CHASSIS SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G1870GE5

DIFFERENTIALS

DI

1. General Description

A: SPECIFICATIONS

When replacing a rear differential assembly, select the correct one according to the following table.

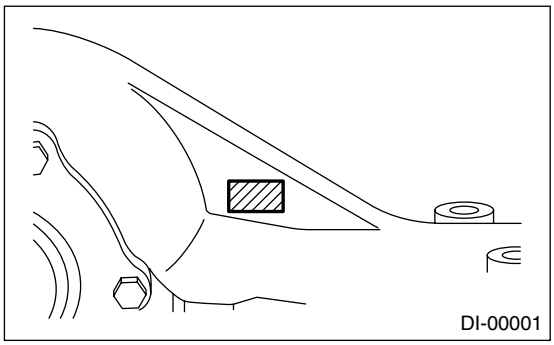
NOTE:
Using the different rear differential assembly causes the drive line and tires to “drag” or emit abnormal noise.

MODEL	1.6 L		2.0 L	
	AT	MT	AT	MT
Rear differential type	VA-type model without LSD			T-type model without LSD
Identification	XP	XN		EG
Type of gear	Hypoid gear			
Gear ratio (Number of gear teeth)	4.444 (40/9)	4.111 (37/9)		3.900 (39/10)
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)			
Rear differential gear oil	GL-5 (75W-90)			

MODEL	2.5 L		2.0 L Turbo		
	AT	MT	AT	MT	
	Australia			Except Australia	Australia
Rear differential type	T-type model with LSD				
LSD type	Viscous coupling		SURETRAC®	Viscous coupling	SURETRAC®
Identification	EJ		EM	EF	EM
Type of gear	Hypoid gear				
Gear ratio (Number of gear teeth)	4.111 (37/9)		4.444 (40/9)	3.545 (39/11)	4.444 (40/9)
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)				
Rear differential gear oil	GL-5 (75W-90)				

MODEL	2.0 L Turbo STi			
	6MT			
	Except Australia	Australia	Except Australia	Australia
Rear differential type	T-type model with LSD			
LSD type	SURETRAC®		Mechanical	
Identification	HJ	HG	HN	HK
Type of gear	Hypoid gear			
Gear ratio (Number of gear teeth)	3.545 (39/11)	3.900 (39/10)	3.545 (39/11)	3.900 (39/10)
Oil capacity	0.9 — 1.1 ℓ (1.0 — 1.2 US qt, 0.8 — 1.0 Imp qt)			
Rear differential gear oil	GL-5 (75W-90)		GL-5 (90)	

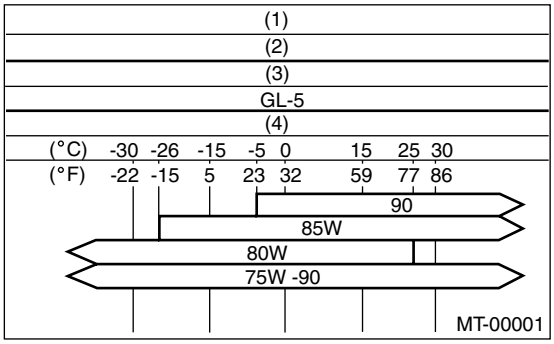
- **Identification**



- **Rear differential gear oil**

Recommended oil
Model without mechanical LSD:
GL-5 (75W-90)
Model with mechanical LSD:
GL-5 (90)

CAUTION:
Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.



(1) Item
(2) Differential gear oil
(3) API classification
(4) SAE viscosity No. and application temperature

1. SERVICE DATA

Front and rear bearing preload at companion flange bolt hole N (kgf, lb)	New bearing	T-type	Except for STi model	18.1 — 38.8 (1.8 — 4.0, 4.1 — 8.7)
			STi model	Except for model without mechanical LSD: 25.9 — 41.5 (2.6 — 4.2, 5.8 — 9.3) Model with mechanical LSD: 24.1 — 38.6 (2.5 — 3.9, 5.4 — 8.7)
		VA-type		12.7 — 32.4 (1.3 — 3.3, 2.9 — 7.3)
Side gear backlash mm (in)		T-type		0.10 — 0.20 (0.0039 — 0.0079)
		VA-type		0.05 — 0.15 (0.0020 — 0.0059)
Side bearing standard width mm (in)				20.00 (0.7874)
Crown gear to drive pinion backlash mm (in)		T-type		0.10 — 0.20 (0.0039 — 0.0079)
		VA-type		0.10 — 0.15 (0.0039 — 0.0059)
Crown gear runout on its back surface mm (in)				Less than 0.05 (0.0020)

2. ADJUSTING PARTS

• VA-type

Front and rear bearing preload at companion flange bolt hole N (kgf, lb)	New bearing	12.7 — 32.4 (1.3 — 3.3, 2.9 — 7.3)
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 mm (in)	0.05 — 0.15 (0.0020 — 0.0059)	

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 mm (in)	Limit	0.10 — 0.15 (0.0039 — 0.0059)
Crown gear runout on its back surface mm (in)		0.05 (0.0020)

• T-type

Front and rear bearing preload at companion flange bolt hole N (kgf, lb)	New bearing	18.1 — 38.8 (1.8 — 4.0, 4.1 — 8.7)
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.	Length 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 mm (in)	0.1 — 0.2 (0.0039 — 0.0079)	
Side gear thrust washer (Model without LSD)	Part No.	Thickness mm (in)
	383445201	0.75 — 0.80 (0.0295 — 0.0315)
	383445202	0.80 — 0.85 (0.0315 — 0.0335)
	383445203	0.85 — 0.90 (0.0335 — 0.0354)
Side bearing standard width mm (in)	—	20.00 (0.7874)
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)
Crown gear to drive pinion backlash mm (in)	Limit	0.10 — 0.20 (0.0039 — 0.0079)
Crown gear runout on its back surface mm (in)		0.05 (0.0020)

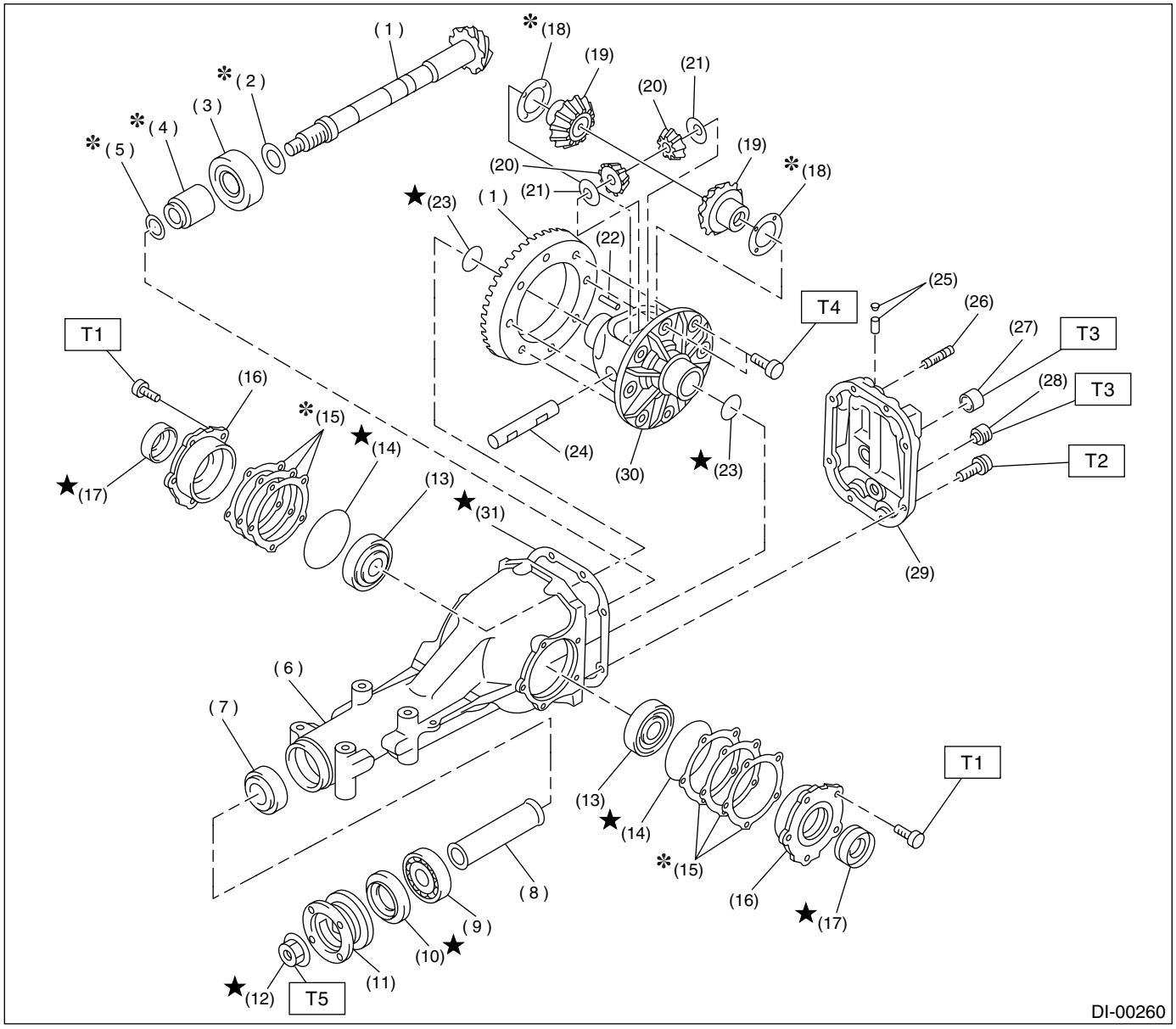
• STi model

Front and rear bearing preload at companion flange bolt hole N (kgf, lb)	Except for model without mechanical LSD: 25.9 - 41.5 (2.6 - 4.2, 5.8 - 9.3) Model with mechanical LSD: 24.1 - 38.6 (2.5 - 3.9, 5.4 - 8.7)	
Preload adjusting spacer	Part No.	Length mm (in)
	31454AA130	52.2 (2.055)
	31454AA140	52.4 (2.063)
	31454AA150	52.6 (2.071)
	31454AA160	52.8 (2.079)
	31454AA170	53.0 (2.087)
	31454AA180	53.2 (2.094)

Preload adjusting washer	Part No.	Length 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.	Length mm (in)
	38336AA230	3.09 (0.1217)
	38336AA240	3.12 (0.1228)
	38336AA250	3.15 (0.1240)
	38336AA260	3.18 (0.1252)
	38336AA270	3.21 (0.1264)
	38336AA280	3.24 (0.1276)
	38336AA290	3.27 (0.1287)
	38336AA300	3.30 (0.1299)
	38336AA310	3.33 (0.1311)
	38336AA320	3.36 (0.1323)
	38336AA330	3.39 (0.1335)
	38336AA340	3.42 (0.1346)
	38336AA350	3.45 (0.1358)
	38336AA360	3.48 (0.1370)
	38336AA370	3.51 (0.1382)
	38336AA380	3.54 (0.1394)
	38336AA390	3.57 (0.1406)
	38336AA400	3.60 (0.1417)
	38336AA410	3.63 (0.1429)
	38336AA420	3.66 (0.1441)
Side bearing standard width mm (in)	20.00 (0.7874)	
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)
Crown gear to drive pinion backlash mm (in)	Limit	0.10 — 0.20 (0.0039 — 0.0079)
Crown gear runout on its back surface mm (in)		0.05 (0.0020)

B: COMPONENT

1. REAR DIFFERENTIAL FOR T-TYPE WITHOUT LSD

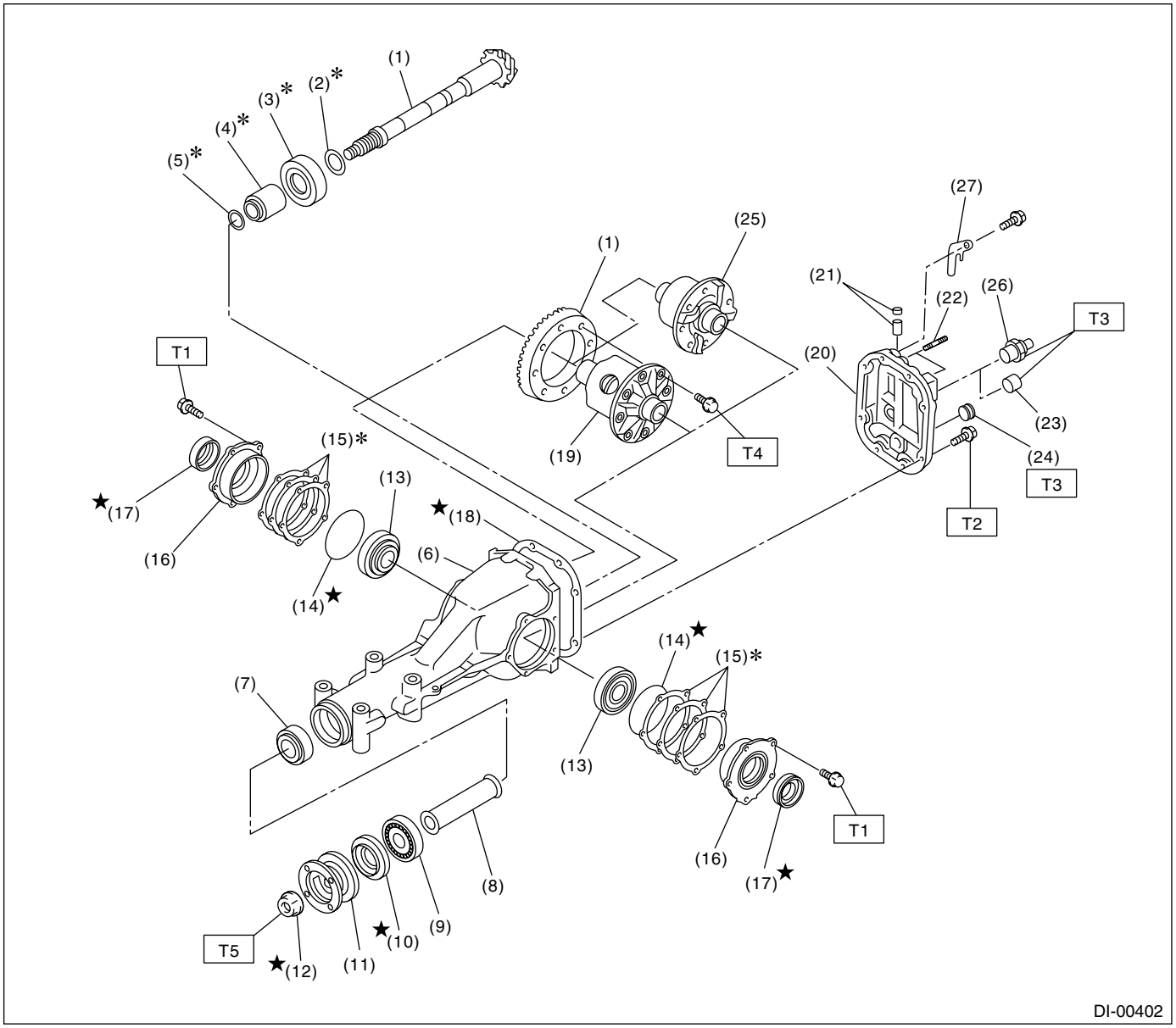


(1)	Pinion crown gear and drive pinion set	(13)	Side bearing	(26)	Stud bolt
(2)	Pinion height adjusting shim	(14)	O-ring	(27)	Oil filler plug
(3)	Rear bearing	(15)	Side bearing retainer shim	(28)	Oil drain plug
(4)	Bearing preload adjusting spacer	(16)	Side bearing retainer	(29)	Rear cover
(5)	Bearing preload adjusting washer	(17)	Side oil seal	(30)	Differential case
(6)	Differential carrier	(18)	Side gear thrust washer	(31)	Gasket
(7)	Front bearing	(19)	Side gear		
(8)	Spacer	(20)	Pinion mate gear		
(9)	Pilot bearing	(21)	Pinion mate gear washer		
(10)	Front oil seal	(22)	Pinion shaft lock pin		
(11)	Companion flange	(23)	Circlip		
(12)	Self-locking nut	(24)	Pinion mate shaft		
		(25)	Air breather cap		

Tightening torque: N·m (kgf-m, ft-lb)

T1: 10.3 (1.05, 7.6)
T2: 29 (3.0, 21.7)
T3: 49 (5.0, 36.2)
T4: 105 (10.7, 77.4)
T5: 181 (18.5, 134)

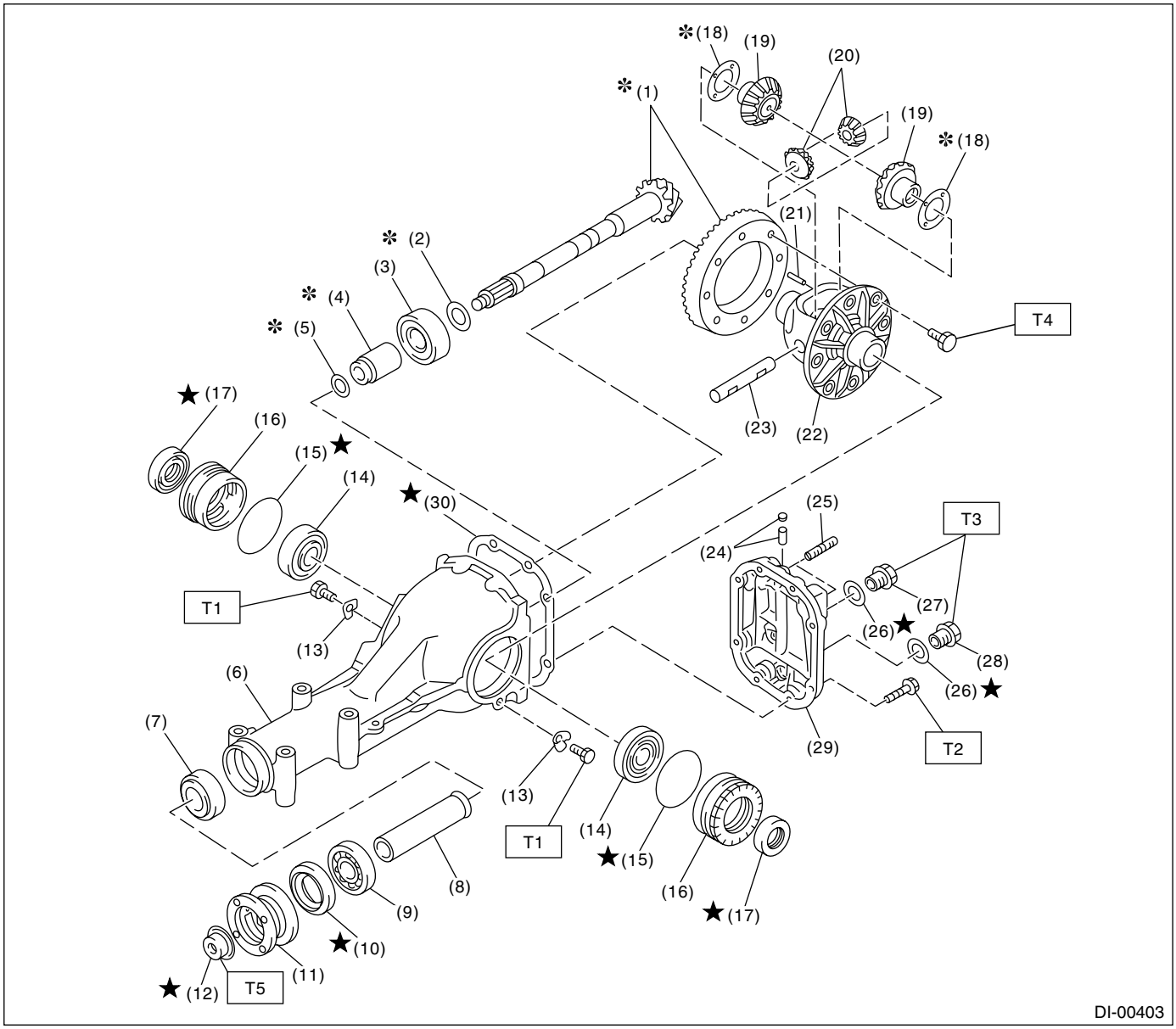
2. REAR DIFFERENTIAL FOR T-TYPE WITH LSD



