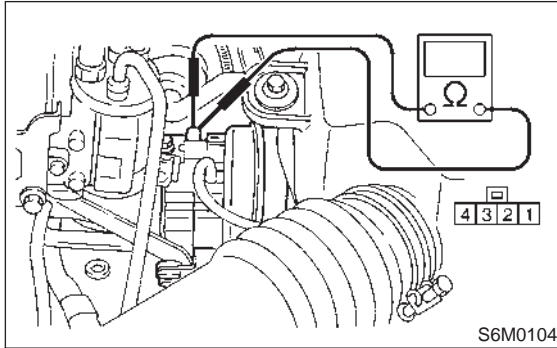
NO : Replace actuator. <Ref. to 6-2 [W11B1].>

2D4 : MEASURE RESISTANCE OF VALVE.

Measure resistance between terminals of actuator.

Terminals

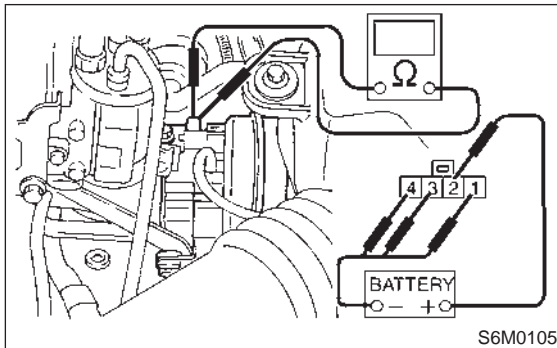
No. 2 — No. 4:



- CHECK** : Is resistance less than 69 Ω ?
- YES** : Go to step 2D5.
- NO** : Replace actuator. <Ref. to 6-2 [W11B1].>

2D5 : CHECK FOR LEAKAGE AND STICKING OF VALVES.

- 1) Disconnect connector from actuator.
- 2) Make sure that cruise control cable moves smoothly when connecting + (positive) battery cable to terminal No. 2 and – (negative) battery cable to terminals No. 1, 3 and 4 of actuator connector.



- CHECK** : Does cruise control cable have a stroke of 35 mm (1.38 in) within 3 seconds?
- YES** : Go to step 2D6.
- NO** : Replace actuator. <Ref. to 6-2 [W11B1].> Go to step 2D6.

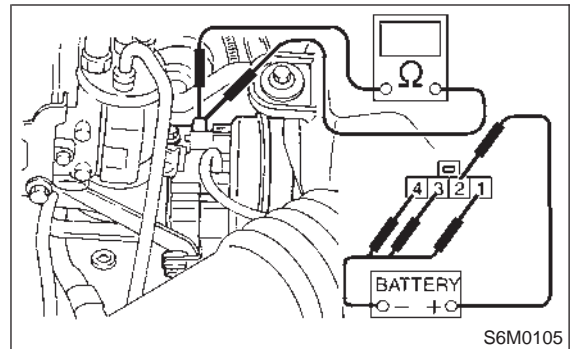
2D6 : CHECK FOR LEAKAGE AND STICKING OF VALVES.

When the battery cable is disconnected from former condition <Ref. to 6-2 [T2D5].> Step 2), make sure the cable returns to its original position smoothly.

- CHECK** : Does cruise control cable get back to its original position within 1.5 seconds?
- YES** : Go to step 2D7.
- NO** : Replace actuator. <Ref. to 6-2 [W11B1].> Go to step 2D7.

2D7 : CHECK CABLE MOVEMENT.

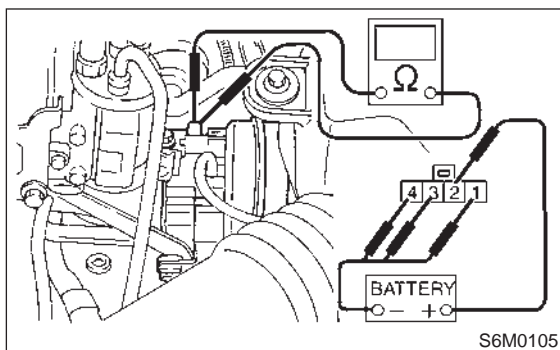
Connect + (positive) battery cable to terminal No. 2 and – (negative) battery cable to terminals No. 1, 3 and 4 of actuator connector.



- CHECK** : Does cruise control perform pull operation?
- YES** : Go to step 2D8.
- NO** : Replace actuator. <Ref. to 6-2 [W11B1].> Go to step 2D8.

2D8 : CHECK CABLE MOVEMENT.

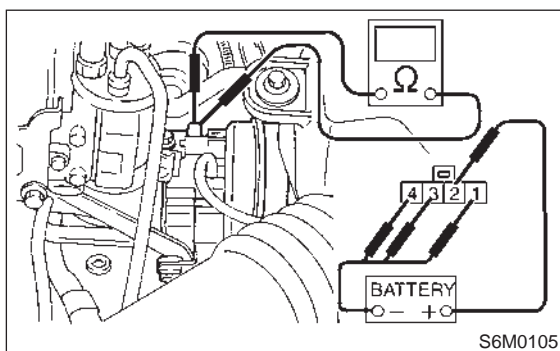
Connect + (positive) battery cable to terminal No. 2 and – (negative) battery cable to terminals No. 1 and 4 of actuator connector.



- CHECK** : **Does cruise control perform hold operation?**
- YES** : Go to step **2D9**.
- NO** : Replace actuator. <Ref. to 6-2 [W11B1].> Go to step **2D9**.

2D9 : CHECK CABLE MOVEMENT.

Connect + (positive) battery cable to terminal No. 2 and – (negative) battery cable to terminal No. 4 of actuator connector.



- CHECK** : **Does cruise control perform release operation?**
- YES** : Go to step **2E1**.
- NO** : Replace actuator. <Ref. to 6-2 [W11B1].> Go to step **2E1**.

E: POWER SUPPLY**2E1 : CHECK BATTERY.**

Measure battery specific gravity of electrolyte.

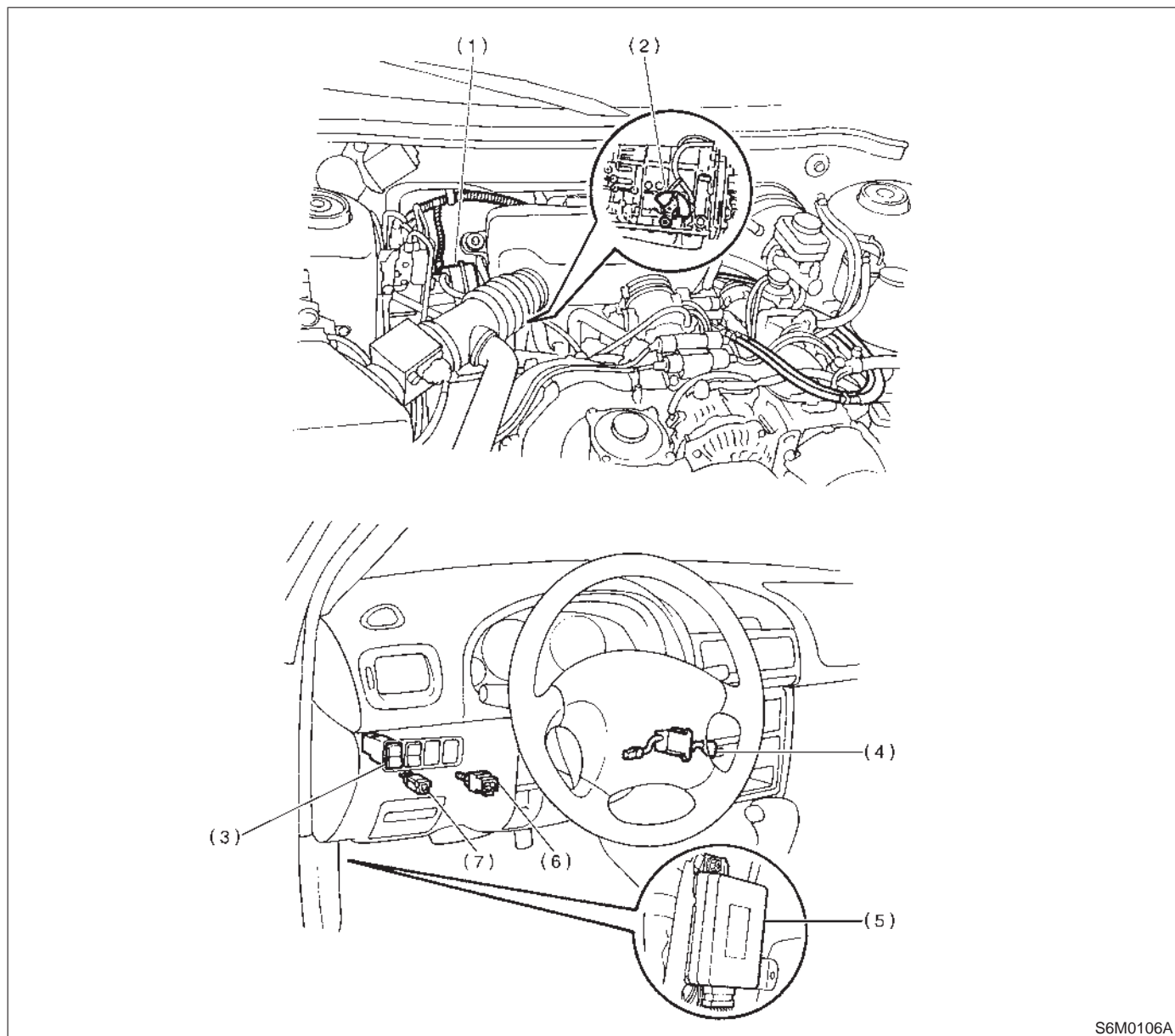
- CHECK** : **Is battery specific gravity more than 1.250?**
- YES** : Go to step **2E2**.
- NO** : Charge or replace battery. <Ref. to 6-2 [W2A0].> Go to step **2E2**.

2E2 : CHECK FUSES, CONNECTORS AND HARNESSSES.

Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

- CHECK** : **Is there anything unusual about the appearance of main fuse, fuse, harness, connector and grounding?**
- YES** : Repair or replace faulty parts. End of pre-inspection.
- NO** : End of pre-inspection.

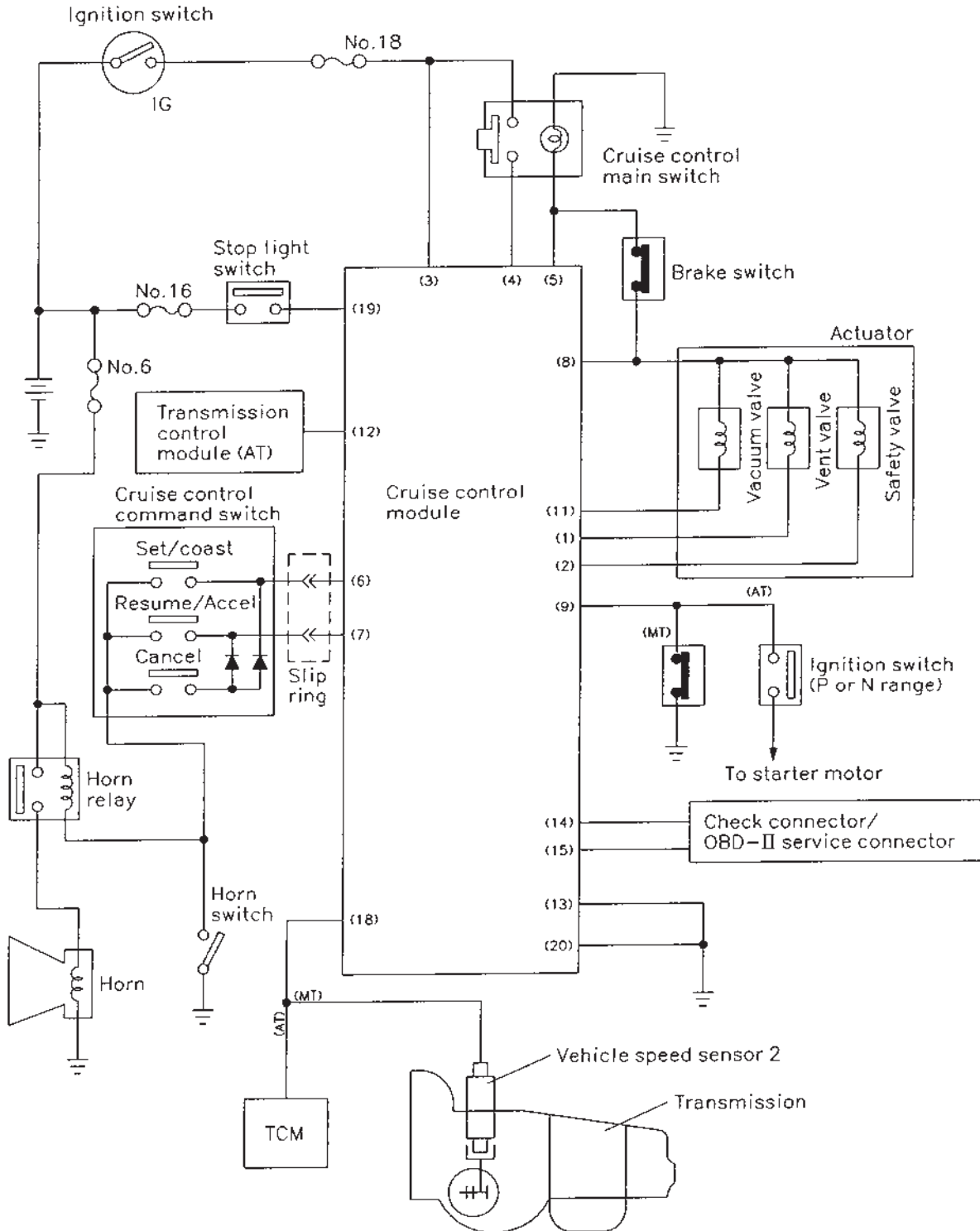
3. Electrical Components Location



S6M0106A

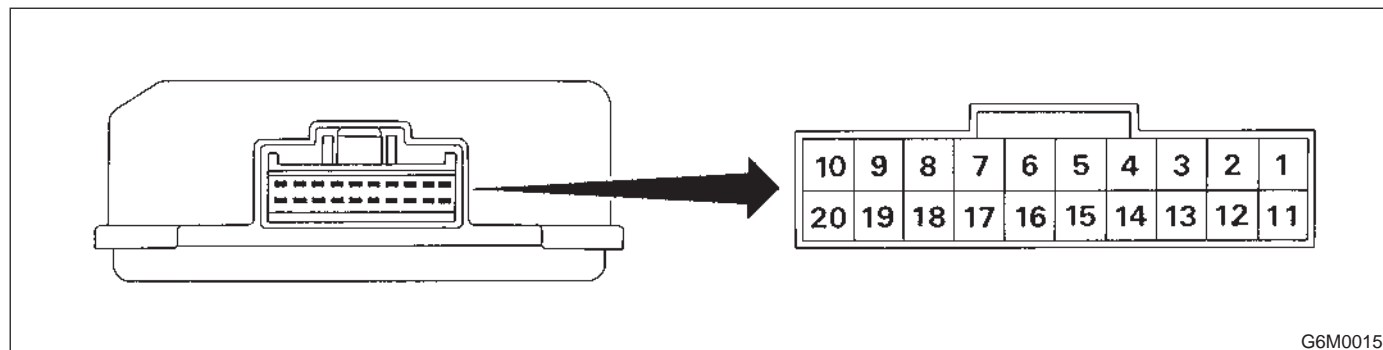
- | | | |
|--------------------------------|-----------------------------------|------------------------|
| (1) Actuator (with valves) | (4) Cruise control command switch | (7) Clutch switch (MT) |
| (2) Inhibitor switch (AT) | (5) Cruise control module | |
| (3) Cruise control main switch | (6) Stop and brake switch | |

4. Schematic



MEMO:

5. Control Module I/O Signal



Content	Terminal No.	Measuring conditions and I/O signals (ignition switch ON and engine idling)
Vent valve	1	<ul style="list-style-type: none"> Power supply is ON when vehicle is stopped. ON-and-OFF ("0"-and-battery voltage) operation is alternately repeated while cruise control is operating.
Safety valve	2	<ul style="list-style-type: none"> Power supply is ON when vehicle is stopped. ON-and-OFF ("0"-and-battery voltage) operation is alternately repeated while cruise control is operating.
Ignition switch	3	<ul style="list-style-type: none"> Battery voltage is present when ignition switch is turned ON. "0" volt is present when ignition switch is turned OFF.
Cruise control main switch	4	<ul style="list-style-type: none"> Battery voltage is present when main power is turned ON. "0" volt is present when main power is turned OFF.
Power supply to vacuum valve, vent valve, safety valve and indicator light	5	<ul style="list-style-type: none"> Battery voltage is present when main power is turned ON. "0" volt is present when main power is turned OFF.
SET/COAST switch	6	<ul style="list-style-type: none"> Battery voltage is present when command switch is turned to SET/COAST position. "0" volt is present when command switch is released.
RESUME/ACCEL switch	7	<ul style="list-style-type: none"> Battery voltage is present when command switch is turned to RESUME/ACCEL position. "0" volt is present when command switch is released.
Brake switch	8	<p>Set selector lever to any position other than "P" or "N" position (AT) / leave clutch pedal released (MT), while cruise control main switch is turned ON. Then check that;</p> <ul style="list-style-type: none"> Battery voltage is present when brake pedal is released. "0" volt is present when brake pedal is depressed, or Battery voltage is present when clutch pedal is released (MT). "0" volt is present when clutch pedal is depressed (MT). Battery voltage is present when selector lever is in any position other than "P" or "N" position (AT). "0" volt is present when selector lever is set to "P" or "N" position (AT).
Clutch switch (MT)/ Inhibitor switch (AT)	9	<ul style="list-style-type: none"> Battery voltage is present when clutch pedal is released (MT). "0" volt is present when clutch pedal is depressed (MT). Battery voltage is present when selector lever is in any position other than "P" or "N" position (AT). "0" volt is present when selector lever is set to "P" or "N" position (AT).
Vacuum valve	11	<ul style="list-style-type: none"> Power supply is ON when vehicle is stopped. ON-and-OFF ("0"-and-battery voltage) operation is alternately repeated while cruise control is operating.
Set signal to transmission control module (AT)	12	<ul style="list-style-type: none"> TCM emits a ground-level signal while driving vehicle at least 40 km/h (25 MPH) with SET switch ON.
Ground	13	—
Check connector/ OBD-II service connector	14	—
Check connector/ OBD-II service connector	15	—

Content	Terminal No.	Measuring conditions and I/O signals (ignition switch ON and engine idling)
Vehicle speed sensor 2 (MT) Automatic transmission control module (AT)	18	Lift-up the vehicle until all four wheels are raised off ground, and then rotate any wheel manually. Approx. 5 and 0 volt pulse signals are alternately input to cruise control module.
Stop light switch	19	Turn ignition switch to OFF. Then check that; <ul style="list-style-type: none"> ● Battery voltage is present when brake pedal is depressed. ● "0" volt is present when brake pedal is released.
Ground	20	—
NOTE: Voltage at terminals 1, 2, 11 and 12 cannot be checked unless vehicle is driving by cruise control operation.		

6. Diagnostics Chart for On-board Diagnosis System

A: BASIC DIAGNOSTIC PROCEDURE

6A1 : CHECK CRUISE CONTROL MAIN SWITCH.

- 1) Trouble occurs.
- 2) Perform pre-inspection. <Ref. to 6-2 [T200].>
- 3) Check cruise control main switch.

CHECK : *Does cruise control main switch turn ON?*

YES : Go to step **6A2**.

NO : Go to "Diagnostics Chart for Power Line". <Ref. to 6-2 [T700].>

6A2 : CHECK CRUISE SPEED IS SET.

CHECK : *Does cruise speed properly set while driving at minimum of 40 km/h (25 MPH)?*

YES : Go to step **6A3**.

NO : Go to "Diagnostics Chart with Trouble Code". <Ref. to 6-2 [T800].>

6A3 : CHECK CRUISE CONTROL IS RELEASED.

CHECK : *Does cruise control properly release during operation?*

YES : Go to step **6A4**.

NO : Go to "Diagnostics Chart with Trouble Code". <Ref. to 6-2 [T800].>

6A4 : CHECK CRUISE SPEED IS HELD WITHIN SET SPEED.

CHECK : *Does cruise speed hold within set speed ± 3 km/h (2 MPH)?*

YES : Go to step **6A5**.

NO : Go to pre-inspection of actuator. <Ref. to 6-2 [T2D0].>

6A5 : CHECK RESUME/ACCEL SWITCH.

CHECK : *Does RESUME/ACCEL switch function properly?*

YES : Go to step **6A6**.

NO : Go to "Diagnostics Chart with Trouble Code". <Ref. to 6-2 [T800].>

6A6 : CHECK SET/COAST SWITCH.

CHECK : *Does SET/COAST switch function properly?*

YES : Go to step **6A7**.

NO : Go to "Diagnostics Chart with Trouble Code". <Ref. to 6-2 [T800].>

6A7 : CHECK CANCEL SWITCH.

CHECK : *Does CANCEL switch function properly?*

YES : Go to step **6A8**.

NO : Go to "Diagnostics Chart with Trouble Code". <Ref. to 6-2 [T800].>

6A8 : CHECK CRUISE SPEED IS RELEASED.

CHECK : *Does cruise speed release when brake pedal is depressed?*

YES : Go to step **6A9**.

NO : Go to "Diagnostics Chart with Trouble Code". <Ref. to 6-2 [T800].>

6A9 : CHECK CRUISE SPEED IS RELEASED.

CHECK : *Does cruise speed release when clutch pedal is depressed?*

YES : Cruise control system is in correct order.

NO : Go to "Diagnostics Chart with Trouble Code". <Ref. to 6-2 [T800].>

B: ON-BOARD DIAGNOSIS WITH SELECT MONITOR

1. GENERAL

The on-board diagnosis function of the cruise control system uses an external select monitor.

The on-board diagnosis function operates in two categories, which are used depending on the type of problems;

NOTE:

Select monitor cartridge:

No. 24082AA090

1) Cruise cancel conditions diagnosis

(1) This category of diagnosis requires actual vehicle driving in order to determine the cause, (as when cruise speed is cancelled during driving although cruise cancel condition is not entered).

(2) Cruise control module memory stores the cancel condition (Code No.) which occurred during driving. When there are plural cancel conditions (Code No.), they are shown on the select monitor.

CAUTION:

● The cruise control memory stores not only the cruise “cancel” which occurred (although “cancel” operation is not entered by the driver), but also the “cancel” condition input by the driver.

● The content of memory is cleared when ignition switch or cruise main switch is turned OFF.

2) Real-time diagnosis

The real-time diagnosis function is used to determine whether or not the input signal system is in good order, according to signal emitted from switches, sensors, etc.

(1) Vehicle cannot be driven at cruise speed because problems occurs in the cruise control system or its associated circuits.

(2) Monitor the signal conditions from switches and sensors.

2. CRUISE CANCEL CONDITIONS DIAGNOSIS

1) Connect select monitor.

2) Start the engine and turn cruise control main switch to ON.

3) Set select monitor in “All System Diagnosis” mode.

NOTE:

The diagnostic code is also shown in the “Each System Check” mode. This mode is called up on the “Cruise Control Diagnosis” screen by selecting the item “Cancel Code(s) Display”.

4) Drive vehicle at least 40 km/h (25 MPH) with cruise speed set.

5) If cruise speed is canceled itself (without doing any cancel operations), a diagnostic code will appear on select monitor display.

CAUTION:

● A diagnostic code will also appear when cruise cancel is effected by driver. Do not confuse.

● Have a co-worker ride in vehicle to assist in diagnosis during driving.

NOTE:

Diagnostic code will be cleared by turning ignition switch or cruise control main switch to OFF.

3. REAL-TIME DIAGNOSIS

1) Connect select monitor.

2) Turn ignition switch and cruise control main switch to ON.

3) Select the “Current Data Display & Save” mode on the select monitor “Cruise Control Diagnosis” screen.

4) Ensure that normal indication is displayed when controls are operated as indicated below:

● Depress/release the brake pedal. (Stop light switch and brake switch turn ON.)

● Turn ON the “SET/COAST” switch.

● Turn ON the “RESUME/ACCEL” switch.

● Depress/release the clutch pedal. (MT)

● Set the selector lever to P or N. (AT)

7. Diagnostics Chart for Power Line

A: BASIC DIAGNOSTICS PROCEDURE

7A1 : DRIVE AT CRUISE SPEED.

- CHECK** : *Can cruise speed be set?*
- YES** : Go to "CHECK INDICATOR AND CIRCUIT IN CRUISE CONTROL MAIN SWITCH". <Ref. to 6-2 [T7B0].>
- NO** : Go to "CHECK CRUISE CONTROL MAIN SWITCH". <Ref. to 6-2 [T7C0].>

B: CHECK INDICATOR AND CIRCUIT IN CRUISE CONTROL MAIN SWITCH

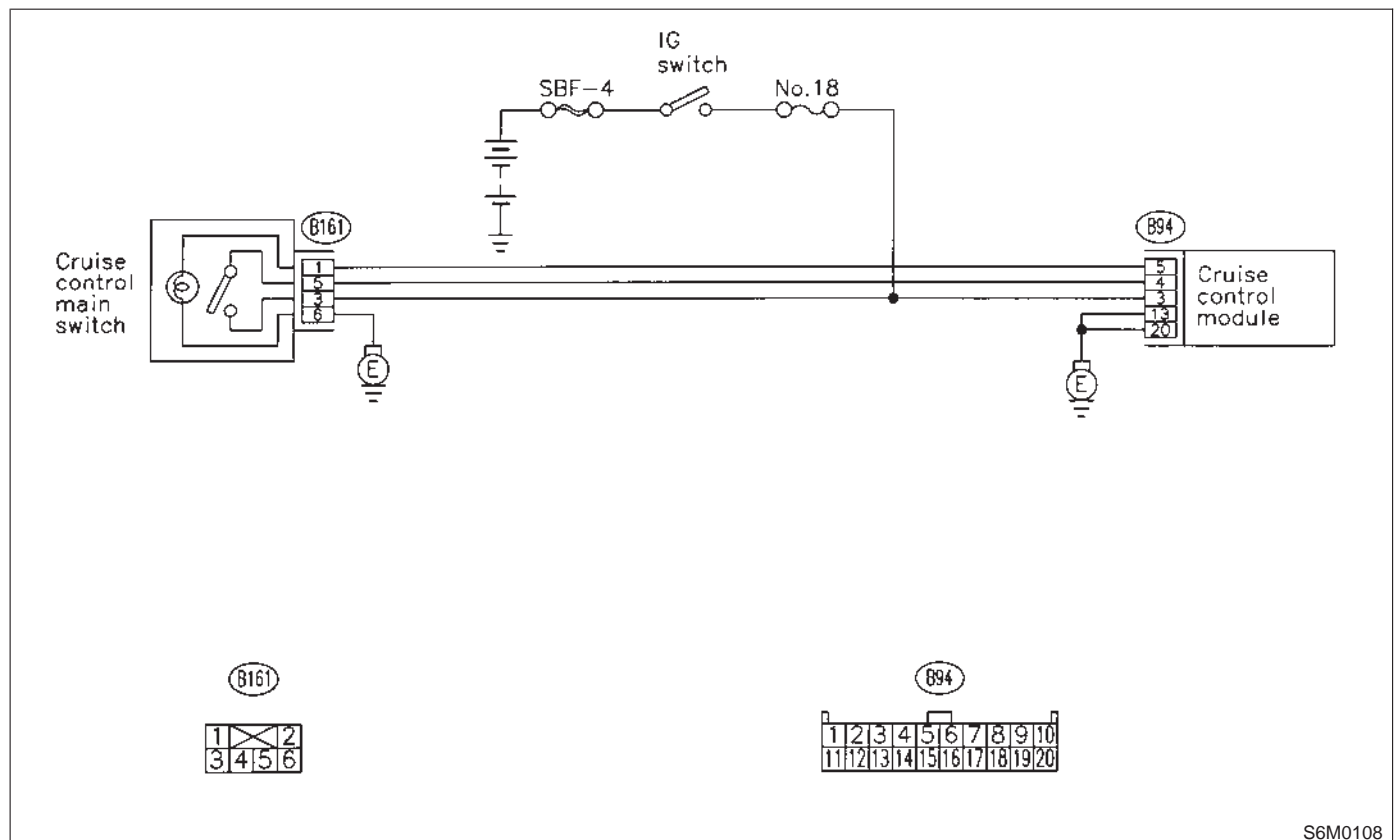
DIAGNOSIS:

- Bulb failure or open harness of the indicator circuit in the cruise control main switch.

TROUBLE SYMPTOM:

- Cruise control can be set, normally indicator does not come on. (When main switch is pressed.)

WIRING DIAGRAM:



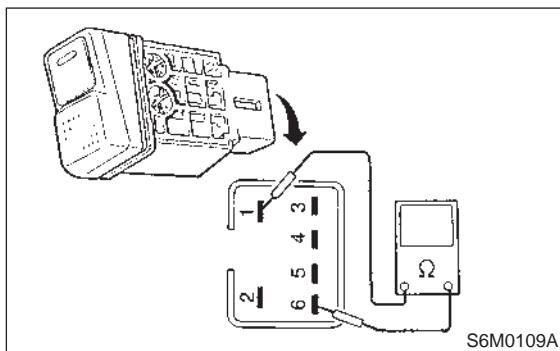
S6M0108

7B1 : CHECK CRUISE CONTROL MAIN SWITCH.

- 1) Remove cruise control main switch.
- 2) Measure resistance between cruise control main switch terminals.

Terminals

No. 1 — No. 6:



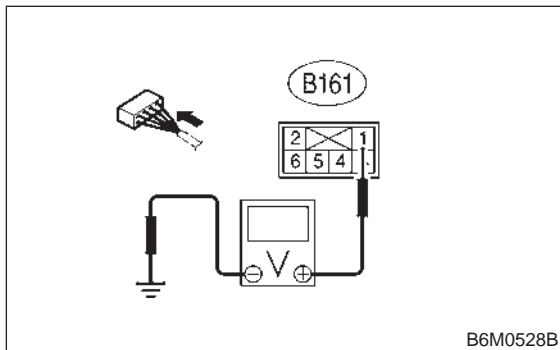
- CHECK** : Is resistance between 10 and 80 Ω ?
- YES** : Go to step 7B2.
- NO** : Replace switch illumination bulb. <Ref. to 6-2 [W11B2].>

7B2 : CHECK CIRCUIT BETWEEN CRUISE CONTROL MODULE AND CRUISE CONTROL MAIN SWITCH INDICATOR LIGHT.

- 1) Turn the ignition switch to ON.
- 2) Turn cruise control main switch to ON.
- 3) Measure voltage between cruise control main switch connector and the chassis ground.

Connector & terminal

(B161) No. 1 (+) — Chassis ground (-):



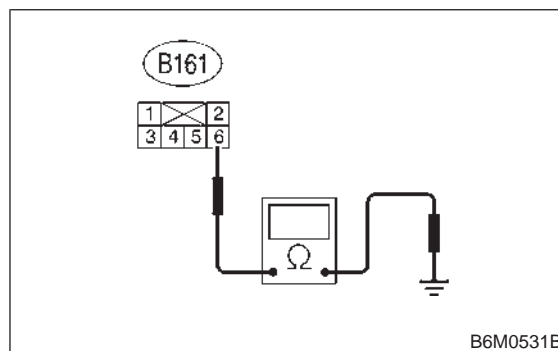
- CHECK** : Is voltage more than 10 V?
- YES** : Go to step 7B3.
- NO** : Repair or replace wiring harness.

7B3 : CHECK CIRCUIT BETWEEN CRUISE CONTROL MODULE AND CRUISE CONTROL MAIN SWITCH INDICATOR LIGHT.

- 1) Turn the ignition switch and cruise control main switch to OFF.
- 2) Remove the connector from the cruise control main switch.
- 3) Measure resistance of ground circuit between the cruise control main switch connector and chassis ground.

Connector & terminal

(B161) No. 6 (+) — Chassis ground (-):



- CHECK** : Is resistance less than 10 Ω ?
- YES** : Replace cruise control module. <Ref. to 6-2 [W11B4].>
- NO** : Repair or replace wiring harness.

C: CHECK CRUISE CONTROL MAIN SWITCH

DIAGNOSIS:

- Faulty cruise control main switch, or open harness.

TROUBLE SYMPTOM:

- Cruise control main switch is not turned ON and cruise control cannot be set.

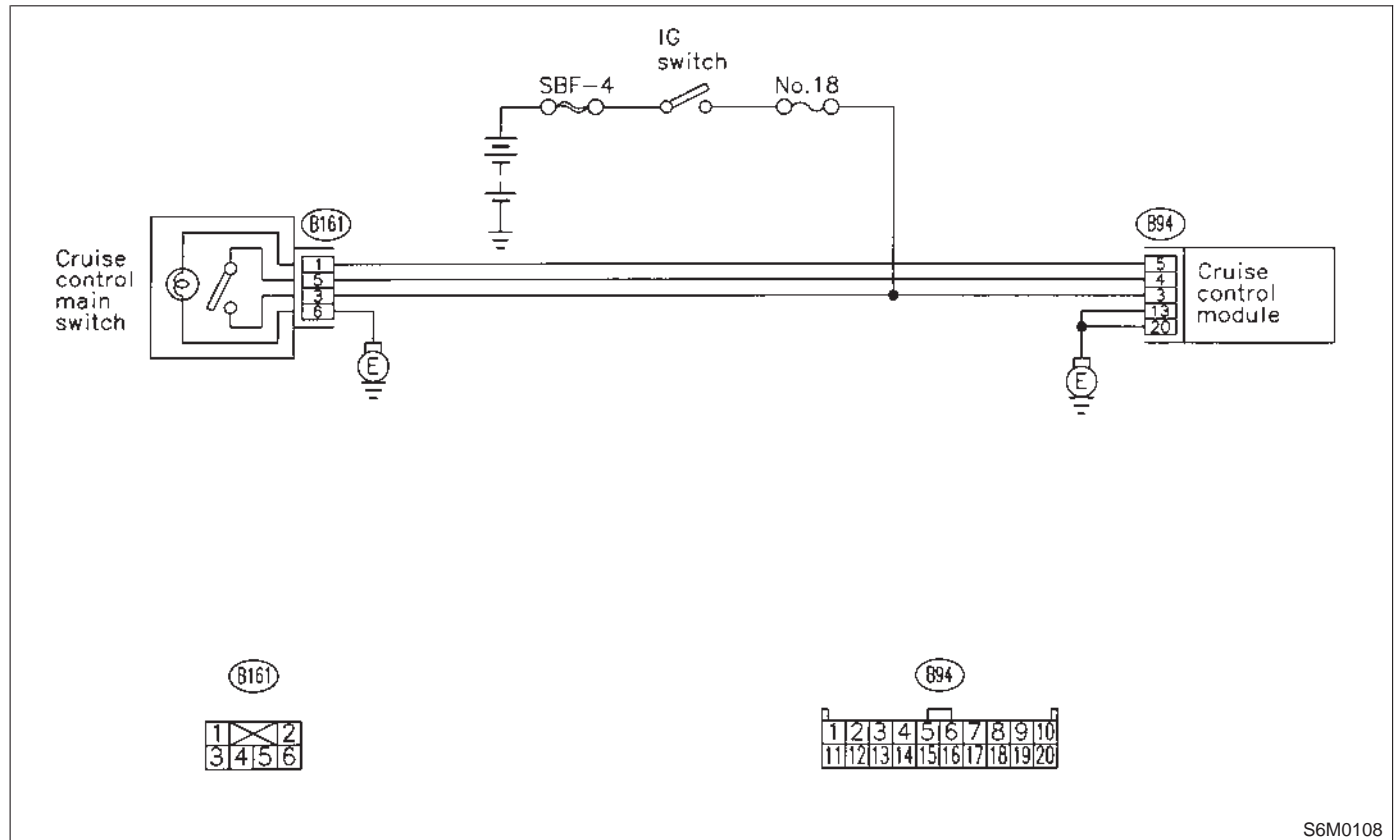
NOTE:

When the main relay (built-in cruise control module) operates, the main switch circuit is in normal condition.

The main relay operation can be checked by hearing the operation sounds.

This operation sounds will be heard when ignition switch and cruise control main switch is turned to ON.

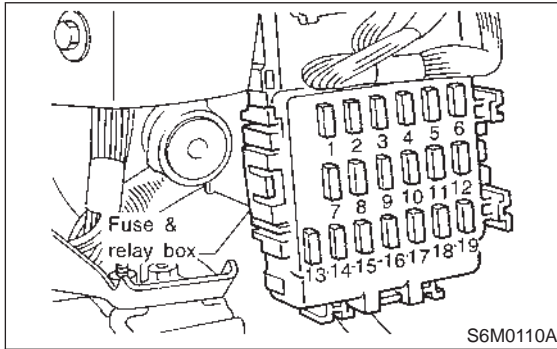
WIRING DIAGRAM:



S6M0108

7C1 : CHECK FUSE.

Check fuse No. 18.



- CHECK** : Is fuse No. 18 blown?
YES : Replace fuse No. 18. Go to step 7C2.
NO : Go to step 7C2.

7C2 : CHECK POWER SUPPLY.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between fuse & relay box connector and chassis ground.

Connector & terminal

(B152) No. 5 (+) — Chassis ground (-):

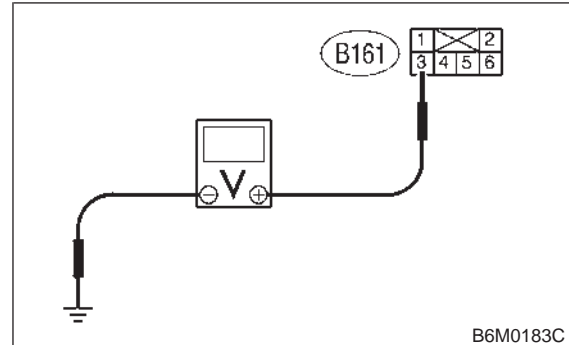
- CHECK** : Is voltage more than 10 V?
YES : Go to step 7C3.
NO : Replace fuse No. 18. When fuse No. 18 is blown again, repair shorted parts of circuit.

7C3 : CHECK CRUISE CONTROL MAIN SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Remove cruise control main switch and disconnect connector.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between cruise control main switch connector and chassis ground.

Connector & terminal

(B161) No. 3 (+) — Chassis ground (-):



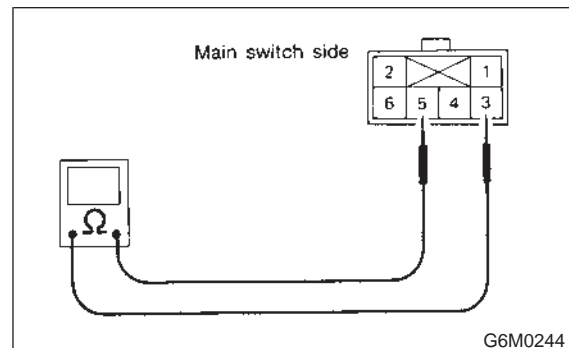
- CHECK** : Is voltage more than 10 V?
YES : Go to step 7C4.
NO : Replace cruise control main switch. <Ref. to 6-2 [W11B2].>

7C4 : CHECK CRUISE CONTROL MAIN SWITCH.

Measure resistance between cruise control main switch terminals.

Terminals

No. 3 — No. 5:



- CHECK** : Is resistance less than 10 Ω? (When switch is ON.)
YES : Go to step 7C5.
NO : Replace cruise control main switch. <Ref. to 6-2 [W11B2].>

6-2 [T7C5] BODY ELECTRICAL SYSTEM (CRUISE CONTROL)

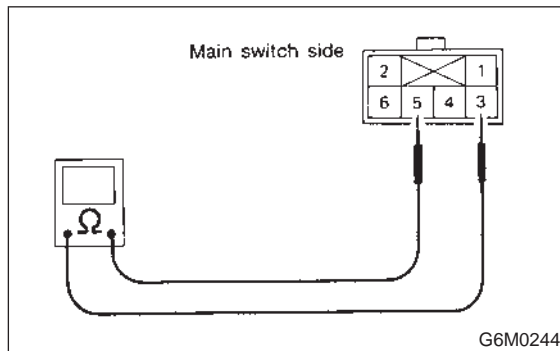
7. Diagnostics Chart for Power Line

7C5 : CHECK CRUISE CONTROL MAIN SWITCH.

Measure resistance between cruise control main switch terminals.

Terminals

No. 3 — No. 5:



CHECK : Is resistance less than 1 M Ω ? (When switch is OFF.)

YES : Go to step 7C6.

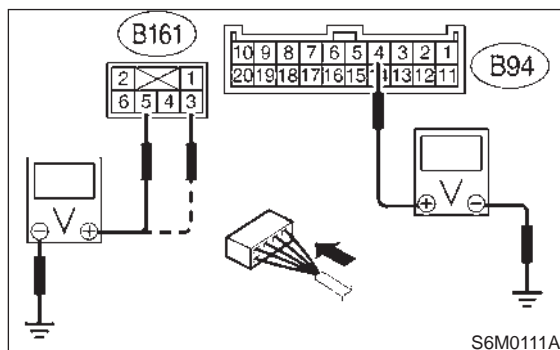
NO : Replace cruise control main switch.
<Ref. to 6-2 [W11B2].>

7C6 : CHECK HARNESS BETWEEN CRUISE CONTROL MAIN SWITCH CONNECTOR AND CHASSIS GROUND.

- 1) Connect connector.
- 2) Turn ignition switch to ON.
- 3) Turn cruise control main switch to ON.
- 4) Measure voltage between terminal of cruise control main switch and chassis ground.

Connector & terminal

(B161) No. 3 (+) — Chassis ground (-):



CHECK : Is voltage more than 10 V?

YES : Go to step 7C7.

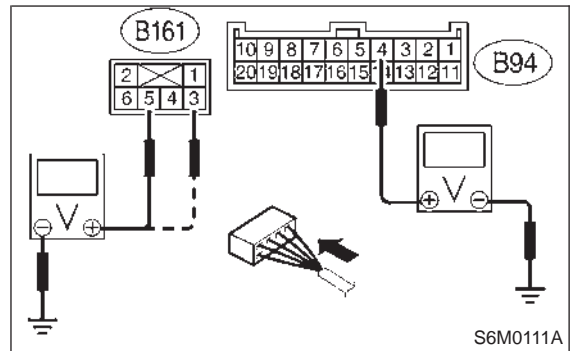
NO : Repair or replace wiring harness.

7C7 : CHECK HARNESS BETWEEN CRUISE CONTROL MAIN SWITCH CONNECTOR AND CHASSIS GROUND.

Measure voltage between terminal of cruise control main switch chassis ground.

Connector & terminal

(B161) No. 5 (+) — Chassis ground (-):



CHECK : Is voltage more than 10 V?

YES : Go to step 7C8.

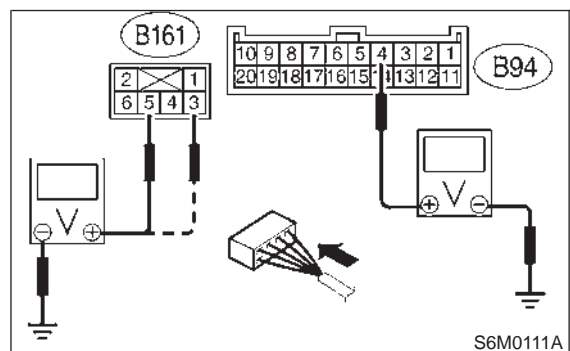
NO : Repair or replace wiring harness.

7C8 : CHECK HARNESS BETWEEN CRUISE CONTROL MODULE CONNECTOR AND CHASSIS GROUND.

Measure voltage between terminal of cruise control module and chassis ground.

Connector & terminal

(B94) No. 4 (+) — Chassis ground (-):



CHECK : Is voltage more than 10 V?

YES : Replace cruise control module. <Ref. to 6-2 [W11B4].>

NO : Repair or replace wiring harness.

NOTE:

Depress cruise control main switch with fingers while measuring voltage between (B161) No. 5 and chassis ground.

8. Diagnostics Chart with Diagnostic Code

A: DIAGNOSTIC CODE LIST

Diagnostic code	Item	Contents of diagnosis	Index No.
11	BRAKE SW/STOP SW	Input signals from brake switch "OFF", stop light switch "ON" (Brake pedal is depressed.)	<Ref. to 6-2 [T8B0].>
12	CLUTCH SW/INHIBITOR SW	Input signals from clutch switch "OFF" (MT), or inhibitor switch "P or N" (AT) [Clutch pedal is depressed (MT), or selector lever is set to P or N position (AT).]	<Ref. to 6-2 [T8C0].>
13	LOW SPEED LIMIT	Low-speed control limiter	<Ref. to 6-2 [T8D0].>
14	CANCEL SW	Input signal from cancel switch (faulty SET/COAST switch or RESUME/ACCEL switch)	<Ref. to 6-2 [T8E0].>
21	VACUUM VALVE	Faulty vacuum valve or valve drive system	<Ref. to 6-2 [T8F0].>
22	VENT 2 VALVE	Faulty vent 2 valve or valve drive system	<Ref. to 6-2 [T8F0].>
23	VENT 1 VALVE	Faulty vent 1 valve or valve drive system	<Ref. to 6-2 [T8F0].>
24	SPEED SENSOR	Faulty vehicle speed sensor 2 (MT) or transmission control module (AT)	<Ref. to 6-2 [T8D0].>
25	CONTROL MODULE	Faulty CPU RAM included in cruise control module	<Ref. to 6-2 [T8G0].>

B: DIAGNOSTIC CODE 11 (BRAKE SWITCH, STOP LIGHT SWITCH)

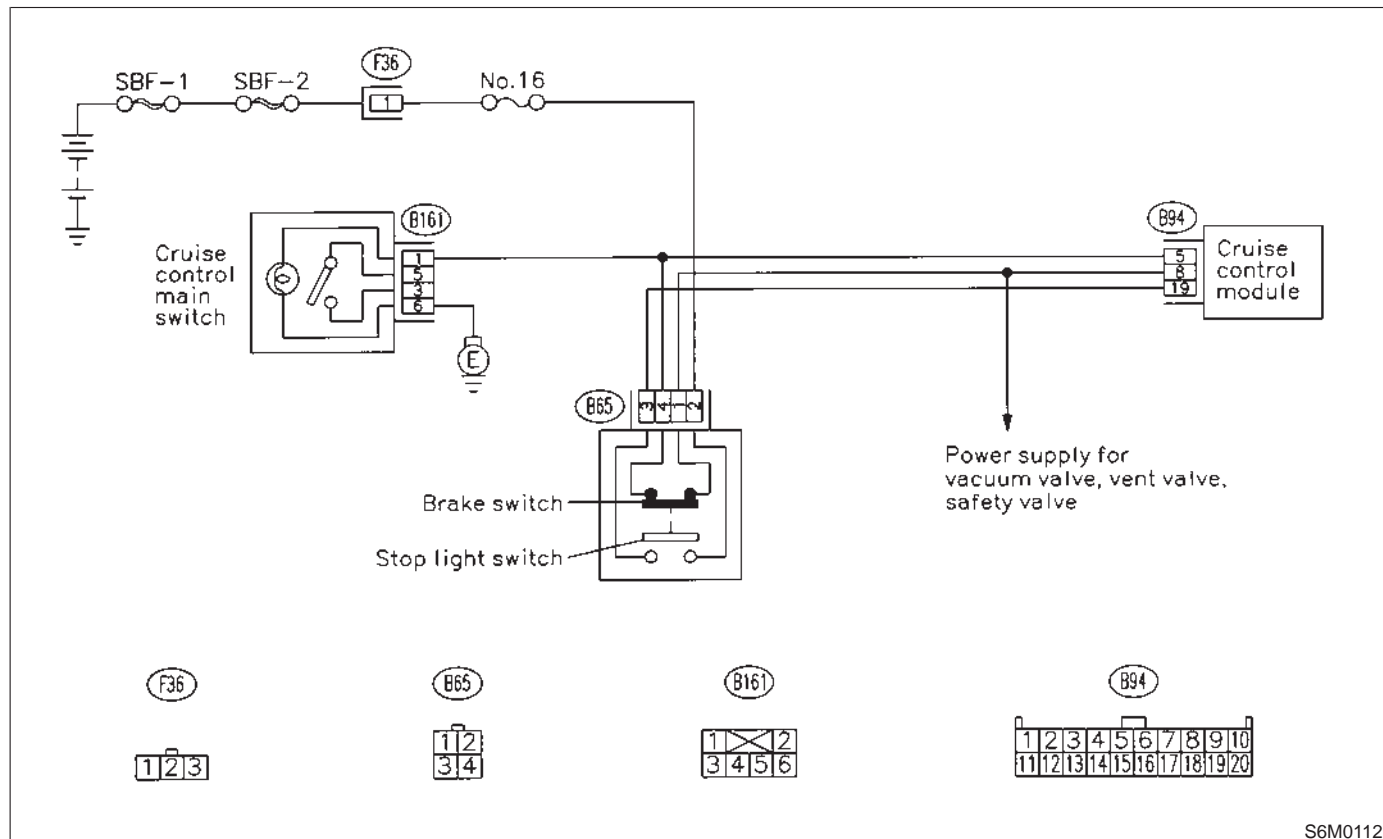
DIAGNOSIS:

- Failure or disconnection of the stop light switch and brake switch.

TROUBLE SYMPTOM:

- Cruise control cannot be set.

WIRING DIAGRAM:



S6M0112

8B1 : CHECK BRAKE SWITCH.

- 1) Turn ignition switch to ON.
- 2) Turn cruise control main switch to ON.
- 3) Apply parking brake securely.
- 4) Set select monitor in "Current Data Display & Save" mode.
- 5) Depress the brake pedal and check signals for proper operation.

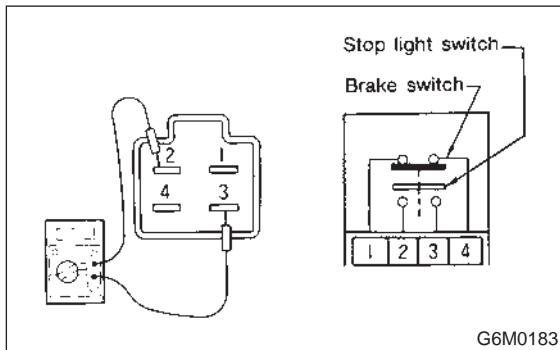
(1) The Stop Lamp Switch shown on the display turns from "OFF" to "ON".

(2) The Brake Switch shown on the display turns from "OFF" to "ON".

- 6) Release the brake pedal.
- 7) Remove connector of stop and brake switch.
- 8) Check circuit between brake switch terminal.

Terminals

No. 1 — No. 4: (Brake switch)



CHECK : *Is resistance less than 1 Ω ? (When brake pedal is released.)*

YES : Go to step 8B2.

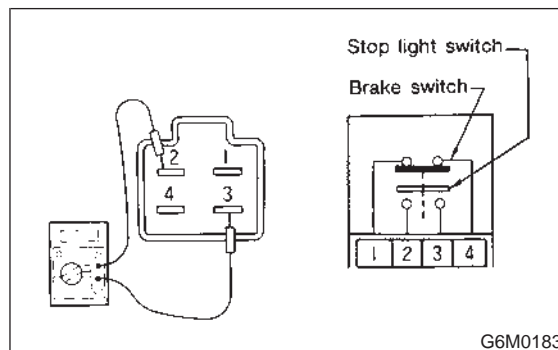
NO : Replace brake and stop light switch.
<Ref. to 4-5 [C100].>

8B2 : CHECK BRAKE SWITCH.

Check circuit between brake switch terminal.

Terminals

No. 1 — No. 4: (Brake switch)



CHECK : *Is resistance more than 1 M Ω ? (When brake pedal is depressed.)*

YES : Go to step 8B3.

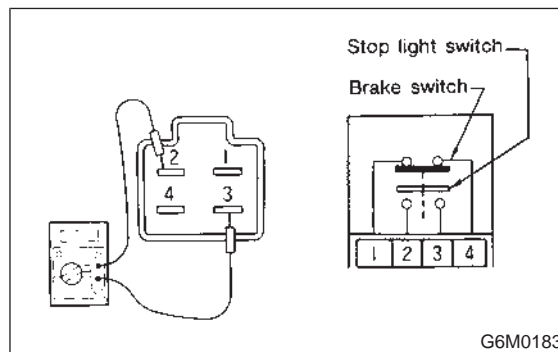
NO : Replace brake and stop light switch.
<Ref. to 4-5 [C100].>

8B3 : CHECK STOP LIGHT SWITCH.

Check circuit between stop light switch terminal.

Terminals

No. 2 — No. 3: (Stop light switch)



CHECK : *Is resistance more than 1 M Ω ? (When brake pedal is released.)*

YES : Go to step 8B4.

