

## ENGINE SECTION 1

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.

**FUEL INJECTION (FUEL SYSTEMS) FU(H4SO)**

**EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES) EC(H4SO)**

**INTAKE (INDUCTION) IN(H4SO)**

**MECHANICAL ME(H4SO)**

**EXHAUST EX(H4SO)**

**COOLING CO(H4SO)**

**LUBRICATION LU(H4SO)**

**SPEED CONTROL SYSTEMS SP(H4SO)**

**IGNITION IG(H4SO)**

**STARTING/CHARGING SYSTEMS SC(H4SO)**

**ENGINE (DIAGNOSTICS) EN(H4SO)(diag)**

**FUEL INJECTION (FUEL SYSTEMS) FU(H4SOw/oOBD)**

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ENGINE SECTION 1

LUBRICATION

LU(H4SOw/oOBD)

SPEED CONTROL SYSTEMS

SP(H4SOw/oOBD)

IGNITION

IG(H4SOw/oOBD)

STARTING/CHARGING SYSTEMS

SC(H4SOw/oOBD)

ENGINE (DIAGNOSTICS)

EN(H4SOw/oOBD)  
(diag)

# FUEL INJECTION (FUEL SYSTEMS)

# *FU(H4SOW/oOBD)*

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	<b>Page</b>
1. General Description .....	2
2. Throttle Body .....	15
3. Intake Manifold .....	16
4. Engine Coolant Temperature Sensor.....	28
5. Crankshaft Position Sensor.....	29
6. Camshaft Position Sensor.....	30
7. Knock Sensor .....	31
8. Throttle Position Sensor .....	32
9. Intake Air Temperature and Manifold Absolute Pressure Sensor .....	34
10. Idle Air Control Solenoid Valve .....	35
11. Fuel Injector .....	36
12. Oxygen Sensor .....	41
13. Engine Control Module (ECM) .....	43
14. Main Relay .....	44
15. Fuel Pump Relay.....	45
16. Fuel .....	46
17. Fuel Tank .....	47
18. Fuel Filler Pipe .....	50
19. Fuel Pump .....	54
20. Fuel Level Sensor .....	57
21. Fuel Sub Level Sensor.....	58
22. Fuel Filter .....	59
23. Fuel Cut Valve.....	60
24. Fuel Damper Valve .....	61
25. Fuel Delivery, Return and Evaporation Lines.....	62
26. Fuel System Trouble in General .....	65

# General Description

## FUEL INJECTION (FUEL SYSTEMS)

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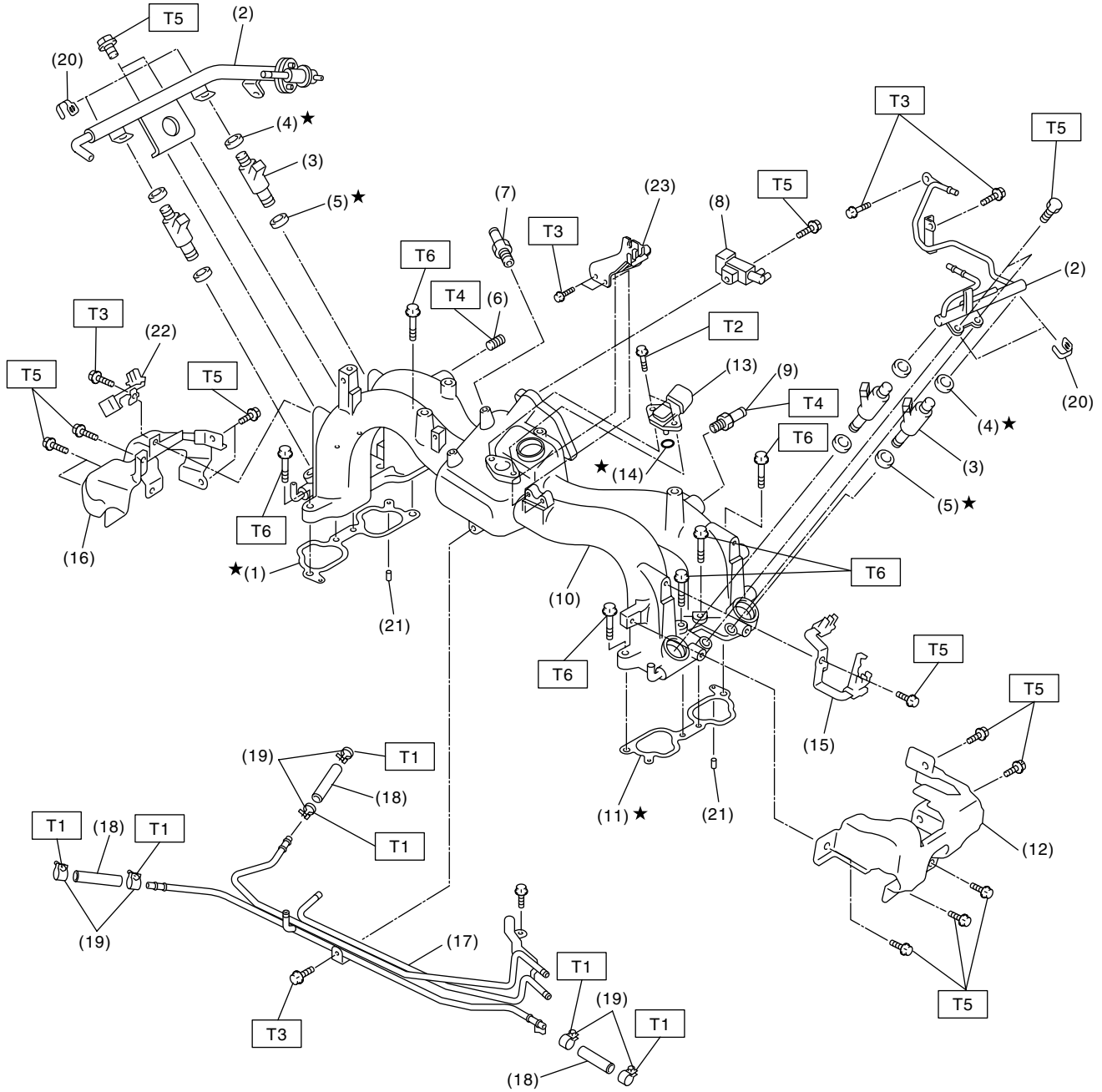
### 1. General Description

#### A: SPECIFICATIONS

Model		1.6 L and 2.0 L	2.5 L
Fuel tank	Capacity	50 ℓ (13.2 US gal, 11.0 Imp gal)	60 ℓ (15.9 US gal, 13.2 Imp gal)
	Location	Under rear seat	
Fuel pump	Type	Impeller	
	Shutoff discharge pressure	370 — 677 kPa (3.77 — 6.9 kg/cm <sup>2</sup> , 53.6 — 98 psi)	
	Discharge flow	More than 65 ℓ (17.2 US gal, 14.3 Imp gal)/h [12 V at 300 kPa (3.06 kg/cm <sup>2</sup> , 43.5 psi)]	
Fuel filter	Cartridge type		

## B: COMPONENT

### 1. INTAKE MANIFOLD



FU-00906

# General Description

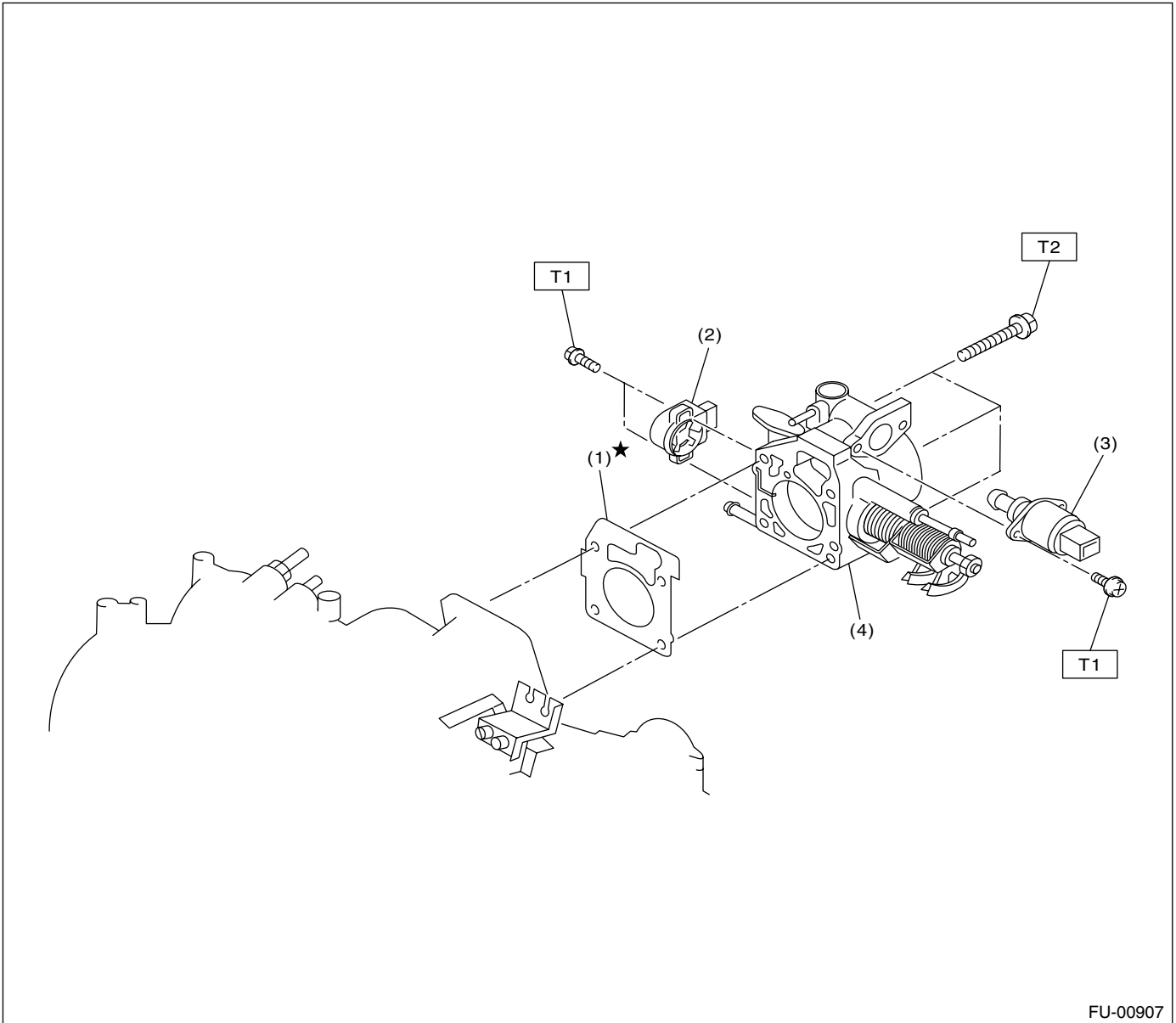
## FUEL INJECTION (FUEL SYSTEMS)

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(1) Intake manifold gasket RH	(12) Fuel pipe protector LH	(22) Plug cord holder RH
(2) Fuel injector pipe	(13) Intake air temperature and manifold absolute pressure sensor	(23) Accelerator cable bracket
(3) Fuel injector		
(4) O-ring	(14) O-ring	<b><i>Tightening torque: N·m (kgf-m, ft-lb)</i></b>
(5) O-ring	(15) Plug cord holder LH	<b><i>T1: 1.5 (0.15, 1.1)</i></b>
(6) Plug	(16) Fuel pipe protector RH	<b><i>T2: 3.4 (0.35, 2.5)</i></b>
(7) PCV valve	(17) Fuel pipe ASSY	<b><i>T3: 6.4 (0.65, 4.7)</i></b>
(8) Purge control solenoid valve	(18) Fuel hose	<b><i>T4: 17 (1.7, 12.5)</i></b>
(9) Nipple	(19) Clip	<b><i>T5: 19 (1.9, 14.0)</i></b>
(10) Intake manifold	(20) Clip	<b><i>T6: 25 (2.5, 18.4)</i></b>
(11) Intake manifold gasket LH	(21) Guide pin	

---

## 2. AIR INTAKE SYSTEM



FU-00907

- (1) Gasket
- (2) Throttle position sensor
- (3) Idle air control solenoid valve

- (4) Throttle body

**Tightening torque: N-m (kgf-m, ft-lb)**

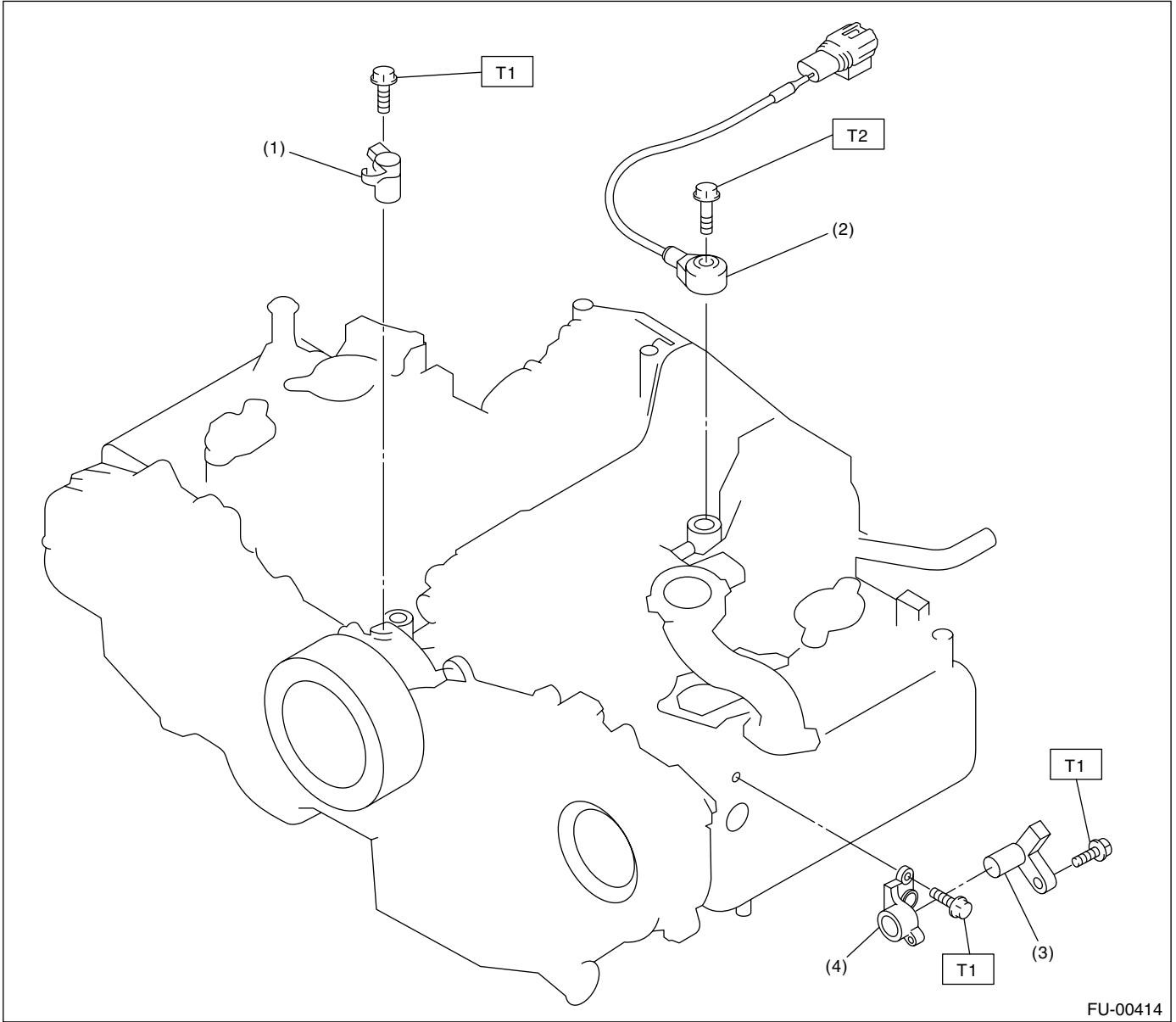
**T1: 1.6 (0.16, 1.2)**

**T2: 22 (2.2, 16.2)**

# General Description

FUEL INJECTION (FUEL SYSTEMS)