(1) Pinion crown gear and drive pinion set
(2) Pinion height adjusting shim
(3) Rear bearing
(4) Bearing preload adjusting spacer
(5) Bearing preload adjusting washer
(6) Differential carrier
(7) Front bearing
(8) Collar
(9) Pilot bearing
(10) Front oil seal
(11) Companion flange
(12) Self-locking nut
(13) Side bearing
(14) O-ring
(15) Side bearing retainer shim
(16) Side bearing retainer
(17) Side oil seal
(18) Gasket
(19) Differential case (Viscous coupling type or mechanical LSD model)
(20) Rear cover
(21) Air breather cap
(22) Stud bolt
(23) Oil filler plug
(24) Oil drain plug
(25) Differential case (SURETRAC® LSD model)
(26) Oil filler plug (mechanical LSD model)
(27) Stay ground (mechanical LSD model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10.3 (1.05, 7.6)
T2: 29 (3.0, 21.7) (Except for STi model)
44 (4.5, 32.5) (STi model)
T3: 49 (5.0, 36.2)
T4: 105 (10.7, 77.4)
T5: 181 (18.5, 134)

3. REAR DIFFERENTIAL FOR VA-TYPE

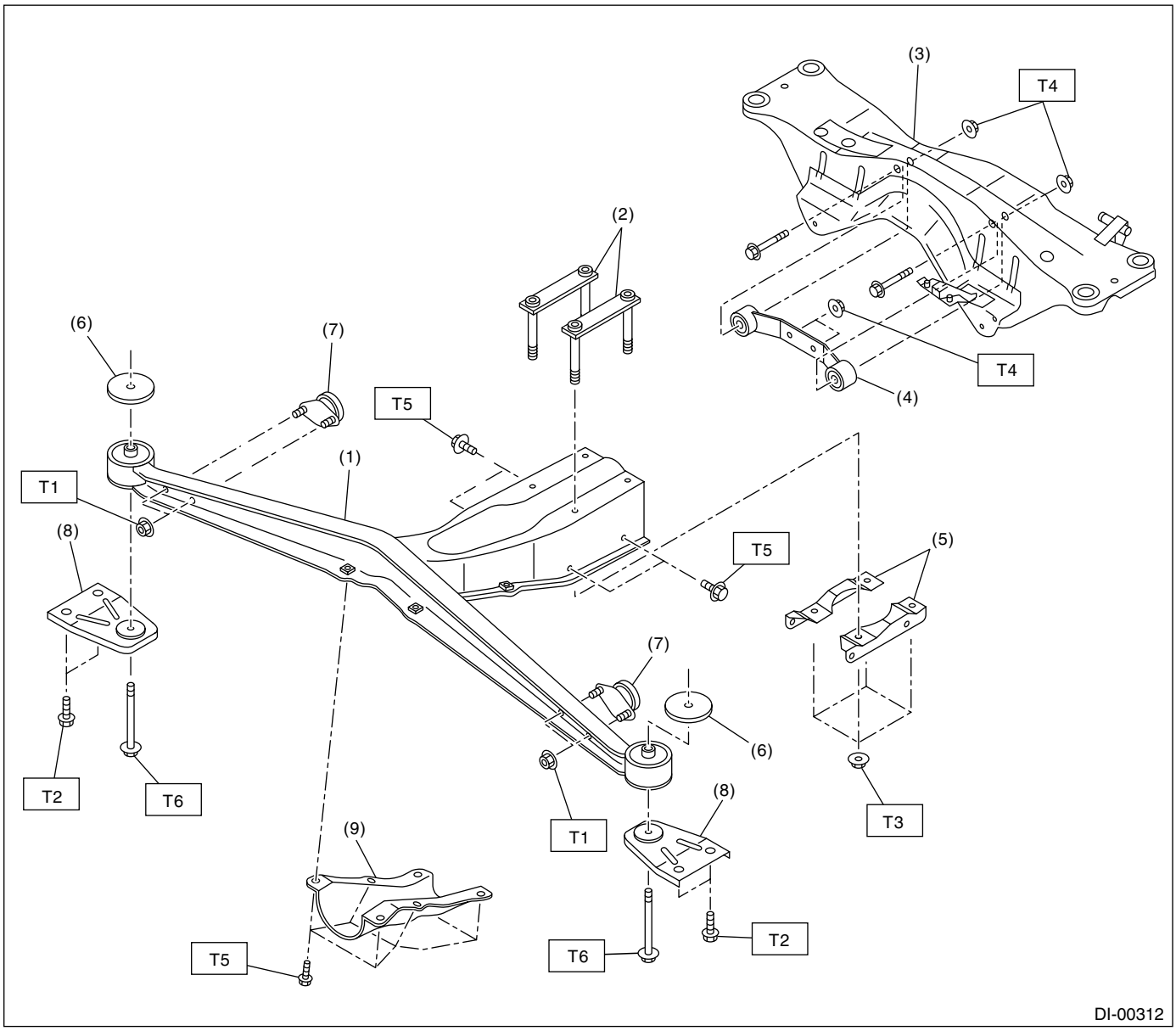


(1)	Pinion crown gear and drive pinion set	(13)	Lock plate	(26)	Gasket
(2)	Pinion height adjusting shim	(14)	Side bearing	(27)	Oil filler plug
(3)	Rear bearing	(15)	O-ring	(28)	Oil drain plug
(4)	Bearing preload adjusting spacer	(16)	Axle shaft holder	(29)	Rear cover
(5)	Bearing preload adjusting washer	(17)	Side oil seal	(30)	Gasket
(6)	Differential carrier	(18)	Side gear thrust washer		
(7)	Front bearing	(19)	Side gear		
(8)	Collar	(20)	Pinion mate gear		
(9)	Pilot bearing	(21)	Pinion shaft lock pin		
(10)	Front oil seal	(22)	Differential case		
(11)	Companion flange	(23)	Pinion mate shaft		
(12)	Self-locking nut	(24)	Air breather cap		
		(25)	Stud bolt		

Tightening torque: N·m (kgf-m, ft-lb)

T1: 25 (2.5, 18.1)
T2: 25 (2.5, 18.1)
T3: 34 (3.5, 25.3)
T4: 62 (6.3, 45.6)
T5: 191 (19.5, 141)

4. REAR DIFFERENTIAL MOUNTING SYSTEM



(1) Differential front member
(2) Plate
(3) Crossmember
(4) Differential rear member
(5) Differential mount lower bracket
(6) Stopper
(7) Dynamic damper
(8) Differential mount bracket
(9) Differential mount front cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 20 (2.0, 14.5)
T2: 33 (3.4, 24.3)
T3: 65 (6.6, 47.9)
T4: 70 (7.1, 51.6)
T5: 90 (9.2, 66.4)
T6: 100 (10.2, 73.8)

C: CAUTION

- Wear working clothing, including a cap, protective goggles and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use SUBARU genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Apply gear oil onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of gear oil to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Avoid damaging the mating face of the case.

D: PREPARATION TOOL

1. SPECIAL TOOLS

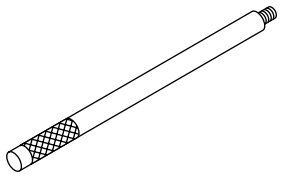
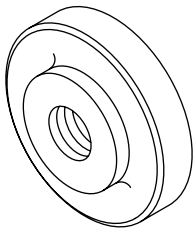
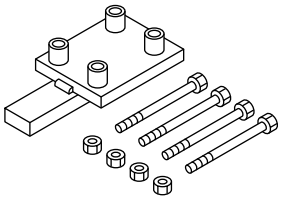
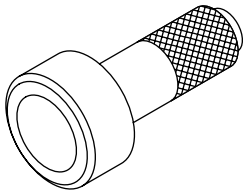
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398477701	398477701	HANDLE	Used for installing front and rear bearing cone.
 ST-398477702	398477702	DRIFT	Used press-fitting the bearing cone of differential carrier (rear).
 ST-398217700	398217700	ATTACHMENT SET	Stand for rear differential carrier disassembly and assembly.
 ST-498447120	498447120	INSTALLER	Used for installing front oil seal.

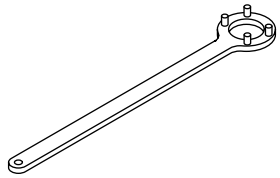
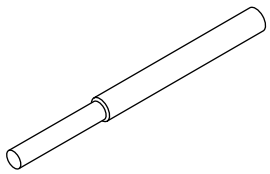
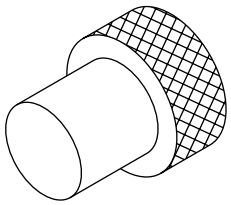
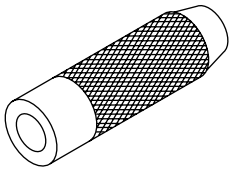
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498427200	498427200	FLANGE WRENCH	• Used for stopping rotation of companion flange when loosening and tightening self-lock nut. • For T-type. (Except for STi model with mechanical LSD)
 ST-398467700	398467700	DRIFT	Used for removing pinion, pilot bearing and front bearing cone.
 ST-399780104	399780104	WEIGHT	Used for installing front bearing cone, pilot bearing companion flange.
 ST-899580100	899580100	INSTALLER	Used for press-fitting the front bearing cone, pilot bearing.

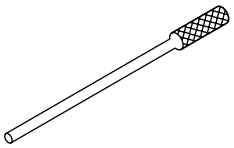
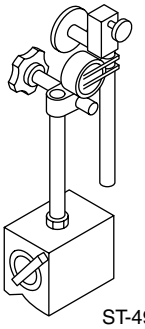
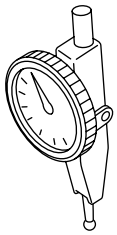
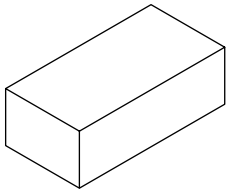
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899904100	899904100	STRAIGHT PIN REMOVER	Used for driving out differential pinion shaft lock pin.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used measuring backlash between side gear and pinion, hypoid gear. • Used with MAGNET BASE (498247001).
 ST-398507704	398507704	BLOCK	Used for adjusting pinion height and preload.

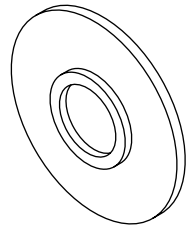
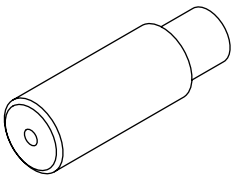
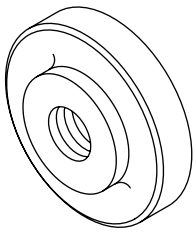
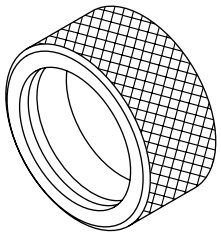
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398177700	398177700	INSTALLER	• Used for installing rear bearing cone. • For T-type.
 ST-398457700	398457700	ATTACHMENT	• Used for removing side bearing retainer. • For T-type.
 ST-398477703	398477703	DRIFT2	• Used for press-fitting the bearing race (rear) of differential carrier. • For T-type.
 ST-398437700	398437700	DRIFT	• Used for installing side oil seal. • For T-type.

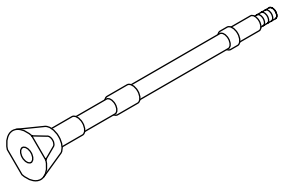
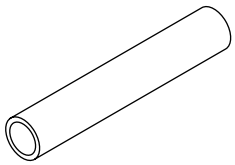
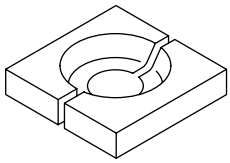
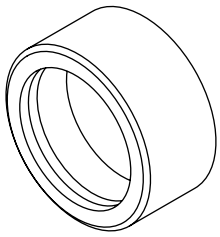
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398507702	398507702	DUMMY SHAFT	• Used for adjusting pinion height and preload. • For T-type.
 ST-398507703	398507703	DUMMY COLLAR	• Used for adjusting pinion height and preload. • For T-type.
 ST-398517700	398517700	REPLACER	• Used for removing rear bearing cone. • For T-type.
 ST-398487700	398487700	DRIFT	• Used for press-fitting the side bearing cone. • For T-type.

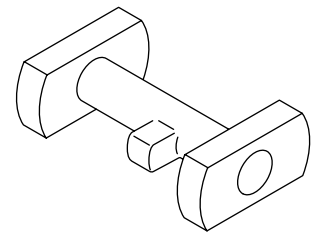
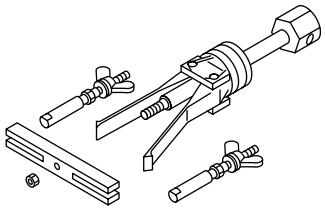
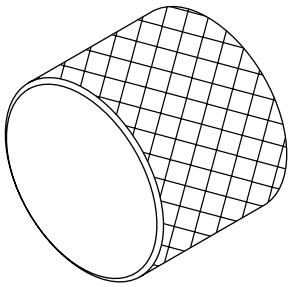
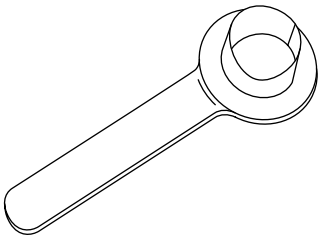
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398507701	398507701	DIFFERENTIAL CARRIER GAUGE	• Used for adjusting pinion height. • For T-type.
 ST-398527700	398527700	PULLER ASSY	• Used for removing front oil seal. • Used for removing side bearing cup. • For T-type.
 ST-398227700	398227700	WEIGHT	• Used for installing side bearing. • For T-type.
 ST28099PA090	28099PA090	OIL SEAL PROTECTOR	• Used for installing rear drive shaft into rear differential. • For protecting oil seal.

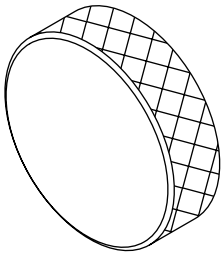
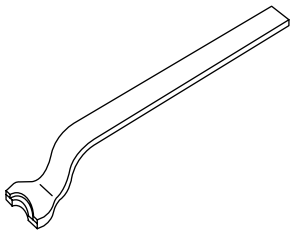
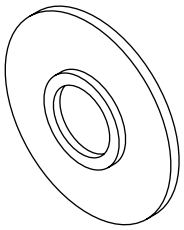
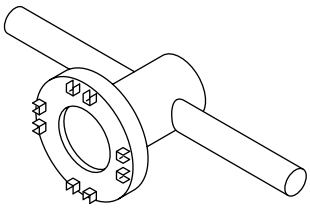
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398237700	398237700	GAUGE	• Used for installing side bearing. • For T-type.
 ST28099PA100	28099PA100	DRIVE SHAFT REMOVER	• Used for removing rear drive shaft from rear differential. • For T-type.
 ST-498175500	498175500	INSTALLER	• Used for installing rear bearing cone. • For VA-type.
 ST-499785500	499785500	WRENCH ASSY	• Used for removing and installing side oil seal holder. • For VA-type.

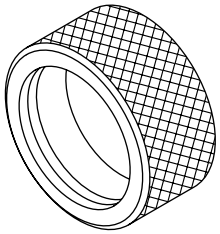
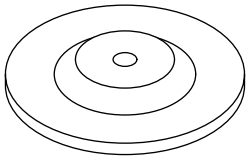
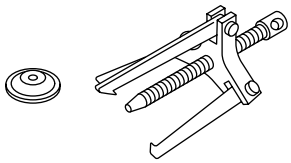
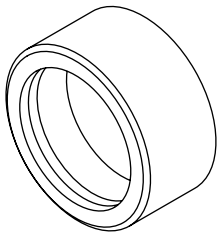
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498447100	498447100	INSTALLER	• Used for installing oil seal. • For VA-type.
 ST-399520105	399520105	SEAT	• Used for removing side bearing cone. • Used with PULLER SET (899524100). • For VA-type.
 ST-399703600	399703600	PULLER ASSY	Used for removing companion flange.
 ST-498485400	498485400	DRIFT	• Used for installing side bearing cone. • For VA-type.

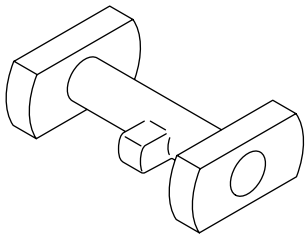
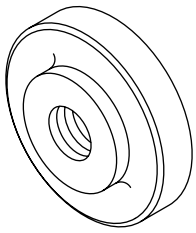
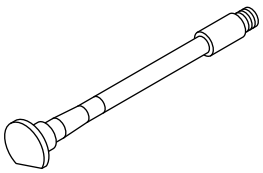
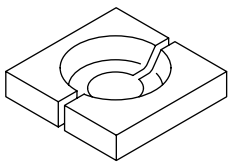
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498505501	498505501	DIFFERENTIAL CARRIER GAUGE	• Used for adjusting pinion height. • For VA-type.
 ST-498447110	498447110	DRIFT	• Used for press-fitting the bearing race (front) of differential carrier. • For VA-type.
 ST-498447150	498447150	DUMMY SHAFT	• Used for adjusting pinion height and Pre-load. • For VA-type.
 ST-498515500	498515500	REPLACER	• Used for removing rear bearing cone. • For VA-type.

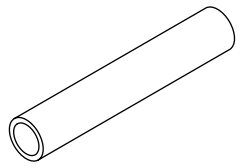
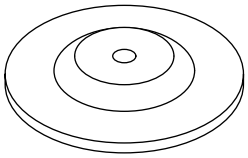
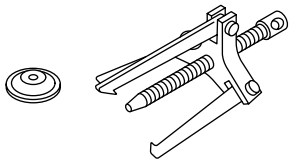
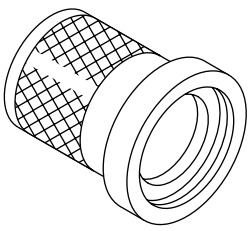
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST32285AA000	32285AA000	DUMMY COLLAR	• Used for adjusting pinion height and pre-load. • For VA-type.
 ST-499705404	499705404	SEAT	• Used for removing side bearing race. • Used with PULLER ASSY (499705401). • For VA-type.
 ST-499705401	499705401	PULLER ASSY	• Used for removing side bearing race. • Used with SEAT (499705404). • For VA-type.
 ST-899874100	899874100	INSTALLER	Used for installing companion flange.