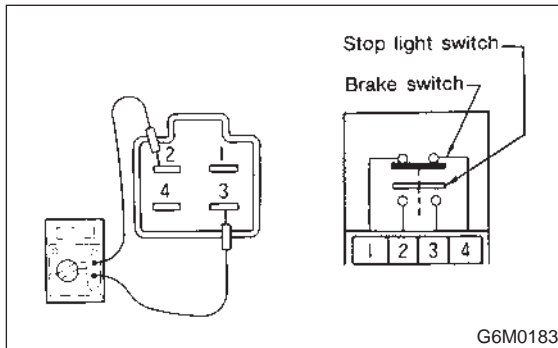
NO : Replace brake and stop light switch.
<Ref. to 4-5 [C100].>

8B4 : CHECK STOP LIGHT SWITCH.

Check circuit between stop light switch terminal.

Terminals

No. 2 — No. 3: (Stop light switch)



- CHECK** : ***Is resistance less than 1 Ω ? (When brake pedal is depressed.)***
- YES** : Replace cruise control module. <Ref. to 6-2 [W11B4].>
- NO** : Replace brake and stop light switch. <Ref. to 4-5 [C1A0].>

MEMO:

C: DIAGNOSTIC CODE 12 (CLUTCH SWITCH, INHIBITOR SWITCH)

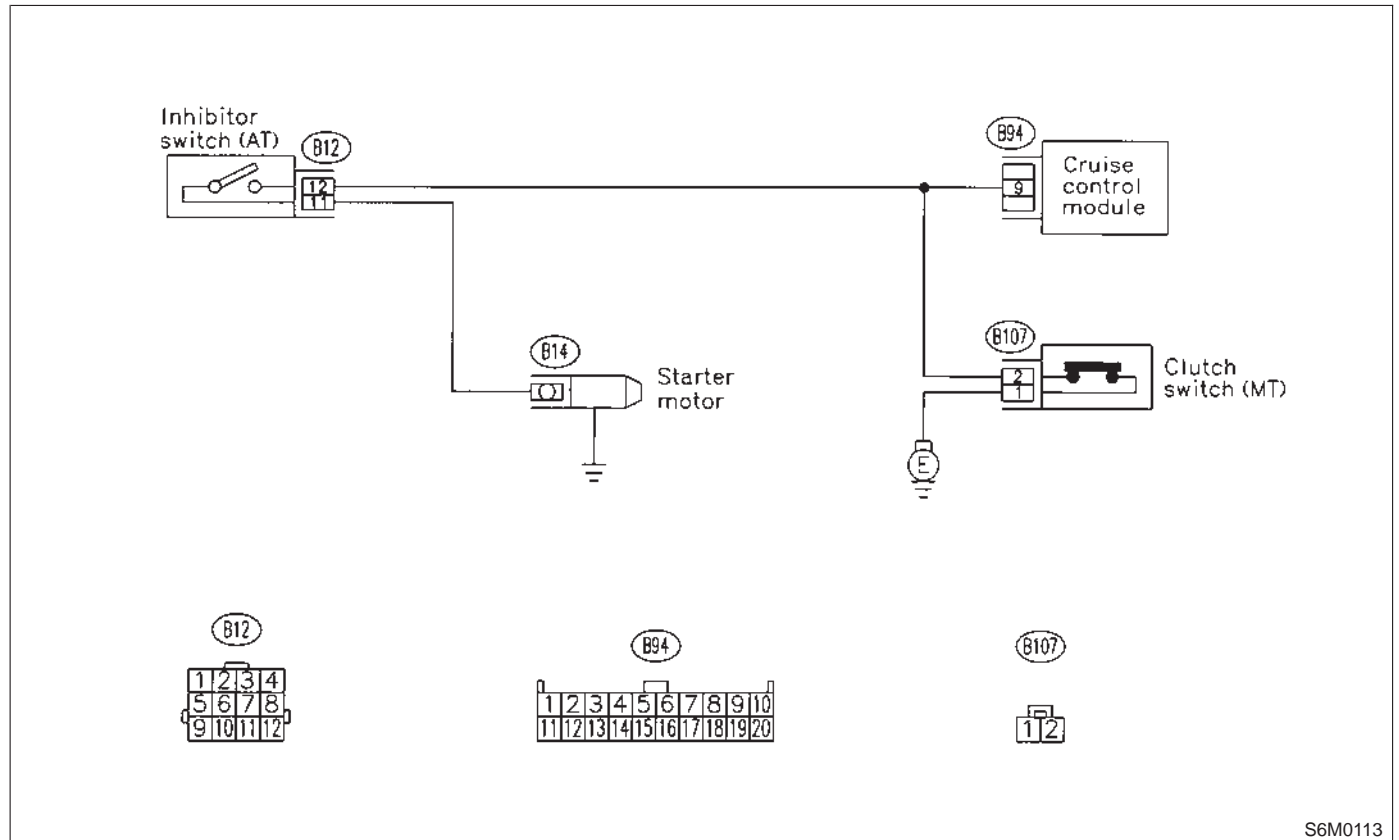
DIAGNOSIS:

- Failure or disconnection of the clutch switch. (MT)
- Failure or disconnection of the inhibitor switch. (AT)

TROUBLE SYMPTOM:

- Cruise control cannot be set.

WIRING DIAGRAM:



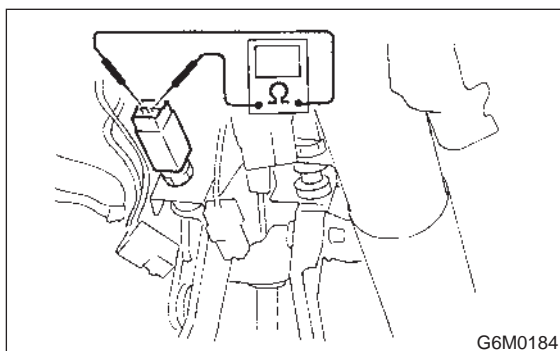
S6M0113

8C1 : CHECK CLUTCH SWITCH. (MT)

- 1) Turn ignition switch to ON.
- 2) Turn cruise control main switch to ON.
- 3) Apply parking brake securely.
- 4) Set select monitor in "Current Data Display & Save" mode.
- 5) Depress the clutch pedal and check signal for proper operation. (MT)
The Clutch/Inhibitor Switch shown on the display turns from "ON" to "OFF".
- 6) Disconnect connector of clutch switch.
- 7) Check continuity of the clutch switch.

Terminals

No. 1 — No. 2:



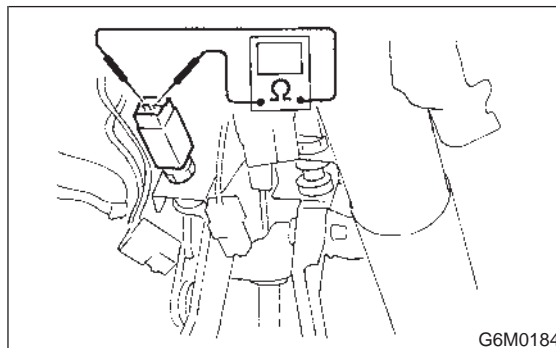
- CHECK** : Is resistance less than 10 Ω ? (When clutch pedal is released.)
- YES** : Go to step 8C2.
- NO** : Replace clutch switch. <Ref. to 4-5 [C1A0].>

8C2 : CHECK CLUTCH SWITCH. (MT)

Check continuity of the clutch switch.

Terminals

No. 1 — No. 2:



- CHECK** : Is resistance more than 1 M Ω ? (When clutch pedal is depressed.)
- YES** : Replace cruise control module. <Ref. to 6-2 [W11B4].>
- NO** : Replace clutch switch. <Ref. to 4-5 [C1A0].>

6-2 [T8C3] BODY ELECTRICAL SYSTEM (CRUISE CONTROL)

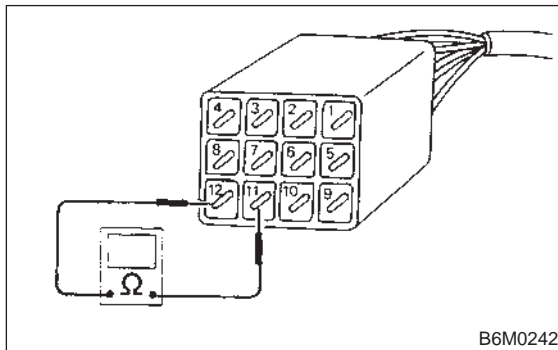
8. Diagnostics Chart with Diagnostic Code

8C3 : CHECK INHIBITOR SWITCH. (AT)

- 1) Turn ignition switch to ON.
- 2) Turn cruise control main switch to ON.
- 3) Apply parking brake securely.
- 4) Set select monitor in "Current Data Display & Save" mode.
- 5) Set the selector lever from P or N position to D position and check signal for proper operation. (AT) The Clutch/Inhibitor Switch shown on the display turns from "ON" to "OFF".
- 6) Set the selector lever to P or N position.
- 7) Disconnect connector of inhibitor switch.
- 8) Check continuity of the inhibitor switch.

Terminals

No. 11 — No. 12:



CHECK : **Is resistance less than 10 Ω? (When selector lever is in P or N.)**

YES : Go to step **8C4**.

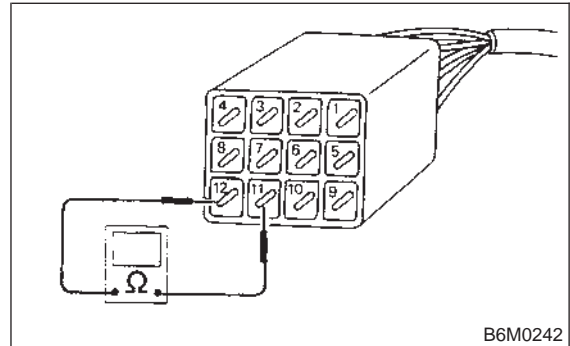
NO : Replace inhibitor switch. <Ref. to 3-2 [W2C0].> Repair inhibitor switch wiring harness.

8C4 : CHECK INHIBITOR SWITCH. (AT)

Check continuity of the inhibitor switch.

Terminals

No. 11 — No. 12:



CHECK : **Is resistance more than 1 MΩ? (When selector lever is not in P or N.)**

YES : Replace cruise control module. <Ref. to 6-2 [W11B4].>

NO : Replace inhibitor switch. <Ref. to 3-2 [W2C0].> Repair inhibitor switch wiring harness.

MEMO:

D: DIAGNOSTIC CODE 13 AND 24 (SPEED SENSOR SYSTEM)

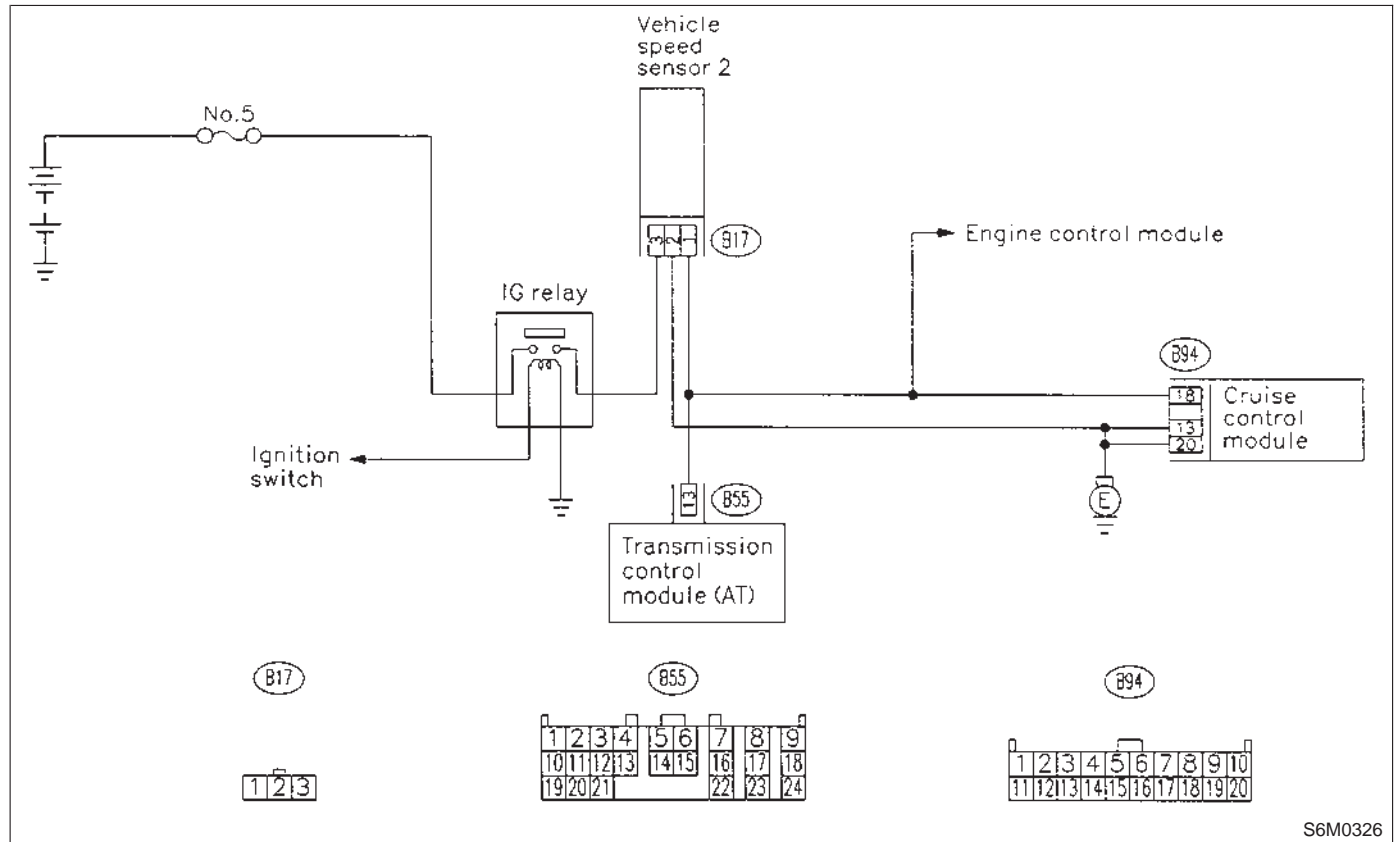
DIAGNOSIS:

- Disconnection or short circuit of vehicle speed sensor 2 (MT model) or transmission control module (AT model).

TROUBLE SYMPTOM:

- Cruise control cannot be set. (Cancelled immediately.)

WIRING DIAGRAM:



S6M0326

8D1 : CHECK TRANSMISSION TYPE.

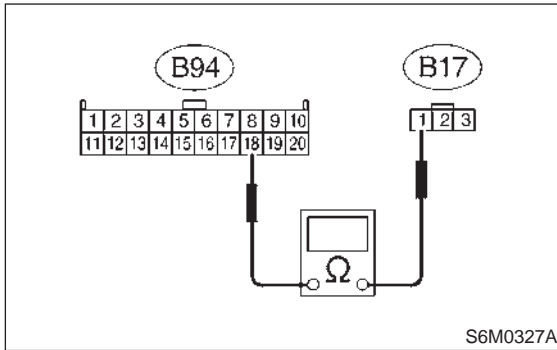
- CHECK** : Is the transmission type MT?
- YES** : Go to step 8D2.
- NO** : Go to step 8D7.

8D2 : CHECK HARNESS CONNECTOR BETWEEN CRUISE CONTROL MODULE AND VEHICLE SPEED SENSOR 2.

- 1) Disconnect connector from vehicle speed sensor 2 and cruise control module.
- 2) Measure resistance of harness connector between vehicle speed sensor 2 and cruise control module.

Connector & terminal

(B17) No. 1 — (B94) No. 18:



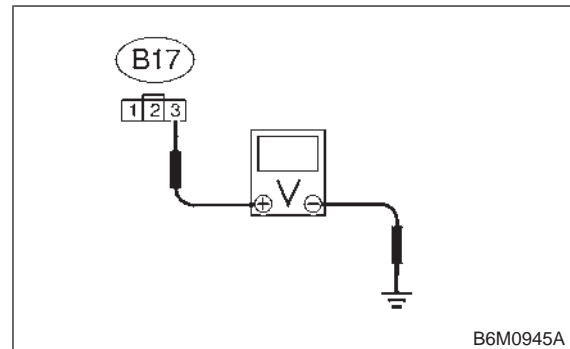
- CHECK** : Is the resistance less than 10 Ω?
- YES** : Go to step 8D3.
- NO** : Repair wiring harness.

8D3 : CHECK HARNESS CONNECTOR BETWEEN BATTERY AND VEHICLE SPEED SENSOR 2.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between vehicle speed sensor 2 connector (B17) and chassis ground.

Connector & terminal

(B17) No. 3 (+) — Chassis ground (-):



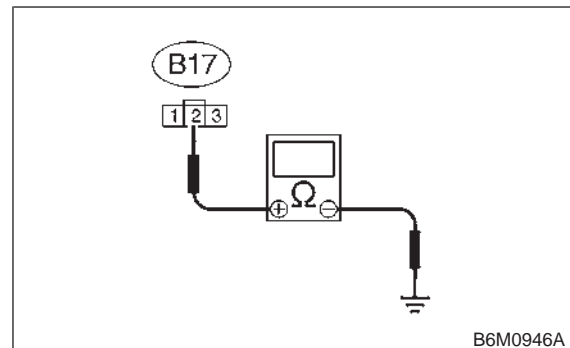
- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 8D4.
- NO** : Repair harness connector between battery and vehicle speed sensor 2.

8D4 : CHECK HARNESS CONNECTOR BETWEEN VEHICLE SPEED SENSOR 2 AND ENGINE GROUND.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between vehicle speed sensor 2 connector (B17) and engine ground.

Connector & terminal

(B17) No. 2 (+) — Engine ground (-):



- CHECK** : Is the resistance less than 10 Ω?
- YES** : Go to step 8D5.
- NO** : Repair harness connector between vehicle speed sensor 2 and engine ground.

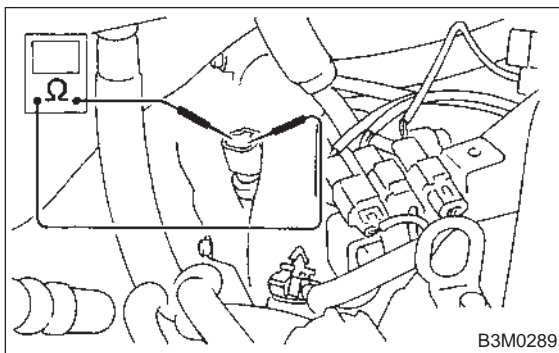
8D5 : CHECK VEHICLE SPEED SENSOR 2.**NOTE:**

- If resistance between terminals of vehicle speed sensor 2 is out of specification, the sensor may have a failure.
- If resistance is OK and voltage between terminals of vehicle speed sensor 2 is out of specification, mechanical trouble may be present between vehicle speed sensor 2 and speedometer shaft in transmission.

Measure resistance between terminals of vehicle speed sensor 2.

Terminals

No. 2 — No. 3:



- CHECK** : Is the resistance between 350 and 450 Ω ?
- YES** : Go to step 8D6.
- NO** : Replace vehicle speed sensor 2.

8D6 : CHECK VEHICLE SPEED SENSOR 2.

- 1) Connect connector to vehicle speed sensor 2.
- 2) Set the vehicle on free roller, or lift-up the vehicle and support with safety stands.

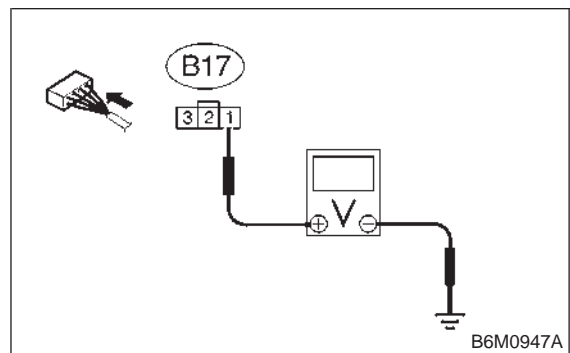
WARNING:

Be careful not to be caught up by the running wheels.

- 3) Drive the vehicle at speed greater than 20 km/h (12 MPH).
- 4) Measure voltage between vehicle speed sensor 2 connector (B17) and chassis ground.

Connector & terminal

(B17) No. 1 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 4 V?
- YES** : Replace cruise control module. <Ref. to 6-2 [W11B4].>
- NO** : Replace vehicle speed sensor 2.

8D7 : CHECK HARNESS CONNECTOR BETWEEN CRUISE CONTROL MODULE AND AUTOMATIC TRANSMISSION CONTROL MODULE.

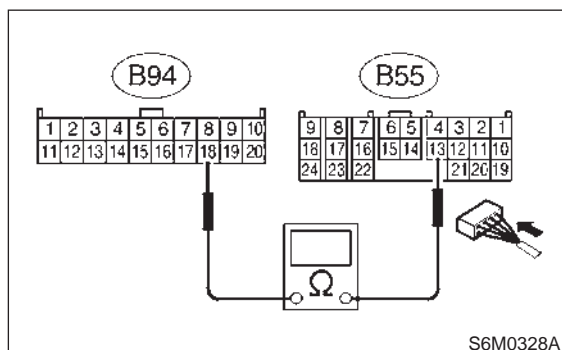
- 1) Disconnect connector from automatic transmission control module and cruise control module.
- 2) Measure resistance between cruise control module connector and automatic transmission control module connector.

CAUTION:

To measure the voltage and/or resistance, use a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in).

Connector & terminal

(B94) No. 18 — (B55) No. 13:



CHECK : Is the resistance less than 10 Ω?

YES : Go to step 8D8.

NO : Repair harness connector between cruise control module and automatic transmission control module.

8D8 : CHECK AUTOMATIC TRANSMISSION CONTROL MODULE.

- 1) Connect connector to automatic transmission control module.
- 2) Set the vehicle on free roller, or lift-up the vehicle and support with safety stands.

WARNING:

Be careful not to be caught by the running wheels.

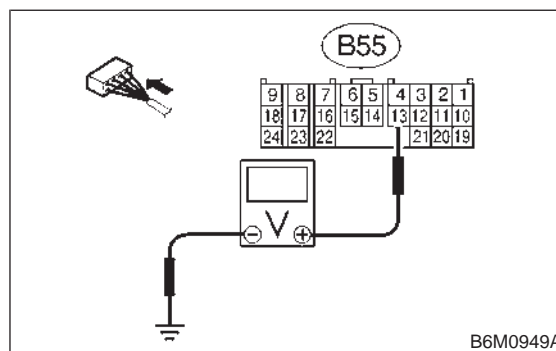
- 3) Drive the vehicle faster than 20 km/h (12MPH).
- 4) Measure voltage between automatic transmission control module connector (B55) and chassis ground.

CAUTION:

To measure the voltage and/or resistance, use a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in).

Connector & terminal

(B55) No. 13 (+) — Chassis ground (-):



CHECK : Is the voltage more than 4 V?

YES : Replace cruise control module. <Ref. to 6-2 [W11B4].>

NO : Replace automatic transmission control module. <Ref. to 3-2 [W22A0].>

E: DIAGNOSTIC CODE 14 (SET/COAST SWITCH, RESUME/ACCEL SWITCH, CANCEL SWITCH)

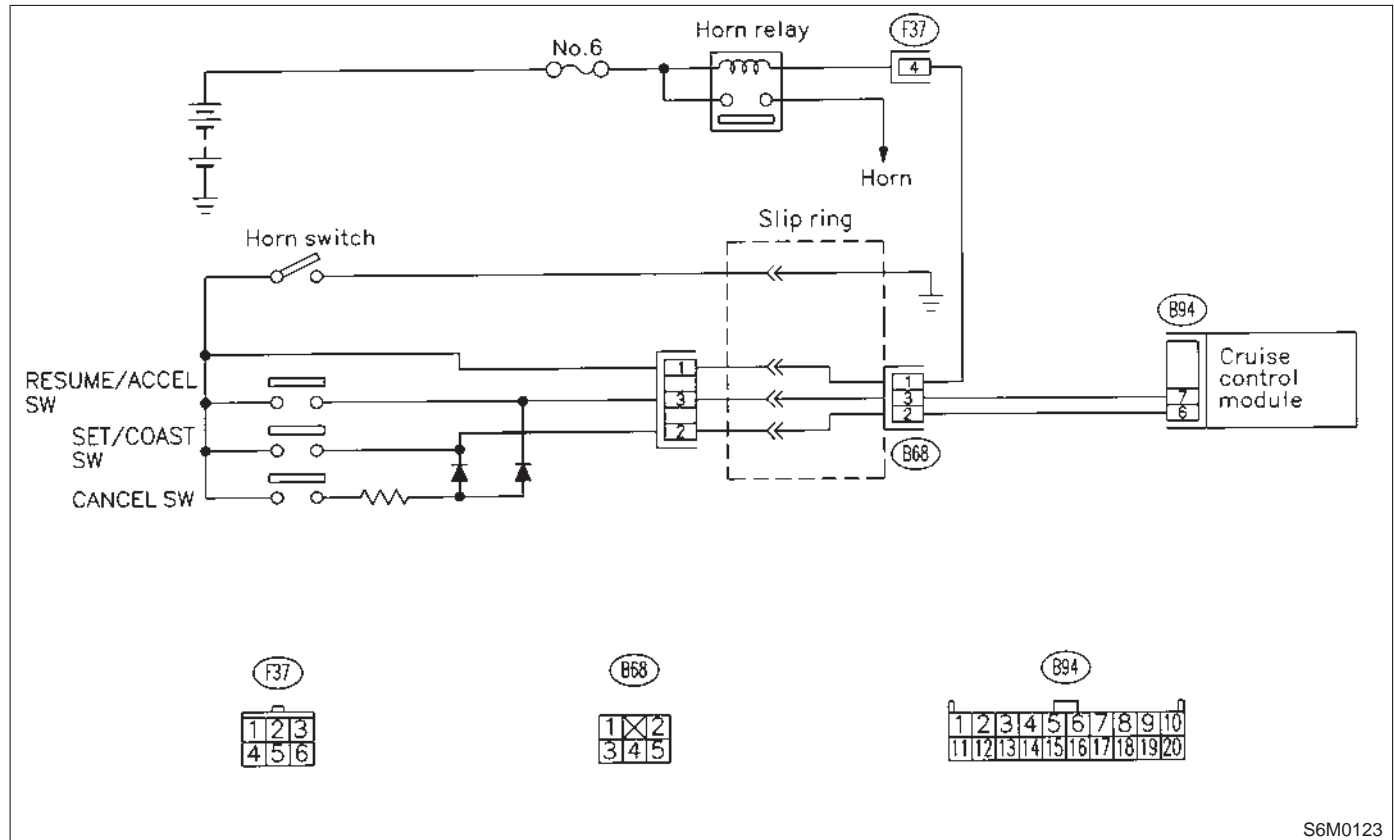
DIAGNOSIS:

- Short circuit inside the SET SW and RESUME SW.

TROUBLE SYMPTOM:

- Cruise control cannot be set. (Cancelled immediately.)

WIRING DIAGRAM:



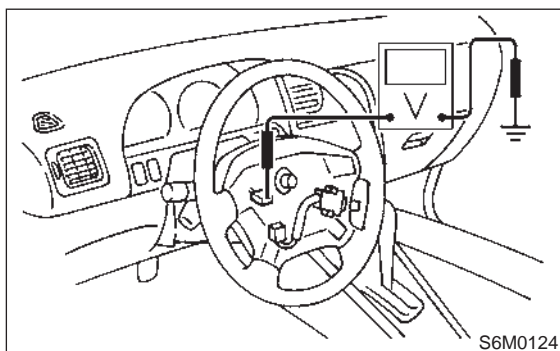
S6M0123

8E1 : CHECK POWER SUPPLY.

- 1) Turn ignition switch to ON.
- 2) Turn cruise control main switch to ON.
- 3) Set select monitor in "Current Data Display & Save" mode.
- 4) Check signals for proper operation.
 - (1) When pushing the SET/COAST switch:
The SET/COAST switch shown on the display turns from "OFF" to "ON".
 - (2) When pushing the RESUME/ACCEL switch:
The RESUME/ACCEL switch shown on the display turns from "OFF" to "ON".
- 5) Turn ignition switch to OFF.
- 6) Disconnect connector from cruise control command switch.
- 7) Turn ignition switch to ON.
- 8) Measure voltage between cruise control command switch connector and chassis ground.

Terminals

No. 1 (+) — Chassis ground (-):



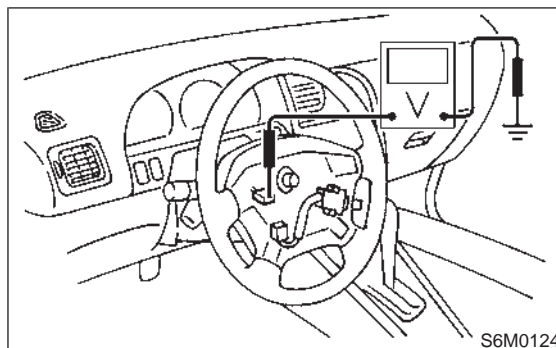
- (CHECK)** : **Is voltage more than 10 V?**
- (YES)** : Go to step **8E2**.
- (NO)** : Repair or replace wiring harness between fuse & relay box and cruise control command switch. <Ref. to 6-2 [W11B3].>

8E2 : CHECK CRUISE CONTROL COMMAND SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Connect connector of cruise control command switch.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between cruise control command switch connector and chassis ground.

Terminals

No. 2 (+) — Chassis ground (-):



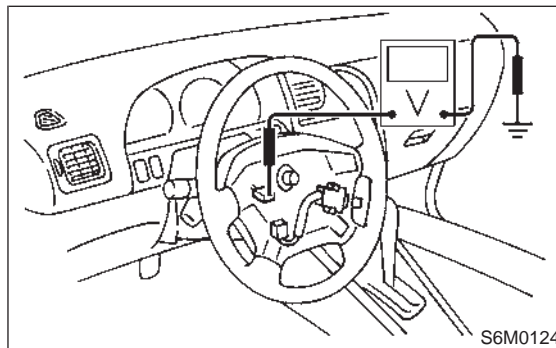
- (CHECK)** : **Is voltage more than 10 V? (When SET/COAST switch is ON.)**
- (YES)** : Go to step **8E3**.
- (NO)** : Replace cruise control command switch. <Ref. to 6-2 [W11B3].>

8E3 : CHECK CRUISE CONTROL COMMAND SWITCH.

Measure voltage between cruise control command switch connector and chassis ground.

Terminals

No. 3 (+) — Chassis ground (-):



- (CHECK)** : **Is voltage more than 10 V? (When RESUME/ACCEL switch is ON.)**
- (YES)** : Go to step **8E4**.
- (NO)** : Replace cruise control command switch. <Ref. to 6-2 [W11B3].>

6-2 [T8E4] BODY ELECTRICAL SYSTEM (CRUISE CONTROL)

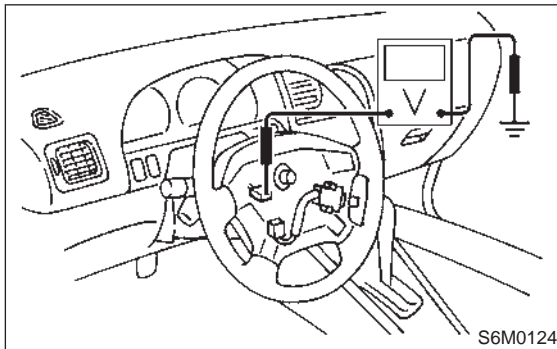
8. Diagnostics Chart with Diagnostic Code

8E4 : CHECK CRUISE CONTROL COMMAND SWITCH.

Measure voltage between cruise control command switch connector and chassis ground.

Terminals

No. 2 (+) — Chassis ground (-):



CHECK : *Is voltage more than 10 V? (When CANCEL switch is ON.)*

YES : Go to step 8E5.

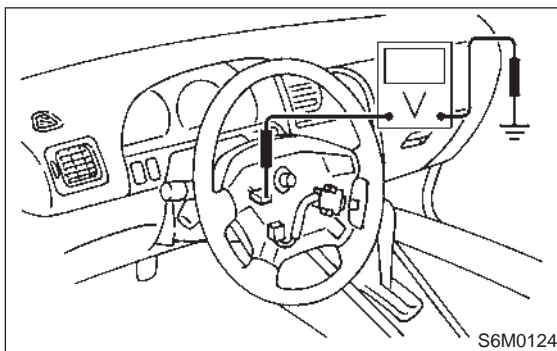
NO : Replace cruise control command switch. <Ref. to 6-2 [W11B3].>

8E5 : CHECK CRUISE CONTROL COMMAND SWITCH.

Measure voltage between cruise control command switch connector and chassis ground.

Terminals

No. 3 (+) — Chassis ground (-):



CHECK : *Is voltage more than 10 V? (When CANCEL switch is ON.)*

YES : Go to step 8E6.

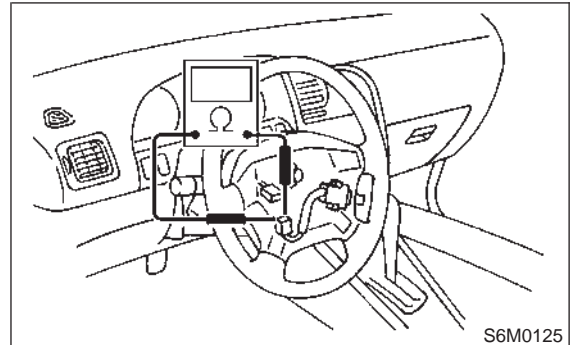
NO : Replace cruise control command switch. <Ref. to 6-2 [W11B3].>

8E6 : CHECK CRUISE CONTROL COMMAND SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from cruise control command switch.
- 3) Measure resistance between terminals of cruise control command switch connector (switch side) to check the switch operation.

Terminals

No. 1 — No. 2:



CHECK : *Is resistance less than 10 Ω ? (When SET/COAST switch is ON.)*

YES : Go to step 8E7.

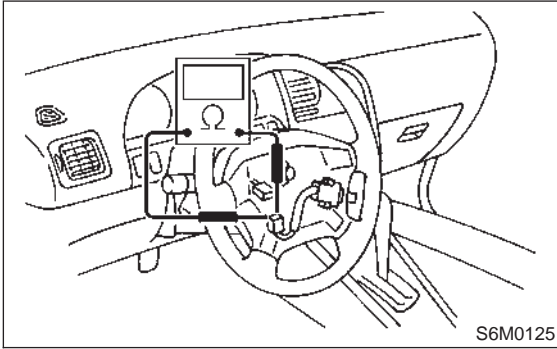
NO : Replace cruise control command switch. <Ref. to 6-2 [W11B3].>

8E7 : CHECK CRUISE CONTROL COMMAND SWITCH.

Measure resistance between terminals of cruise control command switch connector (switch side) to check the switch operation.

Terminals

No. 1 — No. 2:



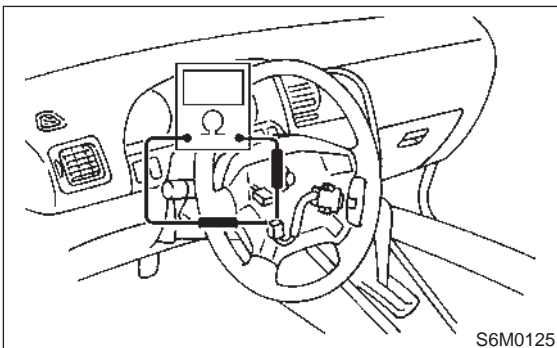
- CHECK** : *Is resistance more than 1 MΩ? (When SET/COAST switch is OFF.)*
- YES** : Go to step 8E8.
- NO** : Replace cruise control command switch. <Ref. to 6-2 [W11B3].>

8E8 : CHECK CRUISE CONTROL COMMAND SWITCH.

Measure resistance between terminals of cruise control command switch connector (switch side) to check the switch operation.

Terminals

No. 1 — No. 3:



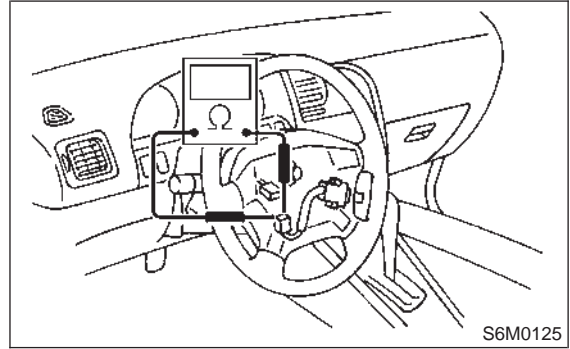
- CHECK** : *Is resistance less than 10 Ω? (When RESUME/ACCEL switch is ON.)*
- YES** : Go to step 8E9.
- NO** : Replace cruise control command switch. <Ref. to 6-2 [W11B3].>

8E9 : CHECK CRUISE CONTROL COMMAND SWITCH.

Measure resistance between terminals of cruise control command switch connector (switch side) to check the switch operation.

Terminals

No. 1 — No. 3:



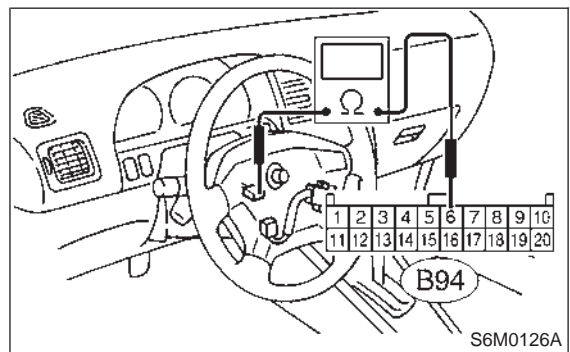
- CHECK** : *Is resistance more than 1 MΩ? (When RESUME/ACCEL switch is OFF.)*
- YES** : Go to step 8E10.
- NO** : Replace cruise control command switch. <Ref. to 6-2 [W11B3].>

8E10 : CHECK HARNESS CONNECTOR BETWEEN CRUISE CONTROL COMMAND SWITCH AND CRUISE CONTROL MODULE.

- 1) Disconnect connector from cruise control module.
- 2) Measure resistance of harness connector between cruise control command switch and cruise control module.

Connector & terminal

No. 2 (command switch) — (B94) No. 6:



- CHECK** : *Is resistance less than 10 Ω?*
- YES** : Go to step 8E11.
- NO** : Repair or replace wiring harness.

6-2 [T8E11] BODY ELECTRICAL SYSTEM (CRUISE CONTROL)

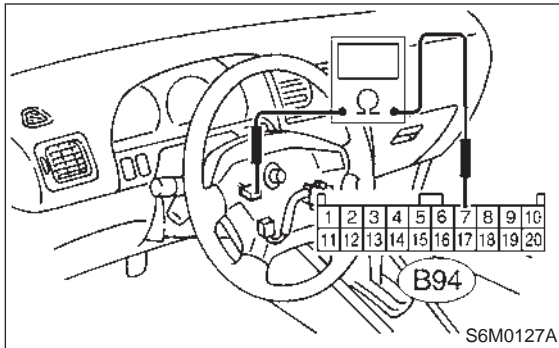
8. Diagnostics Chart with Diagnostic Code

8E11 : CHECK HARNESS CONNECTOR BETWEEN CRUISE CONTROL COMMAND SWITCH AND CRUISE CONTROL MODULE.

Measure resistance of harness connector between cruise control command switch and cruise control module.

Connector & terminal

No. 3 (command switch) — (B94) No. 7:



- CHECK** : **Is resistance less than 10 Ω ?**
- YES** : Replace cruise control module. <Ref. to 6-2 [W11B4].>
- NO** : Repair or replace wiring harness.

MEMO:

F: DIAGNOSTIC CODE 21, 22 AND 23 (VACUUM VALVE, VENT 2 VALVE, VENT 1 VALVE)

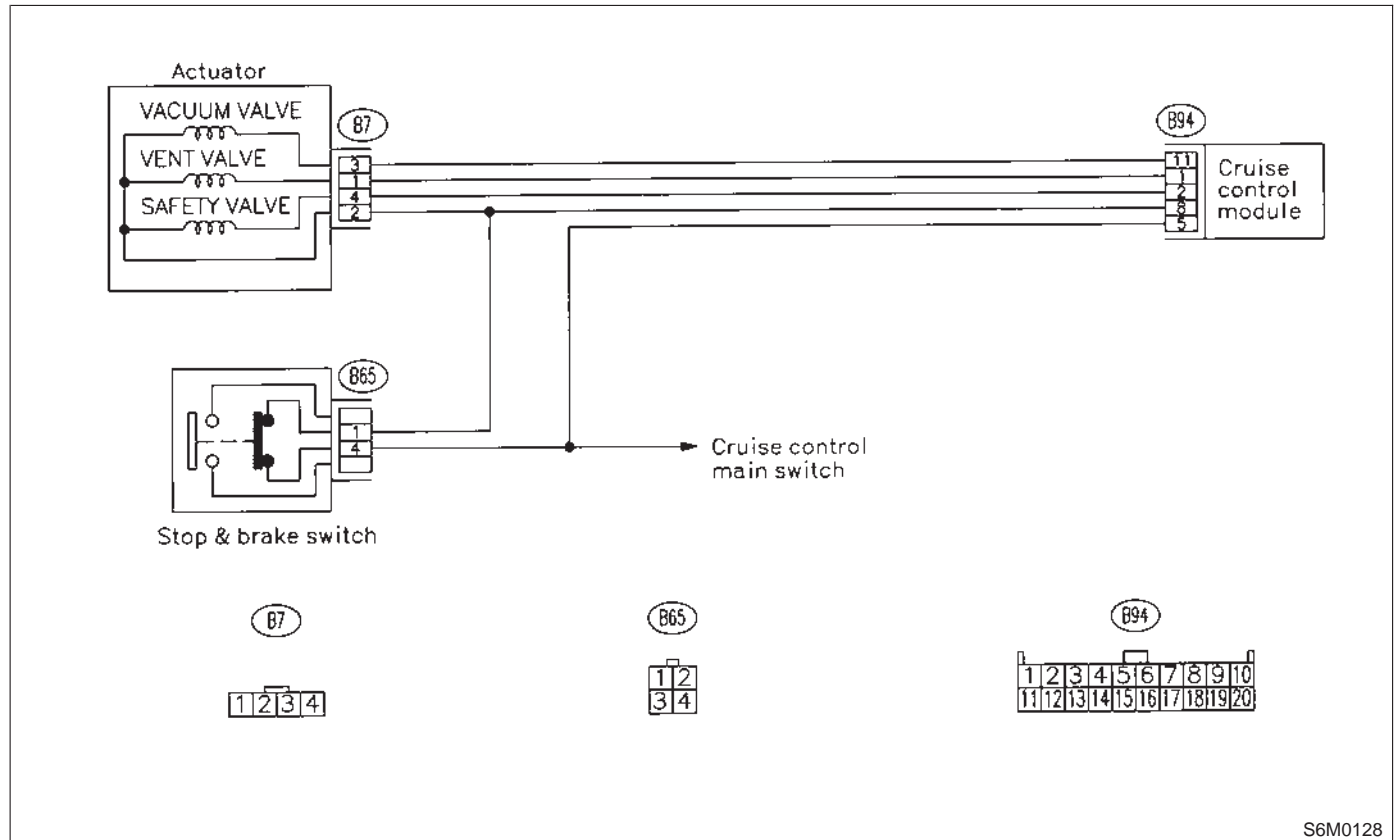
DIAGNOSIS:

- Open or poor contact of vacuum valve, vent 2 valve and vent 1 valve.

TROUBLE SYMPTOM:

- Cruise control cannot be set. (Cancels immediately.)

WIRING DIAGRAM:



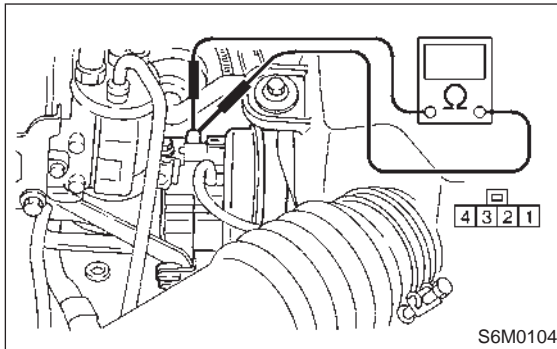
S6M0128

8F1 : MEASURE RESISTANCE OF VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE.

- 1) Disconnect connector from actuator.
- 2) Measure resistance of vacuum valve, vent 2 valve and vent 1 valve.

Terminals

No. 2 — No. 3:



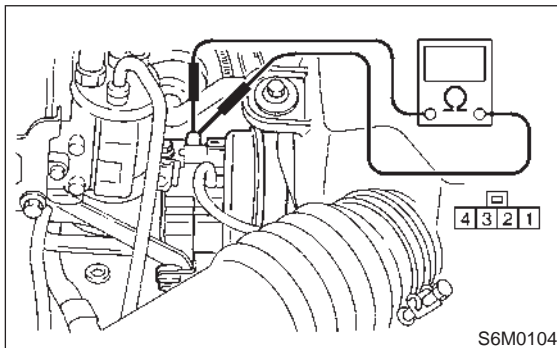
- CHECK** : Is resistance less than 22 Ω ?
- YES** : Go to step 8F2.
- NO** : Replace actuator. <Ref. to 6-2 [W11B1].>

8F2 : MEASURE RESISTANCE OF VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE.

Measure resistance of vacuum valve, vent 2 valve and vent 1 valve.

Terminals

No. 2 — No. 1:



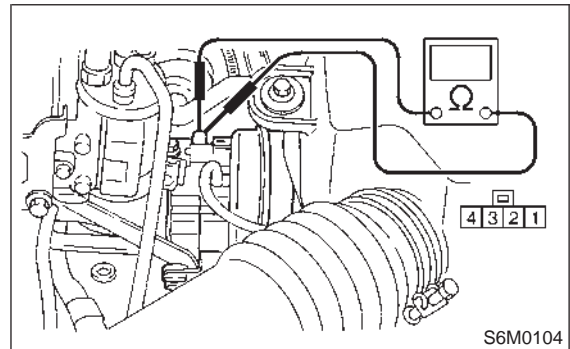
- CHECK** : Is resistance less than 55 Ω ?
- YES** : Go to step 8F3.
- NO** : Replace actuator. <Ref. to 6-2 [W11B1].>

8F3 : MEASURE RESISTANCE OF VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE.

Measure resistance of vacuum valve, vent 2 valve and vent 1 valve.

Terminals

No. 2 — No. 4:



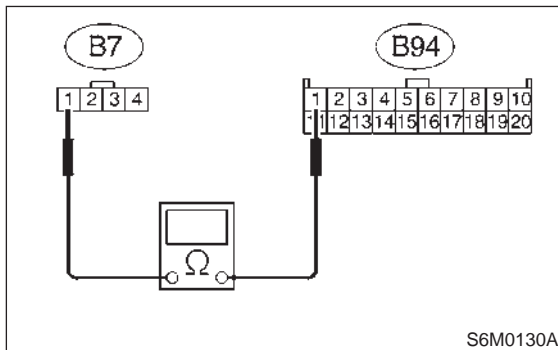
- CHECK** : Is resistance less than 55 Ω ?
- YES** : Go to step 8F4.
- NO** : Replace actuator. <Ref. to 6-2 [W11B1].>

8F4 : PERFORM A CIRCUIT TEST IN HARNESS BETWEEN ACTUATOR (VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE) AND CRUISE CONTROL MODULE.

- 1) Disconnect connector from cruise control module.
- 2) Measure resistance of harness connector between cruise control module, vacuum valve, vent 2 valve and vent 1 valve.

Connector & terminal

(B7) No. 1 — (B94) No. 1:



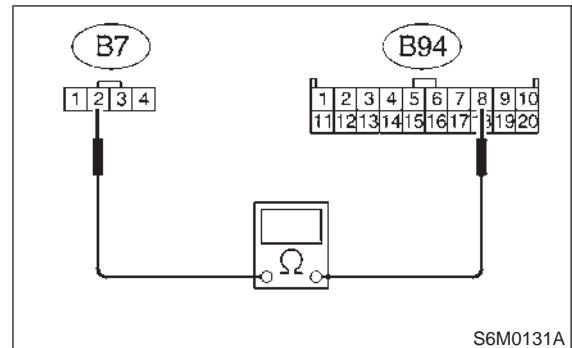
- CHECK** : Is resistance less than 10 Ω?
- YES** : Go to step 8F5.
- NO** : Repair or replace wiring harness between actuator <Ref. to 6-2 [W11B1].> and cruise control module <Ref. to 6-2 [W11B4].>.

8F5 : PERFORM A CIRCUIT TEST IN HARNESS BETWEEN ACTUATOR (VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE) AND CRUISE CONTROL MODULE.

Measure resistance of harness connector between cruise control module, vacuum valve, vent 2 valve and vent 1 valve.

Connector & terminal

(B7) No. 2 — (B94) No. 8:



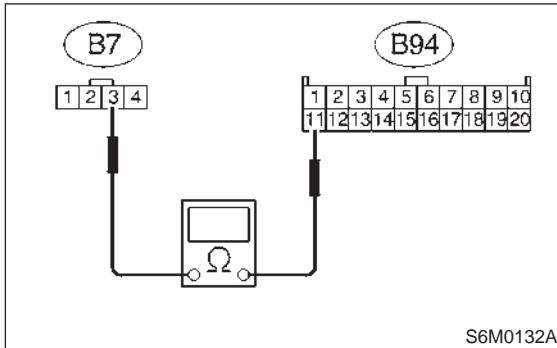
- CHECK** : Is resistance less than 10 Ω?
- YES** : Go to step 8F6.
- NO** : Repair or replace wiring harness between actuator <Ref. to 6-2 [W11B1].> and cruise control module <Ref. to 6-2 [W11B4].>.

8F6 : PERFORM A CIRCUIT TEST IN HARNESS BETWEEN ACTUATOR (VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE) AND CRUISE CONTROL MODULE.

Measure resistance of harness connector between cruise control module, vacuum valve, vent 2 valve and vent 1 valve.

Connector & terminal

(B7) No. 3 — (B94) No. 11:



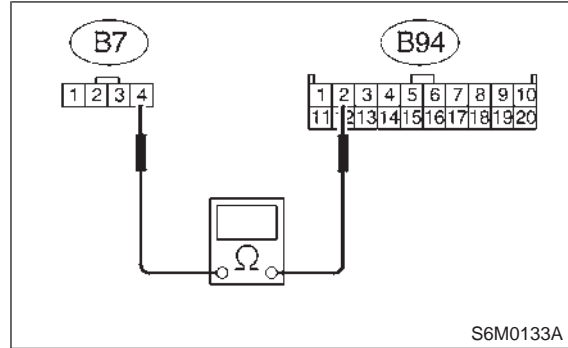
- CHECK** : Is resistance less than 10 Ω?
- YES** : Go to step 8F7.
- NO** : Repair or replace wiring harness between actuator <Ref. to 6-2 [W11B1].> and cruise control module <Ref. to 6-2 [W11B4].>.

8F7 : PERFORM A CIRCUIT TEST IN HARNESS BETWEEN ACTUATOR (VACUUM VALVE, VENT 2 VALVE AND VENT 1 VALVE) AND CRUISE CONTROL MODULE.

Measure resistance of harness connector between cruise control module, vacuum valve, vent 2 valve and vent 1 valve.

Connector & terminal

(B7) No. 4 — (B94) No. 2:



- CHECK** : Is resistance less than 10 Ω?
- YES** : Replace cruise control module.
- NO** : Repair or replace wiring harness between actuator <Ref. to 6-2 [W11B1].> and cruise control module <Ref. to 6-2 [W11B4].>.

G: DIAGNOSTIC CODE 25 (CRUISE CONTROL MODULE BUILT-IN RELAY, CPU RAM)

DIAGNOSIS:

- Poor welding of built-in relay of cruise control module.
- Failure of built-in CPU RAM of cruise control module.

TROUBLE SYMPTOM:

- Cruise control is canceled and memorized cruise speed is also canceled.
- Once cruise control is canceled, cruise control cannot be set until the ignition switch and cruise control main switch turns OFF, and then turns ON again.

NOTE:

Check input/output signal and vehicle speed signal with select monitor. When signals are in good condition, failure is in cruise control module. (Check power supply and ground conditions of cruise control module.)

9. Diagnostics Chart with Select Monitor

A: FUNCTION MODE

NOTE:

Applicable select monitor cartridge:
No. 24082AA090

Select the "Cruise Control" system using the select monitor and set the "Current Data Display & Save" mode. The following parameters will then appear on the display.

- Vehicle Speed

The current vehicle speed is shown on the display.

- Stop Lamp Switch

When the brake pedal is depressed, the stop lamp switch shown on the display turns from "OFF" to "ON".