## 3. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS



FU-00414

- (1) Crankshaft position sensor
- (2) Knock sensor

- (3) Camshaft position sensor
- (4) Camshaft position sensor support

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 6.4 (0.65, 4.7)**

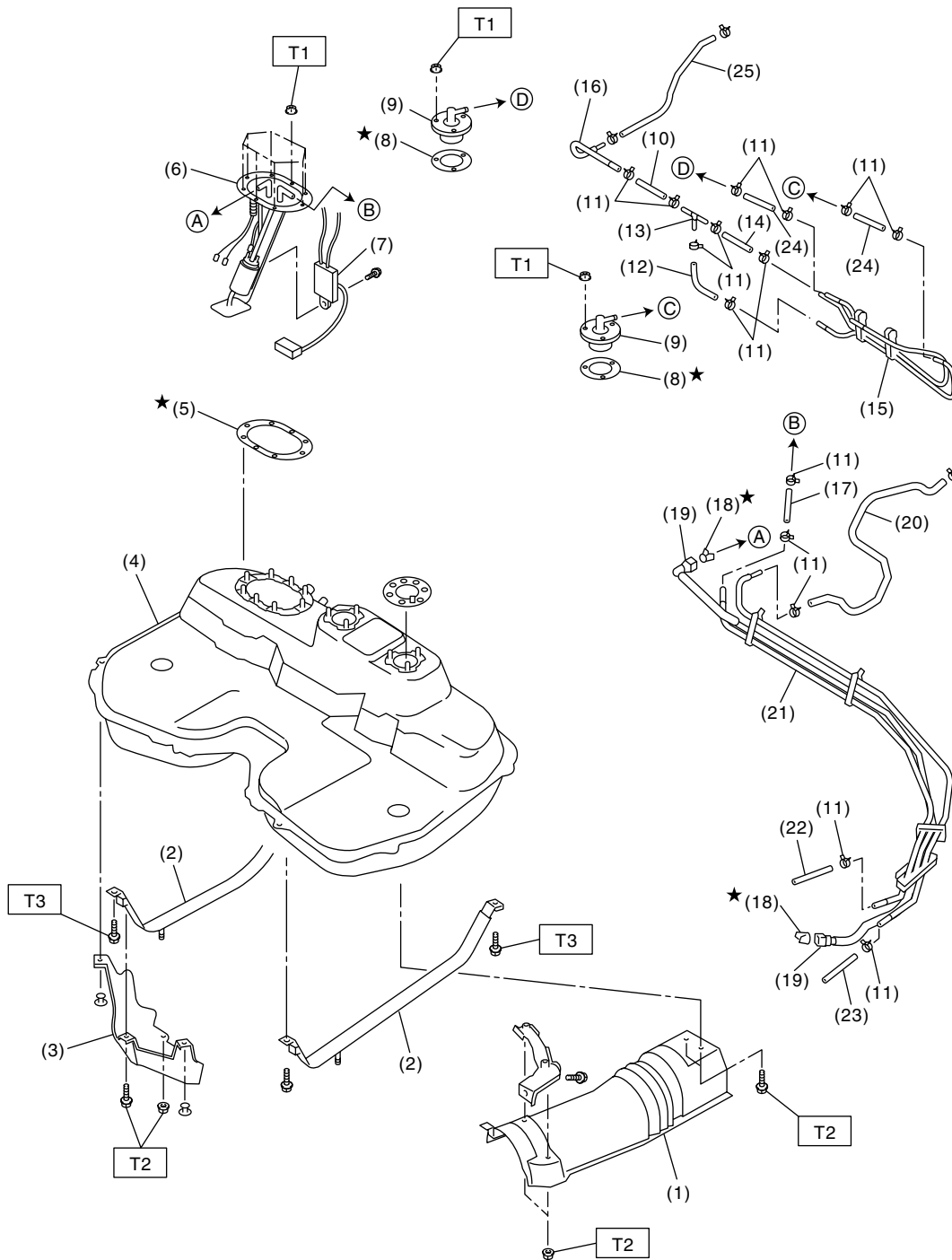
**T2: 24 (2.4, 17.4)**



# General Description

## 4. FUEL TANK

• 1.6 L and 2.0 L MODEL



FU-00908

## General Description

### FUEL INJECTION (FUEL SYSTEMS)

---

(1) Heat shield cover	(11) Clip	(21) Fuel pipe ASSY
(2) Fuel tank band	(12) Evaporation hose B	(22) Fuel return hose B
(3) Protector RH	(13) Joint pipe	(23) Evaporation hose E
(4) Fuel tank	(14) Evaporation hose C	(24) Evaporation hose F
(5) Fuel pump gasket	(15) Evaporation pipe ASSY	(25) Evaporation hose G
(6) Fuel pump ASSY	(16) Evaporation pipe	
(7) Fuel level sensor	(17) Fuel return hose A	
(8) Fuel cut valve gasket	(18) Retainer	
(9) Fuel cut valve	(19) Quick connector	
(10) Evaporation hose A	(20) Evaporation hose D	

---

**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: 4.4 (0.45, 3.3)**

**T2: 7.4 (0.75, 5.4)**

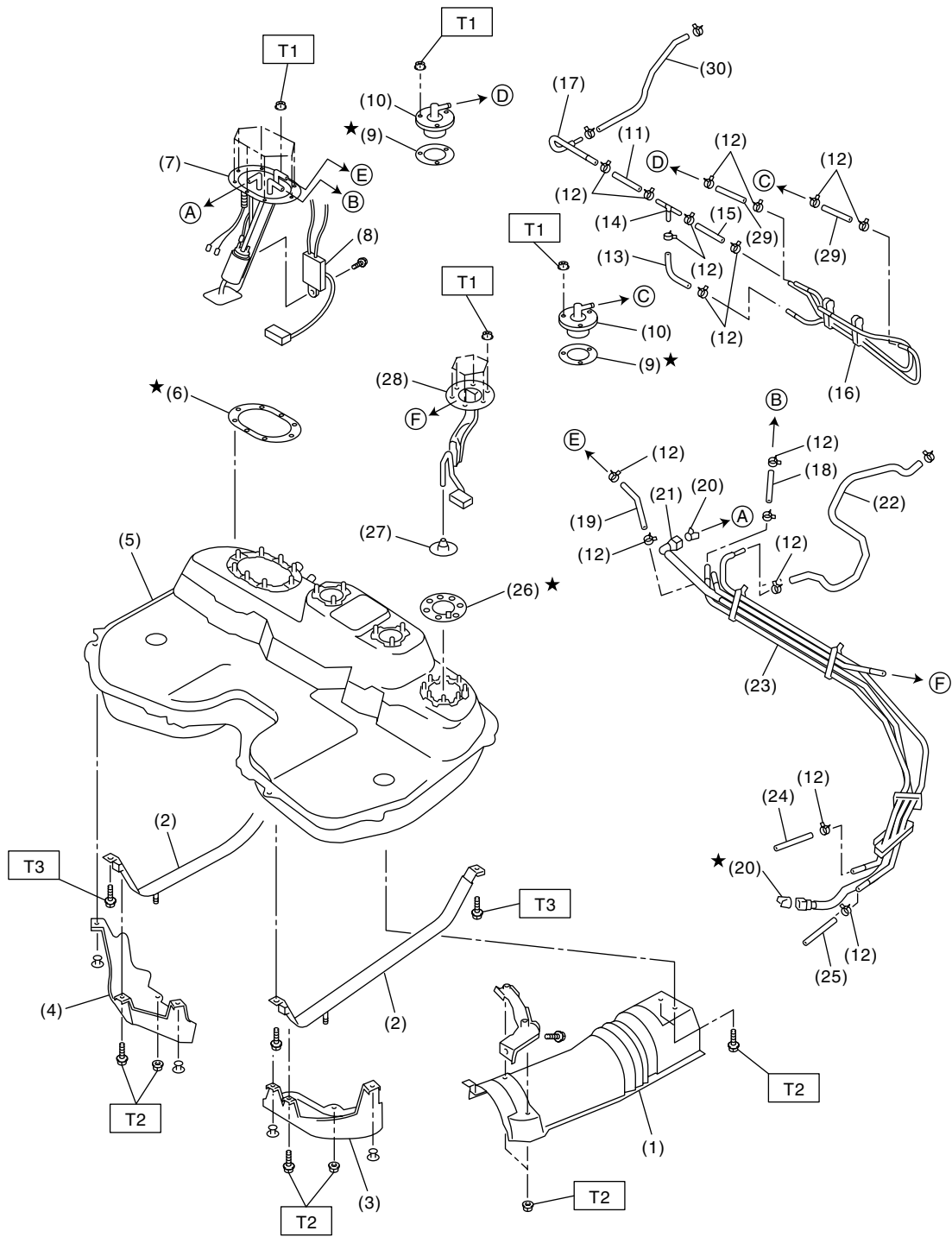
**T3: 33 (3.4, 24.3)**

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# General Description

FUEL INJECTION (FUEL SYSTEMS)

## • 2.5 L MODEL



FU-00909

# General Description

## FUEL INJECTION (FUEL SYSTEMS)

---

(1) Heat shield cover	(13) Evaporation hose B	(25) Evaporation hose E
(2) Fuel tank band	(14) Joint pipe	(26) Fuel sub level sensor gasket
(3) Protector LH	(15) Evaporation hose C	(27) Jet pump filter
(4) Protector RH	(16) Evaporation pipe ASSY	(28) Fuel sub level sensor
(5) Fuel tank	(17) Evaporation pipe	(29) Evaporation hose F
(6) Fuel pump gasket	(18) Fuel return hose A	(30) Evaporation hose G
(7) Fuel pump ASSY	(19) Jet pump hose	
(8) Fuel level sensor	(20) Retainer	<hr/> <b>Tightening torque: N·m (kgf·m, ft·lb)</b>
(9) Fuel cut valve gasket	(21) Quick connector	<b>T1: 4.4 (0.45, 3.3)</b>
(10) Fuel cut valve	(22) Evaporation hose E	<b>T2: 7.4 (0.75, 5.4)</b>
(11) Evaporation hose A	(23) Fuel pipe ASSY	<b>T3: 33 (3.4, 24.3)</b>
(12) Clip	(24) Fuel return hose B	<hr/>



# General Description

## FUEL INJECTION (FUEL SYSTEMS)

---

- |                          |                                |                                 |
|--------------------------|--------------------------------|---------------------------------|
| (1) Clip                 | (11) Fuel pipe ASSY            | (21) Two-way valve drain hose A |
| (2) Fuel delivery hose A | (12) Grommet                   | (22) Connector                  |
| (3) Fuel filter bracket  | (13) Canister hose A           | (23) Two-way valve drain hose B |
| (4) Fuel filter holder   | (14) Canister                  | (24) Clamp                      |
| (5) Fuel filter cup      | (15) Canister bracket plate    | (25) Front canister bracket     |
| (6) Fuel filter          | (16) Cushion                   |                                 |
| (7) Evaporation hose     | (17) Canister bracket spacer   |                                 |
| (8) Fuel damper          | (18) Rear canister bracket     |                                 |
| (9) Fuel delivery hose B | (19) Two-way valve return hose |                                 |
| (10) Fuel return hose    | (20) Two-way valve             |                                 |

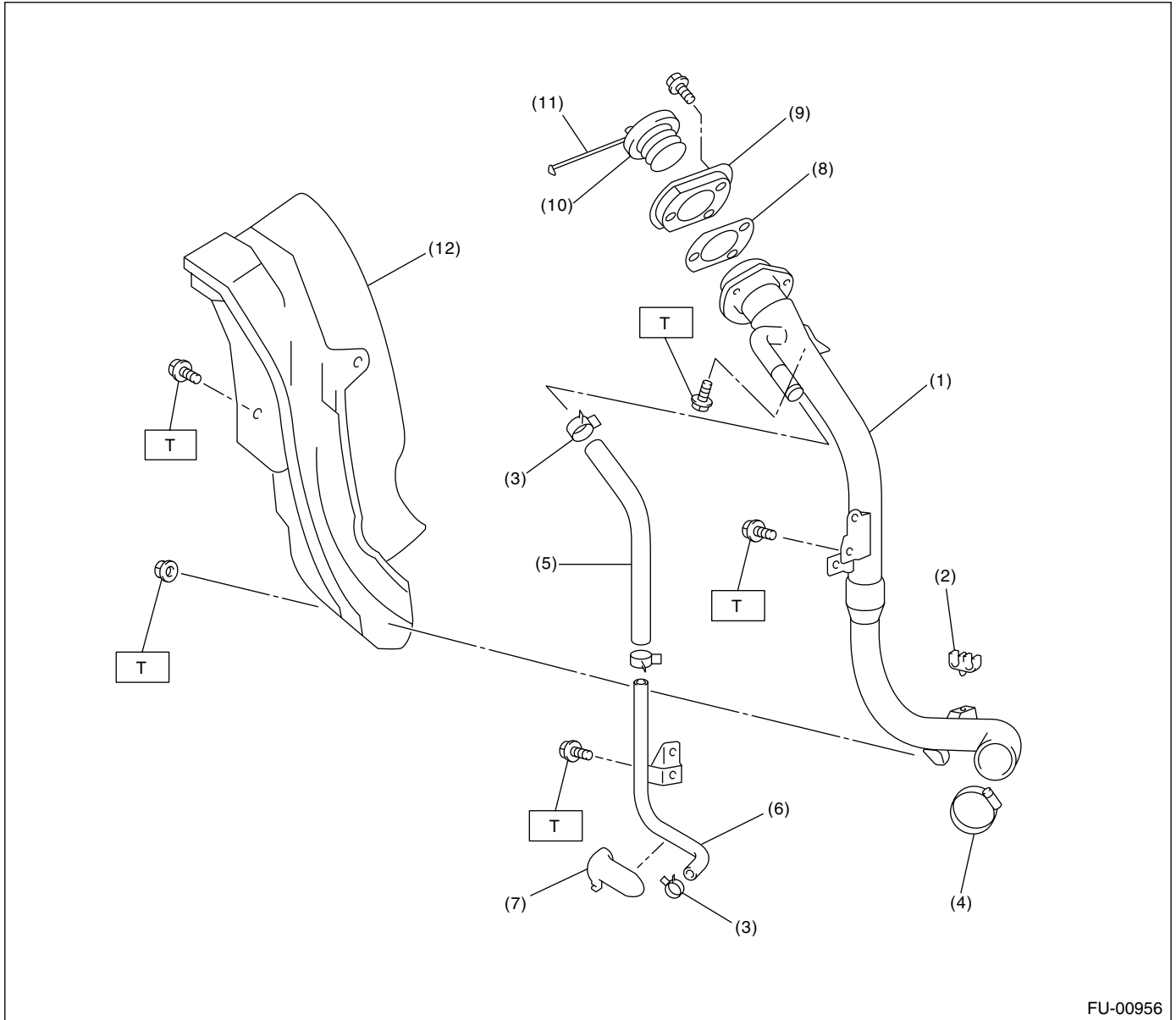
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***Tightening torque: N·m (kgf·m, ft·lb)***

***T: 23 (2.3, 17.0)***

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## 6. FUEL FILLER PIPE



FU-00956

- |                             |                            |
|-----------------------------|----------------------------|
| (1) Fuel filler pipe ASSY   | (7) Air vent pipe holder   |
| (2) Evaporation hose holder | (8) Filler pipe packing    |
| (3) Clip                    | (9) Filler ring            |
| (4) Clamp                   | (10) Filler cap            |
| (5) Air vent hose           | (11) Filler cap tether     |
| (6) Air vent pipe           | (12) Filler pipe protector |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T: 7.5 (0.76, 5.5)**

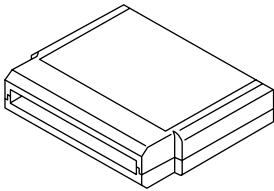

# General Description

## FUEL INJECTION (FUEL SYSTEMS)

### 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.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
- Place "NO FIRE" signs near the working area.
- Be careful not to spill fuel on the floor.