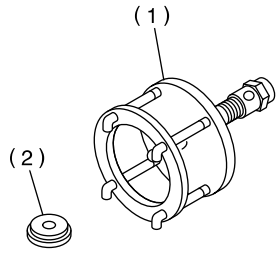
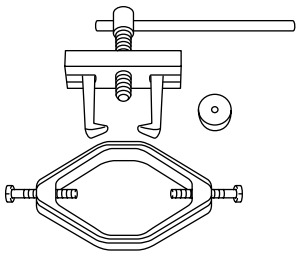
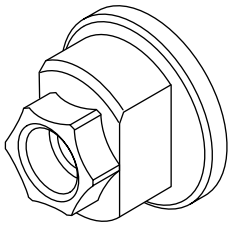
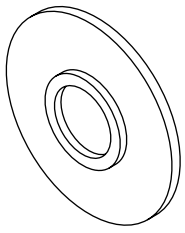
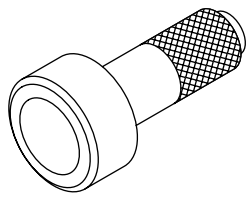
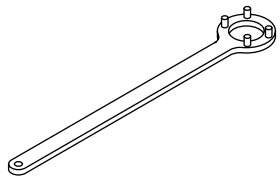
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899524100	899524100	PULLER SET	• Used for removing side bearing cone of differential. • For VA-type. (1) Puller (2) Cap
 ST18759AA000	18759AA000	PULLER ASSY	• Used for removing side bearing cone of differential. • For T-type. (STi model)
 ST-498937110	498937110	HOLDER DRIVE PINION (This special tool is used for current automatic transmission.)	• Used for installing pilot bearing. • For T-type. (STi model)
 ST18674AA000	18674AA000	INSTALLER	• Used for installing rear bearing cone. • For T-type. (STi model)

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398417700	398417700	DRIFT (This special tool was prepared for the vehicles of 92MY and before.)	Used for installing side bearing race. (STi model)
 ST18633AA000	18633AA000	WRENCH COMPL (Newly adopted tool)	• Used for stopping rotation of companion flange when loosening and tightening self-lock nut. • For T-type. (STi model with mechanical LSD)

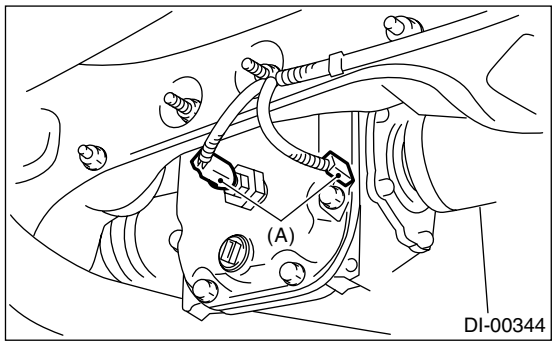
2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Transmission jack	Used for assembly/disassembly of rear differential.
Puller	Used for removal of side bearing retainer.
Thickness gauge	Used for measuring clearance.
Tire lever	Used for removal of rear drive shaft. (VA-type)

2. Differential Gear Oil

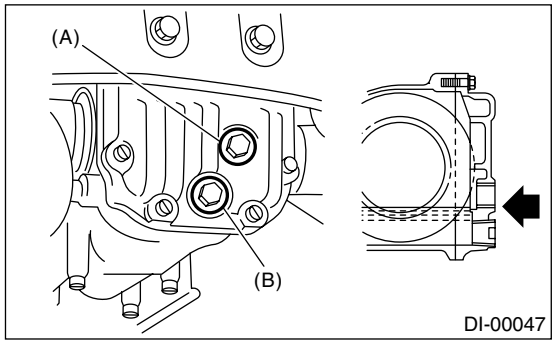
A: INSPECTION

1) Disconnect the oil temperature switch connector (Mechanical LSD model).



(A) Connector

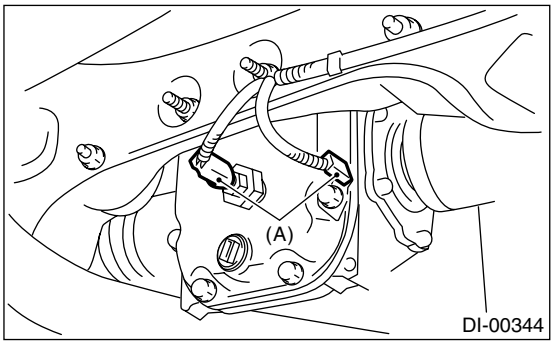
2) Remove the filler plug or oil temperature switch, and then check the gear oil. If it is contaminated or deteriorated, replace the gear oil. <Ref. to DI-25, REPLACEMENT, Differential Gear Oil.>
3) Check the gear oil level is up to the bottom part of filler bolt or oil temperature switch. If the level is low, refill up to the bottom of filler bolt.



(A) Filler plug
(B) Drain plug

B: REPLACEMENT

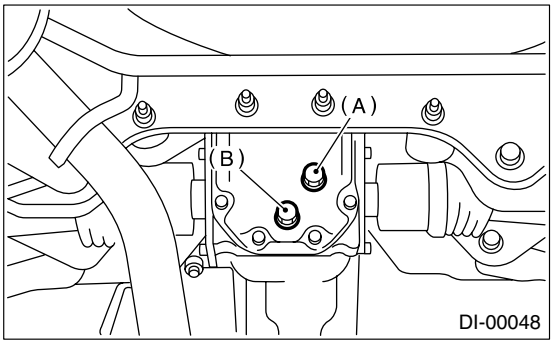
1) Jack-up the vehicle and support it with sturdy racks.
2) Disconnect the oil temperature switch connector (Mechanical LSD model).



(A) Connector

3) Remove the oil drain plug and filler plug or oil temperature switch, and drain the gear oil.

CAUTION:
Be careful not to burn your hands, because gear oil becomes extremely hot after running.



(A) Filler plug
(B) Drain plug

4) Tighten the oil drain plug.

NOTE:
• Apply fluid packing to the drain plug or oil temperature switch for T-type.
• Use a new aluminum gasket for VA-type.

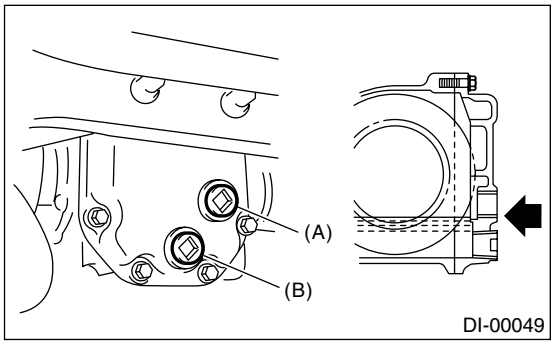
Fluid packing:
THREE BOND 1105 (Part No. 004403010) or equivalent

Tightening torque:
T-type
49 N·m (5.0 kgf-m, 36.2 ft-lb)
VA-type
34 N·m (3.5 kgf-m, 25.3 ft-lb)

5) Fill the differential carrier with gear oil to the upper plug level.

NOTE:
Carefully refill oil while watching the level. Excess or insufficient oil must be avoided.

Oil capacity:
Except for STi model:
0.8 ℓ (0.8 US qt, 0.7 Imp qt)
STi model:
0.9 ℓ — 1.1 ℓ (1.0 — 1.2 US qt, 0.8 — 1.0 Imp qt)



(A) Filler plug
(B) Drain plug

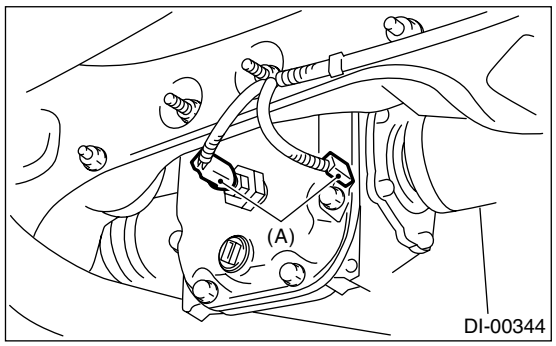
6) Install the filler plug or oil temperature switch.

NOTE:
• Apply fluid packing to the filler plug or oil temperature switch for T-type.
• Use a new aluminum gasket for VA-type.

Fluid packing:
THREE BOND 1105 (Part No. 004403010) or equivalent

Tightening torque:
T-type
49 N·m (5.0 kgf-m, 36.2 ft-lb)
VA-type
34 N·m (3.5 kgf-m, 25.3 ft-lb)

7) Connect the oil temperature switch connector (Mechanical LSD model).



(A) Connector

3. Front Differential

A: NOTE

1. AT MODEL

For front differential of automatic transmission, refer to “AT” section. <Ref. to 4AT-114, Front Differential.>

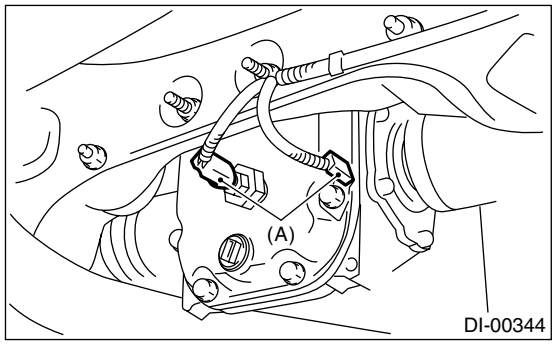
2. MT MODEL

For front differential of manual transmission, refer to “5MT” or “6MT” section. <Ref. to 5MT-102, Front Differential Assembly.> or <Ref. to 6MT-104, Front Differential Assembly.>

4. Rear Differential for T-type

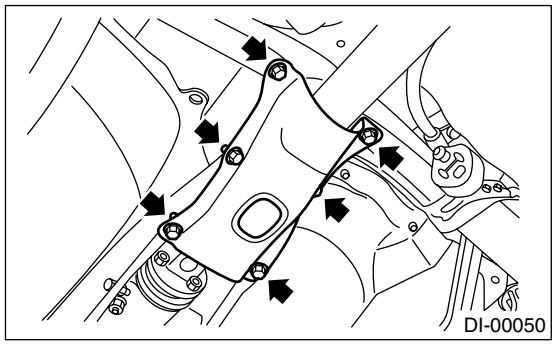
A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Move the select lever or gear shift lever to “N”.
4) Release the parking brake.
5) Loosen the wheel nuts.
6) Jack-up the vehicle and support it with sturdy racks.
7) Remove the wheels.
8) Disconnect the connector from oil temperature switch. (Mechanical LSD model)



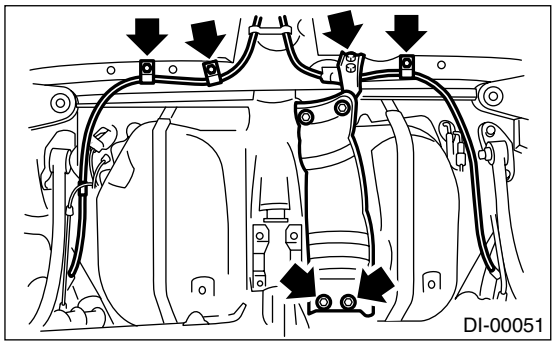
(A) Connector

9) Remove the rear exhaust pipe and muffler.
Non-turbo model without OBD
<Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.>
Non-turbo model with OBD
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
Turbo model
<Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, REMOVAL, Muffler.>
10) Remove the heat shield cover. (If equipped)
11) Remove the front cover of rear differential mount.

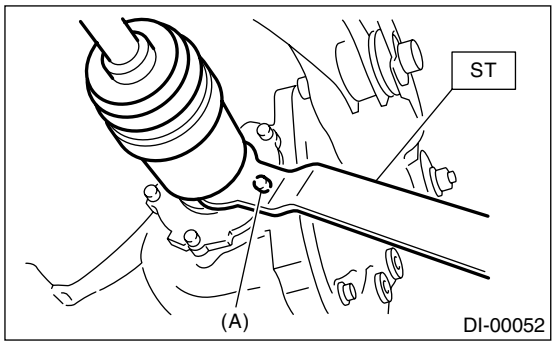


12) Remove the propeller shaft. <Ref. to DS-16, REMOVAL, Propeller Shaft.>

13) Remove the clamps and bracket of parking brake cable.

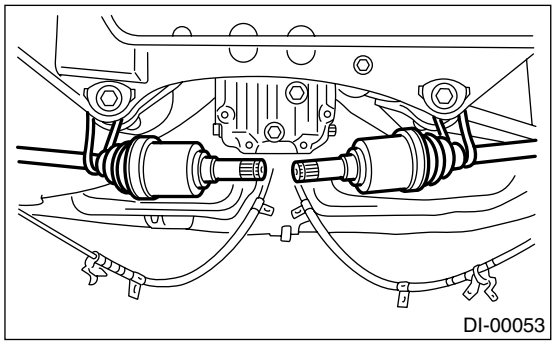


14) Remove the DOJ of rear drive shaft from rear differential using ST. <Ref. to DI-71, REPLACEMENT, Rear Differential Side Oil Seal.>
ST 28099PA100 DRIVE SHAFT REMOVER

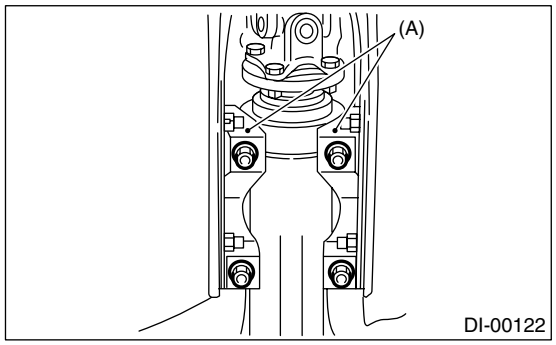


(A) Bolt

15) Secure the rear drive shaft to rear crossmember using wire.

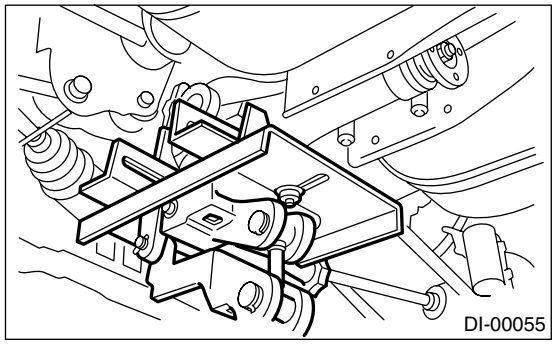


16) Remove the lower bracket.

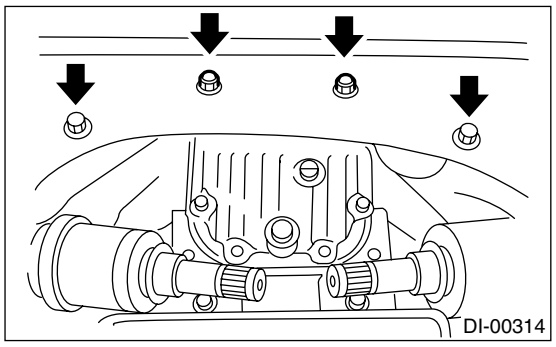


(A) Lower bracket

17) Support the rear differential with transmission jack.

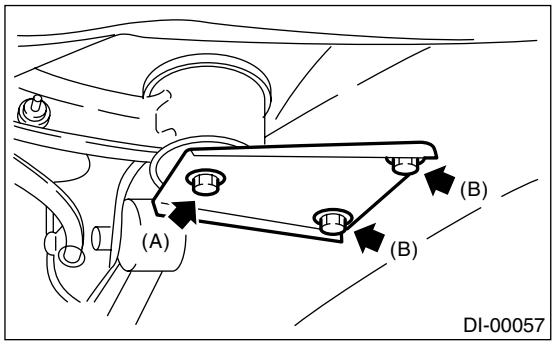


18) Remove the self-locking nuts and bolts.



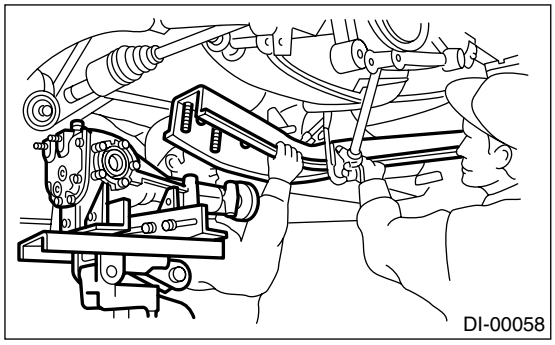
19) Remove the bolts which secure the rear differential front member to body.
Loosen the bolt A first, then remove the bolts B.

NOTE:
Support the front member with use of a helper to prevent it from dropping.

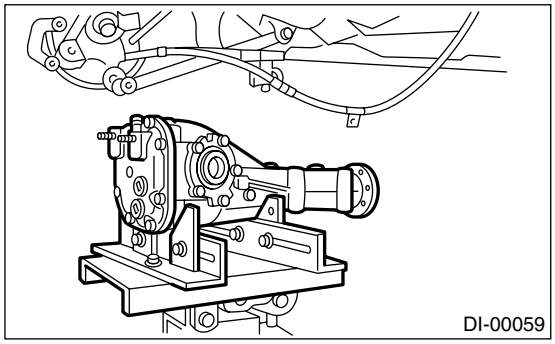


(A) Bolt A
(B) Bolt B

20) Remove the bolt A.
21) While slowly lowering the transmission jack, move the rear differential forward and remove front member and rear differential from vehicle.



22) Remove the rear differential from vehicle.



B: INSTALLATION

Install in the reverse order of removal.
1) Install the air breather cap tapping with a plastic hammer.

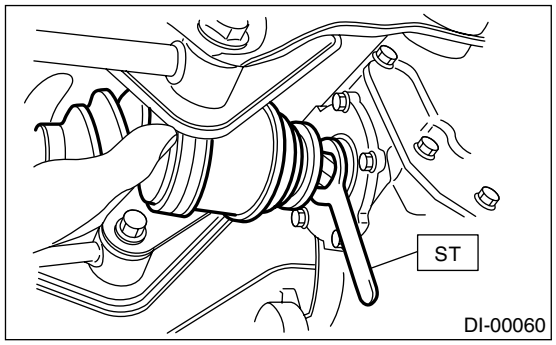
NOTE:
Be sure to install a new air breather cap.

2) Position the front member on body by passing it under the parking brake cable and securing to rear differential.

NOTE:
When installing the rear differential front member, do not confuse the installation sequence of the upper and lower stoppers.

3) Install the DOJ of drive shaft into rear differential. <Ref. to DI-71, REPLACEMENT, Rear Differential Side Oil Seal.>

ST 28099PA090 SIDE OIL SEAL PROTECTOR



4) Installing procedure hereafter is in the reverse order of removal.
5) After installation, fill the differential carrier with gear oil to the filler plug level. <Ref. to DI-25, Differential Gear Oil.>

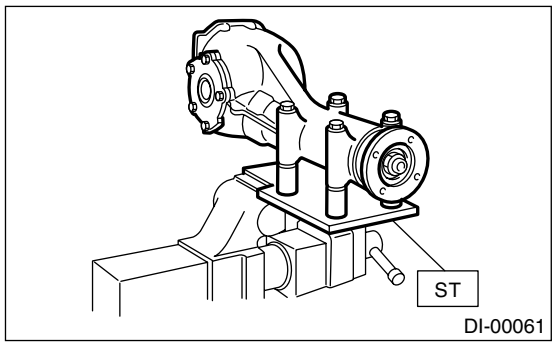
C: DISASSEMBLY

1. EXCEPT FOR STi MODEL

To detect the 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

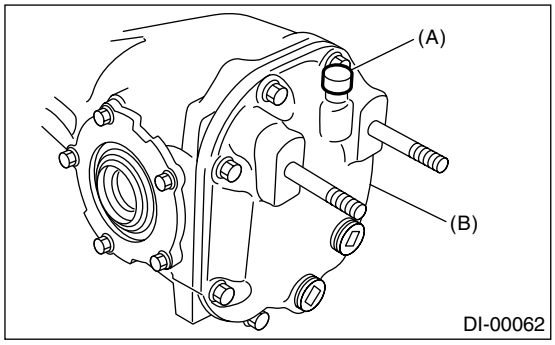
1) Set the ST on vise and install the differential assembly to ST.