- Brake Switch

When the brake pedal is depressed, the brake switch shown on the display turns from "OFF" to "ON".

- "SET/COAST" Switch

When the cruise control command switch is placed in the "SET/COAST" position, the SET/COAST switch shown on the display turns from "OFF" to "ON".

- "RESUME/ACCEL" Switch

When the cruise control command switch is placed in the "RESUME/ACCEL" position, the RESUME/ACCEL switch shown on the display turns from "OFF" to "ON".

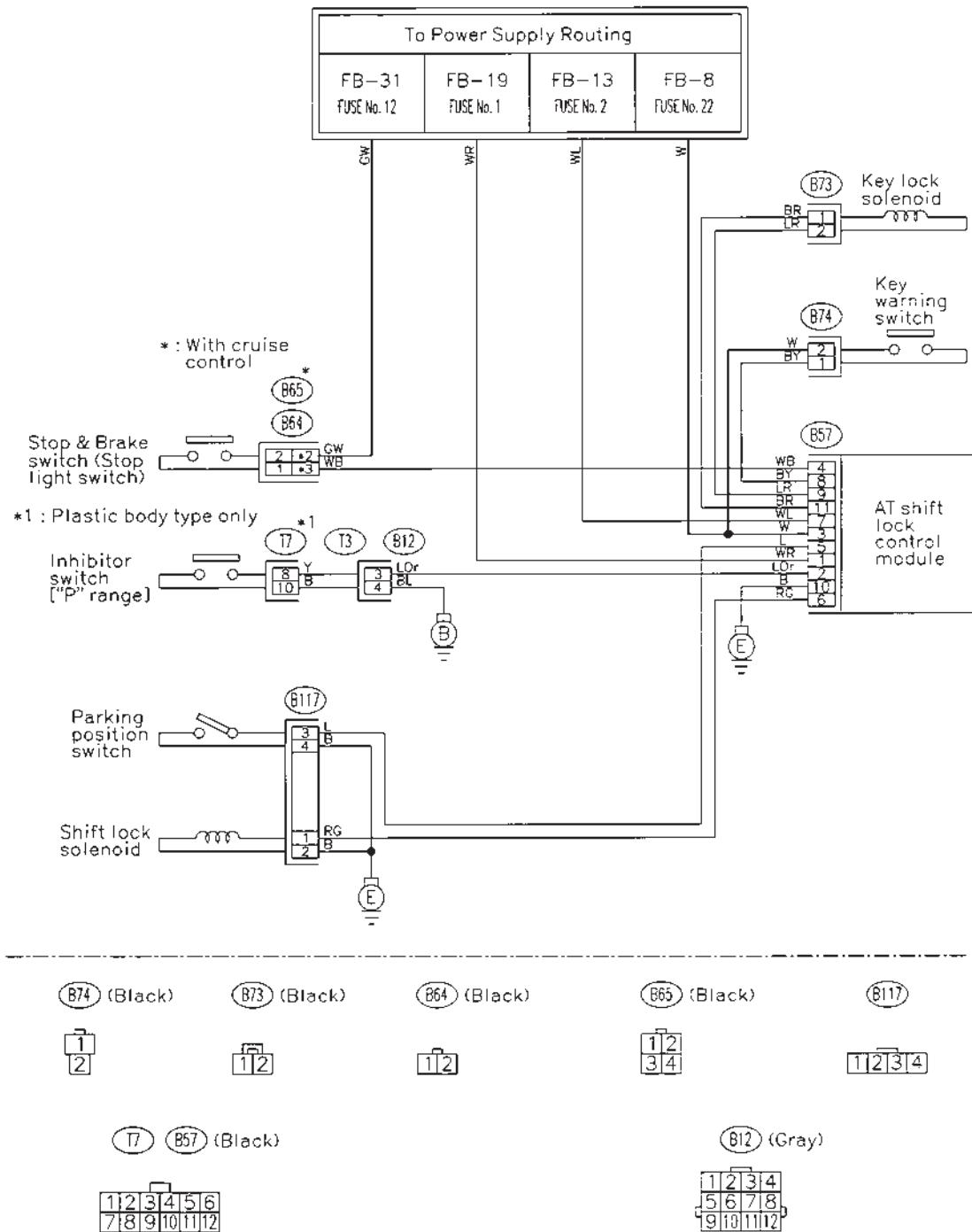
- Clutch/Inhibitor Switch

When the clutch pedal is depressed, the clutch/inhibitor switch shown on the display turns from "ON" to "OFF". (MT models)

When the selector lever is moved from the "N" or "P" position to any other position, the clutch/inhibitor switch shown on the display turns from "ON" to "OFF".

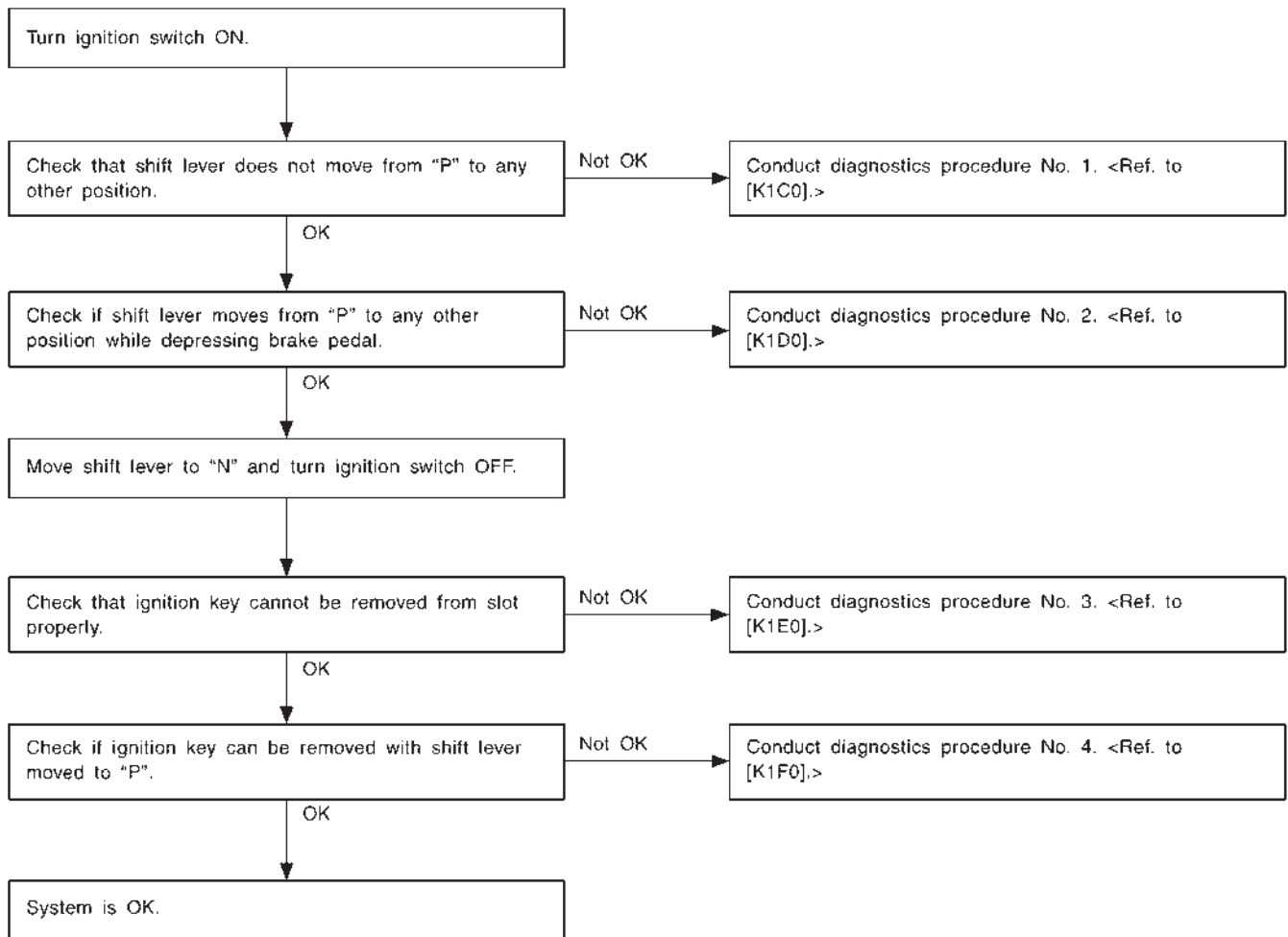
1. AT Shift Lock System

A: WIRING DIAGRAM

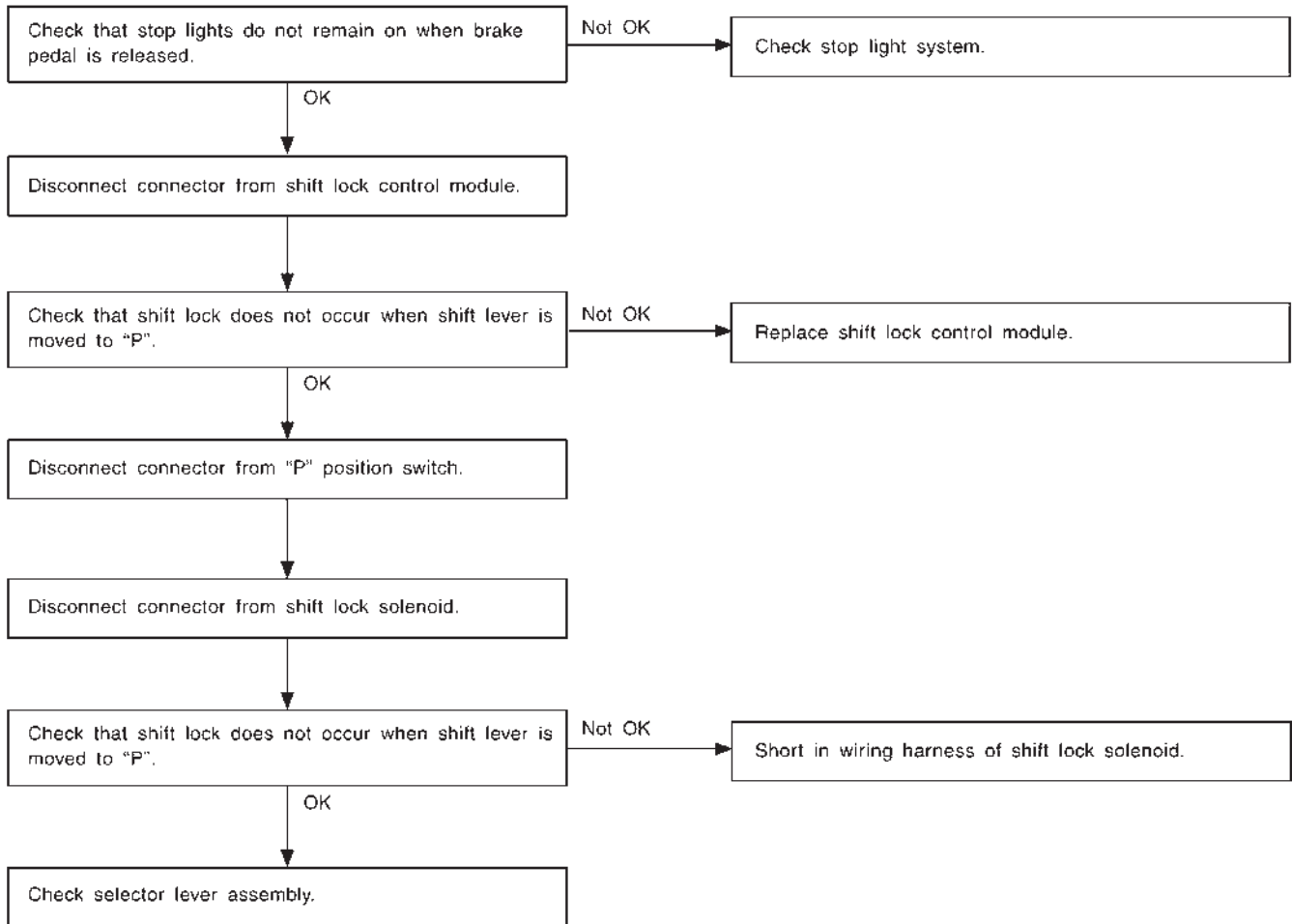


GU42-03

B: BASIC DIAGNOSTICS CHART

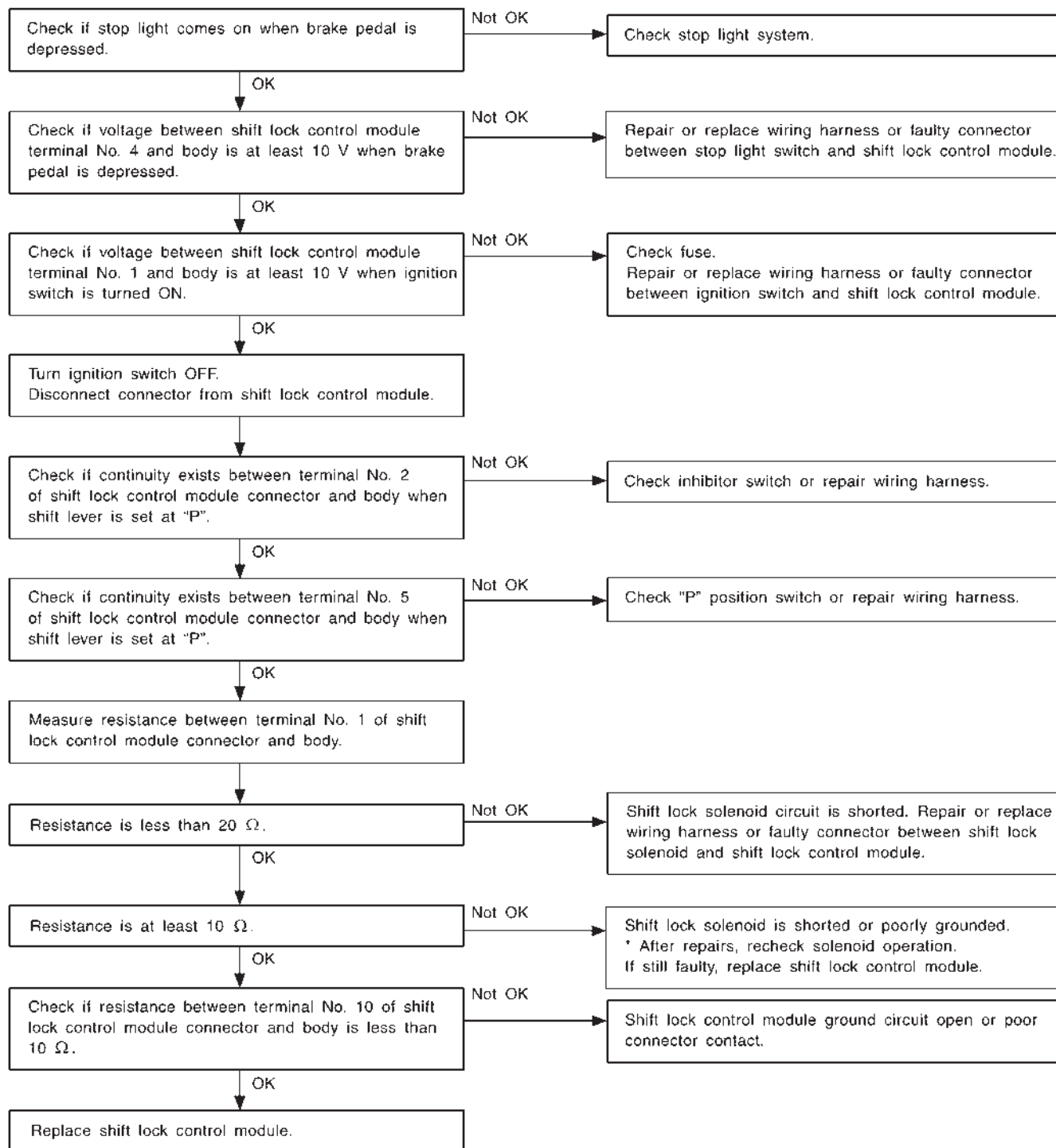


H6M0504

C: DIAGNOSTICS PROCEDURE NO. 1

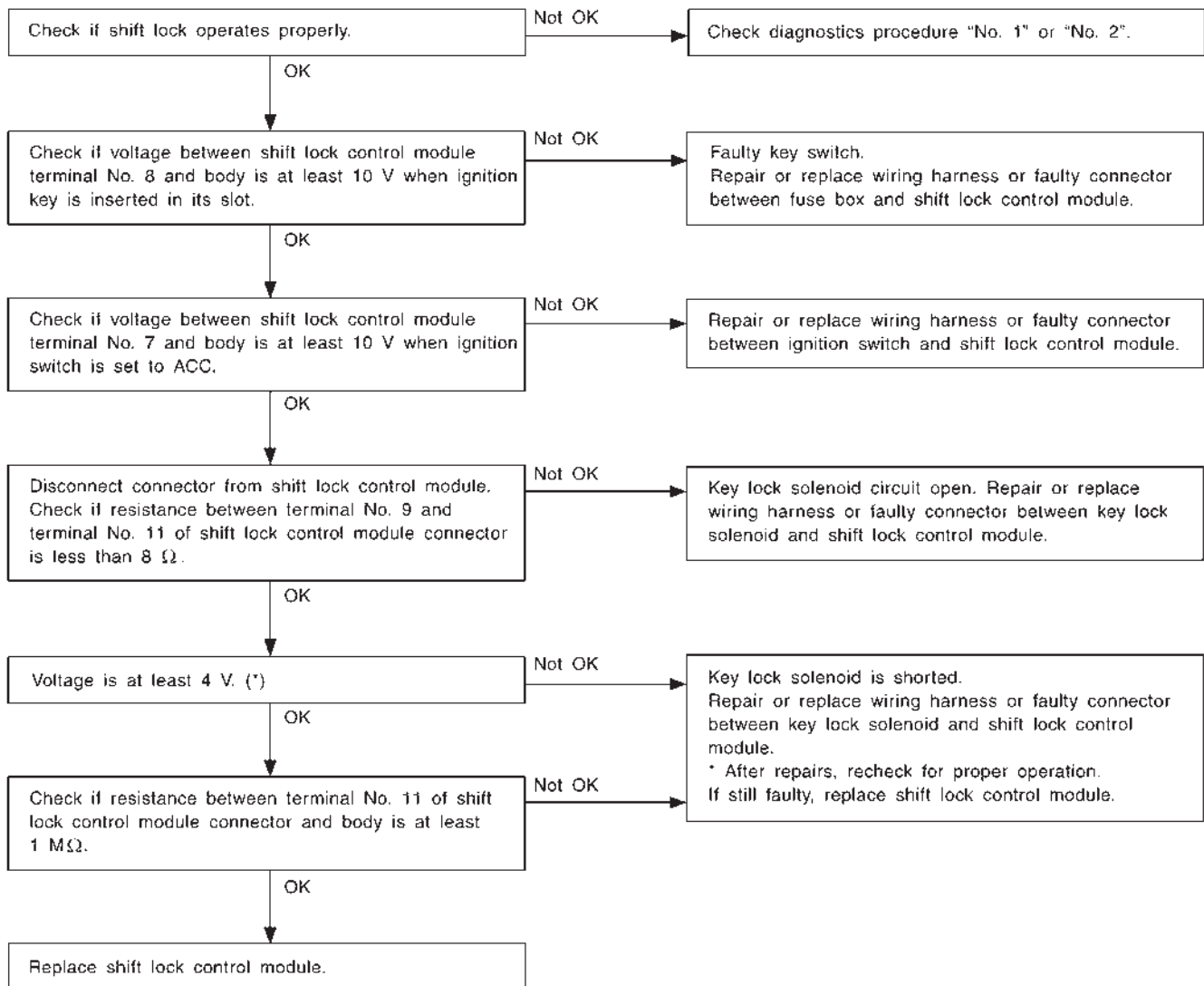
H6M0505

D: DIAGNOSTICS PROCEDURE NO. 2 (SHIFT LOCK DOES NOT RELEASE.)



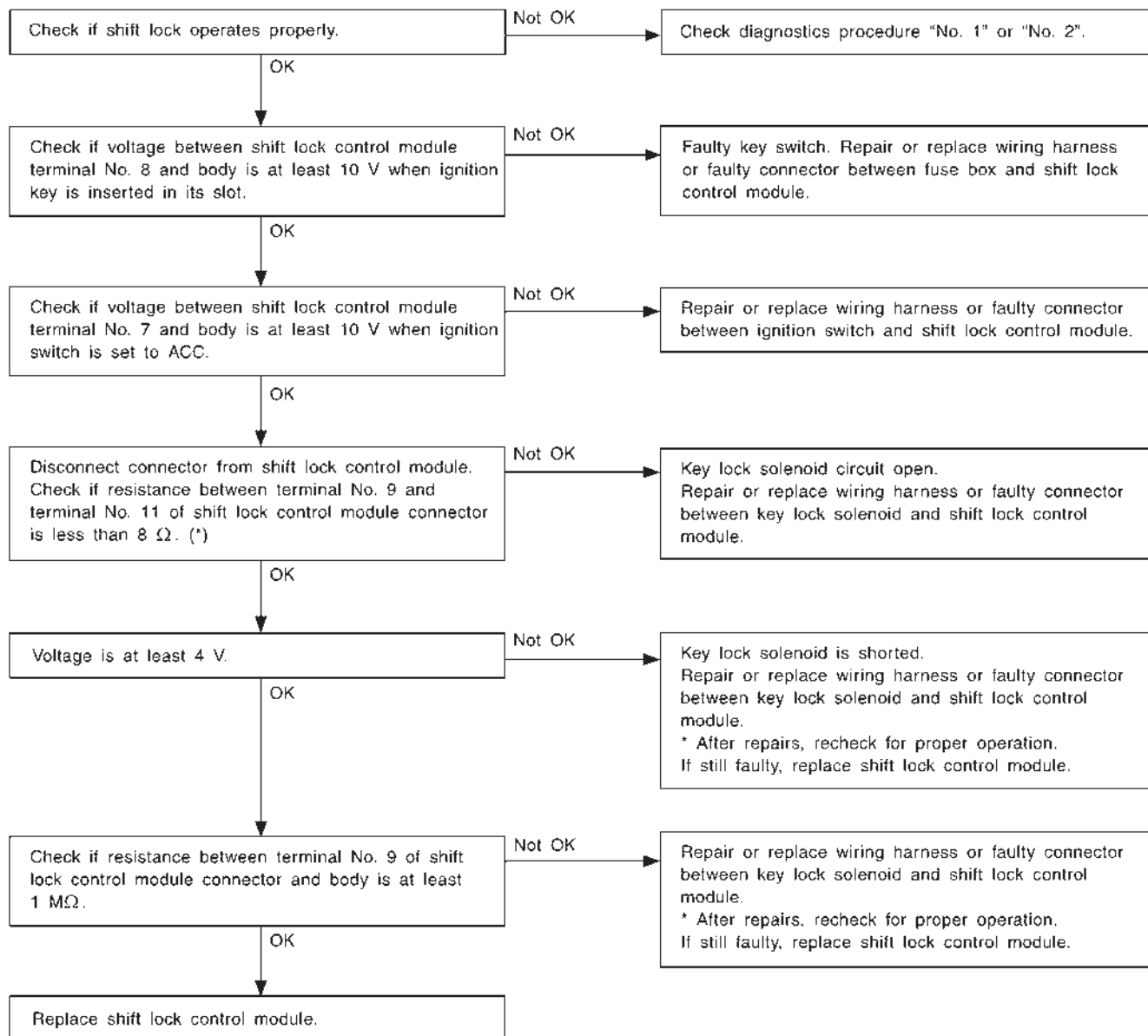
H6M0506

E: DIAGNOSTICS PROCEDURE NO. 3 (KEY INTERLOCK DOES NOT OPERATE.)



*: When conducting operational checks of the key lock solenoid, do not apply 12 V to solenoid for more than one second, since this may break solenoid circuit.

F: DIAGNOSTICS PROCEDURE NO. 4 (KEY INTERLOCK DOES NOT RELEASE.)



*: When conducting operational checks of the key lock solenoid, do not apply 12 V to solenoid for more than one second, since this may break solenoid circuit.

2. Combination Meter

A: DIAGNOSTICS PROCEDURE

If speedometer does not operate, or operates abnormally, check combination meter circuit.

CAUTION:

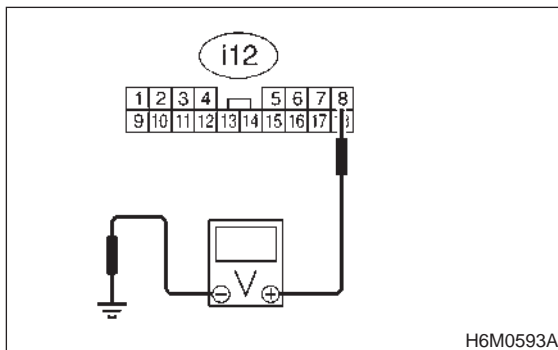
Make sure that trouble code of vehicle speed sensor 2 system appears in electrical system on-board diagnosis.

2A1 : CHECK POWER SUPPLY FOR COMBINATION METER.

- 1) Remove combination meter.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between combination meter connector and chassis ground.

Connector & terminal

(i12) No. 8 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 10 V?
- YES** : Go to step 2A2.
- NO** : Repair harness and connector.

NOTE:

In this case, repair the following:

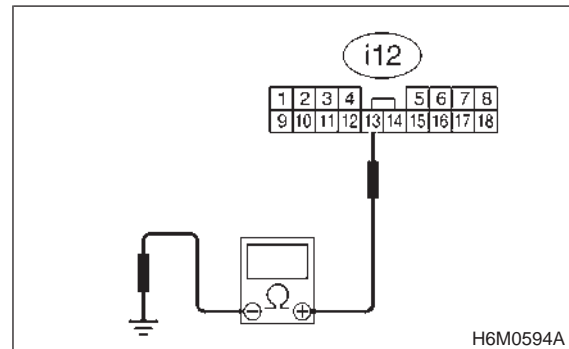
- Open circuit in harness between combination meter and battery.
- Poor contact in coupling connectors (i12) and combination meter connector. <Ref. to FOREWORD [T3C0].>

2A2 : CHECK GROUND CIRCUIT OF COMBINATION METER.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between combination meter connector and chassis ground.

Connector & terminal

(i12) No. 13 (+) — Chassis ground (-):



- CHECK** : Is the resistance less than 10 Ω?
- YES** : Go to step 2A3.
- NO** : Repair harness and connector.

2A3 : CHECK TRANSMISSION TYPE.

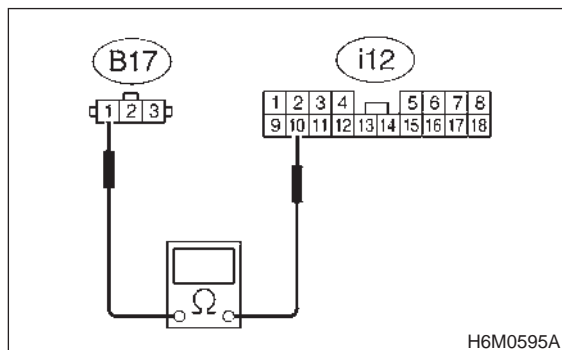
- CHECK** : Is the transmission type MT?
- YES** : Go to step 2A4.
- NO** : Go to step 2A9.

2A4 : CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND VEHICLE SPEED SENSOR 2.

- 1) Disconnect connector from vehicle speed sensor 2.
- 2) Measure resistance of harness connector between vehicle speed sensor 2 and combination meter.

Connector & terminal

(B17) No. 1 — (i12) No. 10:



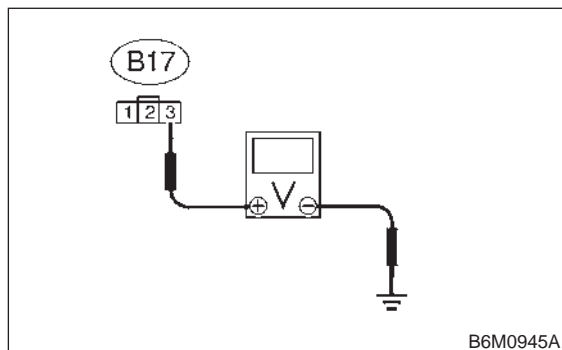
- CHECK** : **Is the resistance less than 10 Ω?**
- YES** : Go to step **2A5**.
- NO** : Repair wiring harness.

2A5 : CHECK HARNESS CONNECTOR BETWEEN BATTERY AND VEHICLE SPEED SENSOR 2.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between vehicle speed sensor 2 connector (B17) and chassis ground.

Connector & terminal

(B17) No. 3 (+) — Chassis ground (-):



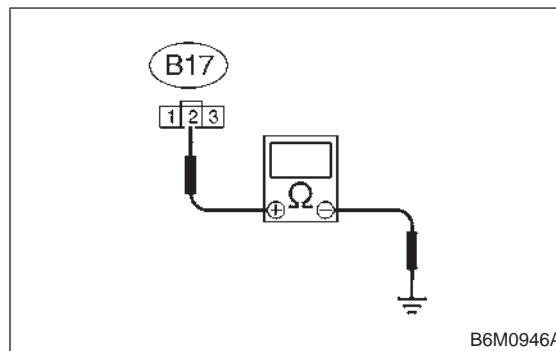
- CHECK** : **Is the voltage more than 10 V?**
- YES** : Go to step **2A6**.
- NO** : Repair harness connector between battery and vehicle speed sensor 2.

2A6 : CHECK HARNESS CONNECTOR BETWEEN VEHICLE SPEED SENSOR 2 AND ENGINE GROUND.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between vehicle speed sensor 2 connector (B17) and engine ground.

Connector & terminal

(B17) No. 2 (+) — Engine ground (-):



- CHECK** : **Is the resistance less than 10 Ω?**
- YES** : Go to step **2A7**.
- NO** : Repair harness connector between vehicle speed sensor 2 and engine ground.

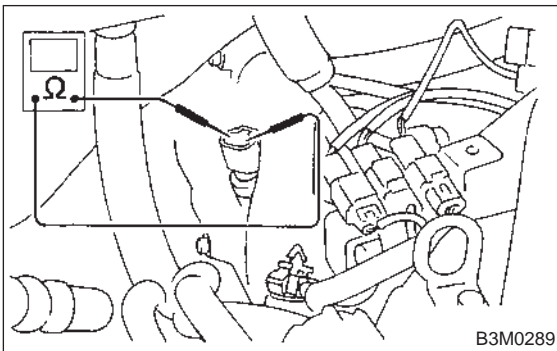
2A7 : CHECK VEHICLE SPEED SENSOR 2.**NOTE:**

- If resistance between terminals of vehicle speed sensor 2 is out of specification, the sensor may have a failure.
- If resistance is OK and voltage between terminals of vehicle speed sensor 2 is out of specification, mechanical trouble may be present between vehicle speed sensor 2 and speedometer shaft in transmission.

Measure resistance between terminals of vehicle speed sensor 2.

Terminals

No. 2 — No. 3:



- CHECK** : Is the resistance between 350 and 450 Ω ?
- YES** : Go to step 2A8.
- NO** : Replace vehicle speed sensor 2.

2A8 : CHECK VEHICLE SPEED SENSOR 2.

- 1) Connect connector to vehicle speed sensor 2.
- 2) Set the vehicle on free roller, or lift-up the vehicle and support with safety stands.

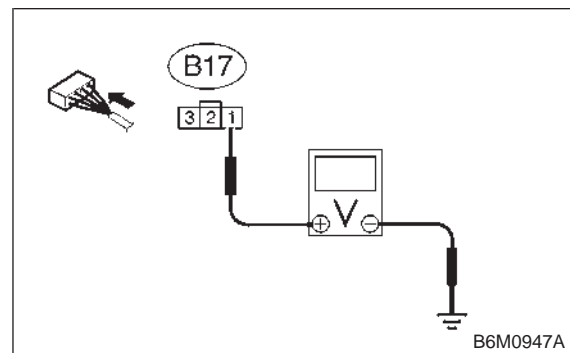
WARNING:

Be careful not to be caught up by the running wheels.

- 3) Drive the vehicle at speed greater than 20 km/h (12 MPH).
- 4) Measure voltage between vehicle speed sensor 2 connector (B17) and chassis ground.

Connector & terminal

(B17) No. 1 (+) — Chassis ground (-):



- CHECK** : Is the voltage more than 4 V?
- YES** : Repair or replace speedometer.
- NO** : Replace vehicle speed sensor 2.

2A9 : CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND AUTOMATIC TRANSMISSION CONTROL MODULE.

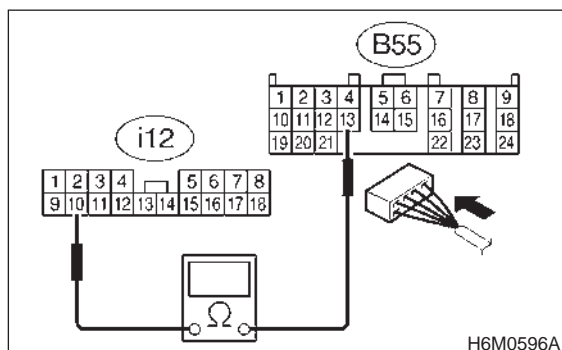
- 1) Disconnect connector from automatic transmission control module.
- 2) Measure resistance between combination meter connector (i12) and automatic transmission control module connector (B55).

CAUTION:

To measure the voltage and/or resistance, use a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in).

Connector & terminal

(i12) No. 10 — (B55) No. 13:



CHECK : Is the resistance less than 10 Ω ?

YES : Go to step 2A10.

NO : Repair harness connector between combination meter and automatic transmission control module.

2A10 : CHECK AUTOMATIC TRANSMISSION CONTROL MODULE.

- 1) Connect connector to automatic transmission control module.
- 2) Set the vehicle on free roller, or lift-up the vehicle and support with safety stands.

WARNING:

Be careful not to be caught by the running wheels.

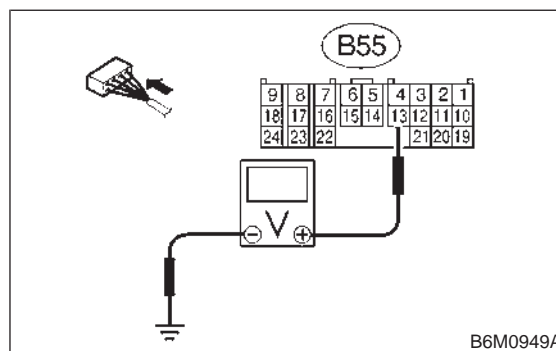
- 3) Drive the vehicle faster than 20 km/h (12 MPH).
- 4) Measure voltage between automatic transmission control module connector (B55) and chassis ground.

CAUTION:

To measure the voltage and/or resistance, use a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in).

Connector & terminal

(B55) No. 13 (+) — Chassis ground (-):



CHECK : Is the voltage more than 4 V?

YES : Repair or replace speedometer.

NO : Replace automatic transmission control module. <Ref. to 3-2 [W22A0].>

WIRING DIAGRAM

6-3

	Page
D WIRING DIAGRAM	2
1. General Description.....	2
2. Basic Diagnostics Procedure	6
3. Working Precautions	8
4. How to Use Wiring Diagram	10
5. Wiring Diagram.....	12
6. Electrical Wiring Harness and Ground Point	67

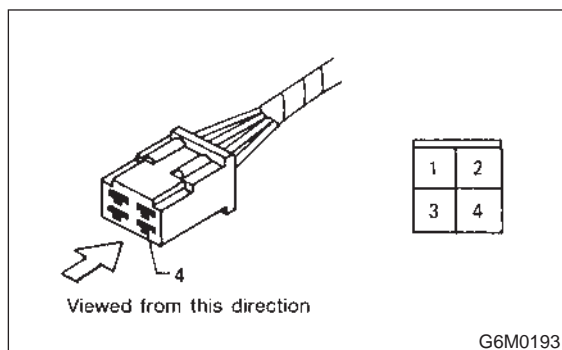
1. General Description

A: WIRING DIAGRAM

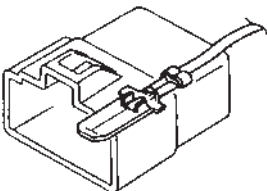
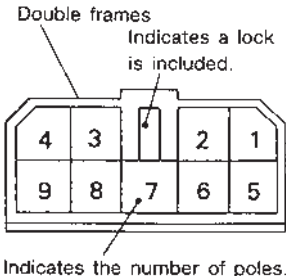
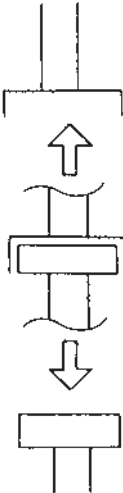
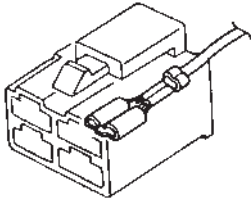
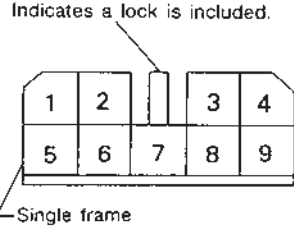
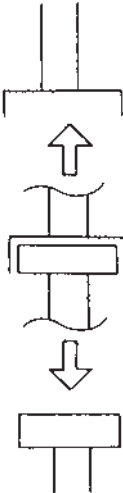
The wiring diagram of each system is illustrated so that you can understand the path through which the electric current flows from the battery.

Sketches and codes are used in the diagrams. They should read as follows:

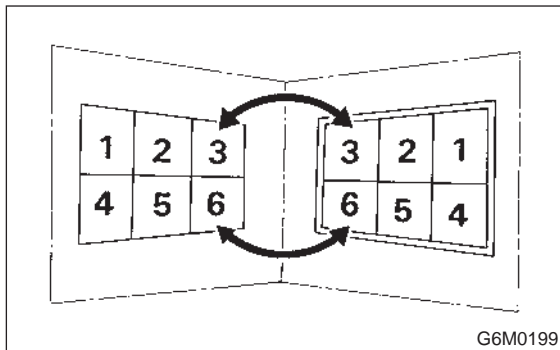
- Each connector and its terminal position are indicated by a sketch of the connector in a disconnected state which is viewed from the front.



- The number of poles or pins, presence of a lock, and pin number of each terminal are indicated in the sketch of each connector. In the sketch, the highest pole number refers to the number of poles which the connector has. For example, the sketch of the connector shown in figure indicates the connector has 9 poles.

Connector used in vehicle	Connector shown in wiring diagram		
	Sketch	Symbol	Number of poles
 G6M0194	 G6M0196	 G6M0198	<p>Numbered in order from upper right to lower left.</p>
 G6M0195	 G6M0197	 G6M0198	<p>Numbered in order from upper left to lower right.</p>

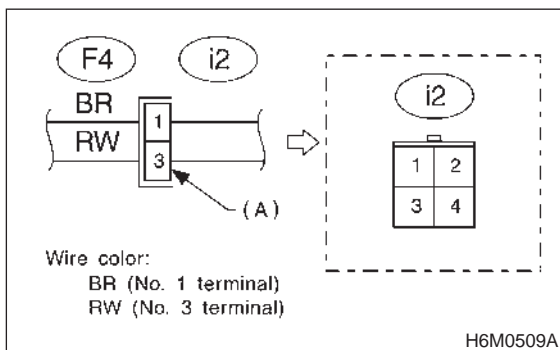
- When one set of connectors is viewed from the front side, the pole numbers of one connector are symmetrical to those of the other. When these two connectors are connected as a unit, the poles which have the same number are joined.



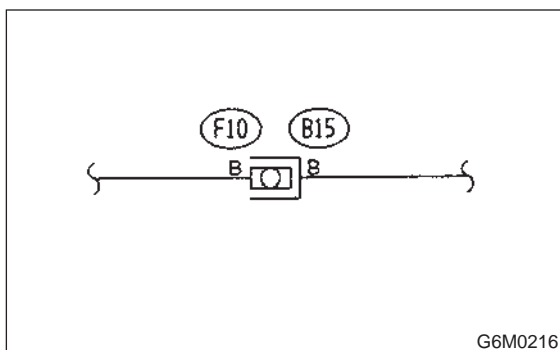
- Electrical wiring harness:
The connectors are numbered along with the number of poles, external colors, and mating connections in the accompanying list.
- The sketch of each connector in the wiring diagram usually shows the (A) side of the connector. The relationship between the wire color, terminal number and connector is described in figure.

NOTE:

A wire which runs in one direction from a connector terminal sometimes may have a different color from that which runs in the other direction from that terminal.

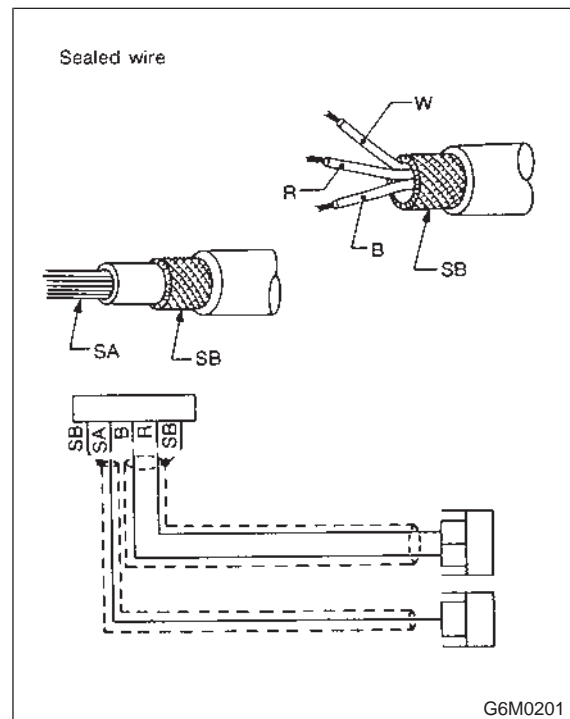


- In wiring diagram, connectors which have no terminal number refer to one-pole types. Sketches of these connectors are omitted intentionally.



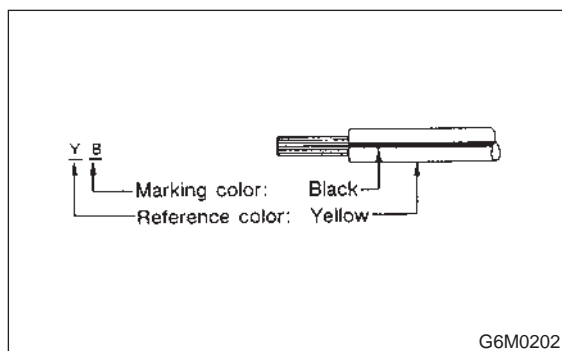
- The following color codes are used to indicate the colors of the wires used.

Color code	Color
L	Blue
B	Black
Y	Yellow
G	Green
R	Red
W	White
Br	Brown
Lg	Light green
Gr	Gray
P	Pink
Or	Orange
Lb	Light Blue
V	Violet
SA	Sealed (Inner)
SB	Sealed (Outer)



1. General Description

- The wire color code, which consists of two letters (or three letters including Br or Lg), indicates the standard color (base color of the wire covering) by its first letter and the stripe marking by its second letter.



- The table lists the nominal sectional areas and allowable currents of the wires.

CAUTION:

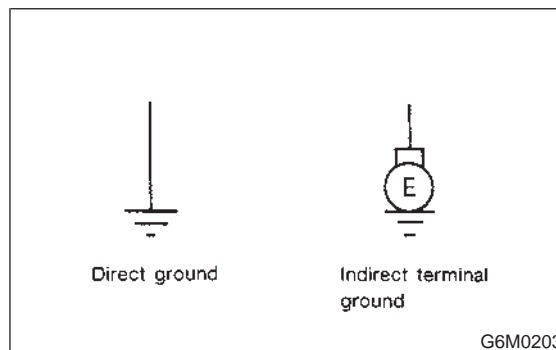
- When replacing or repairing a wire, be sure to use the same size and type of the wire which was originally used.**

NOTE:

- The allowable current in the table indicates the tolerable amperage of each wire at an ambient temperature of 40°C (104°F).
- The allowable current changes with ambient temperature. Also, it changes if a bundle of more than two wires is used.

Nominal sectional area mm ²	No. of strands/ strand diameter	Outside diameter of finished wiring mm	Allowable current Amps/40°C
0.3	7/0.26	1.8	7
0.5	7/0.32	2.2 (or 2.0)	12
0.75	30/0.18	2.6 (or 2.4)	16
0.85	11/0.32	2.4 (or 2.2)	16
1.25	16/0.32	2.7 (or 2.5)	21
2	26/0.32	3.1 (or 2.9)	28
3	41/0.32	3.8 (or 3.6)	38
5	65/0.32	4.6 (or 4.4)	51
8	50/0.45	5.5	67

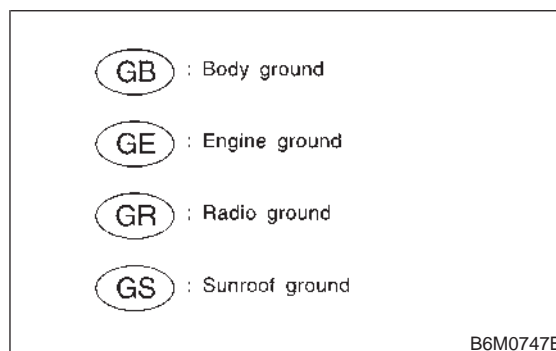
- Each unit is directly grounded to the body or indirectly grounds through a harness ground terminal. Different symbols are used in the wiring diagram to identify the two grounding systems.



- The ground points shown in the wiring diagram refer to the following:

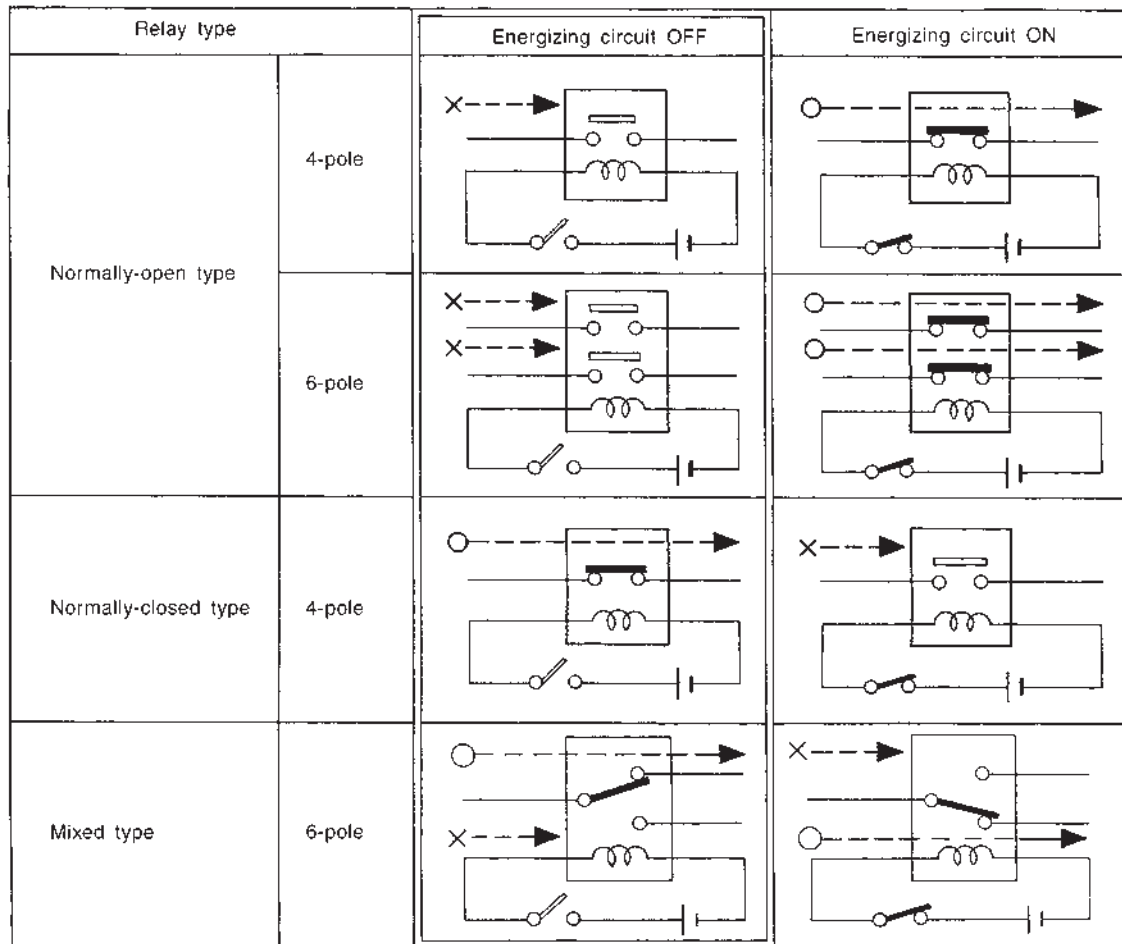
NOTE:

All wiring harnesses are provided with a ground point which should be securely connected.



- Relays are classified as normally-open or normally-closed. The normally-closed relay has one or more contacts.

The wiring diagram shows the relay mode when the energizing circuit is OFF.



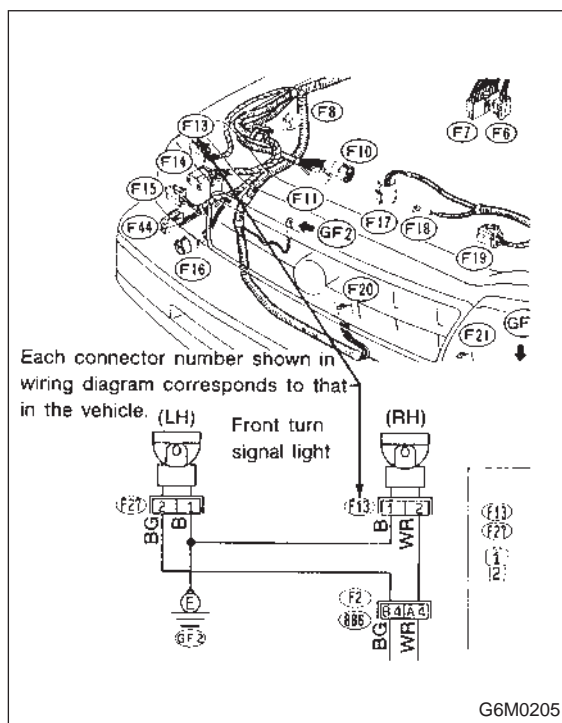
Key to symbols:

- —▶ : Current flows.
 × —▶ : Current does not flow.

B6M0748

- Each connector number shown in the wiring diagram corresponds to that in the wiring harness. The location of each connector in the actual vehicle is determined by reading the first character of the connector (for example, a "F" for F8, "i" for i16, etc.) and the type of wiring harness. The first character of each connector number refers to the area or system of the vehicle.

Symbol	Wiring harness and cord
F	Front wiring harness
B	Bulkhead wiring harness
E	Engine wiring harness
T	Transmission cord, Rear oxygen sensor cord
D	Door cord LH & RH, Rear door cord LH & RH, Rear gate cord, Rear gate lock adapter cord
i	Instrument panel center harness Instrument panel meter harness
R	Rear wiring harness, Rear defogger cord (Ground), Fuel tank cord, Roof cord



2. Basic Diagnostics Procedure

A: BASIC PROCEDURE

1. GENERAL

The most important purpose of diagnostics is to determine which part is malfunctioning quickly, to save time and labor.

2. IDENTIFICATION OF TROUBLE SYMPTOM

Determine what the problem is based on the symptom.

3. PROBABLE CAUSE OF TROUBLE

Look at the wiring diagram and check the system's circuit. Then check the switch, relay, fuse, ground, etc.

4. LOCATION AND REPAIR OF TROUBLE

- Using the diagnostics narrow down the causes.
- If necessary, use a voltmeter, ohmmeter, etc.
- Before replacing certain component parts (switch, relay, etc.), check the power supply, ground, for open wiring harness, poor connectors, etc. If no problems are encountered, check the component parts.

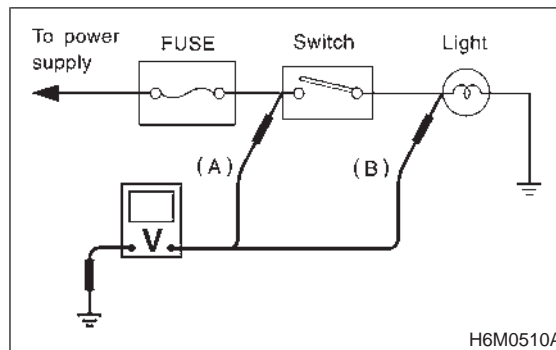
5. CONFIRMATION OF SYSTEM OPERATION

After repairing, ensure that the system operates properly.

