# 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) |
| EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES) | EC(H4SOw/oOBD) |
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| EXHAUST | EX(H4SOw/oOBD) |
| COOLING | CO(H4SOw/oOBD) |

## 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(H4SO)


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# 1. General Description

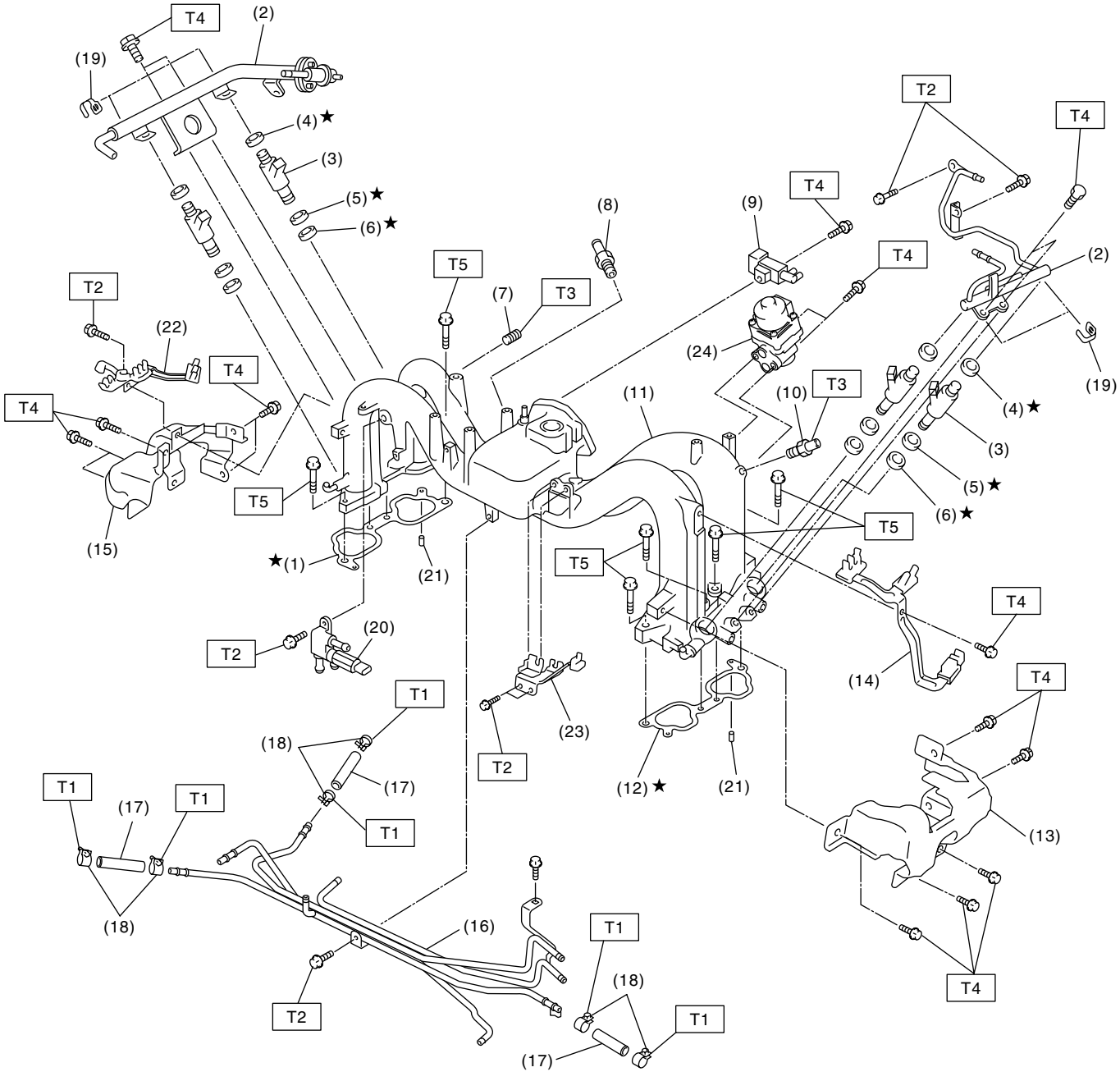
## A: SPECIFICATIONS

| Item | | Specification |
|---|---|---|
| Fuel tank | Capacity | 50 ℓ (13.2 US gal, 11.0 Imp gal) |
| | Location | Under rear seat |
| Fuel pump | Type | Impeller |
| | Shutoff discharge pressure | 370 — 677 kPa (3.77 — 6.9 kg/cm$^2$, 53.6 — 98 psi) |
| | Discharge flow | More than 65 ℓ (17.2 US gal, 14.3 Imp gal)/h<br>[12 V at 300 kPa (3.06 kg/cm$^2$, 43.5 psi)] |
| Fuel filter | | Cartridge type |

# B: COMPONENT

## 1. INTAKE MANIFOLD

**• 1.6 L MODEL**

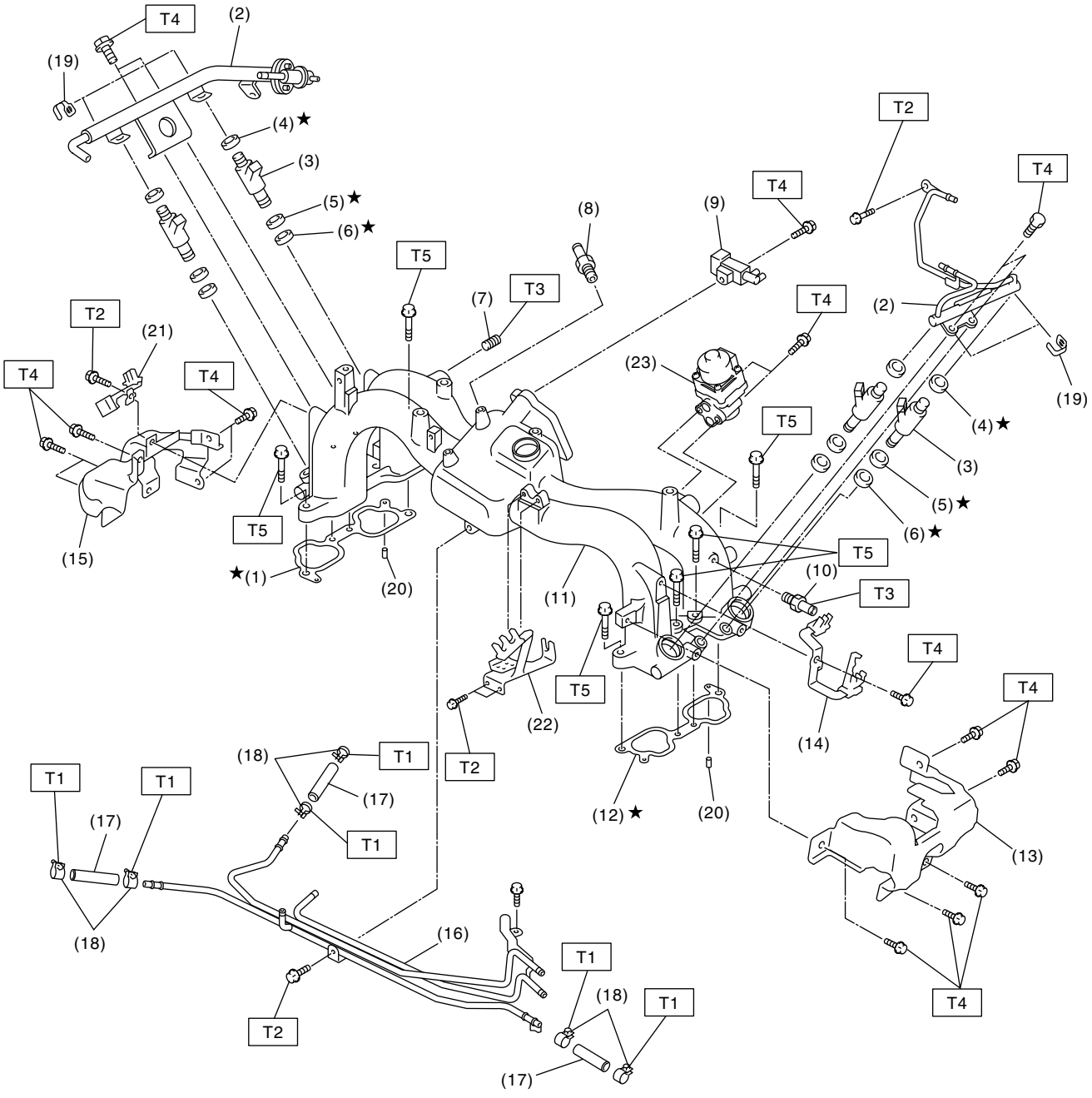



FU-02184

(1) Intake manifold gasket RH
(2) Fuel injector pipe
(3) Fuel injector
(4) O-ring
(5) O-ring
(6) O-ring
(7) Plug
(8) PCV valve
(9) Purge control solenoid valve
(10) Nipple
(11) Intake manifold
(12) Intake manifold gasket LH
(13) Fuel pipe protector LH
(14) Plug cord holder LH
(15) Fuel pipe protector RH
(16) Fuel pipe ASSY
(17) Fuel hose
(18) Clip
(19) Clip
(20) Air assist injector solenoid valve
(21) Guide pin
(22) Plug cord holder RH
(23) Accelerator cable bracket
(24) EGR valve

| ***Tightening torque: N·m (kgf-m, ft-lb)*** |
|---|
| ***T1: 1.5 (0.15, 1.1)*** |
| ***T2: 6.4 (0.65, 4.7)*** |
| ***T3: 17(1.7, 12.5)*** |
| ***T4: 19 (1.9, 14.0)*** |
| ***T5: 25 (2.5, 18.4)*** |

**• 2.0 L MODEL**

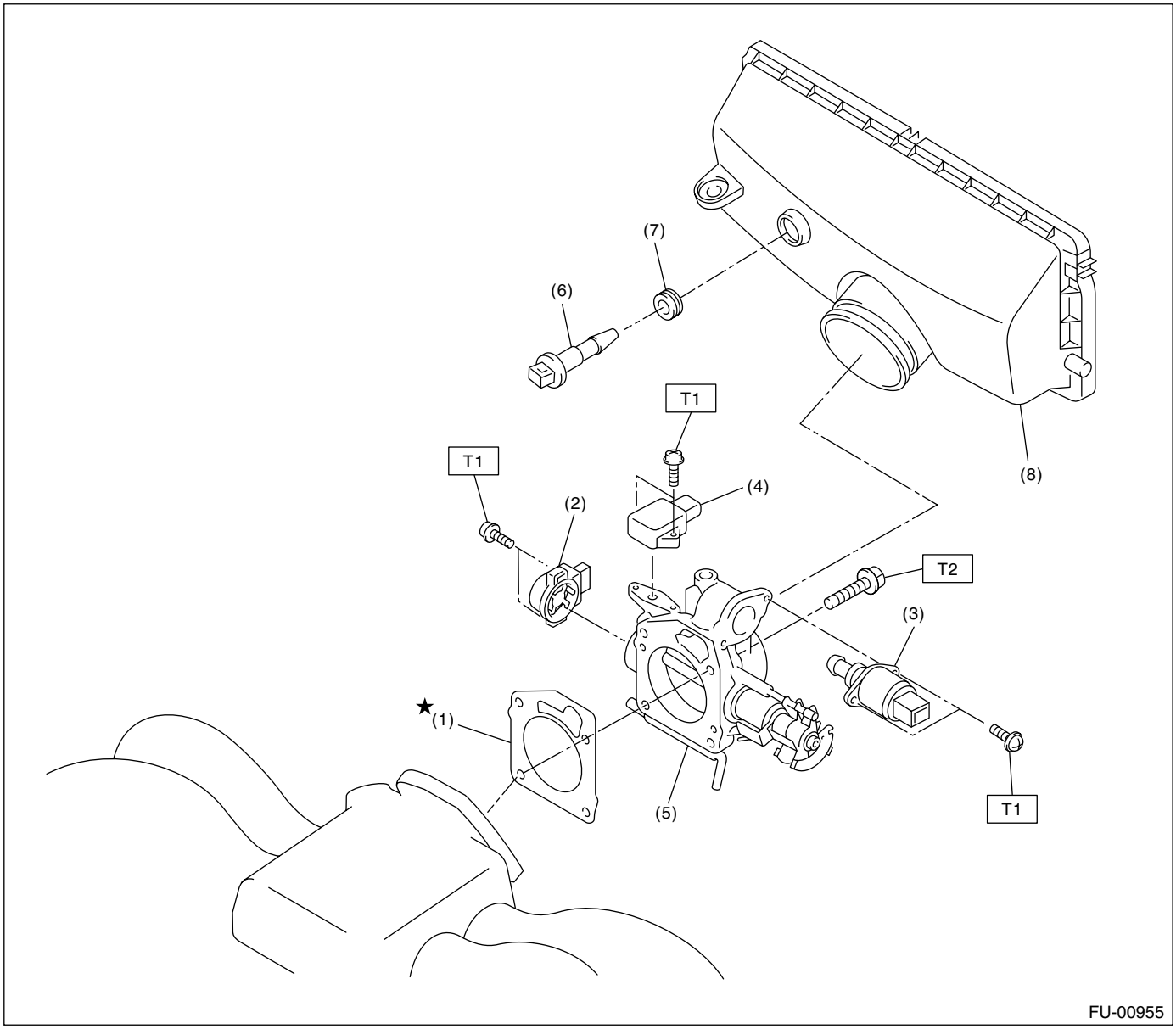



FU-00954

(1) Intake manifold gasket RH
(2) Fuel injector pipe
(3) Fuel injector
(4) O-ring
(5) O-ring
(6) O-ring
(7) Plug
(8) PCV valve
(9) Purge control solenoid valve
(10) Nipple
(11) Intake manifold
(12) Intake manifold gasket LH
(13) Fuel pipe protector LH
(14) Plug cord holder LH
(15) Fuel pipe protector RH
(16) Fuel pipe ASSY
(17) Fuel hose
(18) Clip
(19) Clip
(20) Guide pin
(21) Plug cord holder RH
(22) Accelerator cable bracket
(23) EGR valve

***Tightening torque: N·m (kgf-m, ft-lb)***
***T1: 1.5 (0.15, 1.1)***
***T2: 6.4 (0.65, 4.7)***
***T3: 17 (1.7, 12.5)***
***T4: 19 (1.9, 13.7)***
***T5: 25 (2.5, 18.1)***