### D: PREPARATION TOOL

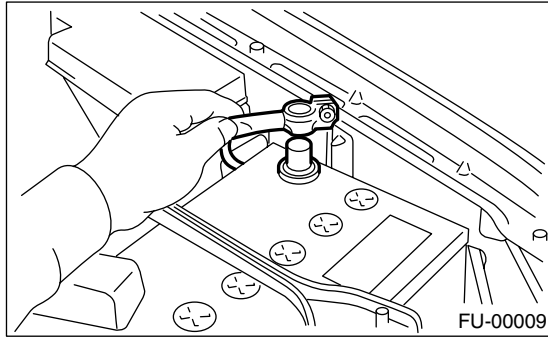
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems. <ul style="list-style-type: none"><li>• English: 22771AA030 (Without printer)</li><li>• German: 22771AA070 (Without printer)</li><li>• French: 22771AA080 (Without printer)</li><li>• Spanish: 22771AA090 (Without printer)</li></ul>



## 2. Throttle Body

### A: REMOVAL

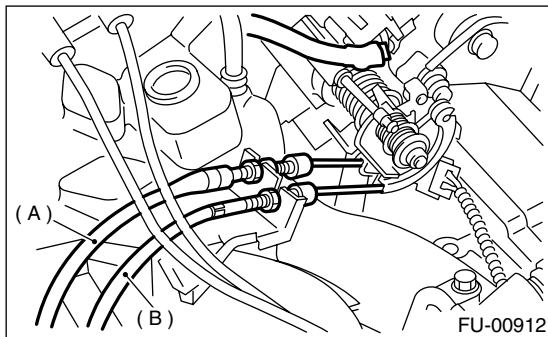
1) Disconnect the ground cable from battery.



2) Remove the air cleaner case.  
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>

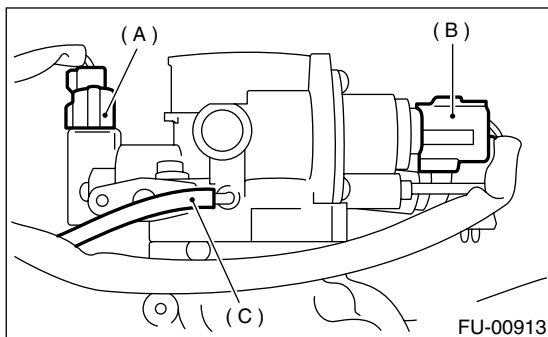
3) Disconnect the accelerator cable (A).

4) Disconnect the cruise control cable (B). (Model with cruise control)



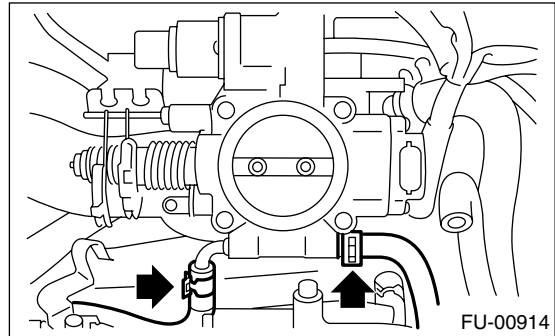
5) Disconnect the connectors from idle air control solenoid valve and throttle position sensor.

6) Disconnect the air by-pass hose from purge control solenoid valve.



- (A) Throttle position sensor
- (B) Idle air control solenoid valve
- (C) Air by-pass hose from purge control solenoid valve

7) Disconnect the engine coolant hoses from throttle body.



8) Remove the bolts which install the throttle body to intake manifold.

### B: INSTALLATION

Install in the reverse order of removal.

#### NOTE:

- Always use a new gasket.
- For tightening torque, refer to "COMPONENT".  
<Ref. to FU(H4SOw/oOBD)-3, COMPONENT, General Description.>

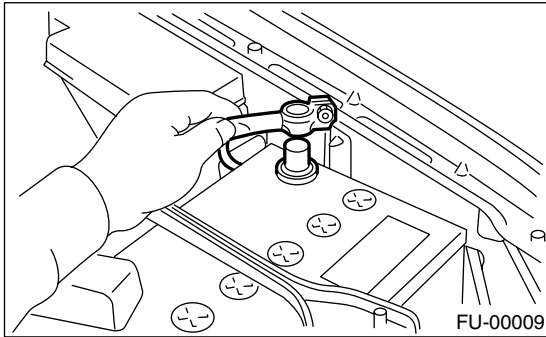
# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

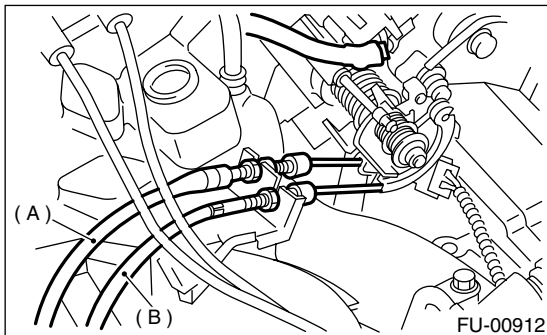
### 3. Intake Manifold

#### A: REMOVAL

- 1) Release the fuel pressure. <Ref. to FU(H4SOw/oOBD)-46, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
- 2) Open the fuel flap lid and remove the fuel filler cap.
- 3) Disconnect the ground cable from battery.



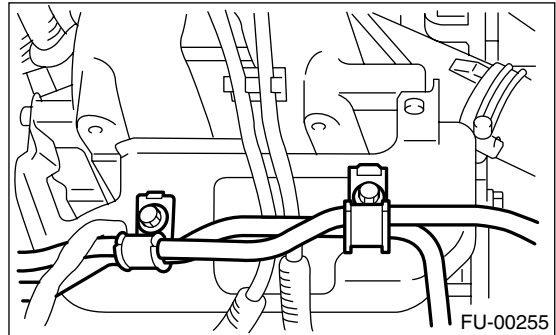
- 4) Remove the air intake duct and air cleaner assembly. <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.> and <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
- 5) Disconnect the accelerator cable (A).
- 6) Disconnect the cruise control cable (B). (Model with cruise control)



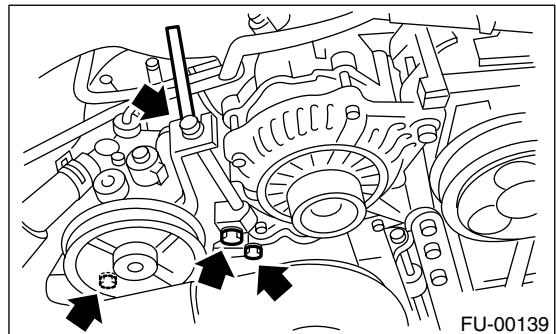
- 7) Remove the power steering pump and tank from brackets.
  - (1) Remove the resonator chamber. <Ref. to IN(H4SO)-7, REMOVAL, Resonator Chamber.>
  - (2) Remove the front side V-belt. <Ref. to ME(H4SO)-43, REMOVAL, V-belt.>
  - (3) Remove the bolts which hold the power steering pipes onto intake manifold protector.

#### NOTE:

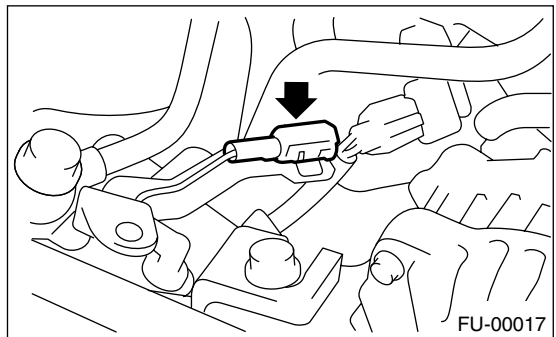
Do not disconnect the power steering hose.



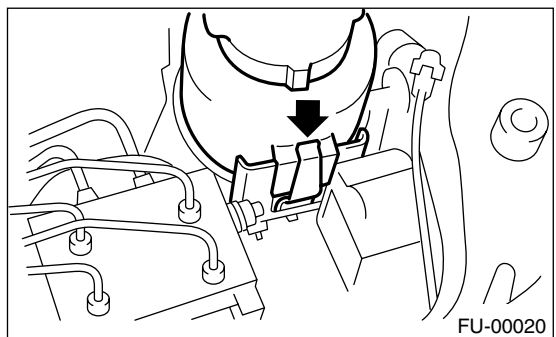
- (4) Remove the bolts which install the power steering pump bracket.



- (5) Disconnect the connector from power steering pump switch.



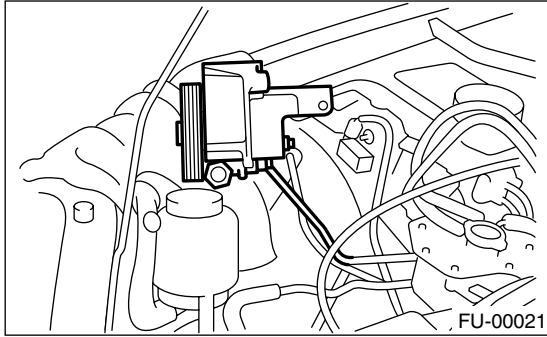
- (6) Remove the power steering tank from the bracket by pulling it upward.



# Intake Manifold

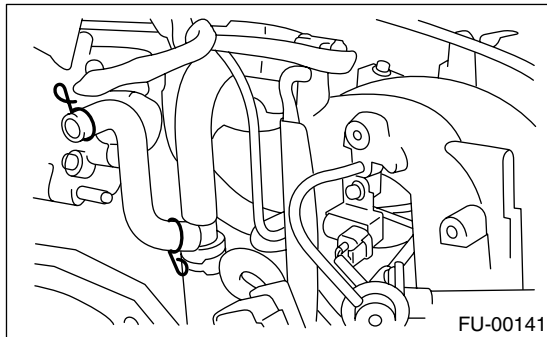
## FUEL INJECTION (FUEL SYSTEMS)

(7) Place the power steering pump and tank on right side wheel apron.

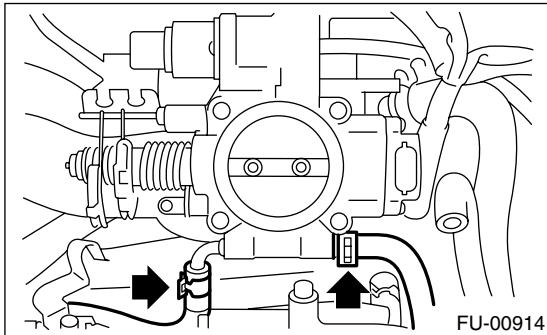


8) Disconnect the spark plug cords from spark plugs.

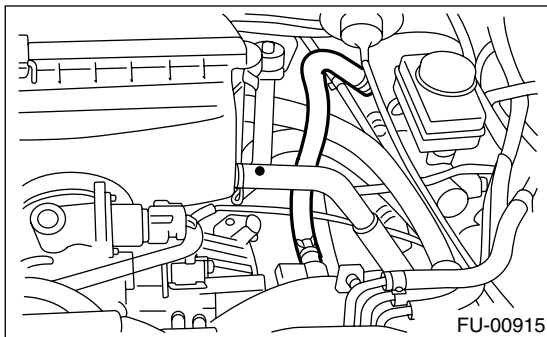
9) Disconnect the PCV hose from intake manifold.



10) Disconnect the engine coolant hose from throttle body.



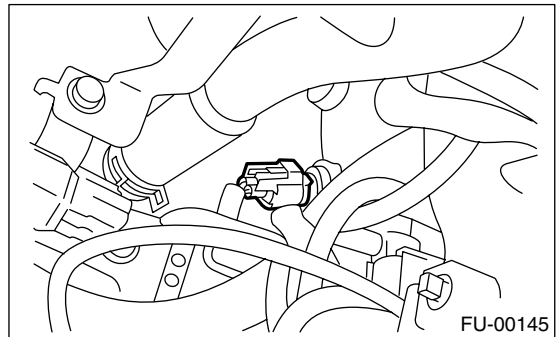
11) Disconnect the brake booster hose.



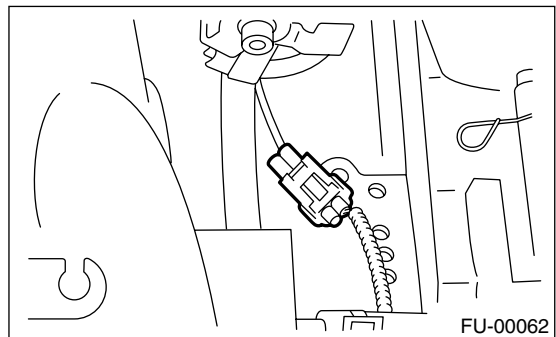
12) Remove the air cleaner case stay RH and engine harness bracket, and then disconnect the engine harness connectors from bulkhead harness connectors.