ST 398217700 ATTACHMENT



2) Drain the gear oil by removing the plug.
3) Remove the air breather cap.

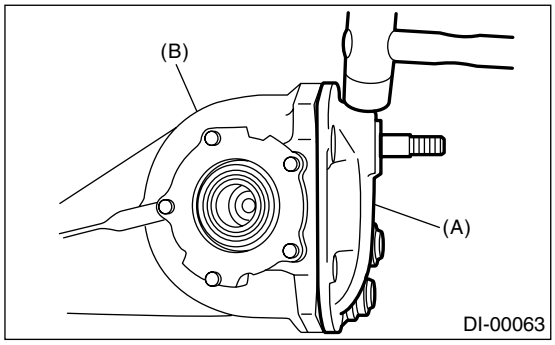
NOTE:
- Do not attempt to remove the air breather cap unless necessary.
- When removing the air breather cap, replace the air breather cap with a new one.



(A) Air breather cap
(B) Rear cover

4) Remove the bolts, and then remove the rear cover.

NOTE:
Remove it by tapping with plastic hammer.

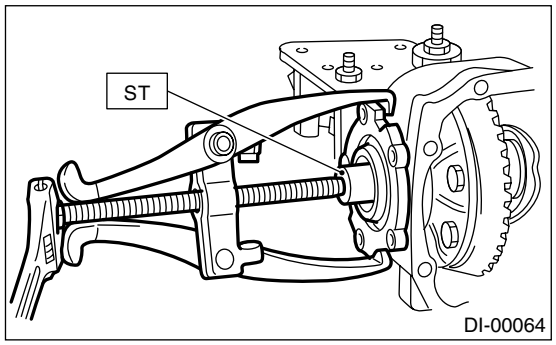


(A) Rear cover
(B) Differential carrier

5) Make right and left side bearing retainers in order to identify them at reassembly. Remove the side bearing retainer attaching bolts, set the ST to differential case, and extract right and left side bearing retainers with a puller.

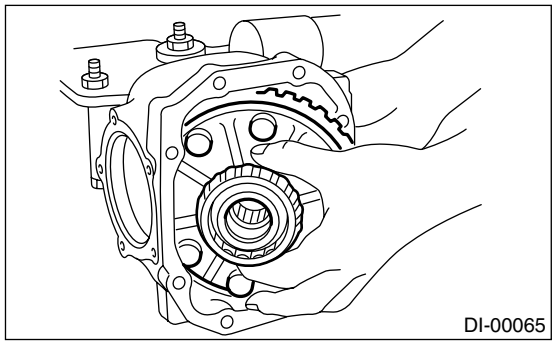
NOTE:
Each shim, which is installed to adjust the side bearing preload, should be kept together with its mating retainer.

ST 398457700 ATTACHMENT

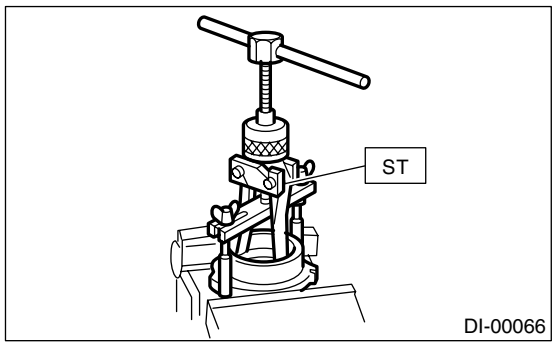


6) Pull out the differential case assembly from differential carrier.

NOTE:
Be careful not to hit the teeth against the case.



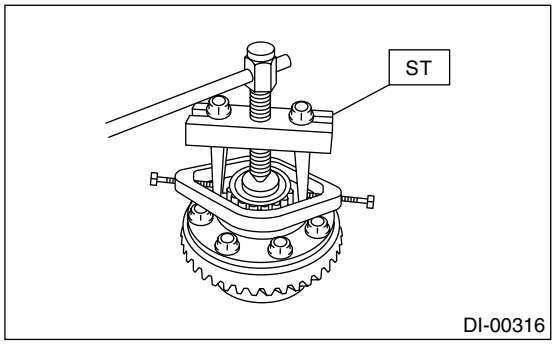
7) When replacing the side bearing, pull the bearing cup from side bearing retainer using ST.
ST 398527700 PULLER ASSY



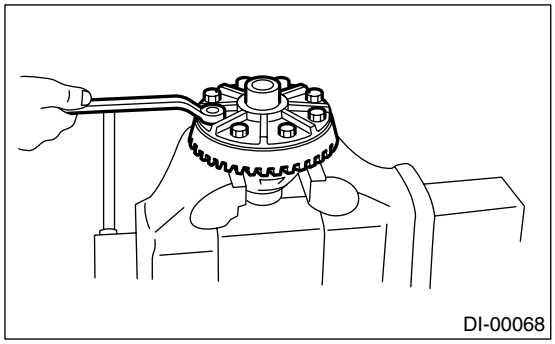
8) Extract the bearing cone with ST.

NOTE:
• Do not attempt to disassemble the parts unless necessary.
• Set the puller so that its claws catch the edge of bearing cone.
• Never mix up the right and left hand bearing races and cones.

ST 18759AA000 PULLER ASSY

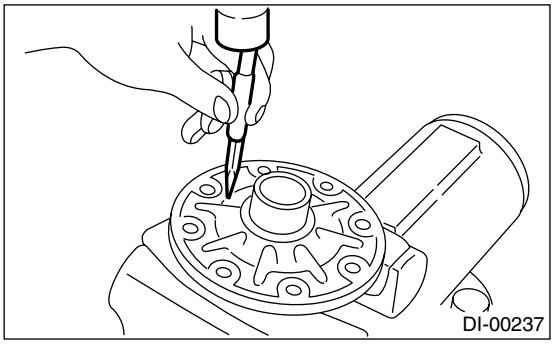


9) Remove the crown gear by loosening the crown gear bolts.



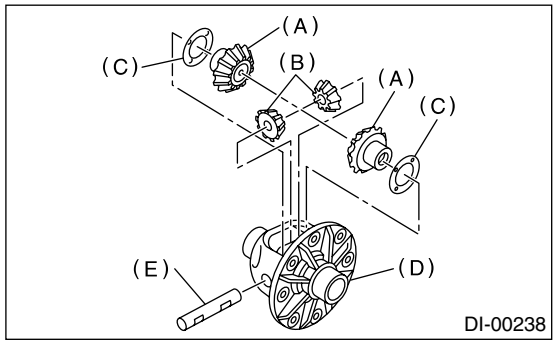
10) Drive out the pinion shaft lock pin from crown gear side. (Model without LSD)

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



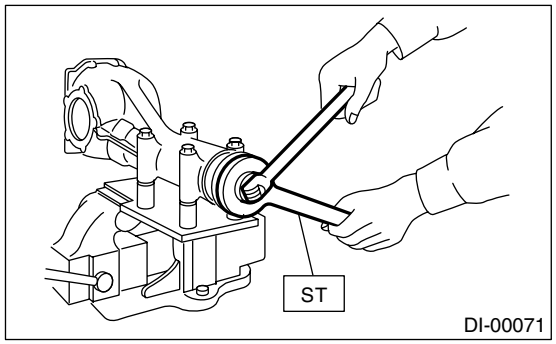
11) Draw out the pinion mate shaft and remove the pinion mate gears, side gears and thrust washers. (Model without LSD)

NOTE:
The gears as well as thrust washers should be marked or kept separated right and left, front and rear.

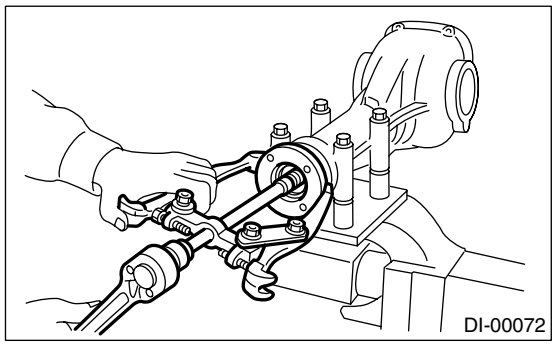


(A) Side gear
(B) Pinion mate gear
(C) Thrust washer
(D) Differential case
(E) Pinion mate shaft

12) Hold the companion flange with ST and remove the drive pinion nut.
ST 498427200 FLANGE WRENCH



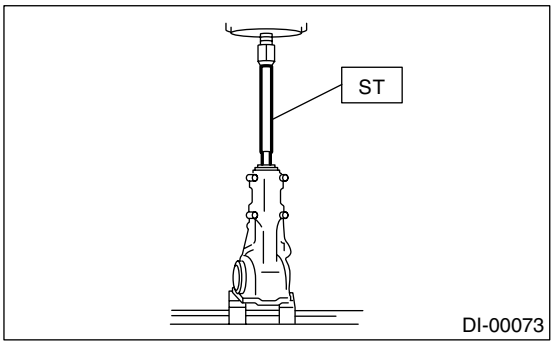
13) Extract the companion flange with a puller.



14) Press the end of drive pinion shaft and extract it together with the rear bearing cone, preload adjusting spacer and washer.

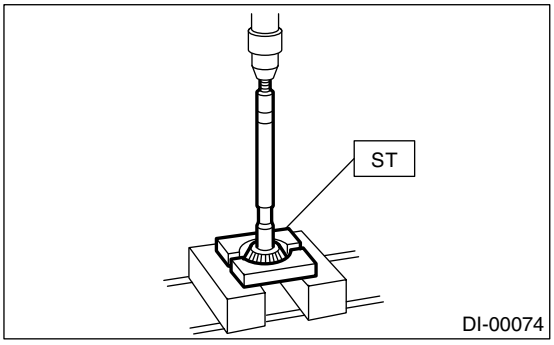
NOTE:
Hold the drive pinion so as not to drop it.

ST 398467700 DRIFT

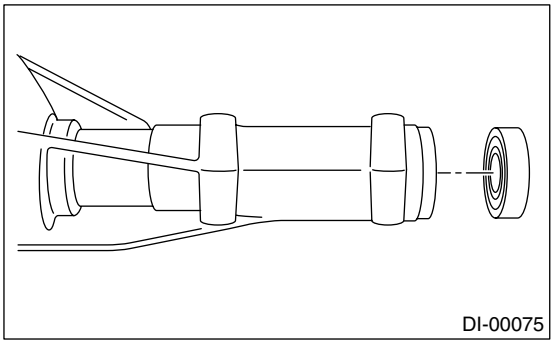


15) Remove the rear bearing cone from drive pinion by supporting the cone with ST.

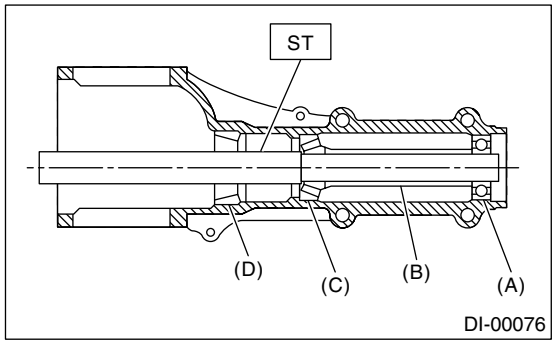
NOTE:
Place the replacer so that its center-recessed side faces the pinion gear.
ST 398517700 REPLACER



16) Remove the front oil seal from differential carrier using ST.
ST 398527700 PULLER ASSY

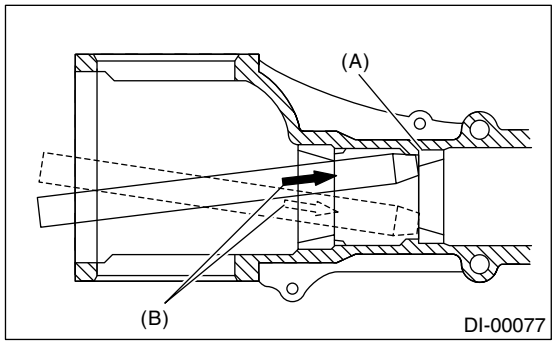


17) Remove the pilot bearing together with front bearing cone and spacer using ST.
ST 398467700 DRIFT



(A) Pilot bearing
(B) Spacer
(C) Front bearing
(D) Rear bearing cup

18) When replacing the bearings, hit out the front bearing cup and rear bearing cup in this order out of case by using a brass bar.

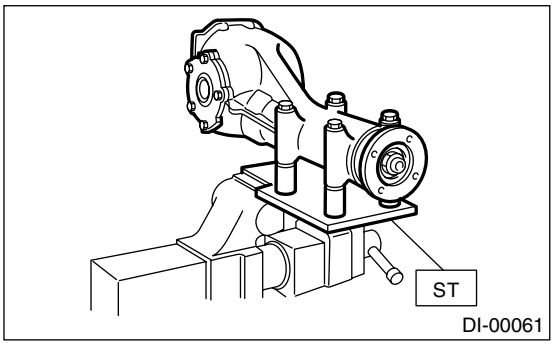


(A) 2 cutouts along diagonal lines
(B) Hit out alternately with brass bar.

2. STi MODEL

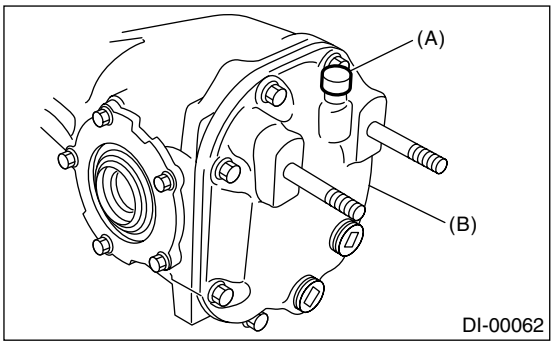
To detect the real cause of trouble, inspect the following items before disassembling.
• Tooth contact of crown gear and pinion, and backlash
• Runout of crown gear at its back surface
• Turning resistance of drive pinion
1) Set the ST on vise and install the differential assembly to ST.

ST 398217700 ATTACHMENT



2) Drain the gear oil by removing the plug.
3) Remove the air breather cap.

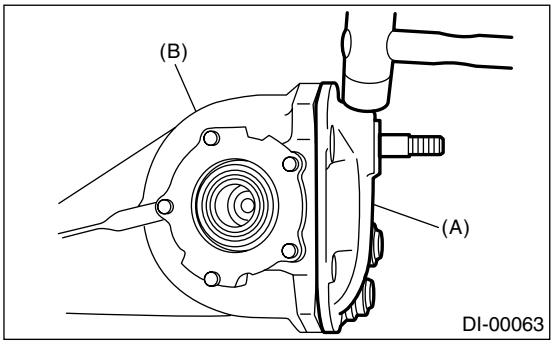
NOTE:
• Do not attempt to remove the air breather cap unless necessary.
• When removing the air breather cap, replace the air breather cap with a new one.



(A) Air breather cap
(B) Rear cover

4) Remove the bolts, and then remove the rear cover.

NOTE:
Remove it by tapping with plastic hammer.

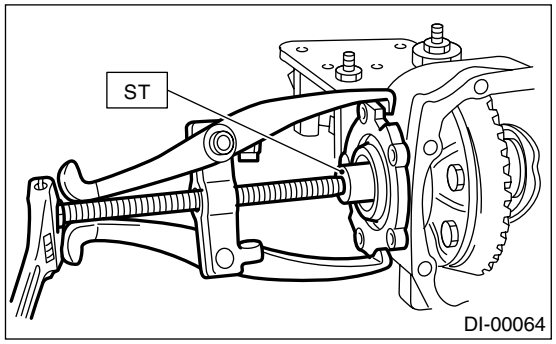


(A) Rear cover
(B) Differential carrier

5) Make right and left side bearing retainers in order to identify them at reassembly. Remove the side bearing retainer attaching bolts, set the ST to differential case, and extract right and left side bearing retainers with a puller.

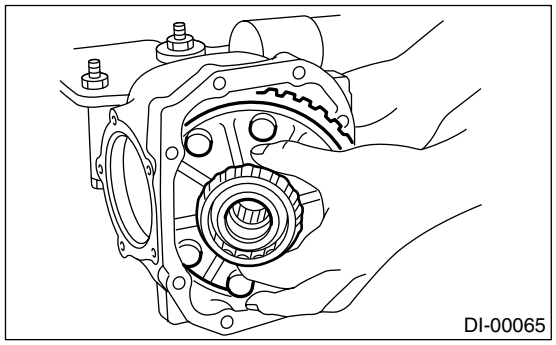
NOTE:
Each shim, which is installed to adjust the side bearing preload, should be kept together with its mating retainer.

ST 398457700 ATTACHMENT



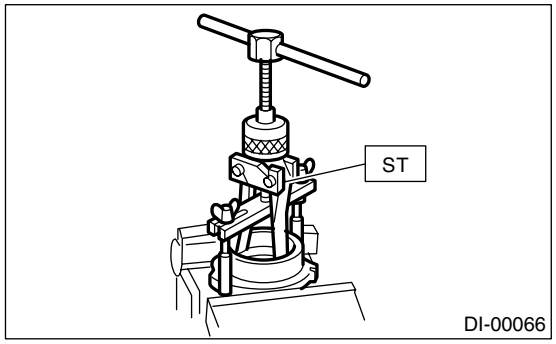
6) Pull out the differential case assembly from differential carrier.

NOTE:
Be careful not to hit the teeth against the case.



7) When replacing the side bearing, pull the bearing cup from side bearing retainer using ST.

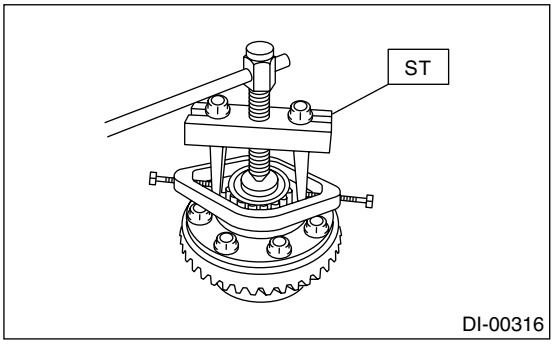
ST 398527700 PULLER ASSY



8) Extract the bearing cone with ST.

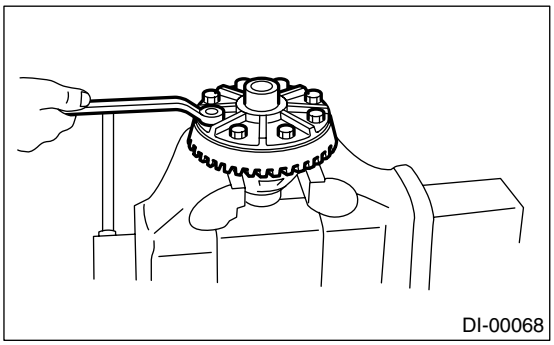
NOTE:
- Do not attempt to disassemble the parts unless necessary.
- Set the puller so that its claws catch the edge of bearing cone.
- Never mix up the right and left hand bearing races and cones.

ST 18759AA000 PULLER ASSY



9) Remove the crown gear by loosening the crown gear bolts.

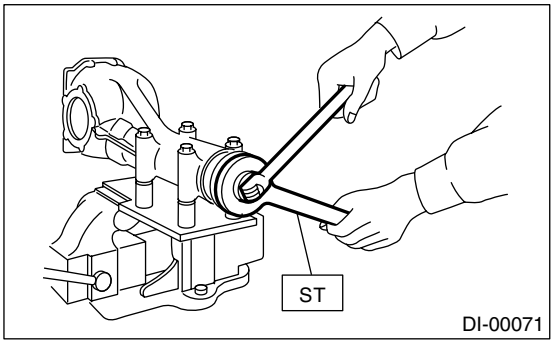
NOTE:
Do not disassemble the differential case.



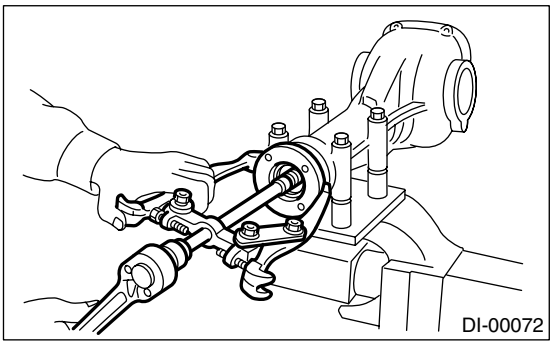
10) Hold the companion flange with ST and remove the drive pinion nut.

ST (MODEL WITH MECHANICAL LSD)
18633AA000
WRENCH COMPL

ST (MODEL WITHOUT MECHANICAL LSD)
498427200
FLANGE WRENCH

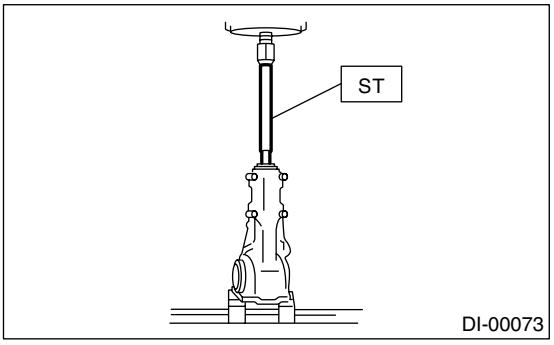


11) Extract the companion flange with a puller.

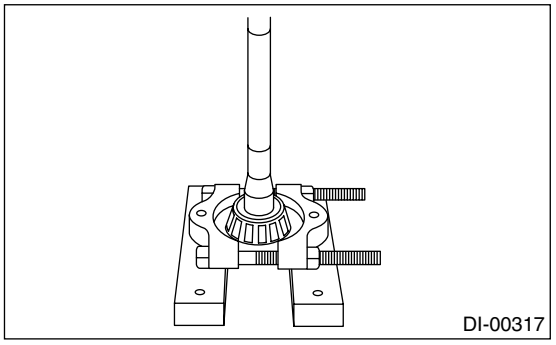


12) Press the end of drive pinion shaft and extract it together with the rear bearing cone, preload adjusting spacer and washer.

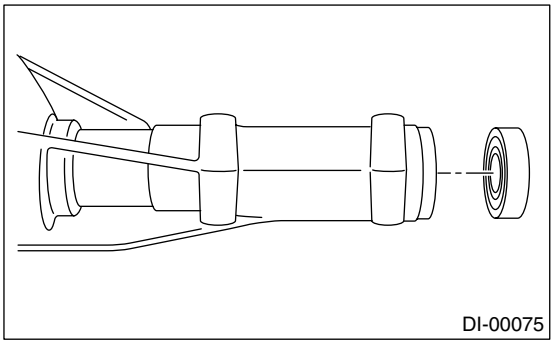
NOTE:
Hold the drive pinion so as not to drop it.
ST 398467700 DRIFT



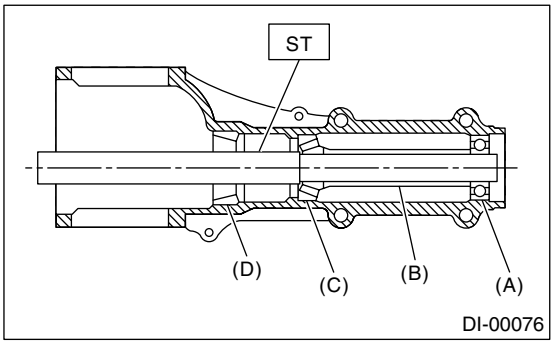
13) Remove the rear bearing cone from drive pinion.



14) Remove the front oil seal from differential carrier using ST.
ST 398527700 PULLER ASSY

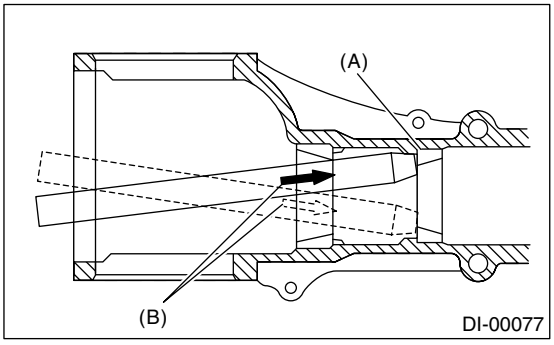


15) Remove the pilot bearing together with front bearing cone using ST.
ST 398467700 DRIFT



(A) Pilot bearing
(B) Spacer
(C) Front bearing
(D) Rear bearing cup

16) When replacing the bearings, tap the front bearing cup and rear bearing cup in this order out of case by using a brass bar.

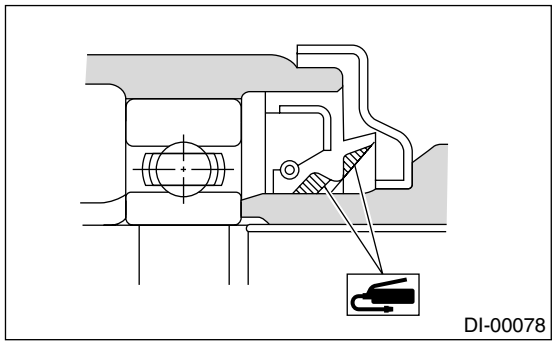


(A) 2 cutouts along diagonal lines
(B) Hit out alternately with brass bar.

D: ASSEMBLY

1. EXCEPT FOR STi MODEL

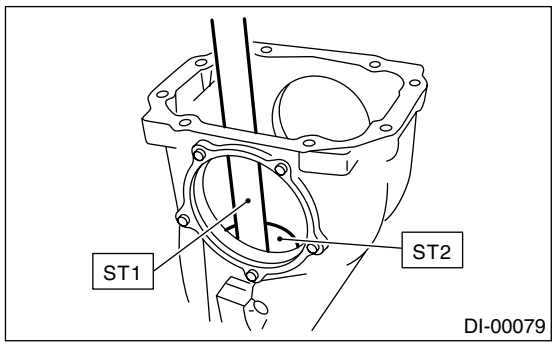
NOTE:
• Assemble in the reverse order of disassembling.
• Check and adjust each part during assembly.
• Keep the shims and washers in order, so that they are not improperly installed.
• Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
• Apply gear oil when installing the bearings and thrust washers.
• Be careful not to mix up the right and left hand races of the bearings.
• Use a new O-ring and gasket.
• Replace the oil seal with a new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.
• Be careful not to mix up the right and left hand oil seal.



1) 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 the front and rear bearing race into differential carrier using ST1 and ST2.

ST1 398477701 HANDLE
ST2 398477703 DRIFT 2



(2) Install the front bearing race to differential carrier using ST1 and ST2.

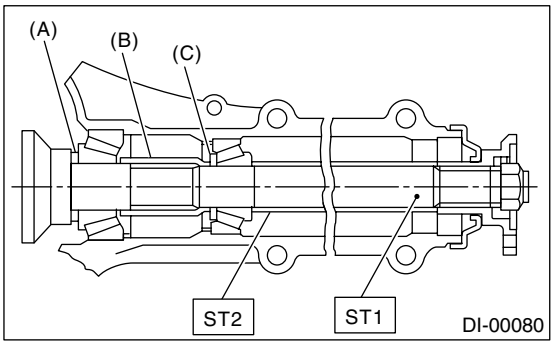
ST1 398477701 HANDLE
ST2 398477703 DRIFT 2

(3) Insert the ST1 into carrier with pinion height adjusting washer and rear bearing cone fitted onto it.

NOTE:
• If tooth contact (Drive pinion, Crown gear) is normal in the inspection before disassembling, verify that the washer is not deformed, and then re-use the used washer.
• Use a new rear bearing cone.

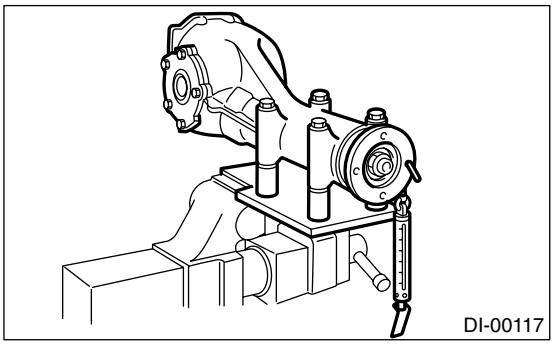
(4) Then install the preload adjusting spacer and washer, front bearing cone, ST2, companion flange, and washer and drive pinion nut.

ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR



(A) Pinion height adjusting shim
(B) Preload adjusting spacer
(C) Preload adjusting washer

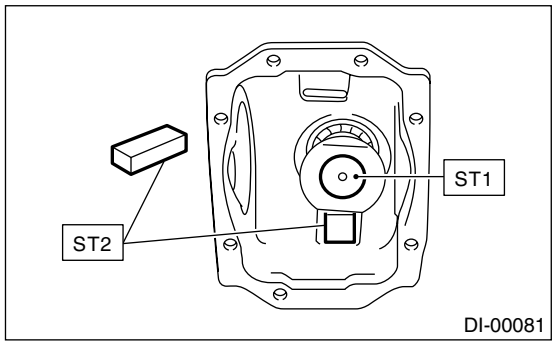
(5) Turn the ST1 with hand to make it seated, and tighten the drive pinion nut while measuring the preload with spring balance. Select the preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque.



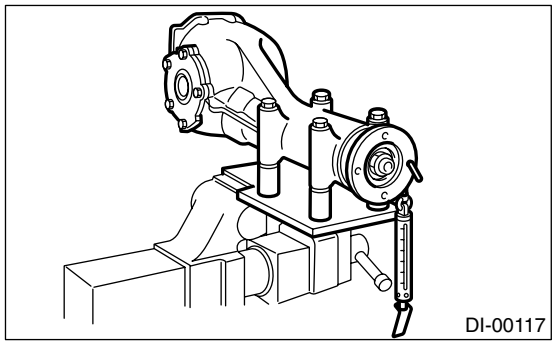
NOTE:
• Use a new lock nut.
• Be careful not to give excessive preload.
• When tightening the drive pinion nut, lock ST1 with ST2 as shown in the figure.
• Measure the preload in direction of tangent to flange.

ST1 398507702 DUMMY SHAFT
ST2 398507704 BLOCK

Tightening torque:
181 N·m (18.5 kgf-m, 134 ft-lb)



Front and rear bearing preload
For new bearing: 18.1 — 38.8 N (1.8 — 4.0 kgf, 4.1 — 8.7 lb) at companion flange bolt hole



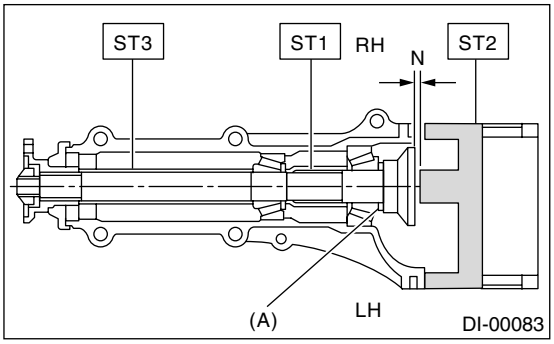
	Part No.	Thickness mm (in)
Preload adjusting washer	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	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)

	Part No.	Length mm (in)
Preload adjusting spacer	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)

2) Adjusting drive pinion height
Adjust the drive pinion height with shim installed between the rear bearing cone and back of pinion gear.
(1) Install the ST2.

Front and rear bearing preload
For new bearing: 18.1 — 38.8 N (1.8 — 4.0 kgf, 4.1 — 8.7 lb) at companion flange bolt hole

NOTE:
At this time, install a pinion height adjusting shim which is temporarily selected or the same as that used before. Measure and record the thickness.
ST1 398507702 DUMMY SHAFT
ST2 398507701 DIFFERENTIAL CARRIER GAUGE
ST3 398507703 DUMMY COLLAR

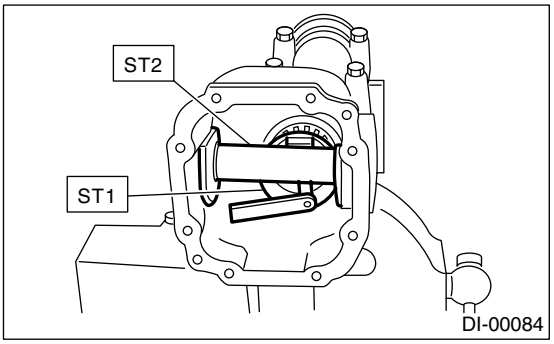


(A) Pinion height adjusting shim

(2) Measure the clearance N between the end of ST2 and end surface of ST1 by using a thickness gauge.

NOTE:
Make sure there is no clearance between the case and ST2.

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.

$T = To + N - (H \times 0.01) - 0.20$ mm (0.0079 in)

NOTE:
Use copies of this page.

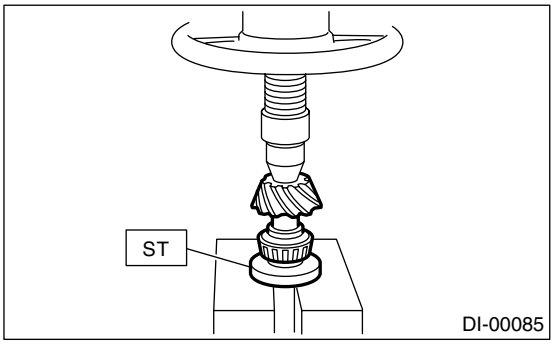
T	Thickness of pinion height adjusting shim mm (in)	
To	Thickness of shim temporarily inserted mm (in)	
N	Reading of thickness gauge mm (in)	
H	Figure marked on drive pinion head	
Memo:		

(Example of calculation)
To = 2.20 + 1.20 = 3.40 mm
N = 0.23 mm H = + 1
T = 3.40 + 0.23 − 0.01 − 0.20 = 3.42
Result: Thickness = 3.42 mm
Therefore use the shim 383605200.

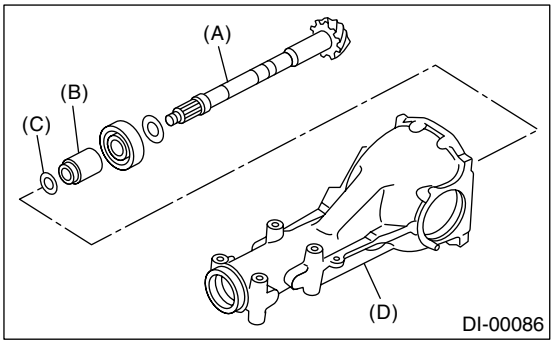
Pinion height adjusting shim	
Part No.	Thickness mm (in)
383495200	3.09 (0.1217)
383505200	3.12 (0.1228)
383515200	3.15 (0.1240)
383525200	3.18 (0.1252)
383535200	3.21 (0.1264)
383545200	3.24 (0.1276)
383555200	3.27 (0.1287)
383565200	3.30 (0.1299)
383575200	3.33 (0.1311)
383585200	3.36 (0.1323)
383595200	3.39 (0.1335)
383605200	3.42 (0.1346)
383615200	3.45 (0.1358)
383625200	3.48 (0.1370)

Pinion height adjusting shim	
Part No.	Thickness mm (in)
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)

3) Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.
ST 398177700 INSTALLER



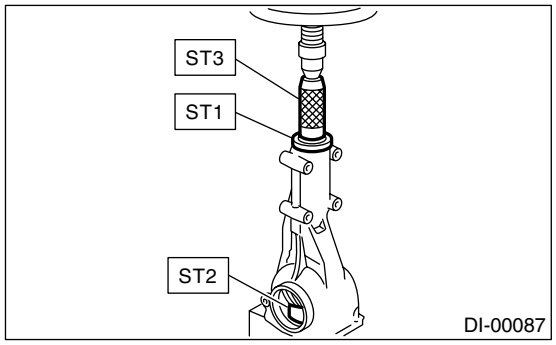
4) Insert the drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.



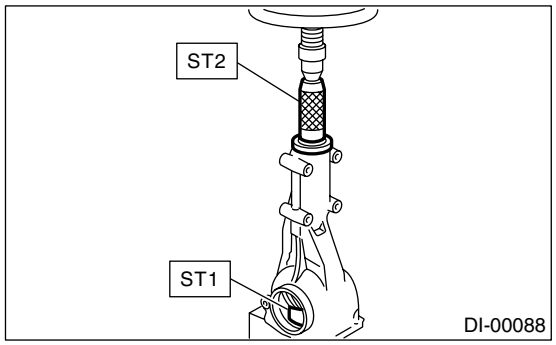
(A) Drive pinion
(B) Bearing adjusting spacer
(C) Washer
(D) Differential carrier

5) Press-fit the front bearing cone into case with ST1, ST2 and ST3.

ST1 398507703 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER



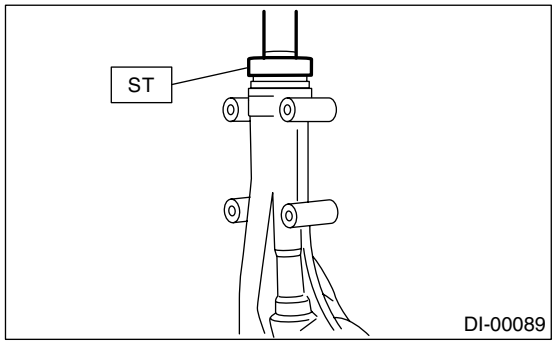
6) Insert the spacer, then press-fit the pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



7) Fit a new oil seal with ST.

NOTE:
• Press-fit until the end of oil seal is 1 mm (0.04 in) inward from end of carrier.
• Apply grease between the oil seal lips.

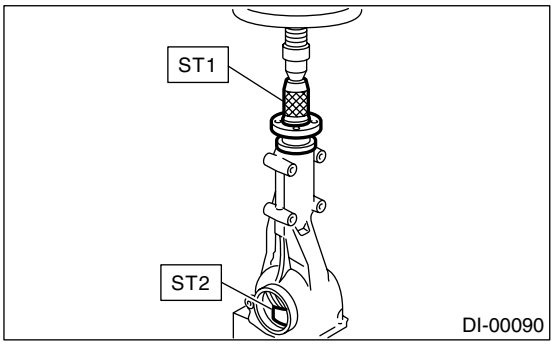
ST 498447120 INSTALLER



8) Press-fit the companion flange with ST1 and ST2.

NOTE:
Be careful not to damage the bearing.

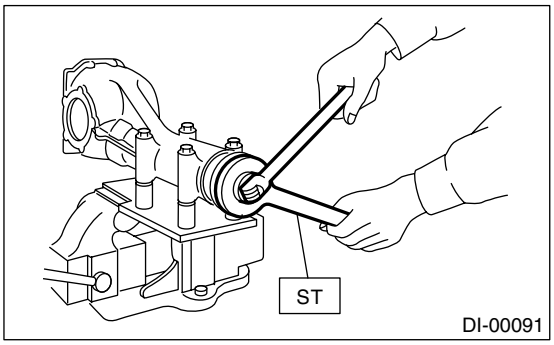
ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



9) Install a new self-locking nut. Then tighten it with the ST.

ST 498427200 FLANGE WRENCH

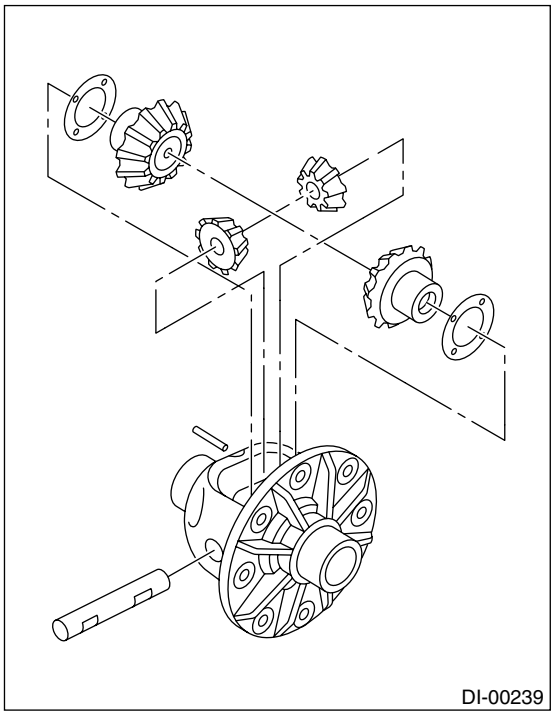
Tightening torque:
181 N·m (18.5 kgf-m, 134 ft-lb)



10) Assembling differential case
Install the side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case. (Model without LSD)

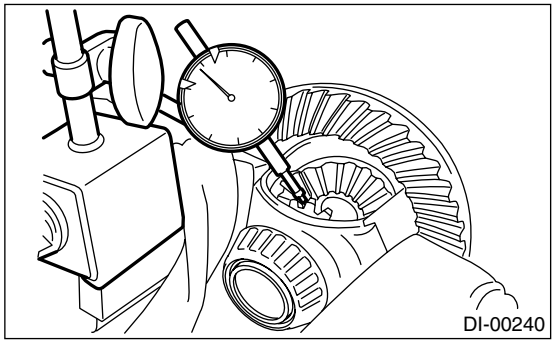
NOTE:
• Apply gear oil on both sides of the washer and on the side gear shaft before installing.

• Insert the pinion mate shaft into the differential case by aligning the lock pin holes.


DI-00239

(1) Measure the side gear backlash.

Side gear backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)


DI-00240

(2) Adjust the backlash as specified by selecting the side gear thrust washer.

Side gear thrust washer	
Part No.	Thickness mm (in)
383445201	0.75 — 0.80 (0.0295 — 0.0315)
383445202	0.80 — 0.85 (0.0315 — 0.0335)
383445203	0.85 — 0.90 (0.0335 — 0.0354)

(3) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.
(4) After inserting the pinion shaft lock pin into differential case, stake both sides of the hole to prevent pin from falling off.

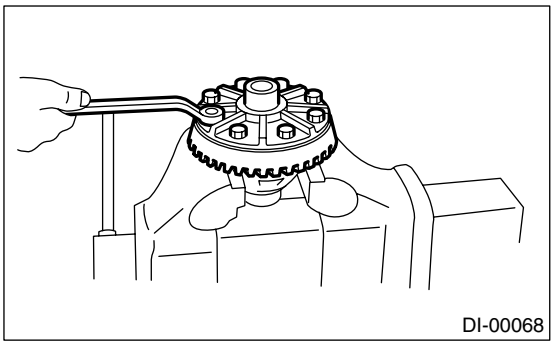
11) Install the crown gear on differential case.

NOTE:
Before installing the bolts, apply Lock Tite to bolt threads.

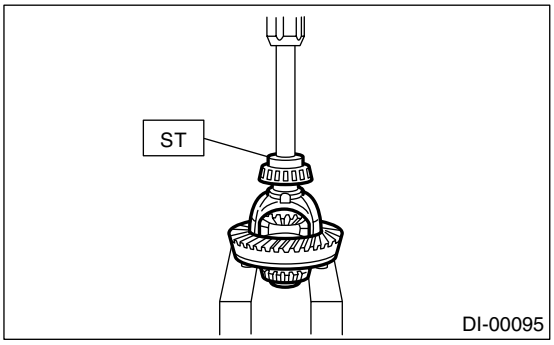
Lock Tite:
THREE BOND 1324 (Part No. 004403042) or equivalent

NOTE:
Tighten diagonally while tapping the bolt heads.

Tightening torque:
105 N·m (10.7 kgf-m, 77.4 ft-lb)

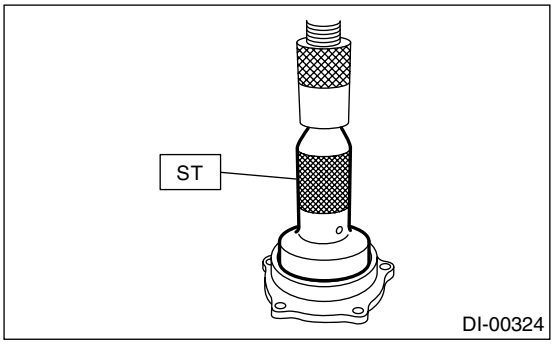

DI-00068

12) Press the side bearing into differential case using ST.
ST 398237700 DRIFT



DI-00095

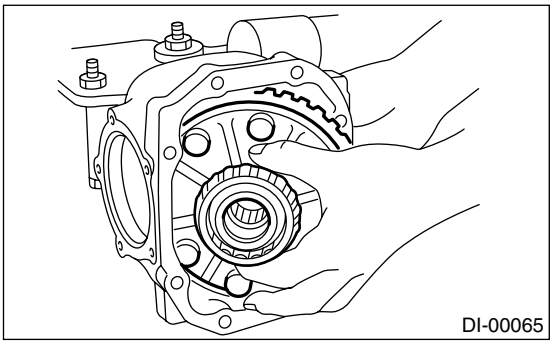
13) Press the side bearing outer race into bearing retainer using ST.
ST 398487700 DRIFT



DI-00324

14) Adjusting side bearing retainer shims
(1) The driven gear backlash and side bearing preload can be determined by the side bearing retainer shim thickness.

(2) Install the differential case assembly into differential carrier in the reverse order of disassembly.


DI-00065

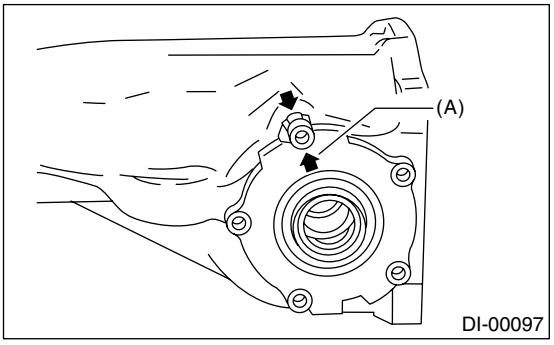
(3) Install the side retainer shims and O-rings to the right and left retainers from which they were removed.

NOTE:
• Replace the broken or cracked O-ring with new one.
• Replace the broken or corroded side retainer shim with a new one of same 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)

(4) Align the arrow mark on differential carrier with the mark on side retainer during installation.

NOTE:
Be careful that side bearing outer race is not damaged by bearing roller.



DI-00097

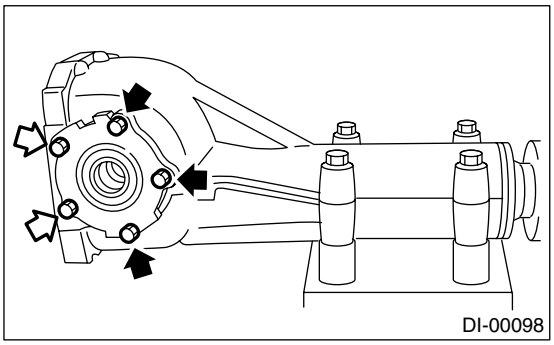
(A) Arrow mark

(5) Tighten the side bearing retainer bolts.

NOTE:
Before tightening the two side bearing retainer bolts, apply Lock Tite to bolt threads.

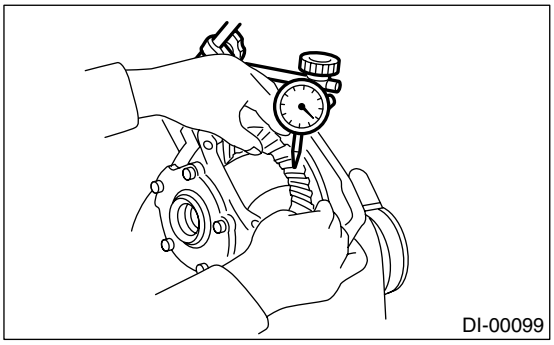
Lock Tite:
THREE BOND 1105 (Part No.004403010) or equivalent

Tightening torque:
10.3 N·m (1.05 kgf-m, 7.6 ft-lb)


DI-00098

(6) Measure the crown gear-to-drive pinion backlash. Set the magnet base on differential carrier. Align the contact point of dial gauge with tooth face of crown gear, and move the crown gear while holding drive pinion still. Read the value indicated on dial gauge.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)

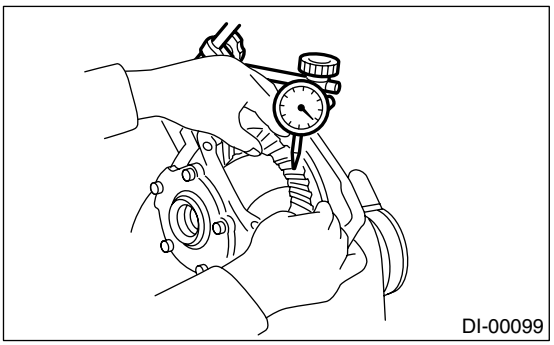

DI-00099

(7) At the same time, measure the total preload of drive pinion. Compared with the resistance when differential case is not installed, if the total preload is not within specification, adjust the thickness of side bearing retainer shims, increasing/reducing by an even amount at a time.

Total preload:
20.7 — 54.4 N (2.1 — 5.5 kgf, 4.7 — 12.2 lb)

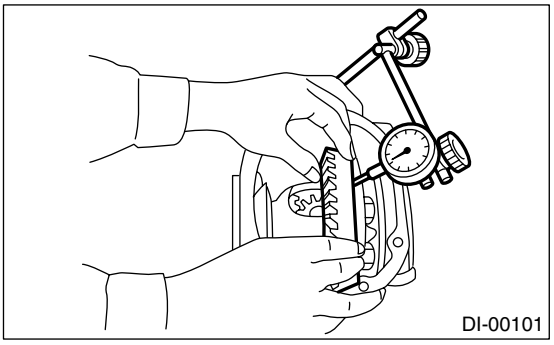
15) Re-check the crown gear-to-pinion backlash.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)



16) Check the crown gear runout on its back surface, and make sure that pinion and crown gear rotate smoothly.

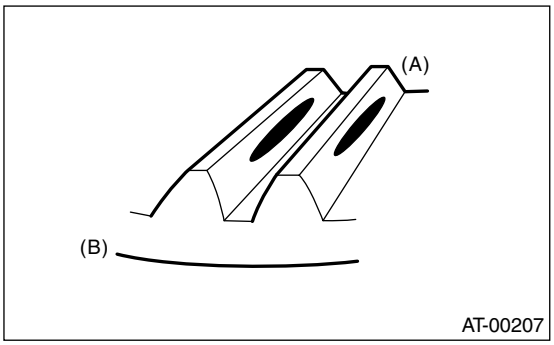
Limit of runout:
Less than 0.05 mm (0.0020 in)



17) 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 the 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".

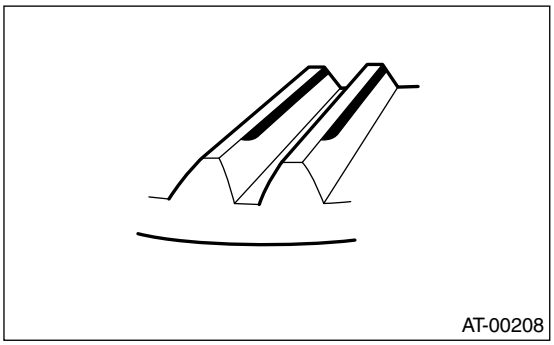
NOTE:
Be sure to wipe off red lead completely after adjustment is completed.

• Correct tooth contact
Checking item: Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. (When loaded, contact pattern moves toward heel)

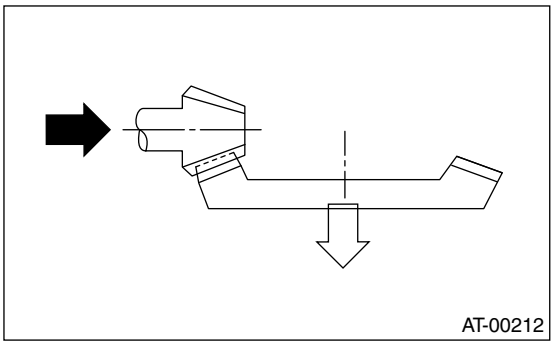


(A) Toe side
(B) Heel side

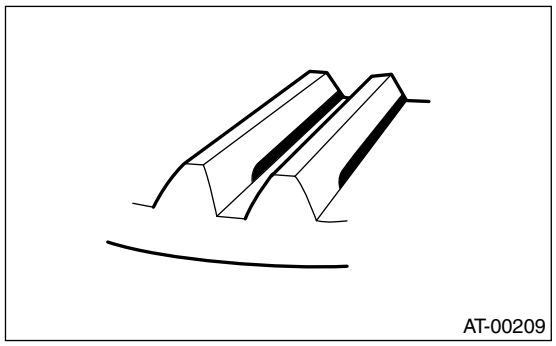
• Face contact
Checking item: Backlash is too large.
Contact pattern



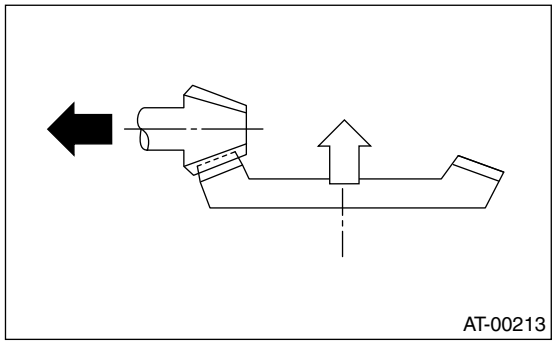
Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.



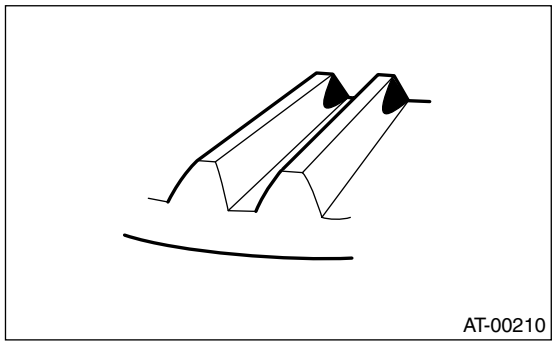
• Flank contact
Checking item: Backlash is too small.
Contact pattern



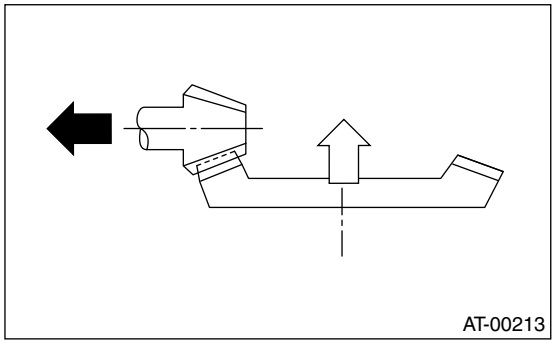
Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.



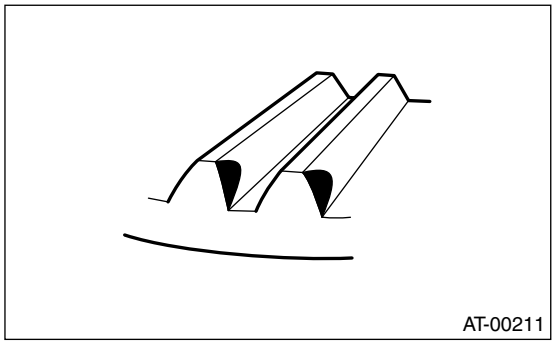
• Toe contact (Inside end contact)
Checking item: Contact area is small.
Contact pattern



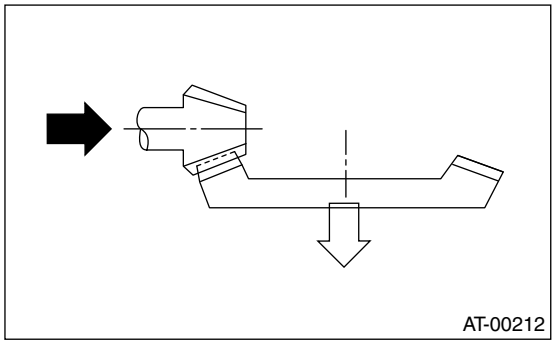
Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.



• Heel contact (Outside end contact)
Checking item: Contact area is small.
Contact pattern

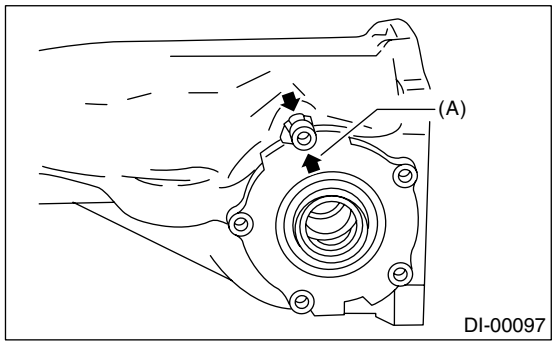


Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.



18) If proper tooth contact is not obtained, once again adjust the drive pinion height by changing RH and LH side bearing retainer shims and the hypoid gear backlash.
19) Install the oil seals to the right and left side bearing retainers.

20) Align the arrow mark on differential carrier with the mark on side retainer during installation.

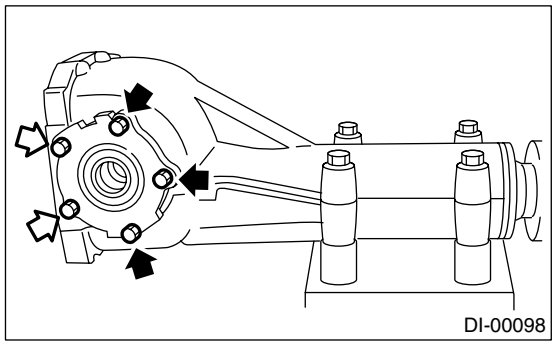


(A) Arrow mark

21) Tighten the side bearing retainer bolts.

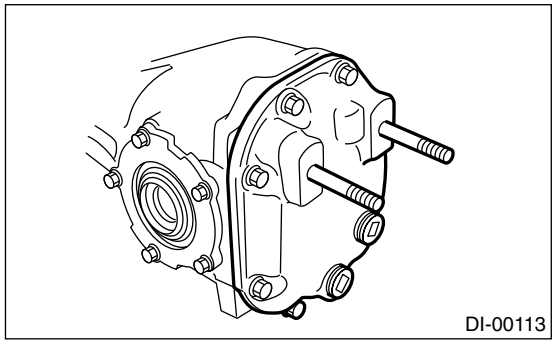
Lock Tite:
THREE BOND 1105 (Part No. 004403010) or equivalent

Tightening torque:
10.3 N·m (1.05 kgf-m, 7.6 ft-lb)



22) Install the new gasket and rear cover and tighten the bolts to specified torque.

Tightening torque:
29 N·m (3.0 kgf-m, 21.7 ft-lb)

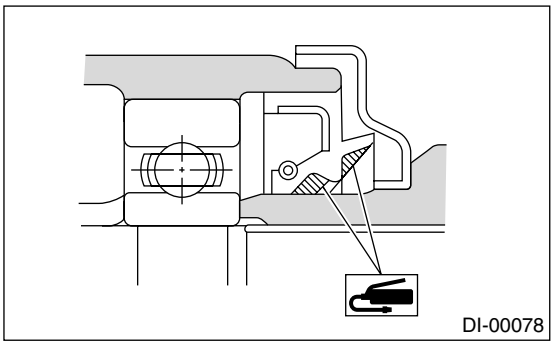


23) Install the breather cap.
24) Install the drain plug and filler plug.

Tightening torque:
49 N·m (5.0 kgf-m, 36.2 ft-lb)

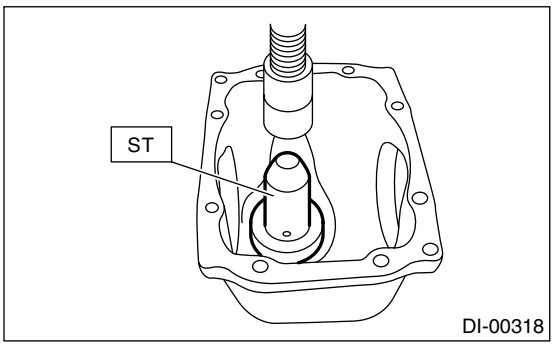
2. STi MODEL

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 improperly installed.
- 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 races of the bearings.
- Replace the oil seal with a new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.



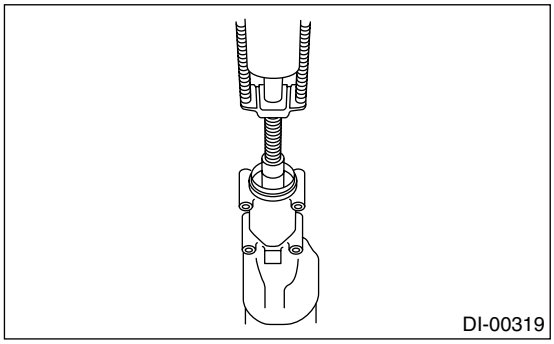
- Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting shim are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.

2) Press-fit the rear bearing race into differential carrier using ST.
ST 398417700 DRIFT

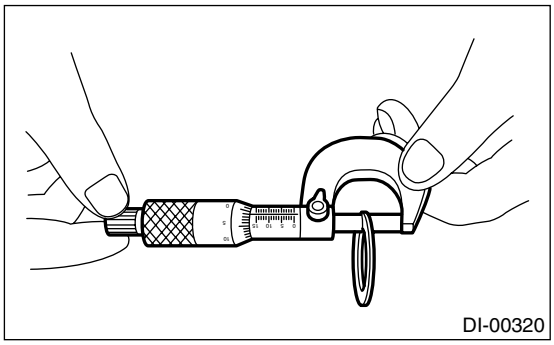


3) Press-fit the front bearing race into differential carrier using ST.

ST 398477702 DRIFT

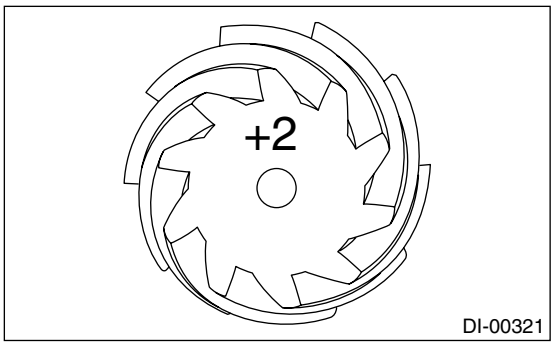


4) Pinion height adjusting shim selection.
(1) Measure the thickness of inserted pinion height adjusting shim.



(2) Read the punch mark of installed drive pinion gear and new one.

NOTE:
If there is no punch mark, it means 0 (zero).



(3) Obtain the thickness of pinion height adjust shim to be inserted from the following formula, and replace the inserted shim with this one.

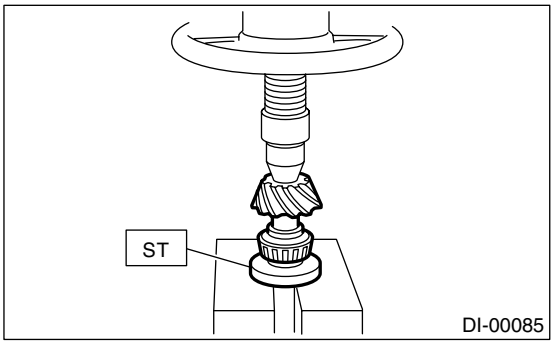
$T = T1 + (T2 \times 0.01 - T3 \times 0.01)$

T mm	Thickness of selected pinion height adjusting shim.
T1 mm	Thickness of inserted pinion height adjusting shim.
T2 mm	Punch mark number on installed drive pinion gear.
T3 mm	Punch mark number on new drive pinion gear.

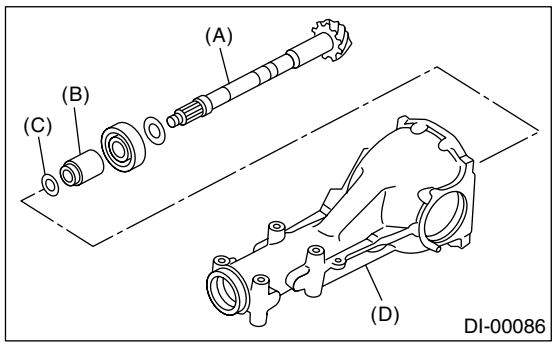
(Example of calculation)
T1 = 3.30, T2 = +2, T3 = −1
T = 3.30 + {(2 x 0.01) − (−1 x 0.01)} = 3.33
Result: Thickness = 3.33 mm
Therefore use the shim 38336AA310.

Pinion height adjusting shim	
Part No.	Thickness T mm (in)
38336AA230	3.09 (0.1217)
38336AA240	3.12 (0.1228)
38336AA250	3.15 (0.1240)
38336AA260	3.18 (0.1252)
38336AA270	3.21 (0.1264)
38336AA280	3.24 (0.1276)
38336AA290	3.27 (0.1287)
38336AA300	3.30 (0.1299)
38336AA310	3.33 (0.1311)
38336AA320	3.36 (0.1323)
38336AA330	3.39 (0.1335)
38336AA340	3.42 (0.1346)
38336AA350	3.45 (0.1358)
38336AA360	3.48 (0.1370)
38336AA370	3.51 (0.1382)
38336AA380	3.54 (0.1394)
38336AA390	3.57 (0.1406)
38336AA400	3.60 (0.1417)
38336AA410	3.63 (0.1429)
38336AA420	3.66 (0.1441)

5) Install the selected pinion height adjusting shim on drive pinion, and press-fit the rear bearing cone into position with ST.
ST 18674AA000 INSTALLER



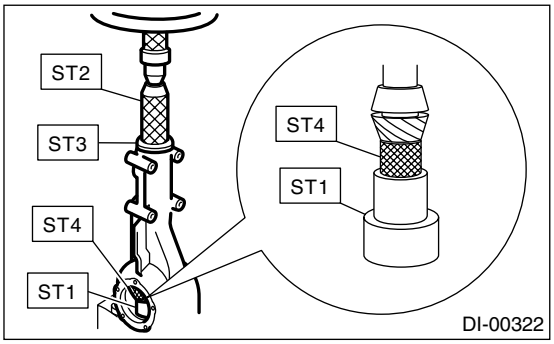
6) Insert the drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.



(A) Drive pinion
(B) Bearing preload adjusting spacer
(C) Bearing preload adjusting washer
(D) Differential carrier

7) Insert the spacer, then press-fit the pilot bearing with STs.

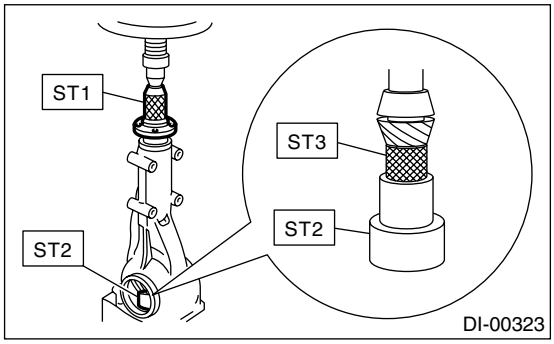
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER
ST3 398507703 DUMMY COLLER
ST4 498937110 HOLDER DRIVE PINION



8) Press-fit the companion flange with ST1, ST2 and ST3.

NOTE:
Be careful not to damage the bearing.

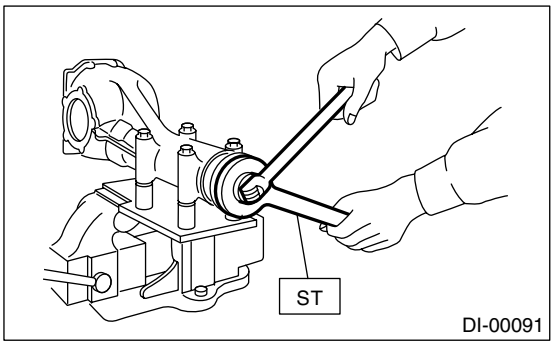
ST1 899874100 INSTALLER
ST2 399780104 WEIGHT
ST3 498937110 HOLDER DRIVE PINION



9) Install the self-locking nut. Then tighten it with the ST.

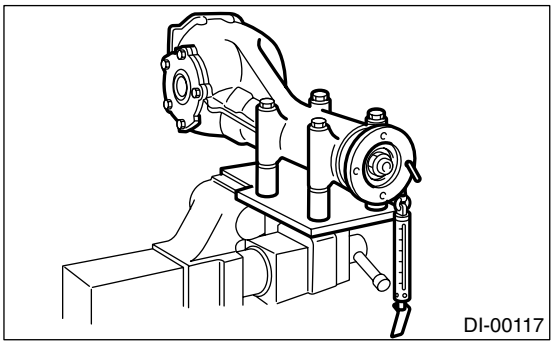
ST (MODEL WITH MECHANICAL LSD)
18633AA000
WRENCH COMPL
ST (MODEL WITHOUT MECHANICAL LSD)
498427200
FLANGE WRENCH

Tightening torque:
181 N·m (18.5 kgf-m, 134 ft-lb)



10) Rotate the drive pinion shaft more than ten times to accustom each taper roller bearing, and then measure the preload.

Bearing preload:
Model without mechanical LSD:
25.9 — 41.5 N (2.64 — 4.23 kgf, 5.8 — 9.3 lb)
Model with mechanical LSD:
24.1 — 38.6 N (2.46 — 3.94 kgf, 5.42 — 9.68 lb)



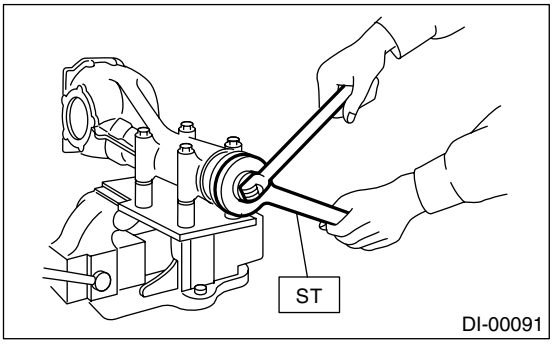
11) If bearing preload is out of specification, adjust to specification by selecting preload adjusting washer and spacer from the following table.

	Part No.	Thickness mm (in)
Preload adjusting washer	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)
	Part No.	Length mm (in)
Preload adjusting spacer	31454AA130	52.2 (2.055)
	31454AA140	52.4 (2.063)
	31454AA150	52.6 (2.071)
	31454AA160	52.8 (2.079)
	31454AA170	53.0 (2.087)
	31454AA180	53.2 (2.094)

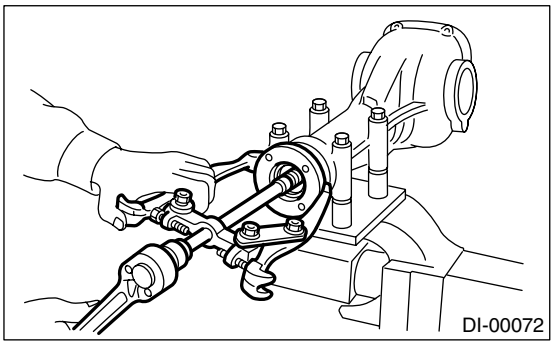
12) Hold the companion flange with ST and remove the self-lock nut.

ST (MODEL WITH MECHANICAL LSD)
18633AA000
WRENCH COMPL

ST (MODEL WITHOUT MECHANICAL LSD)
498427200
FLANGE WRENCH



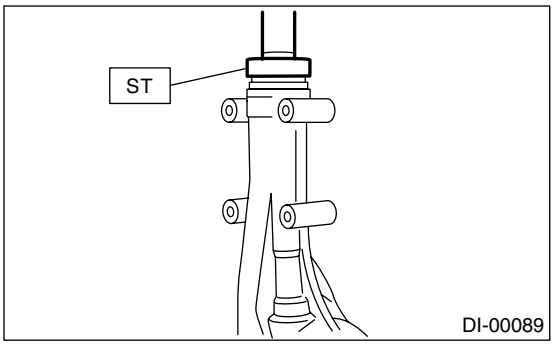
13) Extract the companion flange with a puller.



14) Fit a new oil seal with ST.

NOTE:
- Press-fit until the end of oil seal is 1 mm (0.04 in) inward from end of carrier.
- Apply grease between the oil seal lips.

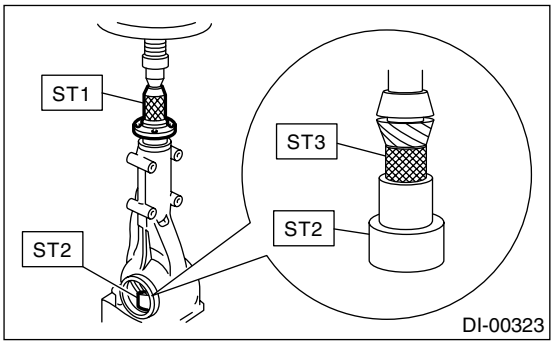
ST 498447120 INSTALLER



15) Press-fit the companion flange with ST1, ST2 and ST3.

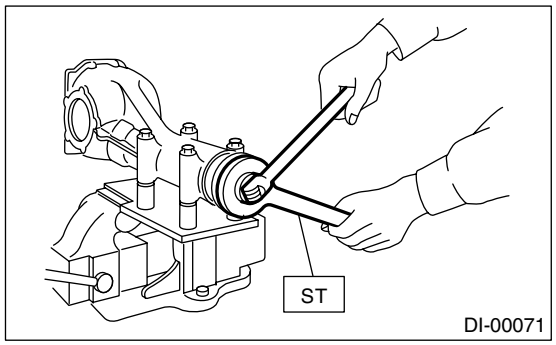
ST1 899874100 INSTALLER
ST2 399780104 WEIGHT
ST3 498937110 HOLDER DRIVE PINION

NOTE:
Be careful not to damage the bearing.



16) Install the self-lock nut. Then tighten it with the ST.

ST (MODEL WITH MECHANICAL LSD)18633AA000 WRENCH COMPL
ST (MODEL WITHOUT MECHANICAL LSD) 498427200 FLANGE WRENCH



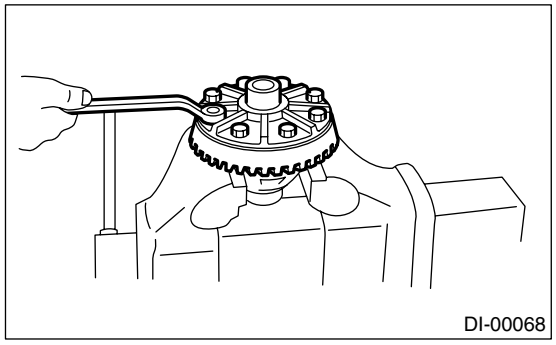
17) Install the crown gear on differential case.

NOTE:
Before installing the bolts, apply Lock Tite to bolt threads.

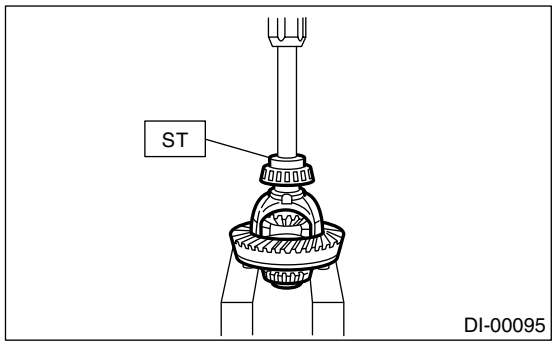
Lock Tite:
THREE BOND 1324 (Part No.004403042) or equivalent

NOTE:
Tighten diagonally while tapping the bolt heads.

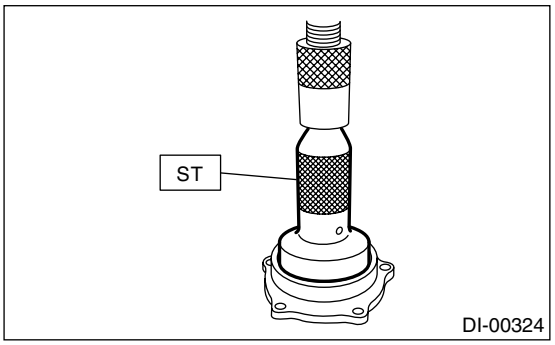
Tightening torque:
105 N·m (10.7 kgf-m, 77.4 ft-lb)



18) Press-fit the side bearing onto differential case with ST.
ST 398487700 DRIFT

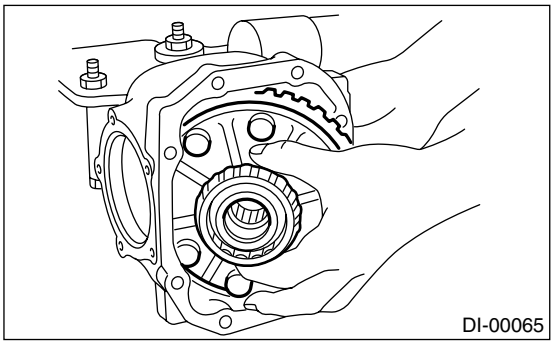


19) Assembling side retainer.
(1) Press-fit the side bearing outer race with press and ST.
ST 398417700 DRIFT



(2) Install the oil seal. <Ref. to DI-71, REPLACEMENT, Rear Differential Side Oil Seal.>

20) Adjusting side bearing retainer shims
(1) The driven gear backlash and side bearing preload can be determined by the side bearing retainer shim thickness.
(2) Install the differential case assembly into differential carrier in the reverse order of disassembly.



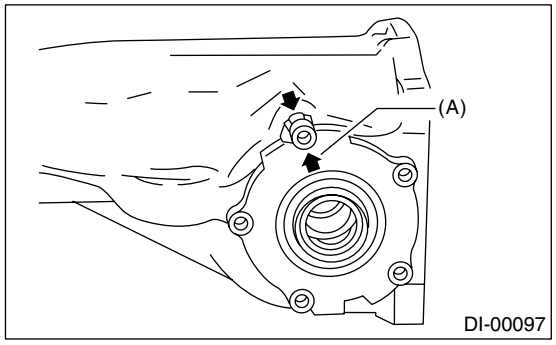
(3) Install the side retainer shims and O-rings to the right and left retainers from which they were removed.

NOTE:
• Replace the broken or cracked O-ring with new one.
• Replace the broken or corroded side retainer shim with a new one of same 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)

(4) Align the arrow mark on differential carrier with the mark on side retainer during installation.

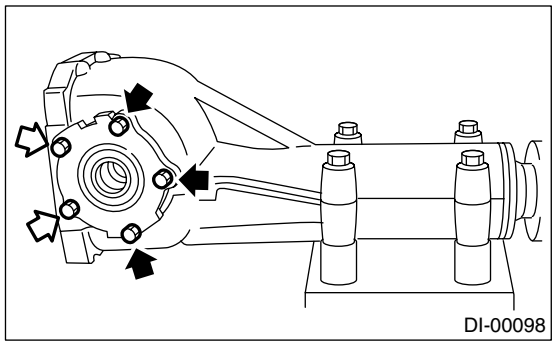
NOTE:
Be careful that side bearing outer race is not damaged by bearing roller.



(A) Arrow mark

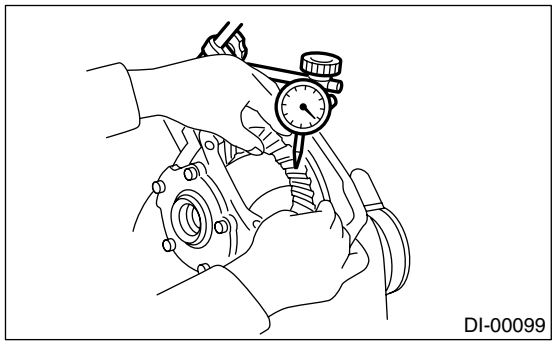
(5) Tighten the side bearing retainer bolts.

Tightening torque:
10.3 N·m (1.05 kgf-m, 7.6 ft-lb)



(6) Measure the crown gear-to-drive pinion backlash. Set the magnet base on differential carrier. Align the contact point of dial gauge with tooth face of crown gear, and move the crown gear while holding drive pinion still. Read the value indicated on dial gauge.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)



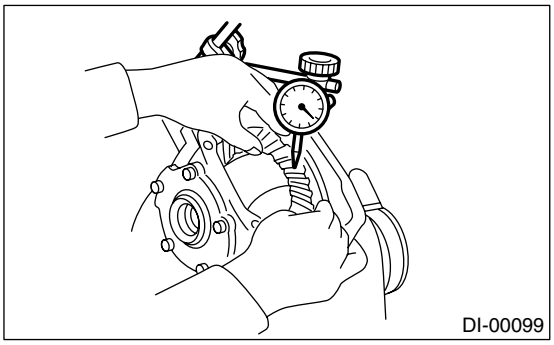
(7) At the same time, measure the total preload of drive pinion. Compared with the resistance when differential case is not installed, if the total preload is not within the specified range, readjust side bearing retainer shims, increasing/reducing by an even amount at a time.

Total preload:
Model without mechanical LSD :
28.5 — 57.0 N (2.91 — 5.81 kgf, 6.4 — 12.8 lb)

Total preload:
Model with mechanical LSD :
27.0 — 53.9 N (2.75 — 5.50 kgf, 6.07 — 12.12 lb)

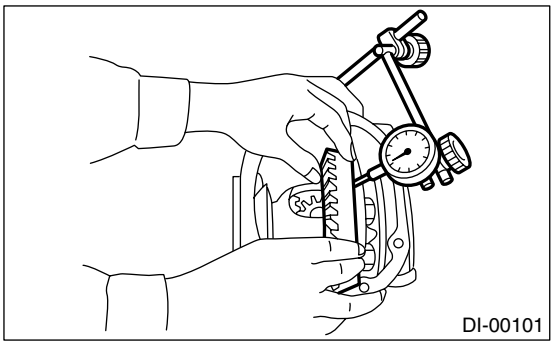
21) Re-check the crown gear-to-pinion backlash.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)



22) Check the crown gear runout on its back surface, and make sure that pinion and crown gear rotate smoothly.

Limit of runout:
Less than 0.05 mm (0.0020 in)



23) Checking and adjusting tooth contact of crown gear

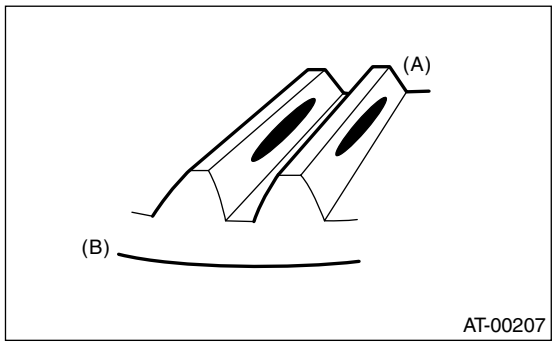
(1) Apply an even coat of red lead on both sides of three or four teeth on the crown gear. Check the contact pattern after rotating the crown gear several revolutions back and forth until a definite contact pattern appears on the crown gear.

(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.

- Correct tooth contact

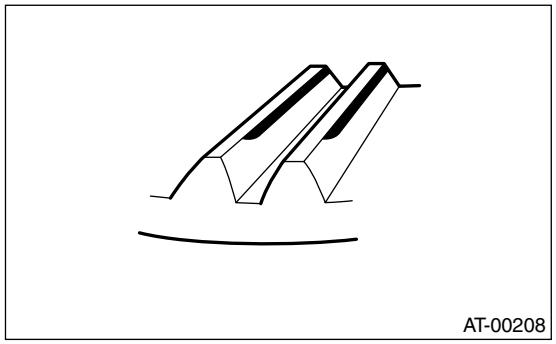
Checking item: Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. (When loaded, contact pattern moves toward heel)



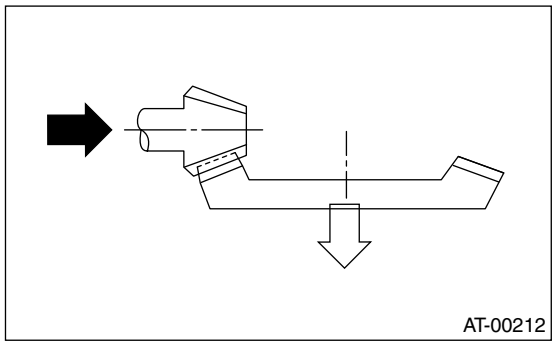
(A) Toe side
(B) Heel side

- Face contact

Checking item: Backlash is too large.
Contact pattern

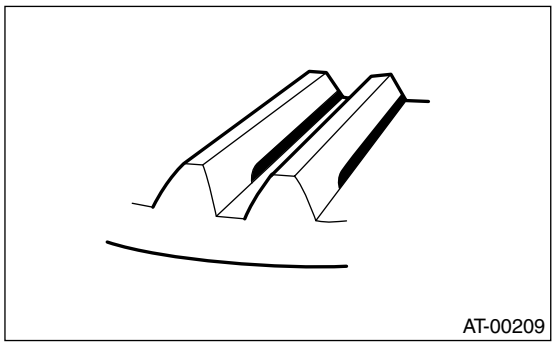


Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.

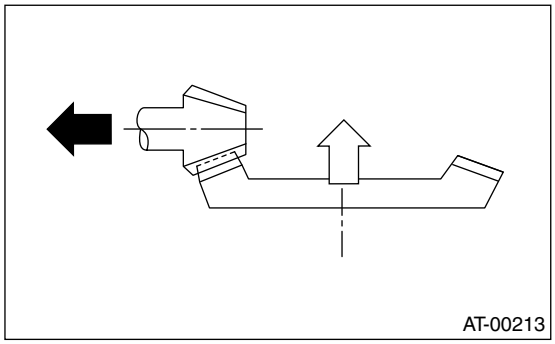


- Flank contact

Checking item: Backlash is too small.
Contact pattern

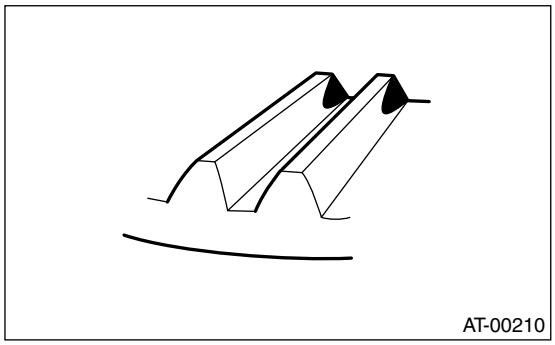


Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.

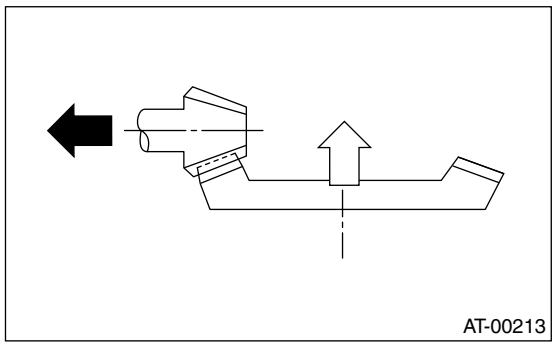


- Toe contact (Inside end contact)

Checking item: Contact area is small.
Contact pattern

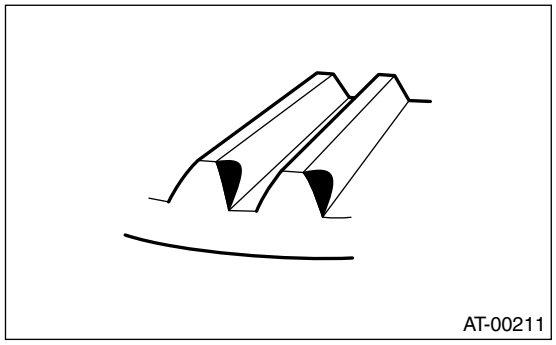


Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.

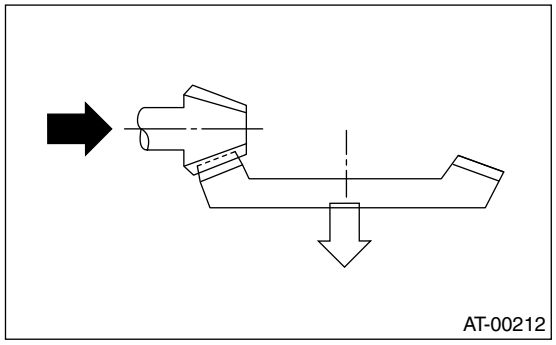


- Heel contact (Outside end contact)

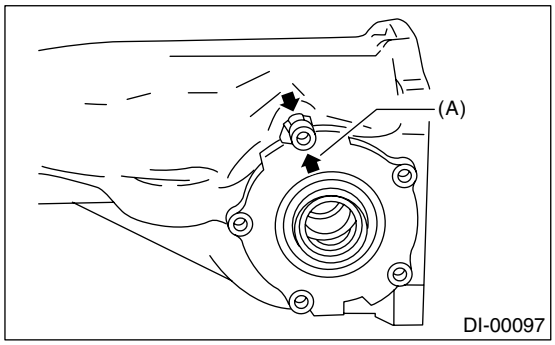
Checking item: Contact area is small.
Contact pattern



Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.



24) If proper tooth contact is not obtained, once again adjust the drive pinion height by changing RH and LH side bearing retainer shims and the hypoid gear backlash.
25) Install the oil seals to the right and left side bearing retainers. <Ref. to DI-71, REPLACEMENT, Rear Differential Side Oil Seal.>
26) Align the arrow mark on differential carrier with the mark on side retainer during installation.

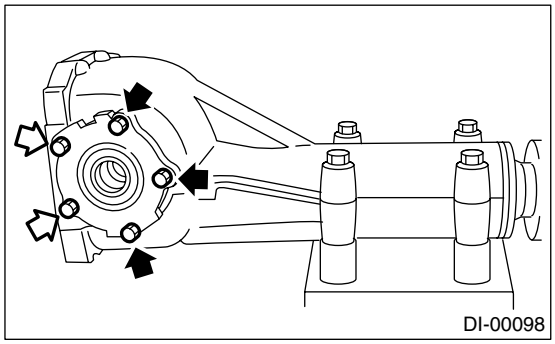


(A) Arrow mark

27) Tighten the side bearing retainer bolts.

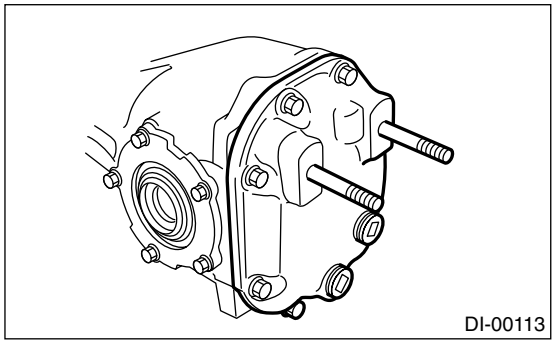
Lock Tite:
THREE BOND 1105 (Part No. 004403010) or equivalent

Tightening torque:
10.3 N·m (1.05 kgf-m, 7.6 ft-lb)



28) Install the new gasket and rear cover and tighten the bolts to specified torque.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)



29) Install the breather cap.
30) Install the drain plug and filler plug or oil temperature sensor.

Tightening torque:
49 N·m (5.0 kgf-m, 36.2 ft-lb)

E: 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.

9) Rear differential oil temperature switch (mechanical LSD model)

If the results of the following inspections are not satisfactory, replace rear differential temperature sensor.

(1) At room temperature, check for continuity between the sensor terminal and body.

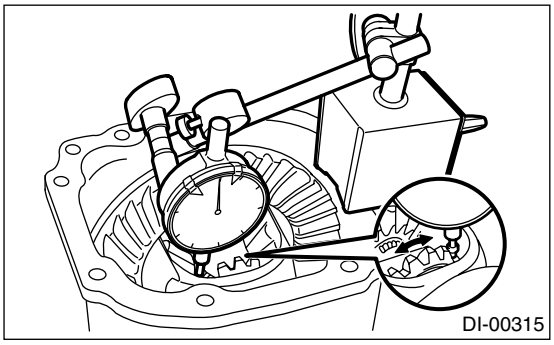
(2) Soak the sensor in oil, then raise the oil temperature. Check that the continuity is cut off when the oil temperature is between 144°C (291°F) and 156°C (313°F). Then, check that the continuity resumes by the time the oil temperature drops to 135°C (275°F).

1. SIDE GEAR BACKLASH

Using a dial gauge, check the backlash of the side gear.

Side gear backlash:
0.1 — 0.2 mm (0.004 — 0.008 in)

If the side gear backlash is not within the specification, adjust clearance as specified by selecting the side gear thrust washer.

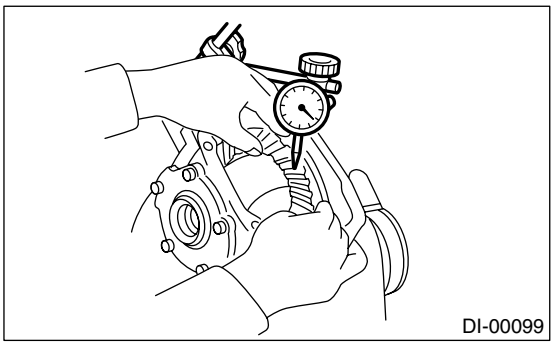

DI-00315

2. CROWN GEAR BACKLASH

Using a dial gauge, check the backlash of the crown gear.

Crown gear backlash:
0.1 — 0.2 mm (0.004 — 0.008 in)

If the crown gear backlash is not within the specification, adjust the side bearing preload or repair if necessary.

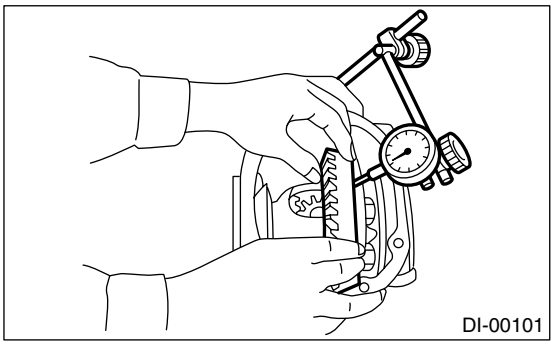

DI-00099

3. CROWN GEAR RUNOUT

Using a dial gauge, check the crown gear runout.

Crown gear runout:
Less than 0.05 mm (0.0020 in)

If the crown gear runout exceeds 0.05 mm (0.0020 in), replace the crown gear.


DI-00101

4. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION

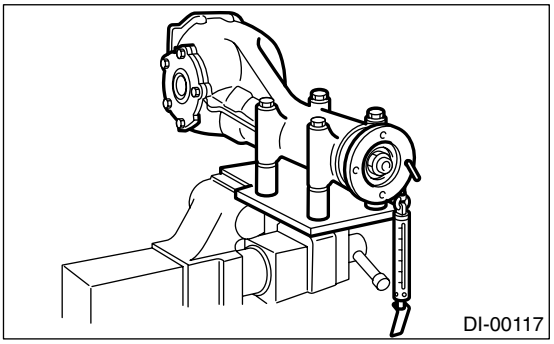
Inspect the tooth contact between crown gear and driven pinion. <Ref. to DI-36, ASSEMBLY, Rear Differential for T-type.>

5. TOTAL PRELOAD

Using a gauge, check the turning resistance increase.

Total preload:
Except for STi model:
20.7 — 54.4 N (2.1 — 5.5 kgf, 4.7 — 12.2 lb)
STi model:
Model with mechanical LSD :
27.0 — 53.9 N (2.75 — 5.50 kgf, 6.07 — 12.12 lb)
Model without mechanical LSD :
28.5 — 57.0 N (2.9 — 5.8 kgf, 6.4 — 12.8 lb)

If the total preload is not within the specification, adjust the side bearing retainer shims.



F: ADJUSTMENT

1. SIDE GEAR BACKLASH

Adjust the side gear backlash. <Ref. to DI-36, ASSEMBLY, Rear Differential for T-type.>

2. CROWN GEAR BACKLASH

Adjust the crown gear backlash. <Ref. to DI-36, ASSEMBLY, Rear Differential for T-type.>

3. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION

Adjust the tooth contact between crown gear and drive pinion gear. <Ref. to DI-36, ASSEMBLY, Rear Differential for T-type.>

4. TOTAL PRELOAD

Adjust the side bearing shim. <Ref. to DI-36, ASSEMBLY, Rear Differential for T-type.>