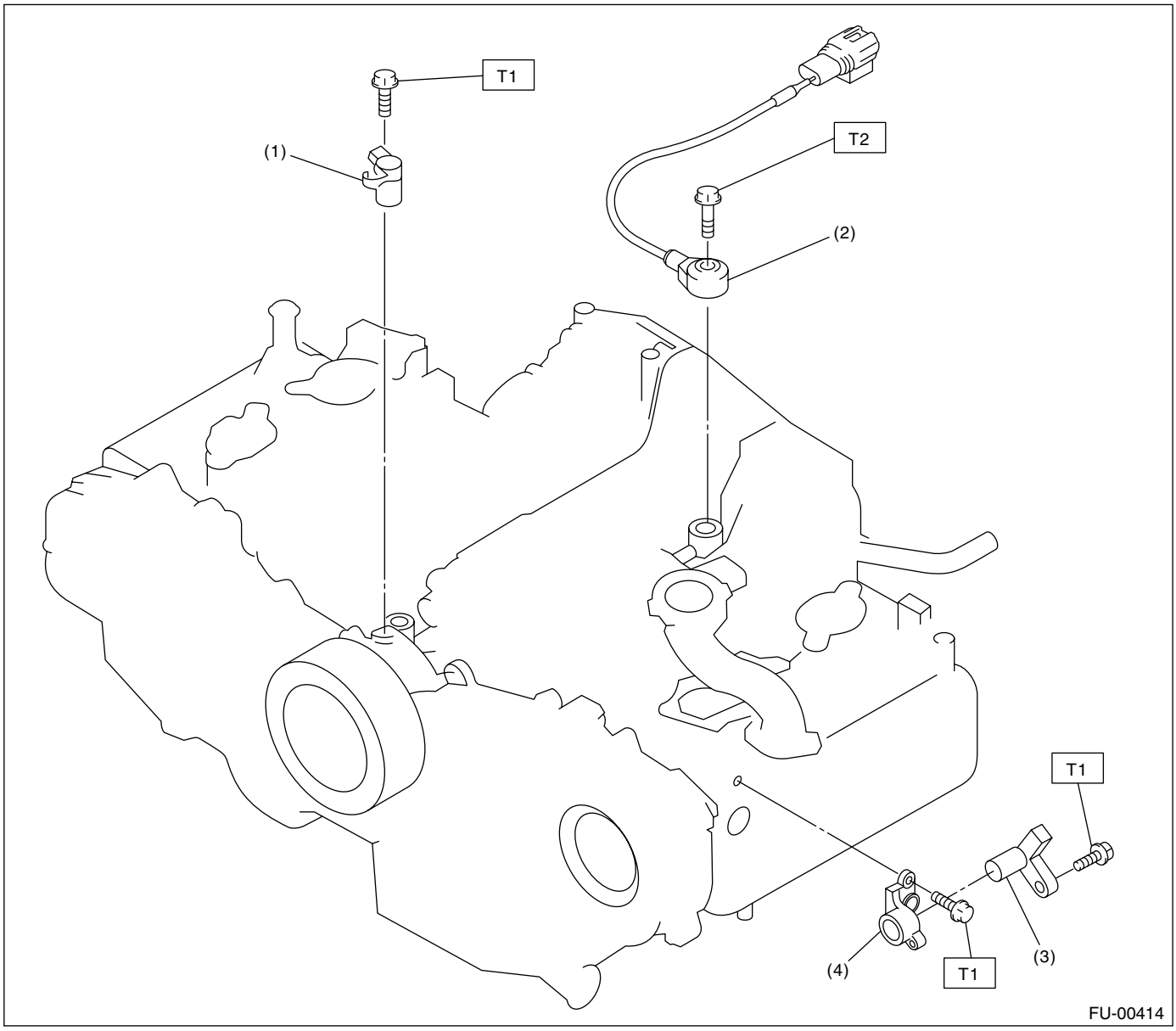
## 2. AIR INTAKE SYSTEM




(1) Gasket
(2) Throttle position sensor
(3) Idle air control solenoid valve
(4) Manifold absolute pressure sensor
(5) Throttle body
(6) Intake air temperature sensor
(7) Grommet
(8) Air cleaner case

***Tightening torque: N·m (kgf-m, ft-lb)***
***T1: 1.6 (0.16, 1.2)***
***T2: 22 (2.2, 15.9)***

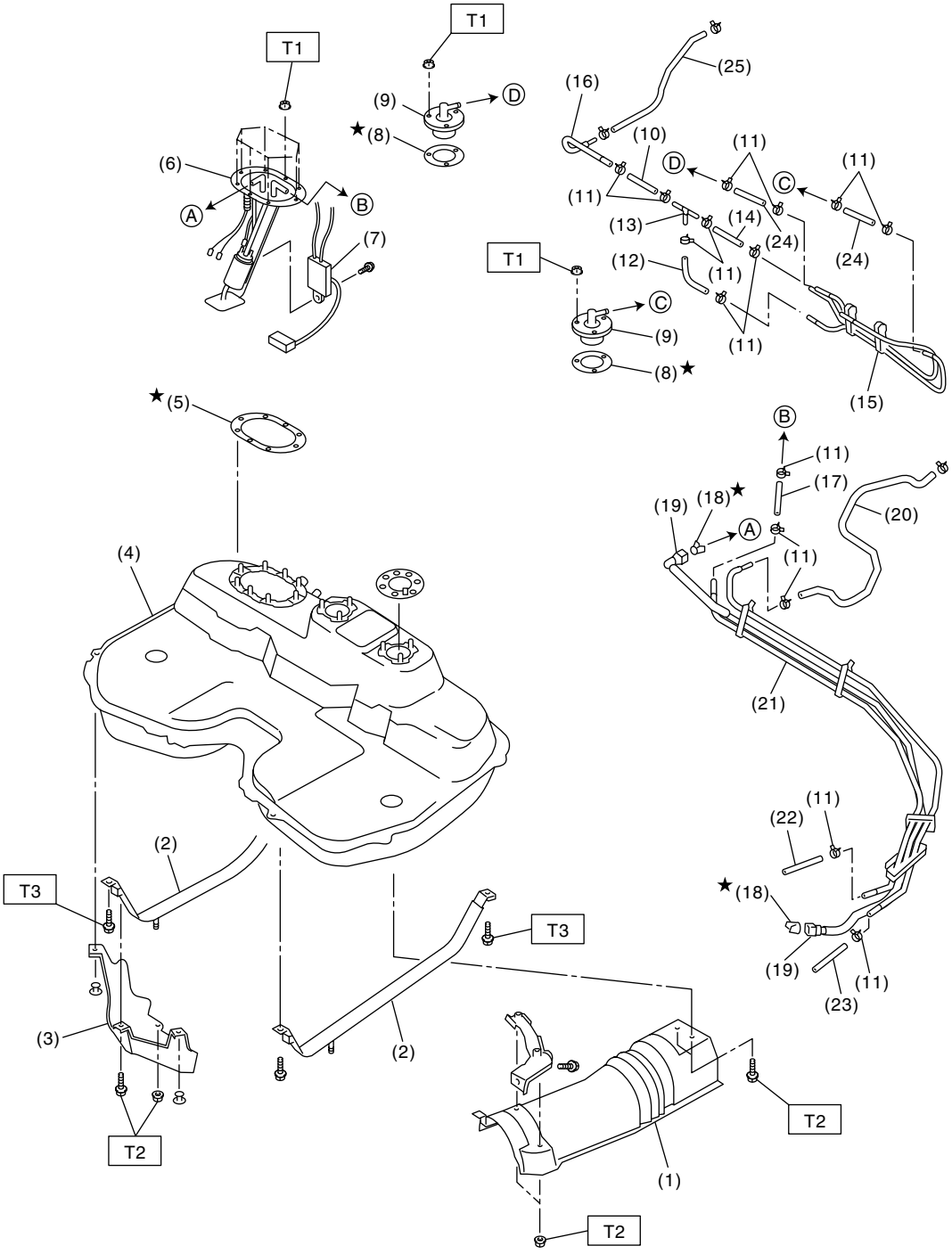
## 3. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS




(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)***

## 4. FUEL TANK

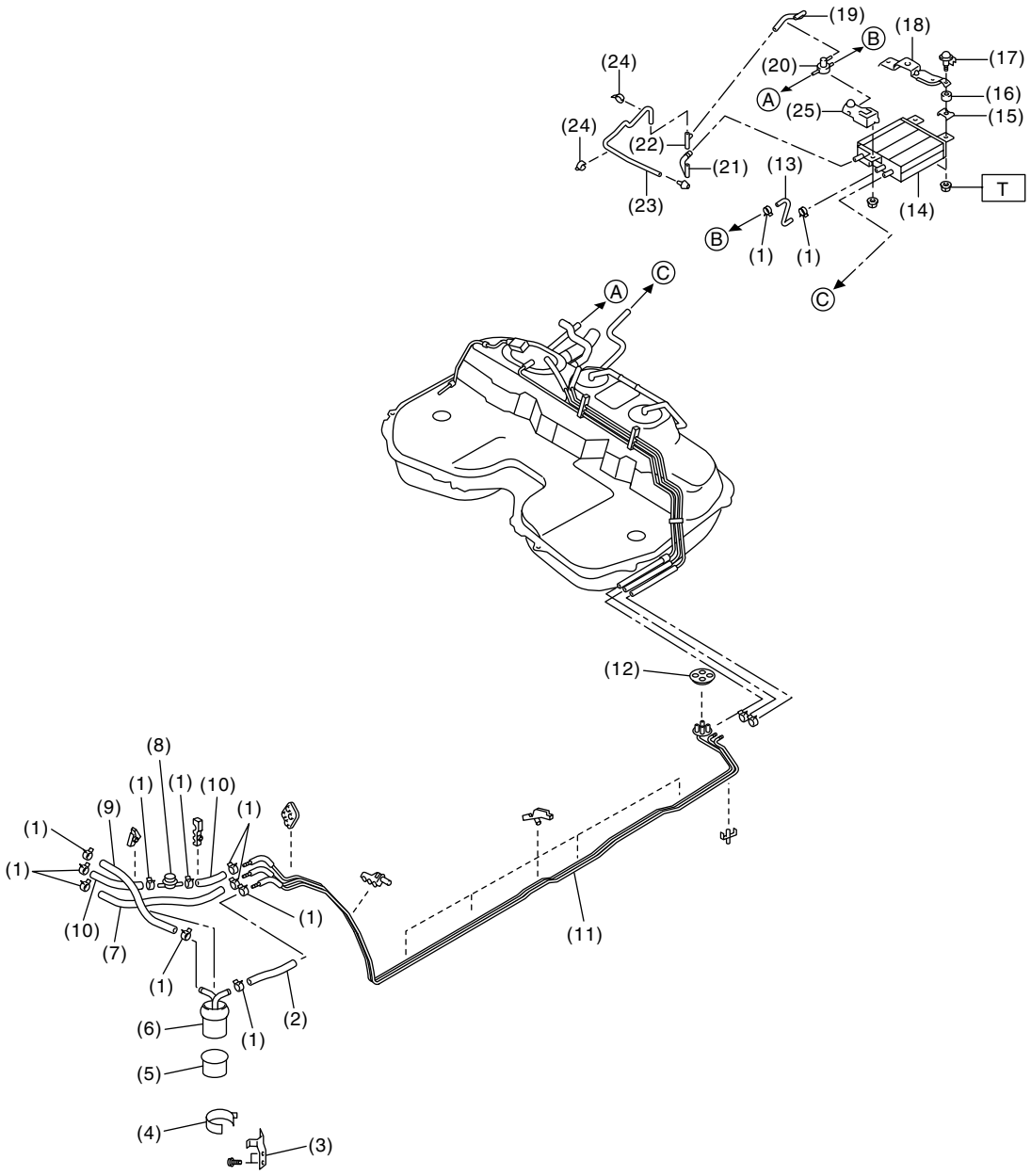



FU-00908

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

***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)***

## 5. FUEL LINE

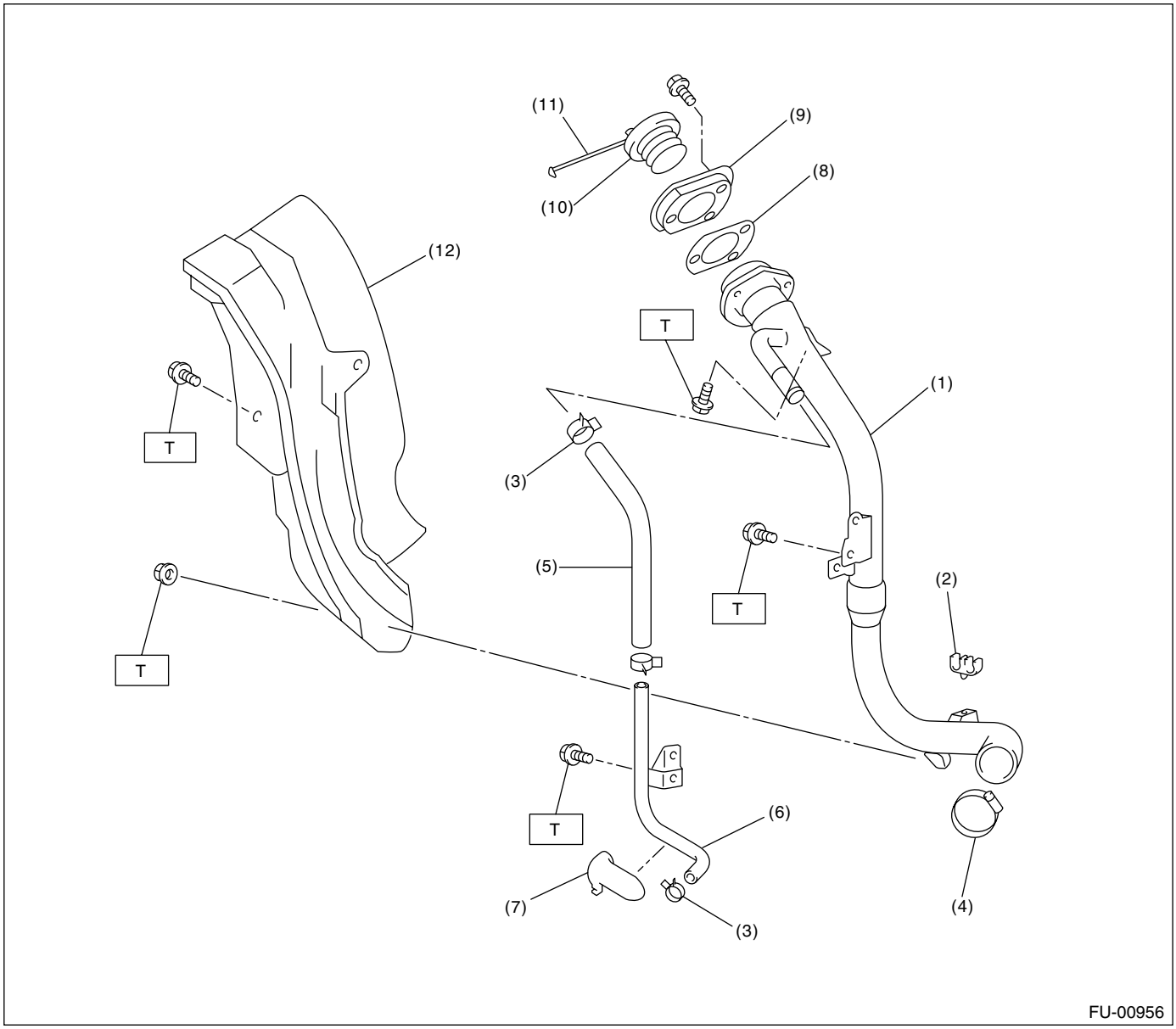



FU-00516

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

***Tightening torque: N·m (kgf-m, ft-lb)***
***T: 23 (2.3, 17.0)***

## 6. FUEL FILLER PIPE



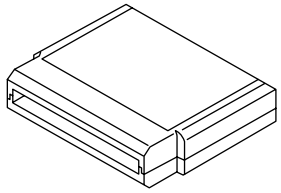

(1) Fuel filler pipe ASSY
(2) Evaporation hose holder
(3) Clip
(4) Clamp
(5) Air vent hose
(6) Air vent pipe
(7) Air vent pipe holder
(8) Filler pipe packing
(9) Filler ring
(10) Filler cap
(11) Filler cap tether
(12) Filler pipe protector