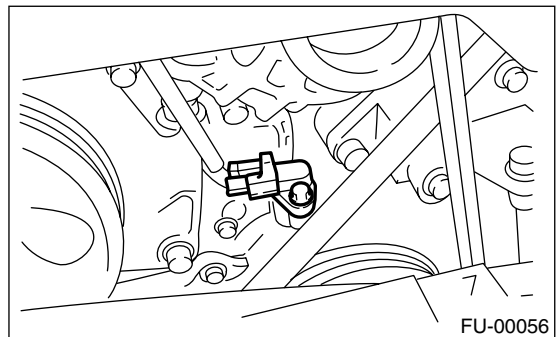
13) Disconnect the connectors from engine coolant temperature sensor.



14) Disconnect the knock sensor connector.



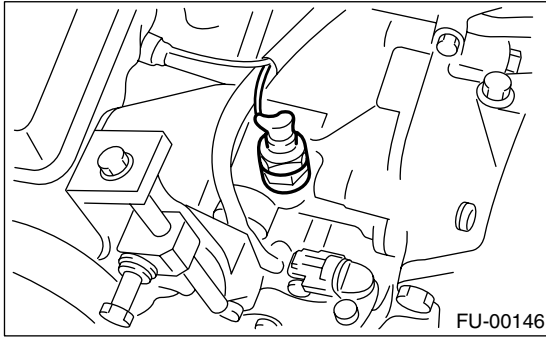
15) Disconnect the connector from crankshaft position sensor.



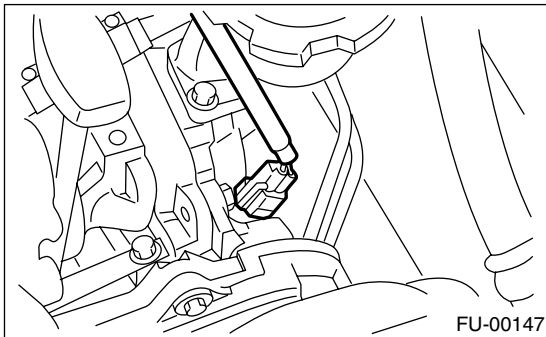
# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

16) Disconnect the connector from oil pressure switch.



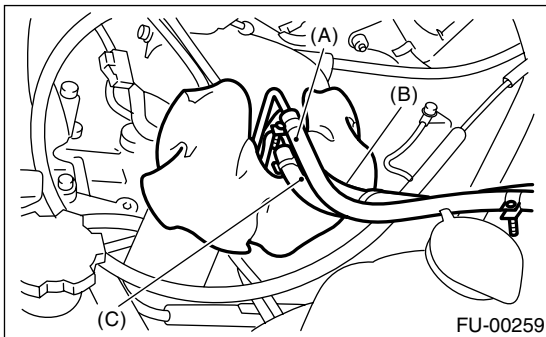
17) Disconnect the connector from camshaft position sensor.



18) Disconnect the fuel hoses from fuel pipes.

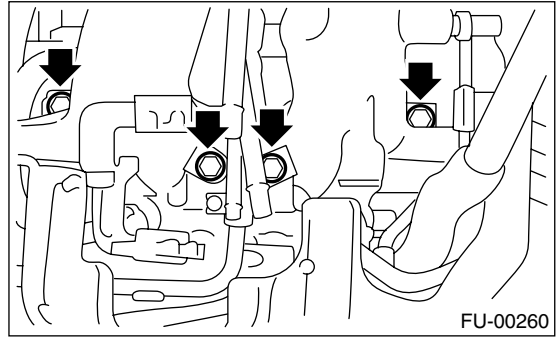
### WARNING:

- Do not spill fuel.
- Catch the fuel from hoses in a container or cloth.



- (A) Fuel delivery hose
- (B) Return hose
- (C) Evaporation hose

19) Remove the bolts which hold the intake manifold onto cylinder heads.



20) Remove the intake manifold.

### B: INSTALLATION

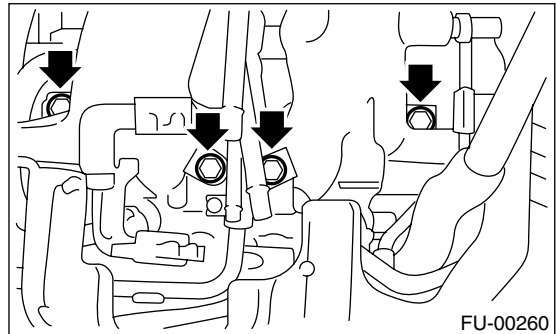
1) Install the intake manifold onto cylinder heads.

#### NOTE:

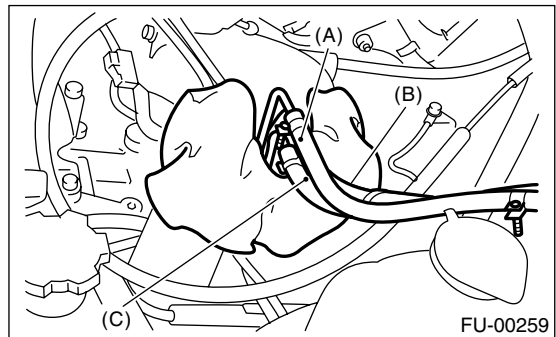
Always use new gaskets.

#### Tightening torque:

**25 N·m (2.5 kgf·m, 18.4 ft·lb)**



2) Connect the fuel hoses.

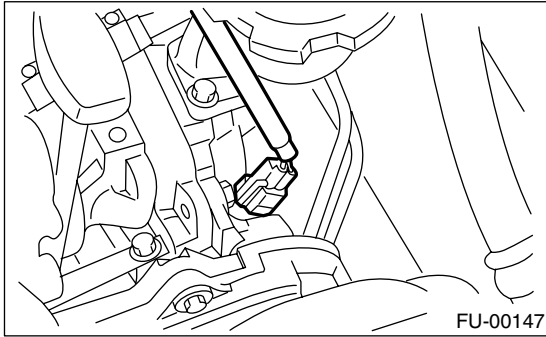


- (A) Fuel delivery hose
- (B) Return hose
- (C) Evaporation hose

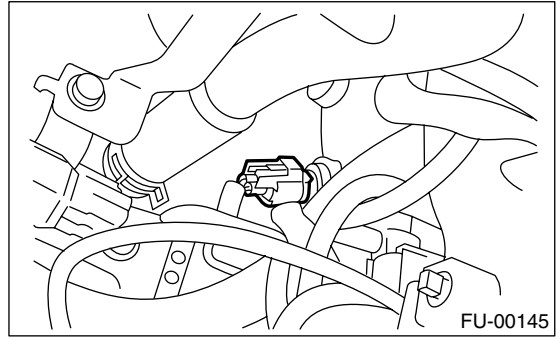
# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

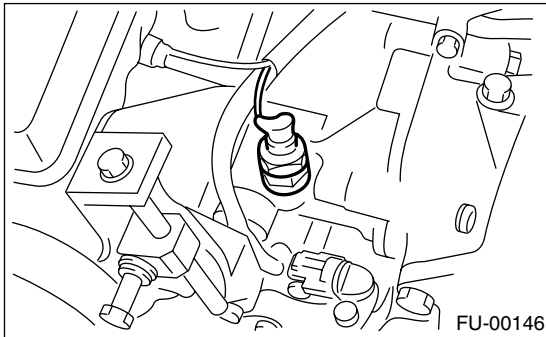
3) Connect the connector to camshaft position sensor.



7) Connect the connectors to engine coolant temperature sensor.



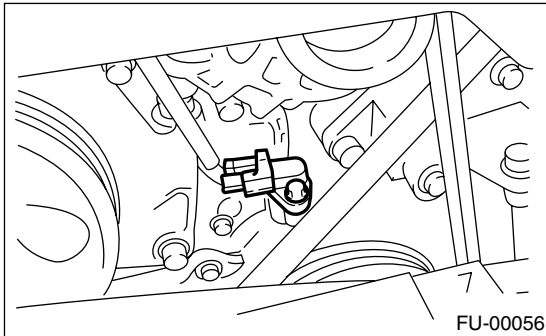
4) Connect the connector to oil pressure switch.



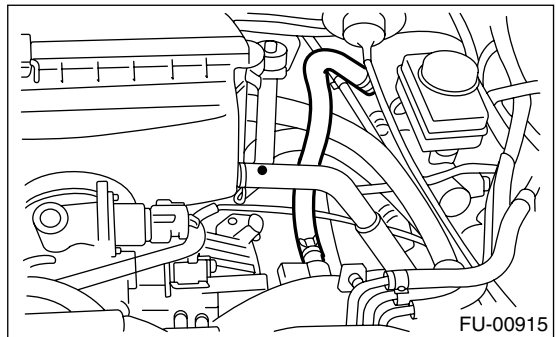
8) Install the air cleaner case stay RH and engine harness bracket, and then connect the engine harness connectors to bulkhead connectors.



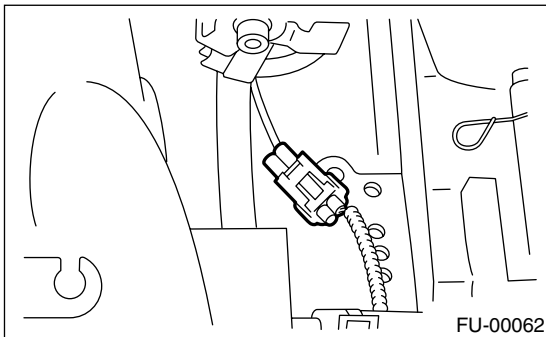
5) Connect the connector to crankshaft position sensor.



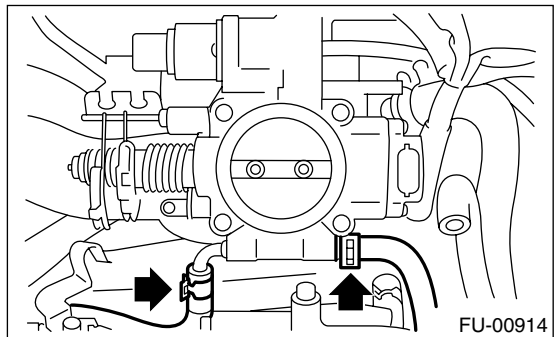
9) Connect the brake booster hose.



6) Connect the knock sensor connector.



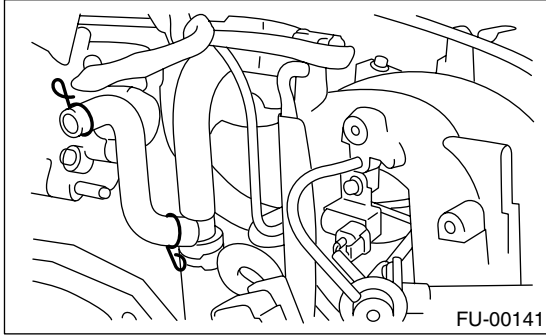
10) Connect the engine coolant hose to throttle body.



# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

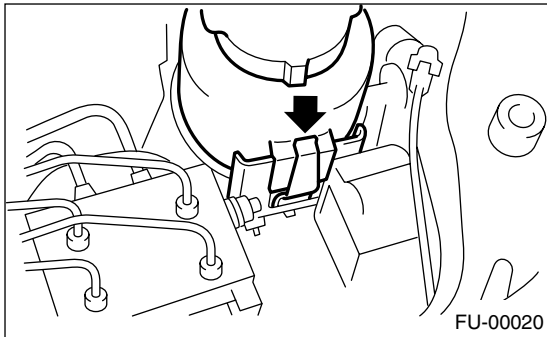
11) Connect the PCV hose to intake manifold.



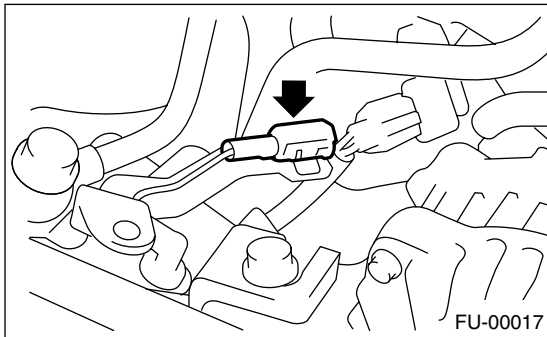
12) Connect the spark plug cords to the spark plugs.

13) Install the power steering pump and tank on brackets.

(1) Install the power steering tank on bracket.



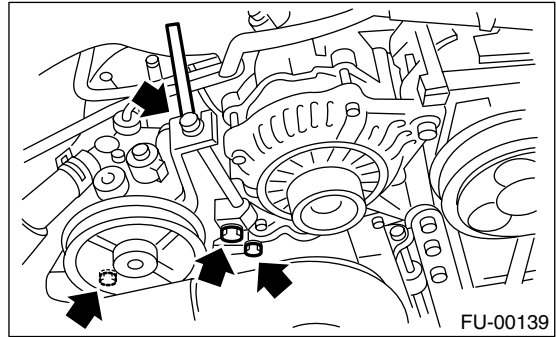
(2) Connect the connector to the power steering pump switch.



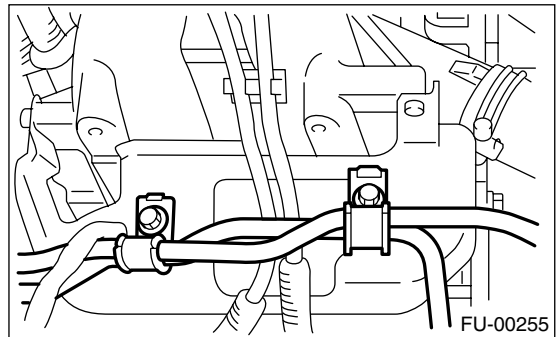
(3) Tighten the bolts which install the power steering pump on bracket.

**Tightening torque:**

**22 N·m (2.2 kgf·m, 16.2 ft·lb)**



(4) Install the power steering pipes onto intake manifold protector RH.

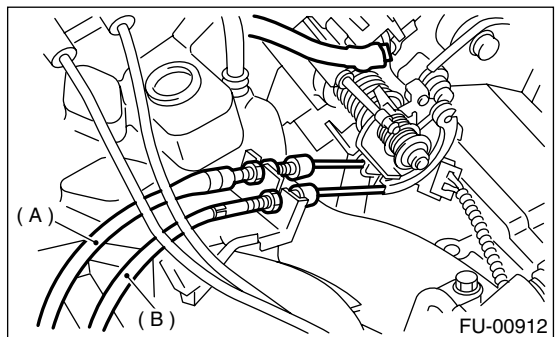


(5) Install the front side V-belt. <Ref. to ME(H4SO)-43, INSTALLATION, V-belt.>

(6) Install the resonator chamber. <Ref. to IN(H4SO)-7, INSTALLATION, Resonator Chamber.>

14) Connect the accelerator cable (A).