B: INSPECTION

1. VOLTAGE MEASUREMENT

- Using a voltmeter, connect the negative lead to a good ground point or negative battery terminal and the positive lead to the connector or component terminal.
- Contact the positive probe of the voltmeter on connector (A). The voltmeter will indicate a voltage.
- Shift the positive probe to connector (B). The voltmeter will indicate no voltage.



4) With test set-up held as it is, turn switch ON. The voltmeter will indicate a voltage and, at the same time, the light will come on.

5) The circuit is in good order. If a problem such as a lamp failing to light occurs, use the procedures outlined above to track down the malfunction.

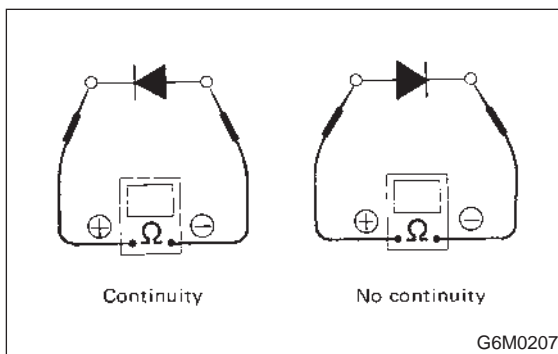
2. CIRCUIT CONTINUITY CHECKS

1) Disconnect the battery terminal or connector so there is no voltage between the check points. Contact the two leads of an ohmmeter to each of the check points.

If the circuit has diodes, reverse the two leads and check again.

2) Use an ohmmeter to check for diode continuity. When contacting the negative lead to the diode positive side and the positive lead to the negative side, there should be continuity.

When contacting the two leads in reverse, there should be no continuity.



3) Symbol “○—○” indicates that continuity exists between two points or terminals. For example, when a switch position is “3”, continuity exists among terminals 1, 3 and 6, as shown in table below.

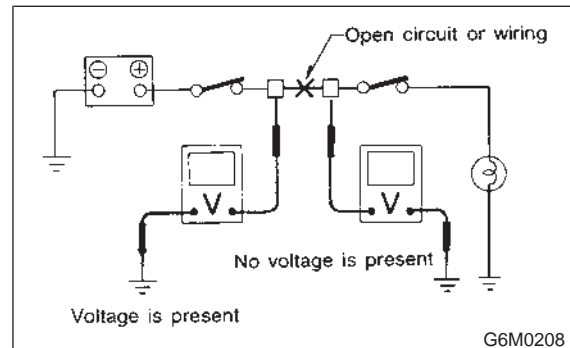
Terminal	1	2	3	4	5	6
Switch Position						
OFF						
1	○—○				○—○	
2	○—○			○—○		○—○
3	○—○		○—○			○—○
4	○—○	○—○				○—○

B6M0749

3. HOW TO DETERMINE AN OPEN CIRCUIT

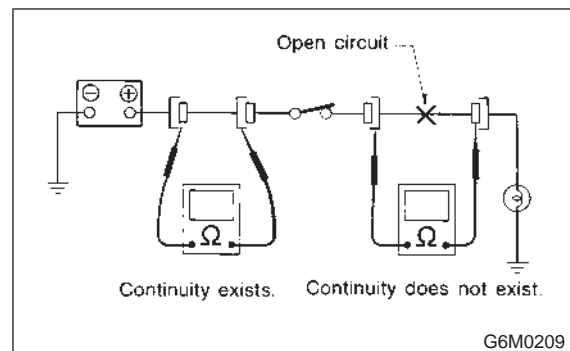
1) Voltmeter Method:

An open circuit is determined by measuring the voltage between respective connectors and ground using a voltmeter, starting with the connector closest to the power supply. The power supply must be turned ON so that current flows in the circuit. If voltage is not present between a particular connector and ground, the circuit between that connector and the previous connector is open.



2) Ohmmeter method:

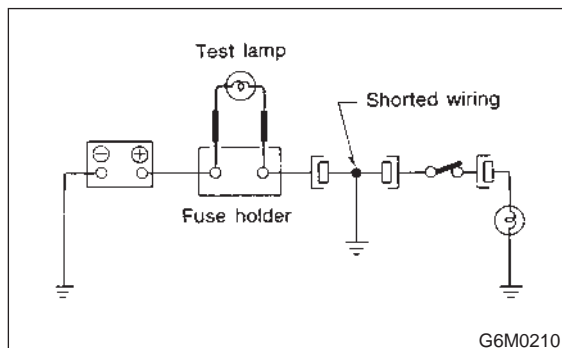
Disconnect all connectors affected, and check continuity in the wiring between adjacent connectors. When the ohmmeter indicates “infinite”, the wiring is open.



4. HOW TO DETERMINE A SHORTCIRCUIT

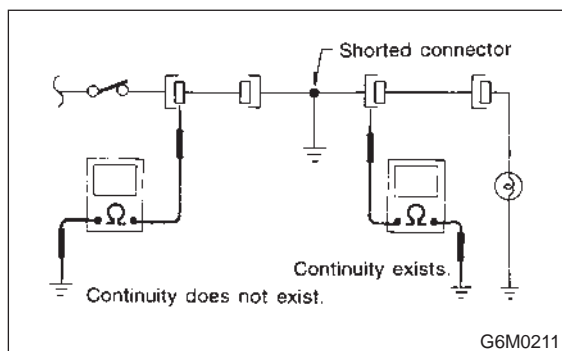
1) Test lamp method:

Connect a test lamp (rated at approximately 3 watts) in place of the blown fuse and allow current to flow through the circuit. Disconnect one connector at a time from the circuit, starting with the one located farthest from the power supply. If the test lamp goes out when a connector is disconnected, the wiring between that connection and the next connector (farther from the power supply) is shorted.



2) Ohmmeter method:

Disconnect all affected connectors, and check continuity between each connector and ground. When ohmmeter indicates continuity between a particular connector and ground, that connector is shorted.



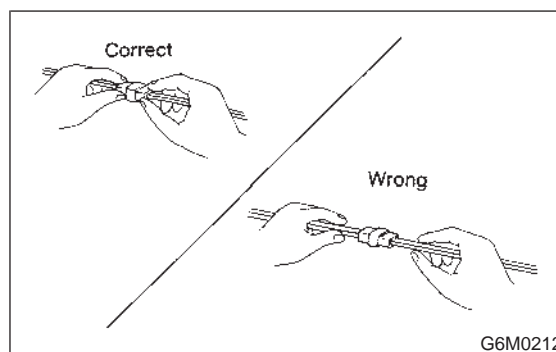
3. Working Precautions

A: PRECAUTIONS WHEN WORKING WITH THE PARTS MOUNTED ON THE VEHICLE

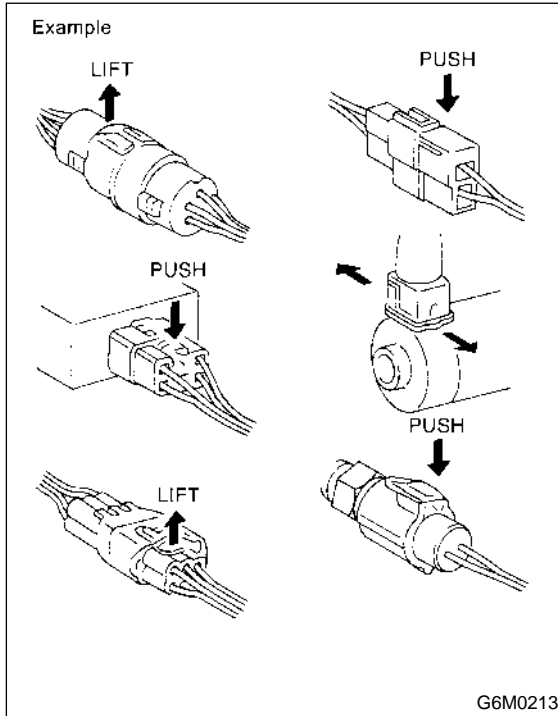
- 1) When working under a vehicle which is jacked-up, always be sure to use safety stands.
- 2) The parking brake must always be applied during working. Also, in automatic transmission vehicles, keep the select lever set to the P (Parking) range.
- 3) Be sure the workshop is properly ventilated when running the engine. Further, be careful not to touch the belt or fan while the engine is operating.
- 4) Be careful not to touch hot metal parts, especially the radiator and exhaust system immediately after the engine has been shut off.

B: PRECAUTIONS IN TROUBLE DIAGNOSIS AND REPAIR OF ELECTRIC PARTS

- 1) The battery cable must be disconnected from the battery's (-) terminal, and the ignition switch must be set to the OFF position, unless otherwise required by the diagnostics.
- 2) Securely fasten the wiring harness with clamps and slips so that the harness does not interfere with the body end parts or edges and bolts or screws.
- 3) When installing parts, be careful not to catch them on the wiring harness.
- 4) When disconnecting a connector, do not pull the wires, but pull while holding the connector body.

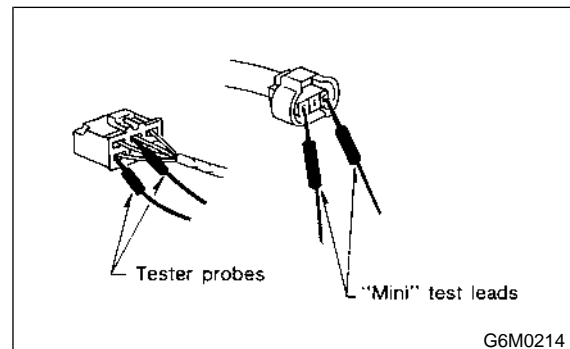


5) Some connectors are provided with a lock. One type of such a connector is disconnected by pushing the lock, and the other, by moving the lock up. In either type the lock shape must be identified before attempting to disconnect the connector. To connect, insert the connector until it snaps and confirm that it is tightly connected.



6) When checking continuity between connector terminals, or measuring voltage across the terminal and ground, always contact tester probe(s) on terminals from the wiring connection side. If the probe is too thick to gain access to the terminal, use "mini" test leads.

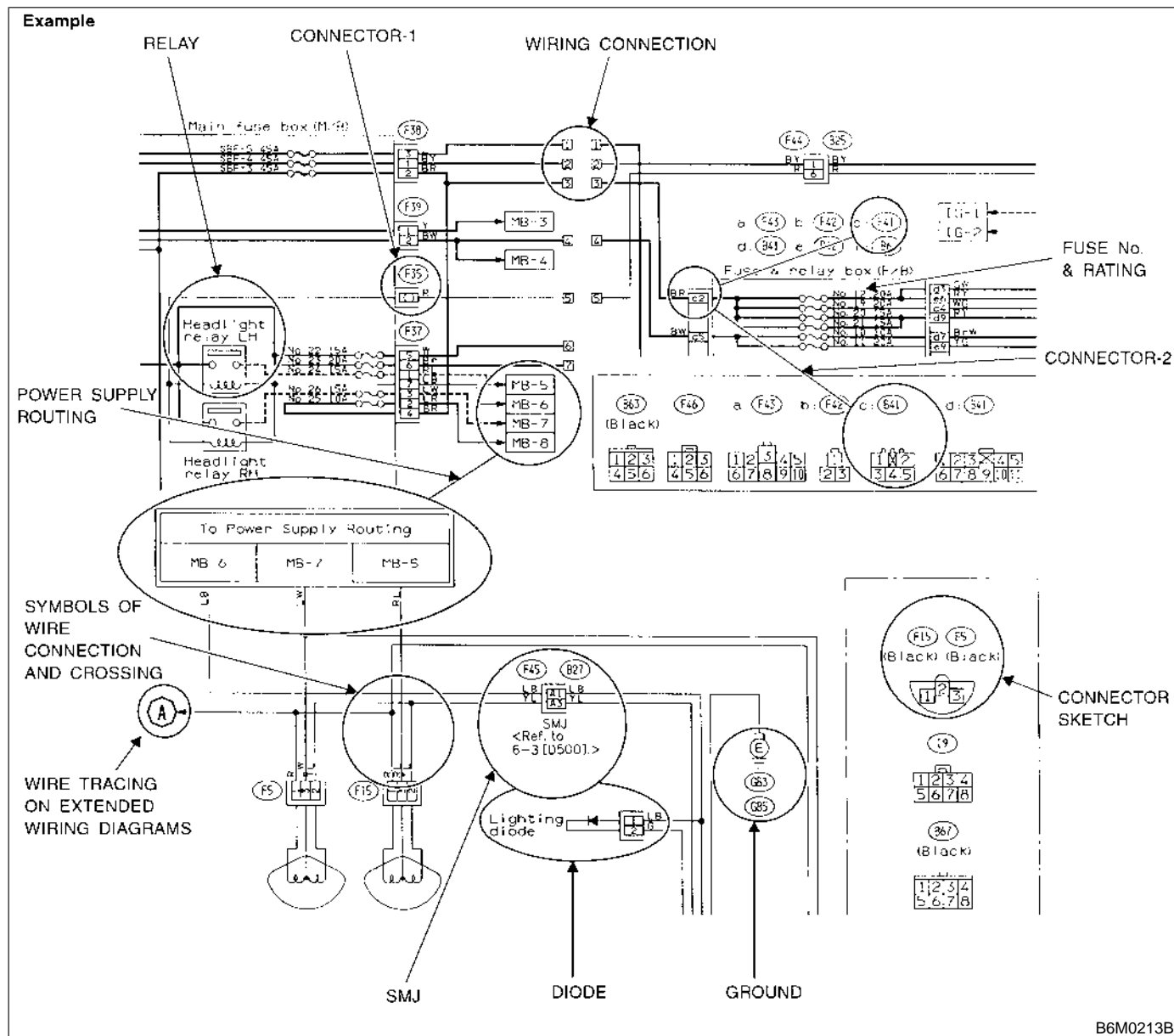
To check water-proof connectors (which are not accessible from the wiring side), contact test probes on the terminal side being careful not to bend or damage the terminals.



7) Sensors, relays, electrical unit, etc., are sensitive to strong impacts.

Handle them with care so that they are not dropped or mishandled.

4. How to Use Wiring Diagram



A: RELAY

A symbol used to indicate a relay.

B: CONNECTOR-1

The sketch of the connector indicates the one- pole types.

C: WIRING CONNECTION

Some wiring diagrams are indicated in foldouts for convenience. Wiring destinations are indicated where necessary by corresponding symbols (as when two pages are needed for clear indication).

D: FUSE No. & RATING

The “FUSE No. & RATING” corresponds with that used in the fuse box (main fuse box, fuse and joint box).

E: CONNECTOR-2

- Each connector is indicated by a symbol.
- Each terminal number is indicated in the corresponding wiring diagram in an abbreviated form.
- For example, terminal number “C2” refers to No. 2 terminal of connector (C:F41) shown in the connector sketch.

F: CONNECTOR SKETCH

- Each connector sketch clearly identifies the shape and color of a connector as well as terminal locations. Non-colored connectors are indicated in natural color.
- When more than two types of connector number are indicated in a connector sketch, it means that the same type connectors are used.

G: GROUND

Each grounding point can be located easily by referring to the corresponding wiring harness.

H: DIODE

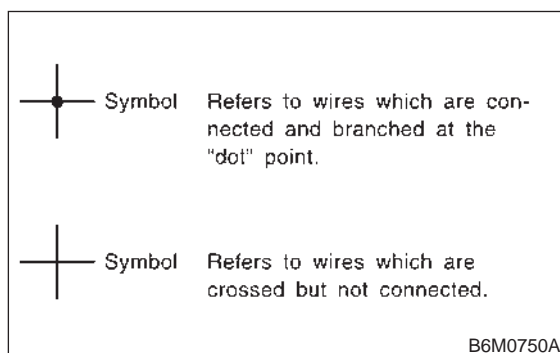
A symbol is used to indicate a diode.

I: WIRE TRACING ON EXTENDED WIRING DIAGRAMS

For a wiring diagram extending over at least two pages, a symbol (consisting of the same characters with arrows), facilitates wire tracing from one page to the next.

A \longleftrightarrow A, B \longleftrightarrow B

J: SYMBOLS OF WIRE CONNECTION AND CROSSING



K: POWER SUPPLY ROUTING

A symbol is used to indicate the power supply in each wiring diagram.

"MB-5", "MB-6", etc., which are used as power-supply symbols throughout the text, correspond with those shown in the POWER SUPPLY ROUTING in the wiring diagram.

Accordingly, using the POWER SUPPLY ROUTING and wiring diagrams permits service personnel to understand the entire electrical arrangement of a system.

L: SYMBOLS AND ABBREVIATIONS

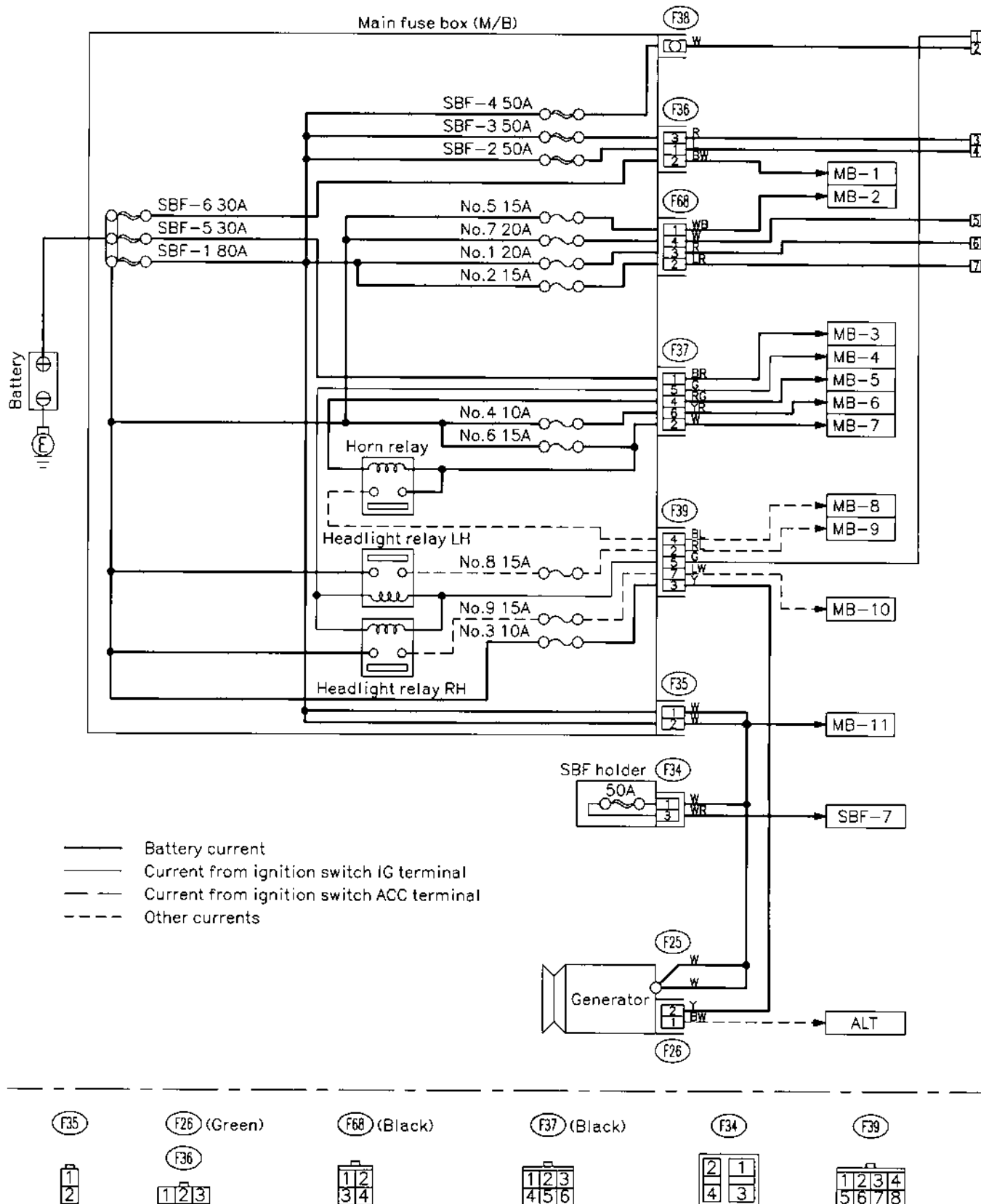
A number of symbols and abbreviations are used in each wiring diagram to easily identify parts or circuits.

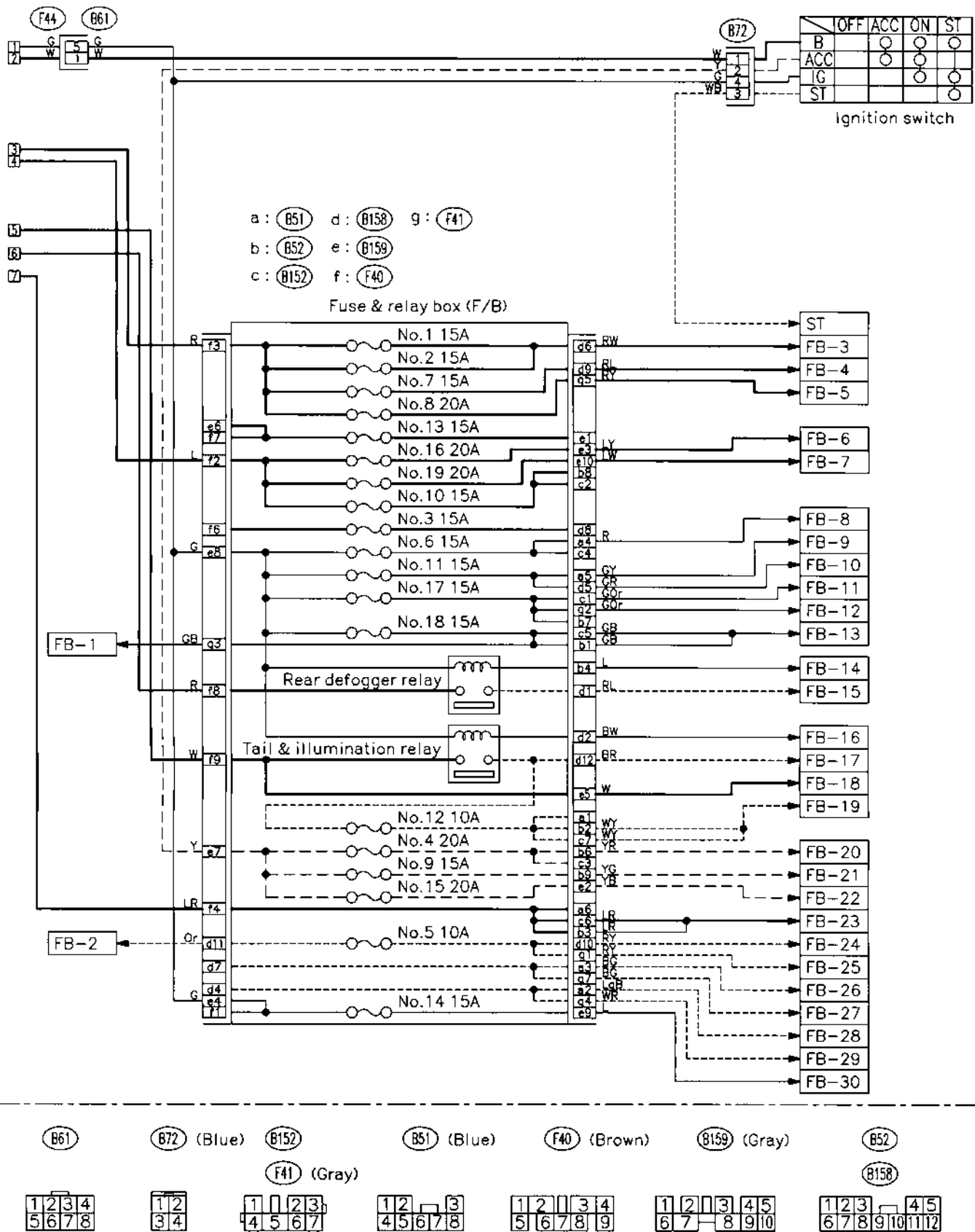
M: ABBREVIATION LIST

Abbr.	Full name
ABS	Antilock Brake System
ACC	Accessory
A/C	Air Conditioning
AD	Auto Down
AT	Automatic Transmission
AU	Auto Up
+B	Battery
DN	Down
E	Ground
F/B	Fuse & Joint Box
FL1.5	Fusible link 1.5 mm ²
IG	Ignition
Illumi.	Illumination
LH	Left Hand
Lo	Low
M	Motor
M/B	Main Fuse Box
MG	Magnet
Mi	Middle
OP	Optional Parts
PASS	Passing
RH	Right Hand
SBF	Slow Blow Fuse
ST	Starter
SW	Switch
UP	Up
WASH	Washer

5. Wiring Diagram

A: POWER SUPPLY ROUTING

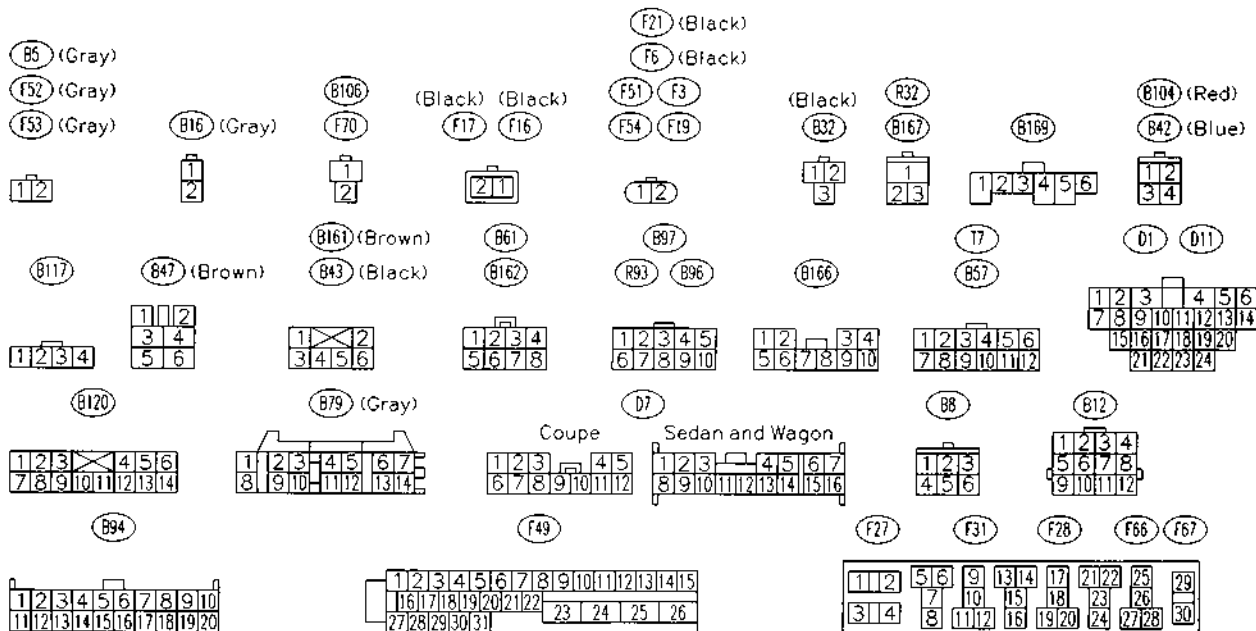
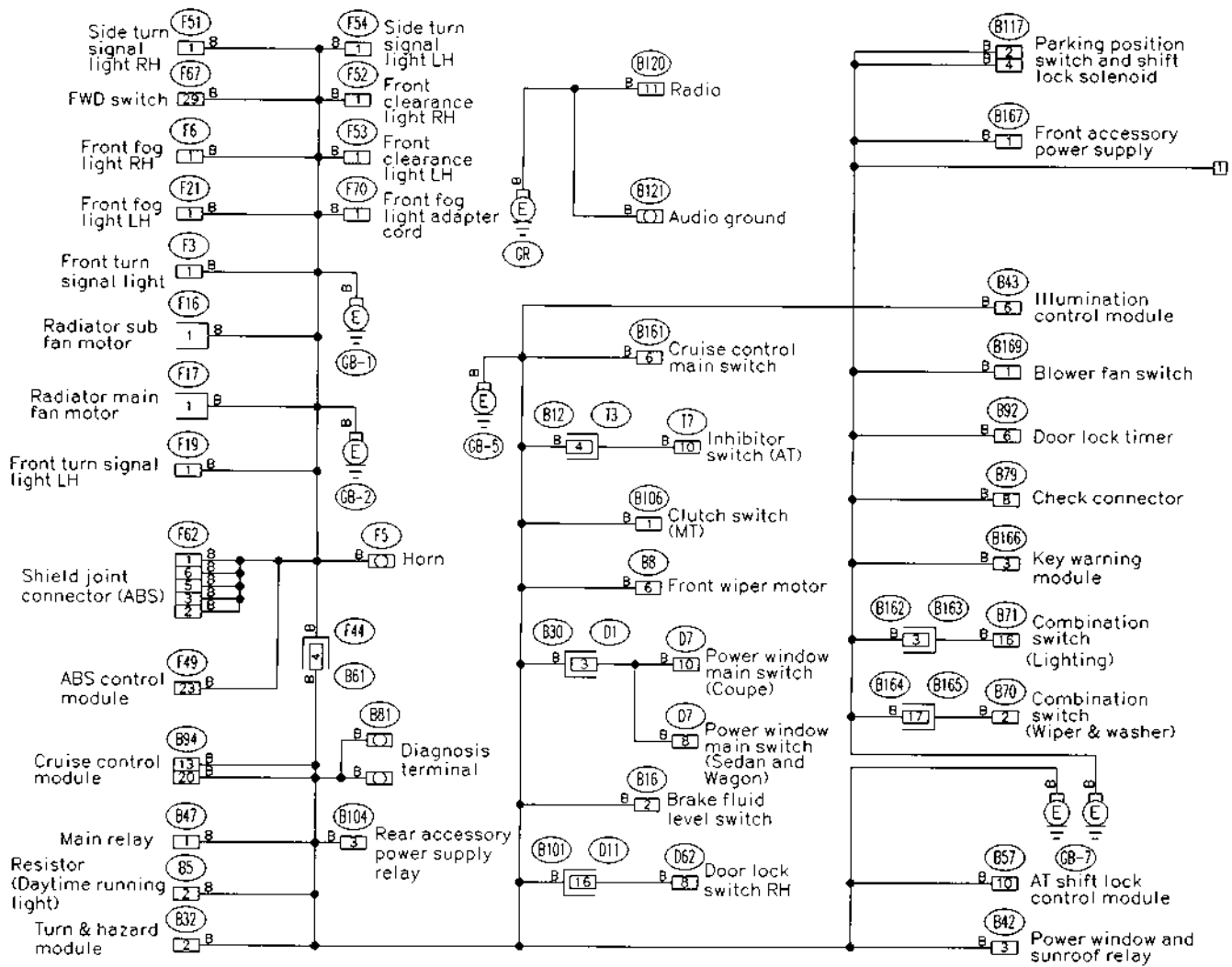


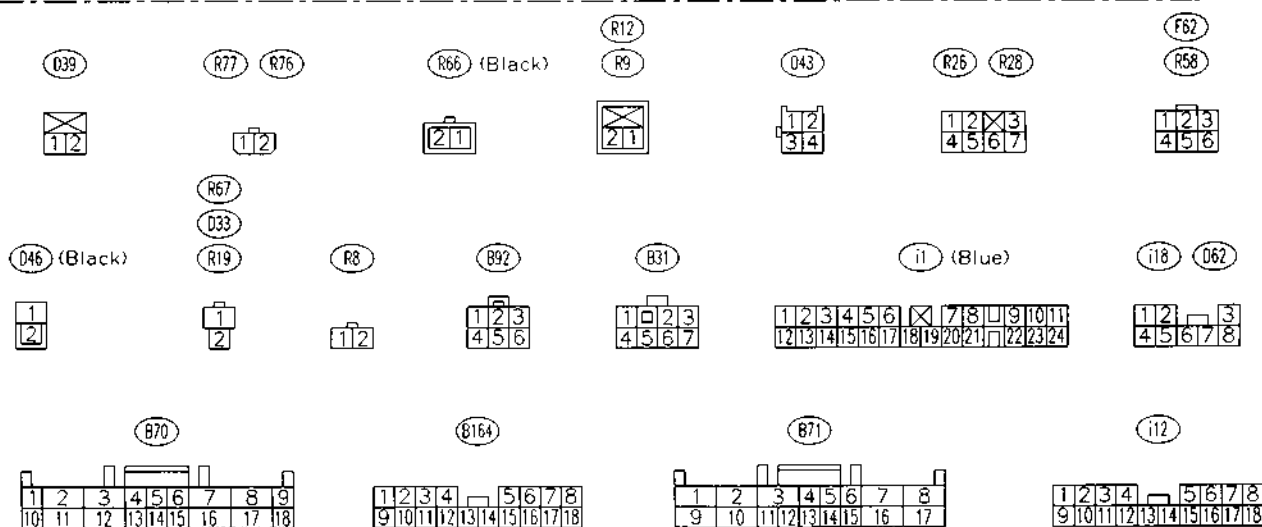
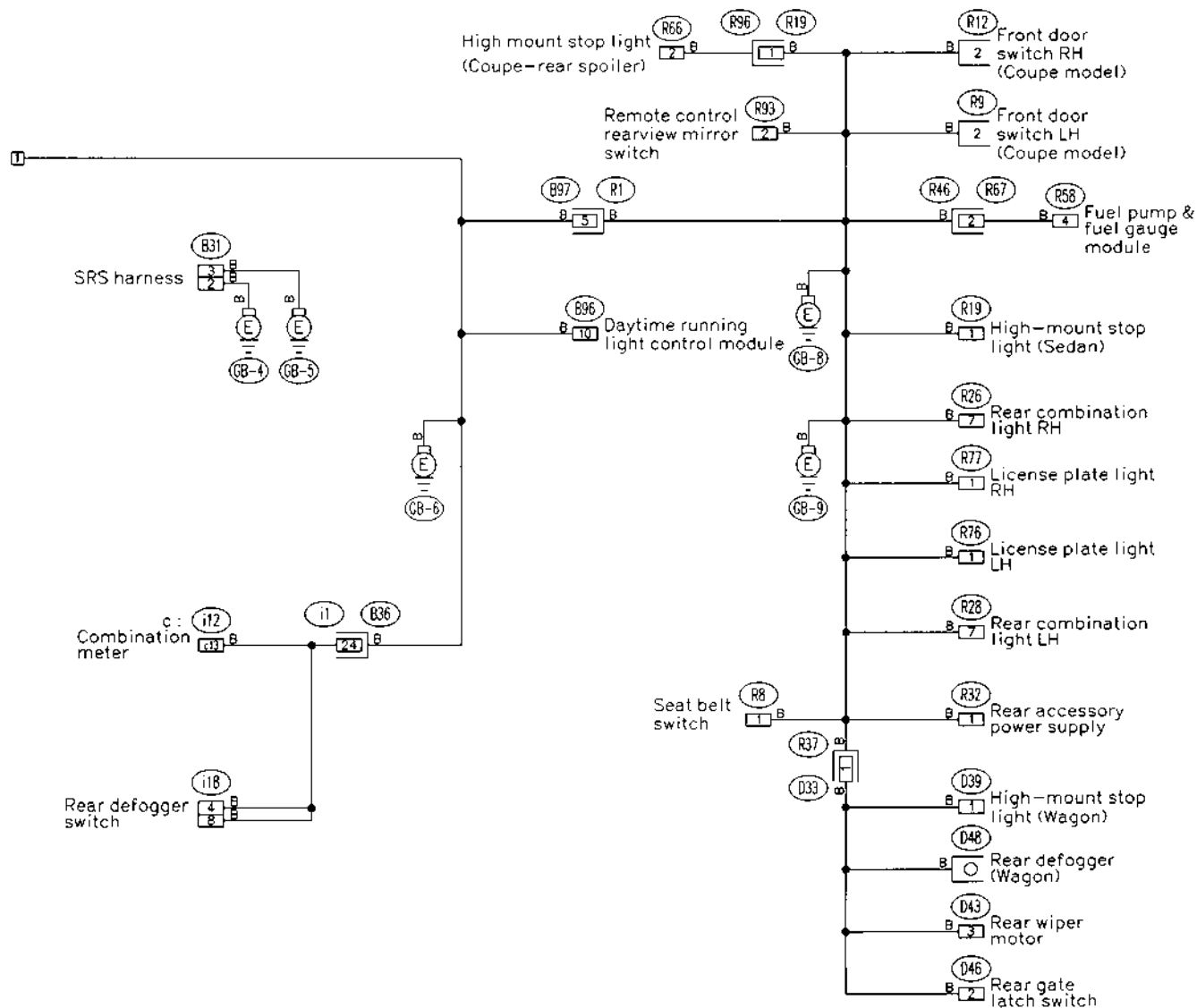


No.	Load
MB-1	Power window and sunroof circuit breaker
MB-2	Door lock timer
MB-3	Data link connector Engine control module Fuel pump relay Main relay
MB-4	Daytime running light control module Diode (Daytime running light) Lighting switch
MB-5	Cruise control sub switch Horn switch
MB-6	Transmission control module
MB-7	AT shift lock control module Hazard switch Key warning switch
MB-8	Horn
MB-9	Headlight LH
MB-10	Combination meter Front fog light relay Front fog light switch Headlight RH
MB-11	A/C relay holder
SBF-7	ABS control module
ALT	Combination meter Daytime running light control module
ST	Engine control module (AT) Inhibitor switch (AT) Starter interlock relay (MT)
FB-1	Main fan relay
FB-2	Parking switch
FB-3	Blower motor relay
FB-4	Front fog light relay
FB-5	ABS control module
FB-6	Stop light switch
FB-7	Rear accessory power supply relay
FB-8	Airbag control module
FB-9	Airbag control module
FB-10	Engine control module Fuel pump relay Ignition coil Transmission control module
FB-11	Blower motor relay Mode control panel Rear defogger switch
FB-12	A/C relay Sub fan relay Thermal protector

No.	Load
FB-13	Back-up light switch (MT) Check connector Combination meter Daytime running light control module Daytime running light hi-beam relay Daytime running light relay Hazard switch Inhibitor switch (AT) Key warning module Power window and sunroof relay Vehicle speed sensor 2 (MT)
FB-14	Rear defogger switch
FB-15	Rear defogger Rear defogger switch
FB-16	Lighting switch
FB-17	Parking switch
FB-18	Parking switch
FB-19	Clock Illumination control module Illumination light
FB-20	AT shift lock control module Front accessory power supply Remote control rearview mirror switch Rear accessory power supply relay
FB-21	Radio
FB-22	Front washer motor Front wiper motor Front wiper & washer switch Rear washer motor Rear wiper motor Rear wiper relay
FB-23	Combination meter Radio Room light Spot light Trunk room light
FB-24	License plate light LH License plate light RH Tail light LH Tail light RH
FB-25	Front clearance light LH Front clearance light RH
FB-26	Combination meter Hazard switch Rear turn signal light LH Turn signal switch
FB-27	Front turn signal light LH Side turn signal light LH
FB-28	Combination meter Hazard switch Rear turn signal light RH Turn signal switch
FB-29	Front turn signal light RH Side turn signal light RH
FB-30	ABS control module AT shift lock control module Cruise control main switch Cruise control module

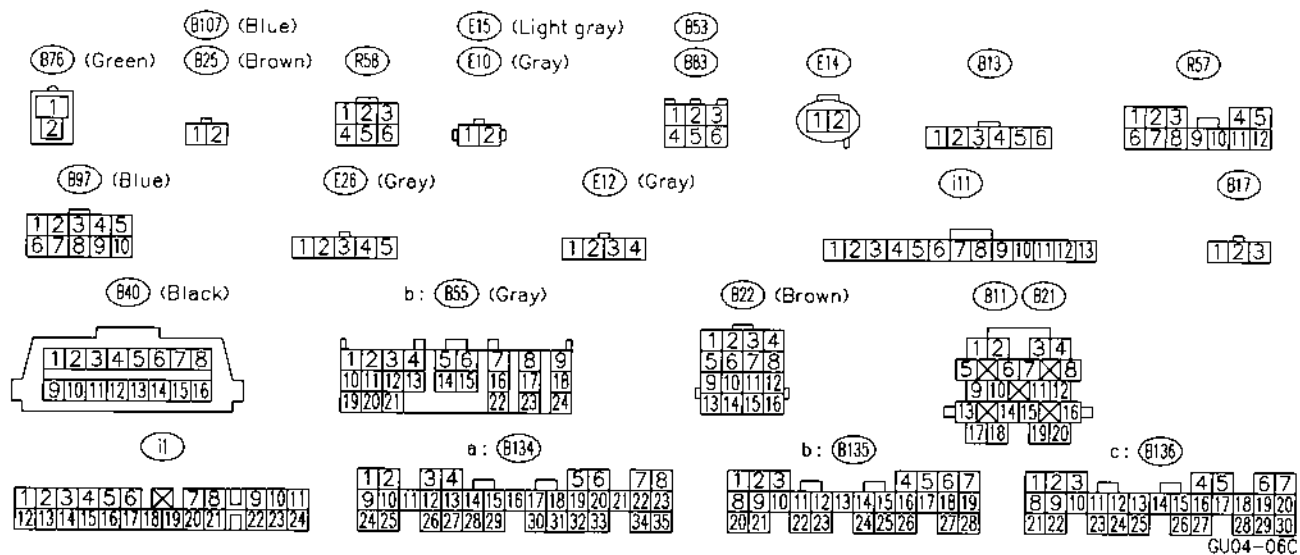
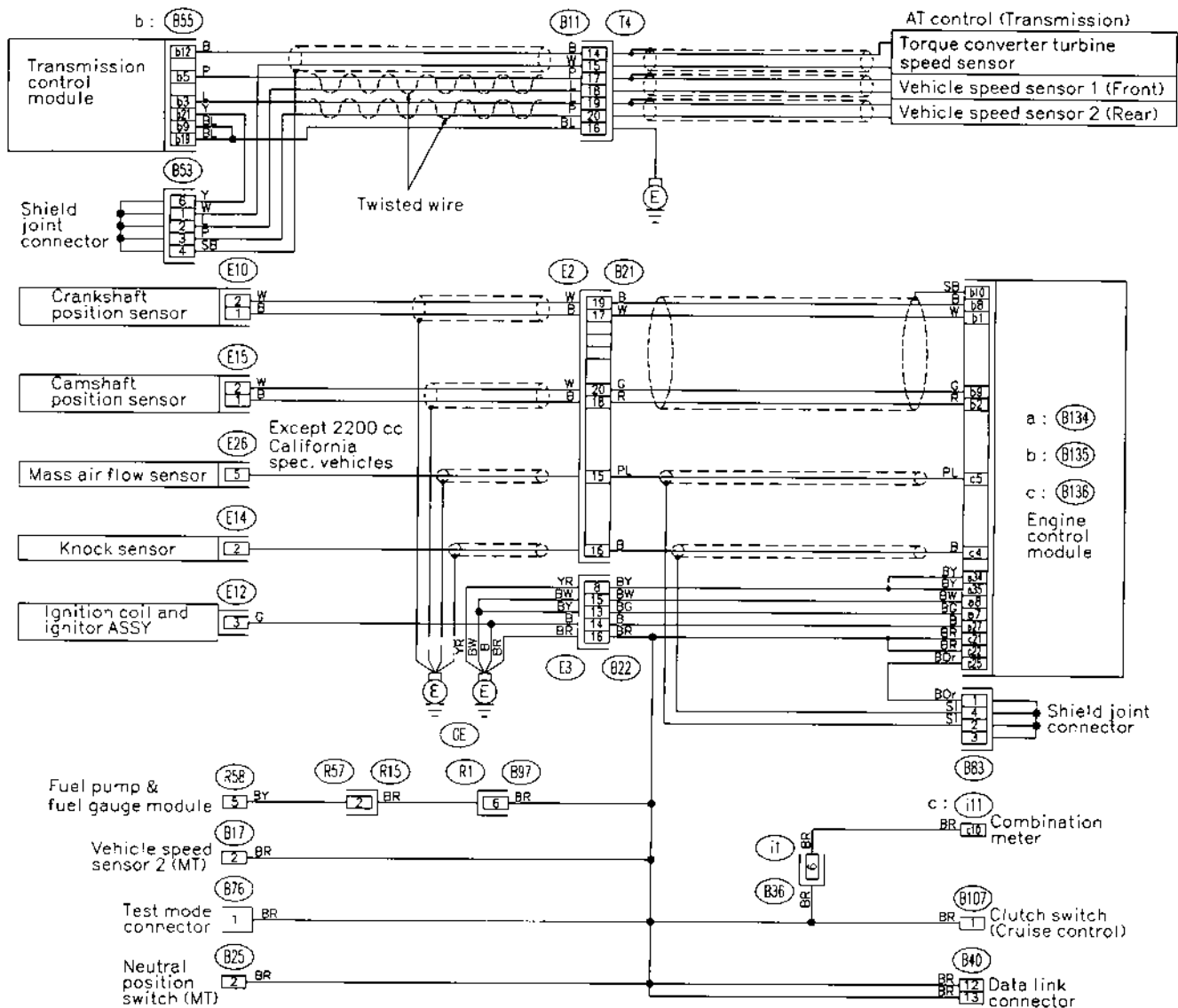
B: GROUND DISTRIBUTION



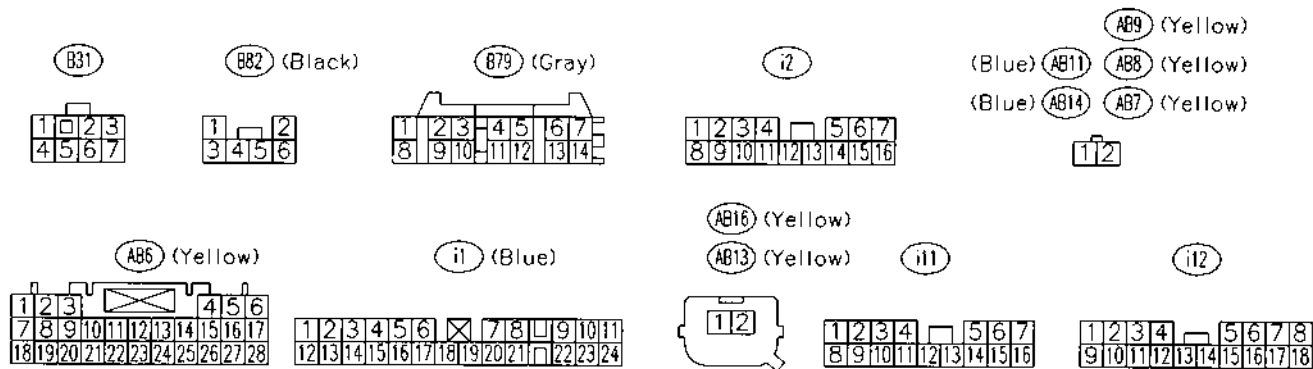
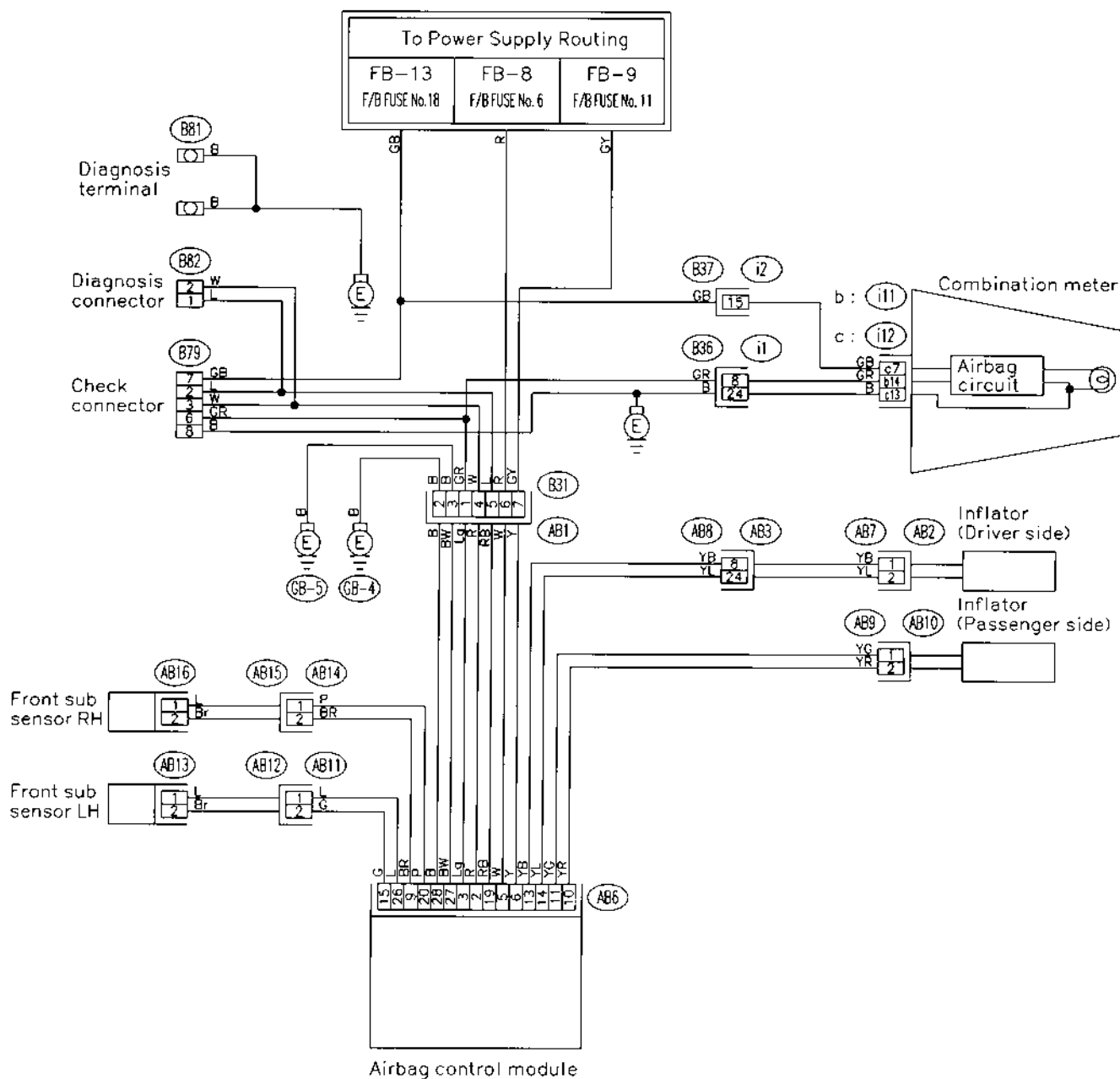