***Tightening torque: N·m (kgf-m, ft-lb)***
***T: 7.4 (0.75, 5.4)***

## 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.

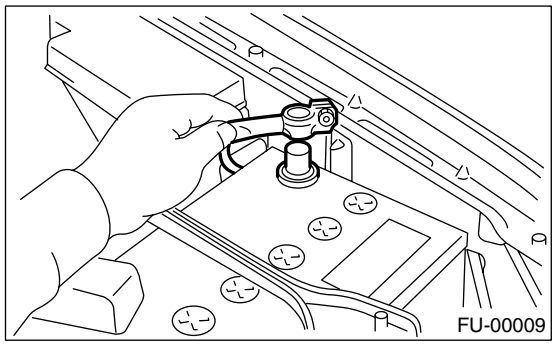
## D: PREPARATION TOOL

| ILLUSTRATION | TOOL NUMBER | DESCRIPTION | REMARKS |
|---|---|---|---|
|  ST24082AA230 | 24082AA230 | CARTRIDGE | Troubleshooting for electrical system. |
|  ST22771AA030 | 22771AA030 | SUBARU SELECT MONITOR KIT | Troubleshooting for electrical systems.<br>• English: 22771AA030 (Without printer)<br>• German: 22771AA070 (Without printer)<br>• French: 22771AA080 (Without printer)<br>• Spanish: 22771AA090 (Without printer) |

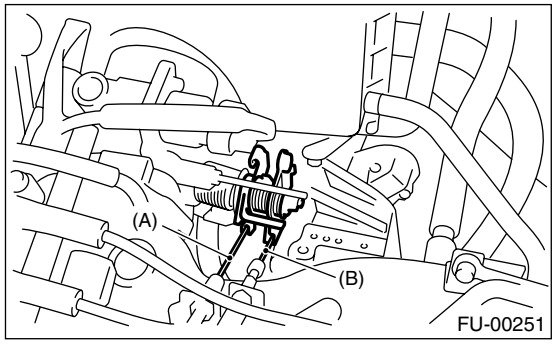
# 2. Throttle Body

## A: REMOVAL

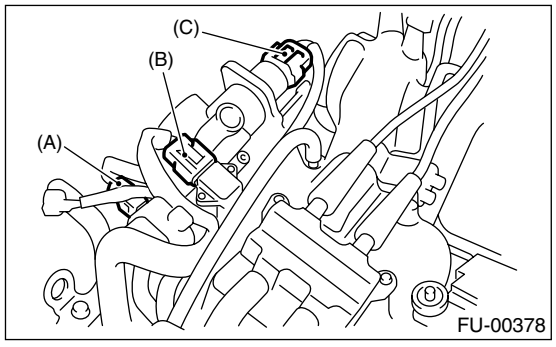
1) Disconnect the ground cable from battery.




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). (With cruise control model)

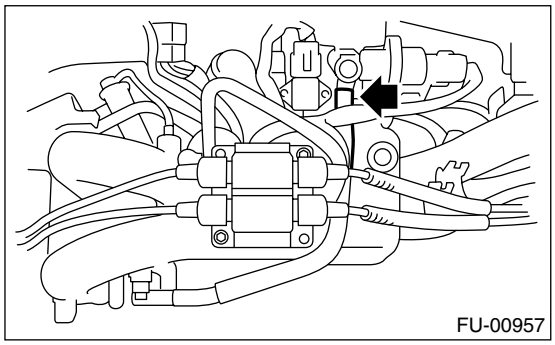



5) Disconnect the connectors from the idle air control solenoid valve, throttle position sensor and manifold absolute pressure sensor.

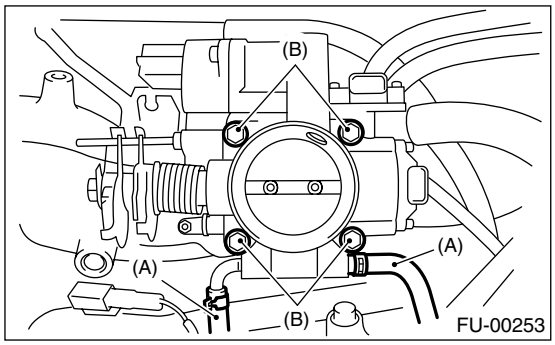



(A) Throttle position sensor
(B) Manifold absolute pressure sensor
(C) Idle air control solenoid valve

6) Disconnect the air by-pass hose from throttle body. (1.6 L model)




7) Disconnect the engine coolant hoses (A) from throttle body.
8) Remove the bolts (B) which install the throttle body to intake manifold.




## B: INSTALLATION

1) Install in the reverse order of removal.

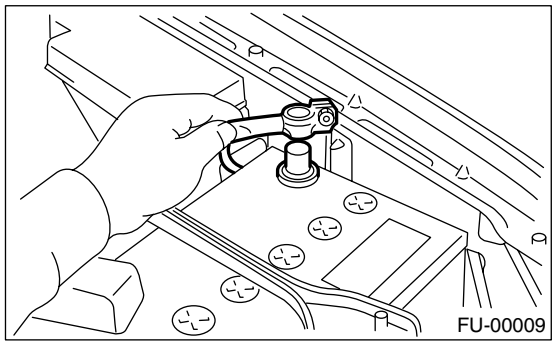
NOTE:
- Replace the gasket with a new one.
- For tightening torque, refer to “COMPONENT”. <Ref. to FU(H4SO)-3, COMPONENT, General Description.>

2) Adjust the accelerator cable play. <Ref. to SP(H4SO)-9, INSTALLATION, Accelerator Control Cable.>

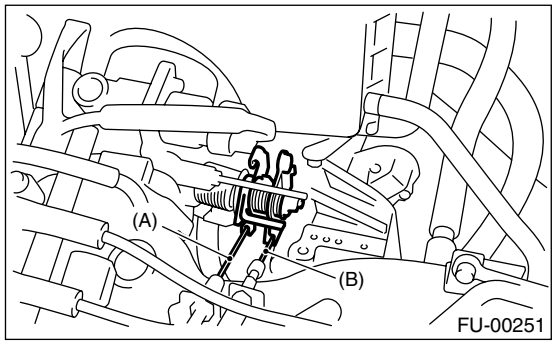
# 3. Intake Manifold

## A: REMOVAL

1) Release the fuel pressure. <Ref. to FU(H4SO)-50, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open the fuel flap lid, and then remove the fuel filler cap.
3) Disconnect the ground cable from battery.

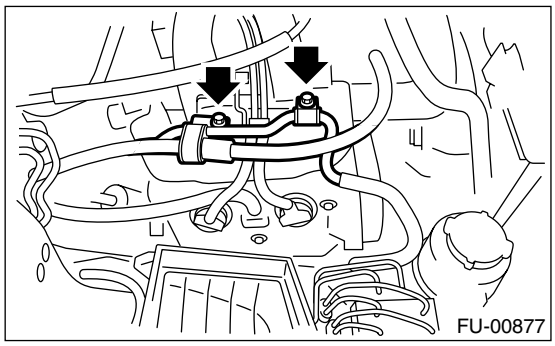



4) Remove the air intake duct and air cleaner case. <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.> and <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
5) Disconnect the accelerator cable (A).
6) Disconnect the cruise control cable (B). (With cruise control model)

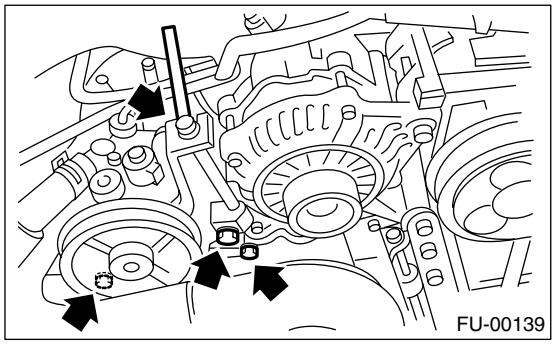



7) Remove the power steering pump and reservoir tank from bracket.
(1) Remove the resonator chamber. <Ref. to IN(H4SO)-7, REMOVAL, Resonator Chamber.>
(2) Remove the front side V-belt. <Ref. to ME(H4SO)-43, REMOVAL, V-belt.>
(3) Remove the bolts which hold the power steering pipes onto intake manifold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

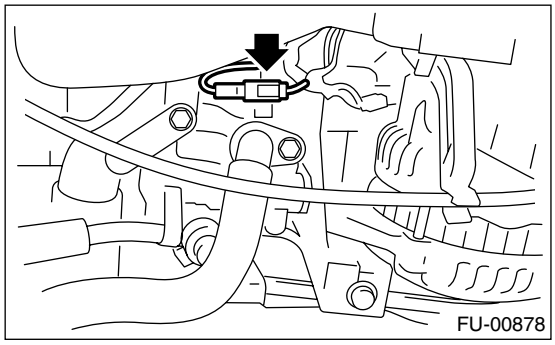
NOTE:
Do not disconnect the power steering hose.



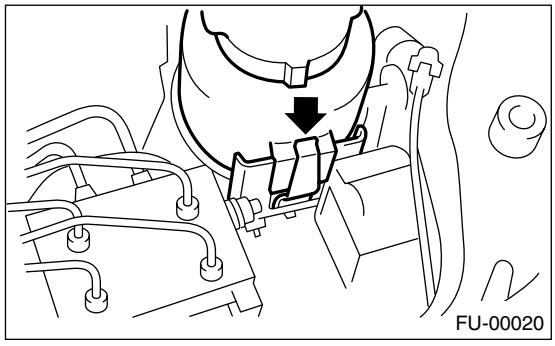

(4) Remove the bolts which install the power steering pump bracket.



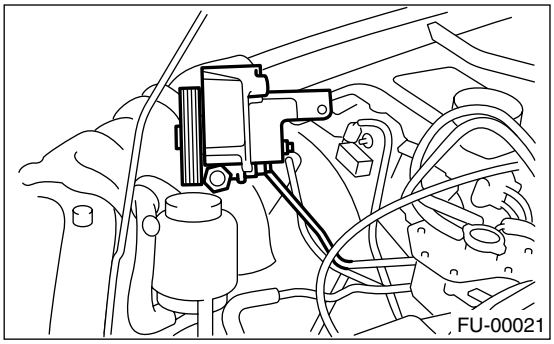

(5) Disconnect the connector from the power steering pump switch.



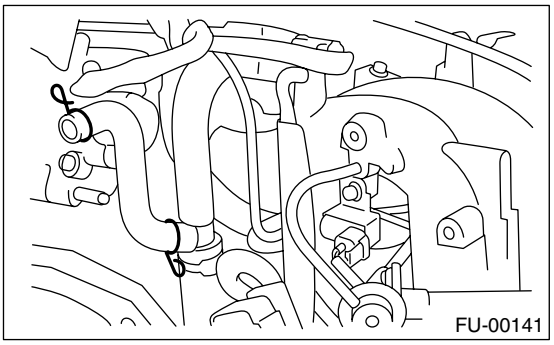

(6) Remove the power steering tank from the bracket by pulling it upwards.



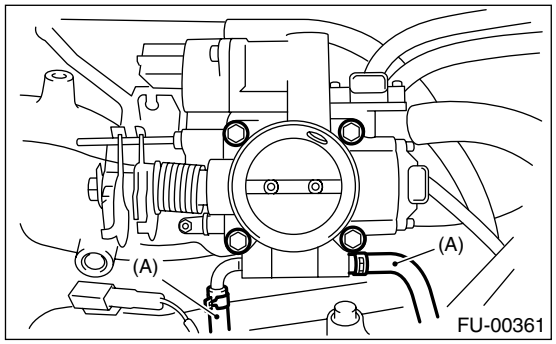
(7) Place the power steering pump on the right side wheel apron.



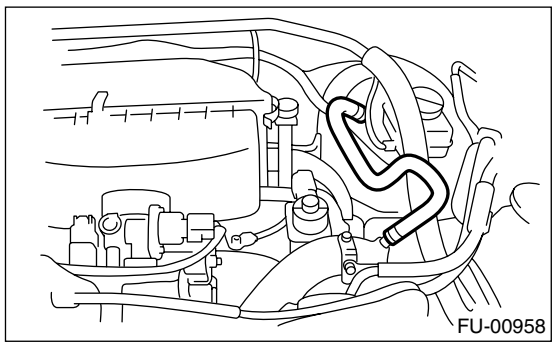

8) Disconnect the spark plug cords from spark plugs.
9) Disconnect the PCV hose from intake manifold.



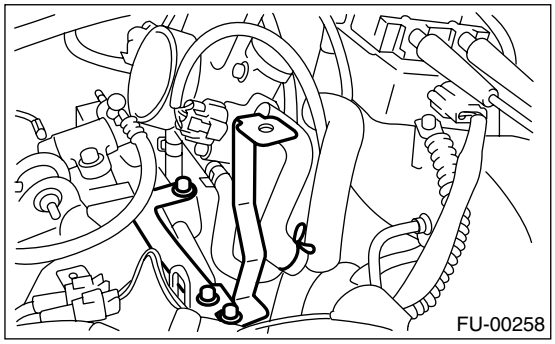

10) Disconnect the engine coolant hose (A) from throttle body.



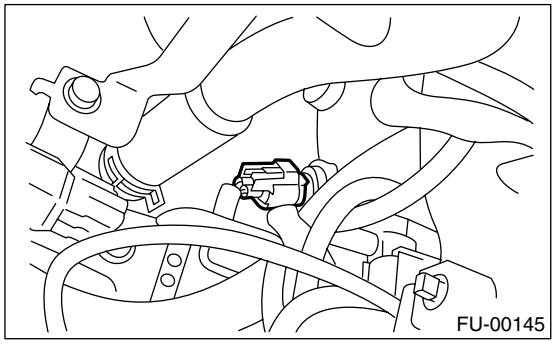

11) Disconnect the brake booster hose.