15) Connect the cruise control cable (B). (Model with cruise control)

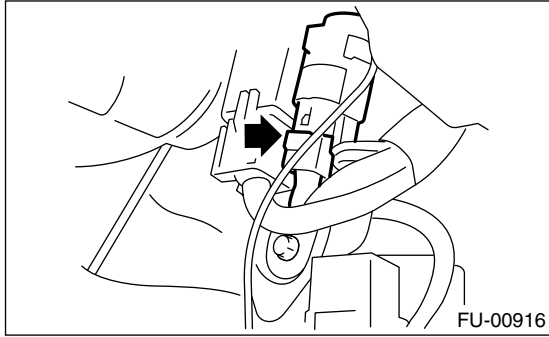


16) Install the air intake duct and air cleaner assembly. <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.> and <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>

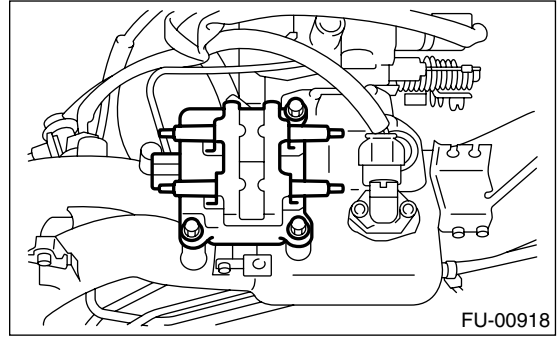
# Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

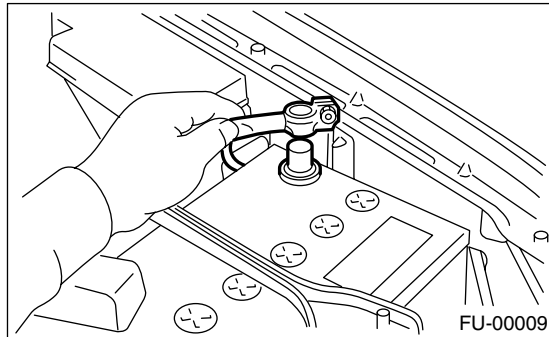
17) Connect the connector to the fuel pump relay.



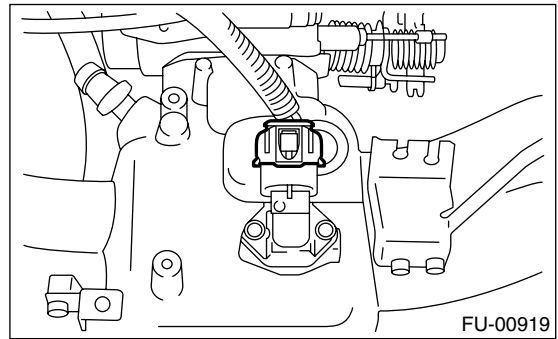
3) Remove the ignition coil & ignitor ASSY.



18) Connect the battery ground cable to battery.

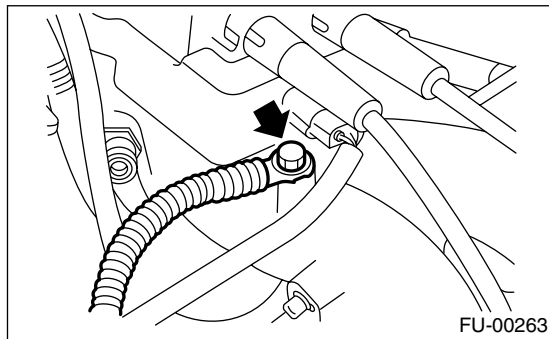


4) Disconnect the connector from intake air temperature and manifold absolute pressure sensor.

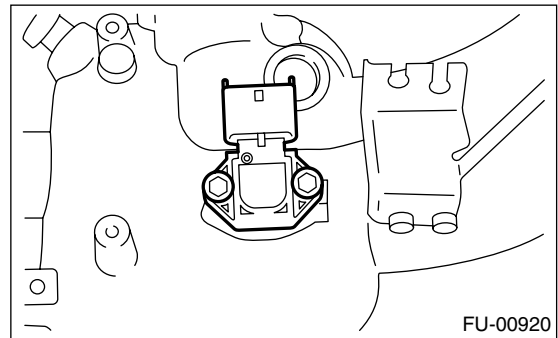


## C: DISASSEMBLY

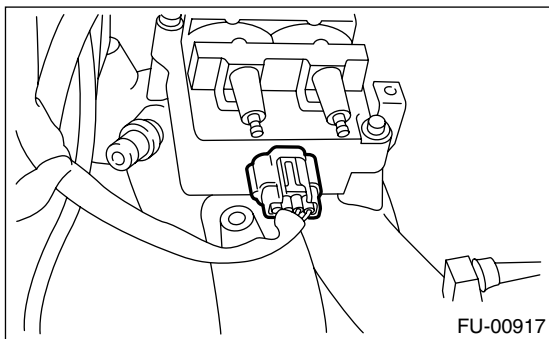
1) Disconnect the engine ground cable from intake manifold.



5) Remove the intake air temperature and manifold absolute pressure sensor from intake manifold.

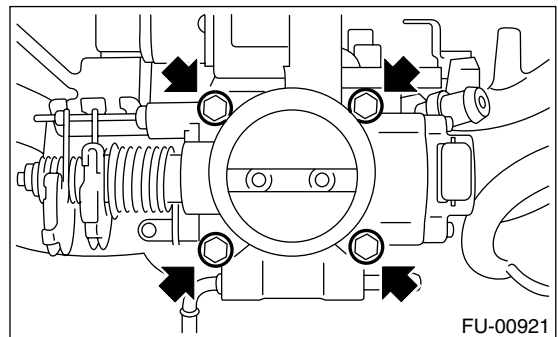


2) Disconnect the connector from ignition coil & ignitor ASSY.



6) Disconnect the connectors from throttle position sensor and idle air control solenoid valve.

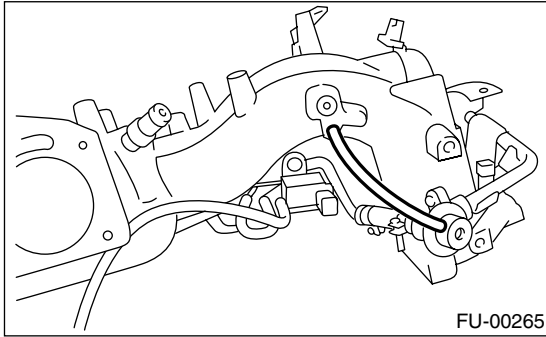
7) Remove the throttle body.



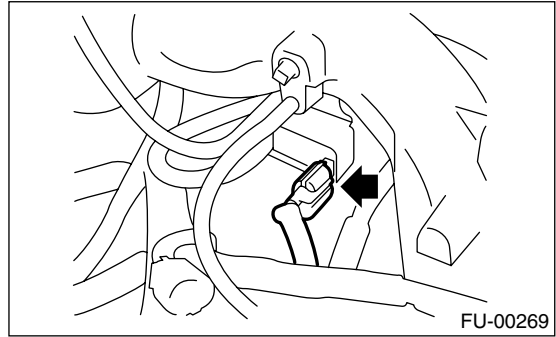
# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

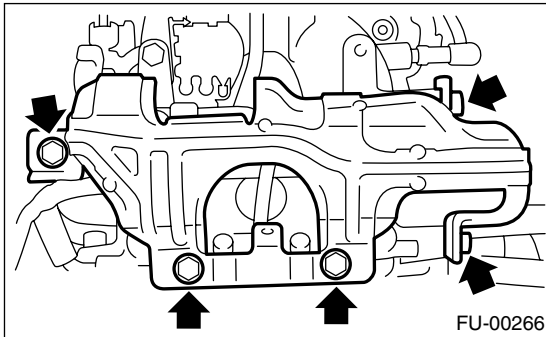
8) Disconnect the pressure regulator vacuum hose from intake manifold.



12) Disconnect the connector from purge control solenoid valve.

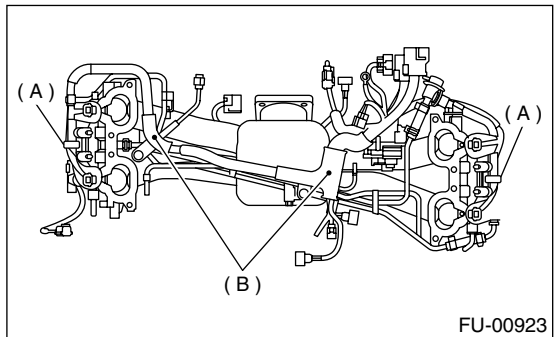


9) Remove the fuel pipe protector LH.

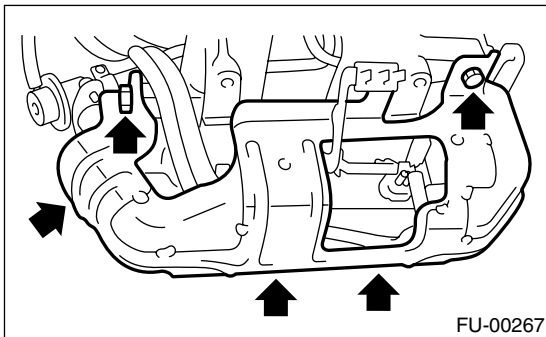


13) Disconnect the air by-pass hose from purge control solenoid valve.

14) Remove the harness bands (A) and harness bracket (B) which hold the engine harness onto intake manifold.



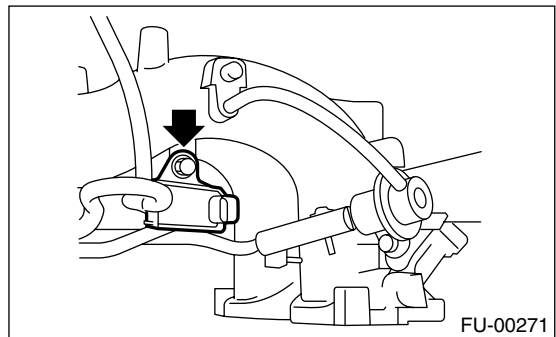
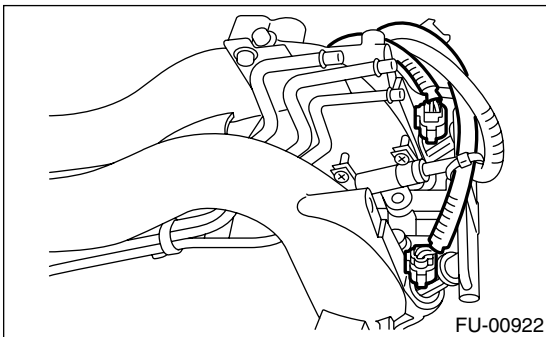
10) Remove the fuel pipe protector RH.



15) Remove the engine harness from intake manifold.

16) Remove the purge control solenoid valve.

11) Disconnect the connectors from fuel injectors.

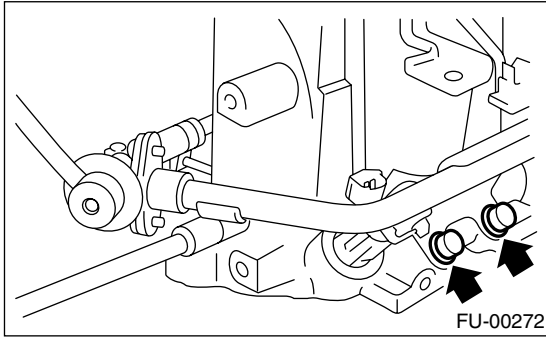




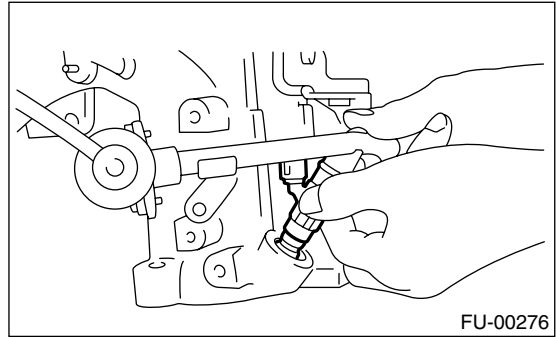
# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

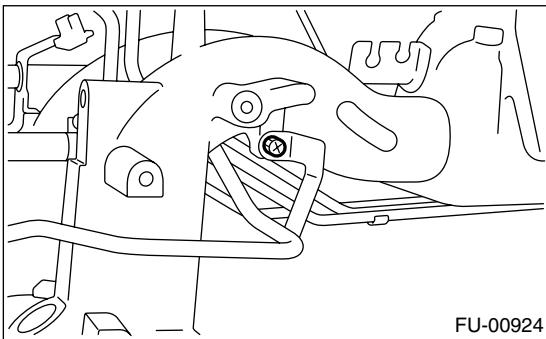
17) Remove the bolt which installs the fuel injector pipe on intake manifold as shown in the figure.



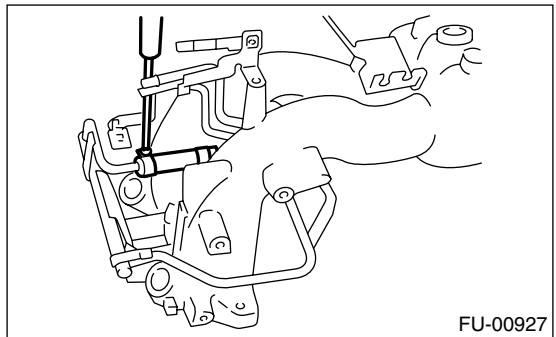
(2) Remove the fuel injector while lifting up the fuel injector pipe.



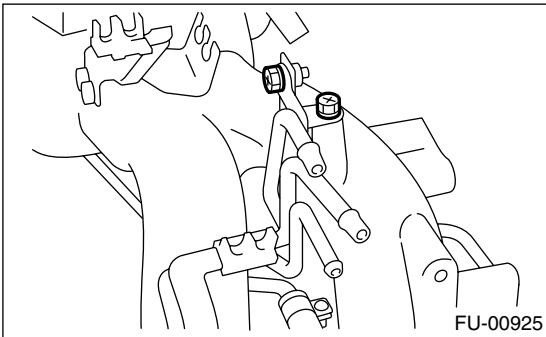
18) Remove the bolt which installs the fuel injector pipe LH on intake manifold.



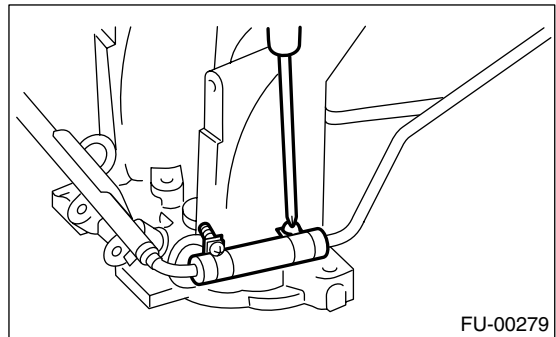
21) Loosen the clamp which holds the fuel injector pipe LH to fuel hose, and then remove the pipe from fuel hose.



19) Remove the two bolts which hold the fuel pipes on intake manifold.