[D5B0] 6-3
5. Wiring Diagram

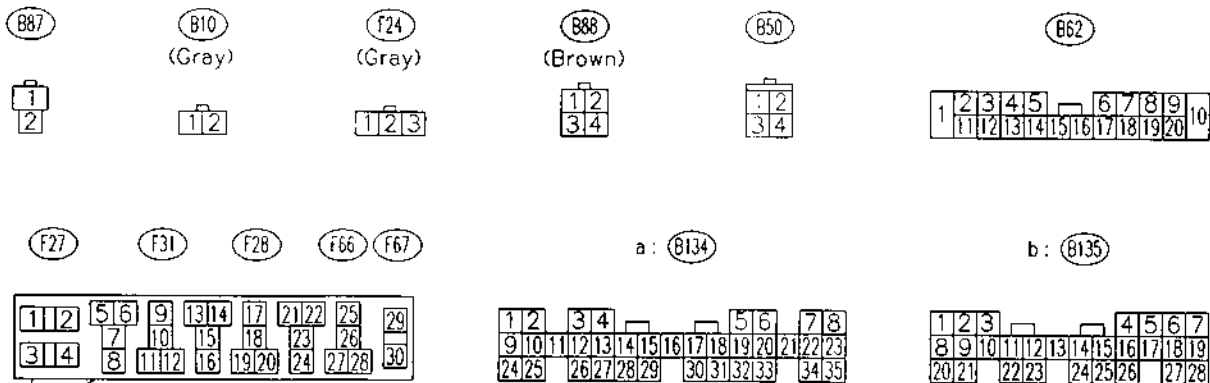
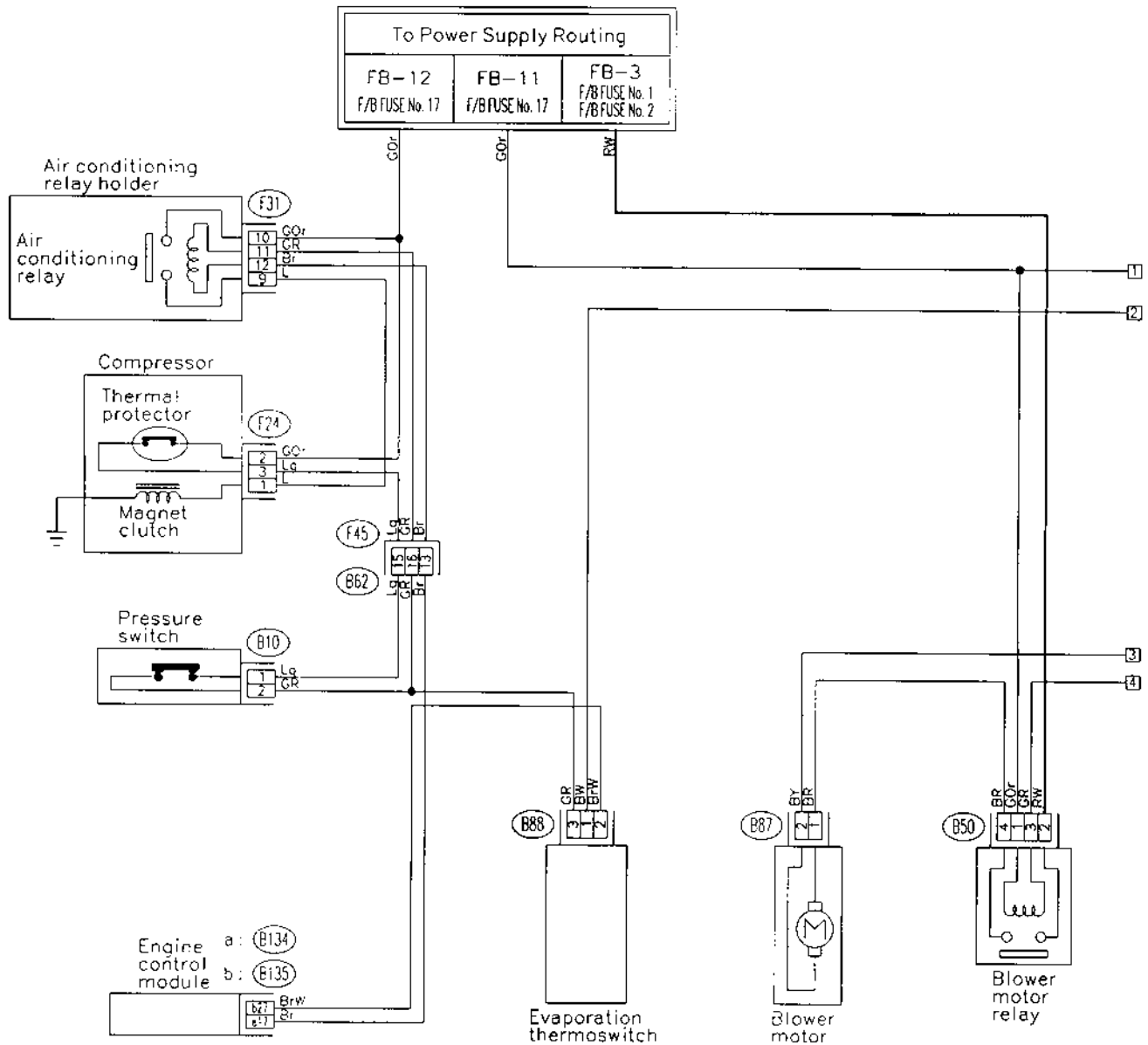
5. Wiring Diagram



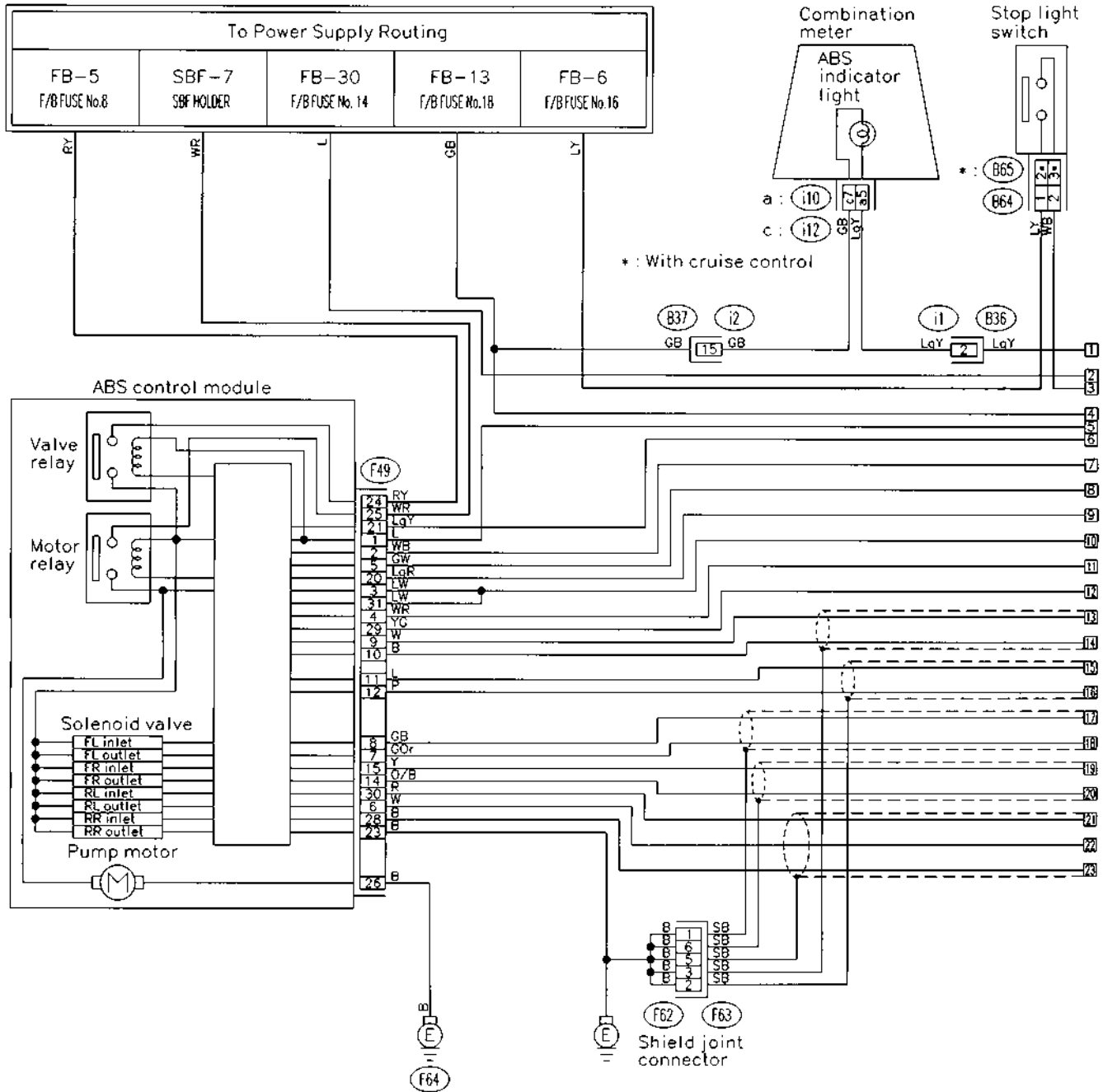
C: AIRBAG SYSTEM



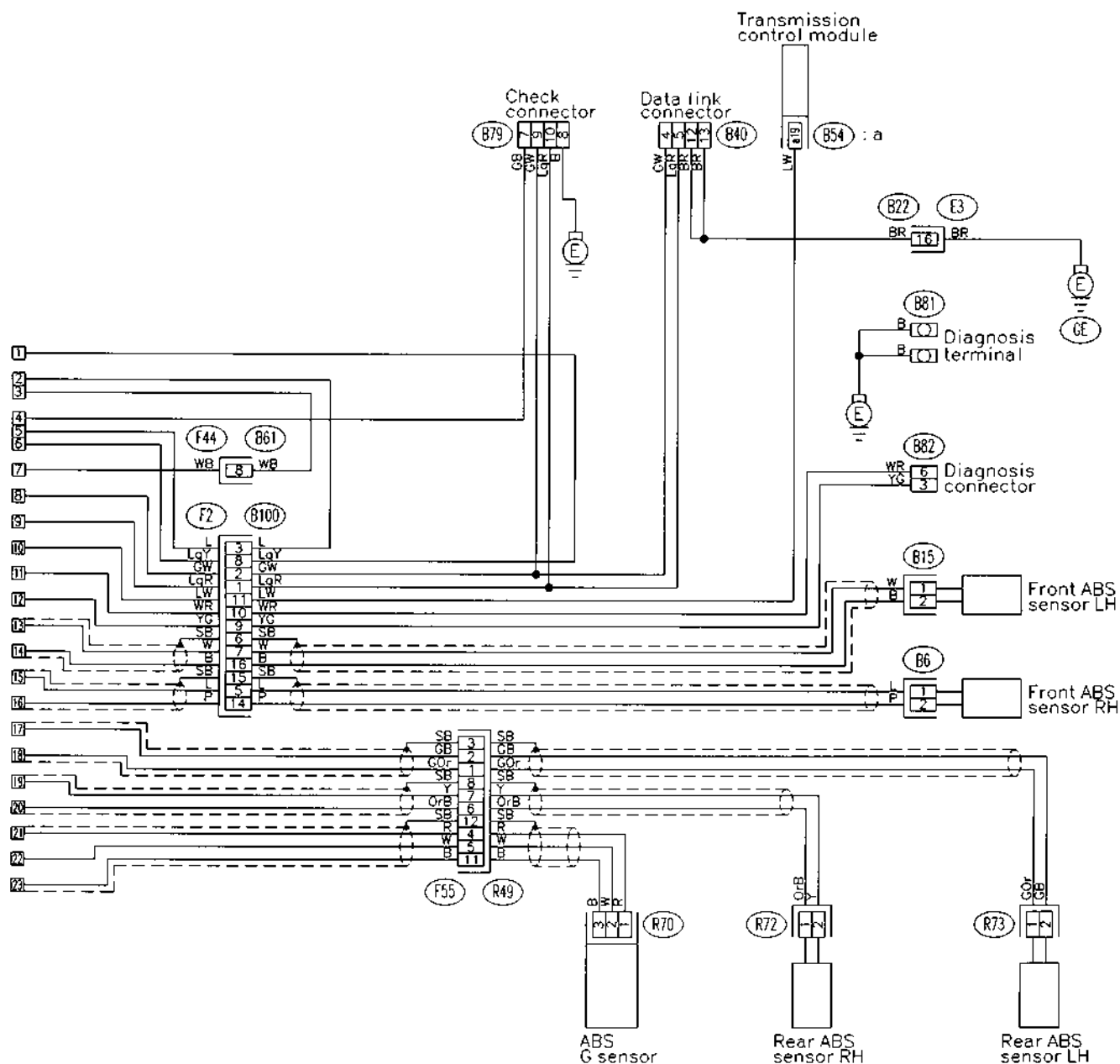
D: AIR CONDITIONING SYSTEM



E: ANTI-LOCK BRAKE SYSTEM



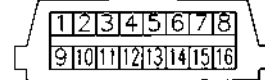
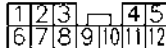
GU82-06A



(Gray) (B6) (B15) (Gray)

(Gray) (R73) (R72) (Gray) (R70) (Black) (B82) (Black) (F55)

(B40) (Black)

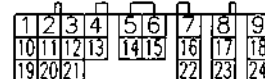
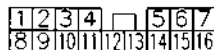
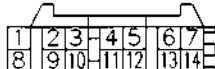
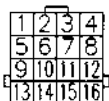


(B22) (Brown)

(B79) (Gray)

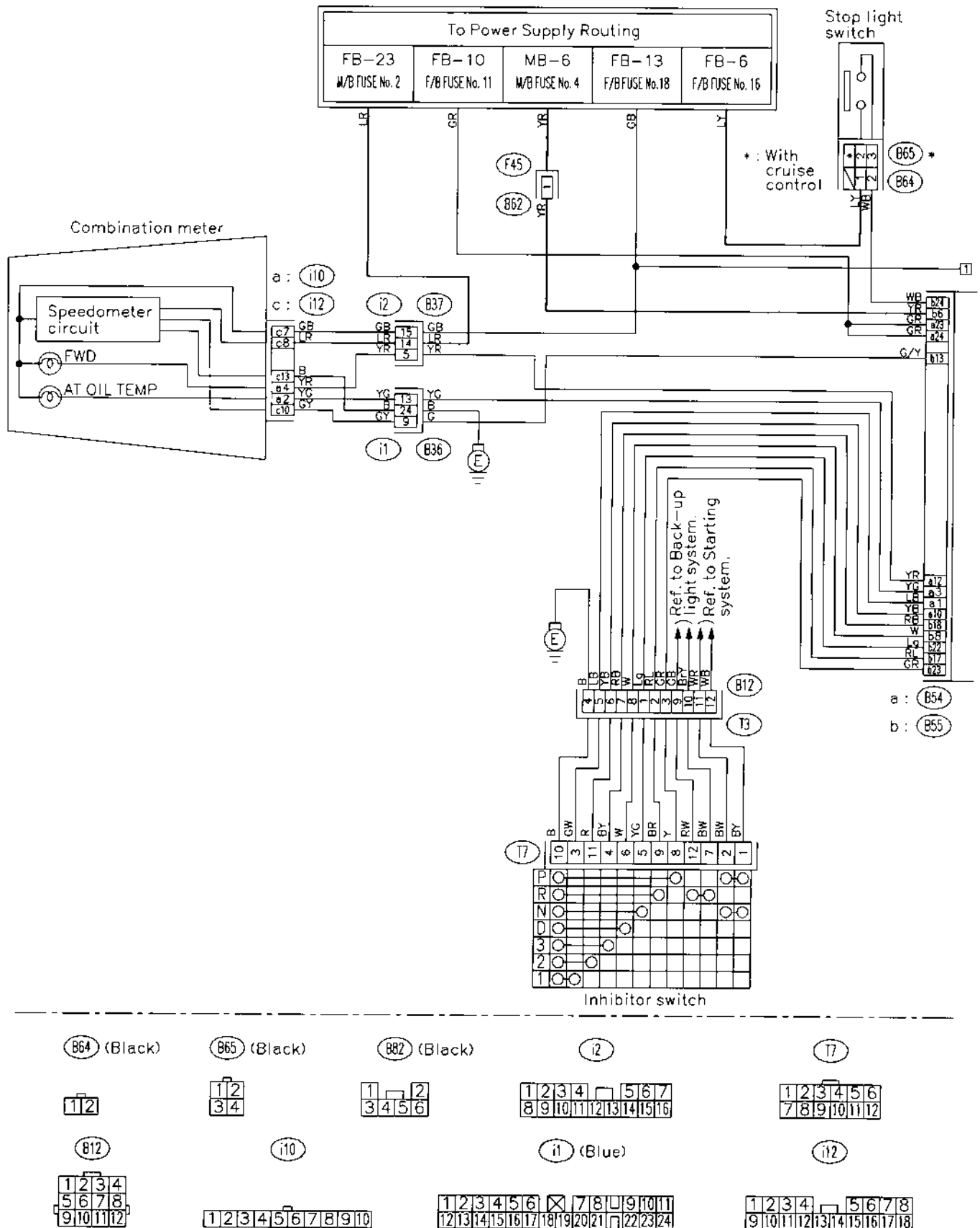
(B100) (Blue)

a : (B54) (White)

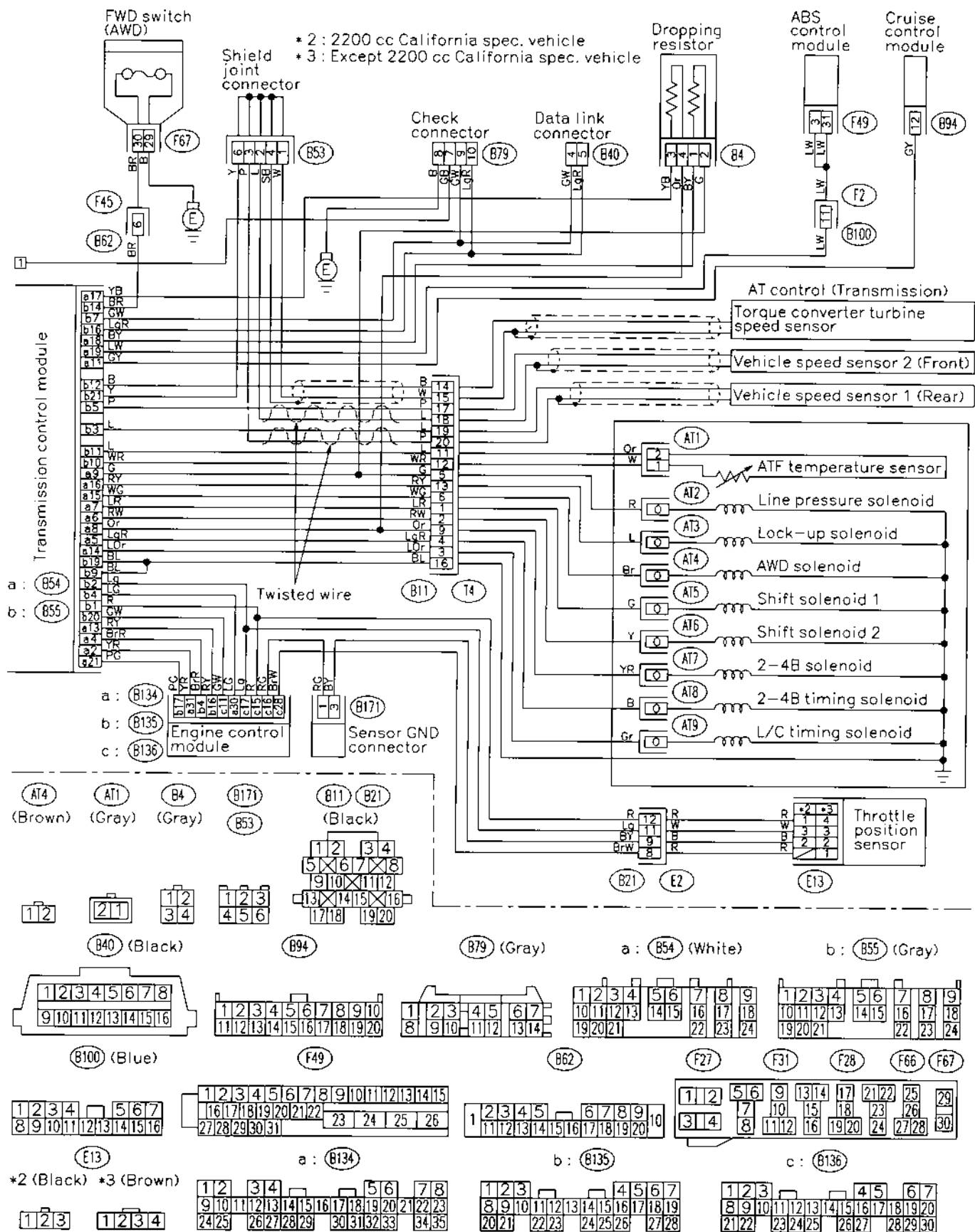


GU82-06B

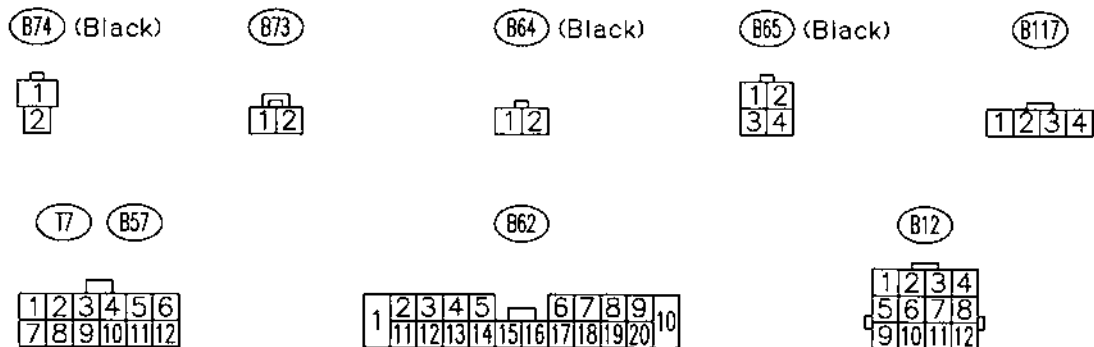
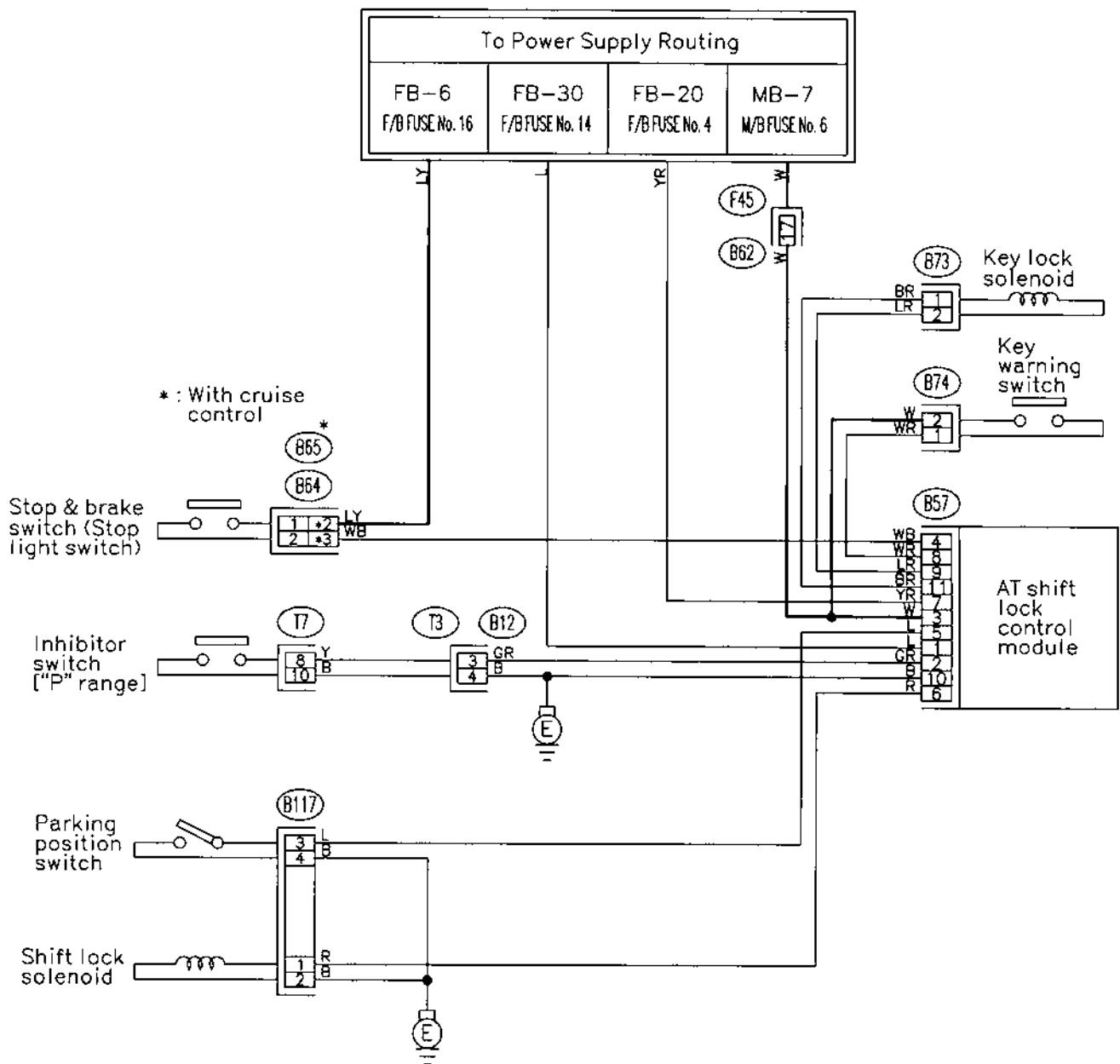
F: A/T CONTROL SYSTEM



GU41-07A

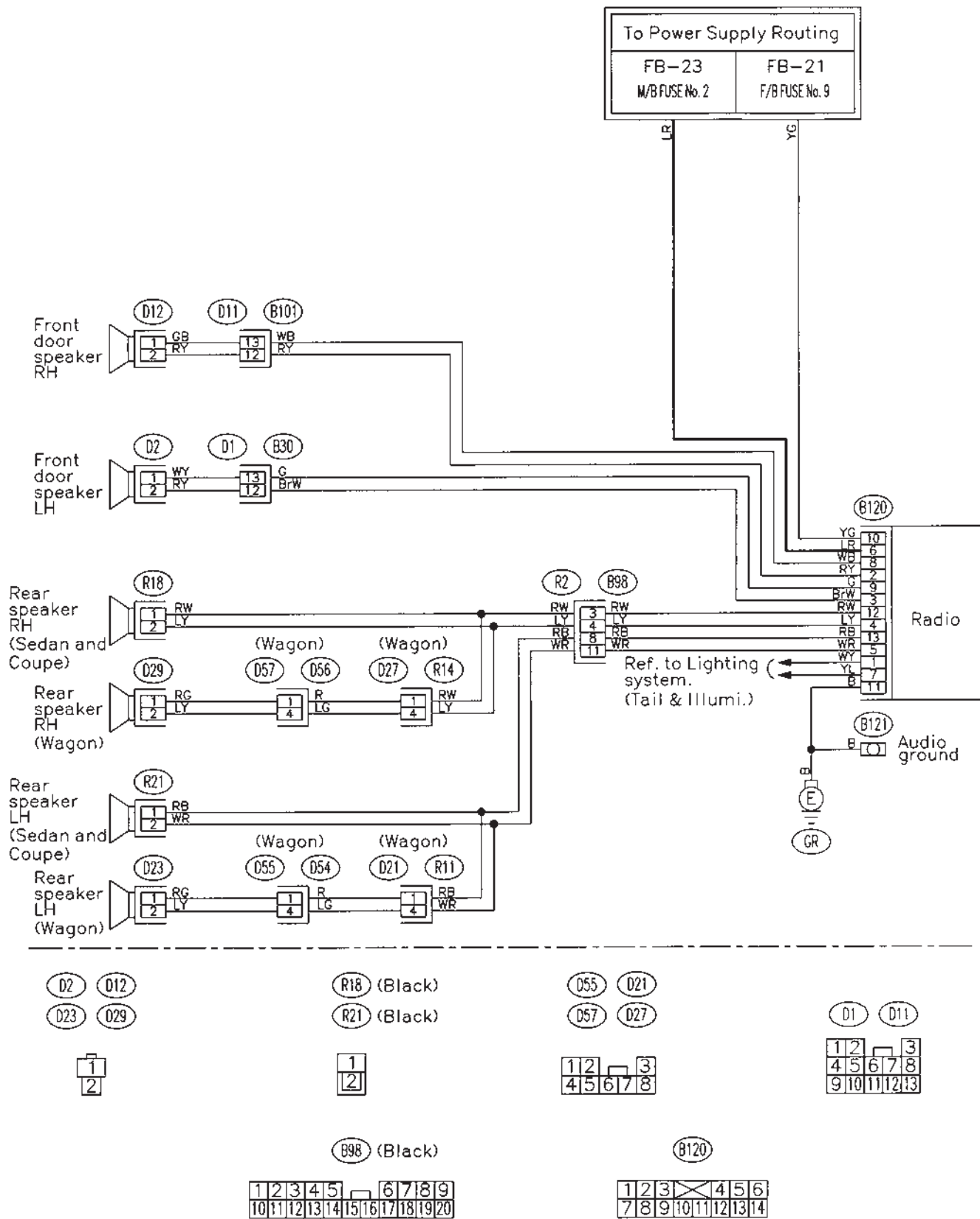


G: A/T SHIFT LOCK SYSTEM



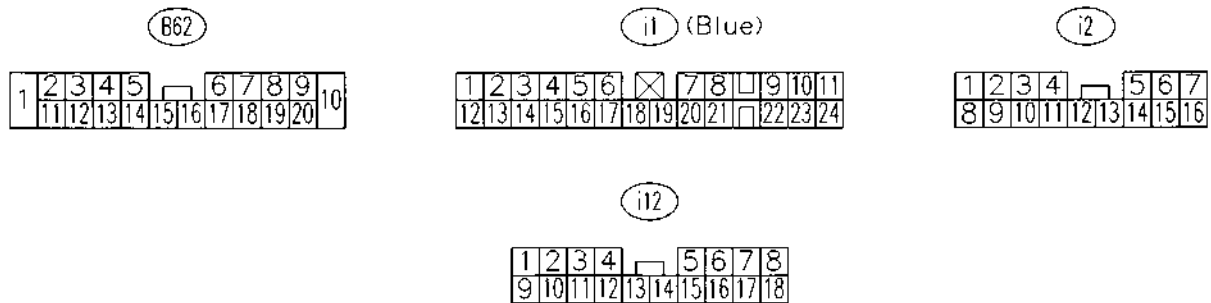
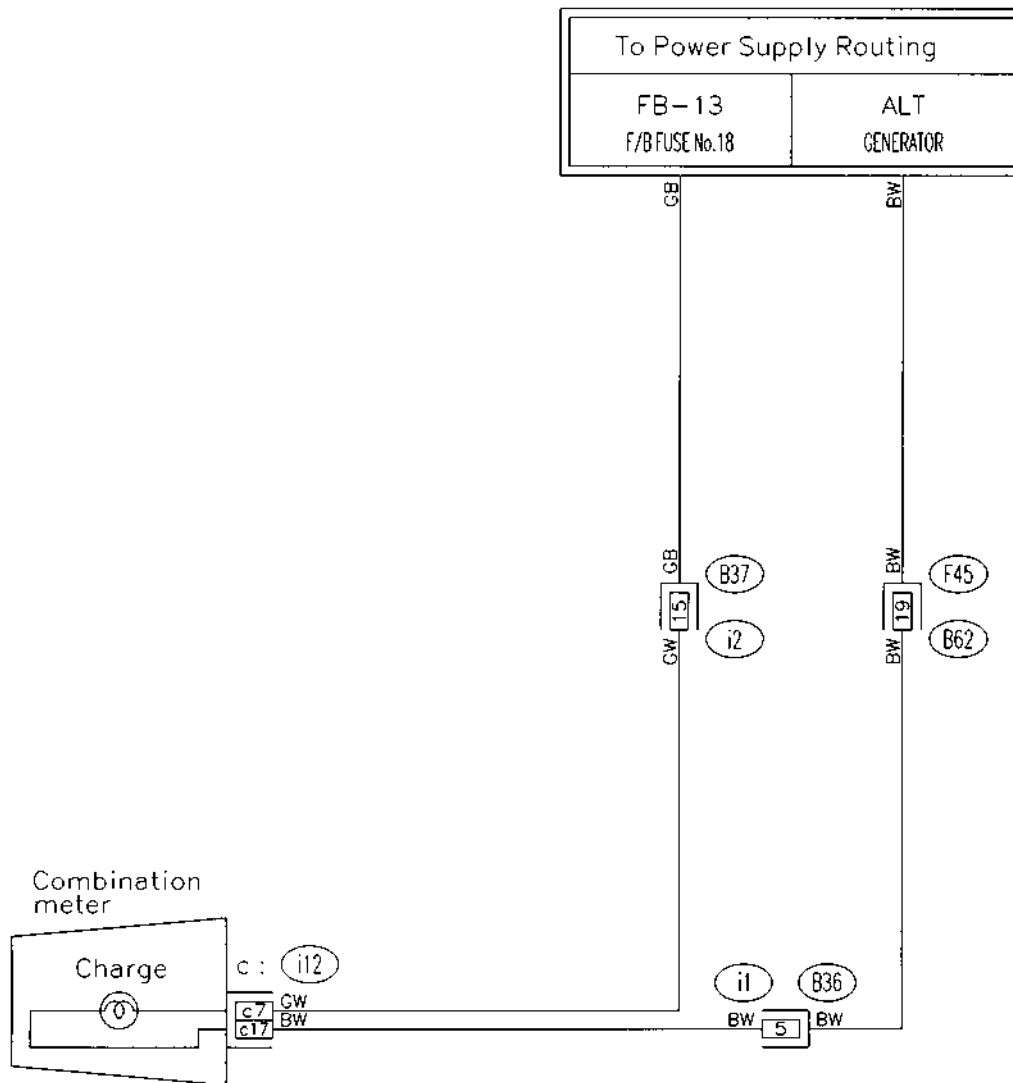
GU42-05

H: AUDIO SYSTEM



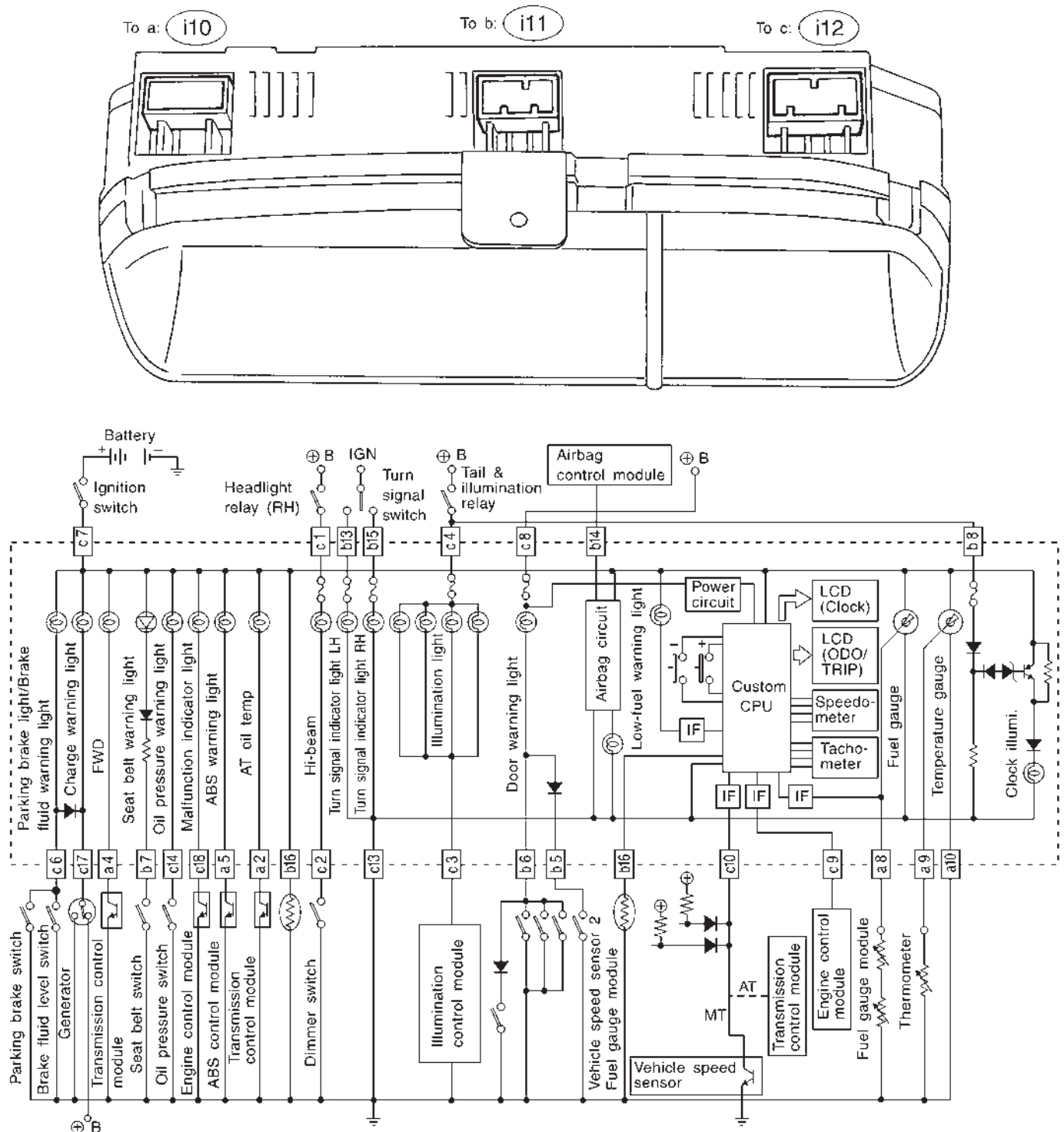
CU76-04

I: CHARGING SYSTEM

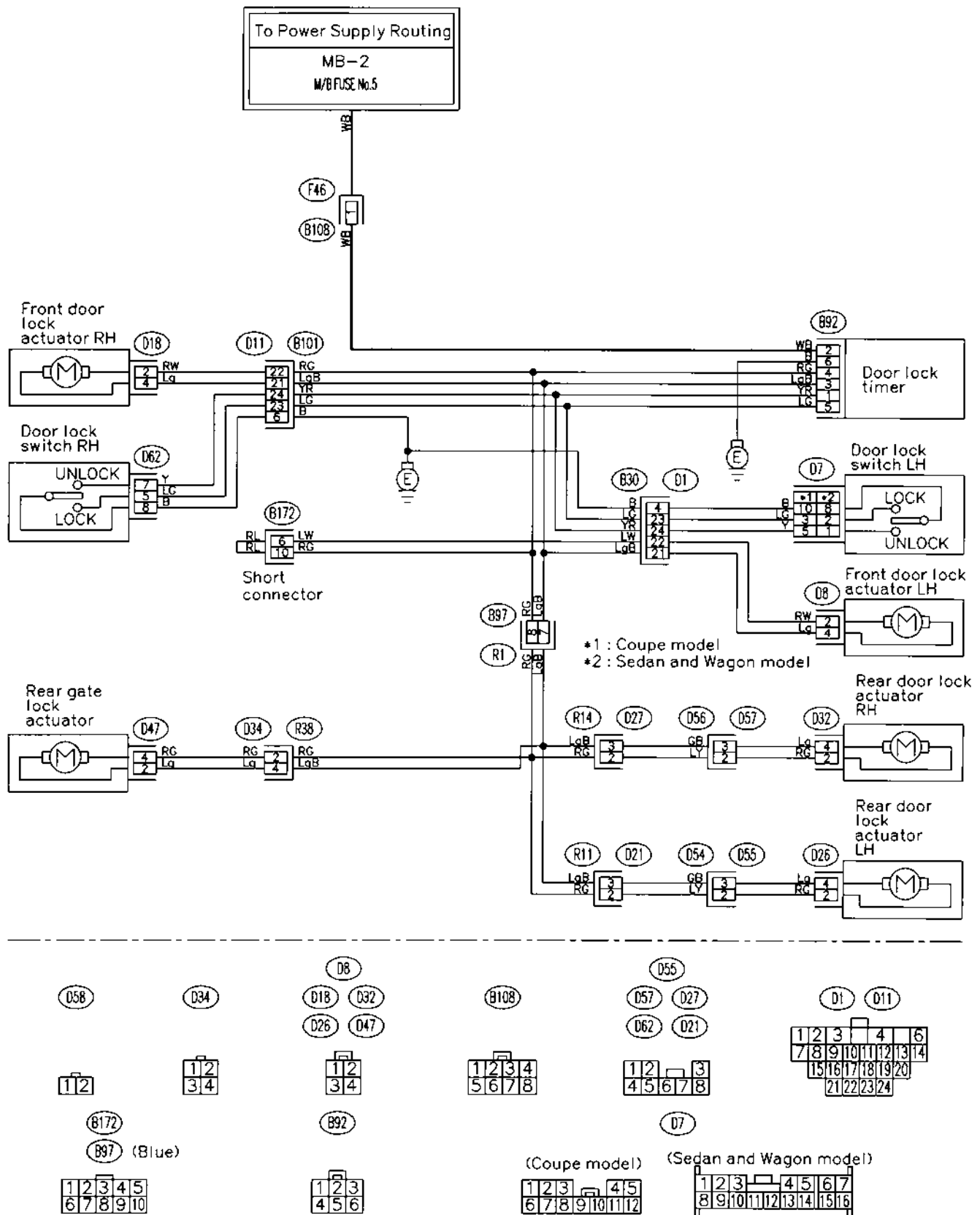


GU02-05

J: COMBINATION METER



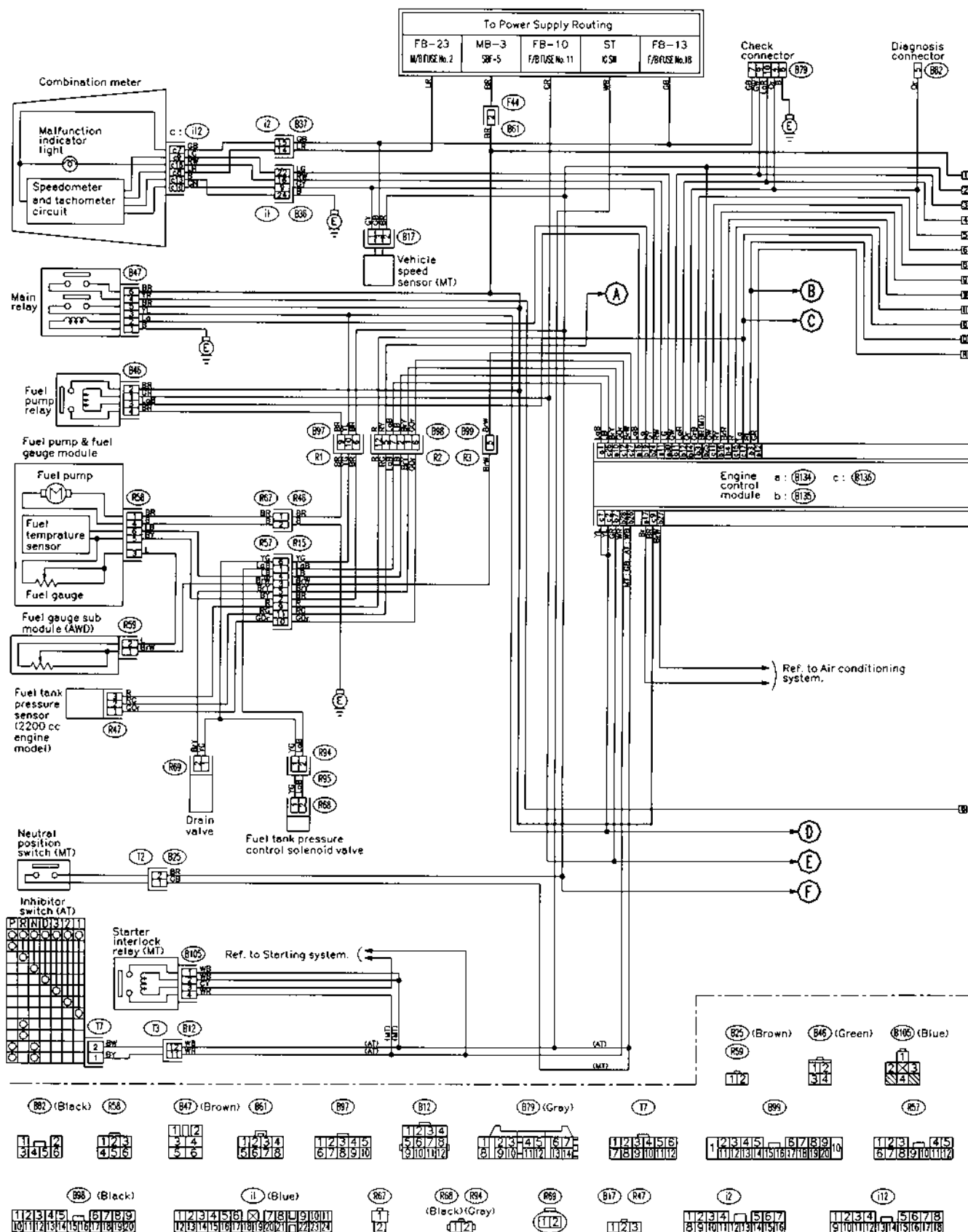
K: DOOR LOCK SYSTEM



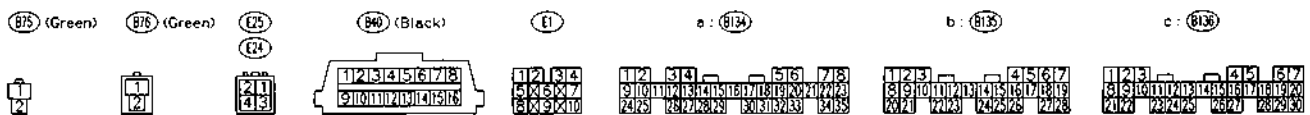
GU73-05

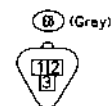
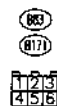
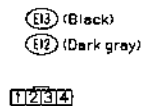
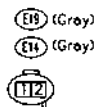
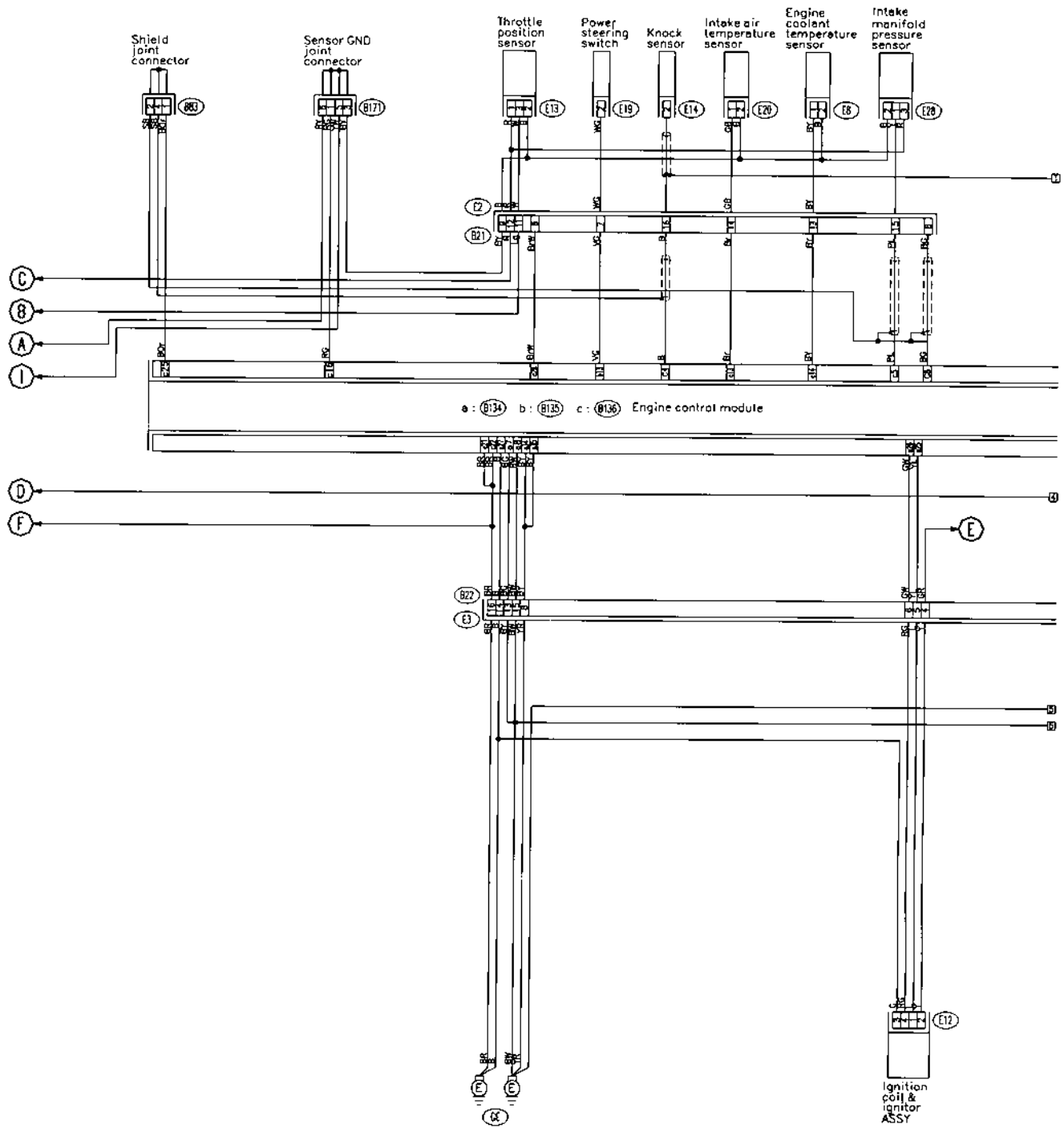
L: ENGINE ELECTRICAL SYSTEM

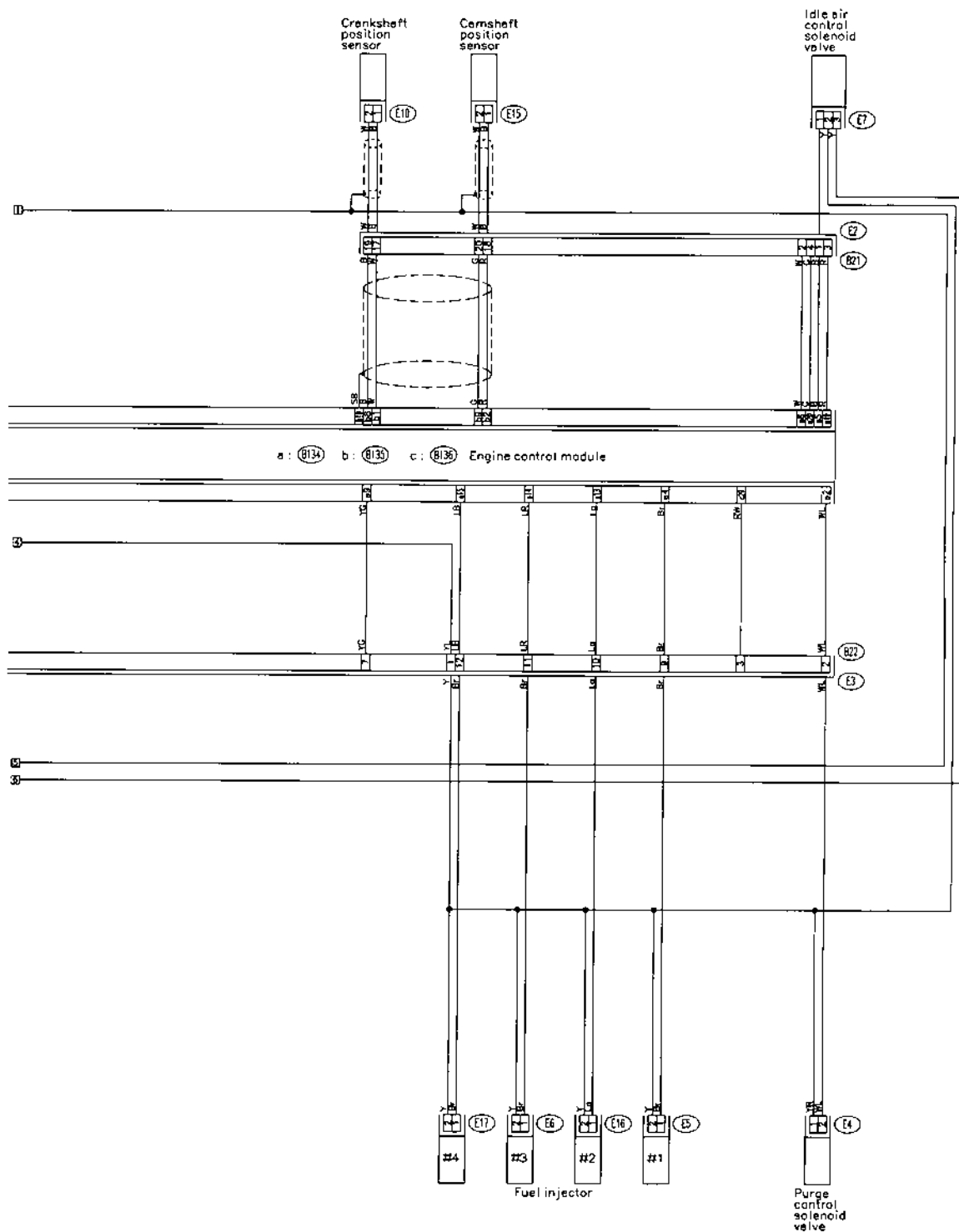
1. 2200 cc CALIFORNIA SPEC. VEHICLES



[D5L1] 6-3
5. Wiring Diagram







(Black) (E10) (E15) (Black)
(Black) (E5) (E16) (Black)
(Black) (E6) (E17) (Black)



(Grey) (E22)
(Black) (E4)



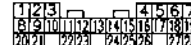
(E7)



a: (8134)