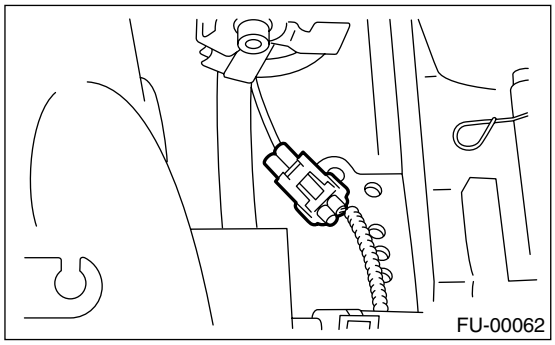

12) Remove the air cleaner case stay RH and engine harness bracket, and then disconnect the engine harness connectors from the bulkhead harness connectors.



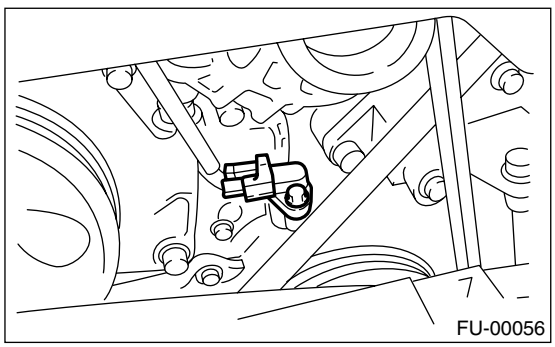

13) Disconnect the connectors from the engine coolant temperature sensor.



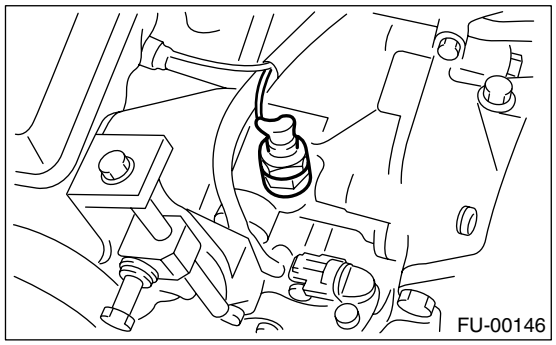

14) Disconnect the knock sensor connector.



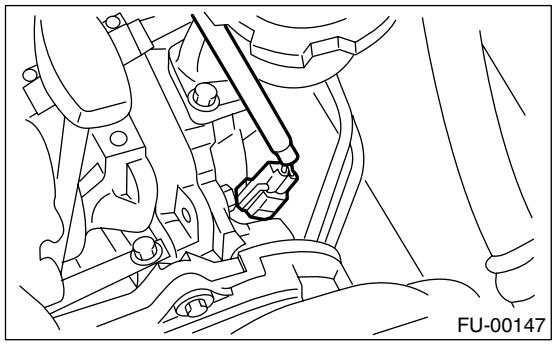

15) Disconnect the connector from the crankshaft position sensor.



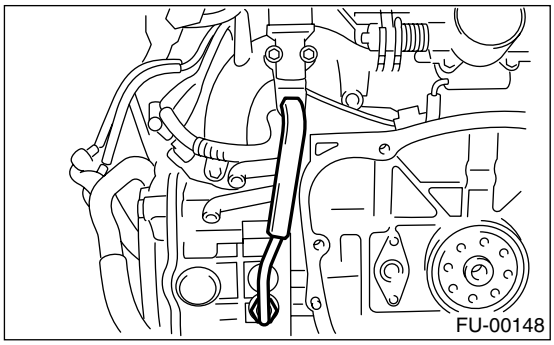
16) Disconnect the connector from the oil pressure switch.




17) Disconnect the connector from the camshaft position sensor.

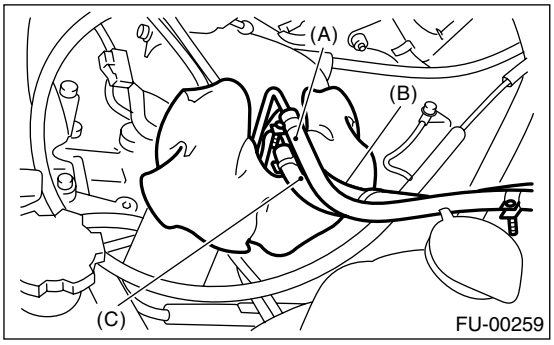



18) Remove the EGR pipe from intake manifold.



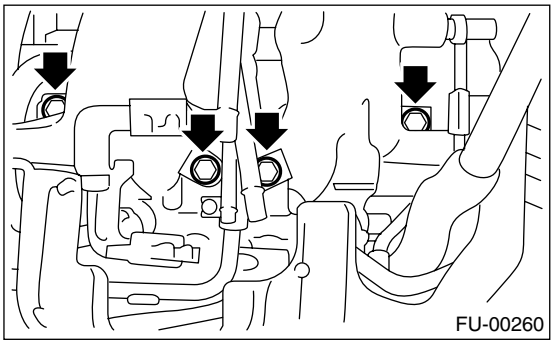

19) Disconnect the fuel hoses from fuel pipes.

**WARNING:**
- **Do not spill fuel.**
- **Catch fuel from hoses in a container or cloth.**




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

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



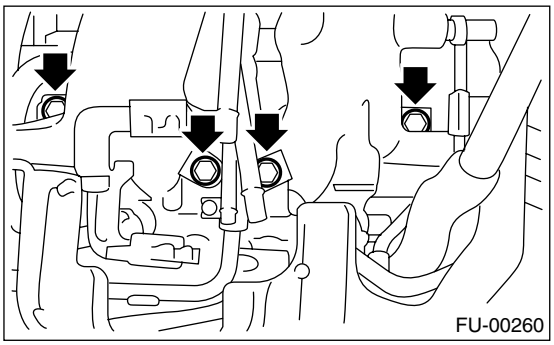

21) Remove the intake manifold.

## B: INSTALLATION

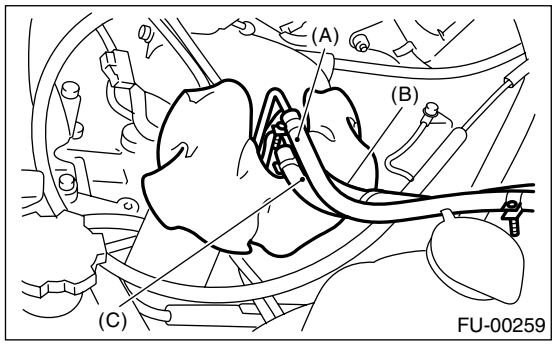
1) Install the intake manifold onto cylinder heads.

NOTE:
Replace the gaskets with new ones.

***Tightening torque:***
***25 N·m (2.5 kgf-m, 18.1 ft-lb)***



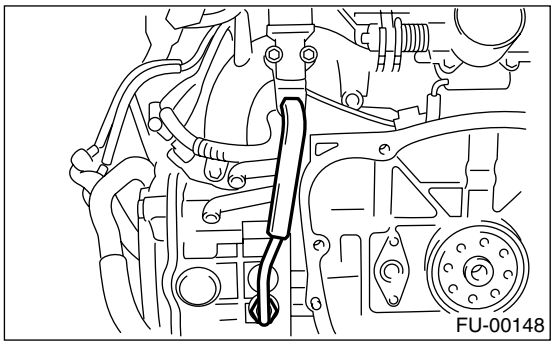
2) Connect the fuel hoses.



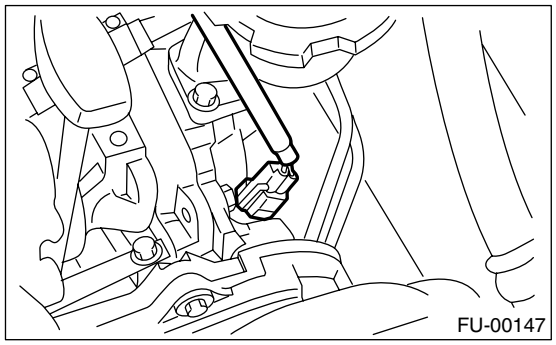

(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

3) Connect the EGR pipe to intake manifold.

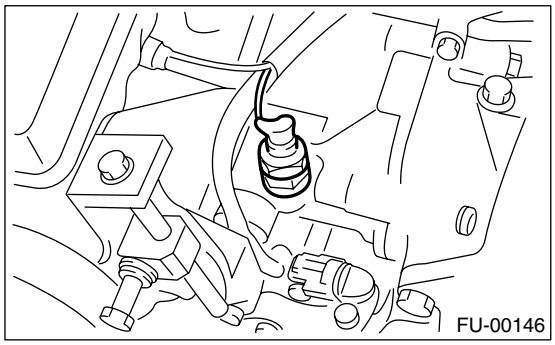
***Tightening torque:***
***34 N·m (3.4 kgf-m, 24.6 ft-lb)***



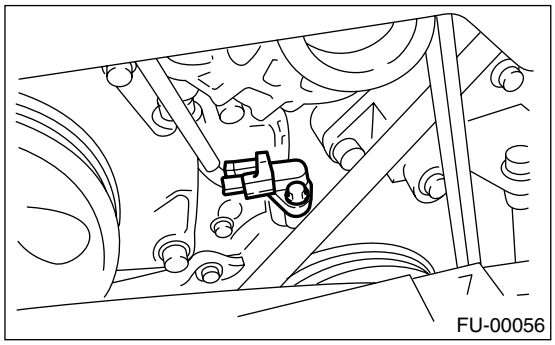

4) Connect the connector to the camshaft position sensor.



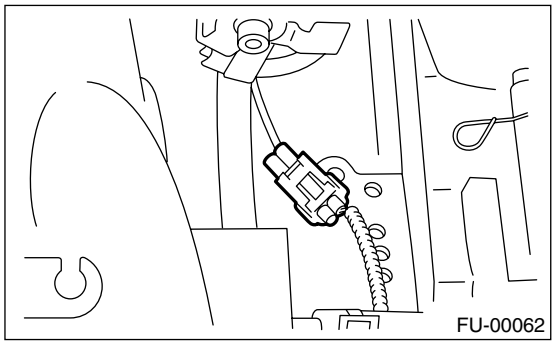

5) Connect the connector to the oil pressure switch.



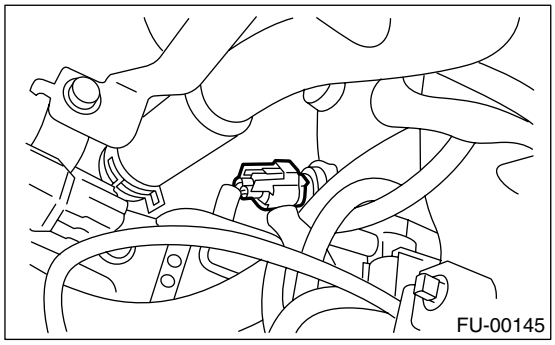

6) Connect the connector to the crankshaft position sensor.



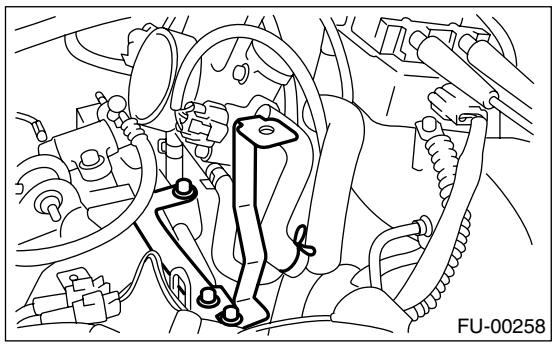

7) Connect the knock sensor connector.



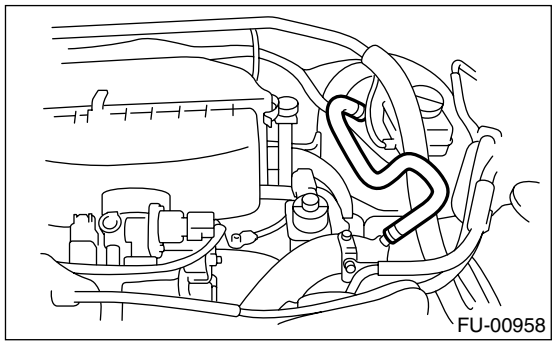

8) Connect the connectors to the engine coolant temperature sensor.



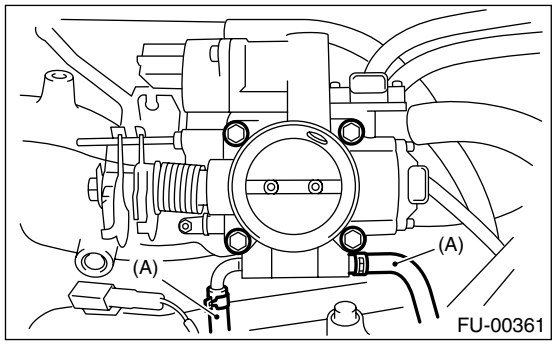
9) Install the air cleaner case stay RH and engine harness bracket, and connect the engine harness connectors to bulkhead connectors.



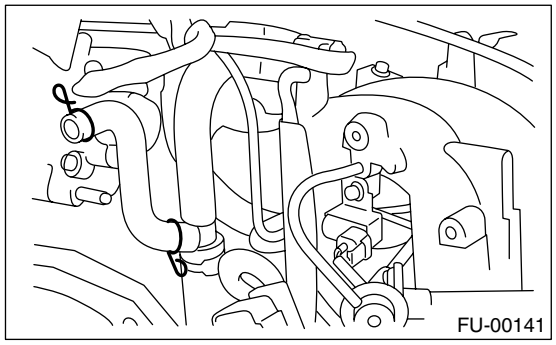

10) Connect the brake booster hose.




11) Connect the engine coolant hose (A) to throttle body.

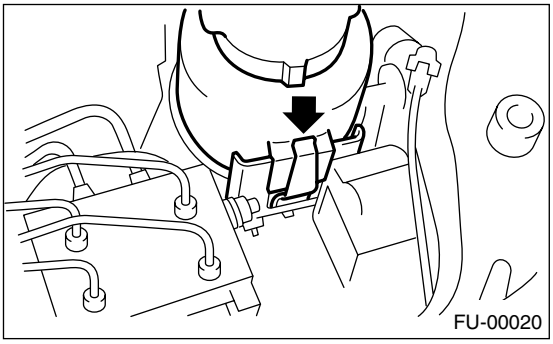



12) Connect the PCV hose to intake manifold.

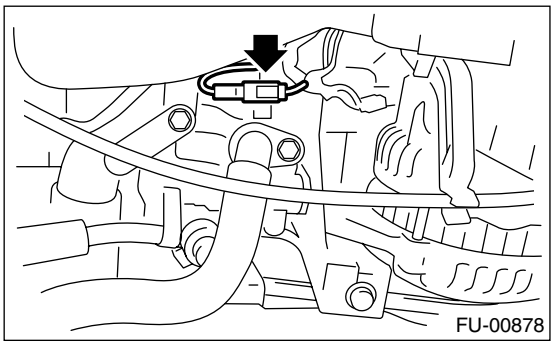



13) Connect the spark plug cords to spark plugs.
14) Install the power steering pump and reservoir tank to bracket.

(1) Install the reservoir tank to bracket.