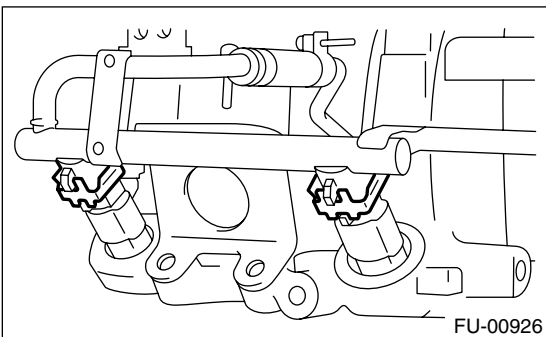


22) Loosen the clamp which holds the fuel injector pipe RH to fuel hose, and remove the pipe from fuel hose.

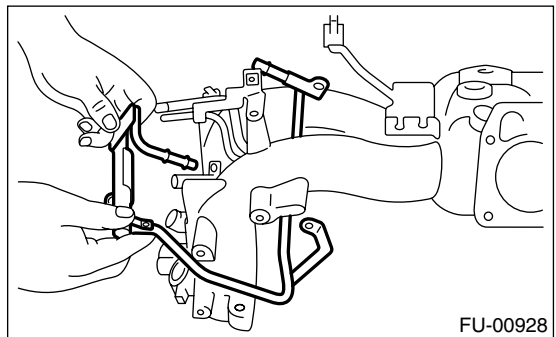


20) Remove the fuel injectors.

(1) Remove the fuel injector securing clip.



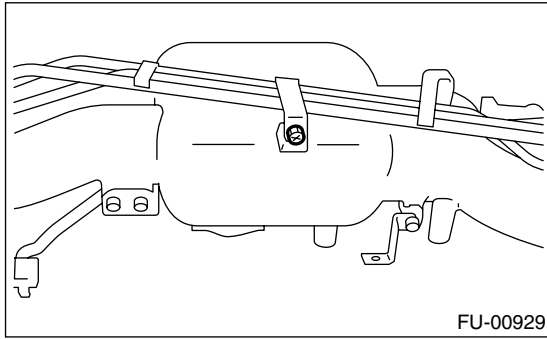
23) Remove the fuel injector pipe.



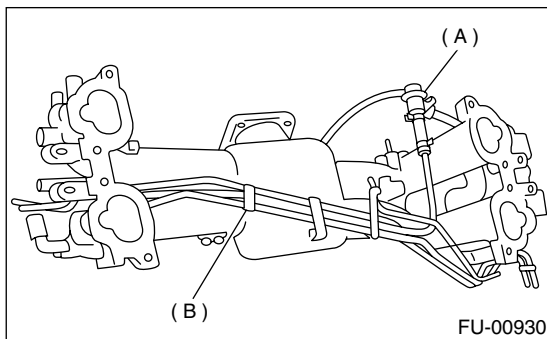
# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

24) Remove the bolt which installs the fuel pipes on intake manifold.

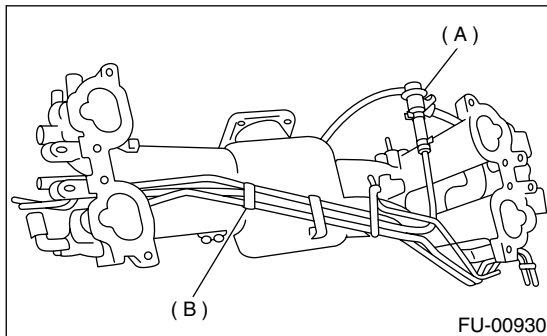


25) Remove the fuel pipe assembly (B) and pressure regulator (A) from intake manifold.



### D: ASSEMBLY

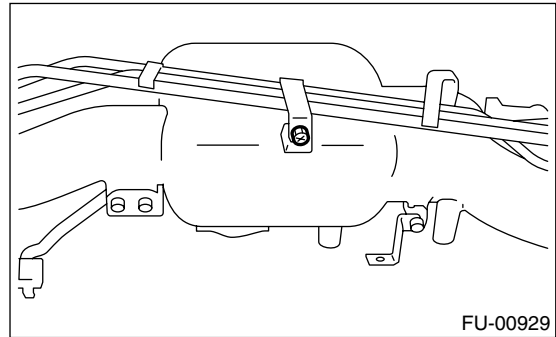
1) Install the fuel pipe assembly (B) and pressure regulator (A), etc. to intake manifold.



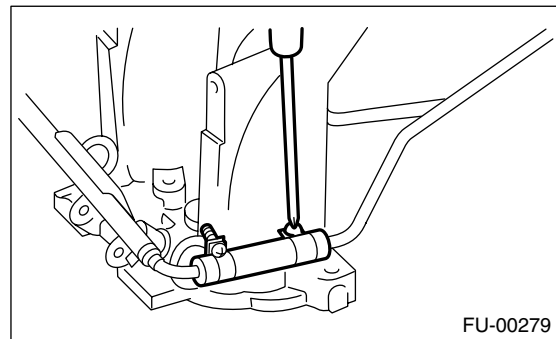
2) Tighten the bolt which installs the fuel pipes on intake manifold.

**Tightening torque:**

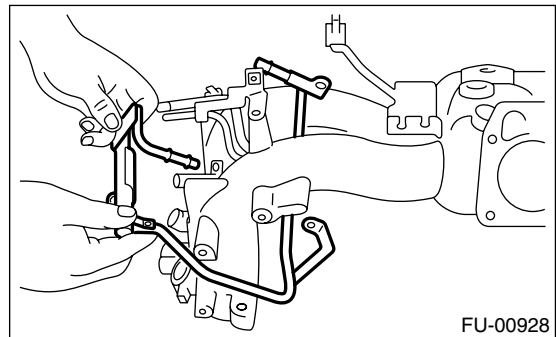
**6.4 N·m (0.65 kgf·m, 4.7 ft·lb)**



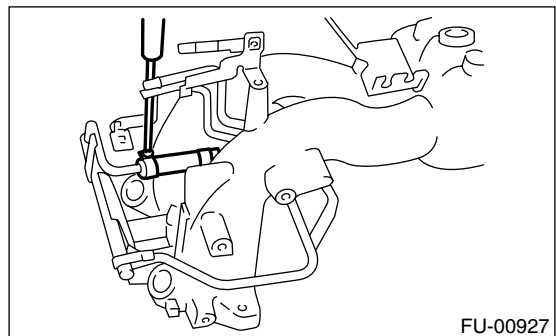
3) Connect the fuel injector pipe RH to fuel hose, and tighten the clamp screws.



4) Install the fuel injector pipe.



5) Connect the fuel injector pipe LH to fuel hose, and then tighten the clamp screw.



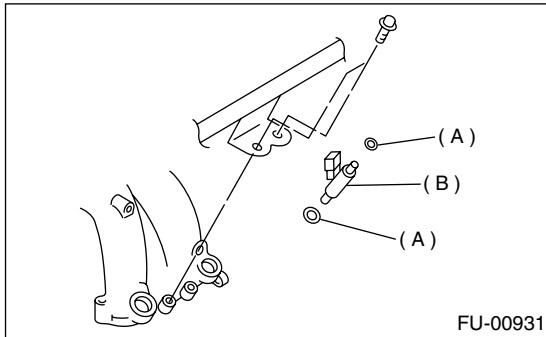
# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

6) Install the fuel injectors.

NOTE:

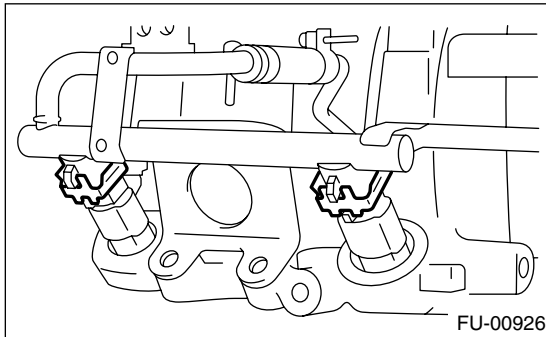
Always use new O-rings.



- (A) O-ring
- (B) Fuel injector

NOTE:

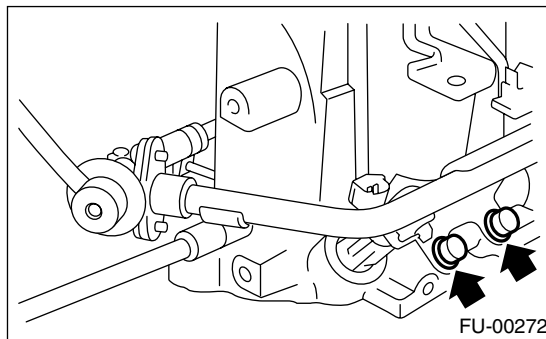
Do not forget to install the fuel injector securing clip.



7) Tighten the bolt which installs the fuel injector pipe on intake manifold.

**Tightening torque:**

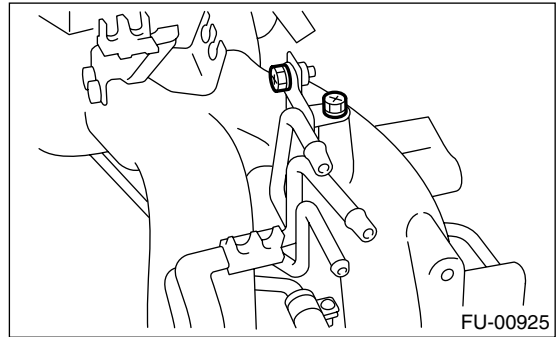
**19 N·m (1.9 kgf-m, 14.0 ft-lb)**



8) Tighten the two bolts which install the fuel pipes on intake manifold.

**Tightening torque:**

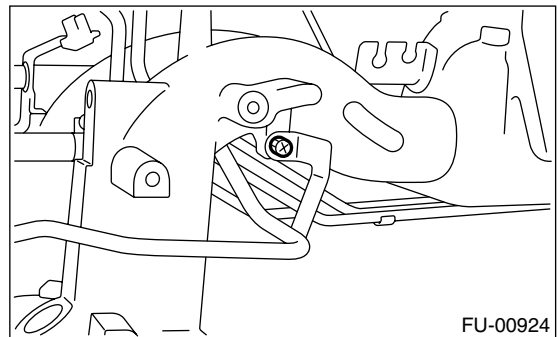
**6.4 N·m (0.65 kgf-m, 4.7 ft-lb)**



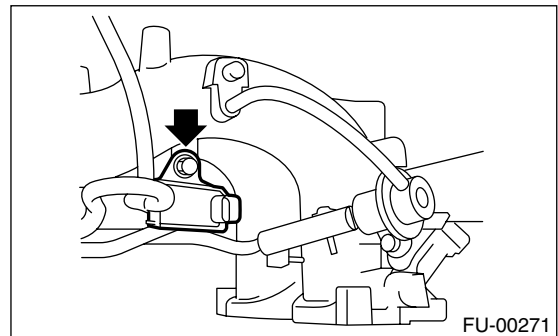
9) Tighten the bolt which installs the injector pipe on intake manifold.

**Tightening torque:**

**6.4 N·m (0.65 kgf-m, 4.7 ft-lb)**



10) Install the purge control solenoid valve.



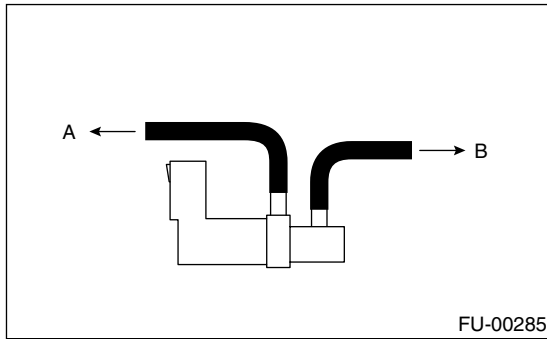
# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

11) Connect the hoses to the purge control solenoid valve.

**NOTE:**

Carefully connect the evaporation hoses.



- A: To fuel pipe
- B: To throttle body

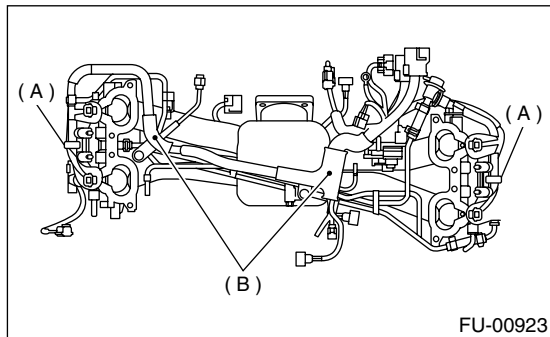
12) Install the engine harness onto intake manifold.

**Tightening torque:**

**16 N·m (1.6 kgf·m, 11.8 ft-lb)**

13) Connect the connectors to the fuel injectors and purge control solenoid valve.

14) Hold the engine harness by harness band (A) and harness bracket (B).



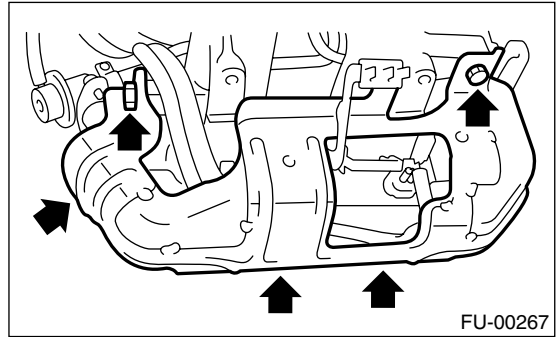
**NOTE:**

Do not use harness bands on the harnesses which are supposed to be protected by fuel pipe protector.

15) Install the fuel pipe protector RH.

**Tightening torque:**

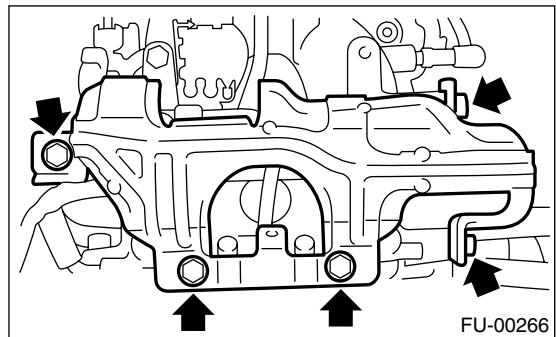
**19 N·m (1.9 kgf·m, 14.0 ft-lb)**



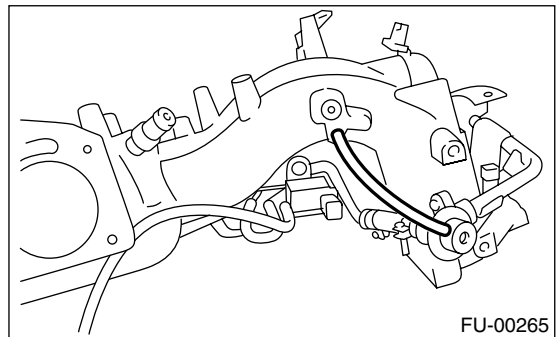
16) Install the fuel pipe protector LH.

**Tightening torque:**

**19 N·m (1.9 kgf·m, 14.0 ft-lb)**



17) Connect the pressure regulator vacuum hose to intake manifold.



# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

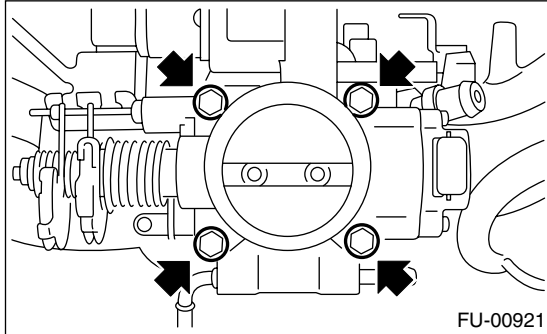
18) Install the throttle body to intake manifold.

**NOTE:**

Replace the gasket with a new one.

**Tightening torque:**

**22 N·m (2.2 kgf-m, 16.2 ft-lb)**

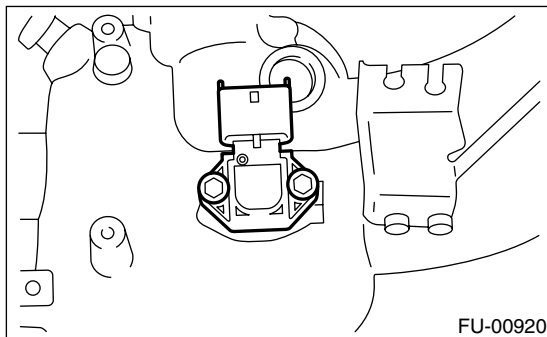


19) Connect the air by-pass hose from purge control solenoid valve to throttle body.

20) Install the intake air temperature and manifold absolute pressure sensor.

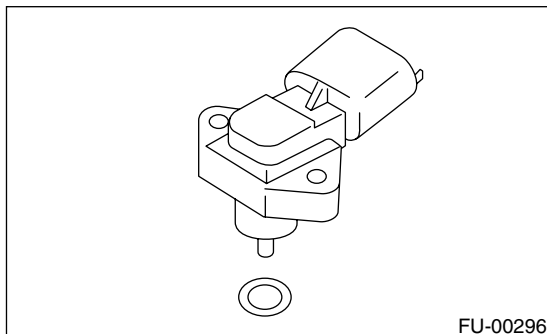
**Tightening torque:**

**3.4 N·m (0.35 kgf-m, 2.5 ft-lb)**



**NOTE:**

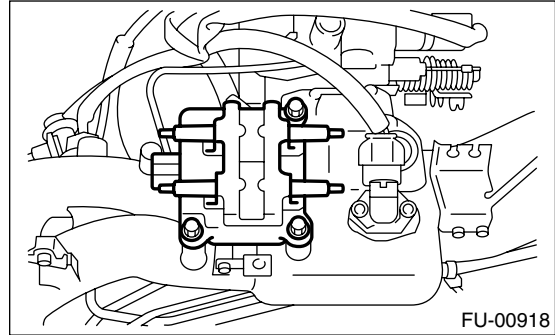
Replace the O-ring with a new one.



21) Connect the connector to intake air temperature and manifold absolute pressure sensor.

22) Connect the connectors to throttle position sensor and idle air control solenoid valve.

23) Install the ignition coil & ignitor ASSY.

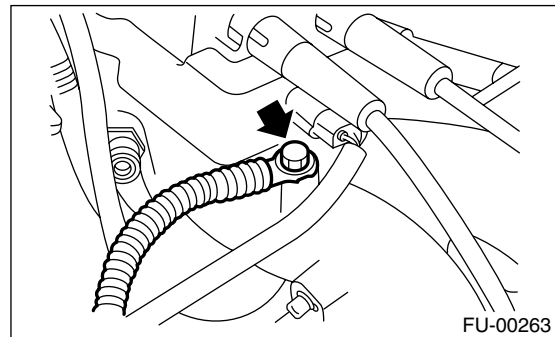


24) Connect the connector to ignition coil & ignitor ASSY.

25) Install the engine ground cable to intake manifold.

**Tightening torque:**

**19 N·m (1.9 kgf-m, 14.0 ft-lb)**



### E: INSPECTION

Make sure the fuel pipe and fuel hoses are not cracked and the connections are tightened firmly.

# Engine Coolant Temperature Sensor

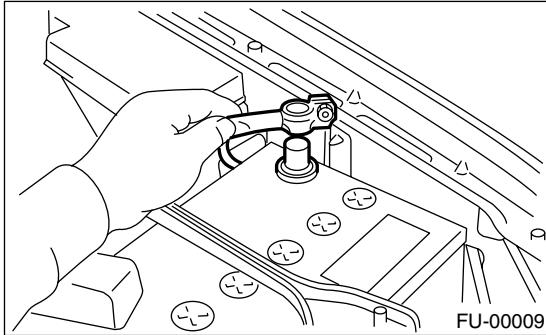
FUEL INJECTION (FUEL SYSTEMS)

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## 4. Engine Coolant Temperature Sensor

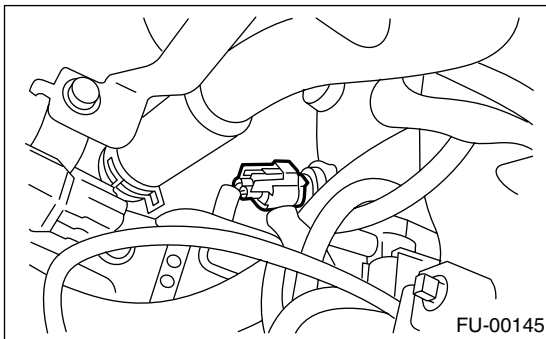
### A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the air intake duct and air cleaner case.  
<Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>  
and <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>

3) Disconnect the connector from engine coolant temperature sensor.



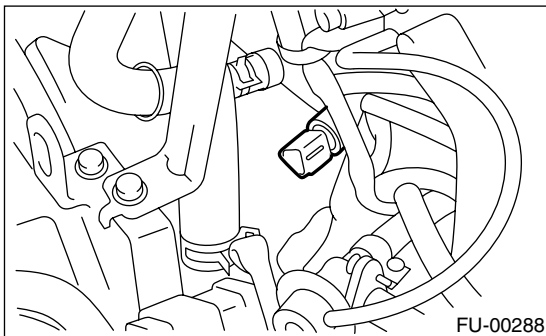
4) Remove the engine coolant temperature sensor.

### B: INSTALLATION

Install in the reverse order of removal.

**Tightening torque:**

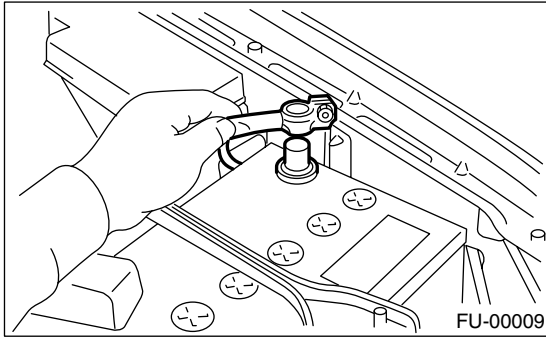
**18 N·m (1.8 kgf·m, 13.0 ft·lb)**



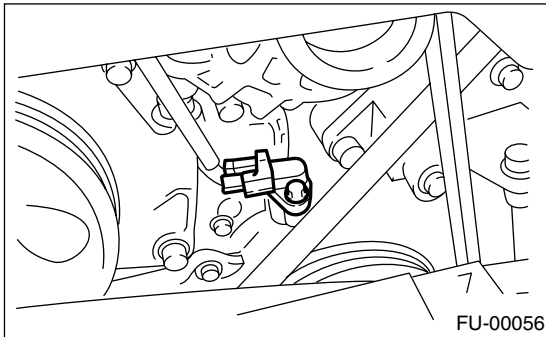
## 5. Crankshaft Position Sensor

### A: REMOVAL

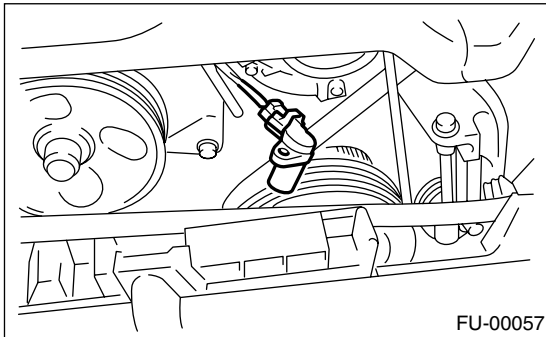
1) Disconnect the ground cable from battery.



2) Remove the bolt which installs the crankshaft position sensor to cylinder block.



3) Remove the crankshaft position sensor, and then disconnect the connector from it.



### B: INSTALLATION

Install in the reverse order of removal.

#### NOTE:

For tightening torque, refer to "COMPONENT".  
<Ref. to FU(H4SOw/oOBD)-3, COMPONENT,  
General Description.>

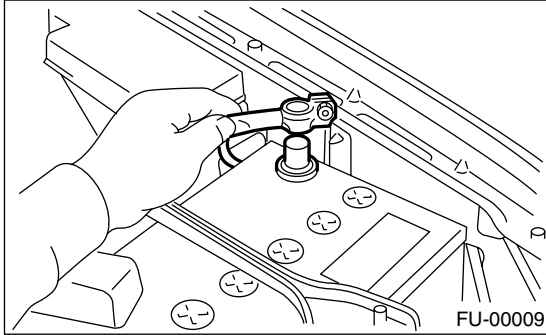
# Camshaft Position Sensor

FUEL INJECTION (FUEL SYSTEMS)

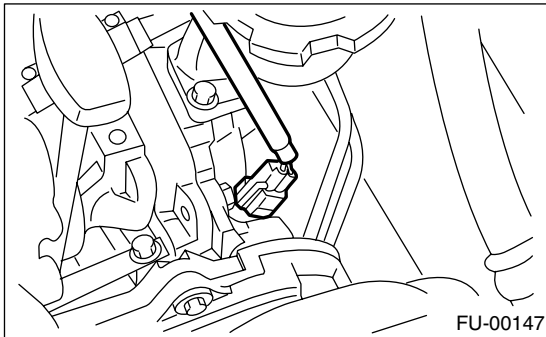
## 6. Camshaft Position Sensor

### A: REMOVAL

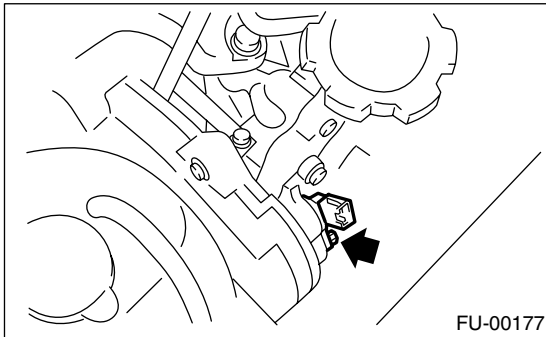
1) Disconnect the ground cable from battery.



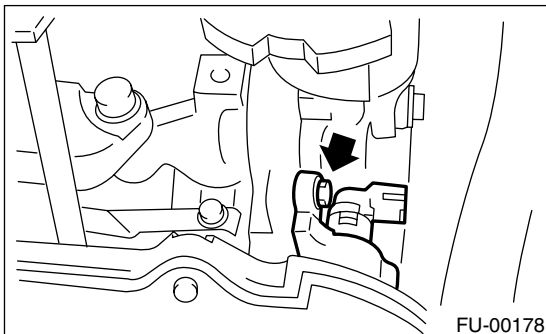
2) Disconnect the connector from camshaft position sensor.



3) Remove the bolt which installs the camshaft position sensor to camshaft position sensor support.

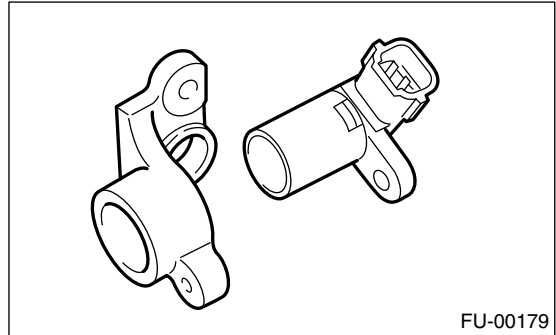


4) Remove the bolt which installs the camshaft position sensor support to camshaft cap LH.



5) Remove the camshaft position sensor and camshaft position sensor support as a unit.

6) Remove the camshaft position sensor itself.



### B: INSTALLATION

Install in the reverse order of removal.

#### NOTE:

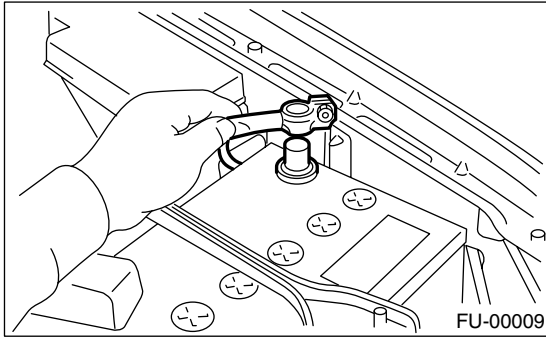
For tightening torque, refer to "COMPONENT".  
<Ref. to FU(H4SOw/oOBD)-3, COMPONENT, General Description.>



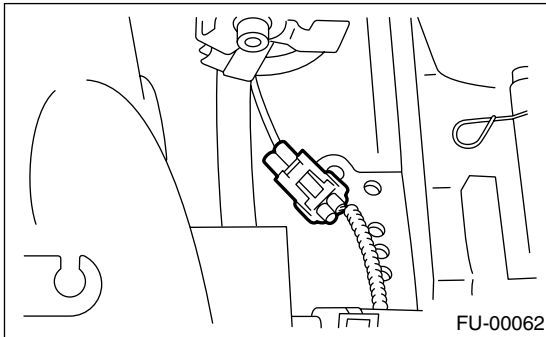
## 7. Knock Sensor

### A: REMOVAL

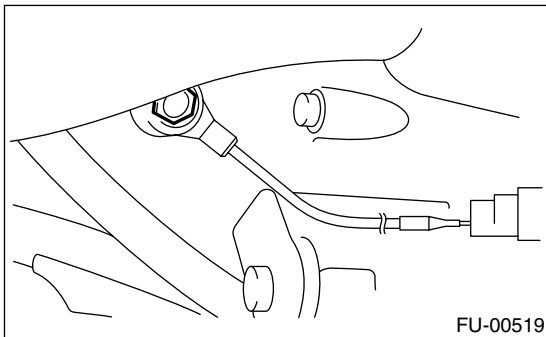
- 1) Disconnect the ground cable from battery.



- 2) Remove the air cleaner case.  
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
- 3) Disconnect the knock sensor connector.



- 4) Remove the knock sensor from cylinder block.

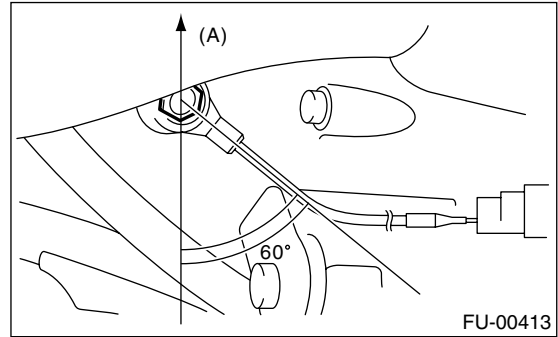


### B: INSTALLATION

- 1) Install the knock sensor to cylinder block.

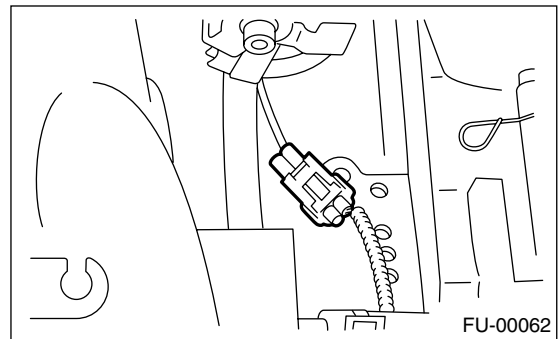
#### NOTE:

- For tightening torque, refer to "COMPONENT".  
<Ref. to FU(H4SOw/oOBD)-3, COMPONENT, General Description.>
- Extraction area of knock sensor cord must be positioned at a 60° angle relative to engine rear.

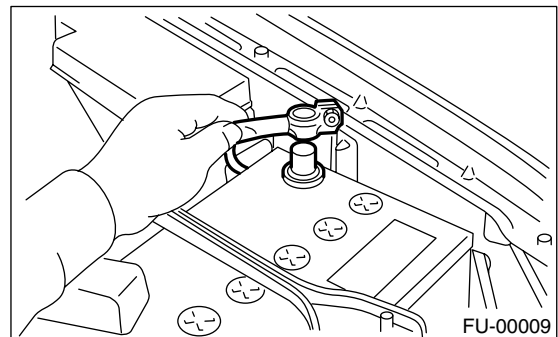


(A) Front side

- 2) Connect the knock sensor connector.



- 3) Install the air cleaner case.  
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
- 4) Connect the battery ground cable to battery.



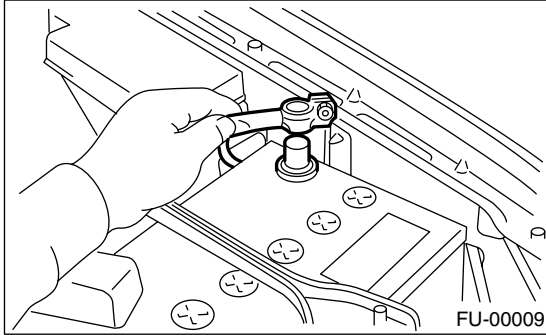
# Throttle Position Sensor

FUEL INJECTION (FUEL SYSTEMS)

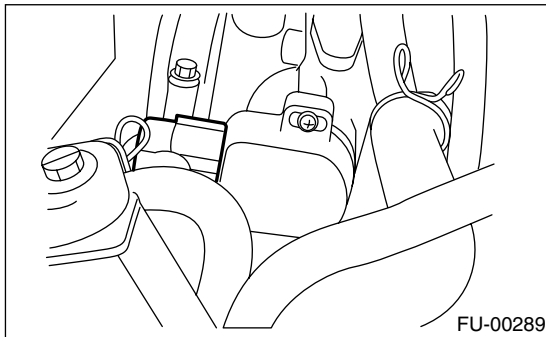
## 8. Throttle Position Sensor

### A: REMOVAL

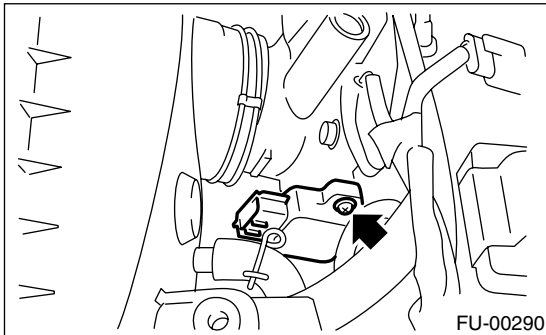
- 1) Disconnect the ground cable from battery.



- 2) Disconnect the connector from throttle position sensor.



- 3) Remove the throttle position sensor holding screws, and remove it.



### B: INSTALLATION

Install in the reverse order of removal.

#### NOTE:

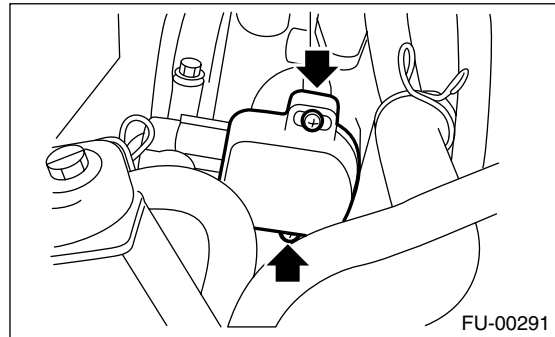
For tightening torque, refer to "COMPONENT".  
<Ref. to FU(H4SOw/oOBD)-3, COMPONENT, General Description.>

#### CAUTION:

**When installing the throttle position sensor, adjust to specified data.**

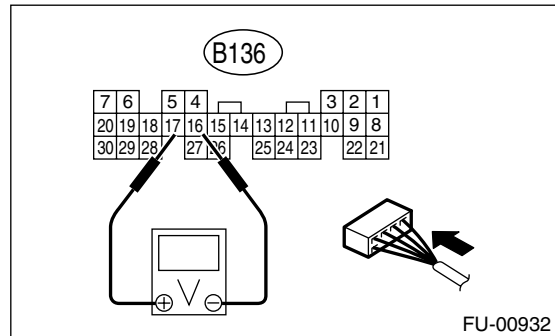
### C: ADJUSTMENT

- 1) Turn the ignition switch to OFF.
- 2) Loosen the throttle position sensor holding screws.



- 3) When using the voltage meter;
  - (1) Take out the ECM.
  - (2) Turn the ignition switch to ON.
  - (3) Adjust the throttle position sensor to proper position to make the voltage signal to ECM come to specification.

**Connector & terminal/Specified voltage**  
**(B136) No. 16 — (B136) No. 17/0.45 — 0.55 V**  
**[Fully closed.]**



- (4) Tighten the throttle position sensor holding screws.

#### NOTE:

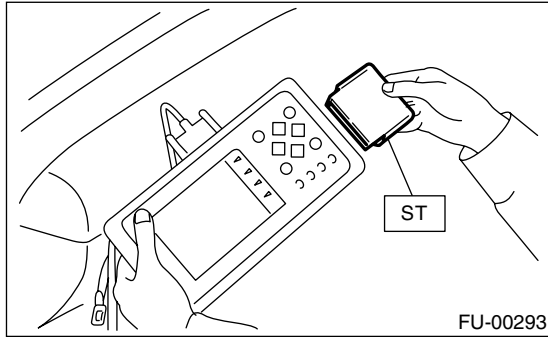
For tightening torque, refer to "COMPONENT".  
<Ref. to FU(H4SOw/oOBD)-3, COMPONENT, General Description.>

- 4) When using the Subaru Select Monitor;
  - (1) Turn the ignition switch to OFF.
  - (2) Loosen the throttle position sensor holding screws.

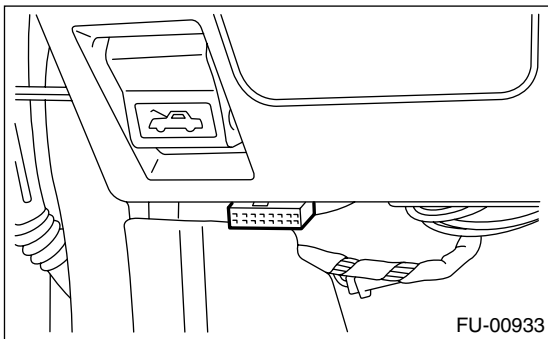
#### NOTE:

For detailed operation procedures, refer to Subaru Select Monitor Operation Manual.

- (3) Insert the cartridge to Subaru Select Monitor.



- (4) Connect the Subaru Select Monitor to data link connector.



- 5) Turn the ignition switch to ON, and Subaru Select Monitor switch to ON.  
6) Select the {2. Each System Check} in Main Menu.  
7) Select the {Engine Control System} in Selection Menu.  
8) Select the {1. Current Data Display & Save} in Engine Control System Diagnosis.  
9) Select the {1.12 Data Display} in Data Display Menu.  
10) Adjust the throttle position sensor to proper position to match with the following specifications.

**Condition: Throttle fully closed**  
**Throttle opening angle 0.00%**  
**Throttle sensor voltage 0.50 V**

- 11) Tighten the throttle position sensor holding screws.

**NOTE:**

For tightening torque, refer to "COMPONENT".  
<Ref. to FU(H4SOw/oOBD)-3, COMPONENT, General Description.>

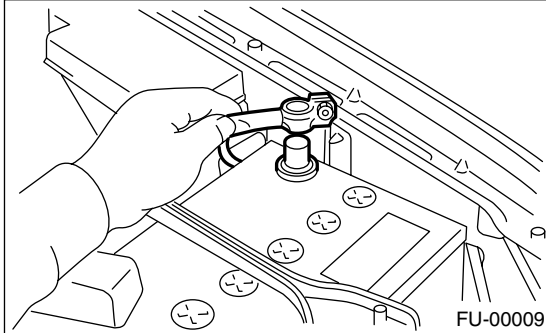
# Intake Air Temperature and Manifold Absolute Pressure Sensor

FUEL INJECTION (FUEL SYSTEMS)

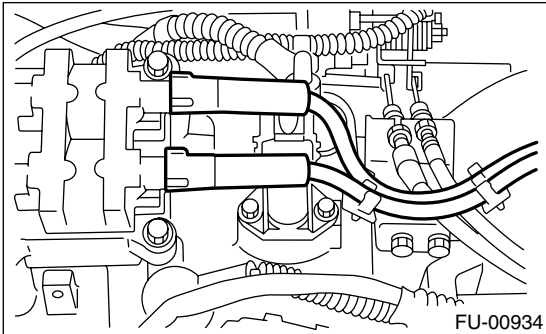
## 9. Intake Air Temperature and Manifold Absolute Pressure Sensor

### A: REMOVAL

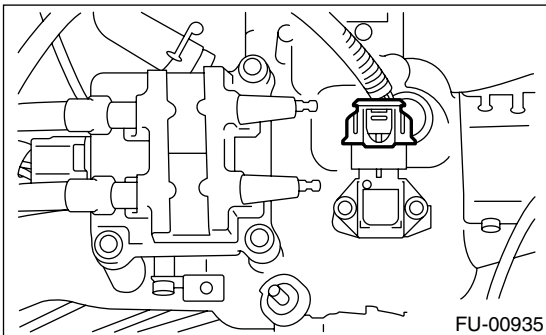
1) Disconnect the ground cable from battery.



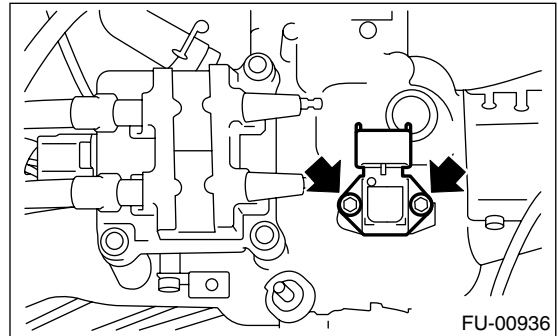
2) Disconnect the spark plug cord from ignition coil and ignitor ASSY.



3) Disconnect the connector from intake air temperature and manifold absolute pressure sensor.



4) Remove the intake air temperature and manifold absolute pressure sensor.

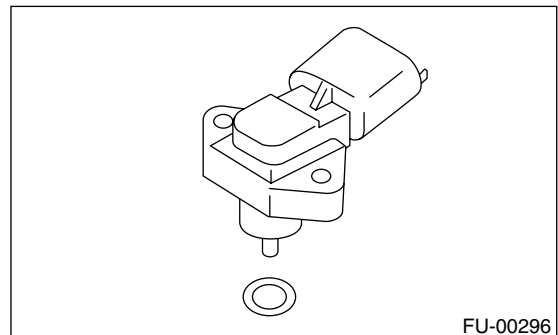


### B: INSTALLATION

Install in the reverse order of removal.

#### NOTE:

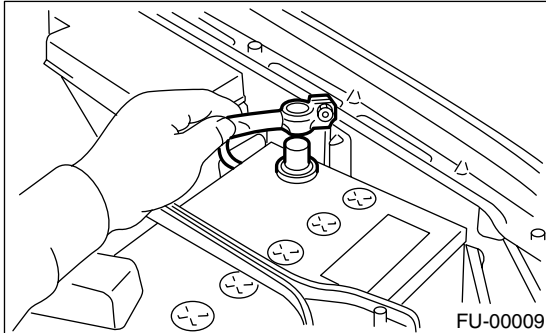
- For tightening torque, refer to "COMPONENT". <Ref. to FU(H4SOw/oOBD)-3, COMPONENT, General Description.>
- Replace the O-ring with a new one.



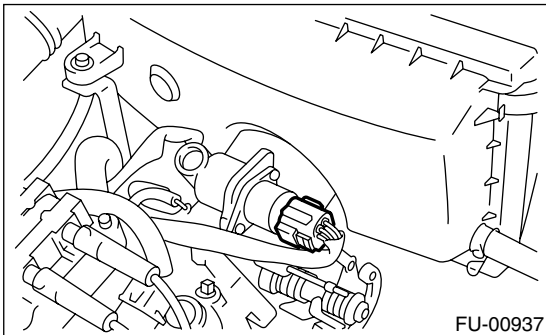
## 10. Idle Air Control Solenoid Valve

### A: REMOVAL

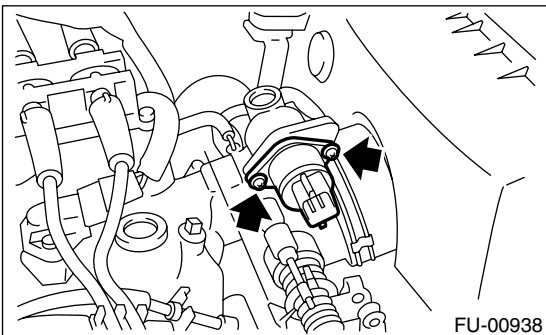
1) Disconnect the ground cable from battery.



2) Disconnect the connector from idle air control solenoid valve.



3) Remove the idle air control solenoid valve from throttle body.



### B: INSTALLATION

Install in the reverse order of removal.

#### NOTE:

- Always use a new gasket.
  - For tightening torque, refer to "COMPONENT".
- <Ref. to FU(H4SOw/oOBD)-3, COMPONENT, General Description.>