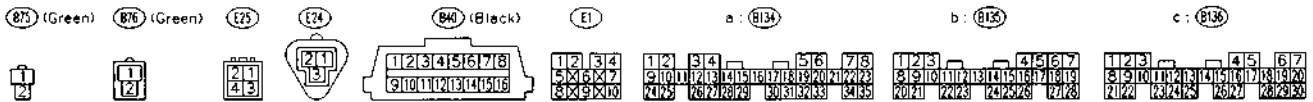
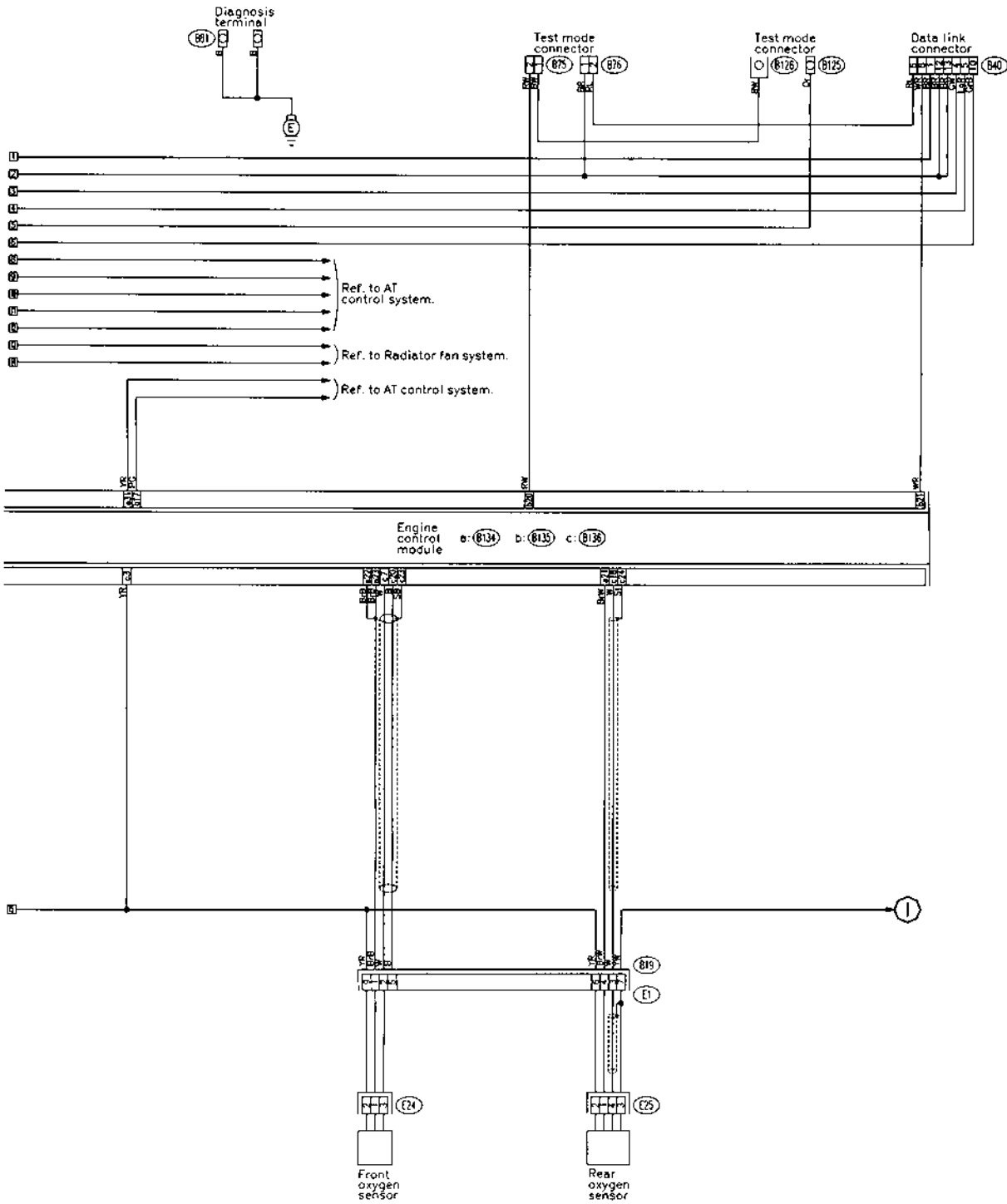


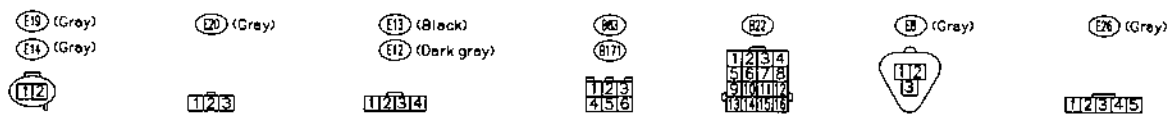
b: (8135)



c: (8136)



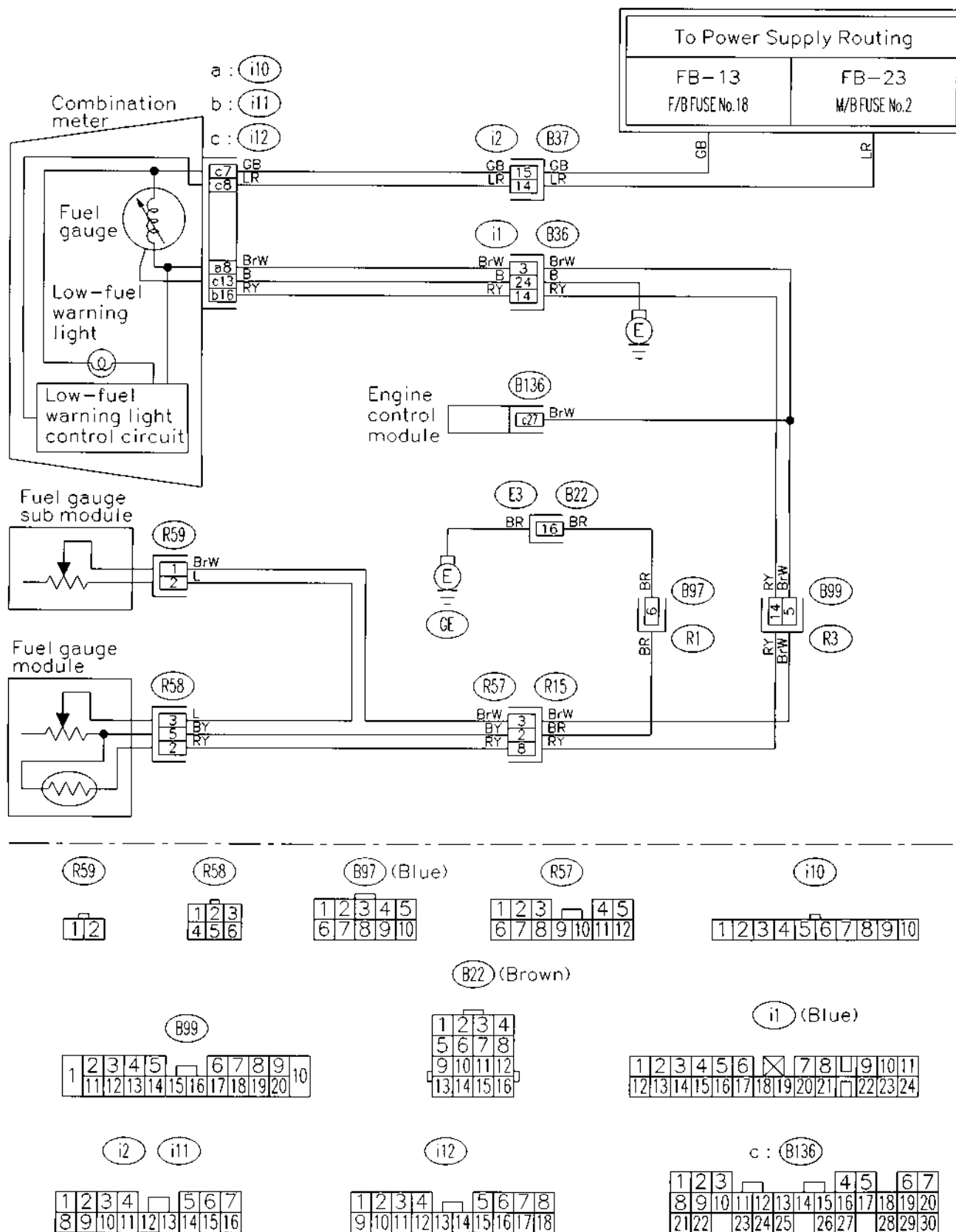




[D5L2] 6-3
5. Wiring Diagram

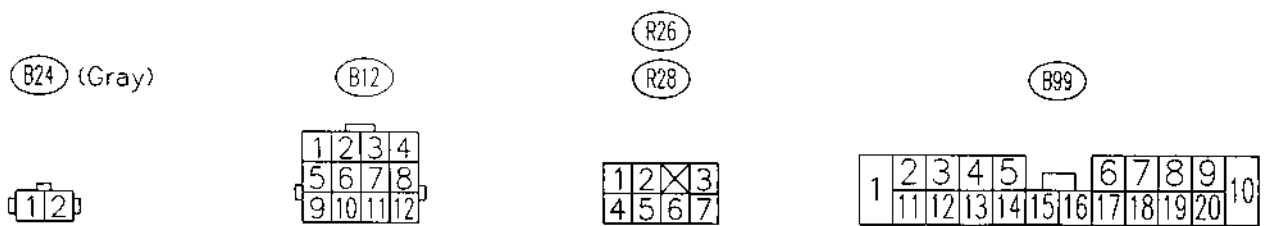
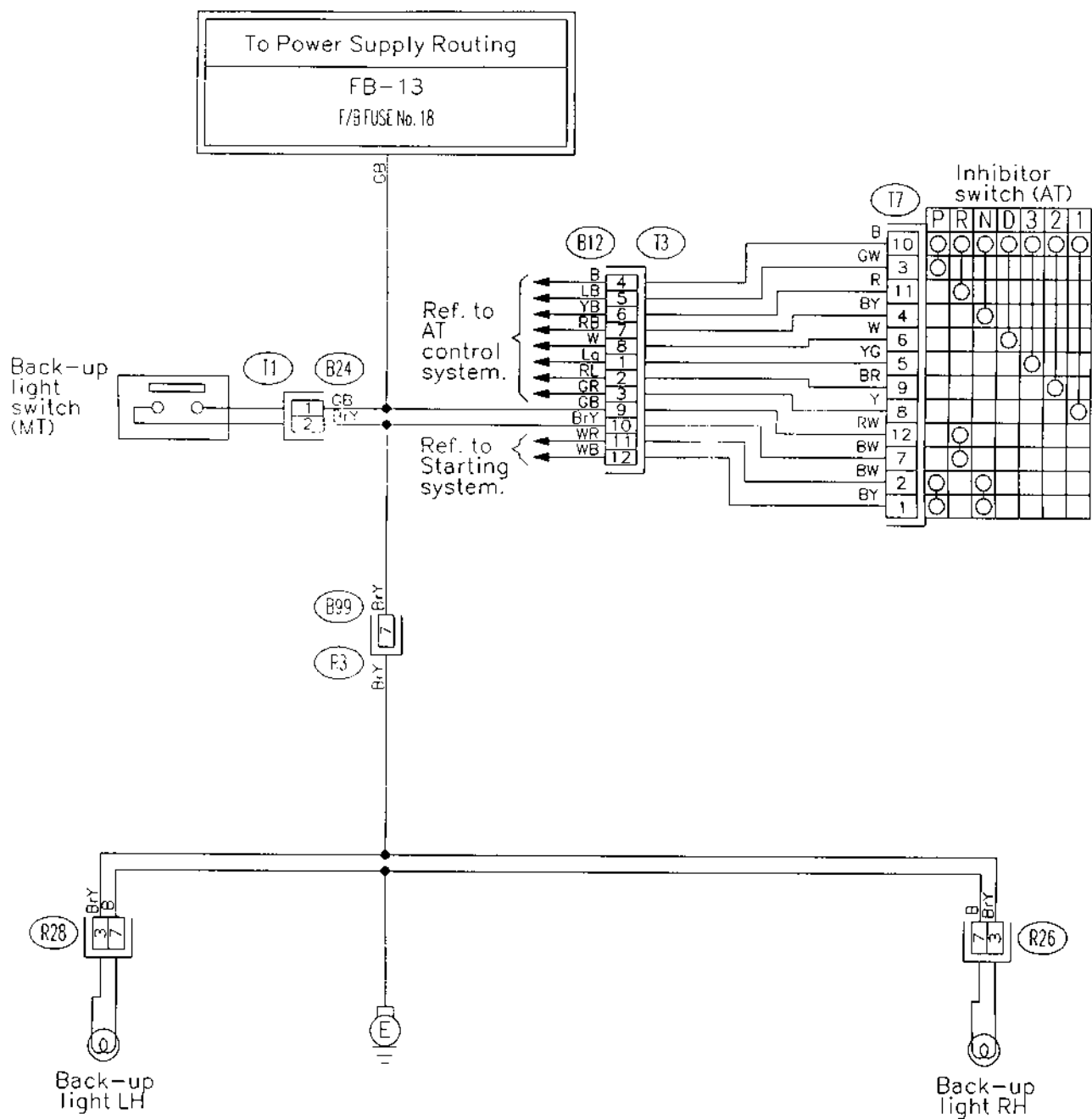


M: FUEL GAUGE SYSTEM



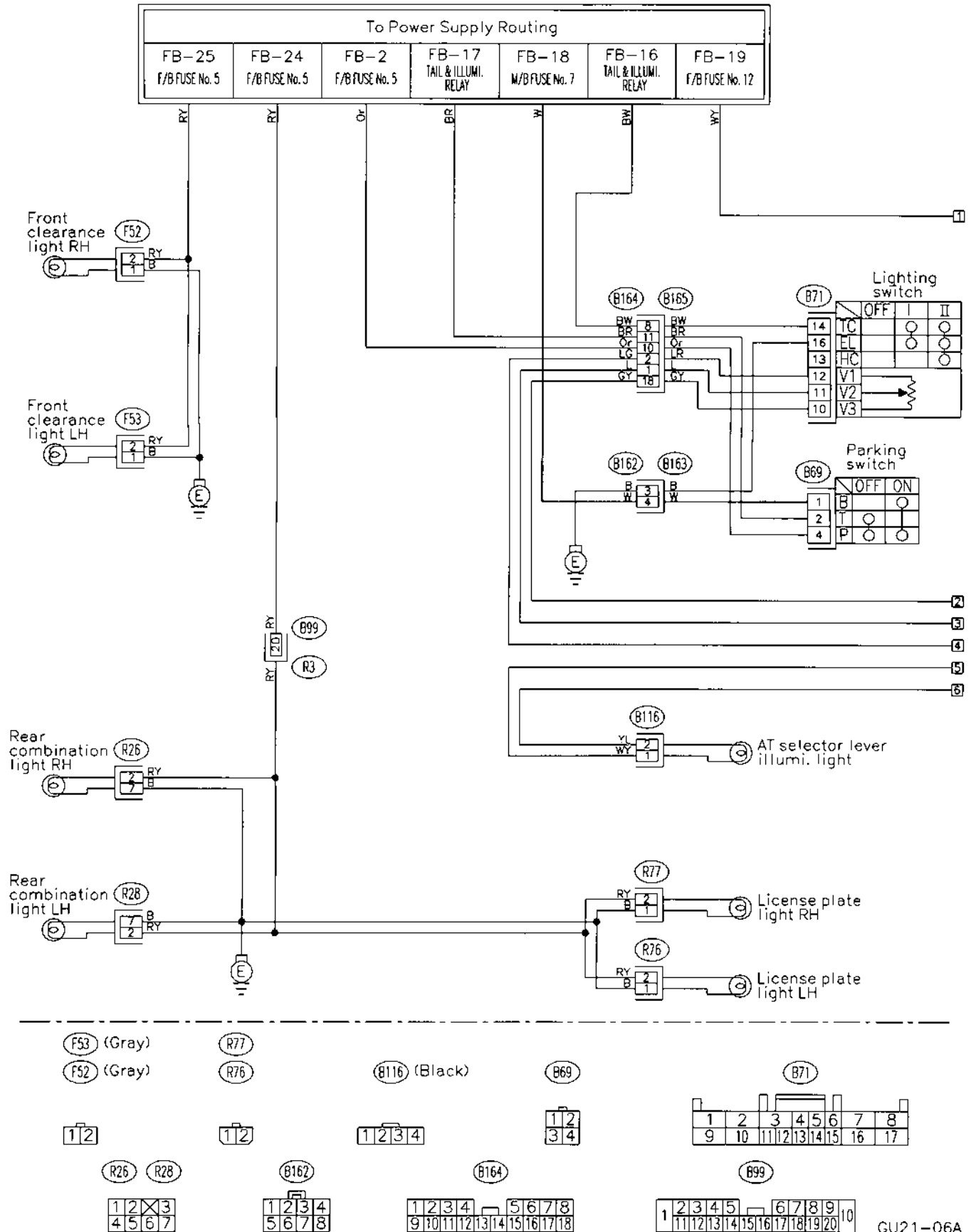
GU61-07

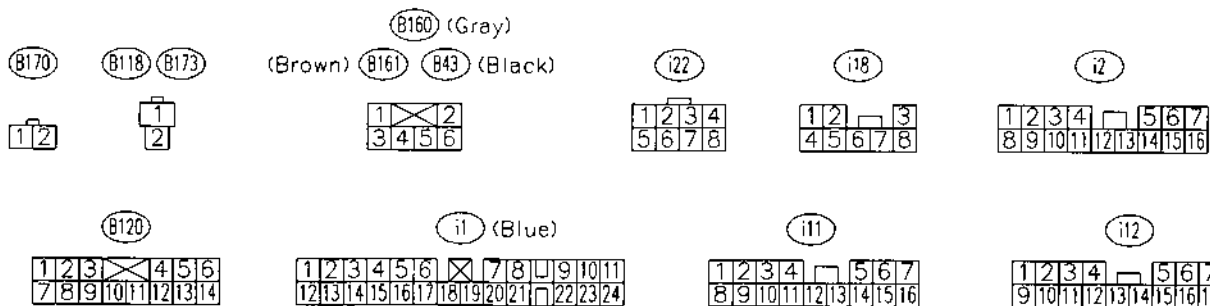
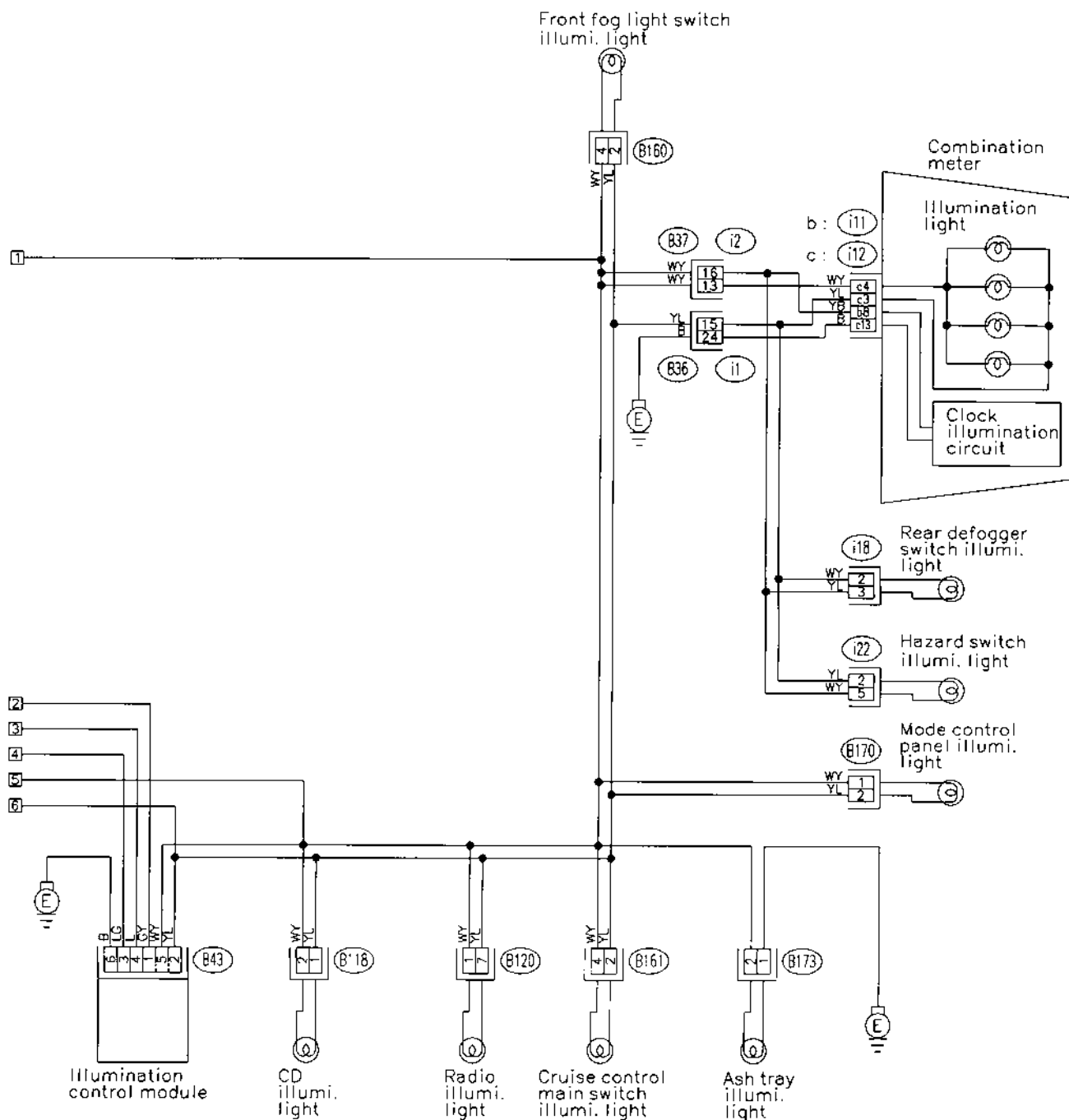
O: LIGHTING SYSTEM (BACK-UP LIGHT)



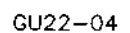
GU29-04

P: LIGHTING SYSTEM (CLEARANCE LIGHT AND ILLUMINATION LIGHT)

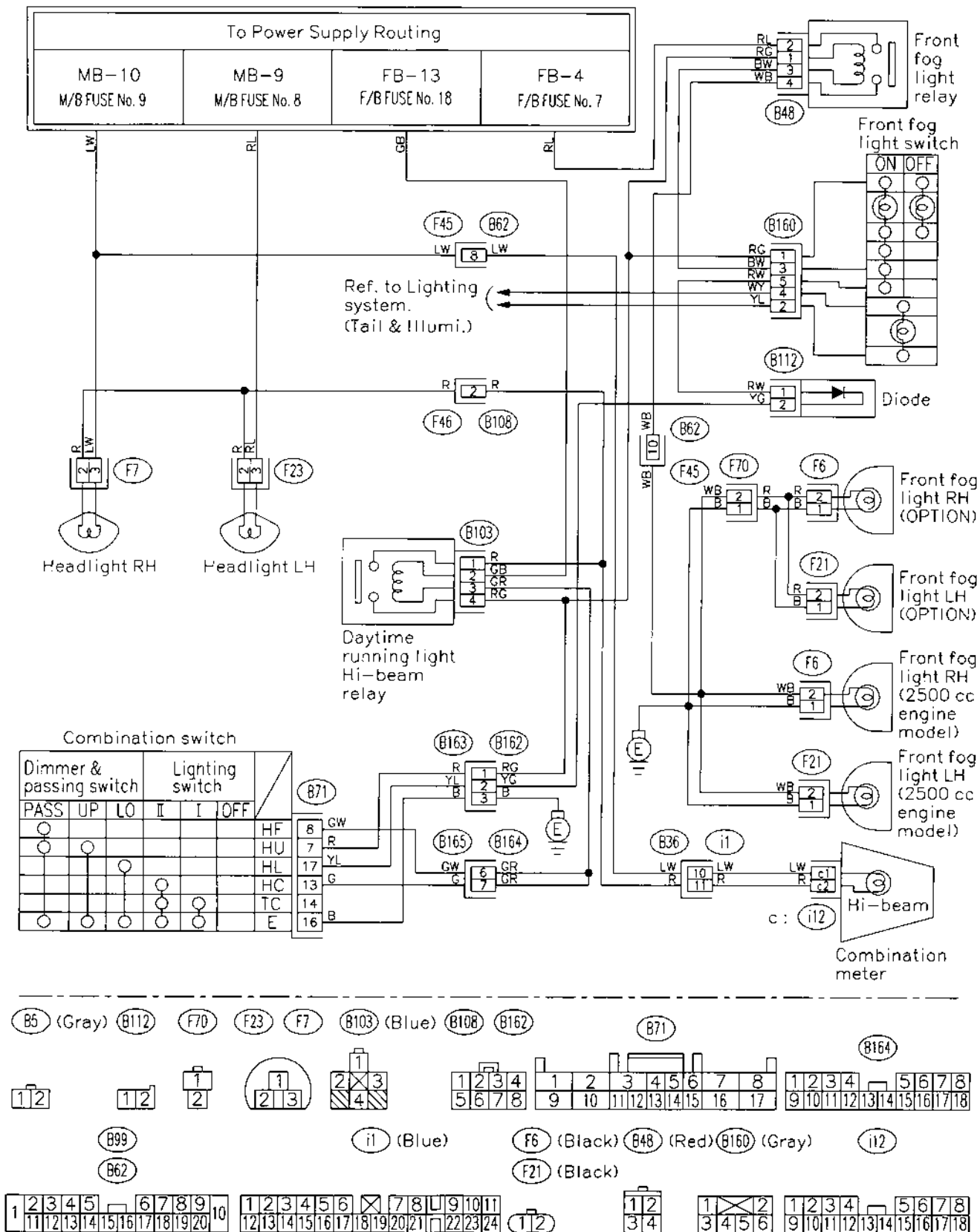




1. WITHOUT DAYTIME RUNNING LIGHT MODEL



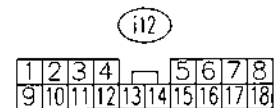
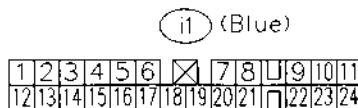
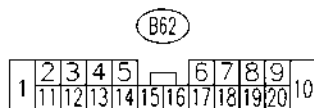
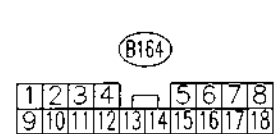
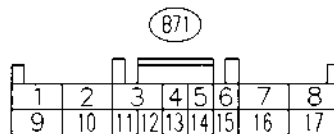
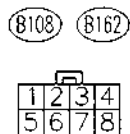
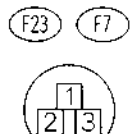
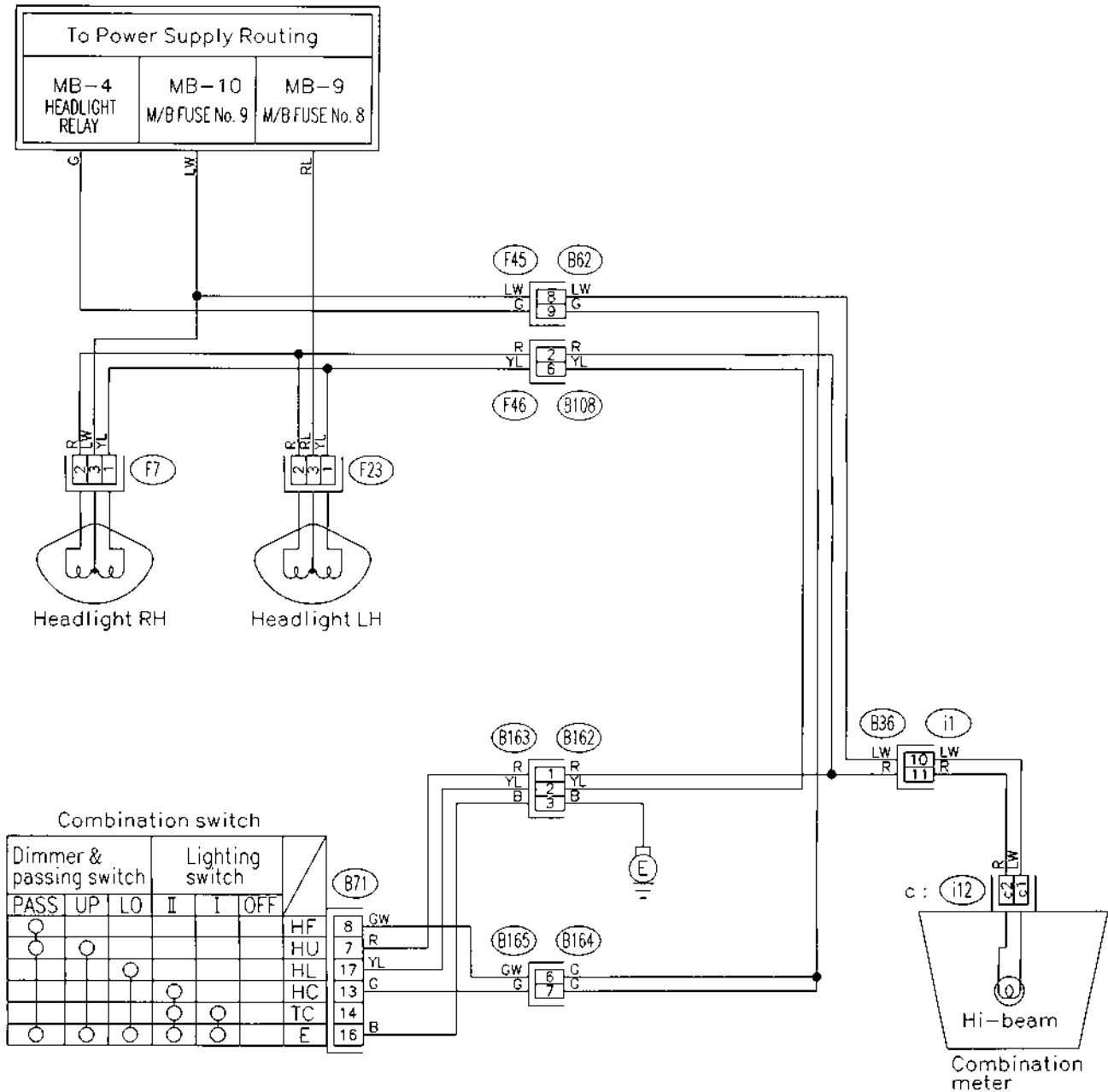
2. WITH DAYTIME RUNNING LIGHT MODEL



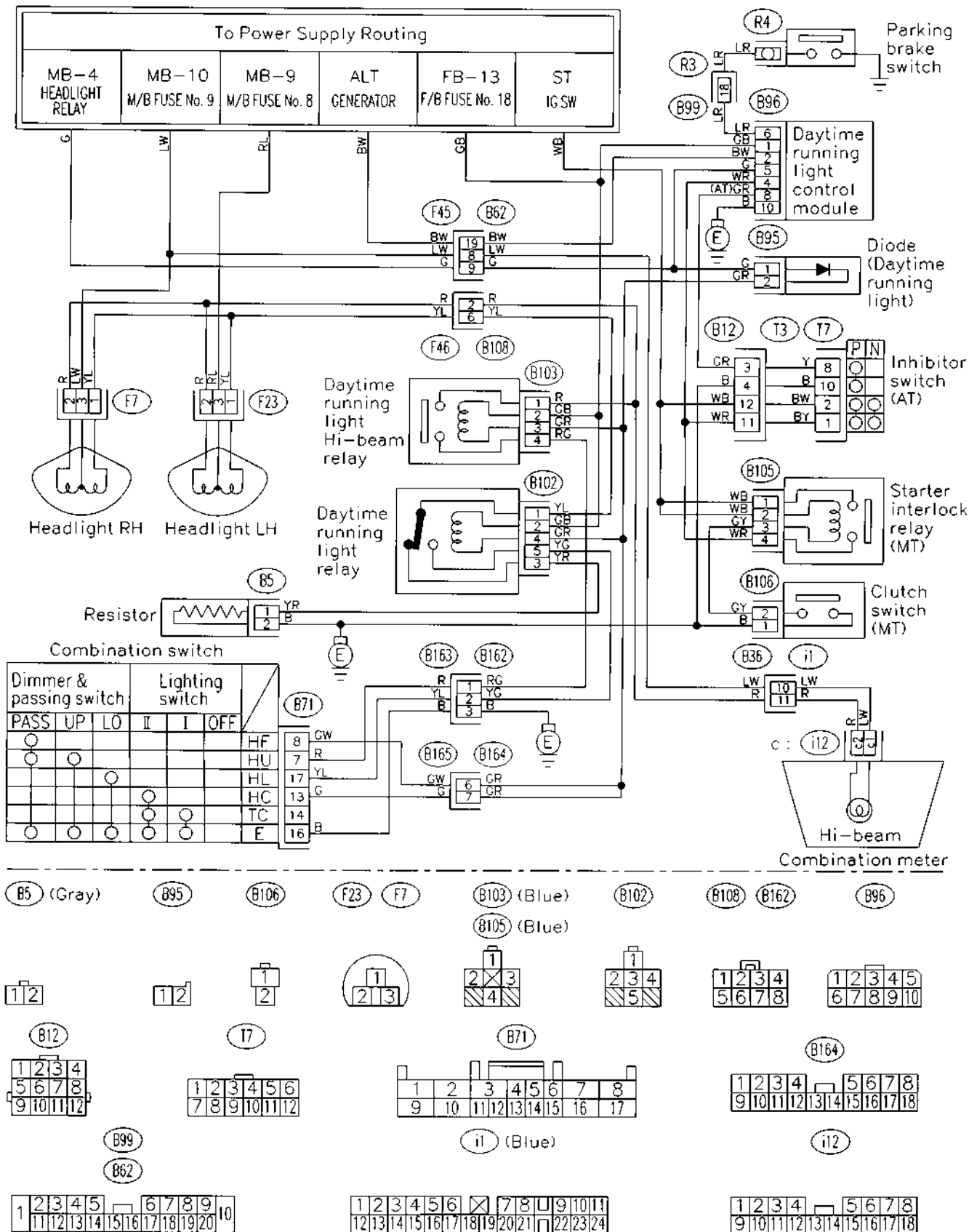
GC20-06

R: LIGHTING SYSTEM (HEADLIGHT)

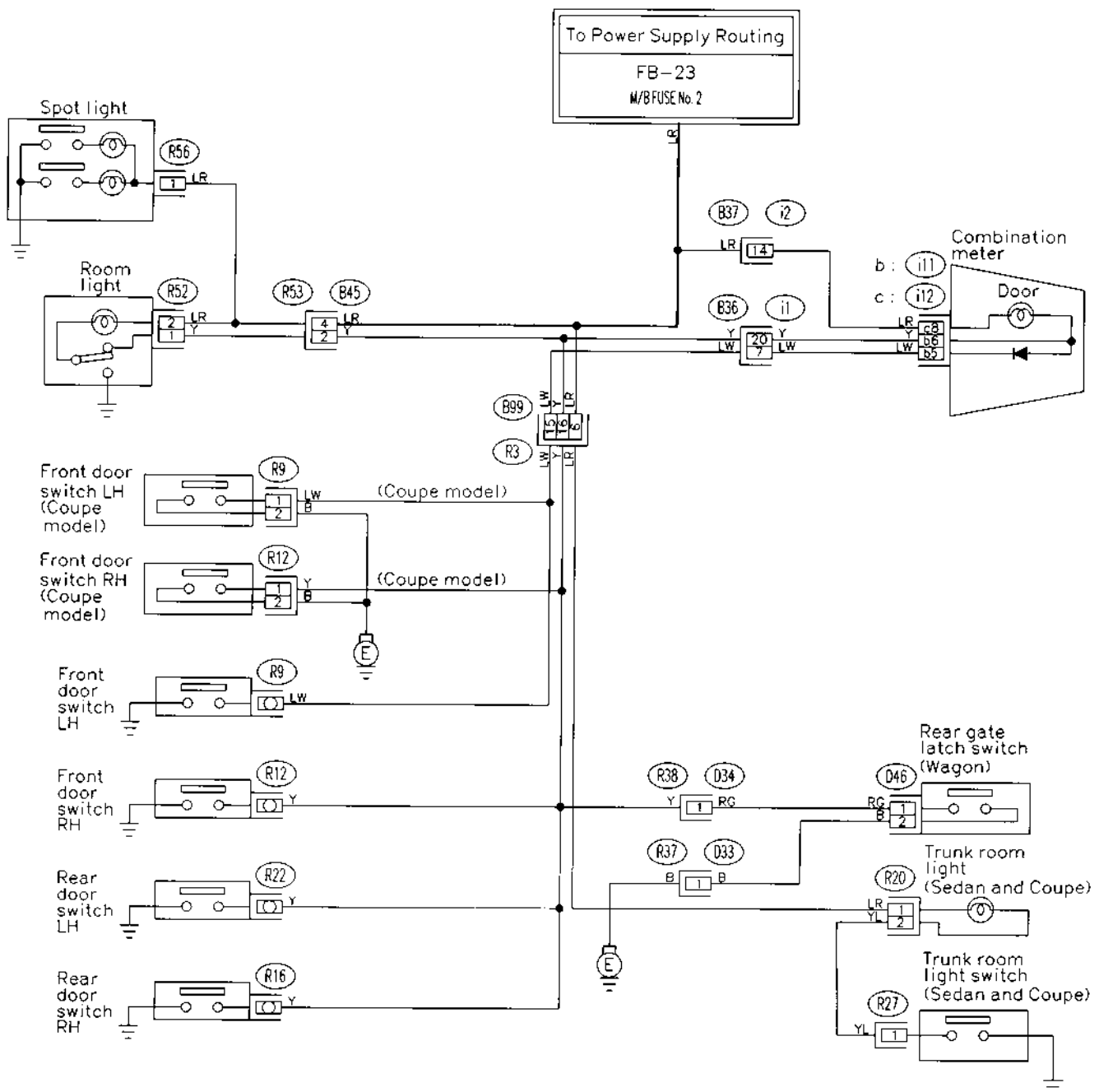
1. WITHOUT DAYTIME RUNNING LIGHT MODEL



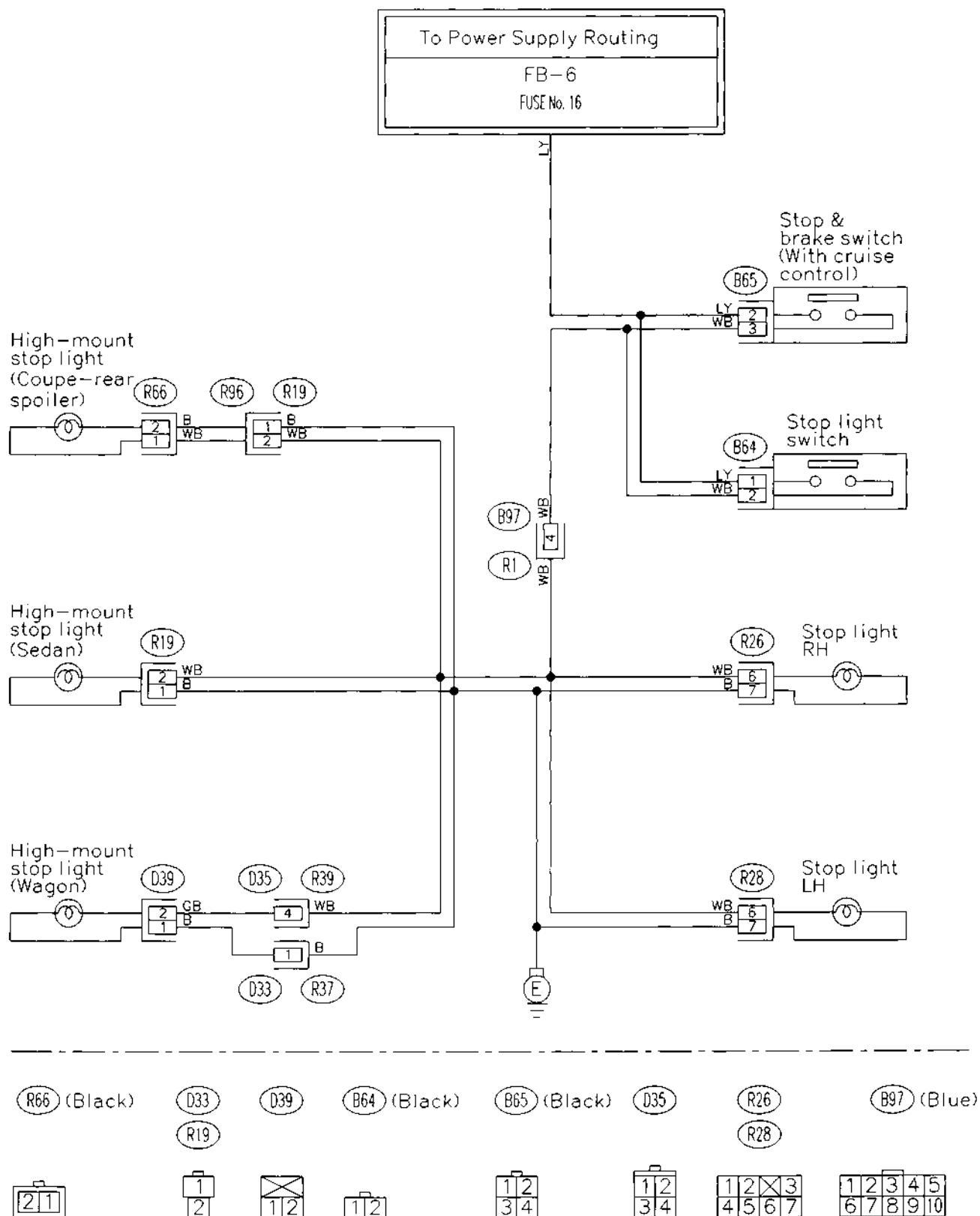
2. WITH DAYTIME RUNNING LIGHT MODEL



S: LIGHTING SYSTEM (IN COMPARTMENT)

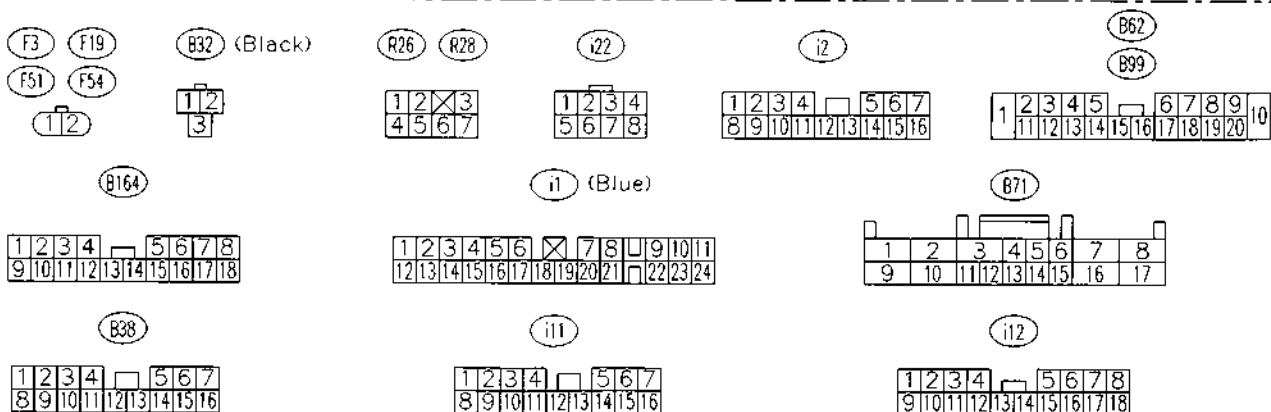
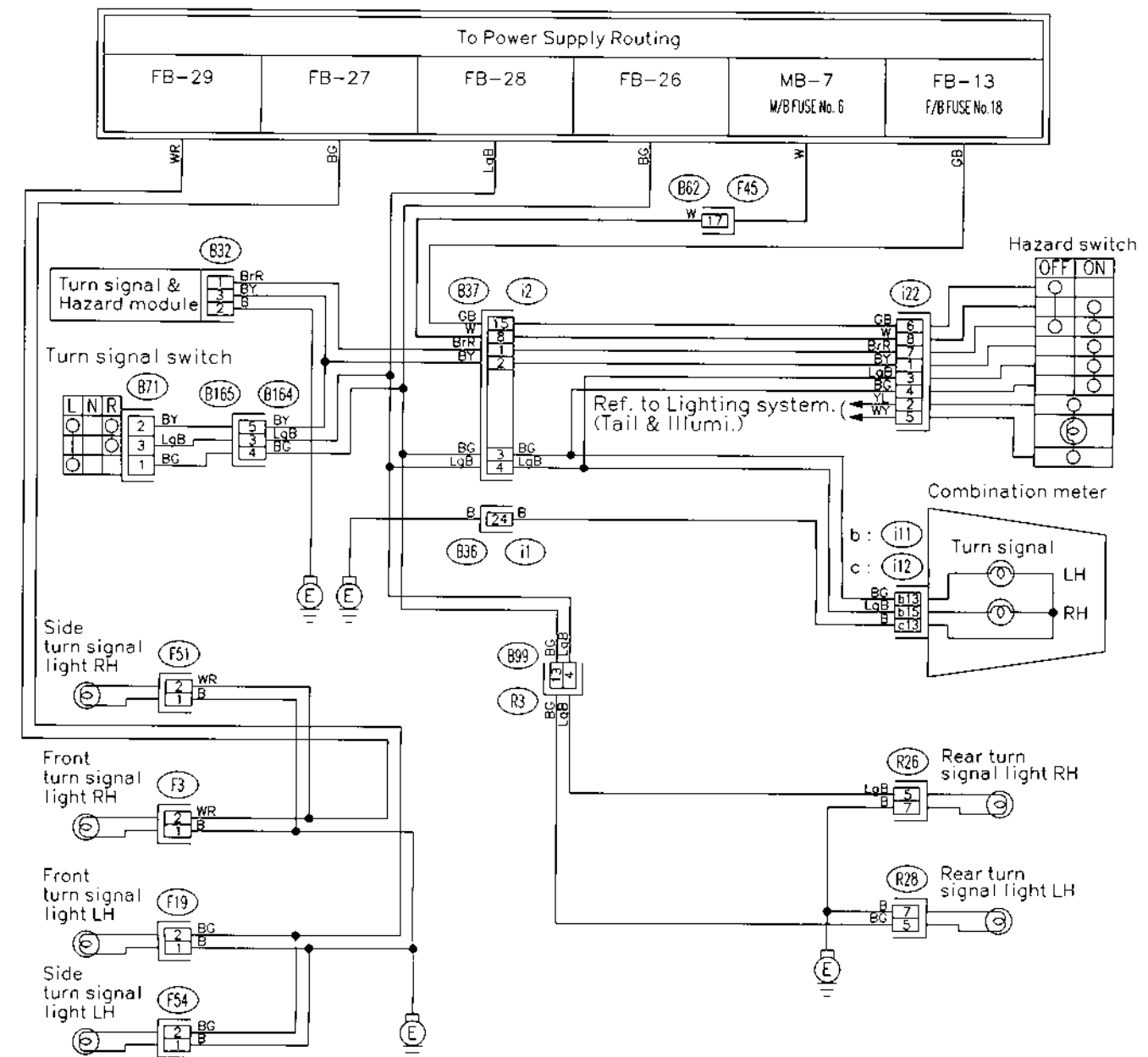


T: LIGHTING SYSTEM (STOP LIGHT)

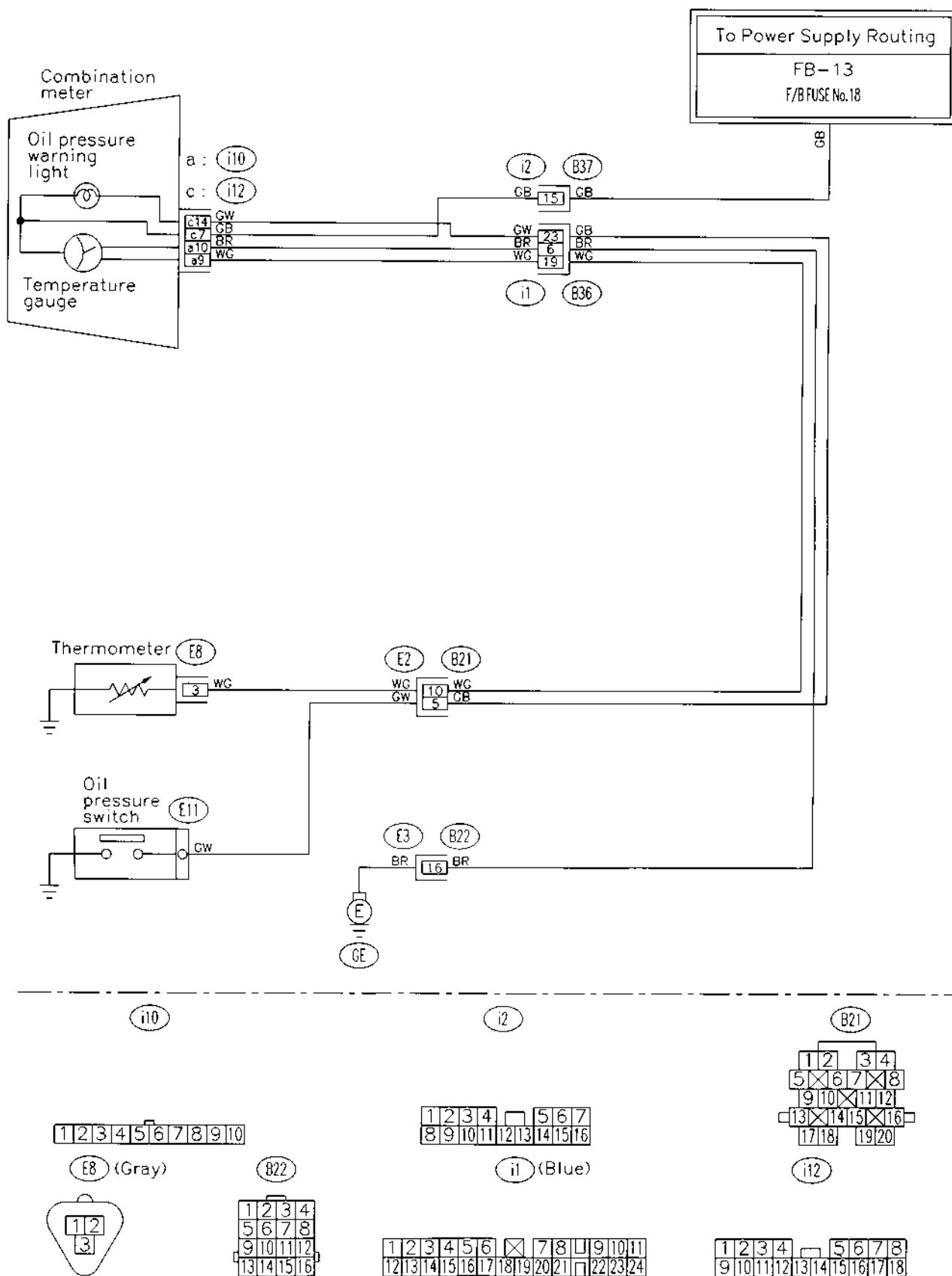


GU25-05

U: LIGHTING SYSTEM (TURN SIGNAL LIGHT AND HAZARD LIGHT)