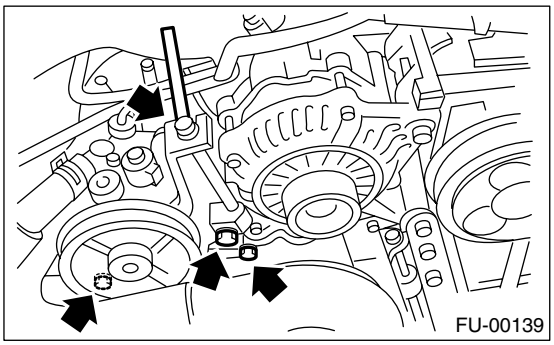



(2) Connect the connector to the power steering pump switch.

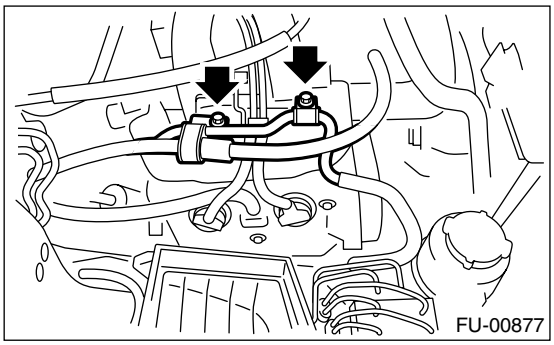



(3) Tighten the bolts which install the power steering pump bracket.

***Tightening torque:***
***22 N·m (2.2 kgf-m, 15.9 ft-lb)***

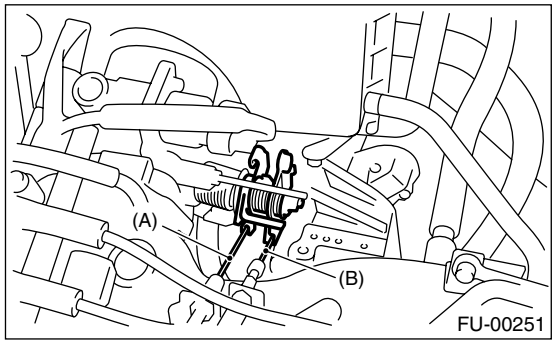



(4) Install the power steering pipes onto the right side intake manifold protector RH.

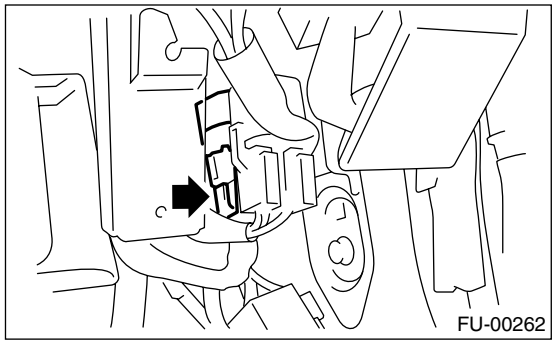


(5) Install the front side V-belt. <Ref. to ME(H4SO)-43, INSTALLATION, V-belt.>
(6) Install the resonator chamber. <Ref. to IN(H4SO)-7, INSTALLATION, Resonator Chamber.>

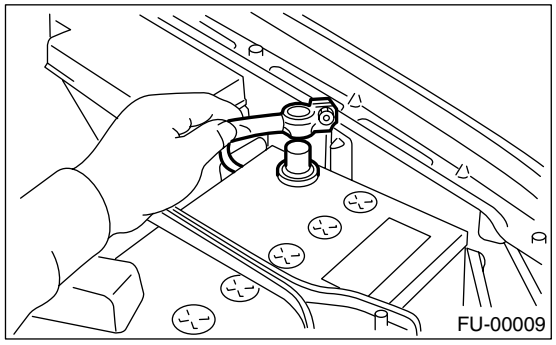
15) Connect the accelerator cable (A). <Ref. to SP(H4SO)-9, INSTALLATION, Accelerator Control Cable.>
16) Connect the cruise control cable (B). (With cruise control model)




17) Install the air intake duct and air cleaner case. <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.> and <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
18) Connect the connector to the fuel pump relay.

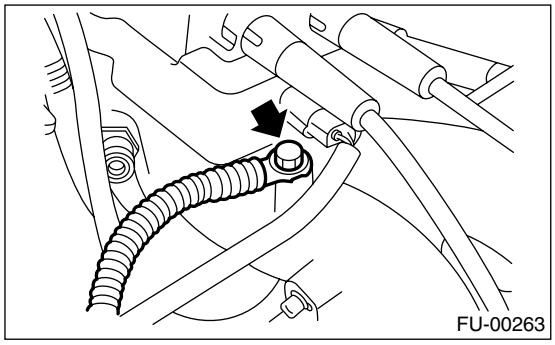



19) Connect the battery ground cable to battery.

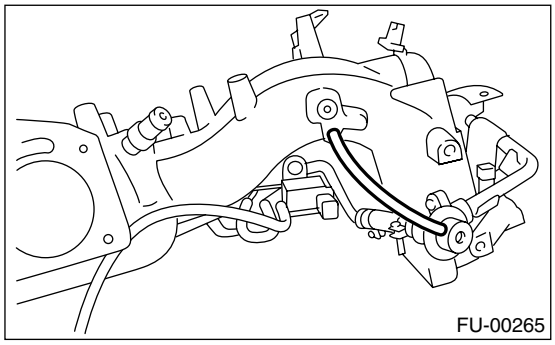



## C: DISASSEMBLY

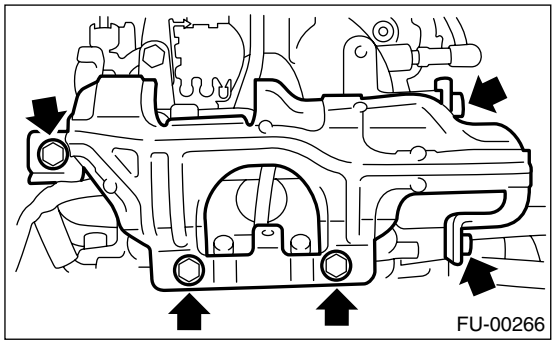
1) Disconnect the engine ground terminal from intake manifold.



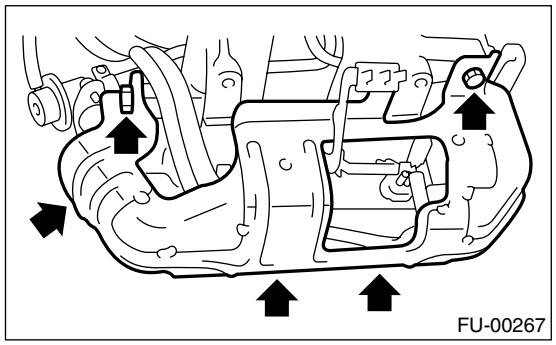

2) Disconnect the ignition coil and ignitor assembly. <Ref. to IG(H4SO)-8, REMOVAL, Ignition Coil & Ignitor ASSY.>
3) Remove the throttle body. <Ref. to FU(H4SO)-15, REMOVAL, Throttle Body.>
4) Remove the EGR valve. <Ref. to FU(H4SO)-36, REMOVAL, EGR Valve.>
5) Remove the air assist injector solenoid valve. (1.6 L model) <Ref. to FU(H4SO)-37, REMOVAL, Air Assist Injector Solenoid Valve.>
6) Disconnect the pressure regulator vacuum hose from intake manifold.



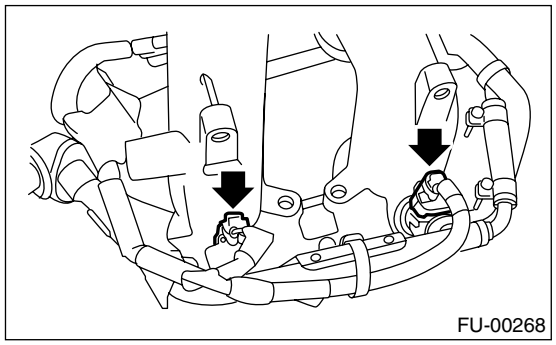

7) Remove the fuel pipe protector LH.



8) Remove the fuel pipe protector RH.

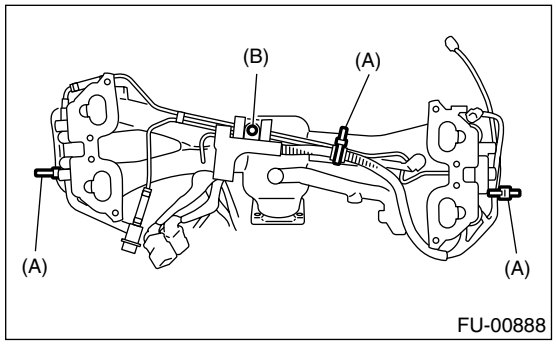



9) Disconnect the connectors from fuel injectors.



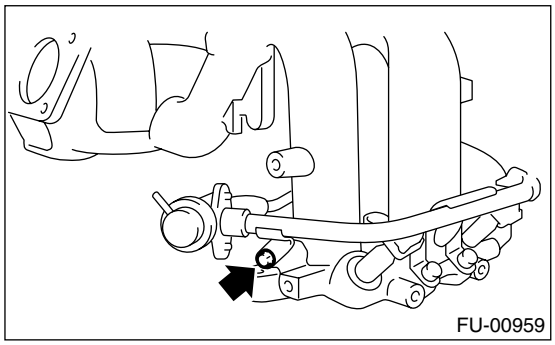

10) Disconnect the purge control solenoid valve. <Ref. to EC(H4SO)-7, REMOVAL, Purge Control Solenoid Valve.>

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

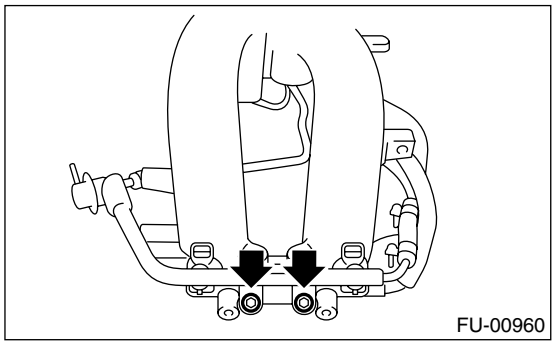



12) Remove the engine harness from the intake manifold.

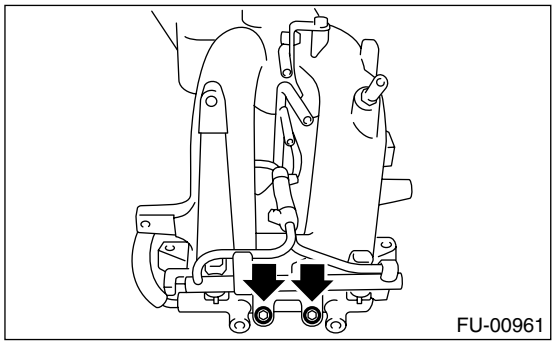
13) Remove the bolt which installs the fuel injector pipe on the intake manifold as shown in the figure.




- RH SIDE

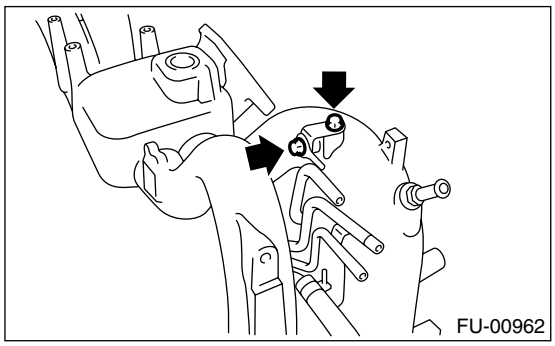



- LH SIDE

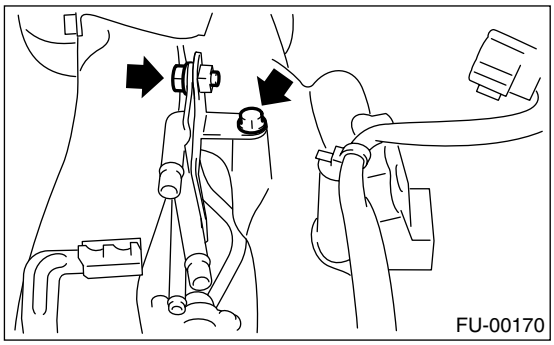



14) Remove the two bolts which hold the fuel pipes on intake manifold.

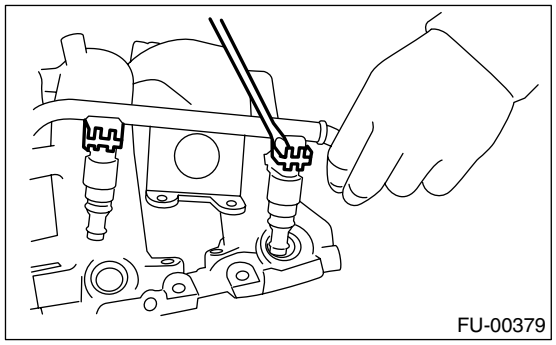
- 1.6 L MODEL



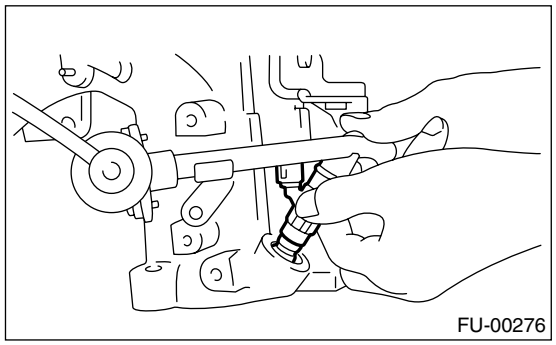
• 2.0 L MODEL



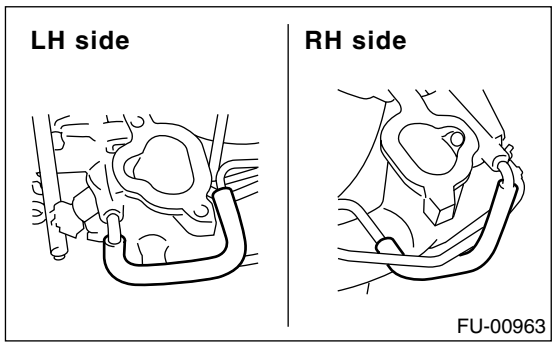

15) Remove the fuel injectors.
(1) Remove the fuel injector securing clip.



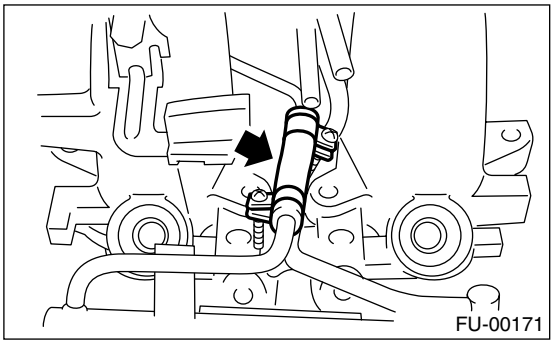

(2) Remove the fuel injector while lifting up the fuel injector pipe.



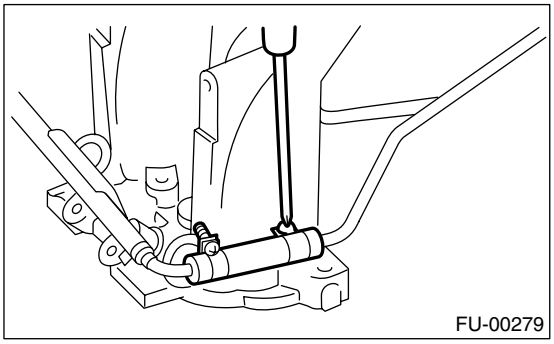

16) Disconnect the air by-pass hose from intake manifold. (1.6 L model)



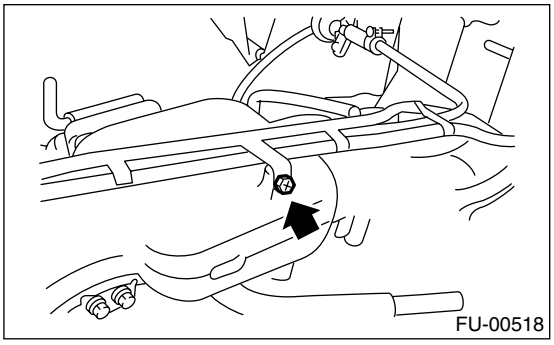

17) Loosen the clamp which holds the fuel injector pipe LH to fuel hose, and then remove the pipe from fuel hose.




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




19) Remove the fuel injector pipe.
20) Remove the bolt which installs the fuel pipes on intake manifold.

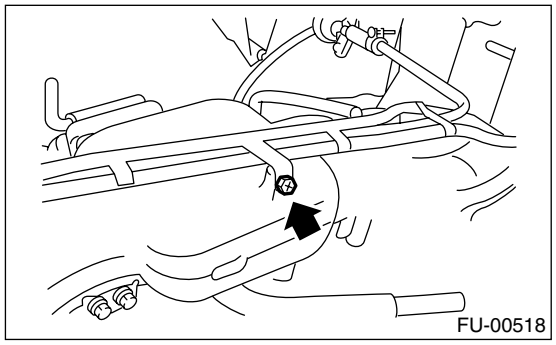



21) Remove the fuel pipe assembly and pressure regulator, from intake manifold.

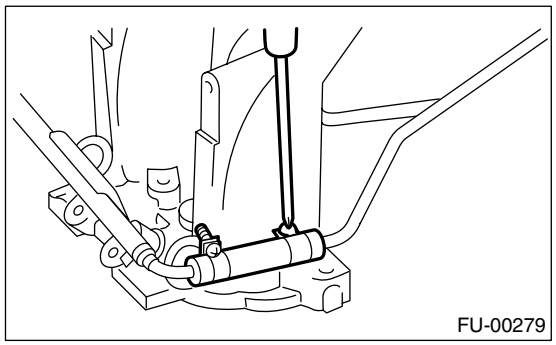
## D: ASSEMBLY

1) Install the fuel pipe assembly and pressure regulator, etc. to intake manifold.
2) Tighten the bolt which installs the fuel pipes on intake manifold.

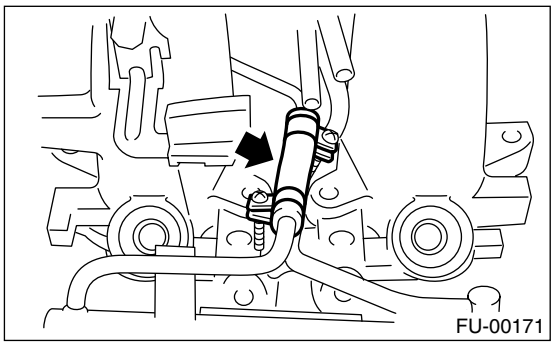
***Tightening torque:***
***5.0 N·m (0.51 kgf-m, 3.7 ft-lb)***



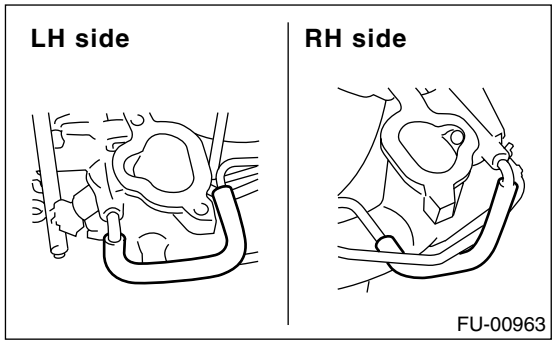

3) Connect the fuel injector pipe RH to fuel hose, and then tighten the clamp screw.




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

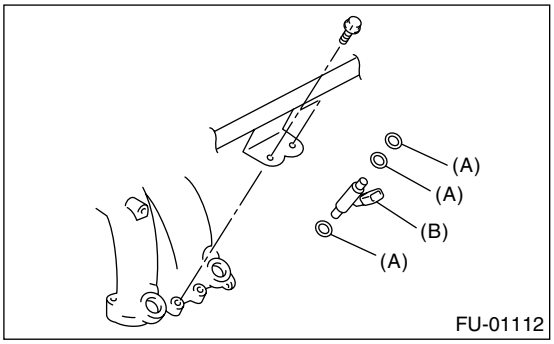



5) Connect the air by-pass hose. (1.6 L model)



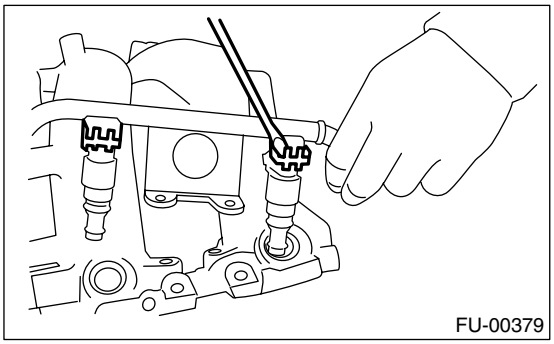

6) Install the fuel injectors.

NOTE:
Replace the O-rings with new ones.



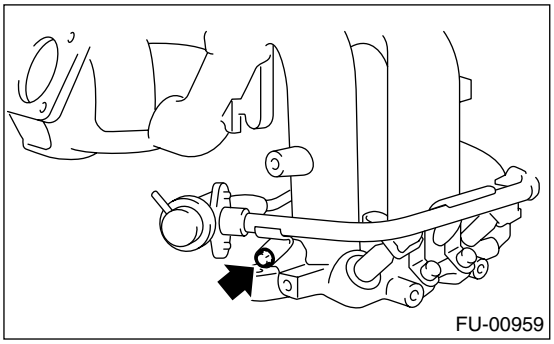

(A) O-ring
(B) Fuel injector

NOTE:
Do not forget to install the fuel injector securing clip.



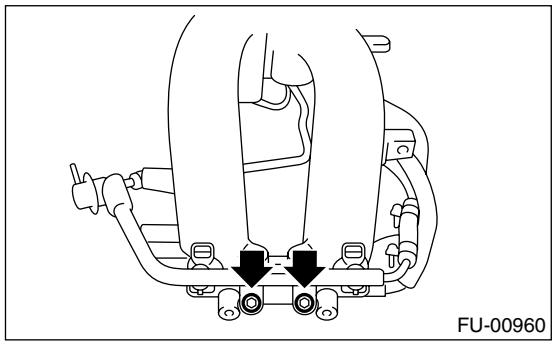

7) Tighten the bolt which installs the injector pipe on intake manifold.

***Tightening torque:***
***5.0 N·m (0.51 kgf-m, 3.7 ft-lb)***

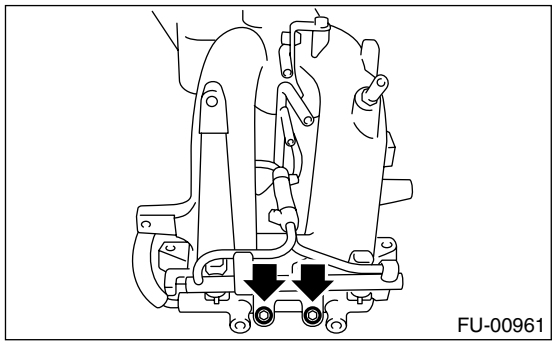



***Tightening torque:***
***19 N·m (1.9 kgf-m, 13.7 ft-lb)***

- RH SIDE



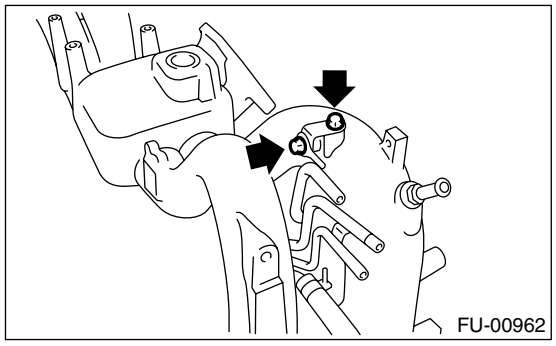

- LH SIDE



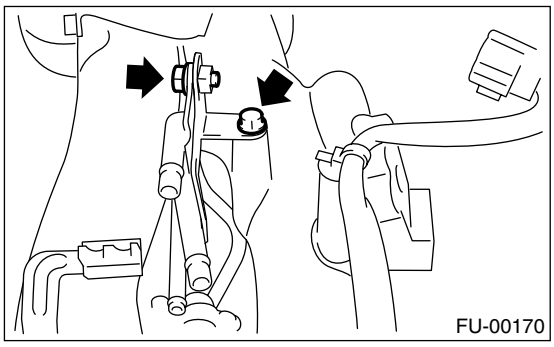

8) Tighten the two bolts which install the fuel pipes on intake manifold.

***Tightening torque:***
***6.4 N·m (0.65 kgf-m, 4.7 ft-lb)***

- 1.6 L MODEL

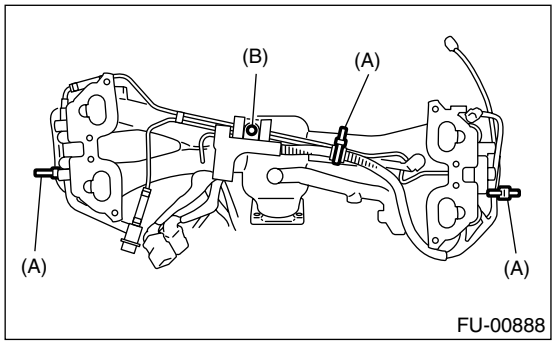



- 2.0 L MODEL

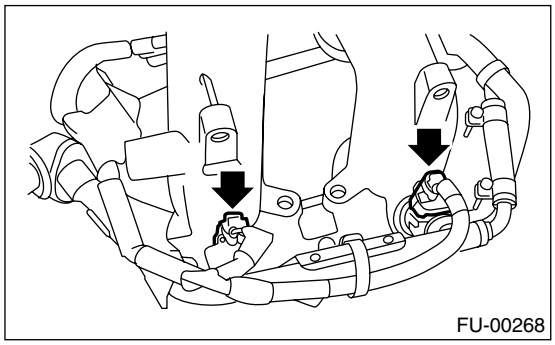



9) Install the engine harness onto intake manifold.

10) Hold the engine harness by harness bands (A) and bolts (B).

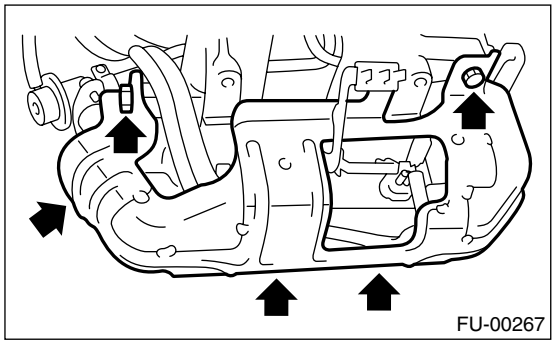



11) Connect the connector to fuel injector.



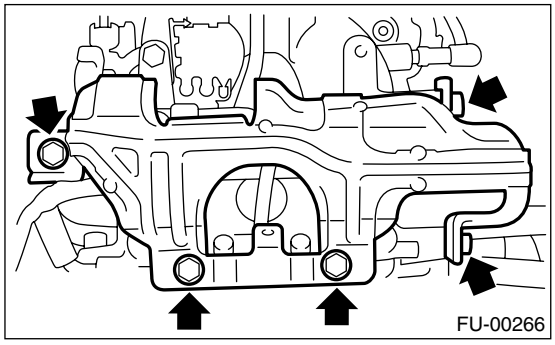

12) Install the fuel pipe protector RH.

***Tightening torque:***
***19 N·m (1.9 kgf-m, 13.7 ft-lb)***

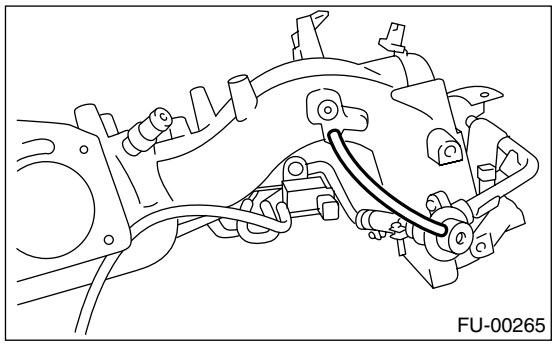



13) Install the fuel pipe protector LH.

***Tightening torque:***
***19 N·m (1.9 kgf-m, 13.7 ft-lb)***

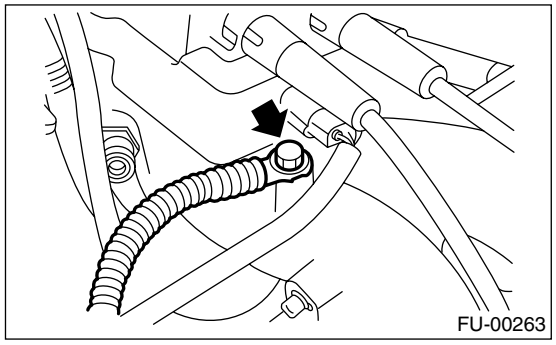


14) Install the purge control solenoid valve. <Ref. to EC(H4SO)-7, INSTALLATION, Purge Control Solenoid Valve.>
15) Connect the pressure regulator vacuum hose to intake manifold.


FU-00265

16) Install the air assist injector solenoid valve. (1.6 L model) <Ref. to FU(H4SO)-37, INSTALLATION, Air Assist Injector Solenoid Valve.>
17) Install the EGR valve. <Ref. to FU(H4SO)-36, INSTALLATION, EGR Valve.>
18) Install the throttle body to intake manifold. <Ref. to FU(H4SO)-15, INSTALLATION, Throttle Body.>
19) Install the ignition coil and ignitor assembly. <Ref. to IG(H4SO)-8, INSTALLATION, Ignition Coil & Ignitor ASSY.>
20) Install the engine ground terminal to intake manifold.

***Tightening torque:***
***19 N·m (1.9 kgf-m, 13.7 ft-lb)***


FU-00263

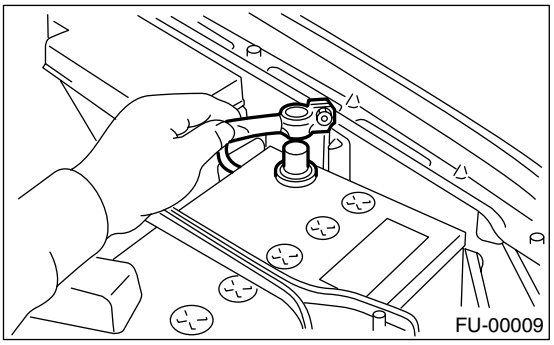
## E: INSPECTION

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

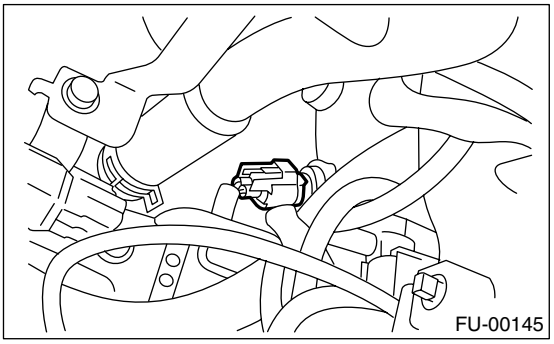
# 4. Engine Coolant Temperature Sensor

## 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 the engine coolant temperature sensor.

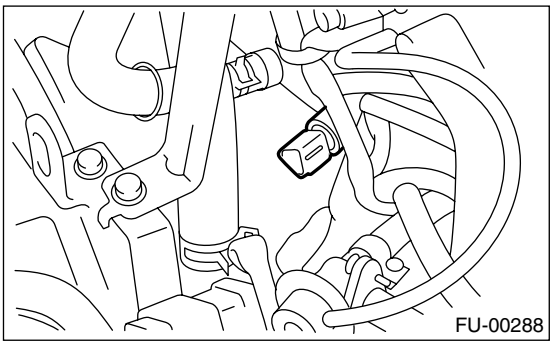



4) Remove the engine coolant temperature sensor.

## B: INSTALLATION

Install in the reverse order of removal.

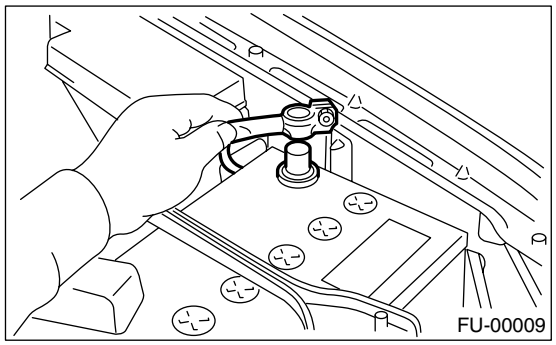
***Tightening torque:***
***18 N·m (1.8 kgf-m, 13.0 ft-lb)***



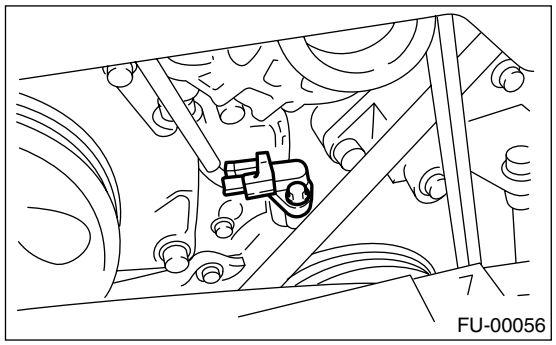
# 5. Crankshaft Position Sensor

## A: REMOVAL

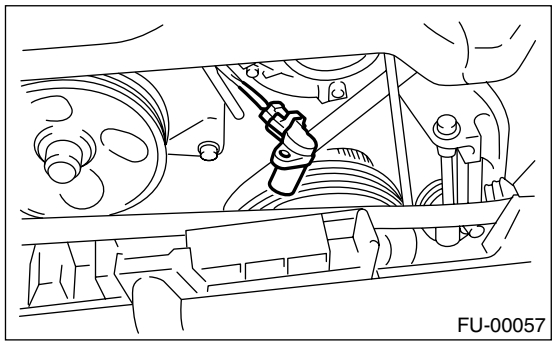
1) Disconnect the ground cable from battery.




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

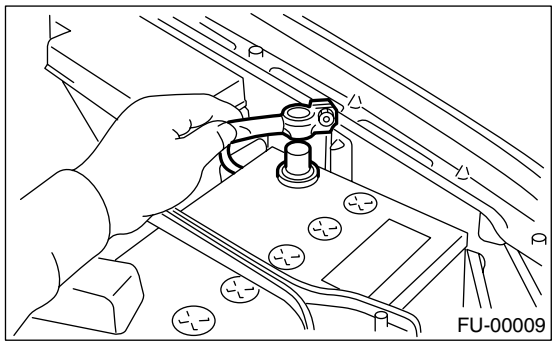
Install in the reverse order of removal.

NOTE:
For tightening torque, refer to “COMPONENT”. <Ref. to FU(H4SO)-3, COMPONENT, General Description.>

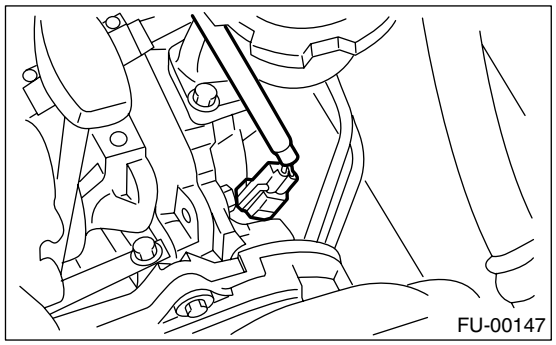
# 6. Camshaft Position Sensor

## A: REMOVAL

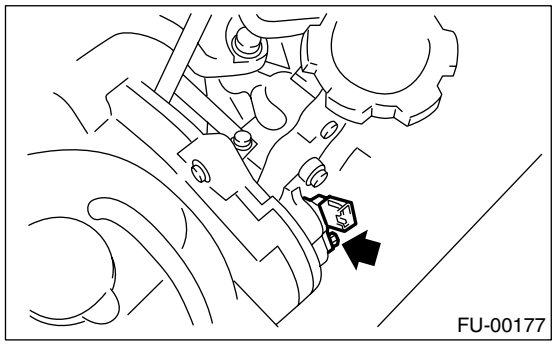
1) Disconnect the ground cable from battery.



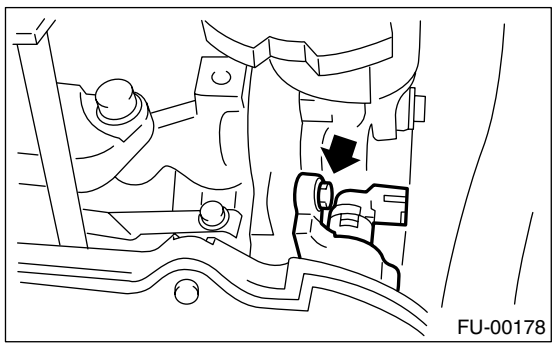

2) Disconnect the connector from the camshaft position sensor.



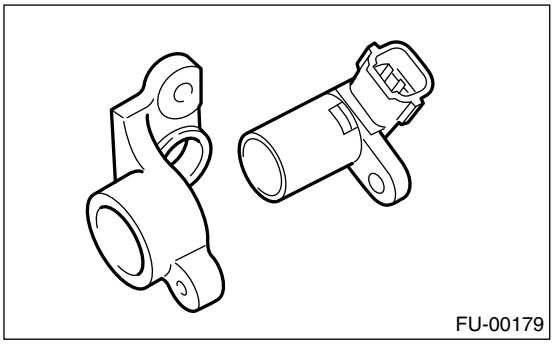

3) Remove the bolt which installs the camshaft position sensor to the camshaft position sensor support.




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

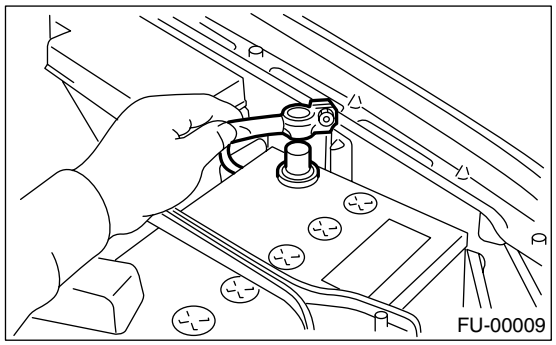
Install in the reverse order of removal.

NOTE:
For tightening torque, refer to “COMPONENT”. <Ref. to FU(H4SO)-3, COMPONENT, General Description.>

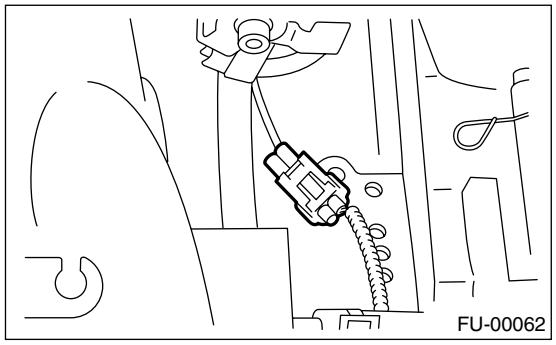
# 7. Knock Sensor

## A: REMOVAL

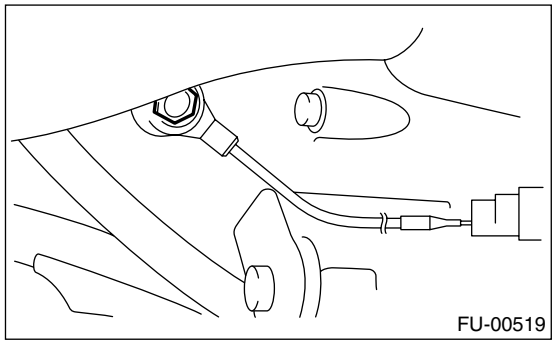
1) Disconnect the ground cable from battery.




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.

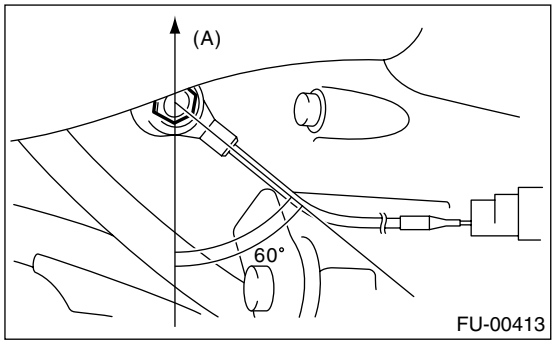



## B: INSTALLATION

1) Install the knock sensor to cylinder block.

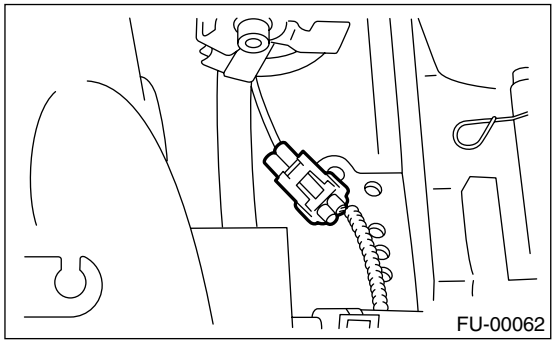
***Tightening torque:***
***24 N·m (2.4 kgf-m, 17.4 ft-lb)***

NOTE:
• For tightening torque, refer to “COMPONENT”. <Ref. to FU(H4SO)-3, COMPONENT, General Description.>
• The extraction area of the knock sensor cord must be positioned at a 60° angle relative to engine rear.

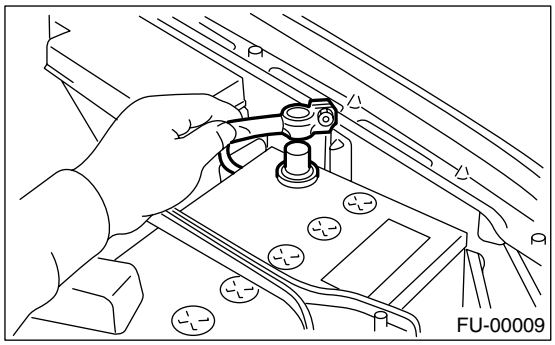



(A) Front side

2) Connect the knock sensor connector.



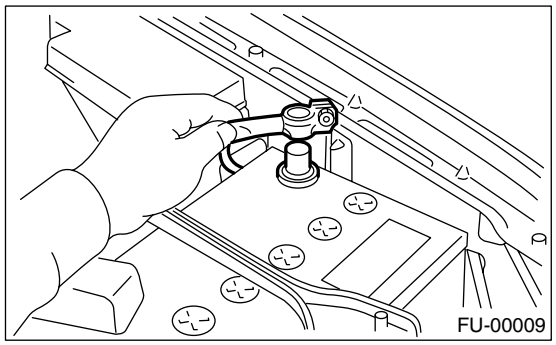

3) Install the air cleaner case.
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
4) Connect the battery ground cable to battery.



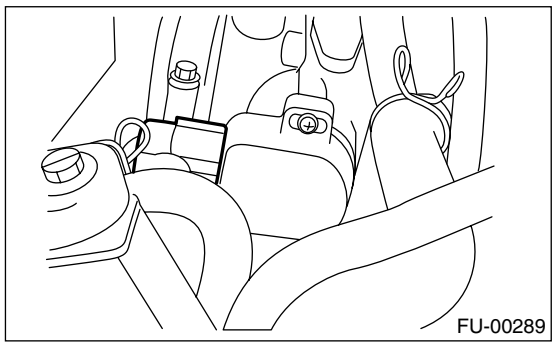
# 8. Throttle Position Sensor

## A: REMOVAL

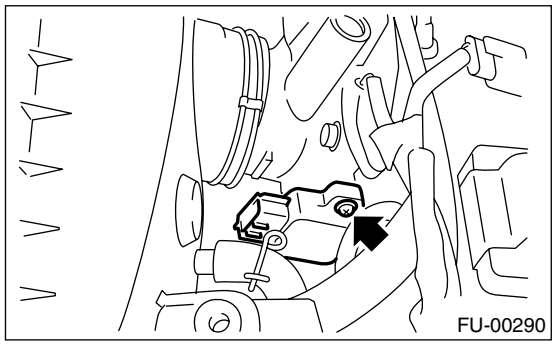
1) Disconnect the ground cable from battery.




2) Disconnect the connector from the throttle position sensor.




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




## B: INSTALLATION

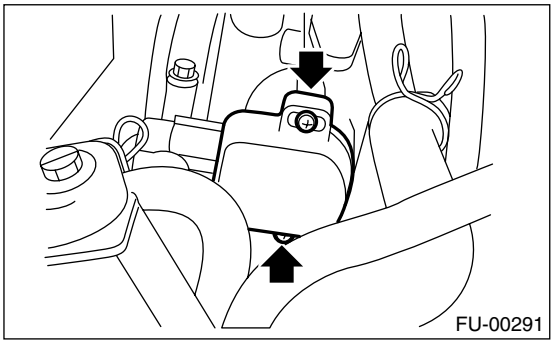
Install in the reverse order of removal.

NOTE:
For tightening torque, refer to “COMPONENT”. <Ref. to FU(H4SO)-3, COMPONENT, General Description.>

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

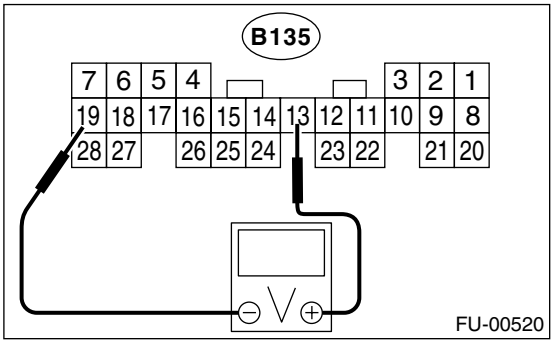
## C: ADJUSTMENT

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



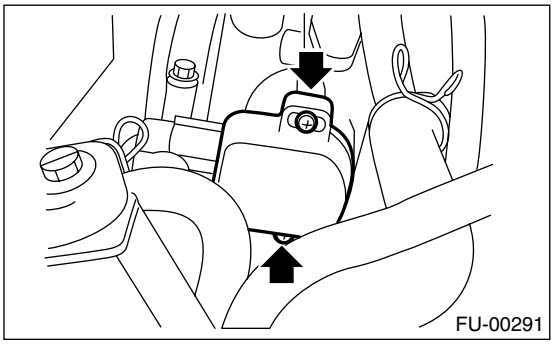

3) When using voltage meter;
(1) Take out the ECM.
(2) Turn the ignition switch to ON.
(3) Adjust the throttle position sensor to proper position to allow the voltage signal to ECM to be in specification.

***Connector & terminal / Specified voltage***
***(B135) No. 13 (+) — (B135) No. 19 (–) / 0.45 — 0.55 V***
***[Fully closed.]***

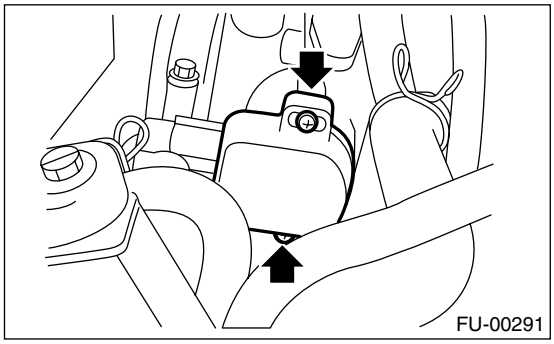



(4) Tighten the throttle position sensor holding screws.

***Tightening torque:***
***1.6 N·m (0.16 kgf-m, 1.2 ft-lb)***

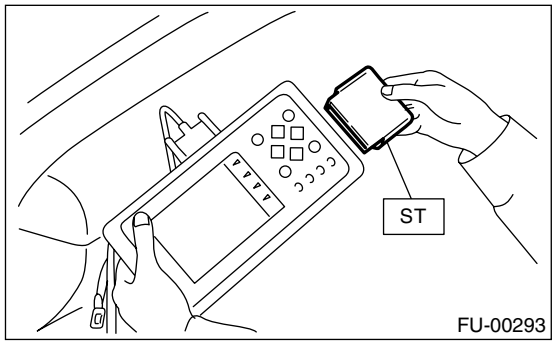


4) When using Subaru Select Monitor;
(1) Turn the ignition switch to OFF.
(2) Loosen the throttle position sensor holding screws.

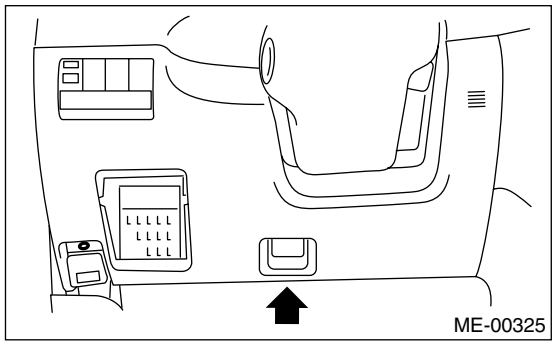



NOTE:
For detailed operation procedures, refer to the Subaru Select Monitor Operation Manual.

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




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

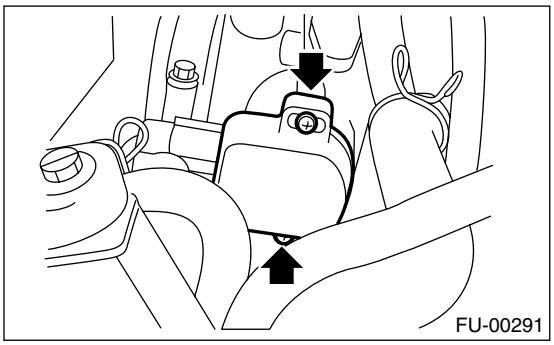



5) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON.
6) Select the {2. Each System Check} in «Main Menu».
7) Select the {Engine Control System} in «Selection Menu».
8) Select the {1. Current Data Display & Save} in «Engine Control System Diagnosis».
9) Select the {1.12 Data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

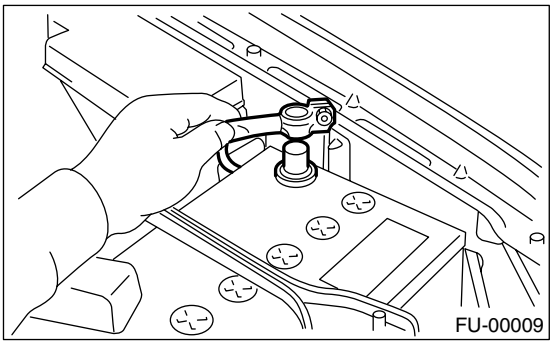
***Tightening torque:***
***1.6 N·m (0.16 kgf-m, 1.2 ft-lb)***



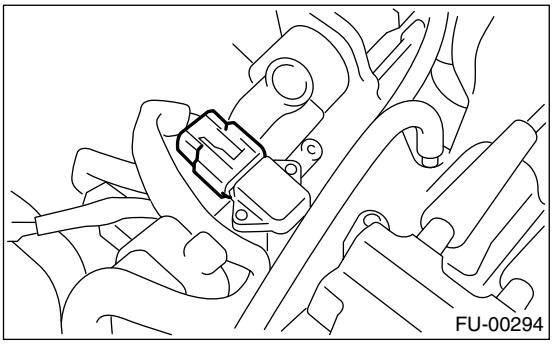
# 9. Manifold Absolute Pressure Sensor

## A: REMOVAL

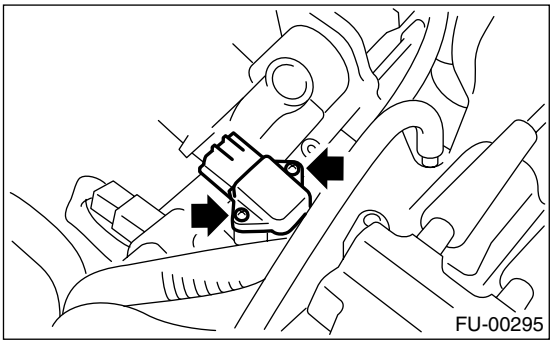
1) Disconnect the ground cable from battery.




2) Disconnect the connector from manifold absolute pressure sensor.




3) Remove the manifold absolute pressure sensor.



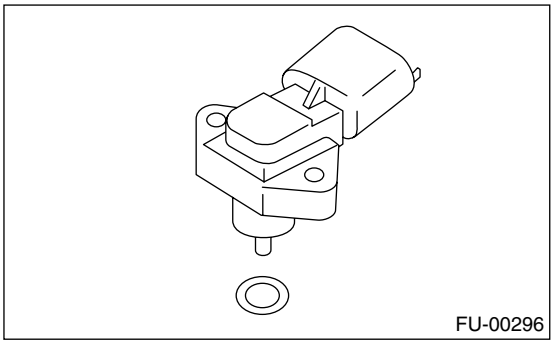

## B: INSTALLATION

Install in the reverse order of removal.

NOTE:

• For tightening torque, refer to “COMPONENT”. <Ref. to FU(H4SO)-3, COMPONENT, General Description.>

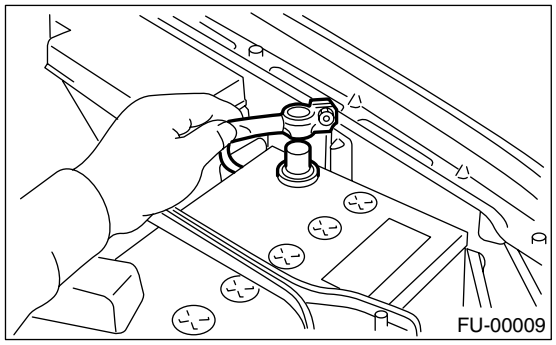
• Replace the O-ring with a new one.



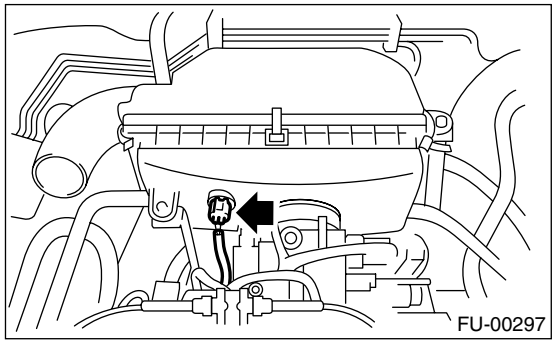
# 10.Intake Air Temperature Sensor

## A: REMOVAL

1) Disconnect the ground cable from battery.




2) Disconnect the connector from the intake air temperature sensor.
3) Remove the intake air temperature sensor from the air cleaner case.



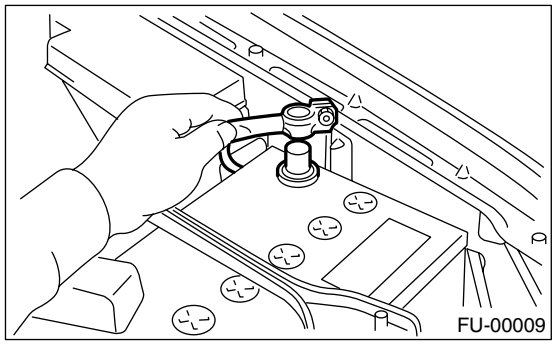

## B: INSTALLATION

Install in the reverse order of removal.

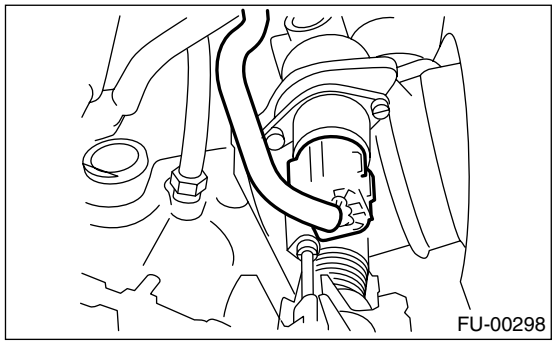
# 11.Idle Air Control Solenoid Valve

## A: REMOVAL

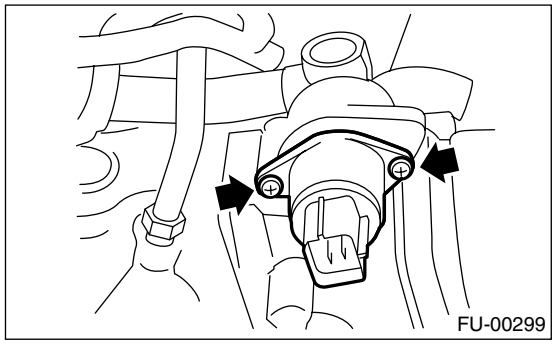
1) Disconnect the ground cable from battery.




2) Disconnect the connector from the 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.

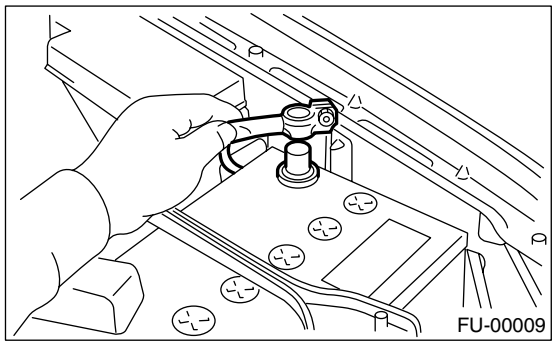
NOTE:

- For tightening torque, refer to “COMPONENT”. <Ref. to FU(H4SO)-3, COMPONENT, General Description.>
- Replace the gasket with a new one.

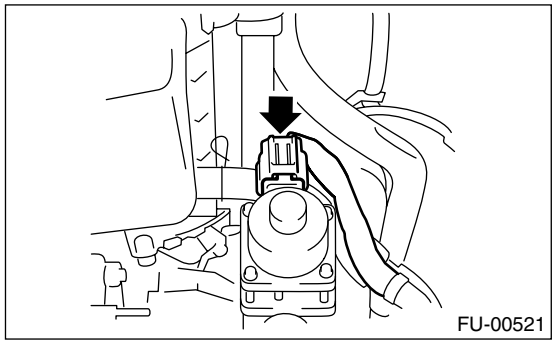
# 12.EGR Valve

## A: REMOVAL

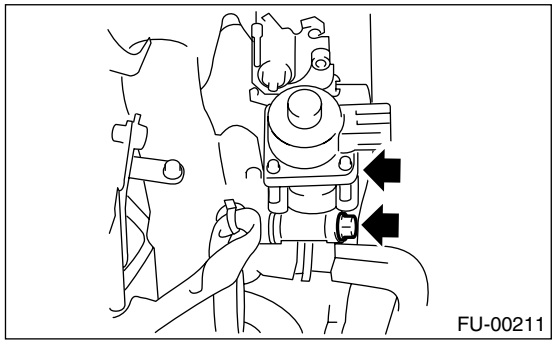
1) Disconnect the ground cable from battery.




2) Disconnect the connector from EGR valve.




3) Remove the EGR valve from intake manifold.




## B: INSTALLATION

Install in the reverse order of removal.

NOTE:
For tightening torque, refer to “COMPONENT”. <Ref. to FU(H4SO)-3, COMPONENT, General Description.>