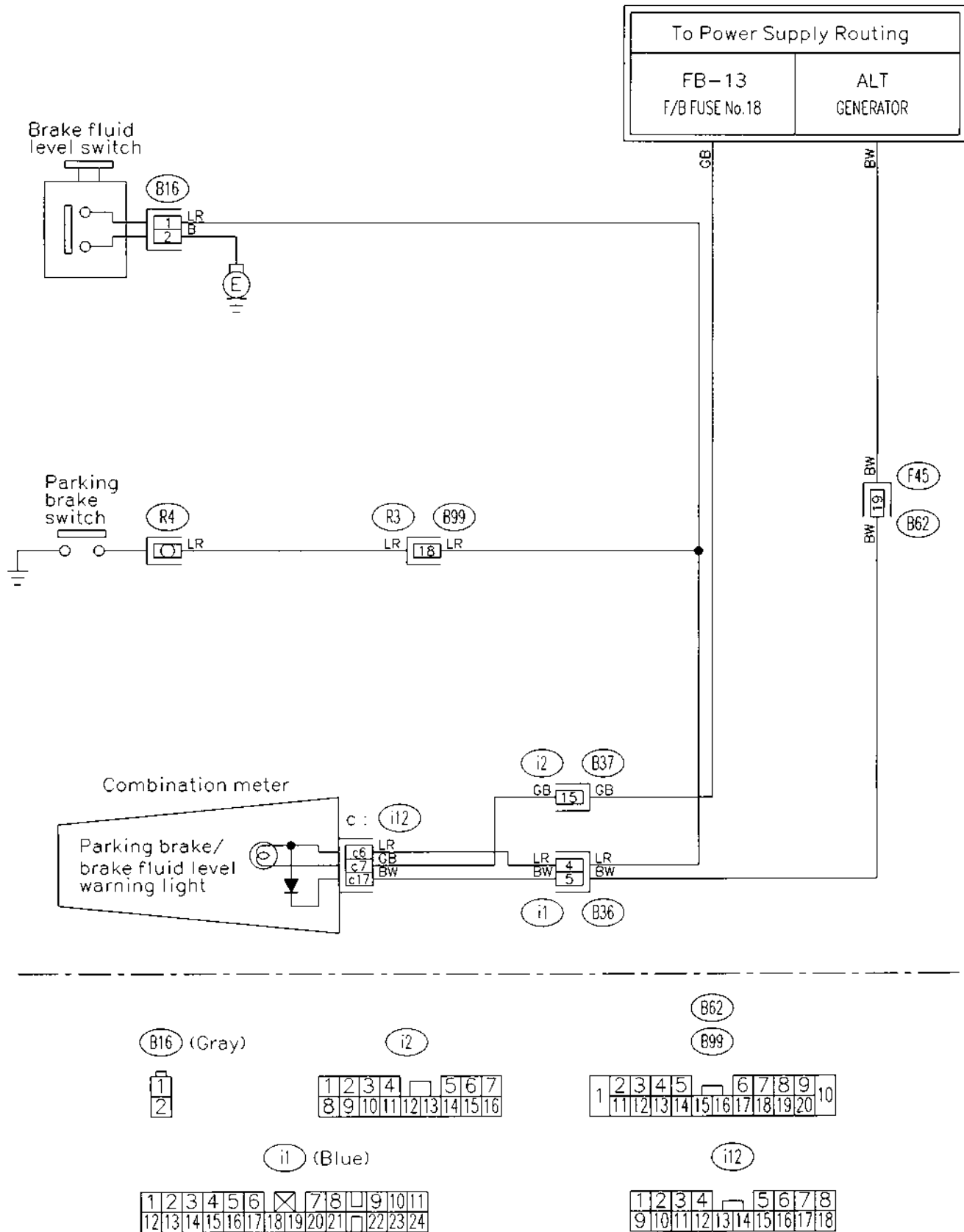


V: OIL PRESSURE AND TEMPERATURE GAUGE SYSTEM



GU66-06

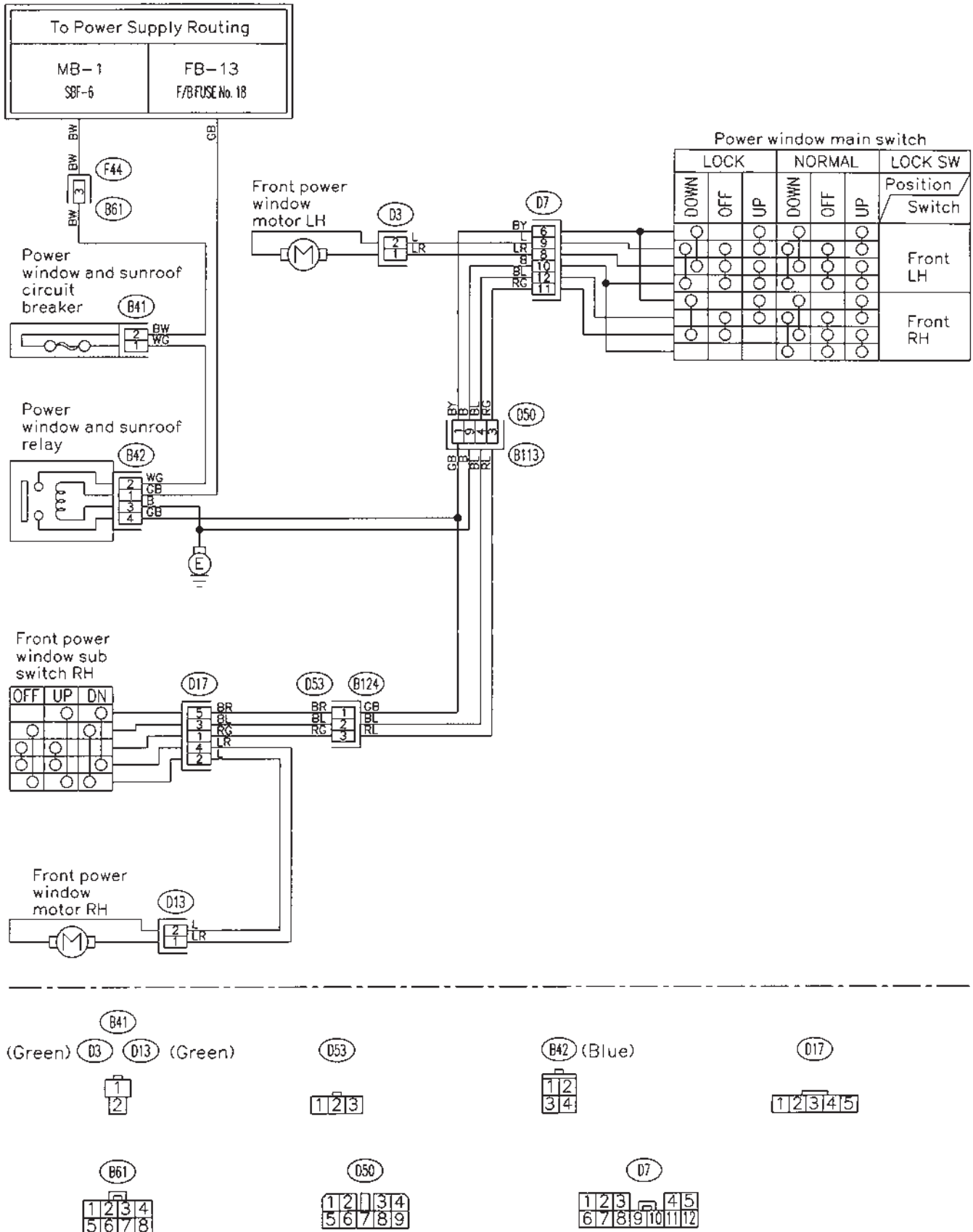
W: PARKING BRAKE AND BRAKE FLUID LEVEL WARNING SYSTEM



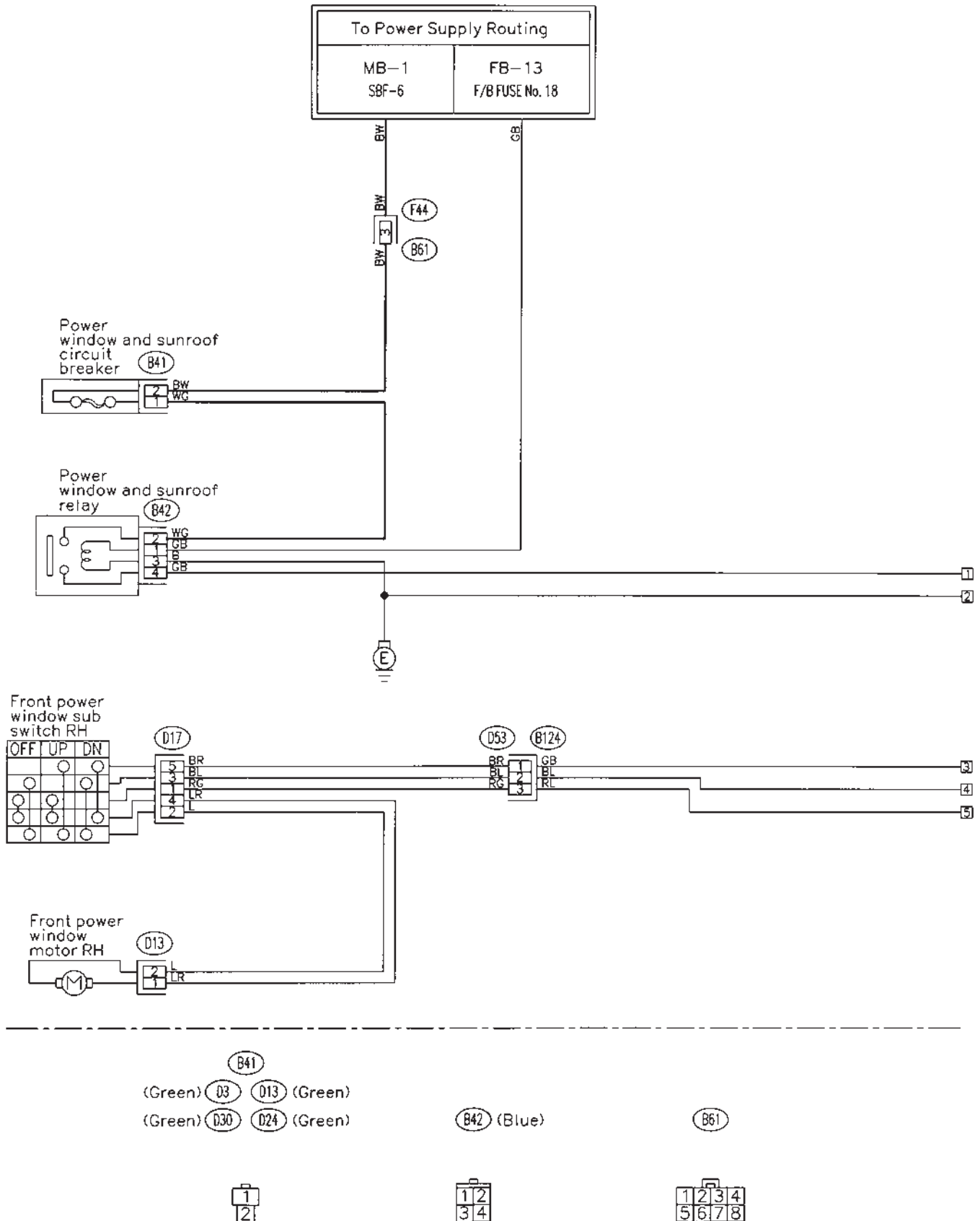
GU60-05

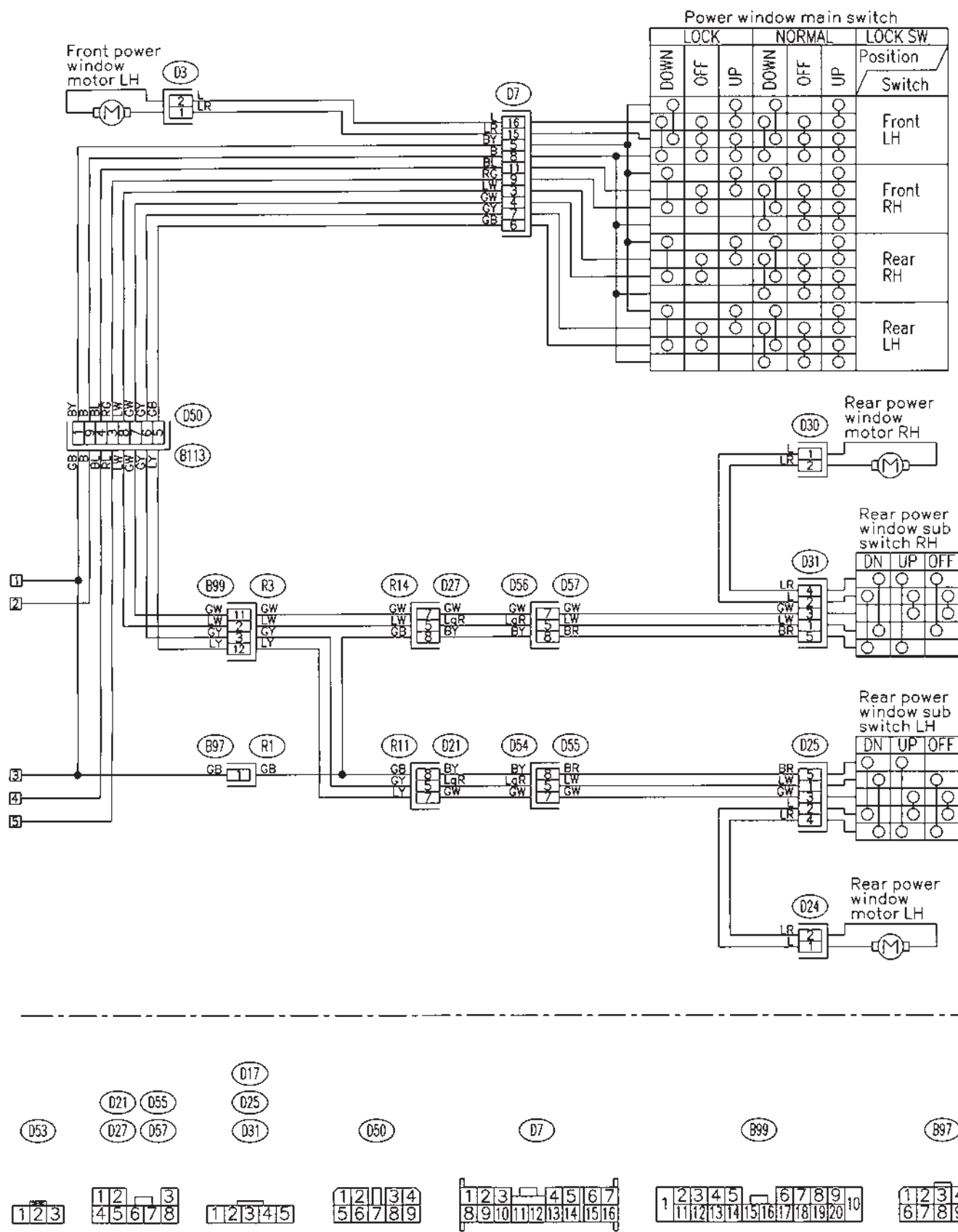
X: POWER WINDOW SYSTEM

1. COUPE MODEL

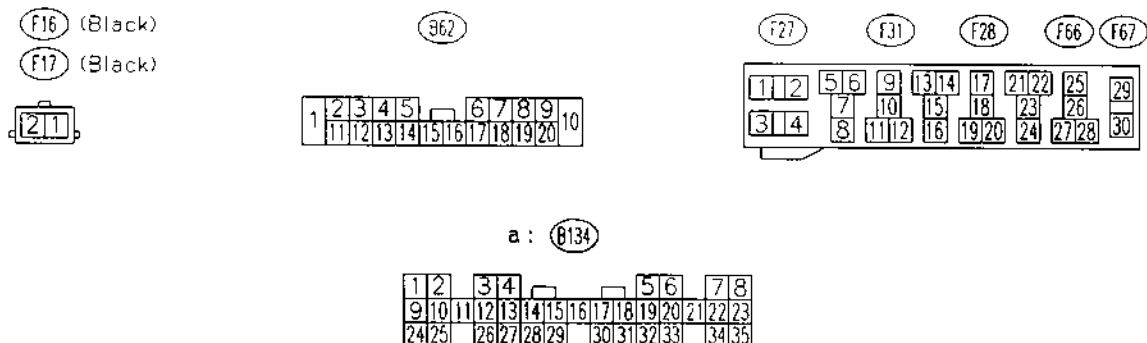
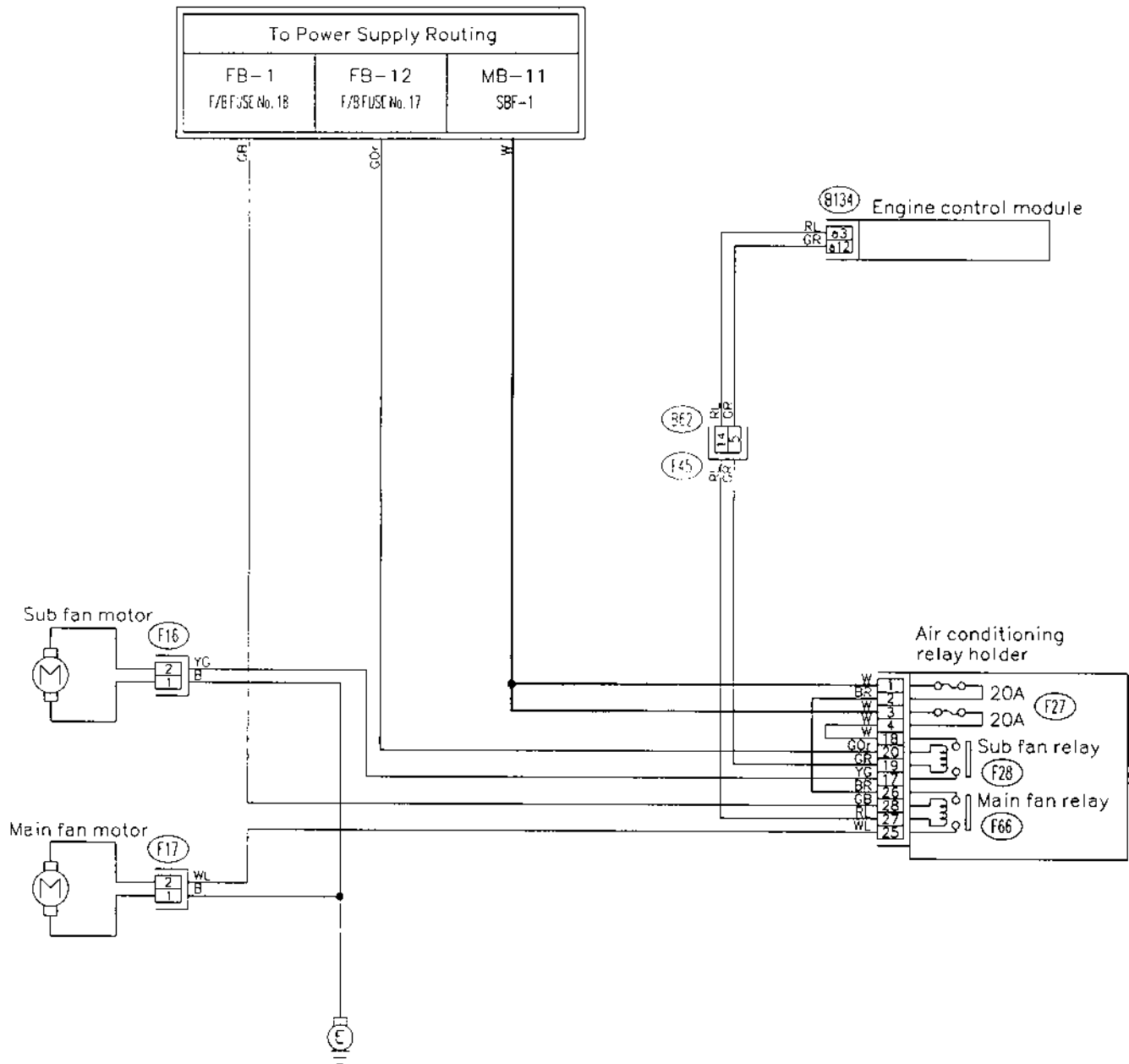


2. SEDAN AND WAGON MODEL

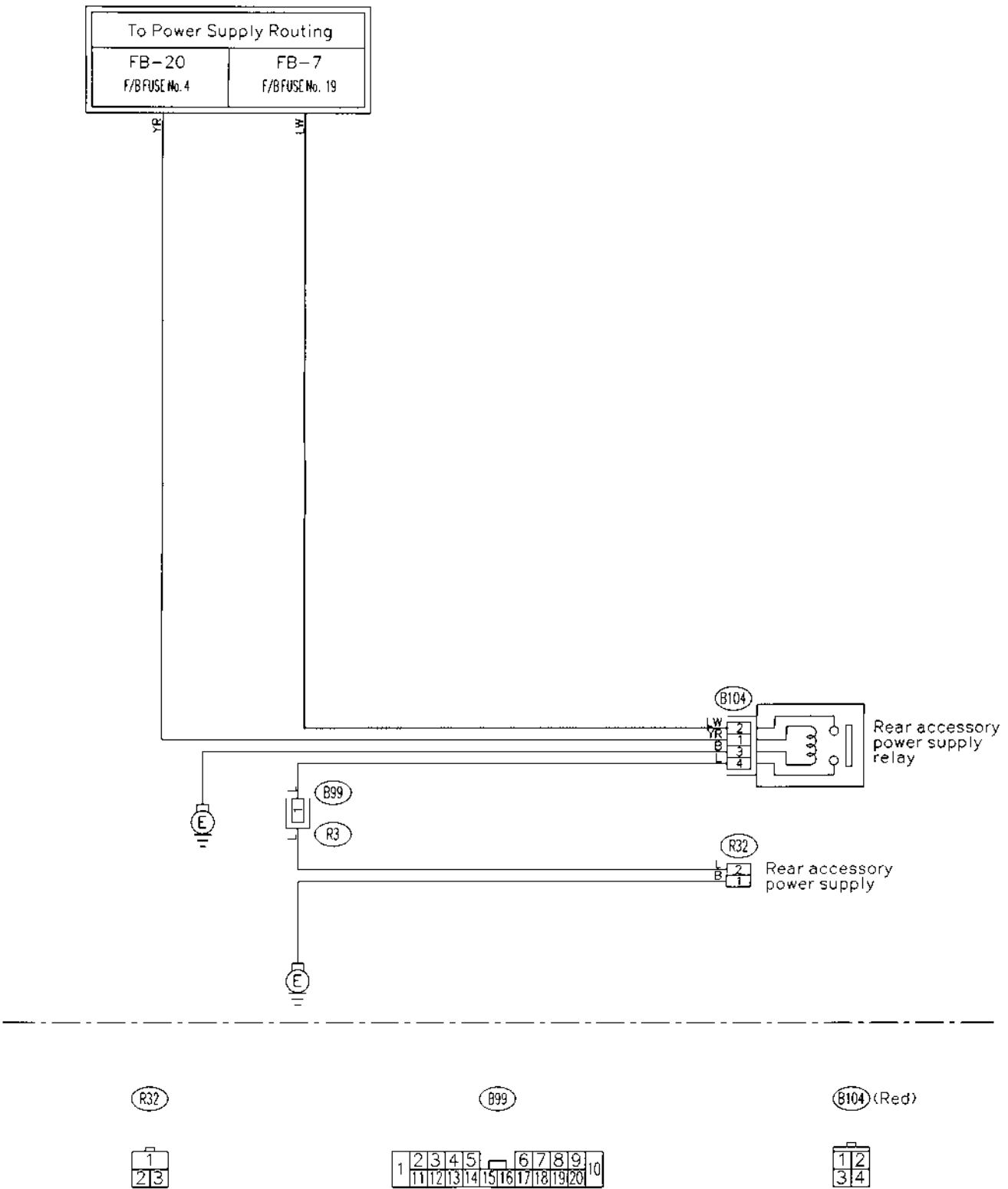




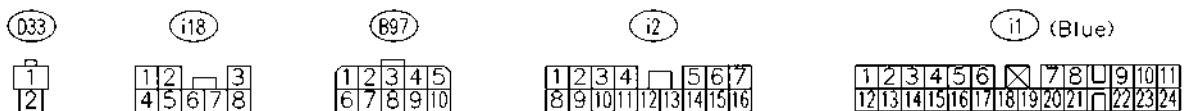
Y: RADIATOR FAN SYSTEM



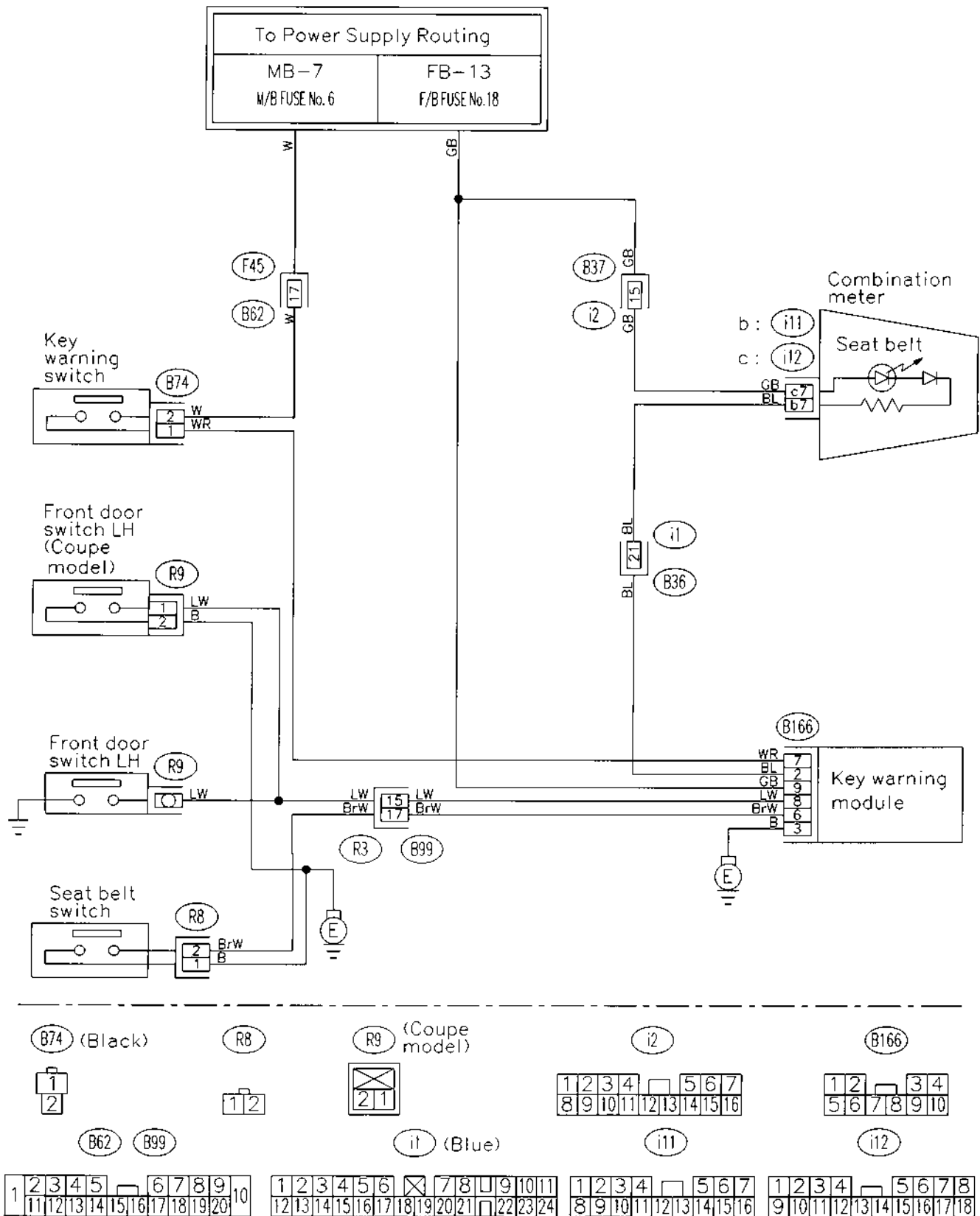
Z: REAR ACCESSORY POWER SUPPLY SYSTEM



5. Wiring Diagram

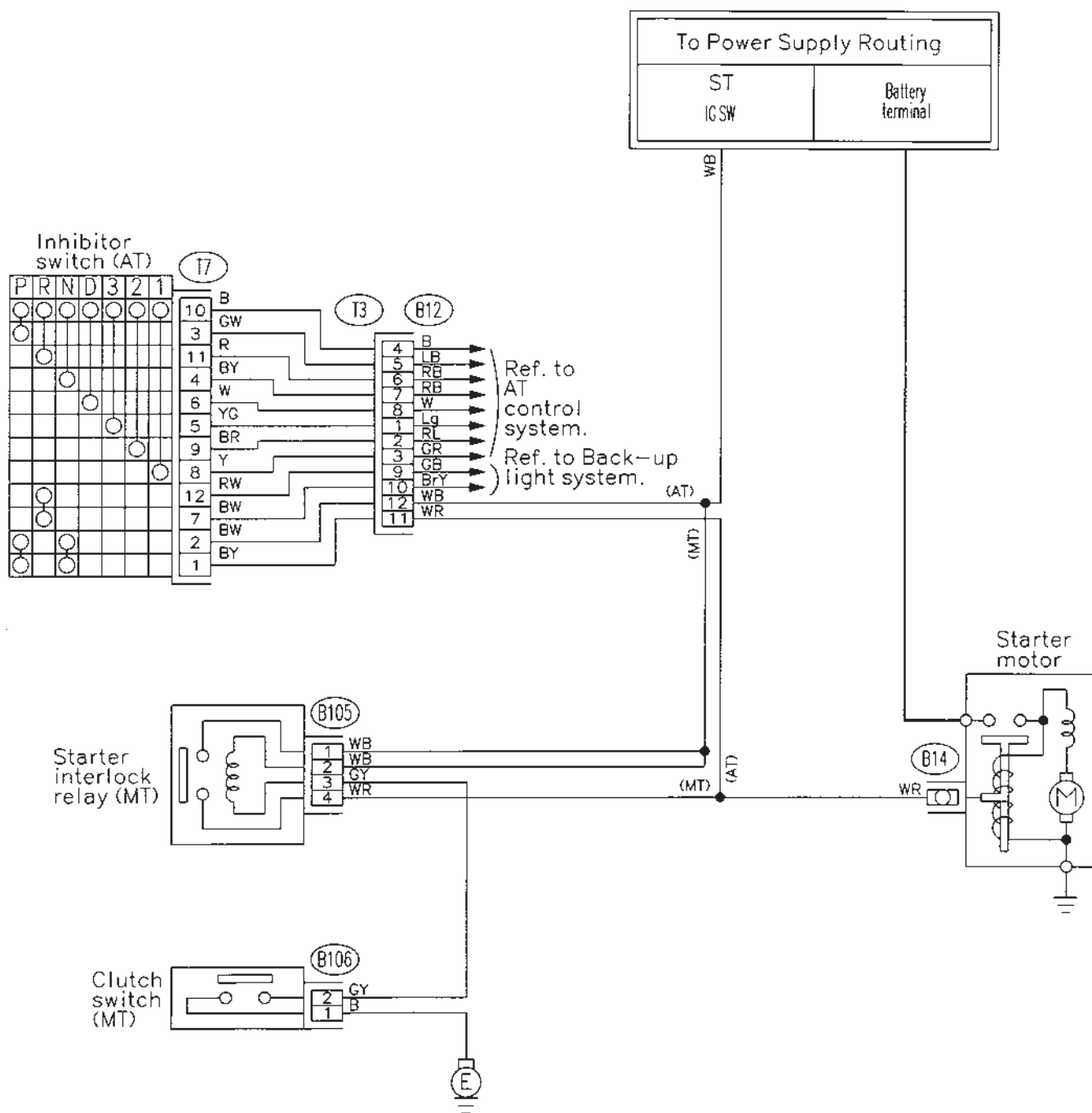


AC: SEAT BELT WARNING AND KEY WARNING SYSTEM



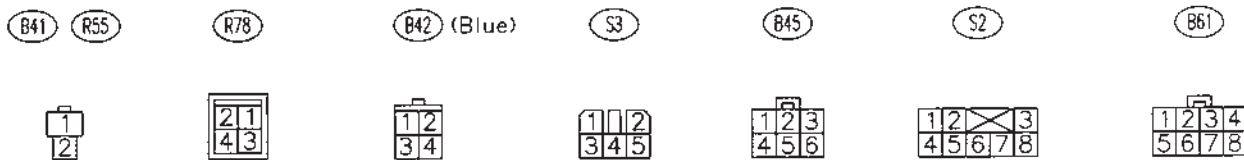
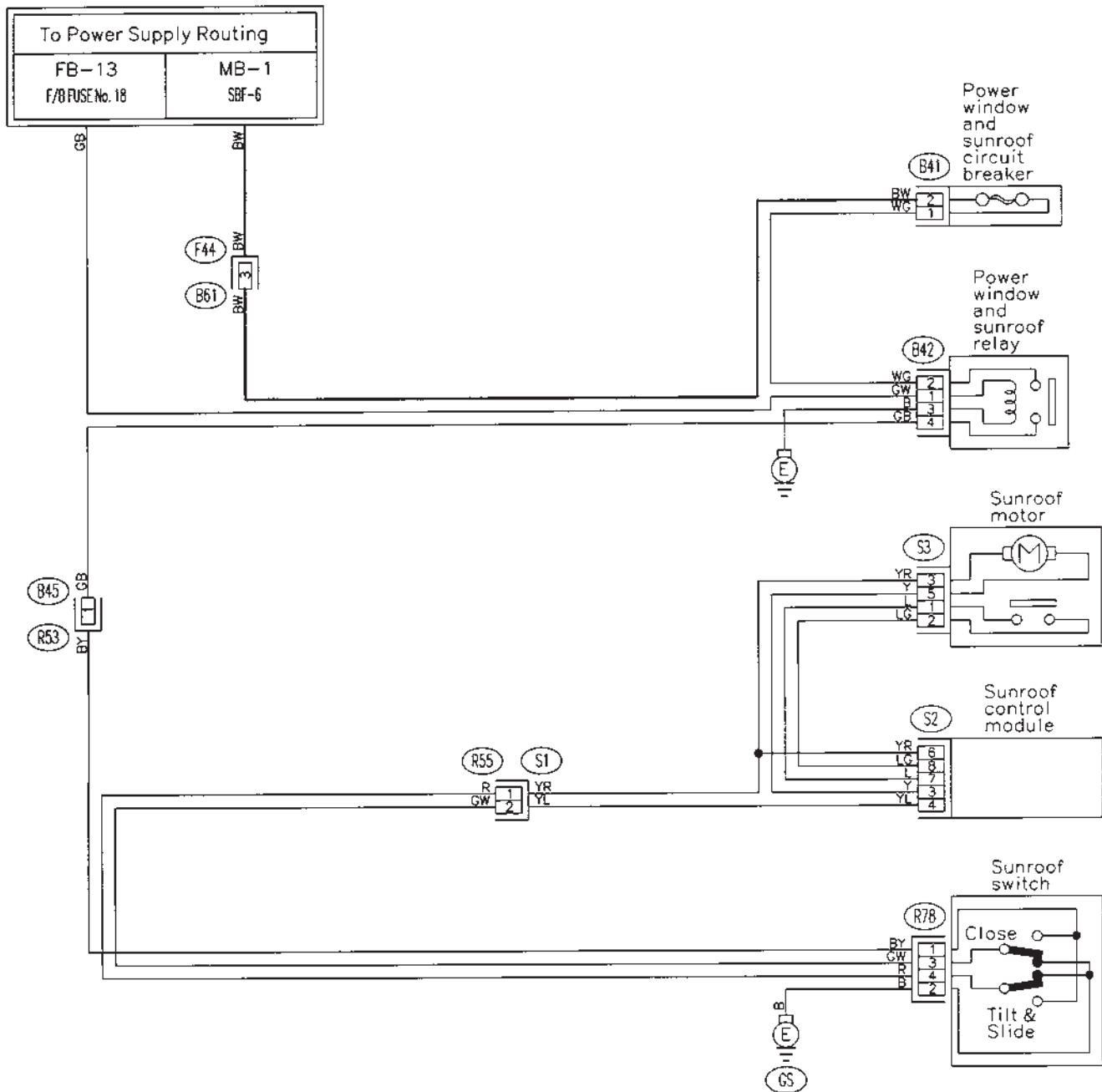
GU87-05

AD: STARTER SYSTEM

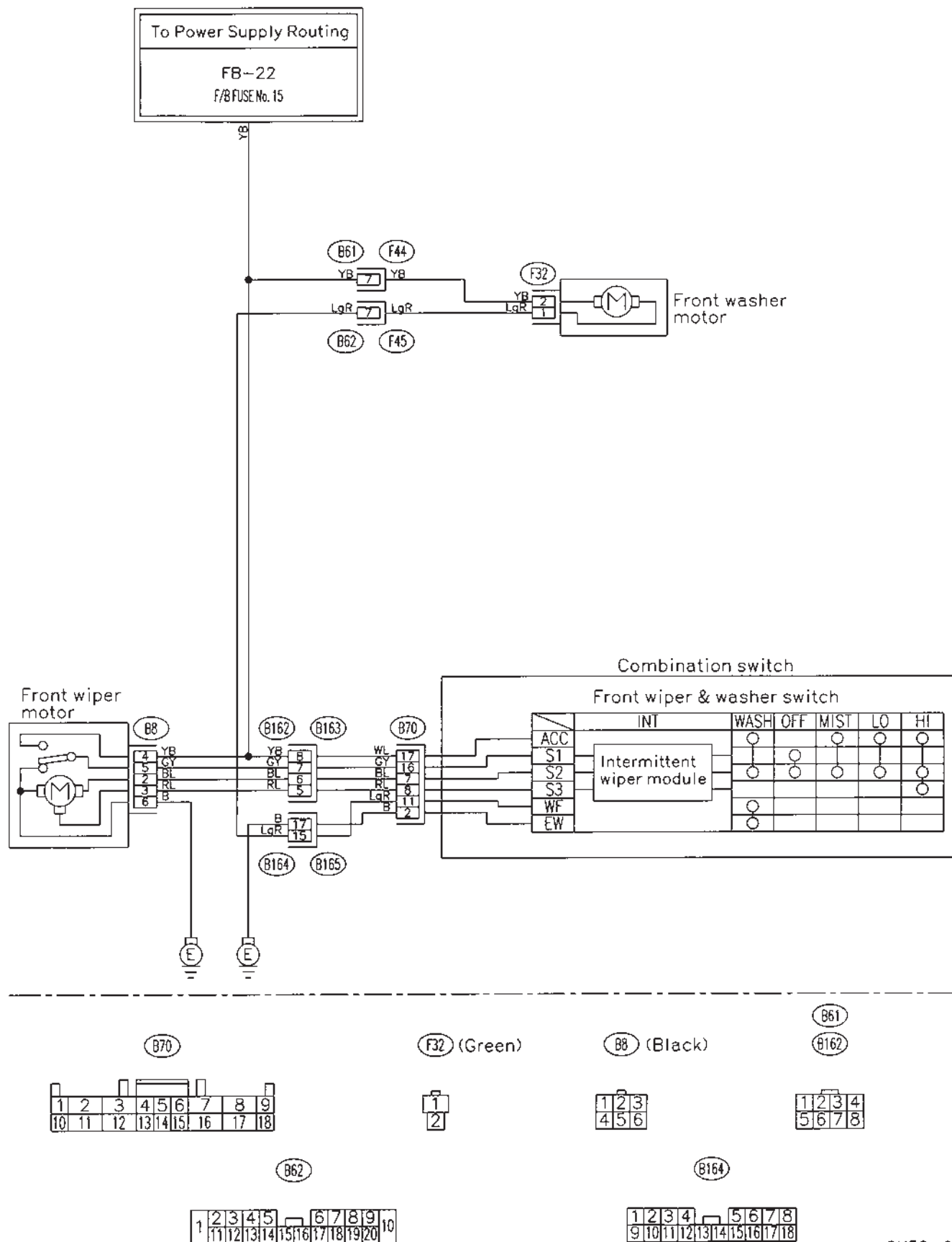


GU03-03

AE: SUNROOF SYSTEM

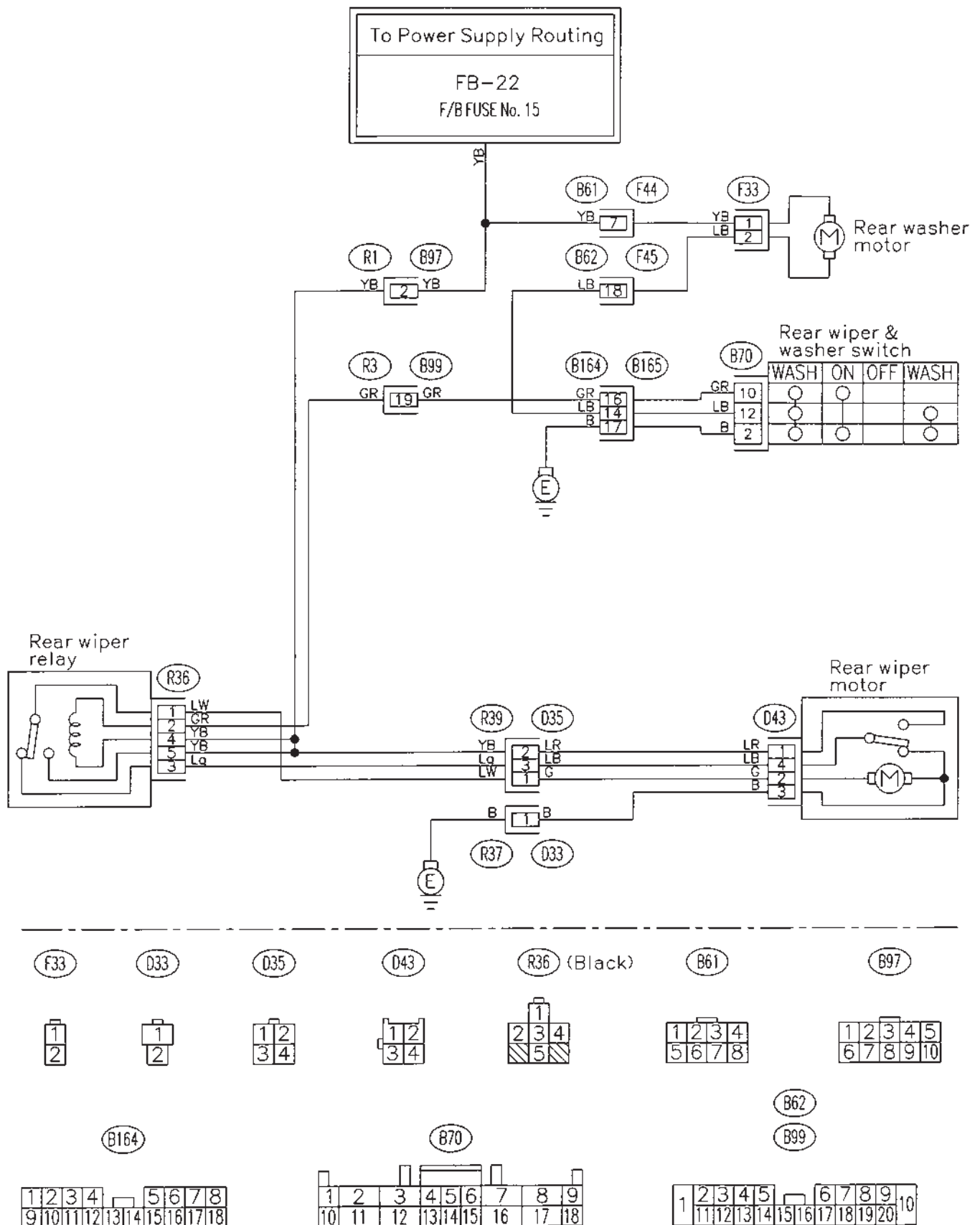


AF: WIPER AND WASHER SYSTEM (FRONT)



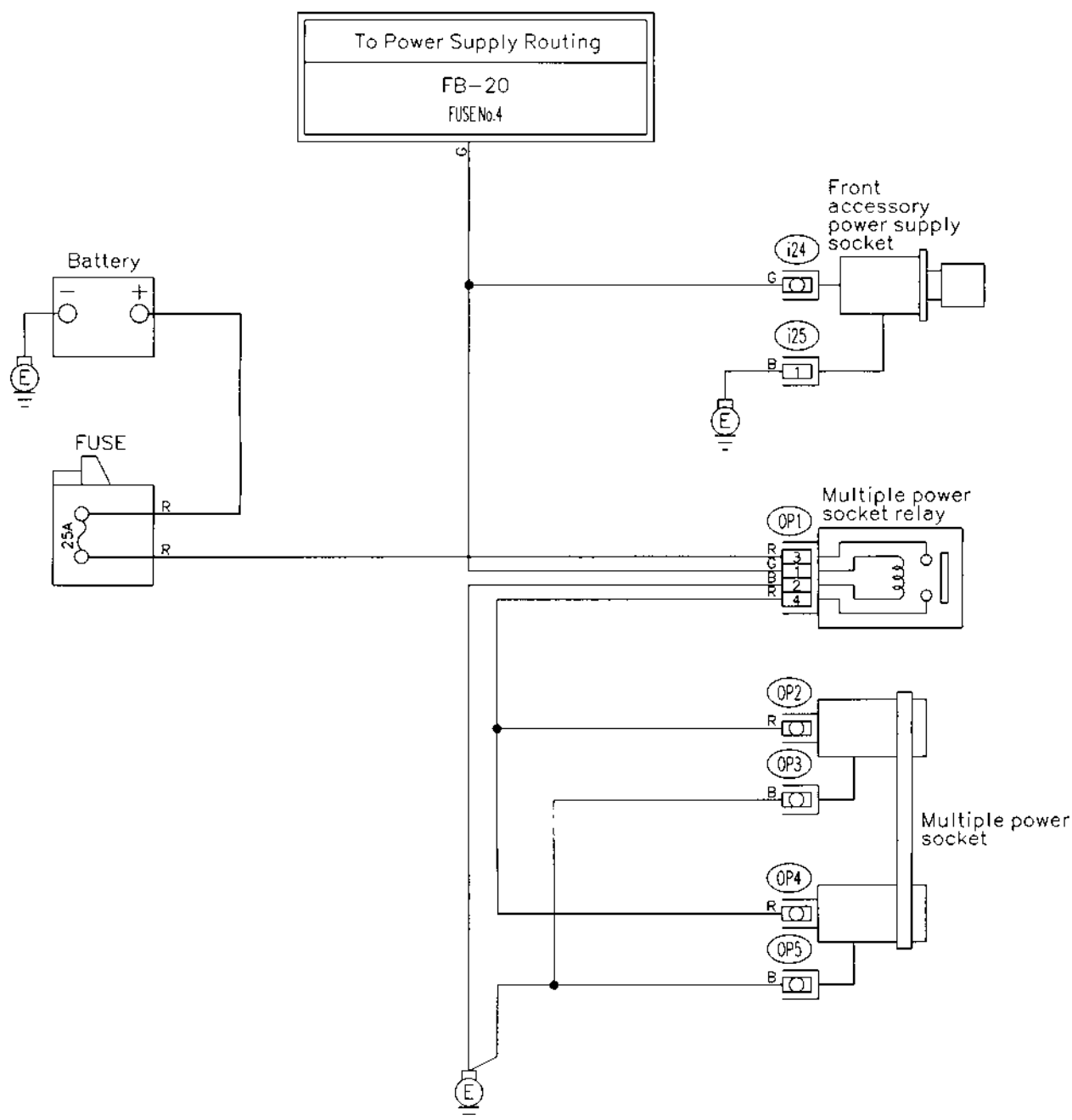
GU50-03

AG: WIPER AND WASHER SYSTEM (REAR)



GU51-04

AH: MULTIPLE POWER SUPPLY (OPTION)



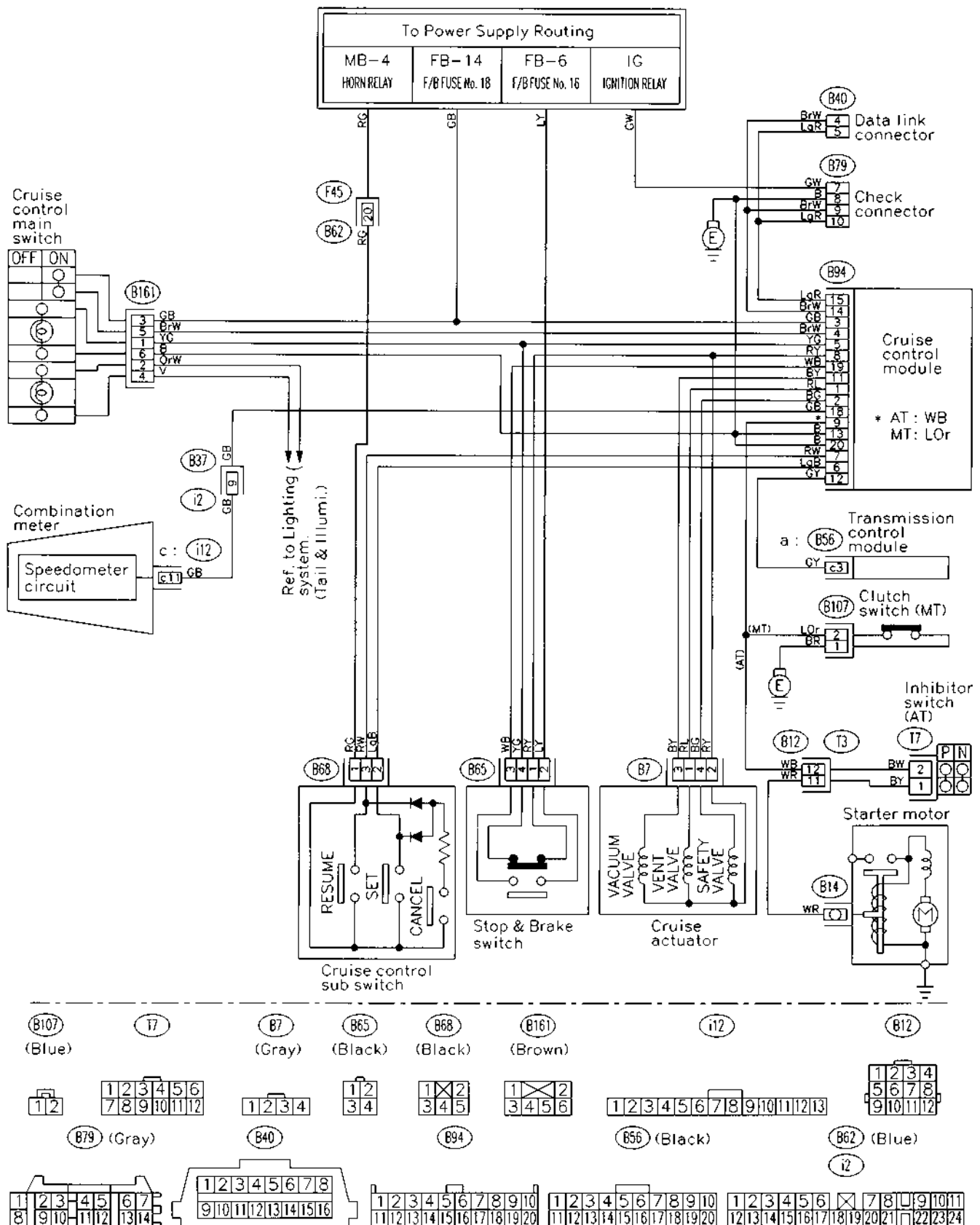
i25

OP1 (Blue)



GU82-01

AI: CRUISE CONTROL SYSTEM (OPTION)

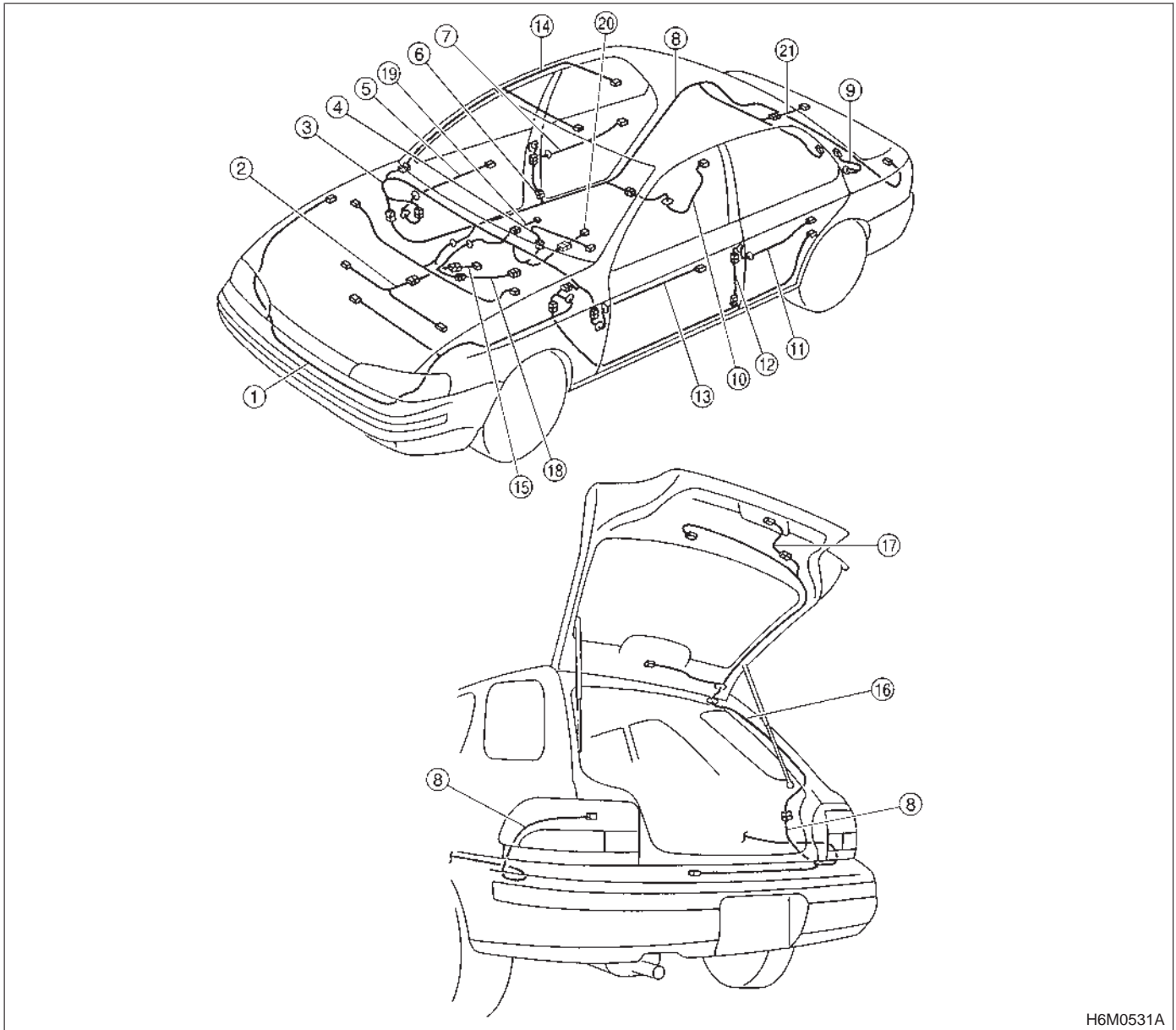


GU71-06

MEMO:

6. Electrical Wiring Harness and Ground Point

A: OVERALL LOCATION



H6M0531A

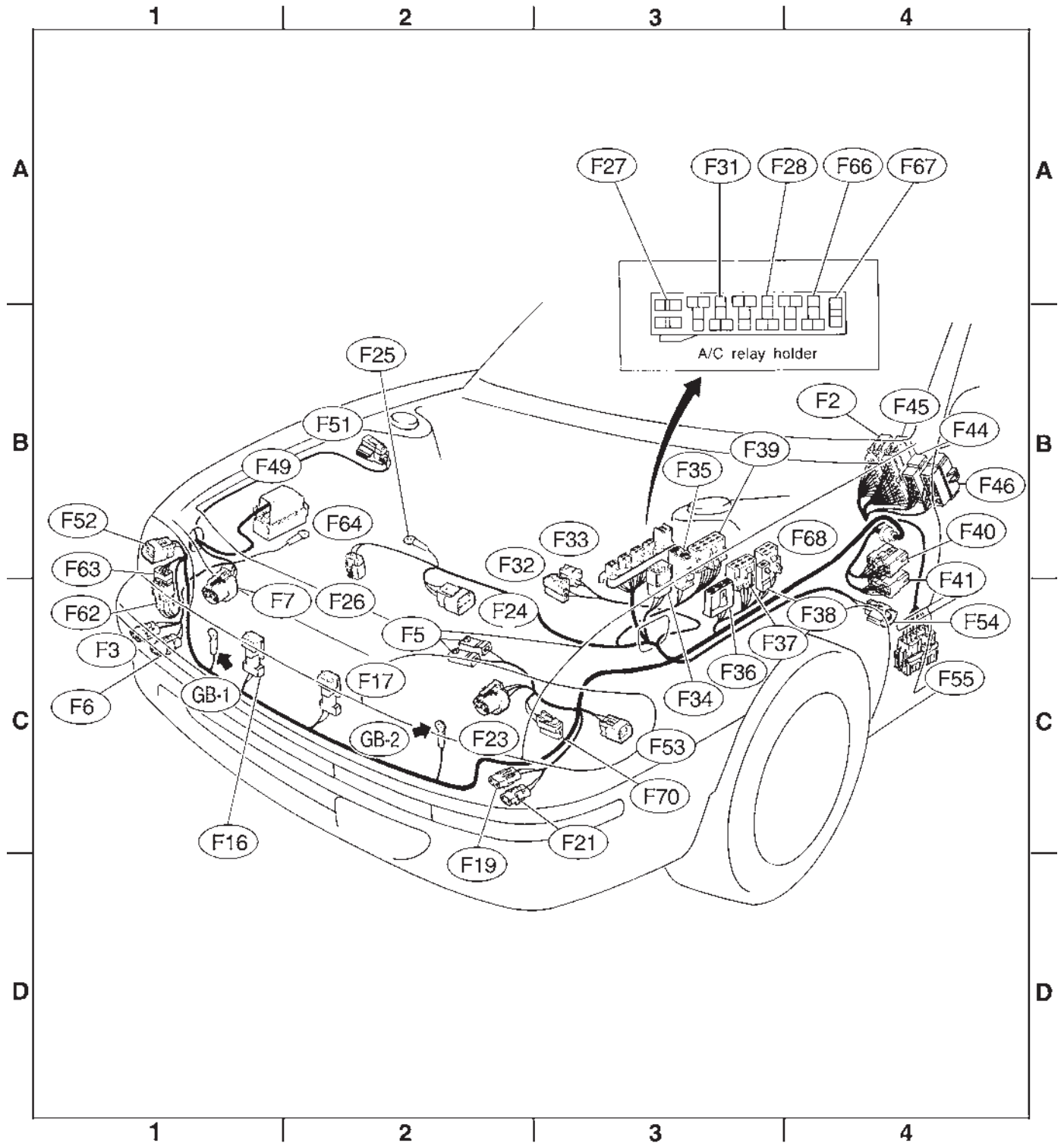
- | | | |
|------------------------------------|---------------------------------|--------------------------------------|
| (1) Front wiring harness | (8) Rear wiring harness | (15) Transmission cord |
| (2) Engine wiring harness | (9) Rear defogger cord (Ground) | (16) Rear gate cord |
| (3) Bulkhead wiring harness | (10) Fuel tank cord | (17) Rear gate lock adapter cord |
| (4) Instrument panel meter harness | (11) Rear door cord LH | (18) Rear oxygen sensor cord |
| (5) Front door cord RH | (12) Rear door adapter cord LH | (19) Instrument panel center harness |
| (6) Rear door adapter cord RH | (13) Front door cord LH | (20) Combination switch cord |
| (7) Rear door cord RH | (14) Roof cord | (21) Trunk lid cord |

B: FRONT WIRING HARNESS**1. LIST OF ITEMS**

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F2	16	Blue	B-4	B100	Bulkhead wiring harness (ABS)
F3	2	★	B-1		Front turn signal light RH
F5	1 × 2	★	B-1		Horn
F6	2	Black	B-1		Front fog light RH (2500 cc engine model)
F7	3	★	B-1		Headlight RH
F16	2	Black	B-1		Sub fan motor
F17	2	Black	B-2		Radiator main fan motor
F19	2	★	C-3		Front turn signal light LH
F21	2	Black	C-2		Front fog light LH (2500 cc engine model)
F23	3	★	B-2		Headlight LH
F24	3	Gray	B-2		A/C compressor
F25	1	★	B-2		Generator
F26	3	Green	B-2		
F27	4	★	B-3		A/C fuse (Relay holder)
F28	4	★	B-3		A/C sub fan relay (Relay holder)
F31	4	★	B-3		A/C relay (Relay holder)
F32	2	Green	B-3		Front washer motor
F33	2	★	B-3		Rear washer motor
F34	4	★	B-3		SBF holder
F35	2	★	B-3		M/B
F36	3	★	B-3		
F37	6	Black	B-3		
F38	1	★	B-3		
F39	8	Black	B-3		
F40	9	Brown	B-4		F/B
F41	7	Gray	B-4		
F44	8	★	B-4	B61	Bulkhead wiring harness
F45	20	★	B-4	B62	
F46	8	★	B-4	B108	
F49	31	★	B-2		ABS control module
F51	2	★	B-2		Side turn signal light RH
F52	2	Gray	B-1		Front clearance light RH
F53	2	Gray	C-3		Front clearance light LH
F54	2	★	B-4		Side turn signal light LH
F55	12	★	B-4	R49	Rear wiring harness (ABS)
F62	6	★	B-1	F63	Shield joint connector (ABS)
F63	6	★	B-1	F62	
F64	1	★	B-2		ABS motor ground
F66	4	★	B-3		Radiator main fan relay (Relay holder)
F67	2	★	B-3		FWD switch (Relay holder)
F68	4	Black	B-3		M/B
F70	2	★			Front fog light (Except 2500 cc engine model)

★: Non-colored

2. LOCATION

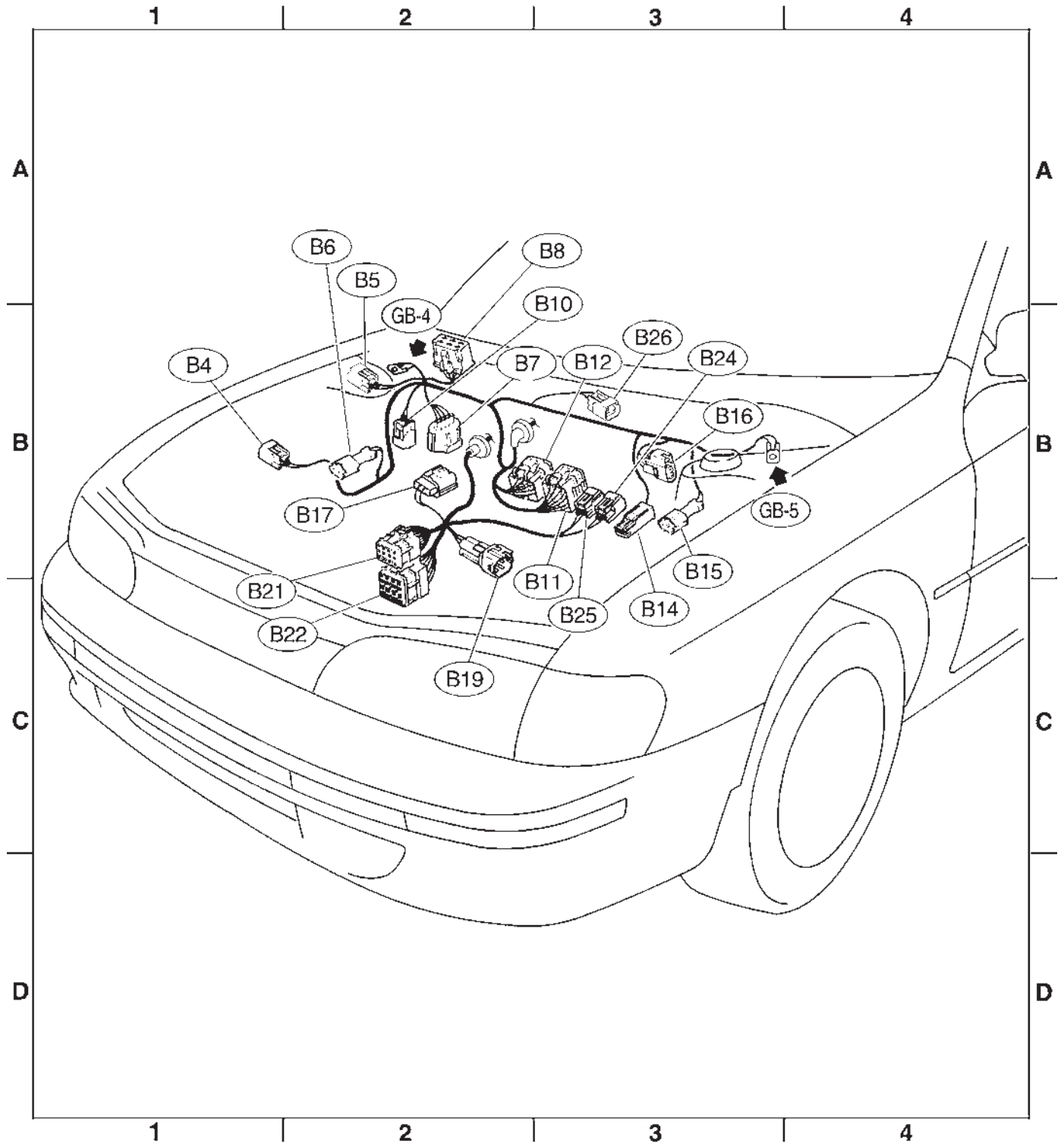


C: BULKHEAD WIRING HARNESS (IN ENGINE ROOM)**1. LIST OF ITEMS**

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B4	4	Gray	B-1		AT dropping resistor
B5	2	Gray	B-2		Resistor (Daytime running light) (Except for Canada model)
B6	2	★	B-2		ABS front sensor RH
B7	4	★	B-2		Cruise control actuator
B8	6	★	A-2		Front wiper motor
B10	2	Gray	B-2		A/C pressure switch
B11	20	Black	B-3	T4	Transmission (AT)
B12	12	★	B-3	T3	
B14	1	Black	B-3		Starter (Magnet)
B15	2	★	B-3		ABS front sensor LH
B16	2	Gray	B-3		Brake fluid level switch
B17	3	★	B-2		Vehicle speed sensor 2 (MT)
B19	10	★	B-2	E1	Oxygen sensor cord
B21	20	★	B-2	E2	Engine wiring harness
B22	16	★	B-2	E3	Engine wiring harness
B24	2	Gray	B-3	T1	Back-up light switch (MT)
B25	2	Brown	B-3	T2	Neutral position switch (MT)
B26	2	★	B-3		Resistor (Daytime running light) (For Canada model only)

★: Non-colored

2. LOCATION



D: BULKHEAD WIRING HARNESS (IN COMPARTMENT)

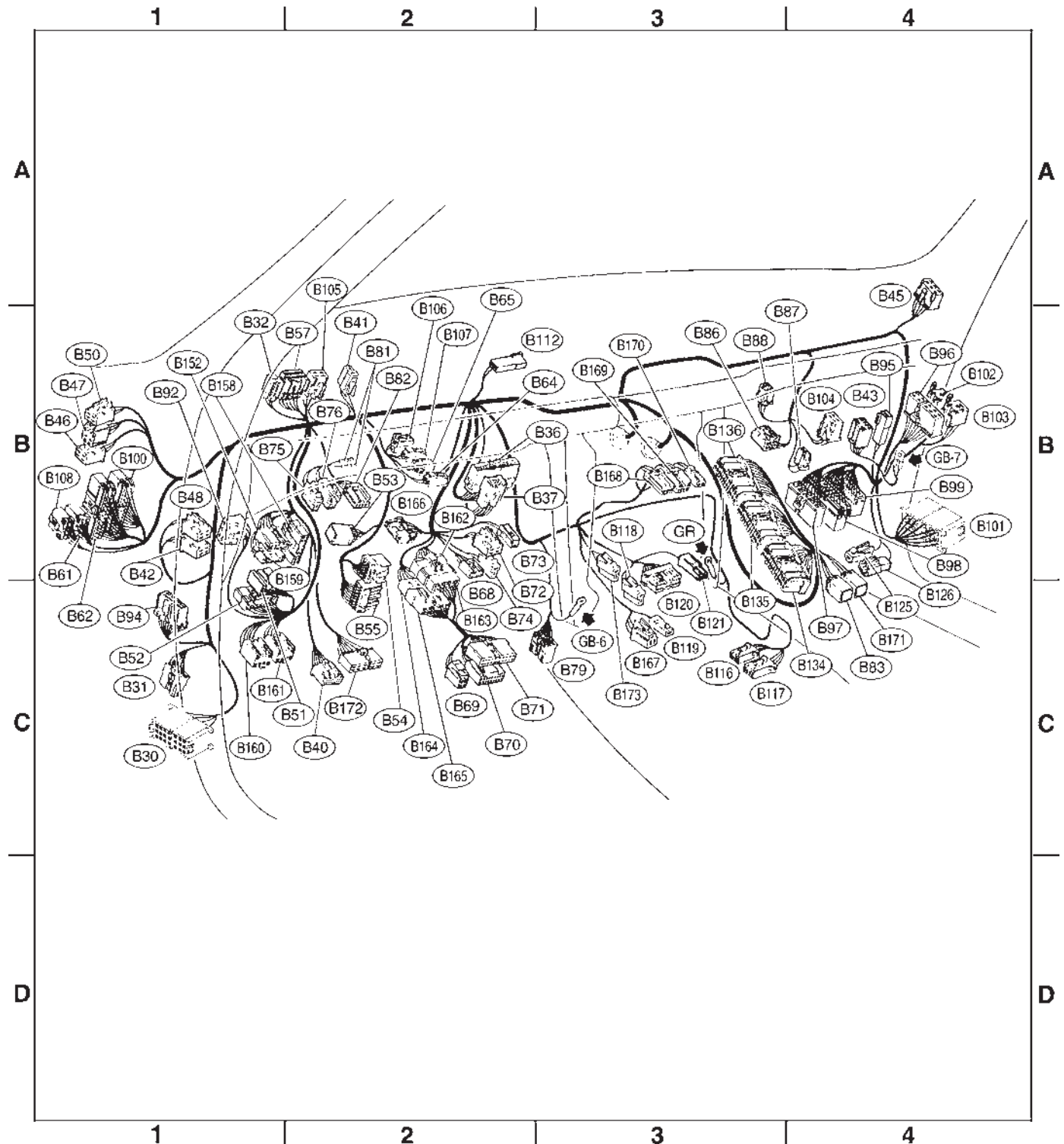
1. LIST OF ITEMS

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B30	24	★	C-1	D1	Front door cord LH
B31	7	★	C-1	AB1	SRS (Airbag) harness
B32	3	Black	B-1		Turn & hazard module
B36	24	Blue	B-2	i1	Instrument panel meter harness
B37	16	★	B-2	i2	
B40	16	★	C-2		Data link connector
B41	2	★	B-1		Power window circuit breaker
B42	4	Blue	C-1		Power window relay
B43	6	Black	B-4		Illumination control module
B45	6	★	B-4	R53	Roof cord
B46	4	Green	C-1		Fuel pump relay
B47	6	Brown	C-1		Main relay
B48	4	Red	B-1		Front fog light relay
B50	4	★	B-1		Blower relay
B51	8	Blue	C-1		F/B
B52	12	Blue	C-1		
B53	6	★	C-2		Shield joint connector (AT)
B54	24	★	C-2		Transmission control module
B55	24	Gray	C-2		
B57	12	★	B-1		Shift lock control module (AT)
B61	8	★	B-1	F44	Front wiring harness
B62	20	★	B-1	F45	
B64	2	Black	B-2		Stop light switch
B65	4	Black	B-2		Stop & brake switch (With cruise control)
B68	5	Black	C-2		Cruise control sub switch
B69	4	★	C-2		Combination switch
B70	18	★	C-2		
B71	17	★	C-2		
B72	4	Blue	C-2		Ignition switch
B73	2	★	C-2		Key lock solenoid (AT)
B74	2	Black	C-2		Key warning switch
B75	2	Green	B-2	B76	Test mode connector
B76	2	Green	B-2	B75	
B79	14	Gray	C-3		Check connector
B81	1 × 2	★	B-2		Diagnosis terminal (Ground)
B82	6	Black	B-2		Diagnosis connector
B83	6	★	C-4		Shield joint connector (E/G)
B86	4	★	B-3		Blower motor resistor
B87	2	★	B-4		Blower motor
B88	4	Brown	B-3		Evaporator thermostat switch
B92	6	★	C-1		Door lock timer
B94	20	★	C-1		Cruise control module
B95	2	★	B-4		Diode (Daytime running light)
B96	10	★	B-4		Daytime running light control module
B97	10	Blue	C-4	R1	Rear wiring harness
B98	20	Black	C-4	R2	
B99	20	★	C-4	R3	

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B100	16	Blue	B-1	F2	Front wiring harness (With ABS model)
B101	24	★	C-4	D11	Front door cord RH
B102	5	★	B-4		Daytime running light relay
B103	4	Blue	B-4		Daytime running light hi-beam relay
B104	4	Red	B-4		Rear accessory power supply relay
B105	4	Blue	B-2		Starter interlock relay (MT)
B106	2	★	B-2		Clutch switch (MT)
B107	2	Blue	B-2		Clutch switch (Cruise control)
B108	8	★	B-1	F46	Front wiring harness
B112	2	★	B-2		Diode (Front fog light)
B116	4	Black	C-3		Select lever illumination light (AT)
B117	4	★	C-3		Parking position switch & shift lock solenoid (AT)
B118	2	★	C-3		CD player illumination light
B119	1	★	C-3		Front accessory power supply (Power)
B120	14	★	C-3		Radio
B121	1	★	C-3		Audio ground
B125	1	Green	C-4	B126	Test mode connector
B126	1	Green	C-4	B125	
B134	35	★	C-3		Engine control module
B135	28	★	C-3		
B136	30	★	C-3		
B152	7	★	C-1		F/B
B158	12	★	C-1		F/B
B159	10	Gray	C-1		F/B
B160	6	Gray	C-1		Front fog light switch
B161	6	Brown	C-1		Cruise control main switch
B162	8	★	C-2	B163	Combination switch cord
B163	8	★	C-2	B162	Bulkhead wiring harness
B164	18	★	C-2	B165	Combination switch cord
B165	18	★	C-2	B164	Bulkhead wiring harness
B166	10	★	C-2		Key warning module
B167	3	★	C-3		Front accessory power supply (Ground)
B168	3	★	B-3		A/C switch
B169	6	★	B-3		Blower fan switch
B170	2	★	B-3		Mode control panel illumination light
B171	6	★	C-4		Joint connector (AVSS)
B172	10	★	C-2		Short connector
B173	2	★	B-3		Ash tray illumi. light

★: Non-colored

2. LOCATION

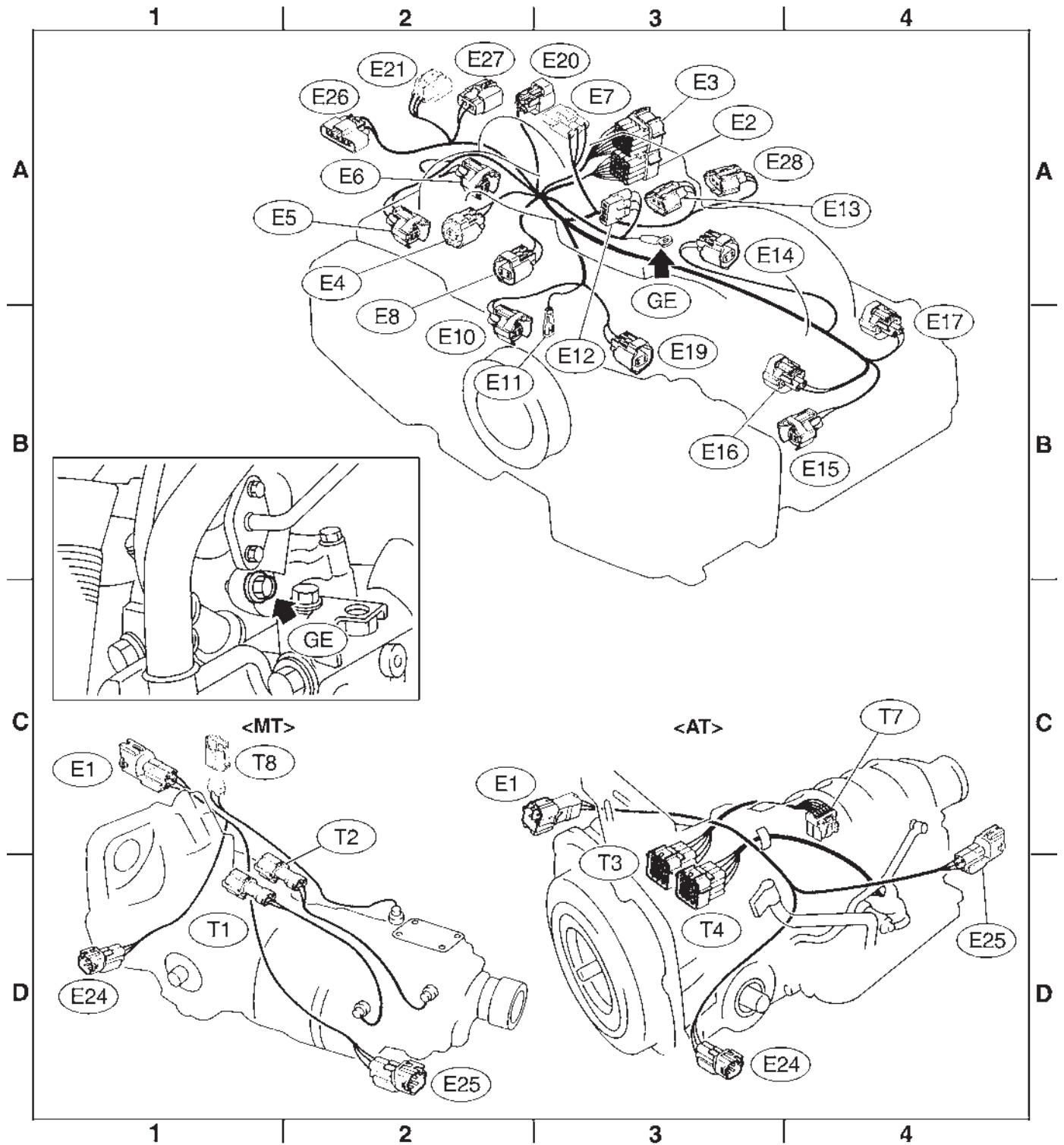


E: ENGINE WIRING HARNESS AND TRANSMISSION CORD**1. LIST OF ITEMS**

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
E1	6	★	C-1·C-2	B19	Bulkhead wiring harness
E2	20	Gray	A-3	B21	
E3	16	Brown	A-3	B22	
E4	2	Black	A-2		Purge control solenoid valve
E5	2	Gray	A-2		Injector #1 (Except 2200 cc California spec. vehicles)
		Dark gray			Injector #1 (2200 cc California spec. vehicles)
E6	2	Gray	A-2		Injector #3 (Except 2200 cc California spec. vehicles)
		Dark gray			Injector #3 (2200 cc California spec. vehicles)
E7	6	Black	A-3		Idle air control solenoid valve (Except 2200 cc California spec. vehicles)
	3	Gray			Idle air control solenoid valve (2200 cc California spec. vehicles)
E8	3	Gray	A-2		Engine coolant temperature sensor and thermometer
E10	2	Gray	A-2		Crankshaft position sensor
E11	1	★	A-3		Oil pressure switch
E12	4	Gray	A-3		Ignition coil
E13	4	Black	A-3		Throttle position sensor (Except 2200 cc California spec. vehicles)
	3				Throttle position sensor (2200 cc California spec. vehicles)
E14	2	★	A-3		Knock sensor
E15	2	Light gray	B-3		Camshaft position sensor
E16	2	Gray	B-3		Injector #2 (Except 2200 cc California spec. vehicles)
		Dark gray	B-3		Injector #2 (2200 cc California spec. vehicles)
E17	2	Gray	B-4		Injector #4 (Except 2200 cc California spec. vehicles)
		Dark gray	B-4		Injector #4 (2200 cc California spec. vehicles)
E19	2	Gray	B-3		Power steering switch
E20	2	Gray	A-3		Intake air temperature sensor (2200 cc California spec. vehicles)
E21	2	Black	A-2		Pressure sensor (Except 2200 cc California spec. vehicles)
E24	4	★	D-1·D-3		Front oxygen sensor
E25	4	★	D-2·D-4		Rear oxygen sensor
E26	5	Gray	A-2		Mass air flow sensor (Except 2200 cc California spec. vehicles)
E27	2	Gray	A-2		Pressure sources switching solenoid valve (Except 2200 cc California spec. vehicles)
E28	3	Gray	A-3		Intake manifold pressure sensor (2200 cc California spec. vehicles)
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
T1	2	Gray	C-1	B24	Bulkhead wiring harness (MT)
T2	2	Brown	C-1	B25	
T3	12	★	C-3	B12	Bulkhead wiring harness (AT)
T4	16	★	C-3	B11	
T7	12	★	C-4		Inhibitor switch (AT)
T8	2	★	C-1	B17	Bulkhead wiring harness (MT)
★: Non-colored					

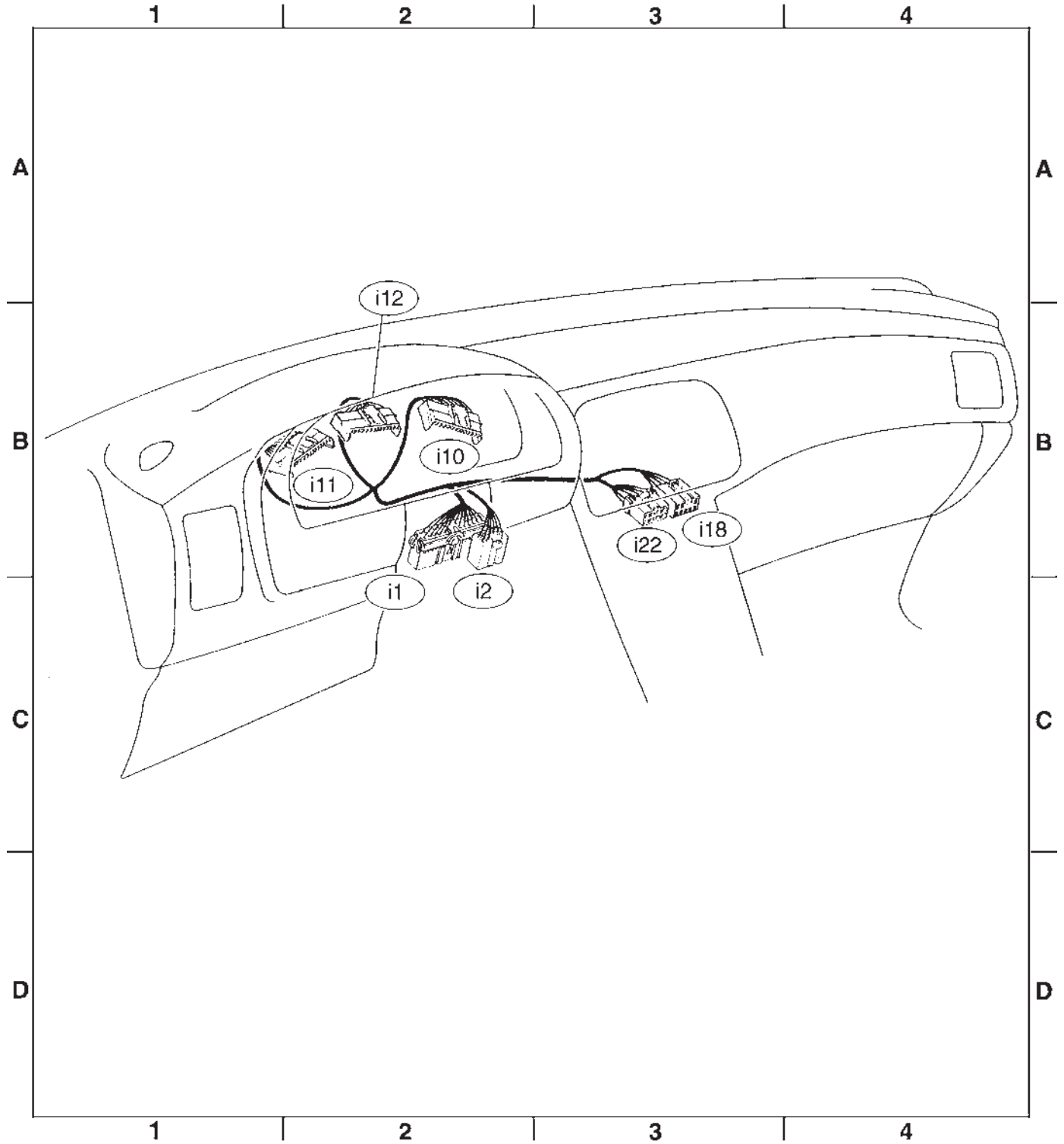
2. LOCATION



F: INSTRUMENT PANEL WIRING HARNESS**1. LIST OF ITEMS**

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
i1	24	Blue	B-2	B36	Bulkhead wiring harness
i2	16	★	B-2	B37	
i10	18	★	B-2		Combination meter
i11	16	★	B-2		
i12	10	★	B-2		
i18	8	★	B-3		Rear defogger switch
i22	8	★	B-3		Hazard switch
★: Non-colored					

2. LOCATION

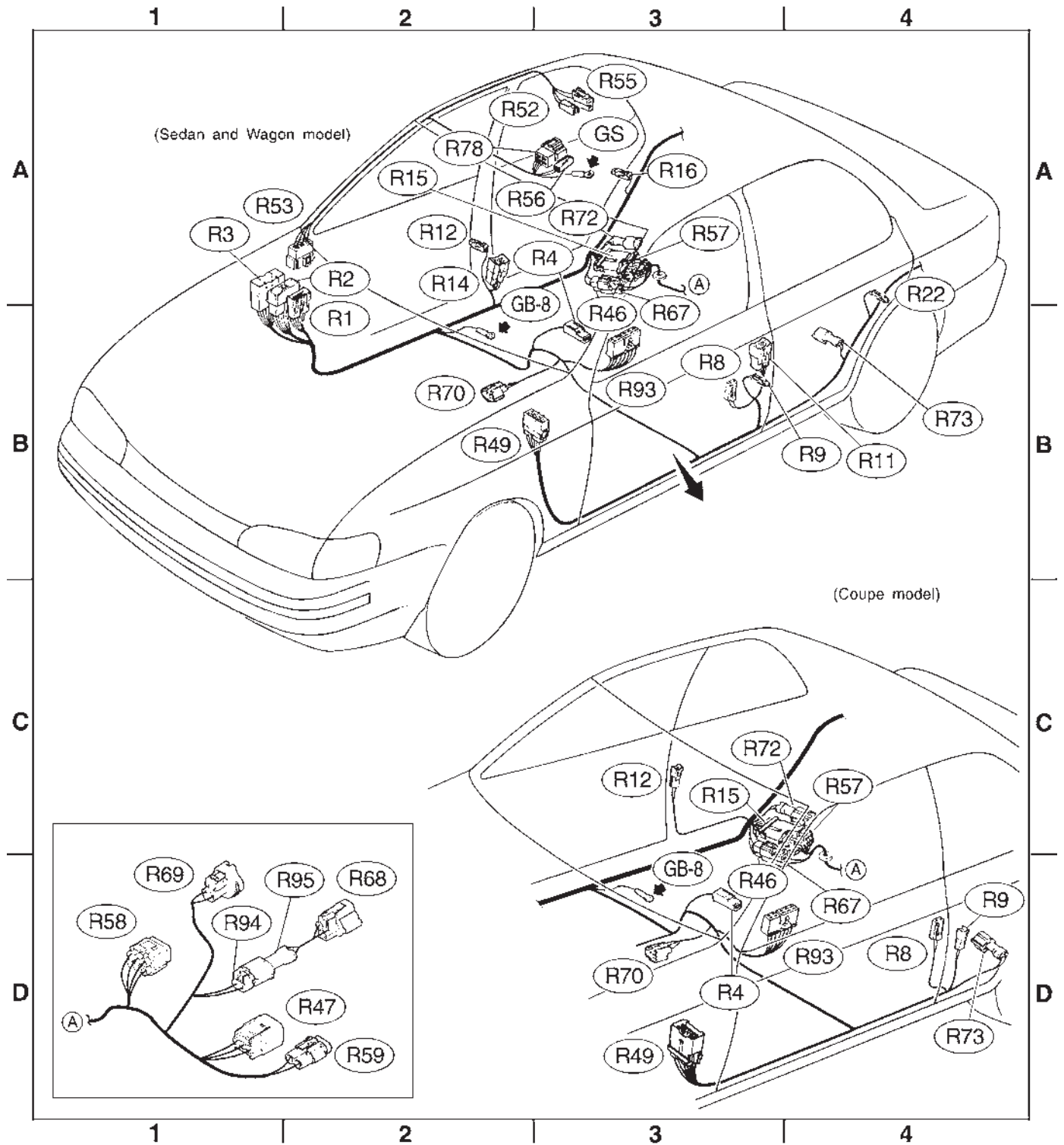


G: REAR WIRING HARNESS**1. LIST OF ITEMS**

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R1	10	Blue	B-2	B97	Bulkhead wiring harness
R2	20	Black	B-2	B98	
R3	20	★	B-2	B99	
R4	1	Black	B-3		Parking brake switch
R8	2	★	B-3		Seat belt switch
R9	1	Brown	B-3		Front door switch LH (Sedan and Wagon model)
	2	★	D-4		Front door switch LH (Coupe model)
R11	8	★	B-3	D21	Rear door adapter cord LH
R12	1	Brown	B-2		Front door switch RH (Sedan and Wagon model)
	2	★	C-3		Front door switch RH (Coupe model)
R14	8	★	B-2	D27	Rear door adapter cord RH
R15	12	★	B-3	R57	Fuel tank cord
R16	1	Brown	A-3		Rear door switch RH
R22	1	Brown	B-4		Rear door switch LH
R46	2	★	B-3	R67	Fuel tank cord
R47	3	★	C-1		Fuel tank pressure sensor
R49	12	★	B-3	F55	Front wiring harness (With ABS model)
R52	2	★	A-3		Room light
R53	6	★	B-2	B45	Bulkhead wiring harness
R55	2	★	A-3		Sunroof control module and sunroof motor
R56	2	★	A-3		Spot light
R57	12	★	B-3	R15	Rear wiring harness
R58	6	★	C-1/D-1		Fuel gauge module & fuel pump assembly
R59	2	★	C-2/D-2		Fuel gauge sub module
R67	2	★	B-3	R46	Rear wiring harness
R68	2	Black	C-2/D-1		Pressure control solenoid valve
R69	2	★	C-1/D-1		Drain valve
R70	3	★	B-2		ABS G sensor
R72	2	★	B-3		Rear ABS sensor RH
R73	2	★	B-4		Rear ABS sensor LH
R78	4	★	A-3		Sunroof switch
R93	10	★	B-3		Remote control rearview mirror switch
R94	2	Gray	C-1	R95	Pressure control solenoid valve cord
R95	2	Gray	C-1	R94	Fuel tank cord

★: Non-colored

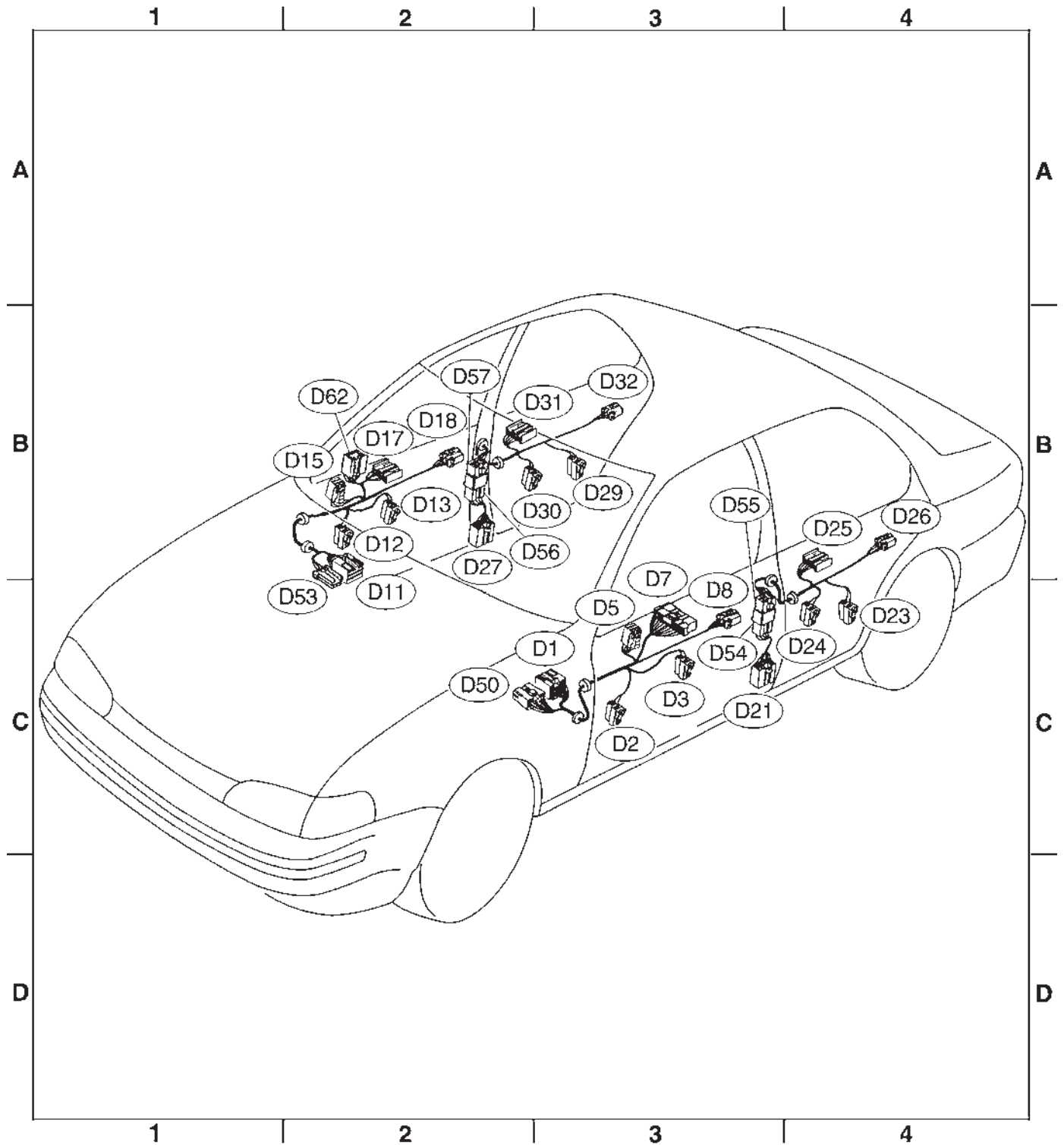
2. LOCATION



H: DOOR CORD**1. LIST OF ITEMS**

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D1	13	★	C-3	B30	Bulkhead wiring harness
D2	2	★	C-3		Front speaker LH
D3	2	Green	C-3		Front power window motor LH
D5	6	★	C-3		Remote control rearview mirror LH
D7	16	★	C-3		Power window main switch (Sedan and Wagon model)
	12	★	C-3		Power window main switch (Coupe model)
D8	4	★	C-3		Front door lock actuator LH
D11	13	★	B-2	B101	Bulkhead wiring harness
D12	2	★	B-2		Front speaker RH
D13	2	Green	B-2		Front power window motor RH
D15	6	★	B-2		Remote control rearview mirror RH
D17	5	★	B-2		Front power window sub switch RH
D18	4	★	B-2		Front door lock actuator RH
D21	8	★	C-3	R11	Rear wiring harness
D23	2	★	C-4		Rear door speaker LH
D24	2	Green	C-4		Rear power window motor LH
D25	5	★	B-4		Rear power window sub switch LH
D26	4	★	B-4		Rear door lock actuator LH
D27	8	★	B-2	R14	Rear wiring harness
D29	2	★	B-3		Rear door speaker RH
D30	2	Green	B-3		Rear power window motor RH
D31	5	★	B-2		Rear power window sub switch RH
D32	4	★	B-3		Rear door lock actuator RH
D50	9	★	B-2	B113	Bulkhead wiring harness
D53	3	★	B-2	B124	Bulkhead wiring harness
D54	8	★	C-3	D55	Rear door cord LH
D55	8	★	C-3	D54	Rear door adapter cord LH
D56	8	★	B-2	D57	Rear door cord RH
D57	8	★	B-2	D56	Rear door adapter cord RH
D62	8	★	B-2		Door lock switch RH
★: Non-colored					

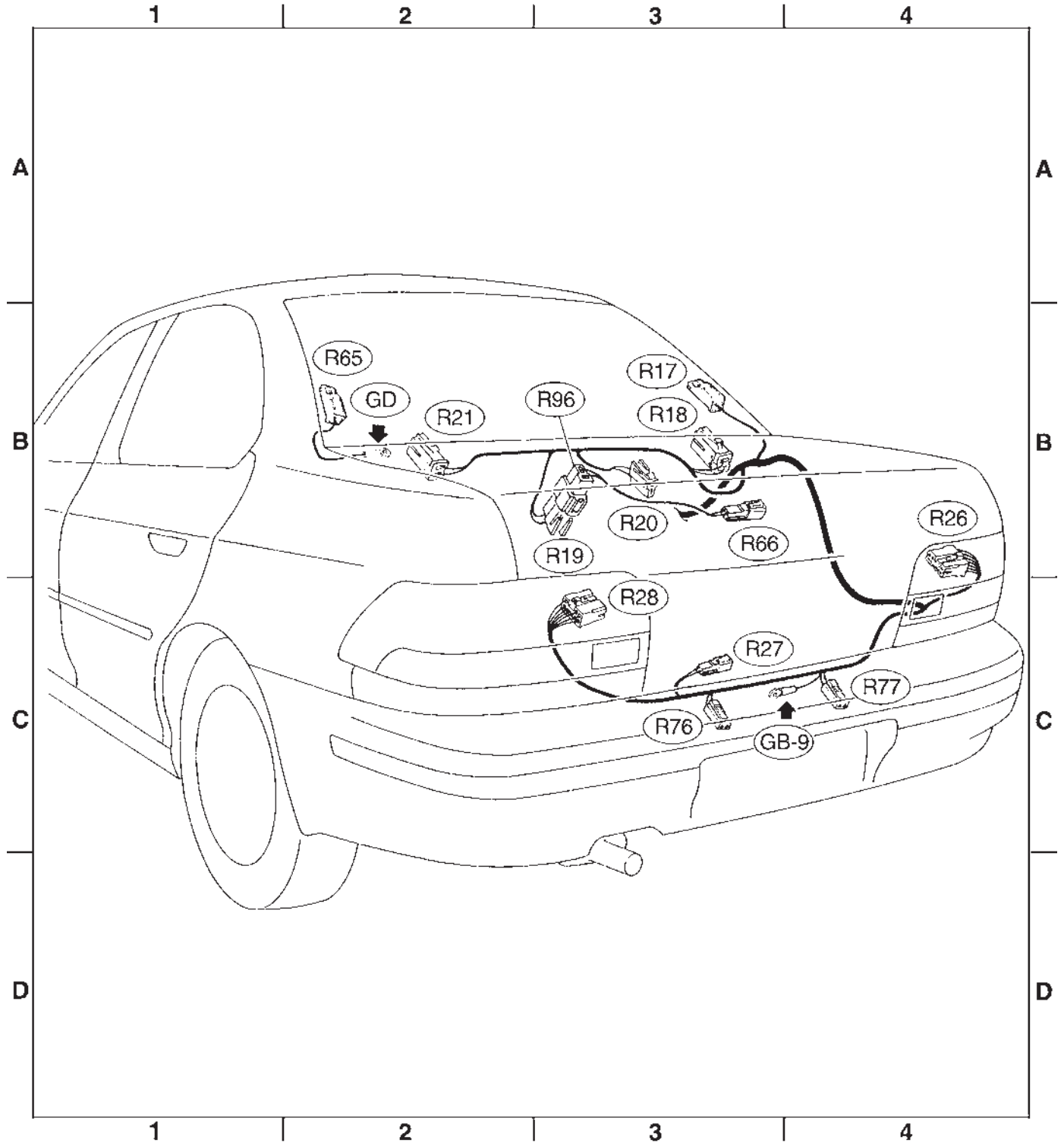
2. LOCATION



I: REAR AND WIRING HARNESS OF SEDAN AND COUPE**1. LIST OF ITEMS**

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R17	1	Black	B-3		Rear defogger (Power)
R18	2	Black	B-3		Rear speaker RH
R19	2	★	B-3		High-mount stop light (Sedan)
	2	★	B-3	R96	Trunk lid cord (Coupe-rear spoiler)
R20	2	Black	B-3		Trunk room light
R21	2	Black	B-2		Rear speaker LH
R26	7	★	B-4		Rear combination light RH
R27	2	★	C-3		Trunk room light switch
R28	7	★	C-3		Rear combination light LH
R65	1	Black	B-2		Rear defogger (Ground)
R66	2	Black	B-3		High-mount stop light (Coupe-rear spoiler)
R76	2	★	C-3		License plate light LH
R77	2	★	C-4		License plate light RH
R96	2	Black	B-3	R19	Rear wiring harness
★: Non-colored					

2. LOCATION

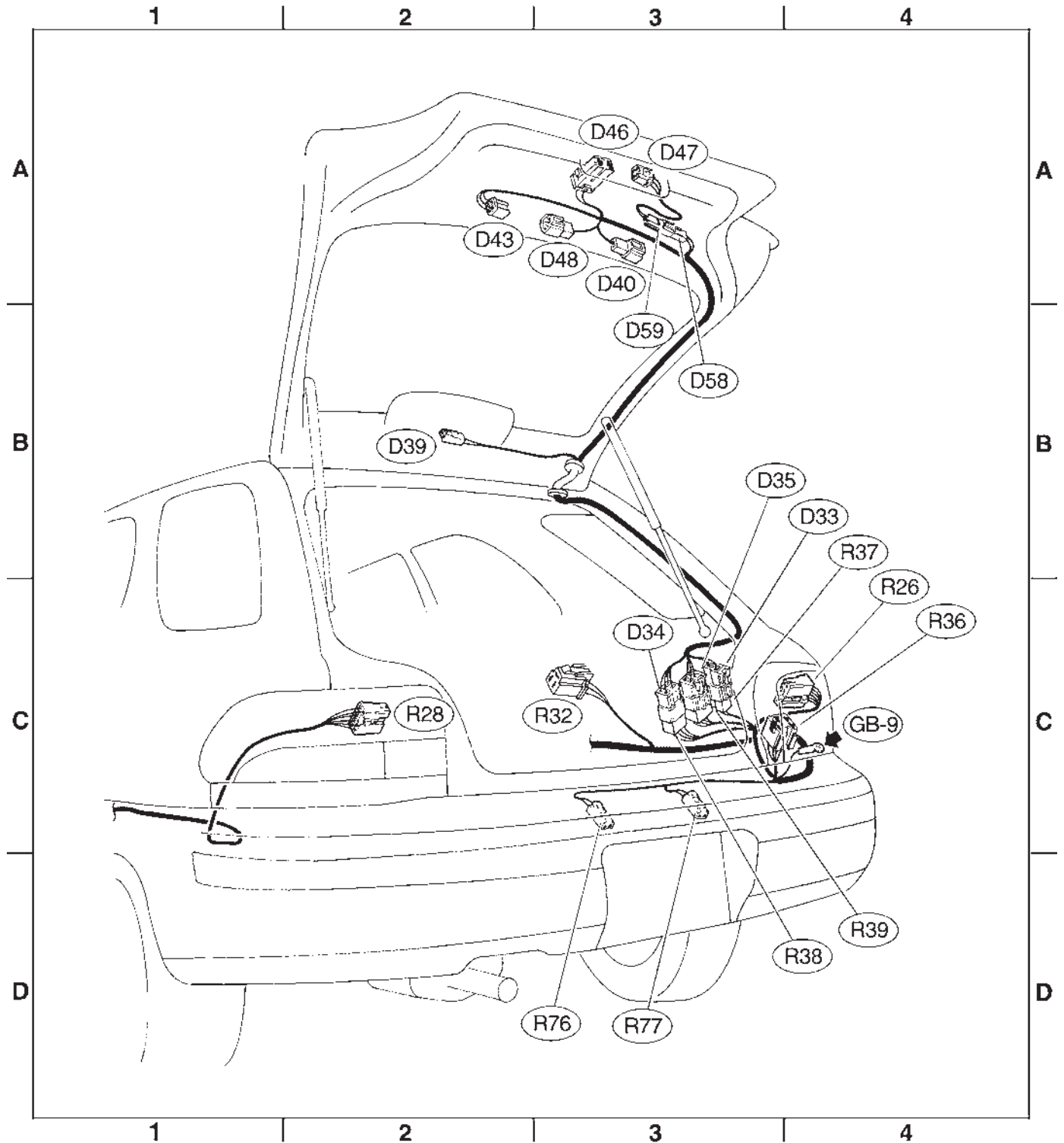


J: REAR END WIRING HARNESS OF WAGON**1. LIST OF ITEMS**

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R26	7	★	C-4		Rear combination light RH
R28	7	★	C-2		Rear combination light LH
R32	3	★	C-3		Rear accessory power supply
R36	5	Black	C-4		Rear wiper relay
R37	2	★	C-3	D33	Rear gate cord
R38	4	★	C-3	D34	
R39	4	★	C-3	D35	
R76	2	★	C-3		License plate light LH
R77	2	★	C-3		License plate light RH
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D33	2	★	C-3	R37	Rear wiring harness
D34	4	★	C-3	R38	
D35	4	★	C-3	R39	
D39	2	★	B-2		High-mount stop light
D40	1	★	B-3		Rear defogger (Power)
D43	4	★	A-3		Rear wiper motor
D46	2	Black	A-3		Rear gate latch switch
D47	4	★	A-3		Rear gate lock actuator
D48	1	★	A-3		Rear defogger (Ground)
D58	2	★	A-3	D59	Rear gate lock adapter cord
D59	2	★	A-3	D58	Rear gate cord
★: Non-colored					

2. LOCATION



MEMO: