

FUEL INJECTION (FUEL SYSTEMS)

FU(H4DOTC)

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General Description

FUEL INJECTION (FUEL SYSTEMS)

1. General Description

A: SPECIFICATION

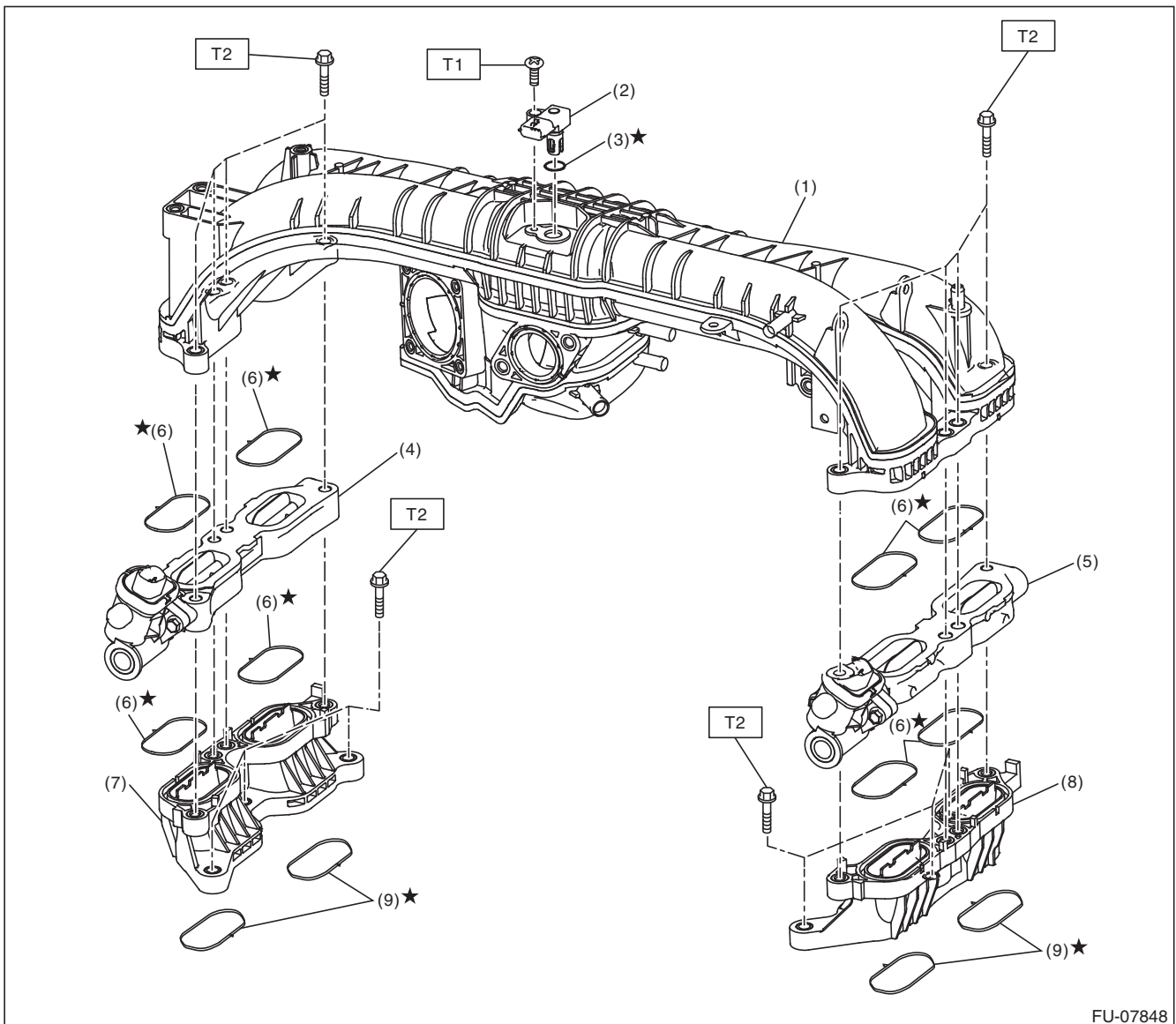
Fuel tank	Capacity	60 L (15.9 US gal, 13.2 Imp gal)
	Location	Under rear seat
Fuel pump	Type	Impeller
	Shutoff discharge pressure	940 kPa (9.6 kgf/cm ² , 123.3 psi) or less
	Discharge rate	153 L (40.4 US gal, 33.7 Imp gal)/h or more [12 V at 343 kPa (3.5 kgf/cm ² , 49.7 psi)]
Fuel filter		In-tank type

General Description

FUEL INJECTION (FUEL SYSTEMS)

B: COMPONENT

1. INTAKE MANIFOLD



- | | |
|--|---------------------------|
| (1) Intake manifold | (6) Gasket |
| (2) Manifold absolute pressure and intake air temperature sensor | (7) Air intake adapter LH |
| (3) O-ring | (8) Air intake adapter RH |
| (4) Tumble generator valve ASSY LH | (9) Gasket |
| (5) Tumble generator valve ASSY RH | |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 3.5 (0.4, 2.6)

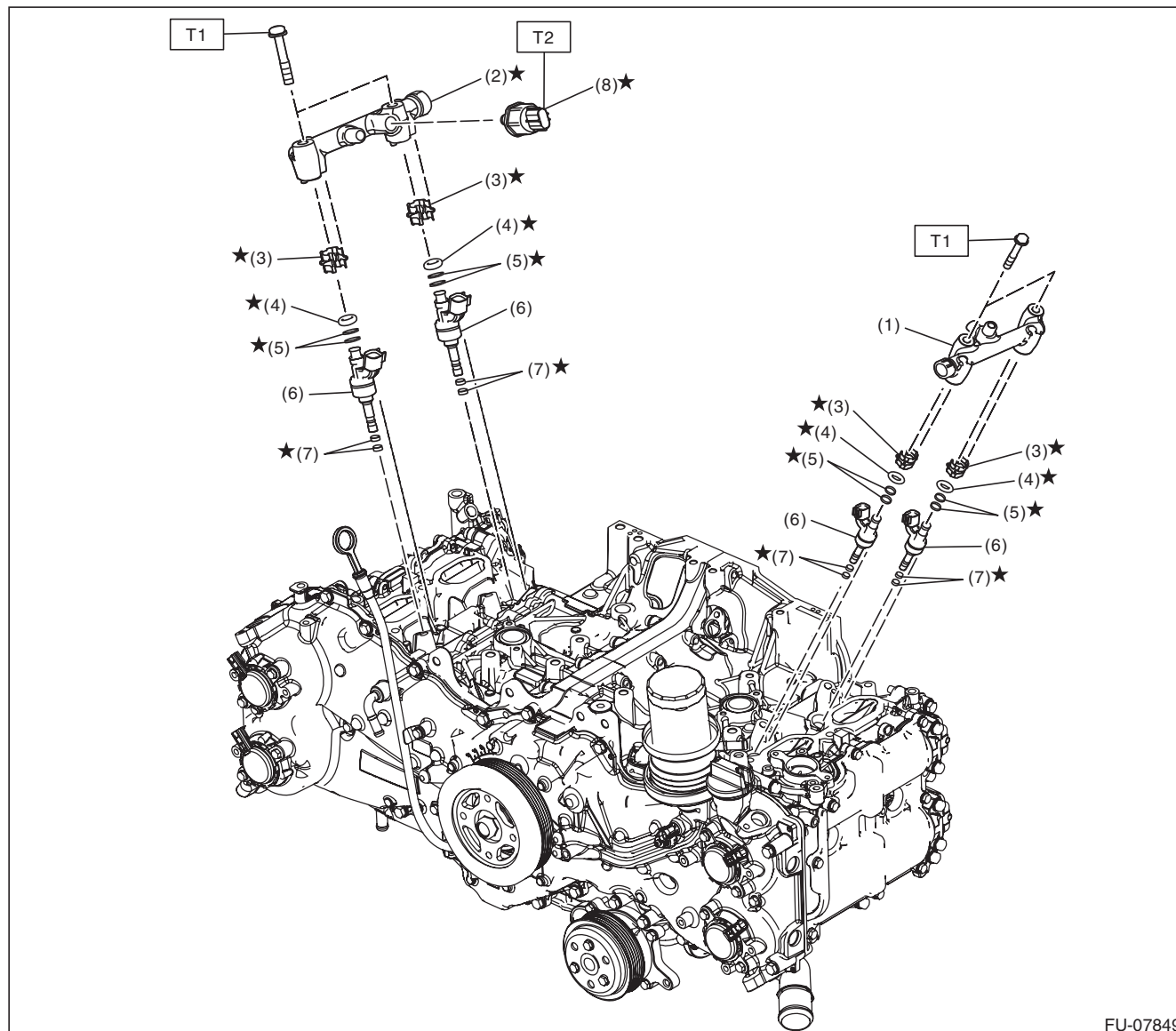
T2: 25 (2.5, 18.4)

FU(H4DOTC)-3

General Description

FUEL INJECTION (FUEL SYSTEMS)

2. FUEL INJECTOR 1



FU-07849

- | | |
|---------------------------|--------------------------|
| (1) Fuel injector pipe LH | (5) Back-up ring |
| (2) Fuel injector pipe RH | (6) Fuel injector |
| (3) Holder | (7) Injector seal |
| (4) O-ring | (8) Fuel pressure sensor |

Tightening torque: N·m (kgf-m, ft-lb)

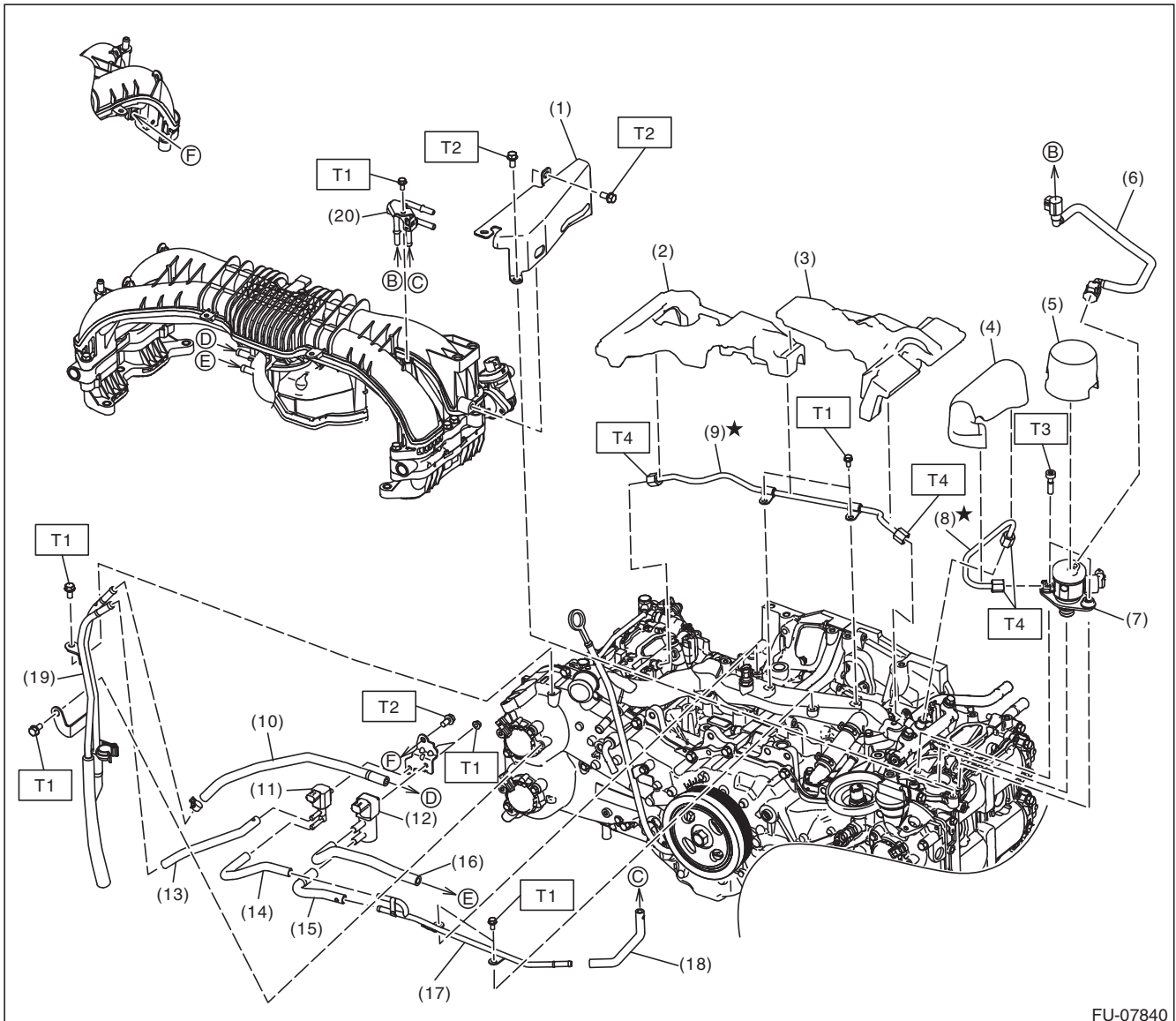
T1: 19 (1.9, 14.0)

T2: 46 (4.7, 33.9)

General Description

FUEL INJECTION (FUEL SYSTEMS)

3. FUEL INJECTOR 2



FU-07840

- | | | |
|---|-------------------------------------|-----------------------|
| (1) Fuel pipe protector | (10) Vacuum control hose | (19) Vacuum pipe ASSY |
| (2) Fuel pipe insulator No. 3 | (11) Purge control solenoid valve A | (20) Fuel pipe ASSY |
| (3) Fuel pipe insulator No. 2 | (12) Purge control solenoid valve B | |
| (4) Fuel pipe insulator No. 1 | (13) Vacuum hose A | |
| (5) Fuel pump insulator | (14) Vacuum hose B | |
| (6) Fuel delivery pipe | (15) Vacuum hose C | |
| (7) High-pressure fuel pump | (16) Vacuum hose D | |
| (8) High-pressure fuel delivery pipe | (17) Canister pipe | |
| (9) High-pressure fuel delivery pipe ASSY | (18) Vacuum hose E | |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.7, 4.7)

T2: 19 (1.9, 14.0)

T3: 21 (2.1, 15.5)

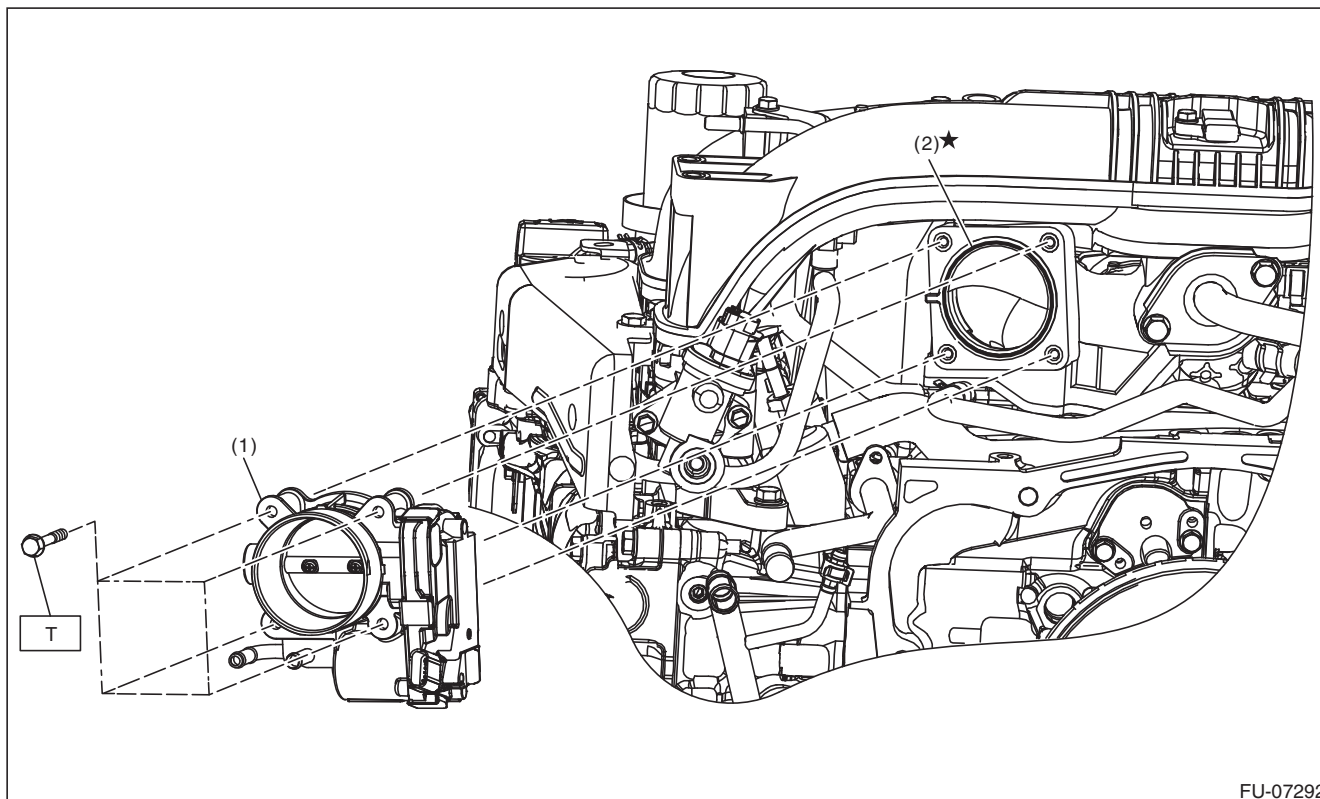
T4: 25 (2.5, 4.7)

FU(H4DOTC)-5

General Description

FUEL INJECTION (FUEL SYSTEMS)

4. THROTTLE BODY



FU-07292

(1) Throttle body

(2) Gasket

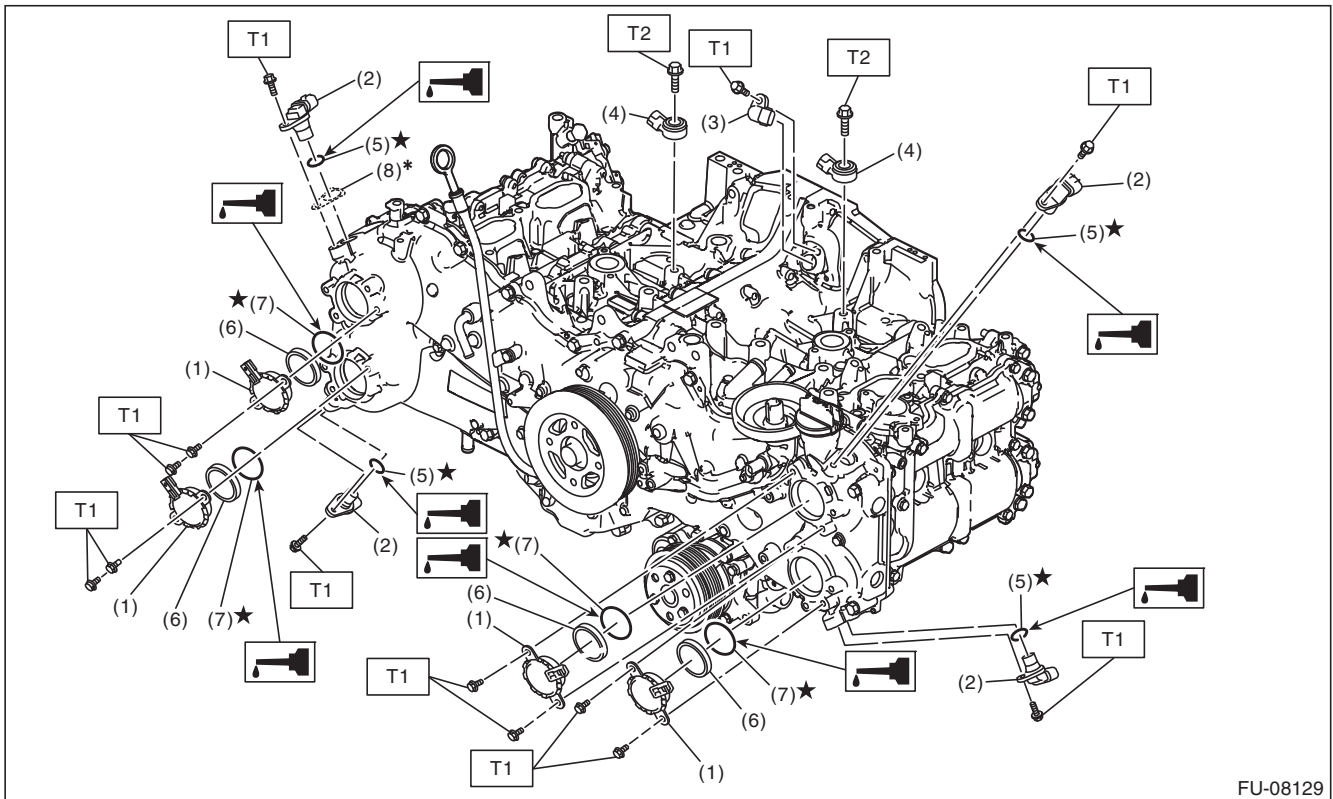
Tightening torque: N·m (kgf-m, ft-lb)

T: 8 (0.8, 5.9)

General Description

FUEL INJECTION (FUEL SYSTEMS)

5. CRANKSHAFT POSITION SENSOR, CAMSHAFT POSITION SENSOR AND KNOCK SENSOR



FU-08129

- | | |
|--------------------------------|------------------|
| (1) Oil control solenoid | (5) O-ring |
| (2) Camshaft position sensor | (6) Back-up ring |
| (3) Crankshaft position sensor | (7) O-ring |
| (4) Knock sensor | (8) Spacer |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.7, 4.7)

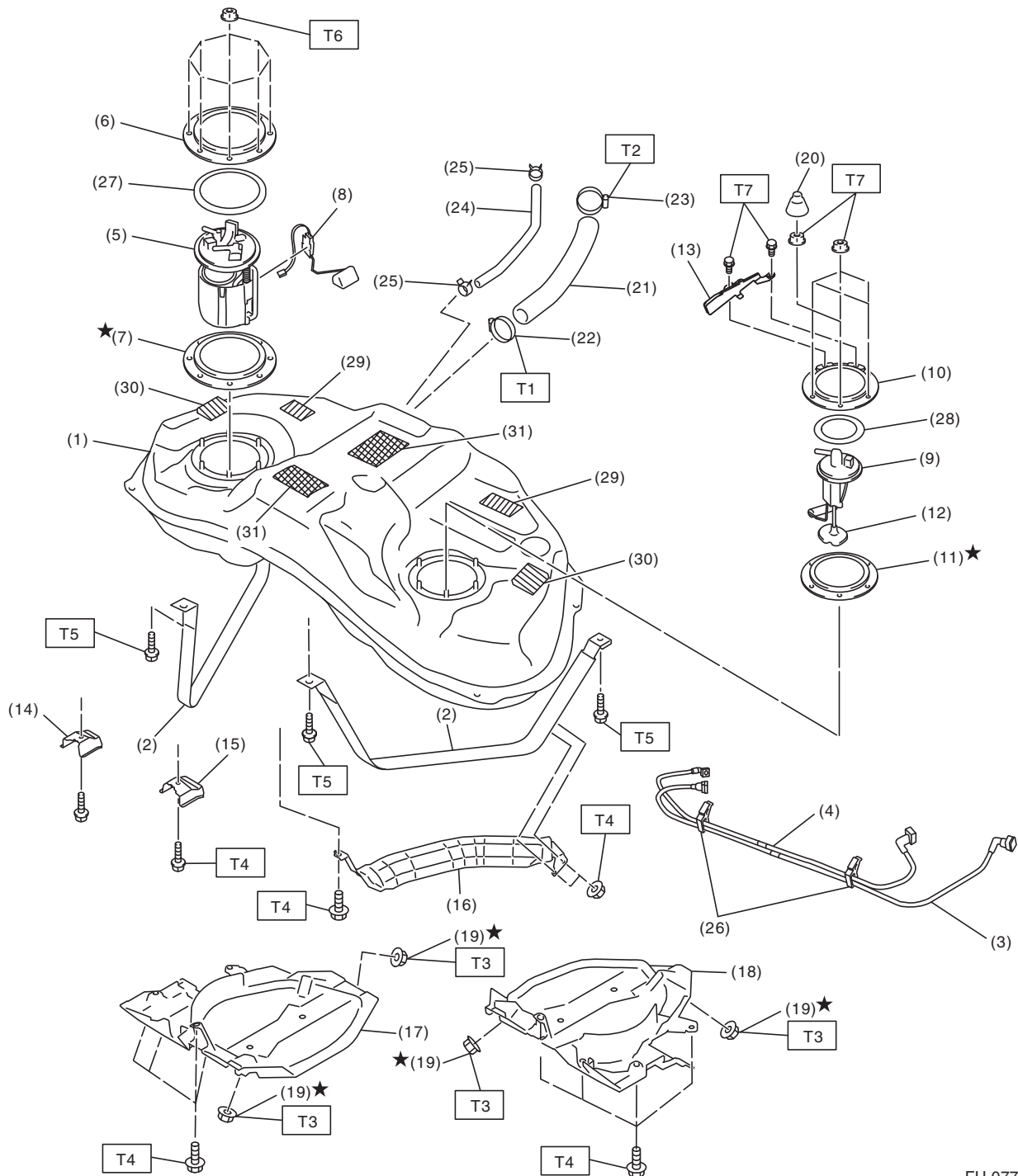
T2: 24 (2.4, 17.7)

* Use one or no spacer to adjust the gap.

General Description

FUEL INJECTION (FUEL SYSTEMS)

6. FUEL TANK



FU-07738

FU(H4DOTC)-8

General Description

FUEL INJECTION (FUEL SYSTEMS)

- | | |
|--|--|
| (1) Fuel tank | (16) Heat shield cover |
| (2) Fuel tank band | (17) Fuel tank protector RH |
| (3) Delivery tube | (18) Fuel tank protector LH |
| (4) Jet pump tube | (19) Self-locking nut |
| (5) Fuel pump ASSY | (20) Rubber cap |
| (6) Fuel pump upper plate | (21) Fuel filler hose |
| (7) Fuel pump gasket | (22) Clamp |
| (8) Fuel level sensor | (23) Clamp |
| (9) Fuel sub level sensor | (24) Air vent hose |
| (10) Fuel sub level sensor upper plate | (25) Clip |
| (11) Fuel sub level sensor gasket | (26) Tube clamp |
| (12) Fuel sub level sensor filter | (27) Fuel pump upper plate cushion |
| (13) Fuel sub level sensor protector | (28) Fuel sub level sensor upper plate cushion |
| (14) Stopper RH | |
| (15) Stopper LH | |

- (29) Cushion
- (30) Cushion
- (31) Cushion

Tightening torque: N·m (kgf-m, ft-lb)

T1: 2 (0.2, 1.5)

T2: 2.5 (0.3, 1.8)

T3: 9 (0.9, 6.6)

T4: 18 (1.8, 13.3)

T5: <Ref. to FU(H4DOTC)-163, INSTALLATION, Fuel Tank.>

T6: <Ref. to FU(H4DOTC)-181, INSTALLATION, Fuel Pump.>

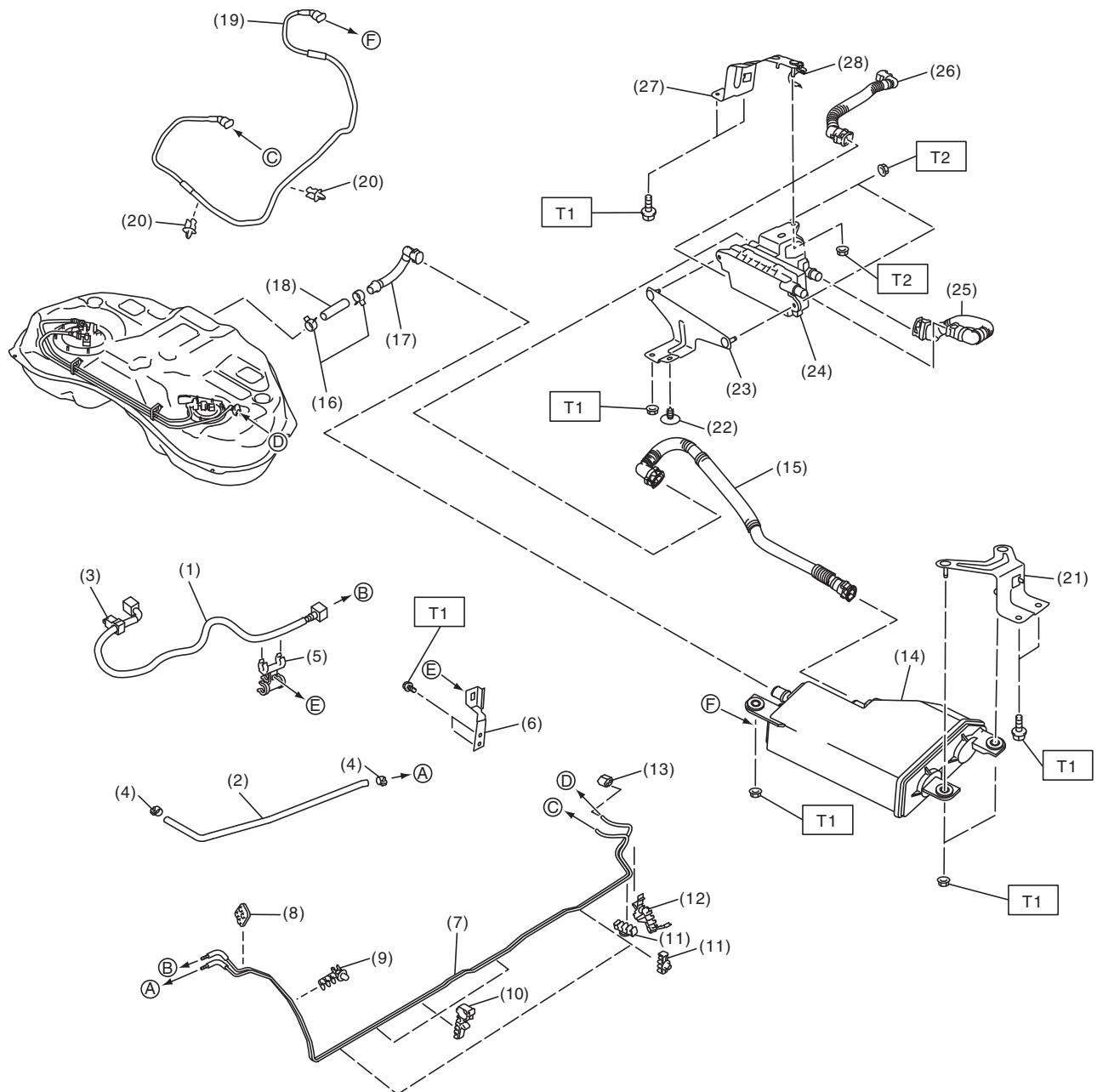
T7: <Ref. to FU(H4DOTC)-191, INSTALLATION, Fuel Sub Level Sensor.>



General Description

FUEL INJECTION (FUEL SYSTEMS)

7. FUEL LINE



FU-07857

FU(H4DOTC)-10

General Description

FUEL INJECTION (FUEL SYSTEMS)

(1) Fuel delivery tube	(12) Pipe clamp	(23) Leak check valve bracket A
(2) Evaporation hose	(13) Fuel pipe rear grommet	(24) Leak check valve ASSY
(3) Tube clamp	(14) Canister	(25) Drain tube B
(4) Clip	(15) Drain tube A	(26) Drain tube C
(5) Hose clamp	(16) Clip	(27) Leak check valve bracket B
(6) Hose clamp bracket	(17) Vent tube	(28) Tube clamp
(7) Fuel pipe ASSY	(18) Vent hose	
(8) Fuel pipe front grommet	(19) Purge pipe	
(9) Pipe clamp	(20) Pipe clamp	
(10) Pipe clamp	(21) Canister bracket	
(11) Pipe clamp	(22) Clip	

Tightening torque: N·m (kgf-m, ft-lb)

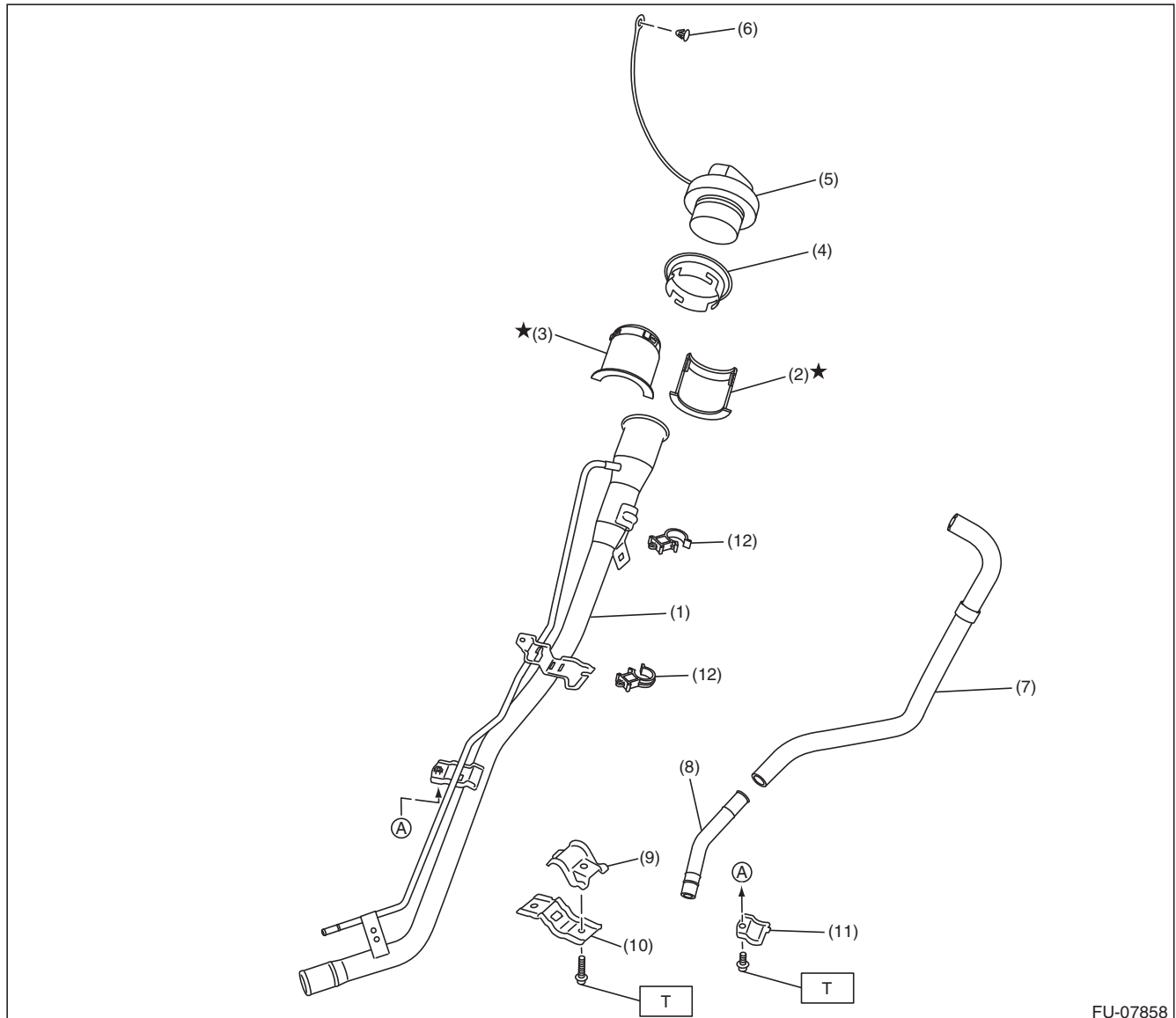
T1: 7.5 (0.8, 5.5)

T2: 18 (1.8, 13.3)

General Description

FUEL INJECTION (FUEL SYSTEMS)

8. FUEL FILLER PIPE



- (1) Fuel filler pipe ASSY
- (2) Neck holder A
- (3) Neck holder B
- (4) Fuel filler pipe protector
- (5) Fuel filler cap

- (6) Clip
- (7) Drain hose
- (8) Drain pipe
- (9) Upper bracket
- (10) Lower bracket

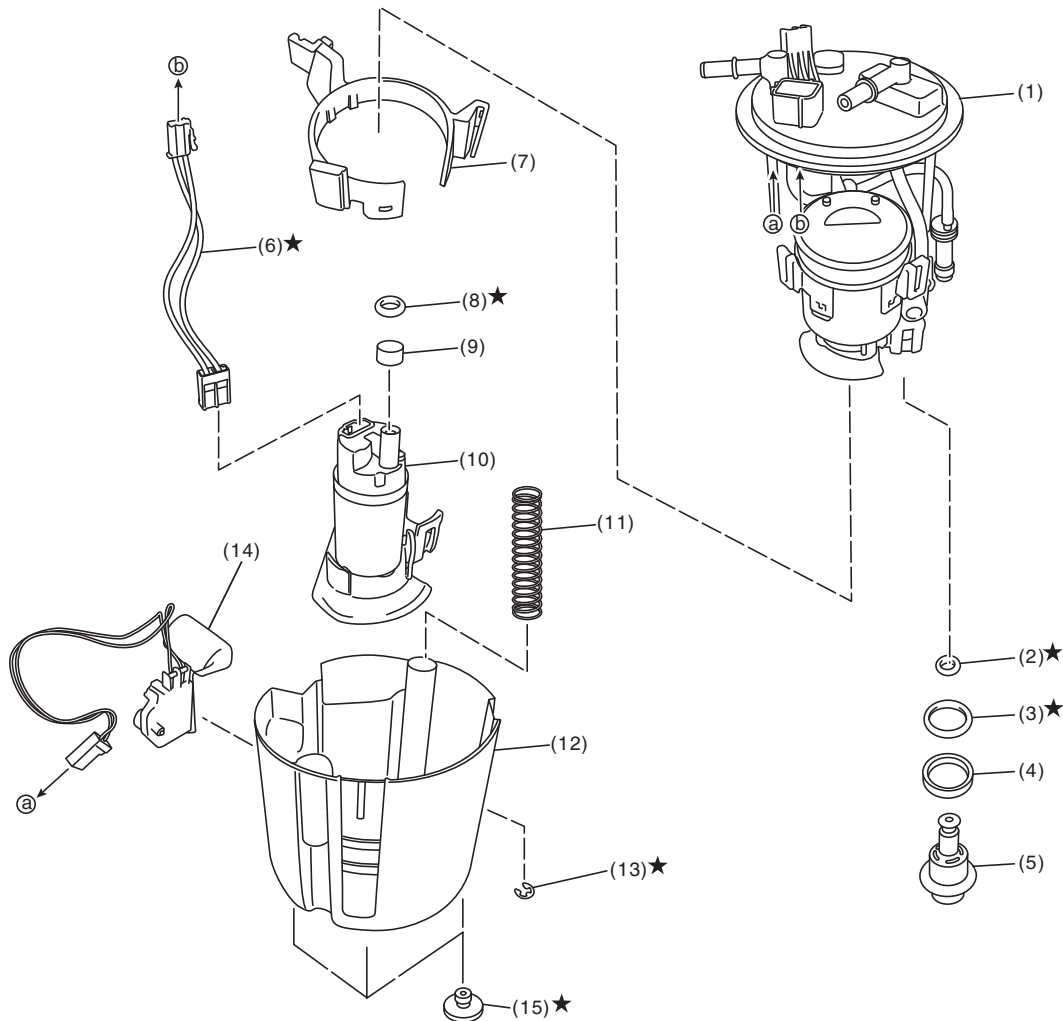
- (11) Drain lower bracket
- (12) Drain hose clamp

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.8, 5.5)

General Description

FUEL INJECTION (FUEL SYSTEMS)

9. FUEL PUMP



FU-07727

- | | | |
|------------------------|----------------------|------------------------|
| (1) Fuel filter ASSY | (6) Connector cable | (11) Spring |
| (2) O-ring | (7) Fuel pump holder | (12) Fuel chamber ASSY |
| (3) O-ring | (8) O-ring | (13) Clip |
| (4) Back-up ring | (9) Spacer | (14) Fuel level sensor |
| (5) Pressure regulator | (10) Fuel pump | (15) Cushion |

General Description

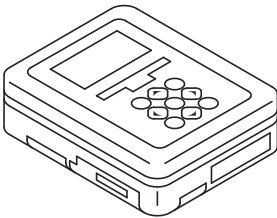
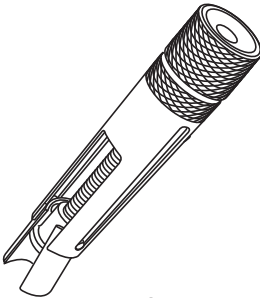
FUEL INJECTION (FUEL SYSTEMS)

C: CAUTION

- Prior to starting work, pay special attention to the following:
 1. Always wear work clothes, a safety cap, protective shoes. Additionally, wear a helmet, protective goggles, etc. if necessary.
 2. Protect the vehicle using a seat cover, fender cover, etc.
 3. Prepare the service tools, clean cloth, containers to catch grease and oil, etc.
- Place "NO OPEN FLAMES" signs near the working area.
- Prepare a container and cloth to prevent scattering of fuels when performing work where fuels can be spilled. If the oil spills, wipe it off immediately to prevent from penetrating into floor or flowing out for environmental protection.
- Vehicle components are extremely hot immediately after driving. Be wary of receiving burns from heated parts.
- When performing a repair, identify the cause of trouble and avoid unnecessary removal, disassembly and replacement.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from battery.
- Always use the jack-up point when the shop jacks or rigid racks are used to support the vehicle.
- Remove contamination including dirt and corrosion before removal, installation, disassembly or assembly.
- Keep the removed parts in order and protect them from dust and dirt.
- All removed parts, if to be reused, should be reinstalled in the original positions with attention to the correct directions, etc.
- Bolts, nuts and washers should be replaced with new parts as required.
- Follow all government and local regulations concerning disposal of refuse when disposing fuel.
- When the suspension-related components have been removed and installed, be sure to adjust the steering angle sensor. <Ref. to VDC-23, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDC-CM&H/U).>

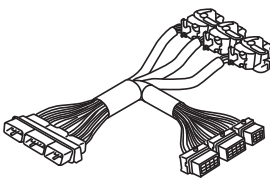
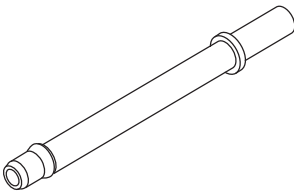
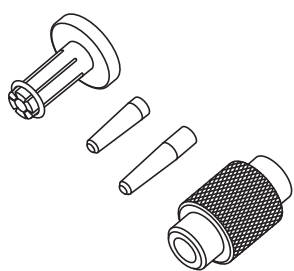
D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for draining fuel and each inspection.
 ST18356AA000	18356AA000 (Newly adopted tool)	REMOVER INJECTOR	Used for removing the injector.

General Description

FUEL INJECTION (FUEL SYSTEMS)

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18460AA030	18460AA030 (Newly adopted tool)	CHECK BOARD	Used for inspecting the fuel system.
 ST18471AA000	18471AA000	FUEL PIPE ADAPTER	Used for draining fuel.
 ST18683AA000	18683AA000 (Newly adopted tool)	INSTALLER INJECTOR SEAL	Used for installing the injector seal.

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.
Oscilloscope	Used for inspecting the waveform of each sensor.
TORX PLUS® bit 40IP	Used for removing and installing high-pressure fuel pump.

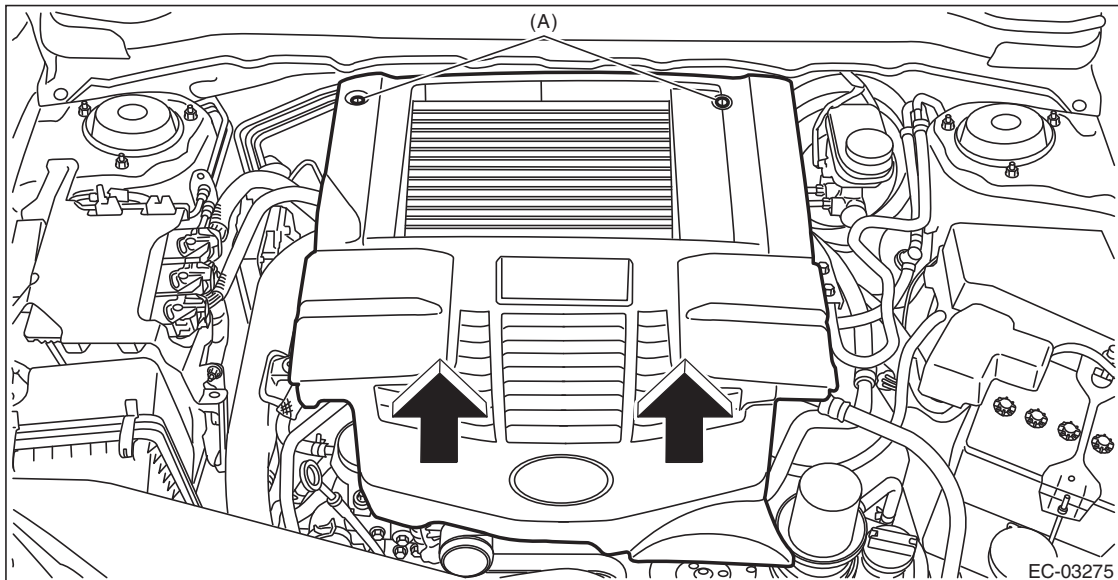
Throttle Body

FUEL INJECTION (FUEL SYSTEMS)

2. Throttle Body

A: REMOVAL

1) Remove the clip (A), lift the front of the collector cover in the direction of arrow, and then remove the collector cover.



2) Disconnect the ground cable from battery.

3) Lift up the vehicle.

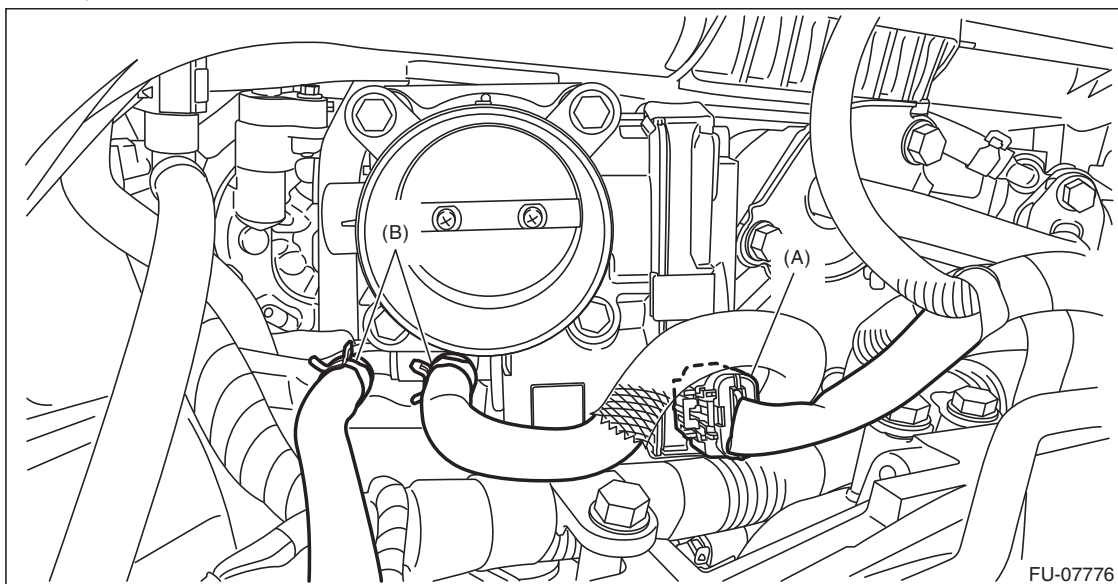
4) Remove the under cover. <Ref. to EI-22, REMOVAL, Front Under Cover.>

5) Drain approximately 3.0 L (3.2 US qt, 2.6 Imp qt) of coolant. <Ref. to CO(H4DOTC)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

6) Remove the intercooler. <Ref. to IN(H4DOTC)-35, REMOVAL, Intercooler.>

7) Remove the intake duct No. 3. <Ref. to IN(H4DOTC)-25, INTAKE DUCT NO. 3, REMOVAL, Intake Duct.>

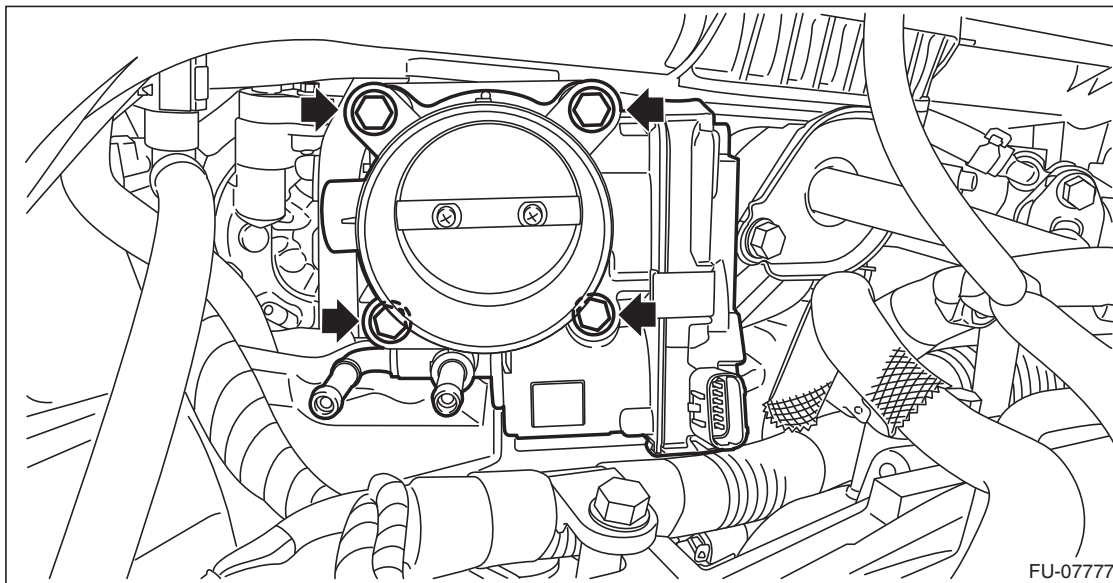
8) Disconnect the connector (A) from the throttle position sensor, and disconnect the preheater hose (B) from the throttle body.



Throttle Body

FUEL INJECTION (FUEL SYSTEMS)

9) Remove the throttle body from the intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:

Use a new gasket.

Tightening torque:

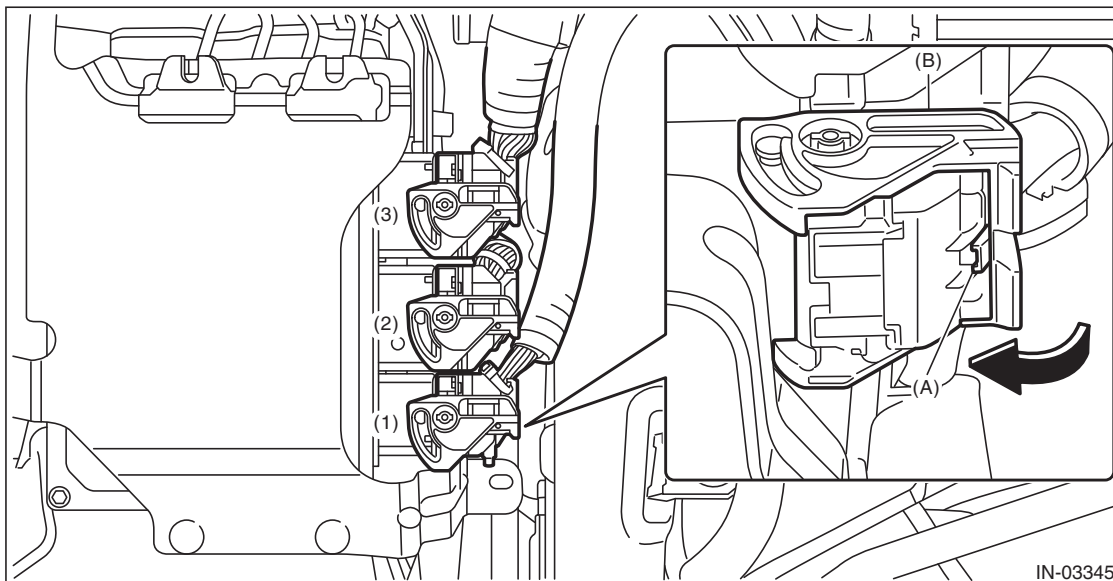
8 N·m (0.8 kgf-m, 5.9 ft-lb)

C: INSPECTION

1. THROTTLE SENSOR (METHOD WITH CIRCUIT TESTER)

1) Disconnect the ground cable from battery.

2) While pressing the section (A) shown in the figure, move the lock lever (B) in the direction of the arrow to disconnect the connectors from the ECM in numerical order as shown in the figure.



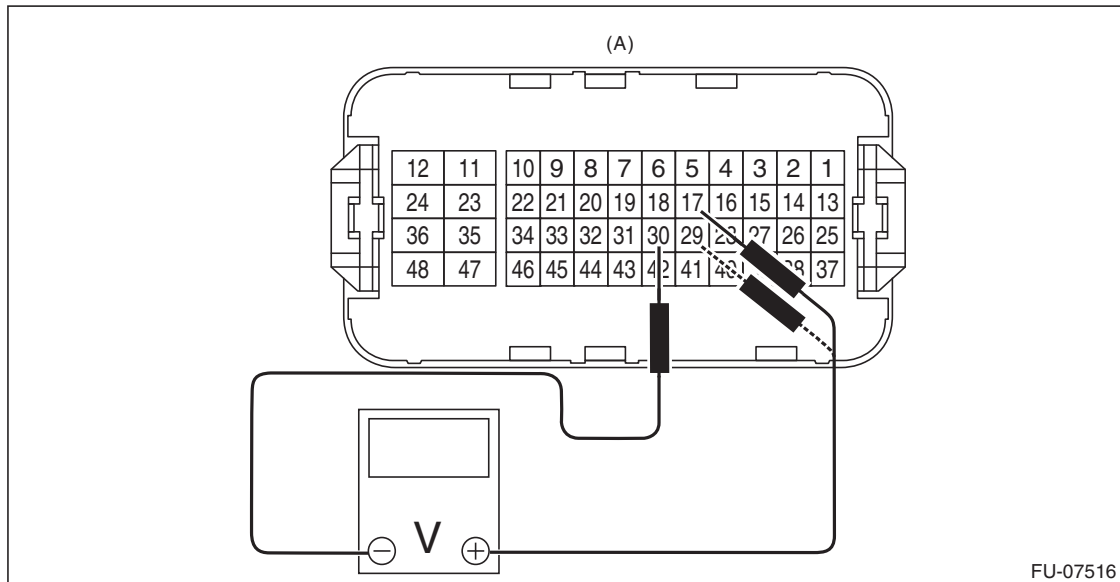
3) Install the special tool between the ECM and body harness and the engine harness. <Ref. to EN(H4DOTC)(diag)-6, CAUTION, General Description.>

ST 18460AA030 CHECK BOARD

Throttle Body

FUEL INJECTION (FUEL SYSTEMS)

- 4) Connect the battery ground terminal.
- 5) After warming-up the engine, turn the ignition switch to OFF.
- 6) Turn the ignition switch to ON. (engine OFF)
- 7) Measure the voltage between ECM connector terminals using ST.



- (A) To the check board connector
(ECM connector)

Throttle sensor	Accelerator pedal	Terminal No.	Standard
Main	Not depressed (full closed)	17 (+) and 30 (-)	Approx. 0.7 V
	Depressed (full opened)		Approx. 3.9 V
Sub	Not depressed (full closed)	29 (+) and 30 (-)	Approx. 4.4 V
	Depressed (full opened)		Approx. 1.1 V

- 8) After inspection, install the related parts in the reverse order of removal.

2. THROTTLE SENSOR (METHOD WITH SUBARU SELECT MONITOR)

- 1) After warming-up the engine, turn the ignition switch to OFF.
- 2) Turn the ignition switch to ON. (engine OFF)
- 3) Read the throttle opening angle signal and voltage of throttle sensor using Subaru Select Monitor. <Ref. to EN(H4DO)(diag)-41, DISPLAY OF ENGINE FREEZE FRAME DATA, OPERATION, Subaru Select Monitor.>

NOTE:

Due to the specification of the Subaru Select Monitor, value read from the throttle opening angle signal is highlighted and displayed as the voltage readings of sub throttle sensor.

Throttle sensor	Throttle opening angle signal	Standard
Main	0.0%	Approx. 0.7 V
	100.0%	Approx. 3.9 V
Sub	0.0%	Approx. 1.1 V
	100.0%	Approx. 4.4 V

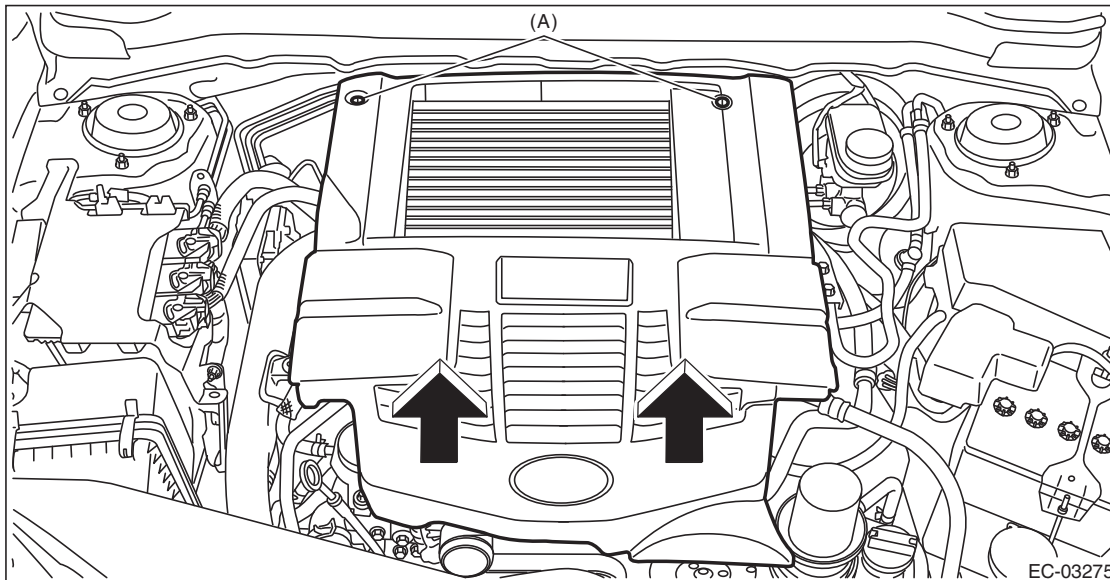
3. OTHER INSPECTIONS

- 1) Check that the throttle body has no deformation, cracks or other damages.
- 2) Check that the preheater hose has no cracks, damage or loose part.

3. Intake Manifold

A: REMOVAL

1) Remove the clip (A), lift the front of the collector cover in the direction of arrow, and then remove the collector cover.



2) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>

3) Disconnect the ground cable from battery.

4) Open the fuel filler lid and remove the fuel filler cap.

5) Lift up the vehicle.

6) Remove the under cover. <Ref. to EI-22, REMOVAL, Front Under Cover.>

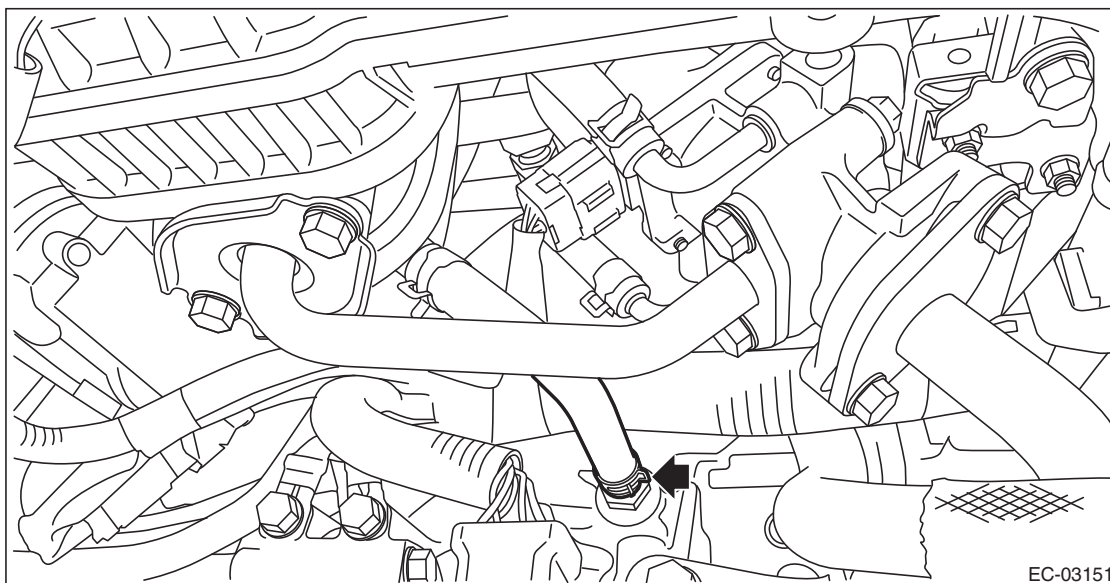
7) Drain approximately 3.0 L (3.2 US qt, 2.6 Imp qt) of coolant. <Ref. to CO(H4DOTC)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

8) Remove the intercooler. <Ref. to IN(H4DOTC)-35, REMOVAL, Intercooler.>

9) Remove the intake duct No. 2. <Ref. to IN(H4DOTC)-20, REMOVAL, Intake Duct.>

10) Remove the intake duct No. 3. <Ref. to IN(H4DOTC)-20, REMOVAL, Intake Duct.>

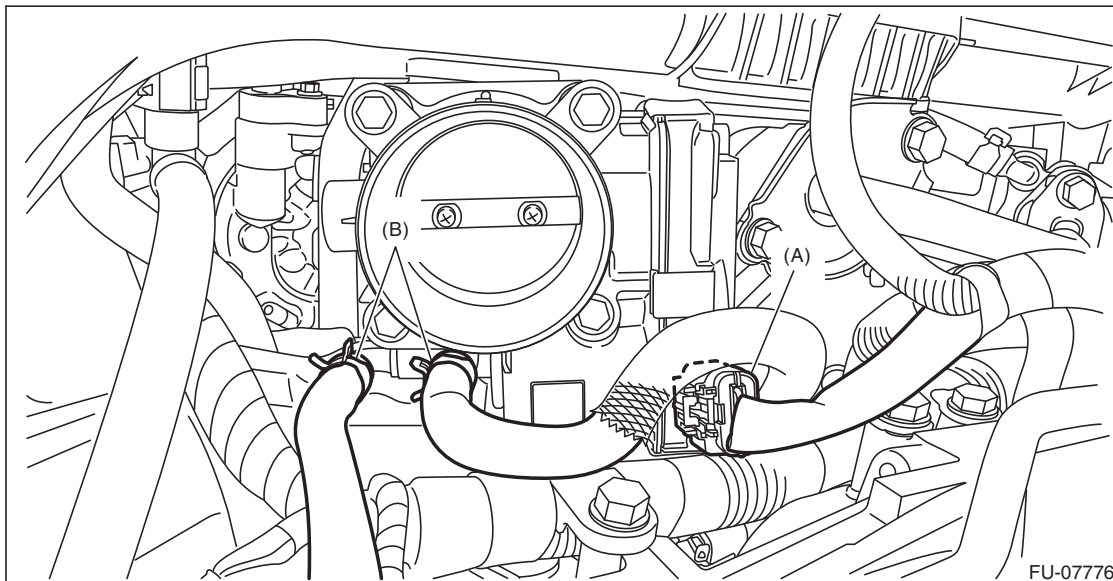
11) Disconnect the PCV hose from the PCV valve.



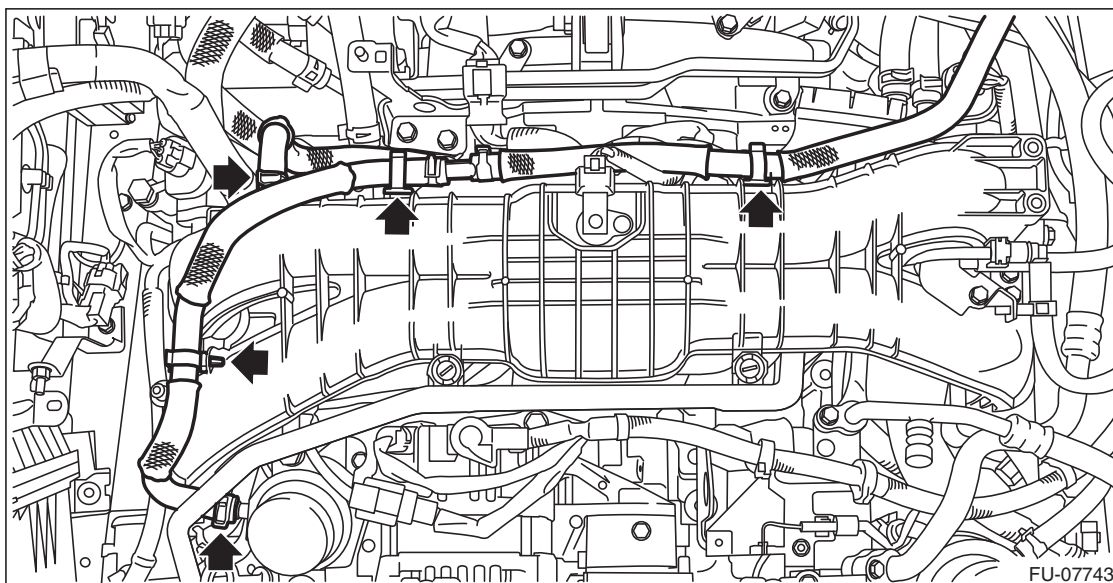
Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

12) Disconnect the connector (A) from the throttle body, and disconnect the preheater hose (B) from the throttle body.



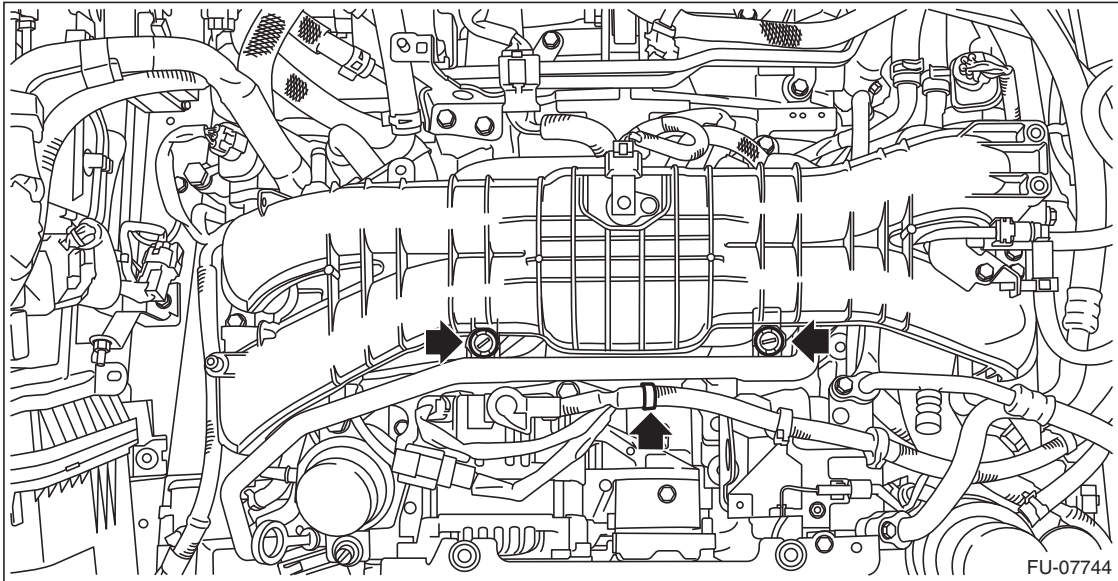
13) Remove the clip, and disconnect the brake booster vacuum hose from the intake manifold.



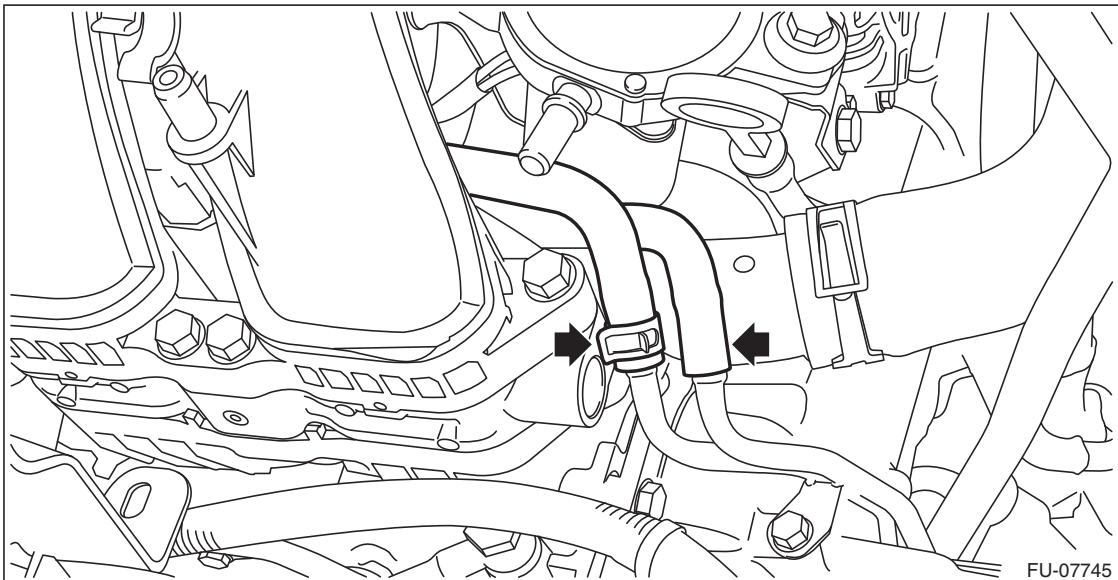
Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

- 14) Remove the clips securing the PCV pipe and generator cord to the intake manifold.



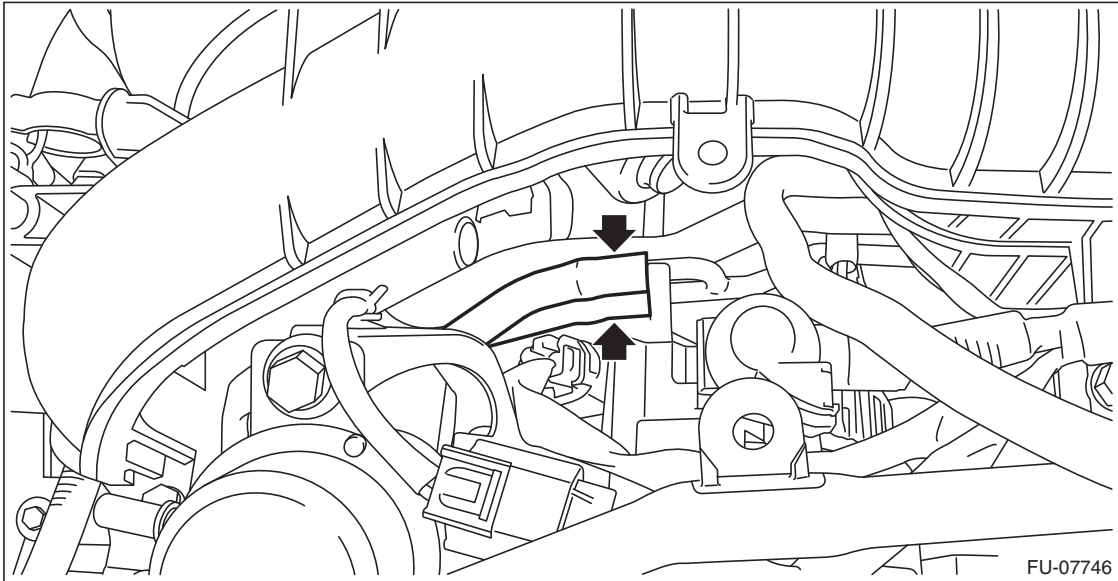
- 15) Disconnect the vacuum control hose and vacuum hose from the vacuum pipe assembly.



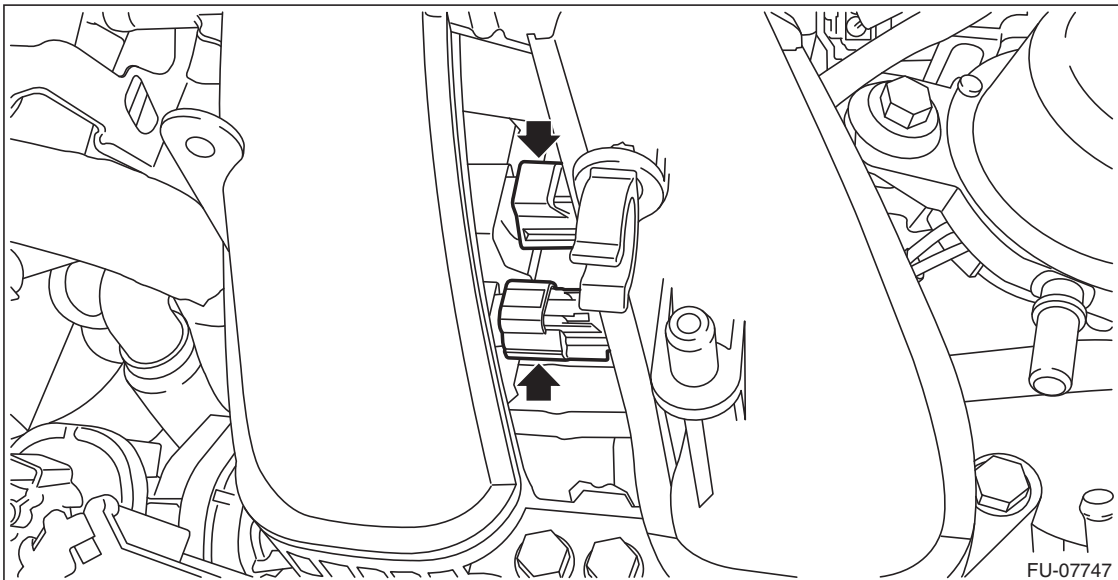
Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

- 16) Disconnect two vacuum hoses from the canister pipe.



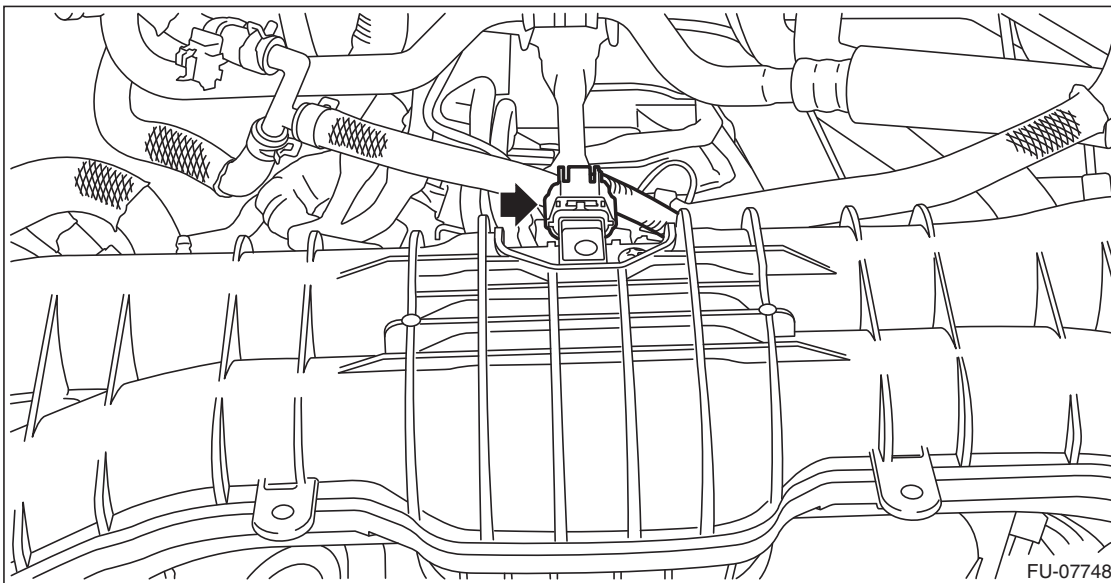
- 17) Disconnect the connector from the purge control solenoid valve.



Intake Manifold

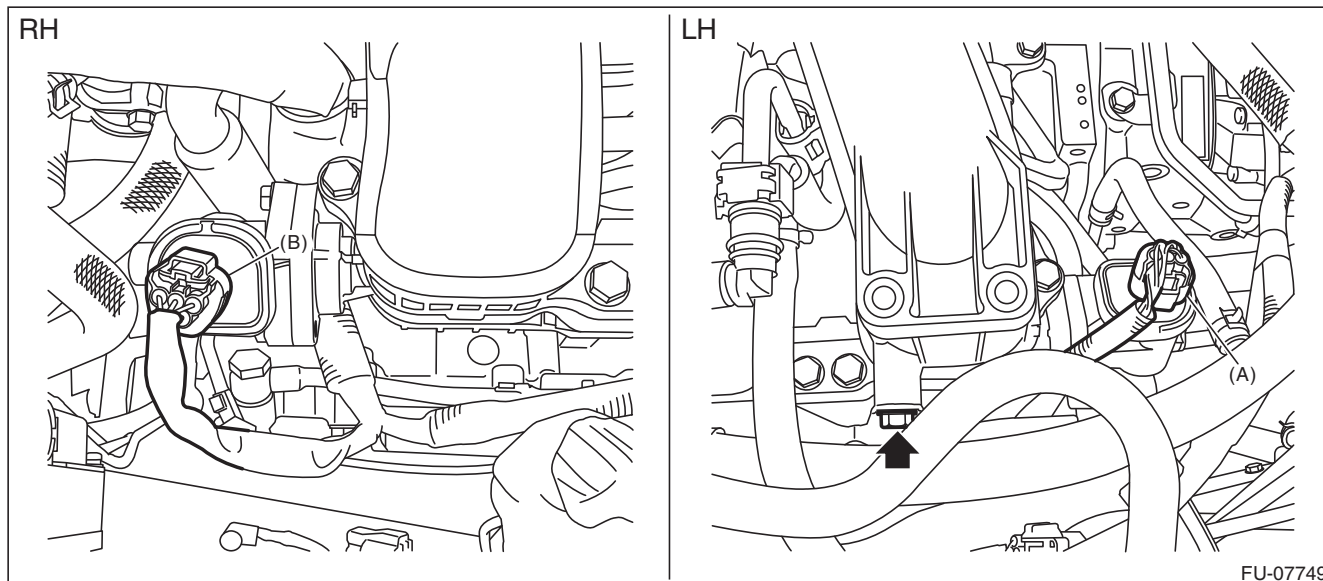
FUEL INJECTION (FUEL SYSTEMS)

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



- 19) Disconnect the connector (A) from the tumble generator valve LH, and remove the bolt securing the fuel pipe protector to the intake manifold.

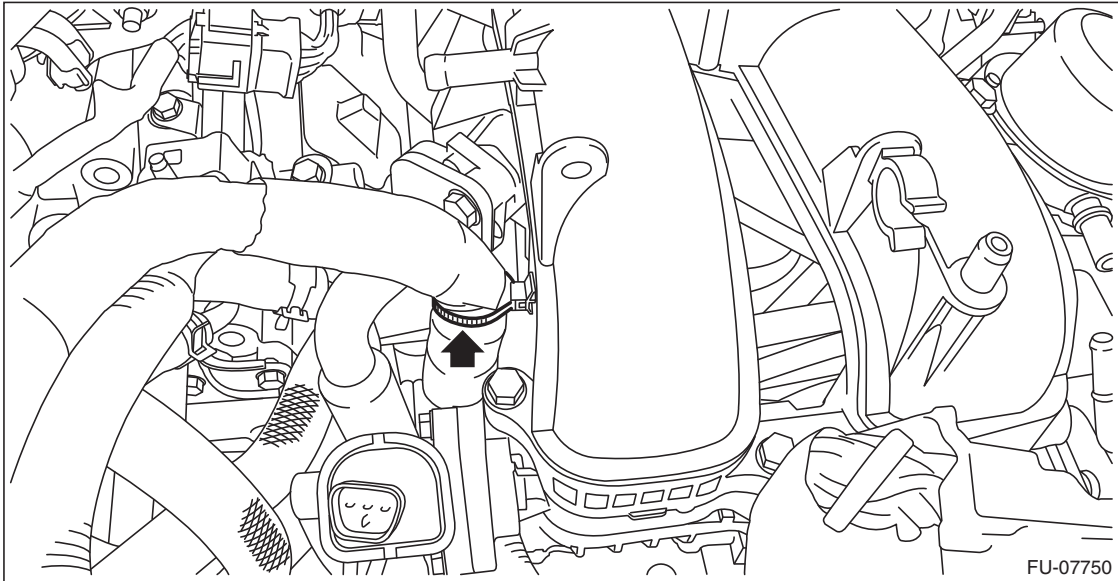
- 20) Disconnect the connector (B) from the tumble generator valve RH.



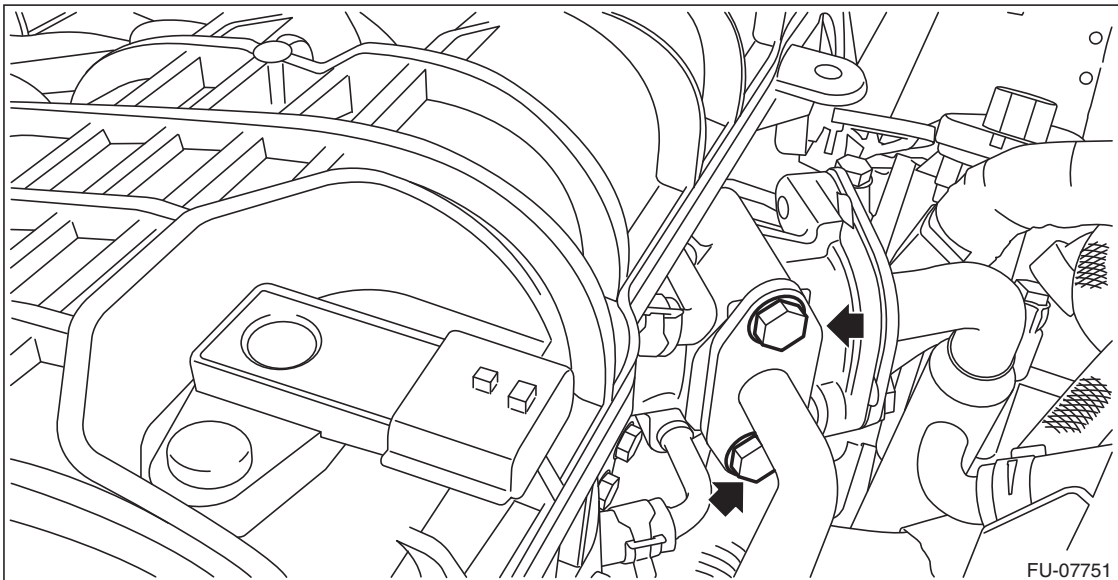
Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

21) Remove the engine harness clip from the intake manifold.



22) Remove the bolt securing the EGR pipe to the EGR valve.



Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

23) Disconnect the fuel delivery tube and evaporation hose.

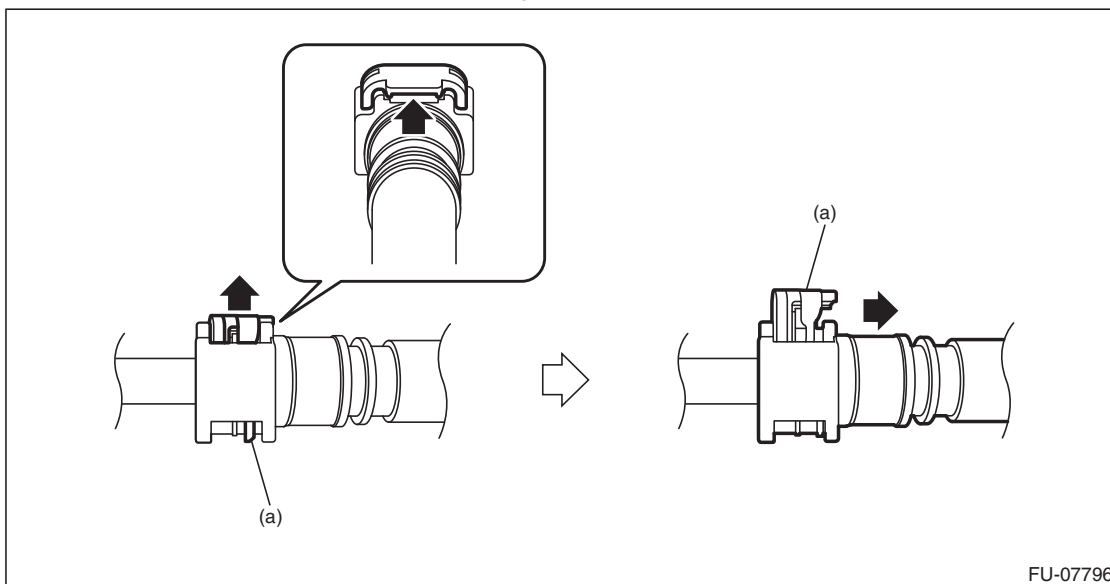
CAUTION:

- Be careful not to spill fuel.
- Catch the fuel from the tubes using a container or cloth.

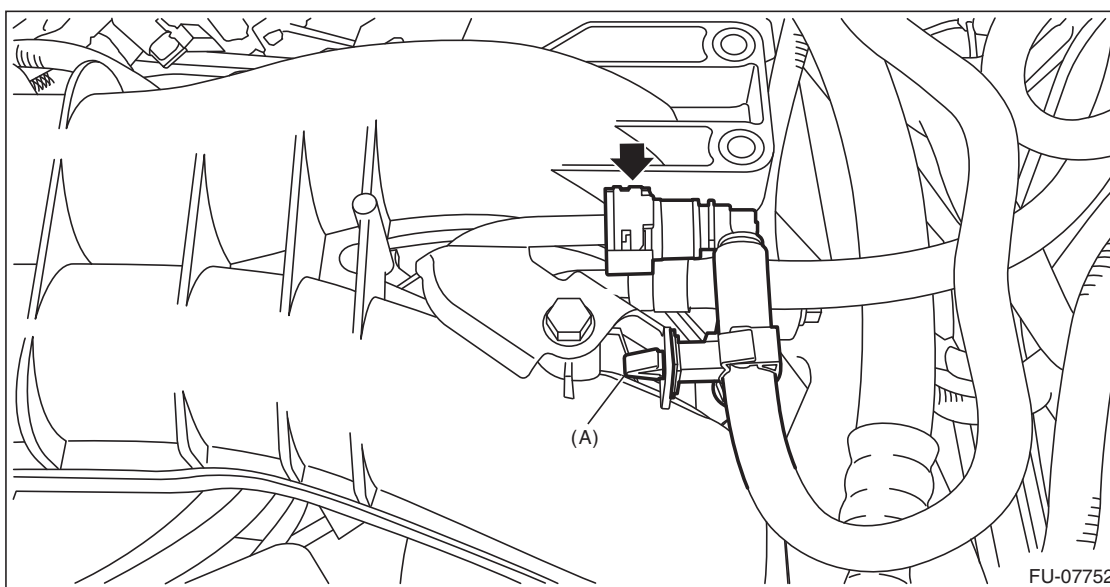
(1) Disconnect the quick connector on the fuel delivery tube from the fuel pipe assembly, and remove the clip (A) securing the fuel delivery tube.

NOTE:

Disconnect the quick connector as shown in the figure.



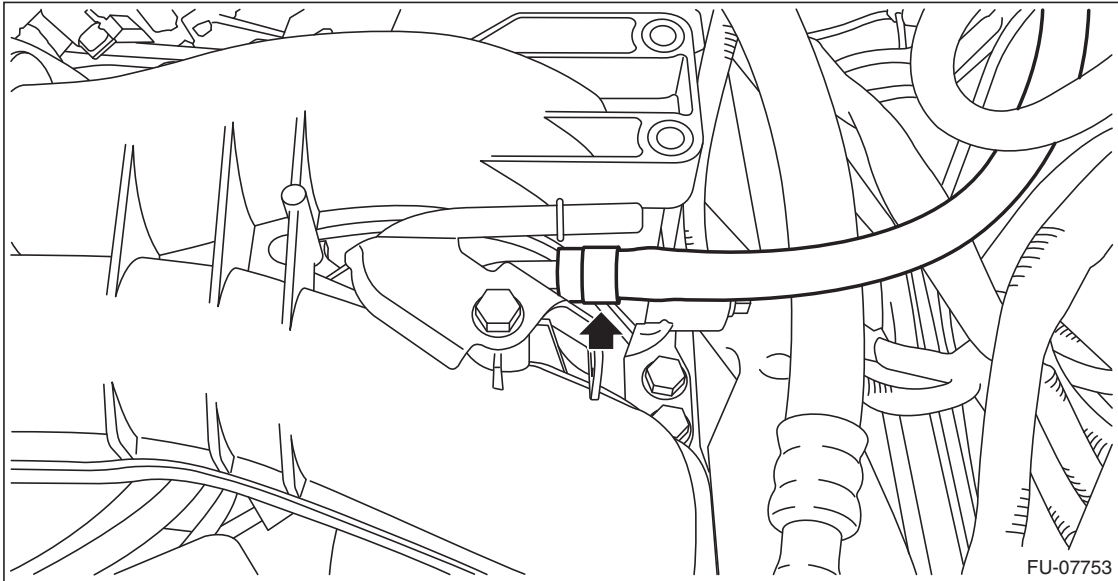
(a) Slider



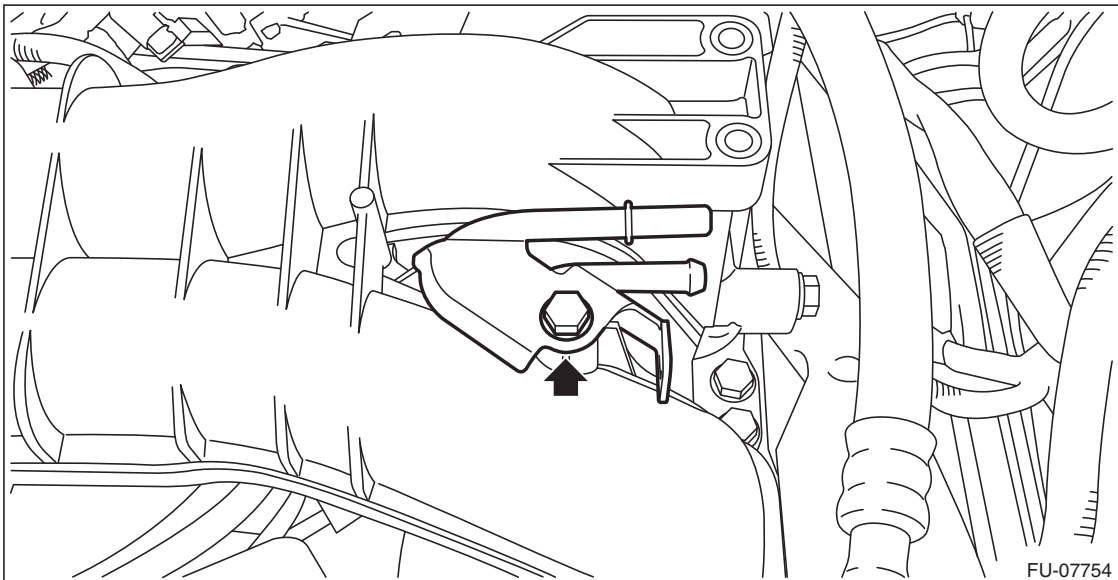
Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

- (2) Disconnect the evaporation hose from the fuel pipe assembly.



- 24) Remove the bolts securing the fuel pipe assembly to the intake manifold.



Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

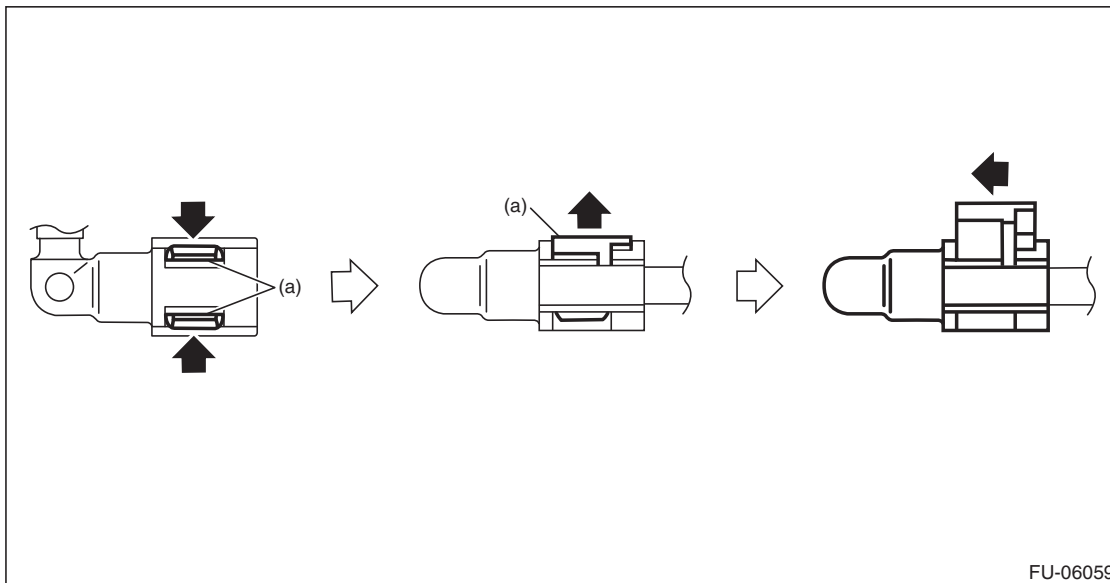
25) Disconnect the fuel delivery pipe (A) and vacuum hose (B), and remove the fuel pipe assembly.

CAUTION:

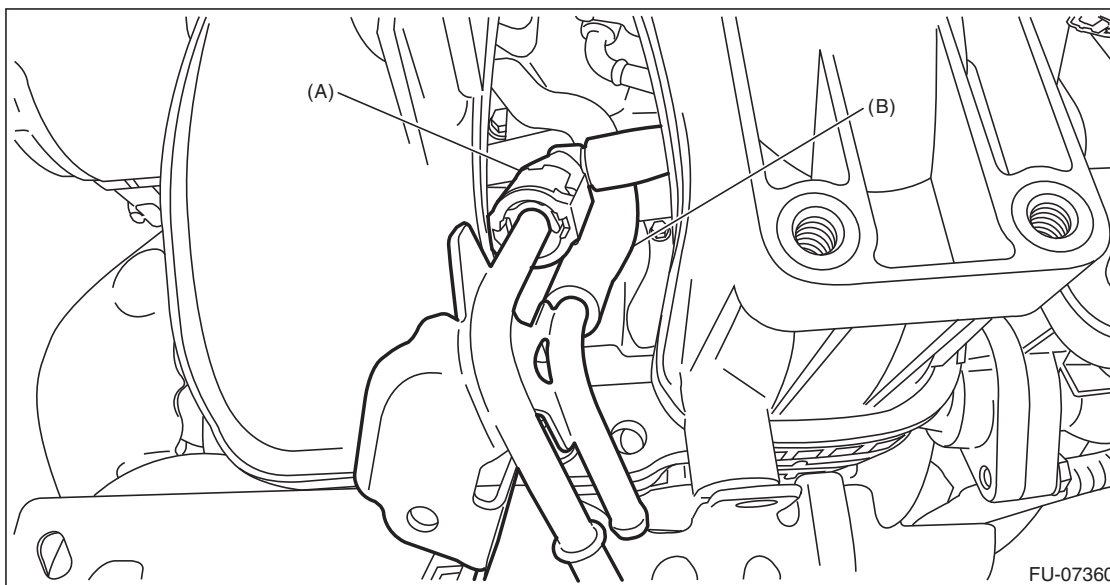
- Be careful not to spill fuel.
- Catch the fuel from the pipes using a container or cloth.

NOTE:

Disconnect the quick connector as shown in the figure.



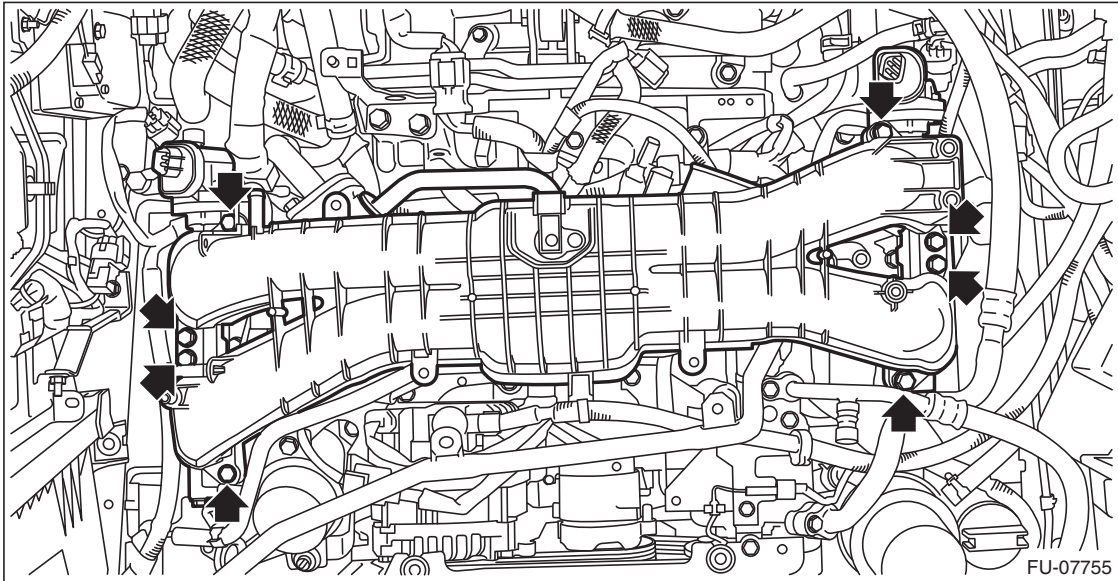
(a) Slider



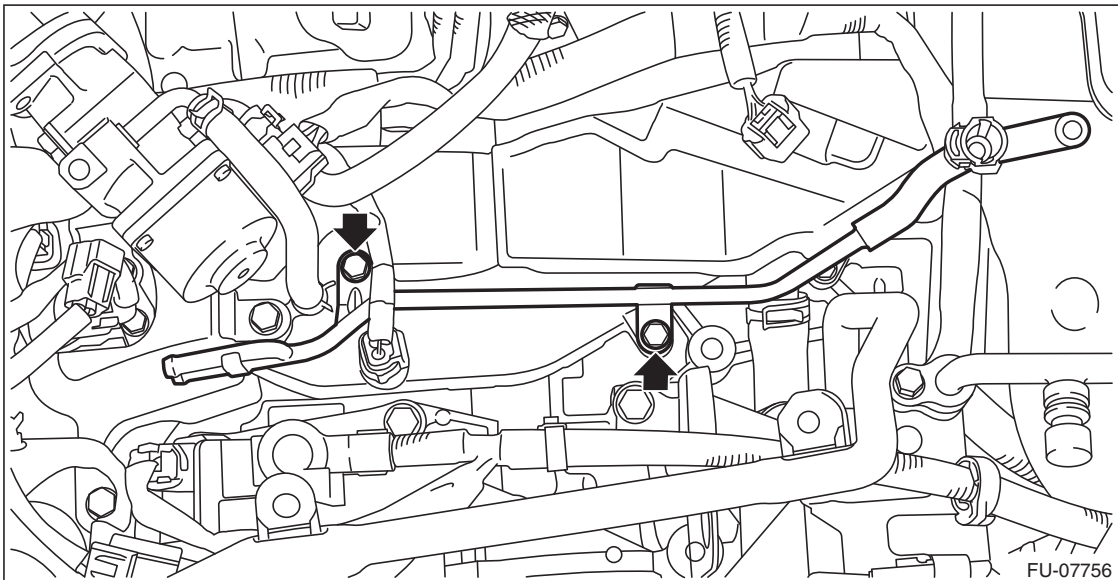
Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

- 26) Remove the intake manifold from the cylinder head together with the tumble generator valve assembly.



- 27) Remove the vacuum hose assembly from the cylinder block.



Intake Manifold

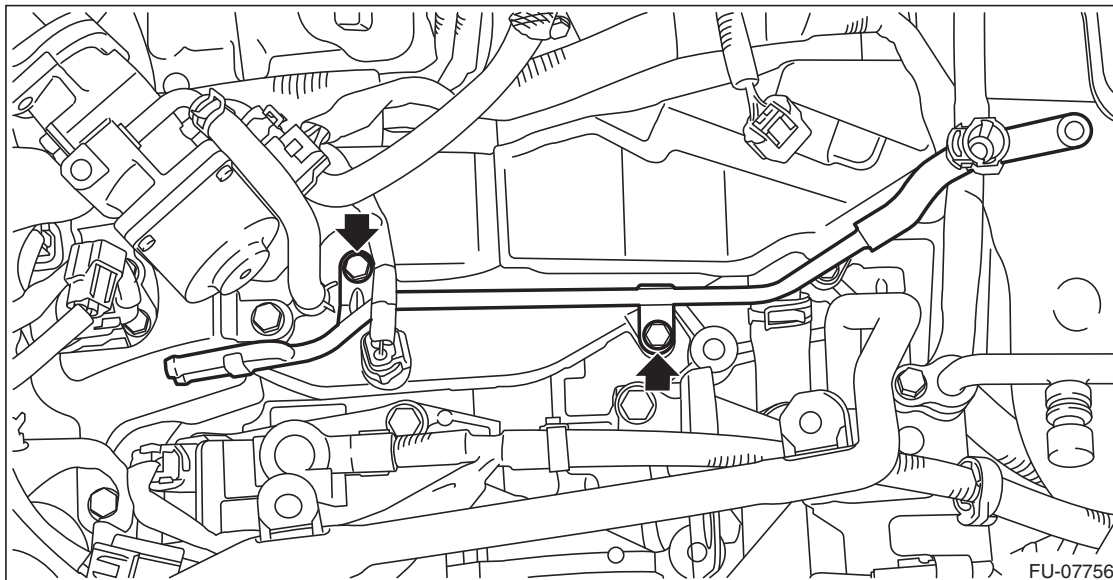
FUEL INJECTION (FUEL SYSTEMS)

B: INSTALLATION

1) Install the vacuum hose assembly to the cylinder block.

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



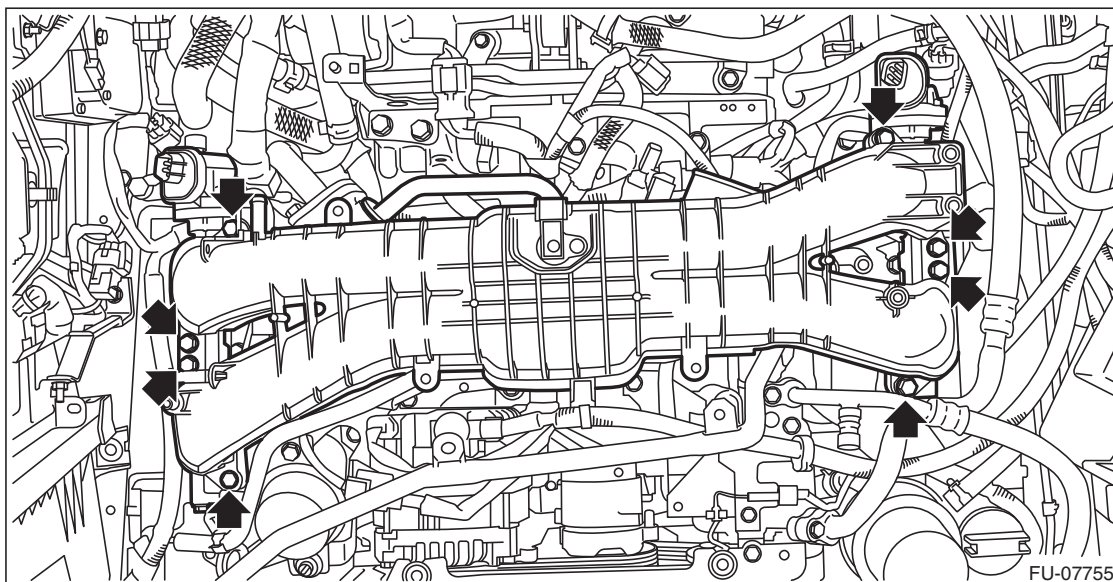
2) Install the tumble generator valve assembly to the cylinder head.

NOTE:

Use a new gasket.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

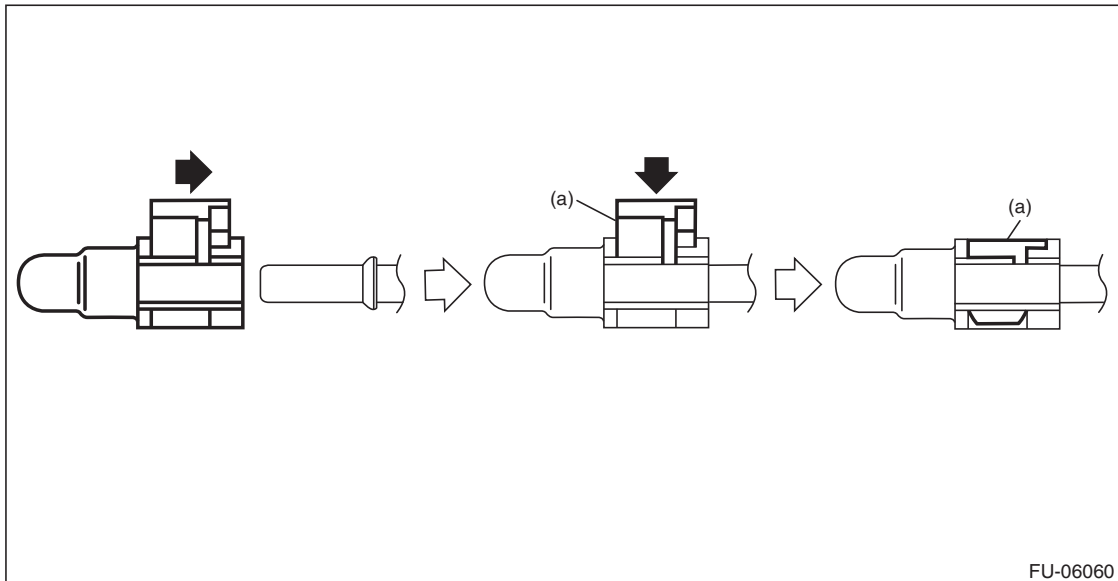
3) Connect the fuel delivery pipe (A) and vacuum hose (B) to the fuel pipe assembly.

CAUTION:

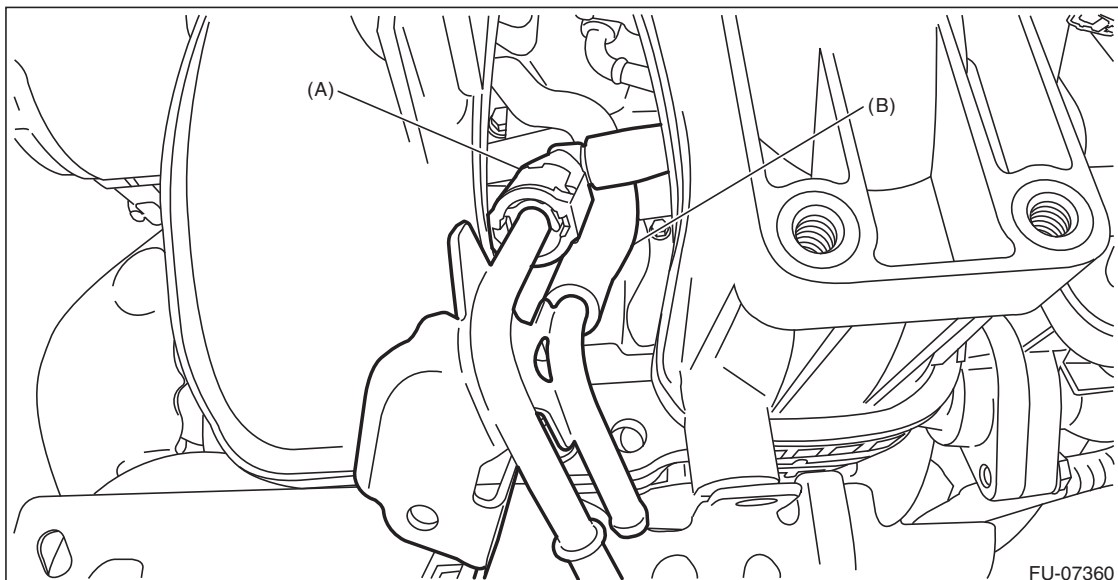
- Check that there is no damage or dust on the quick connector. If necessary, clean the seal surface of the pipe.
- When connecting the quick connector, make sure to insert the pipe all the way in before locking the slider.
- When it is difficult to lock the slider, check that the pipe is fully inserted.
- Make sure that the quick connector is securely connected.

NOTE:

Connect the quick connector as shown in the figure.



(a) Slider



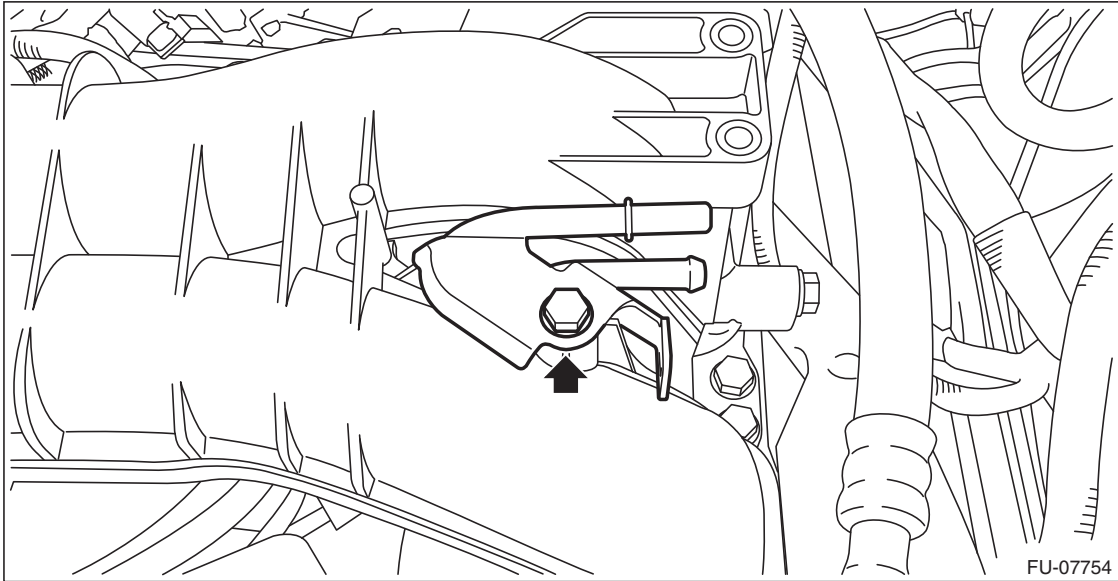
Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

4) Install the fuel pipe assembly to the intake manifold.

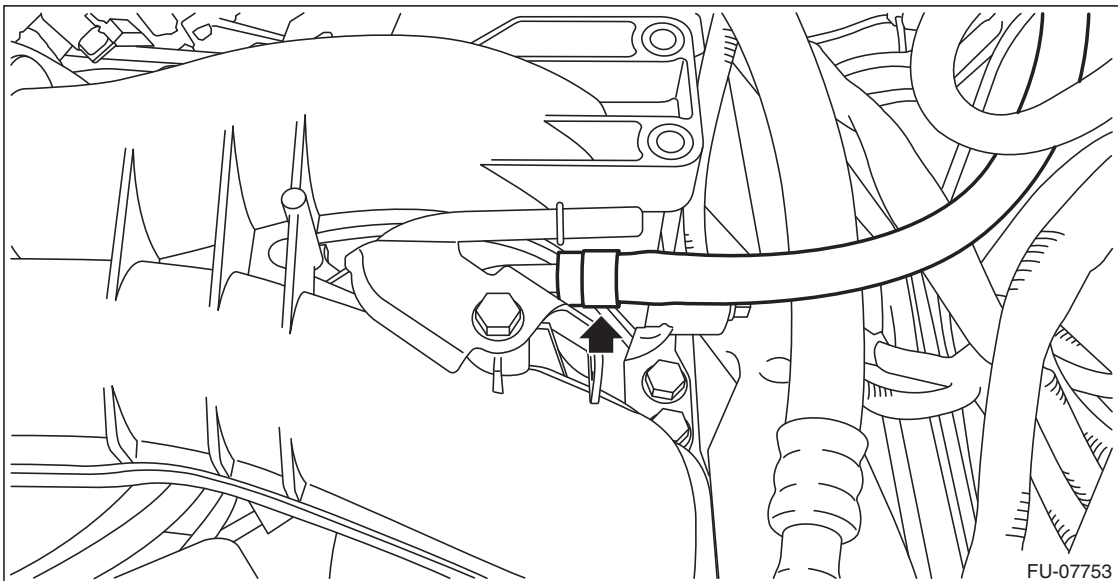
Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



5) Connect the fuel delivery tube and evaporation hose.

(1) Connect the evaporation hose to fuel pipe assembly.



Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

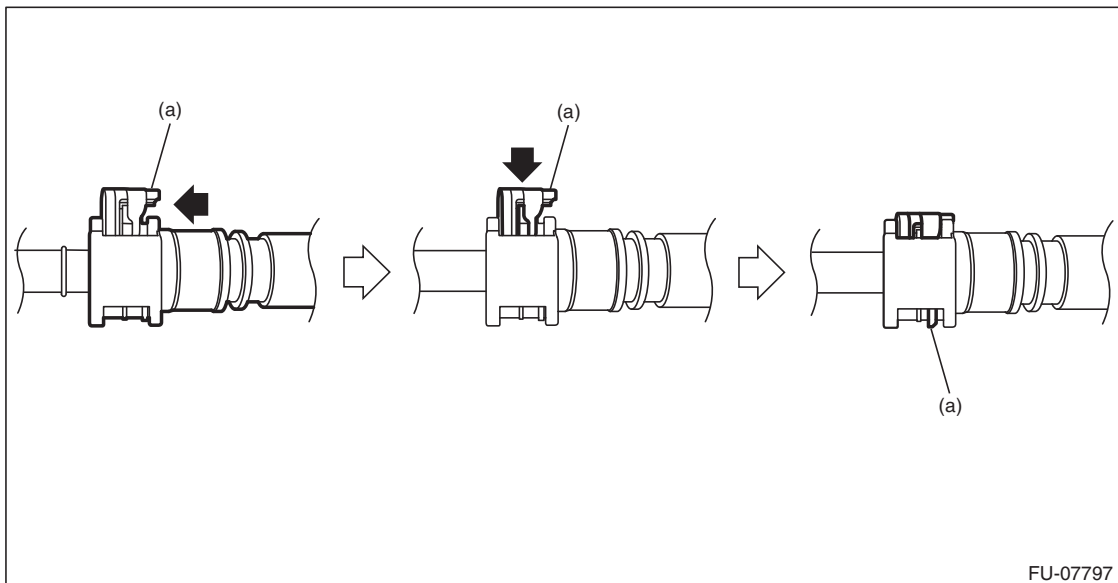
(2) Connect the connector on the fuel delivery tube to the fuel pipe assembly, and secure the fuel delivery tube using clip (A).

CAUTION:

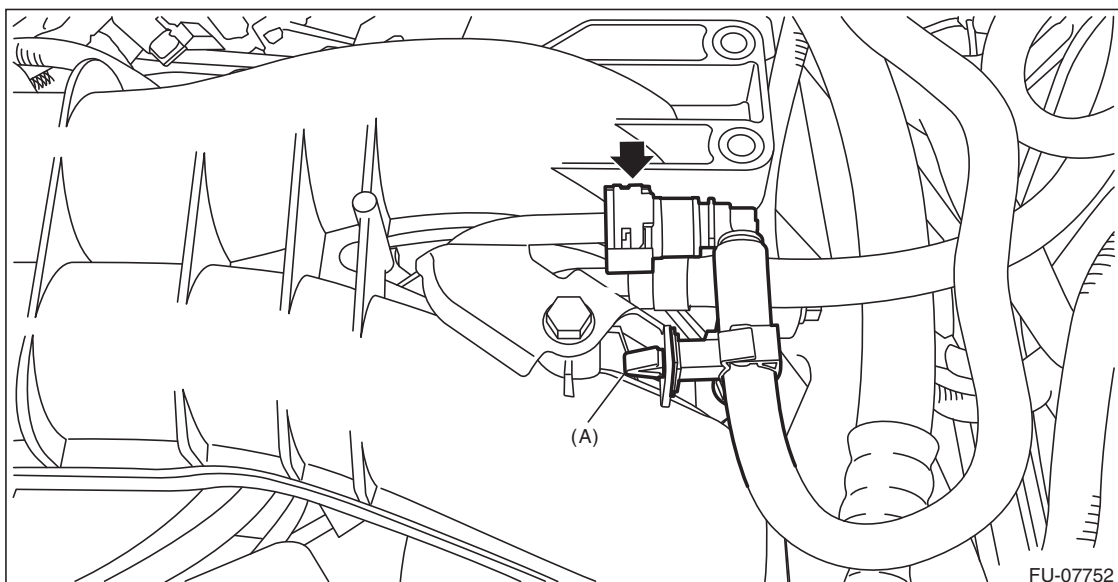
- Check that there is no damage or dust on the quick connector. If necessary, clean the seal surface of the pipe.
- When connecting the quick connector, make sure to insert the pipe all the way in before locking the slider.
- When it is difficult to lock the slider, check that the pipe is fully inserted.
- Make sure that the quick connector is securely connected.

NOTE:

Connect the quick connector as shown in the figure.



(a) Slider

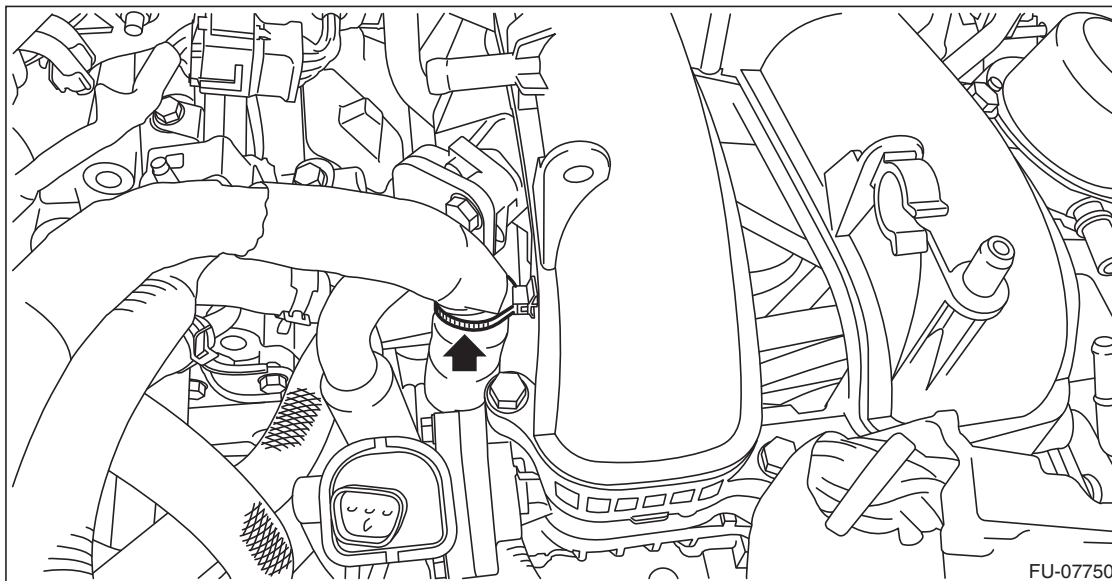


6) Install the EGR pipe. <Ref. to EC(H4DOTC)-27, INSTALLATION, EGR Pipe.>

Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

- 7) Secure the engine harness to the intake manifold using clip.

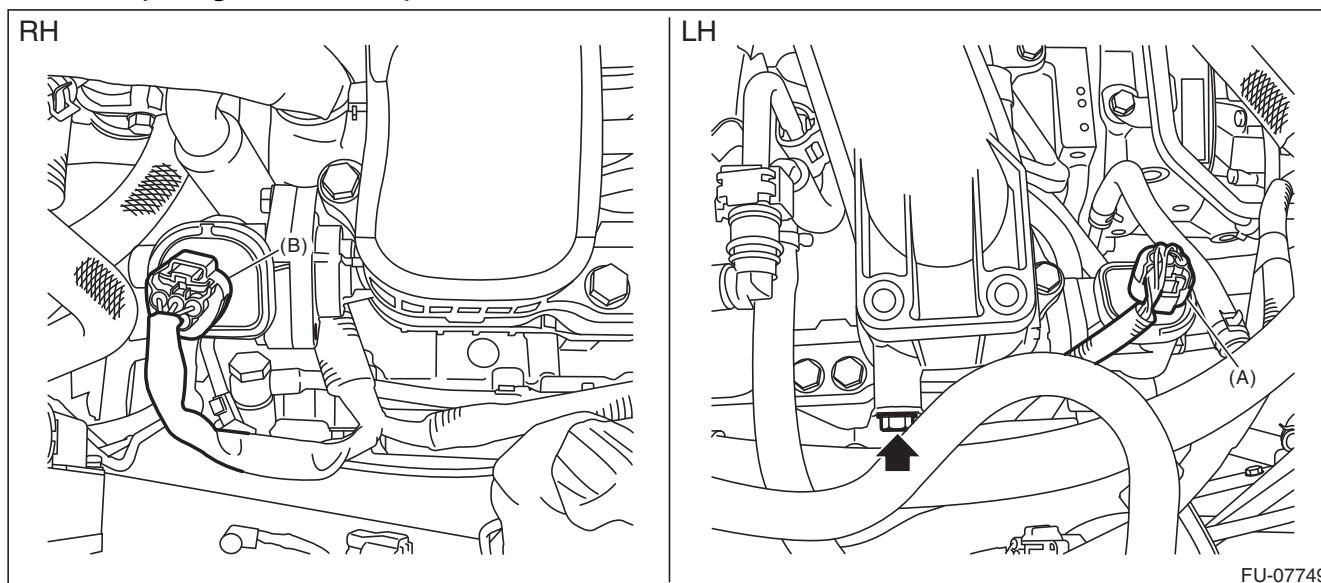


- 8) Connect the connector (B) to the tumble generator valve RH.

- 9) Connect the connector (A) to the tumble generator valve LH, and secure the fuel pipe protector to the intake manifold.

Tightening torque:

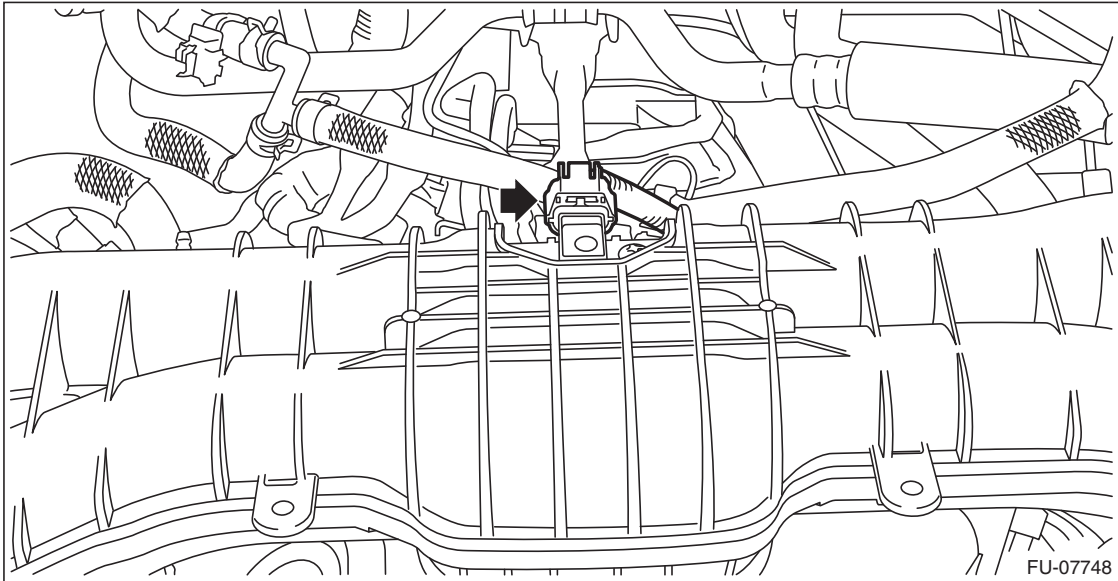
19 N·m (1.9 kgf-m, 14.0 ft-lb)



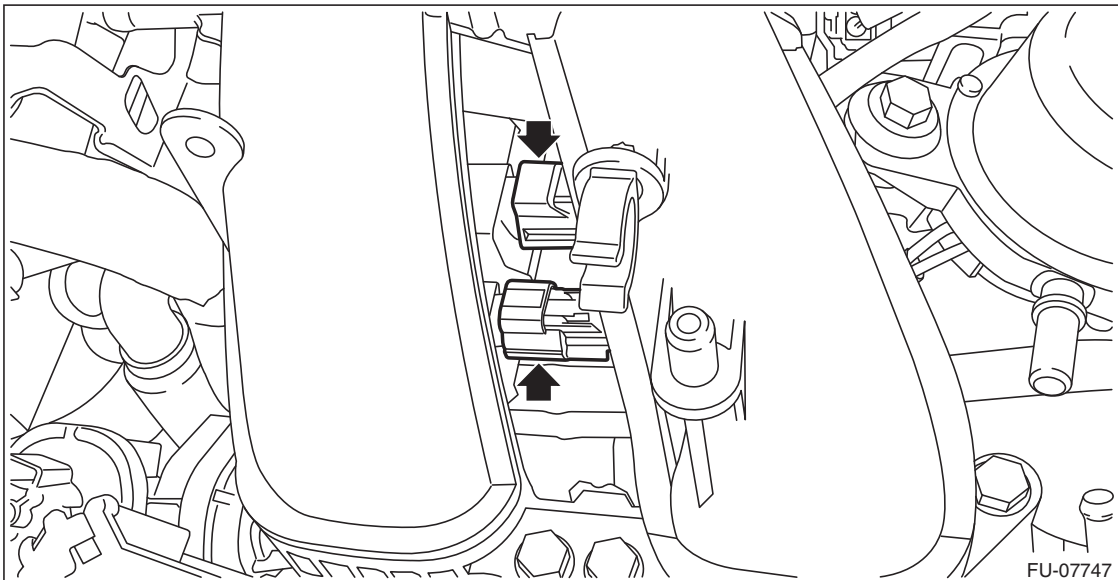
Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

- 10) Connect connectors to the manifold absolute pressure & intake air temperature sensor.



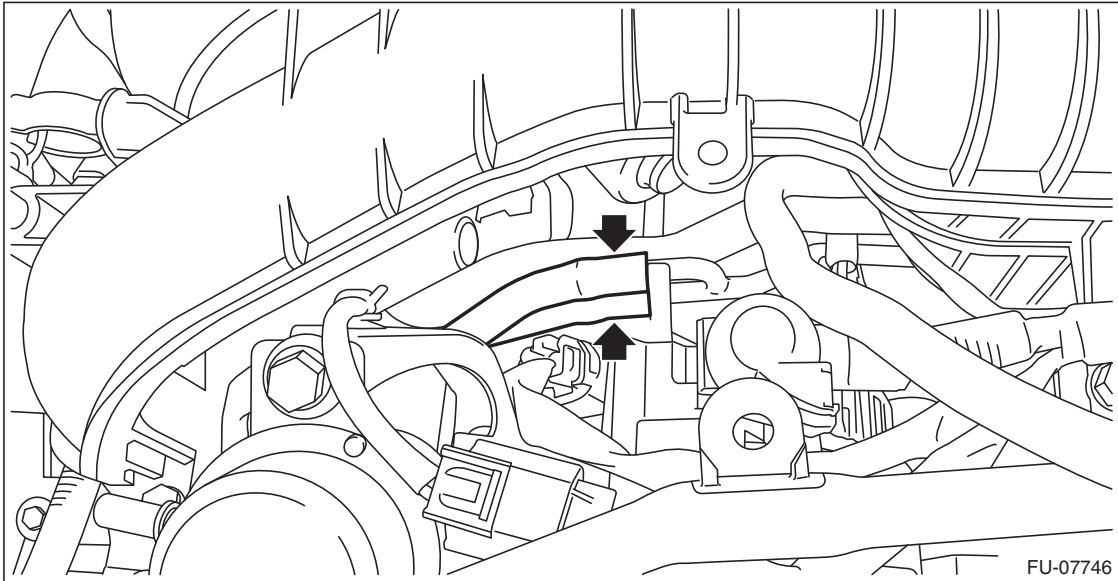
- 11) Connect the connector to the purge control solenoid valve.



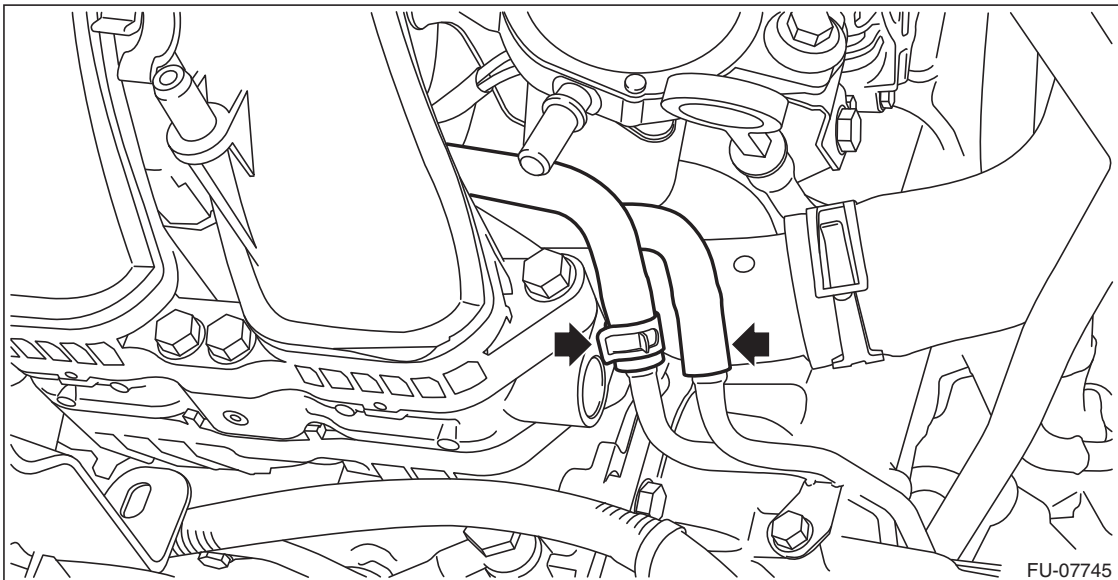
Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

- 12) Connect the vacuum hose to the canister pipe.



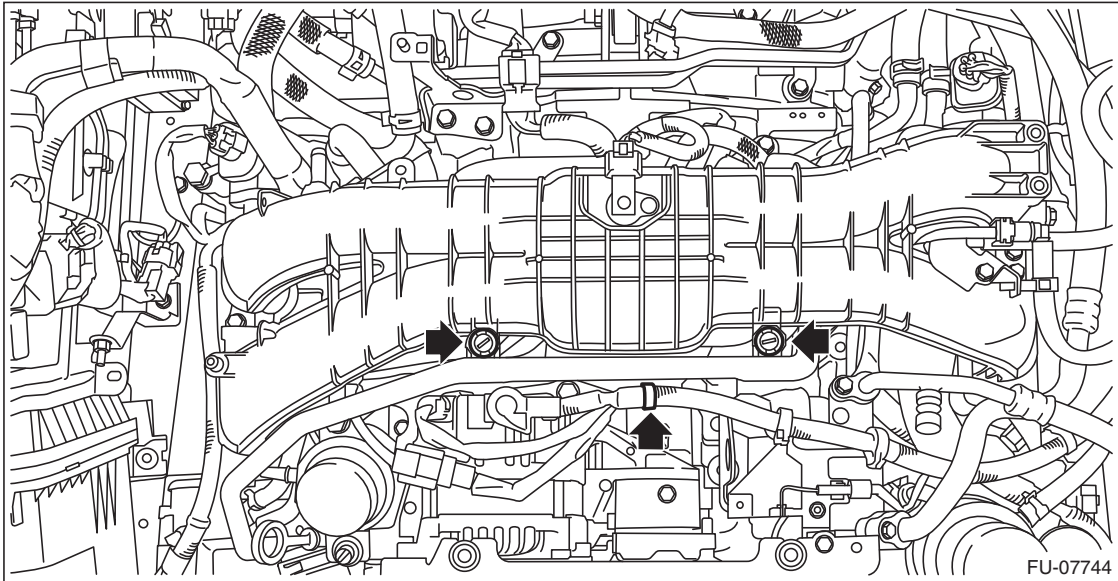
- 13) Connect the vacuum control hose and vacuum hose to the vacuum pipe assembly.



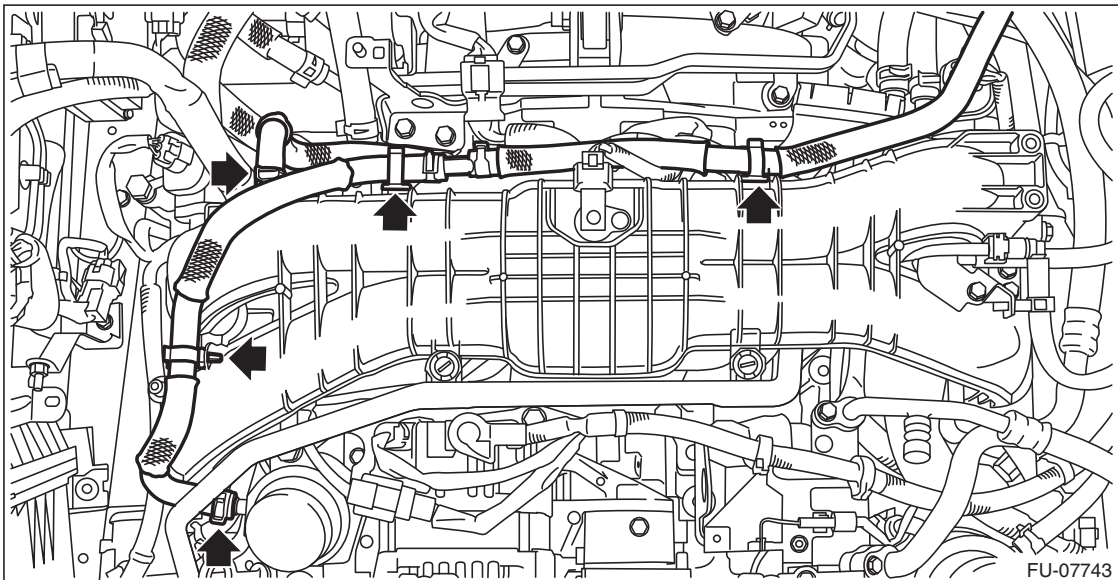
Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

- 14) Secure the PCV pipe and generator cord to the intake manifold using the clip.



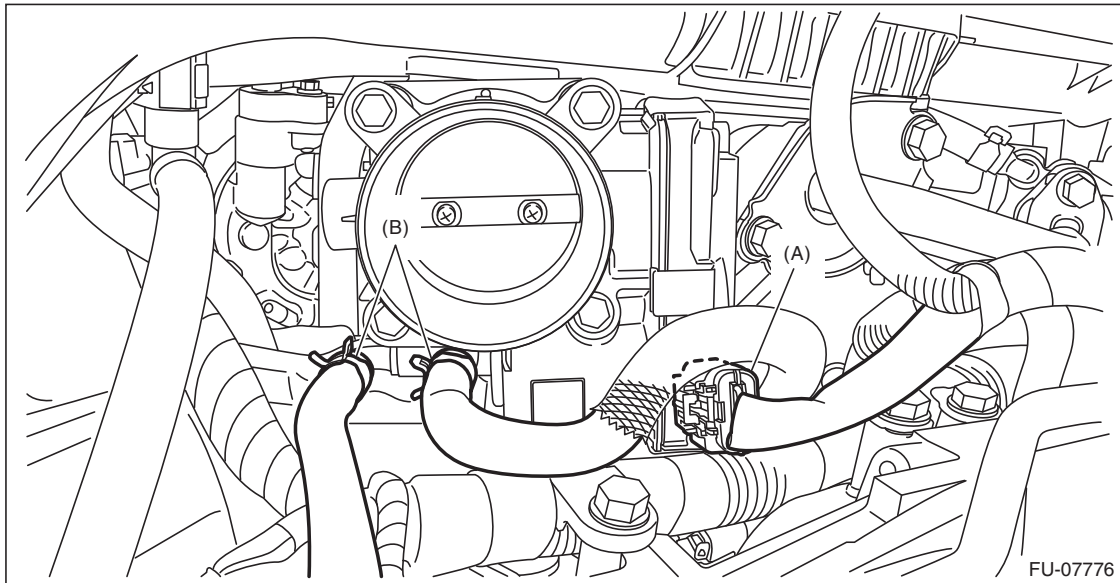
- 15) Connect the brake booster vacuum hose to the intake manifold.



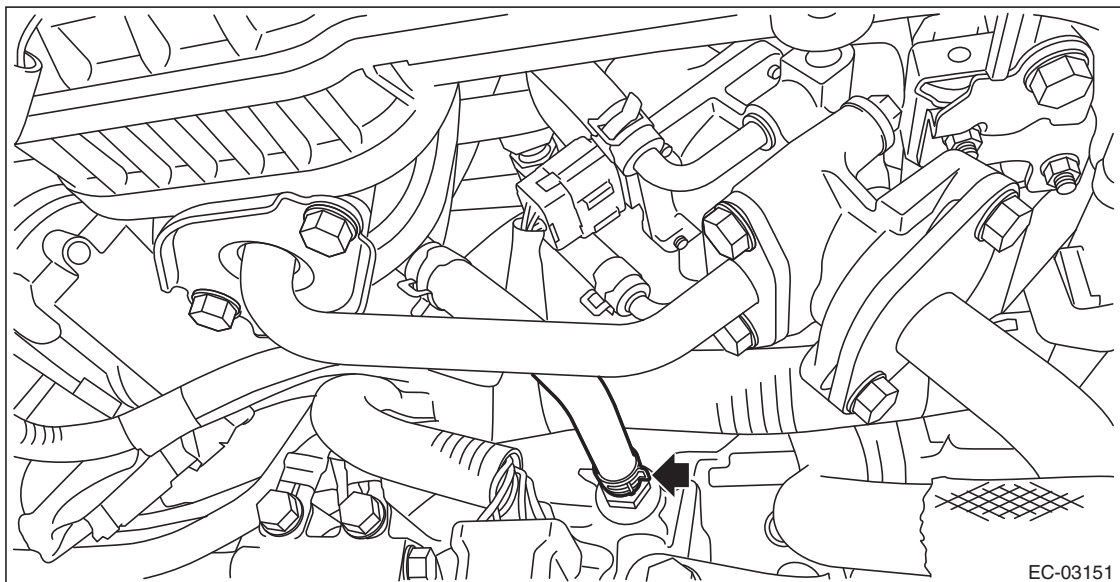
Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

- 16) Connect the preheater hose (B) to the throttle body, and connect the connector (A) to the throttle body.



- 17) Connect the PCV hose to the PCV valve.



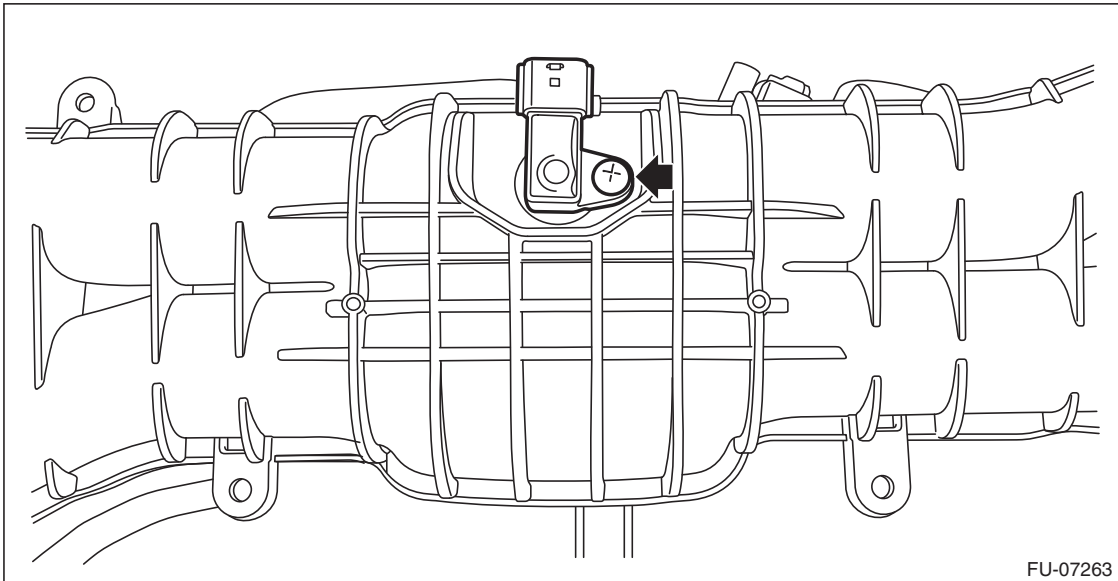
- 18) Install the intake duct No. 3. <Ref. to IN(H4DOTC)-31, INTAKE DUCT NO. 3, INSTALLATION, Intake Duct.>
19) Install the intake duct No. 2. <Ref. to IN(H4DOTC)-29, INTAKE DUCT NO. 2, INSTALLATION, Intake Duct.>
20) Install the intercooler. <Ref. to IN(H4DOTC)-37, INSTALLATION, Intercooler.>
21) Install the air intake duct (rear). <Ref. to IN(H4DOTC)-19, INSTALLATION, Air Intake Duct.>
22) Fill engine coolant. <Ref. to CO(H4DOTC)-14, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
23) Install the under cover. <Ref. to EI-22, INSTALLATION, Front Under Cover.>
24) Lower the vehicle.
25) Connect the battery ground terminal.
26) Install the collector cover.

Intake Manifold

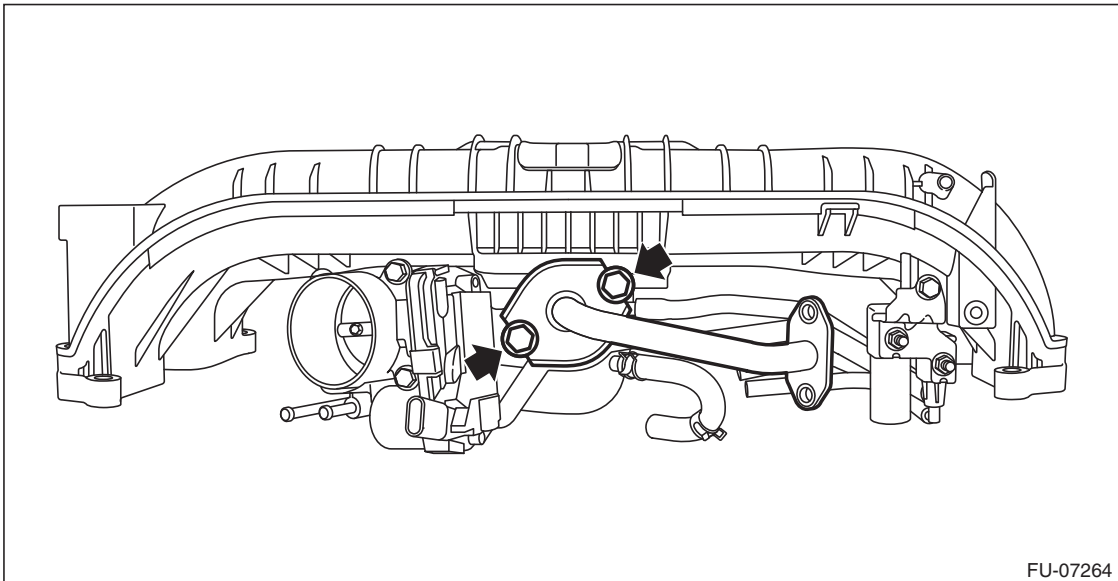
FUEL INJECTION (FUEL SYSTEMS)

C: DISASSEMBLY

- 1) Remove the manifold absolute pressure & intake air temperature sensor from the intake manifold.



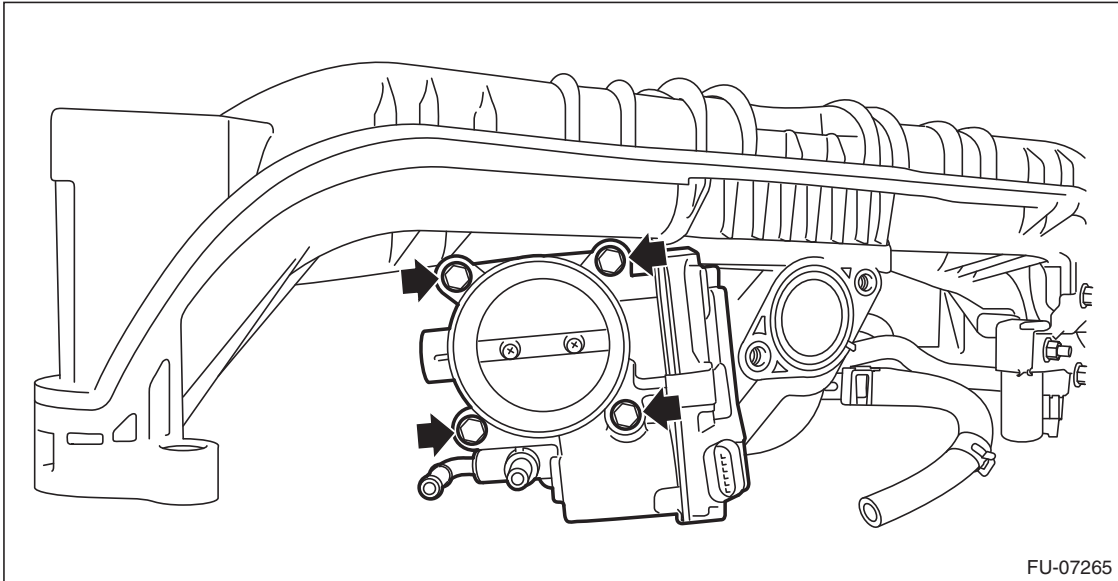
- 2) Remove the EGR pipe from intake manifold.



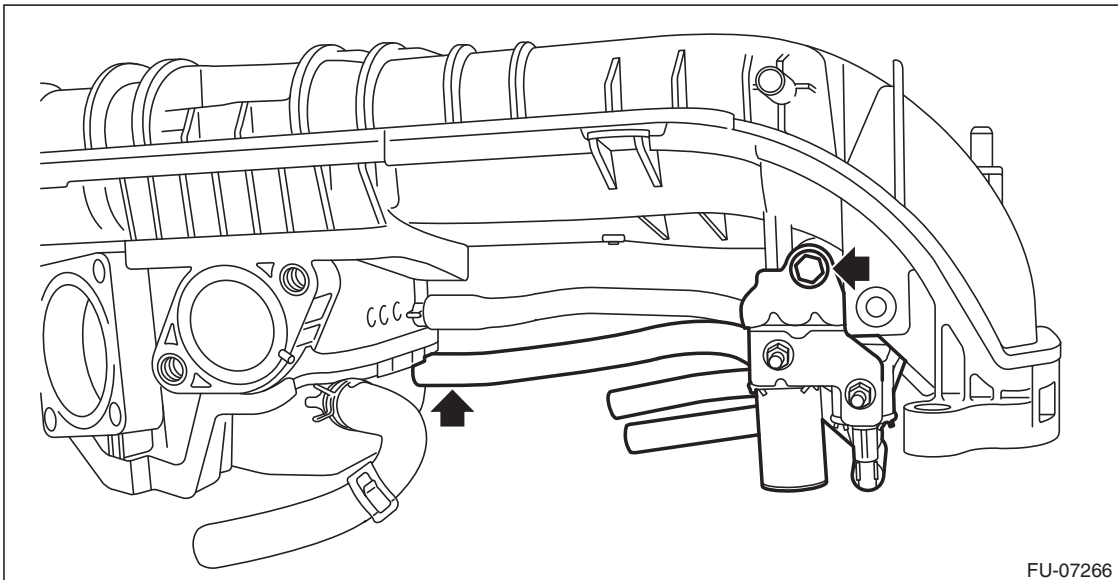
Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

- 3) Remove the throttle body from the intake manifold.



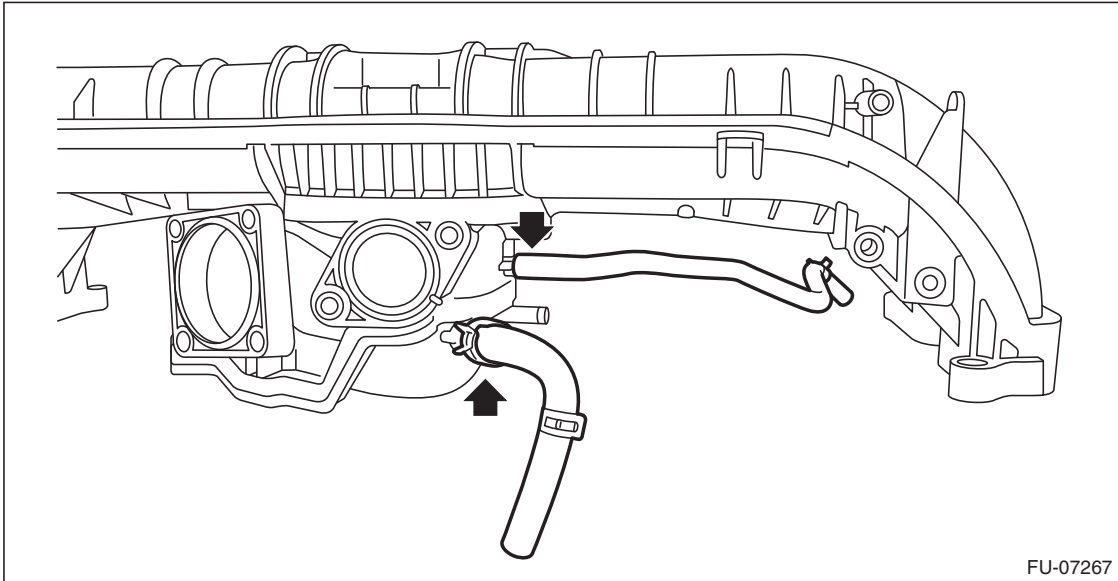
- 4) Disconnect the vacuum hose from the intake manifold, and remove the purge control solenoid valve.



Intake Manifold

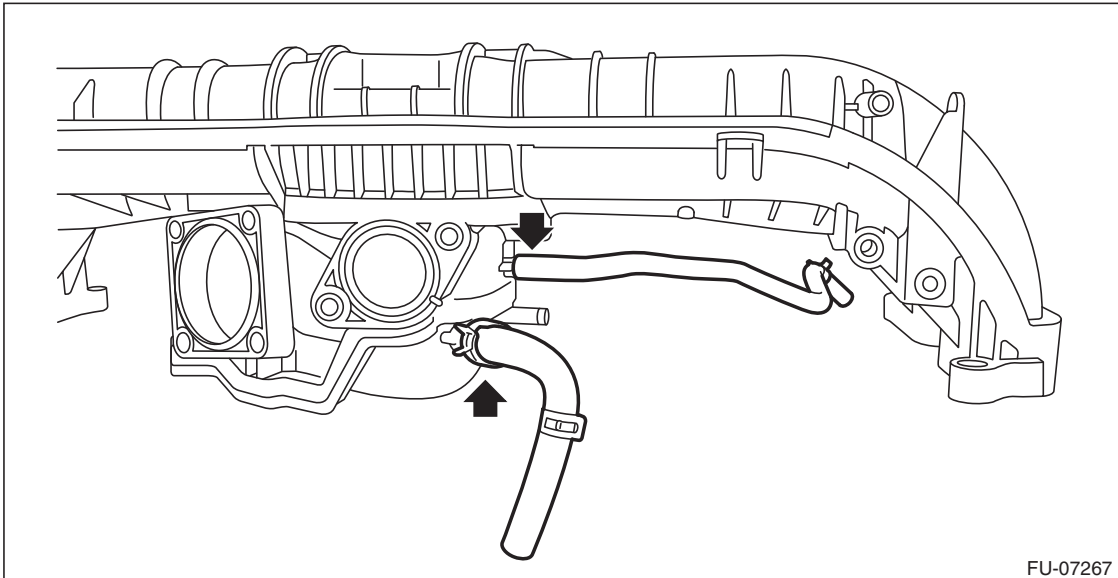
FUEL INJECTION (FUEL SYSTEMS)

- 5) Disconnect the PCV hose and vacuum control hose from the intake manifold.



D: ASSEMBLY

- 1) Connect the PCV hose and vacuum control hose to intake manifold.



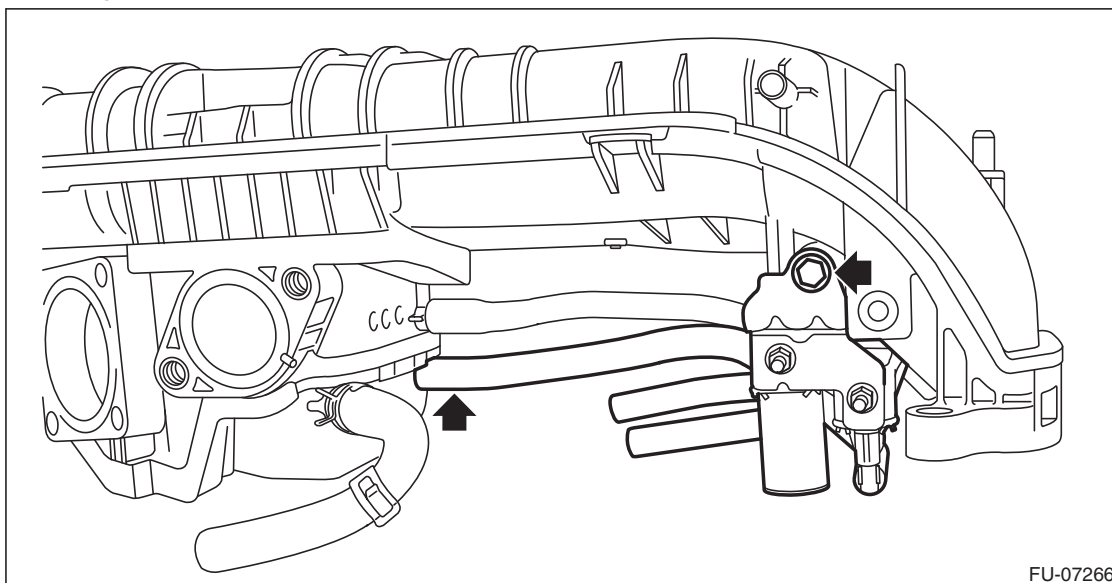
Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

2) Connect the vacuum hose to the intake manifold, and install the purge control solenoid valve.

Tightening torque:

19 N·m (1.9 kgf-m, 14.0 ft-lb)



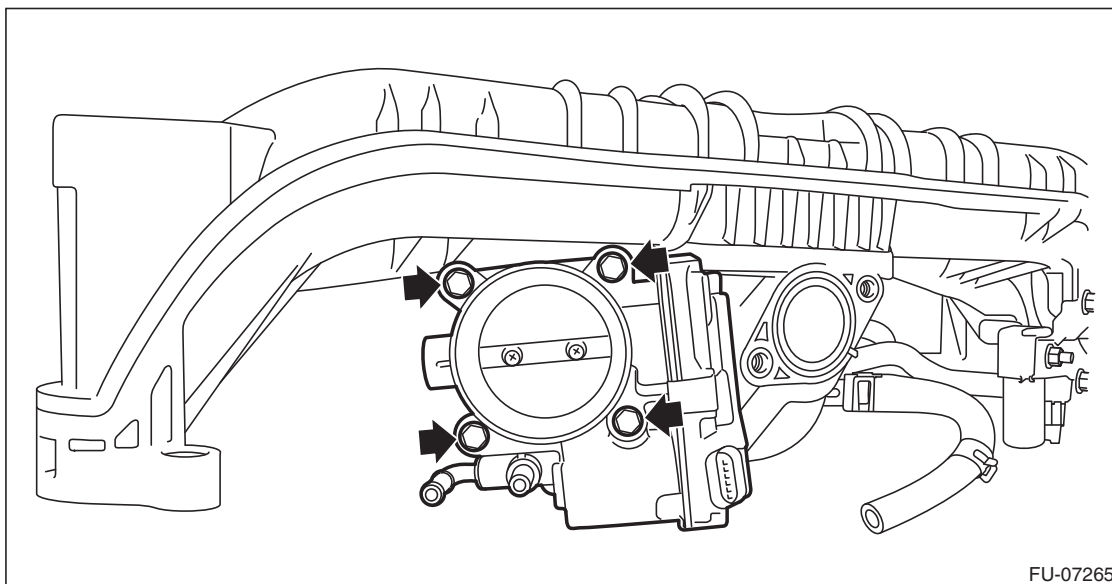
3) Install the throttle body to the intake manifold.

NOTE:

Use a new gasket.

Tightening torque:

8 N·m (0.8 kgf-m, 5.9 ft-lb)



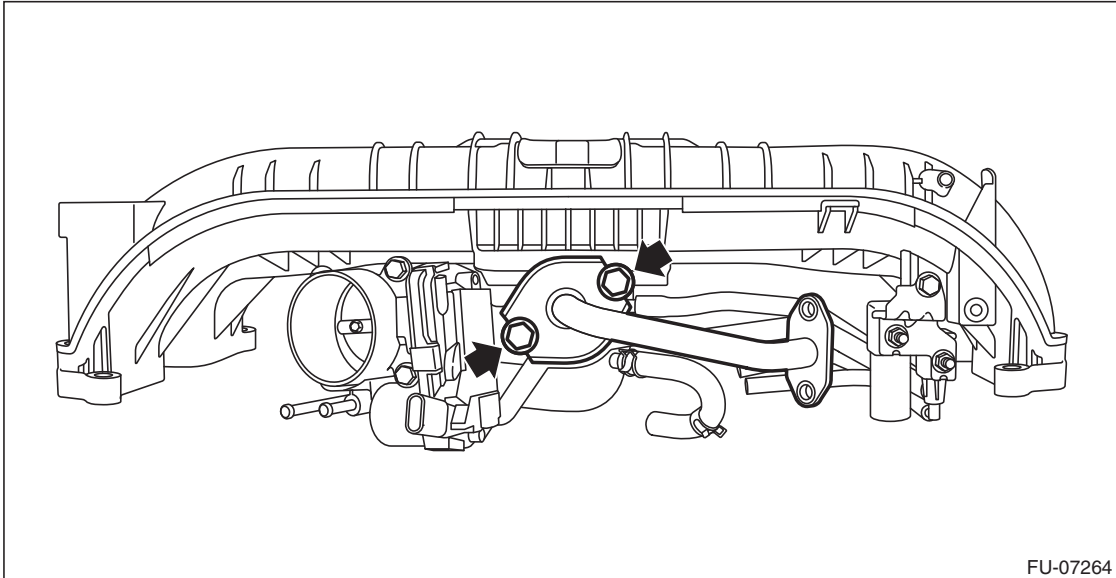
Intake Manifold

FUEL INJECTION (FUEL SYSTEMS)

4) Temporarily install the EGR pipe to the intake manifold.

NOTE:

- Use new O-rings.
- Tighten the EGR pipe when installing the intake manifold. <Ref. to EC(H4DOTC)-27, INSTALLATION, EGR Pipe.>



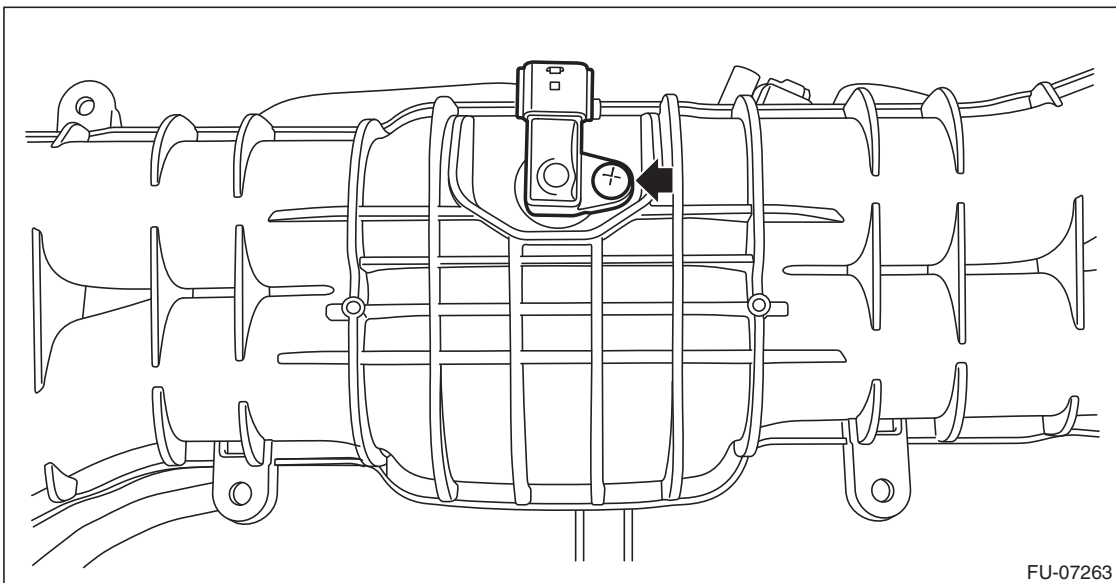
5) Install the manifold absolute pressure & intake air temperature sensor to the intake manifold.

NOTE:

Use new O-rings.

Tightening torque:

3.5 N·m (0.3 kgf-m, 2.5 ft-lb)



E: INSPECTION

- 1) Check that the intake manifold and fuel pipe have no deformation, cracks and other damages.
- 2) Check that the hose has no cracks, damage or loose part.

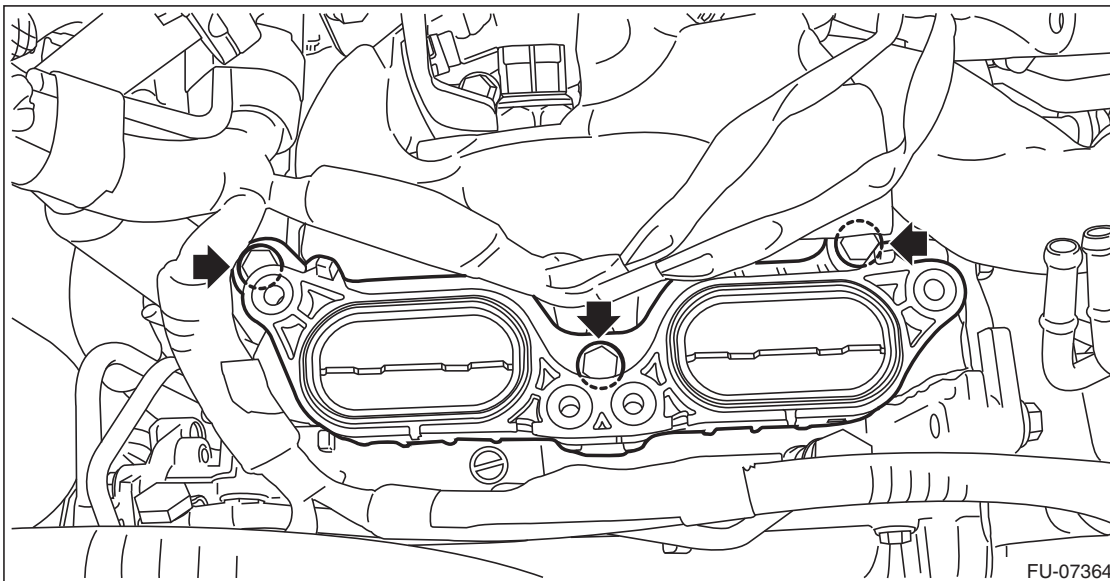
Tumble Generator Valve Assembly

FUEL INJECTION (FUEL SYSTEMS)

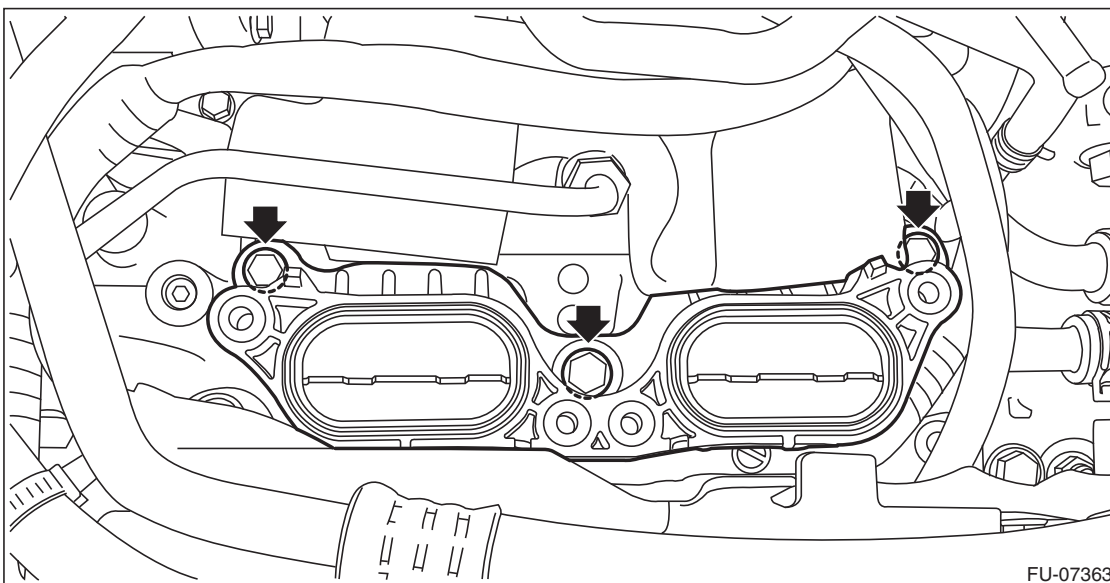
4. Tumble Generator Valve Assembly

A: REMOVAL

- 1) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
 - 2) Disconnect the ground cable from battery.
 - 3) Open the fuel filler lid and remove the fuel filler cap.
 - 4) Remove the intake manifold. <Ref. to FU(H4DOTC)-19, REMOVAL, Intake Manifold.>
 - 5) Remove the air intake adapter from the cylinder head.
- RH side



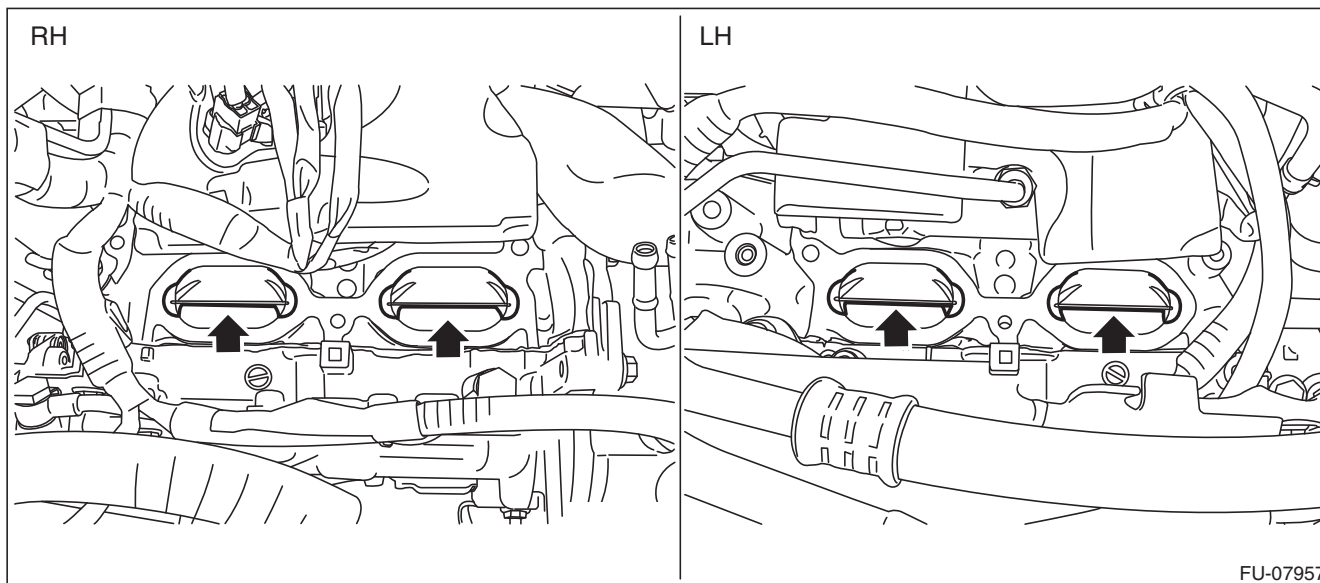
- LH side



Tumble Generator Valve Assembly

FUEL INJECTION (FUEL SYSTEMS)

6) Remove the cylinder head plate from cylinder head.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:

Use a new gasket.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

C: INSPECTION

- 1) Check that the tumble generator valve assembly or air intake adapter has no deformation, cracks or other damages.
- 2) Check tumble generator valve assembly or air intake adapter for contamination or clogging.

Tumble Generator Valve Actuator

FUEL INJECTION (FUEL SYSTEMS)

5. Tumble Generator Valve Actuator

A: SPECIFICATION

The tumble generator valve assembly cannot be disassembled.

Refer to "Tumble Generator Valve Assembly" for removal and installation procedures. <Ref. to FU(H4DOTC)-43, REMOVAL, Tumble Generator Valve Assembly.> <Ref. to FU(H4DOTC)-44, INSTALLATION, Tumble Generator Valve Assembly.>

Fuel Insulator

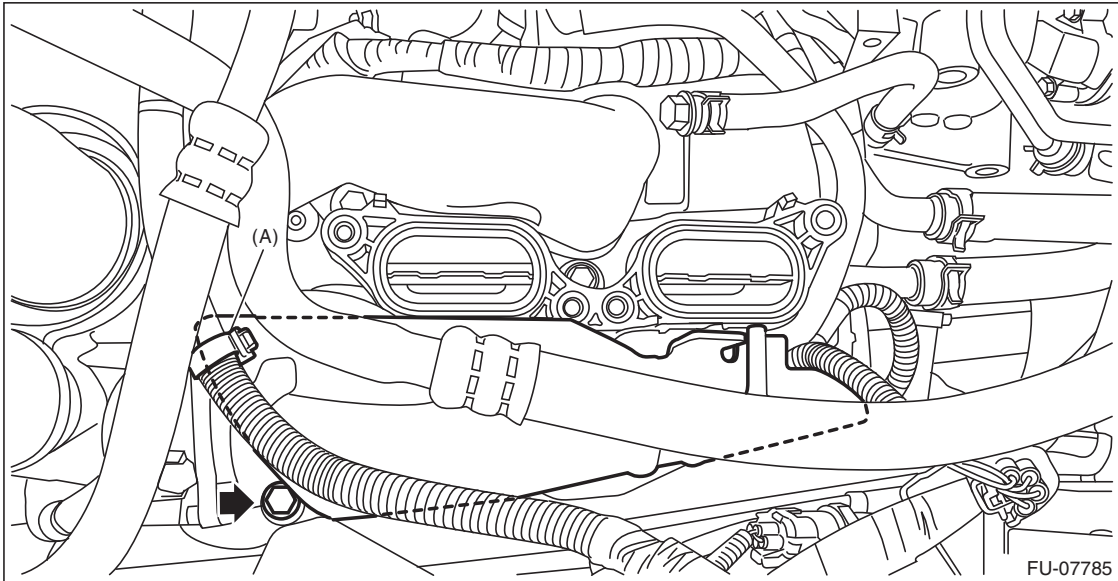
FUEL INJECTION (FUEL SYSTEMS)

6. Fuel Insulator

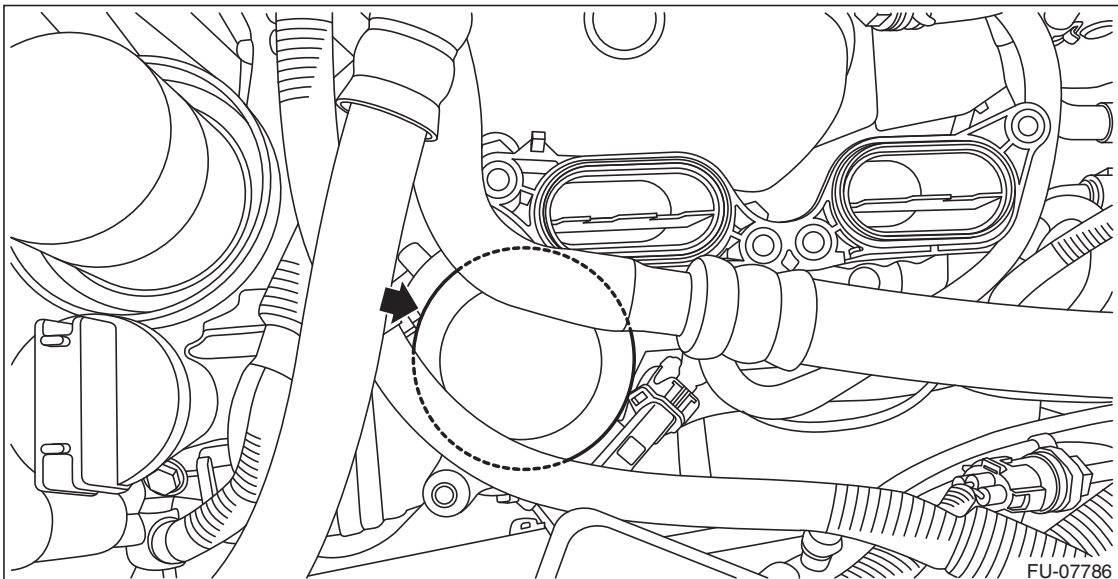
A: REMOVAL

1. FUEL PUMP INSULATOR

- 1) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 2) Disconnect the ground cable from battery.
- 3) Open the fuel filler lid and remove the fuel filler cap.
- 4) Remove the intake manifold. <Ref. to FU(H4DOTC)-19, REMOVAL, Intake Manifold.>
- 5) Remove the clip (A) on the generator cord, and remove the fuel pipe protector.



- 6) Remove the fuel pump insulator.

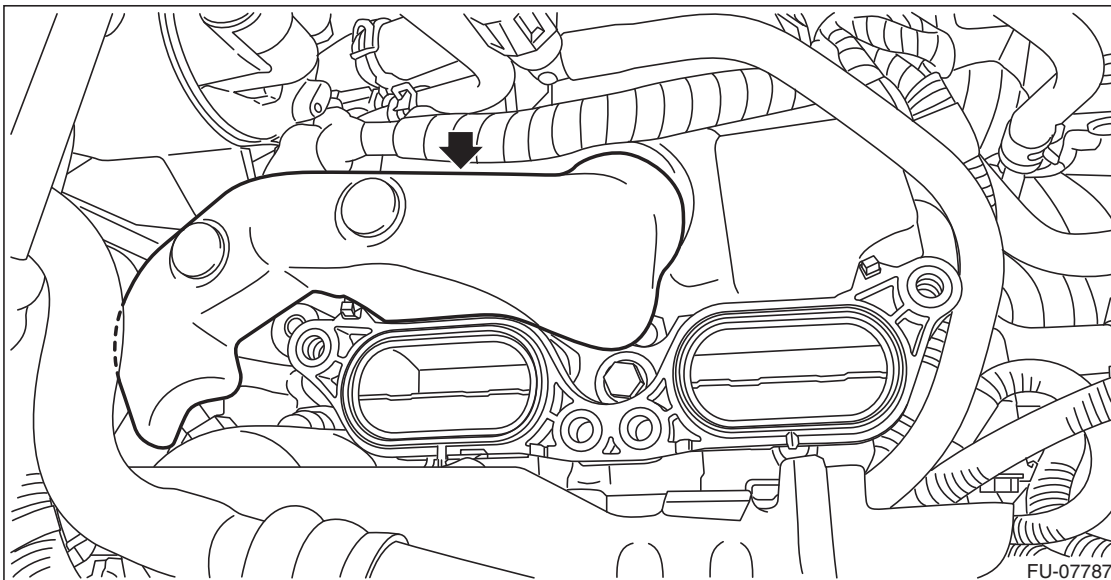


Fuel Insulator

FUEL INJECTION (FUEL SYSTEMS)

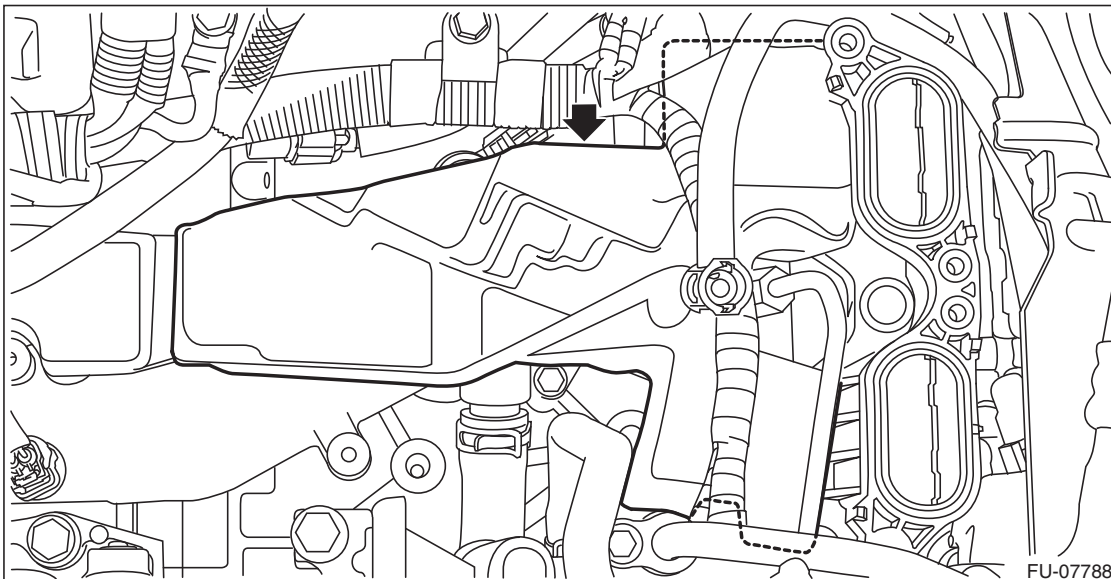
2. FUEL PIPE INSULATOR NO. 1

- 1) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, DRAINING FUEL (WITH SUBARU SELECT MONITOR), PROCEDURE, Fuel.>
- 2) Disconnect the ground cable from battery.
- 3) Open the fuel filler lid and remove the fuel filler cap.
- 4) Remove the intake manifold. <Ref. to FU(H4DOTC)-19, REMOVAL, Intake Manifold.>
- 5) Remove the fuel pipe insulator No. 1.



3. FUEL PIPE INSULATOR NO. 2

- 1) Remove the fuel pipe insulator No. 1. <Ref. to FU(H4DOTC)-47, FUEL PIPE INSULATOR NO. 1, REMOVAL, Fuel Insulator.>
- 2) Remove the fuel pipe insulator No. 2.

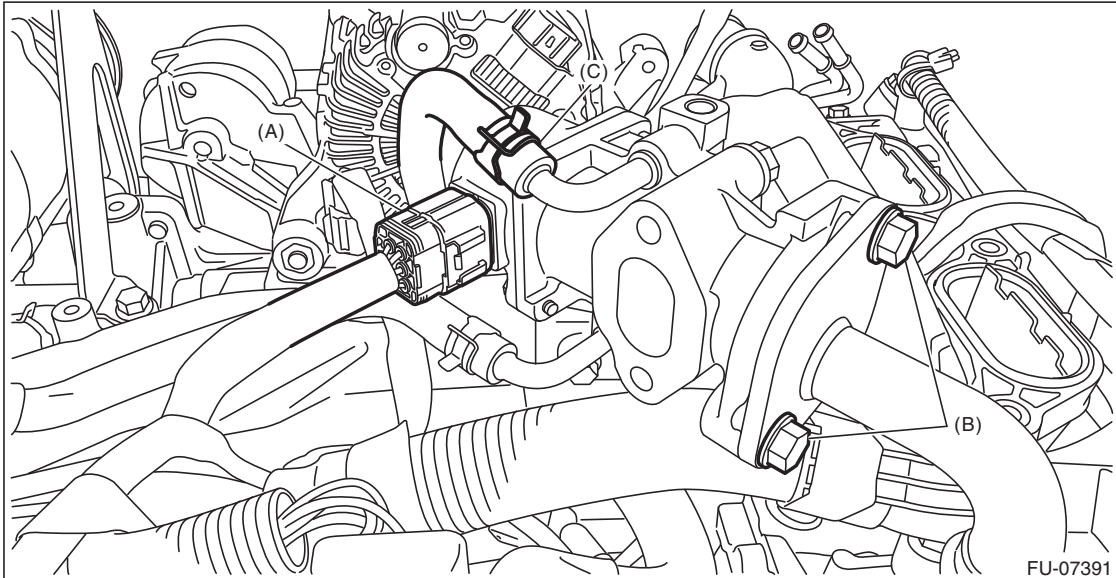


Fuel Insulator

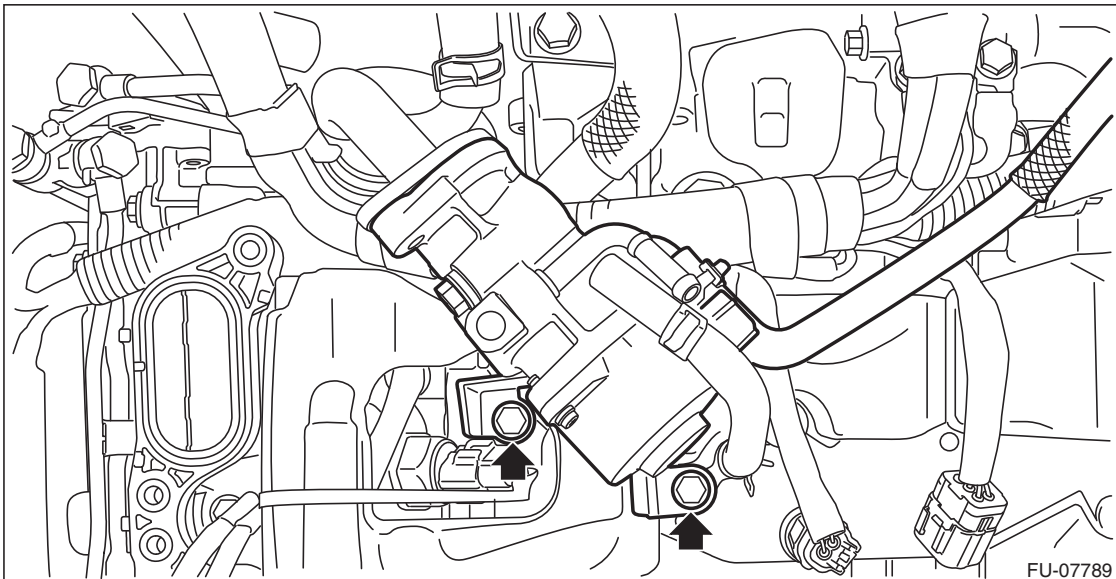
FUEL INJECTION (FUEL SYSTEMS)

4. FUEL PIPE INSULATOR NO. 3

- 1) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, DRAINING FUEL (WITH SUBARU SELECT MONITOR), PROCEDURE, Fuel.>
- 2) Disconnect the ground cable from battery.
- 3) Open the fuel filler lid and remove the fuel filler cap.
- 4) Remove the intake manifold. <Ref. to FU(H4DOTC)-19, REMOVAL, Intake Manifold.>
- 5) Disconnect the connector (A) from the EGR control valve.
- 6) Remove the bolts (B) securing the EGR cooler to the EGR control valve.
- 7) Remove the preheater hose (C) from the EGR control valve.



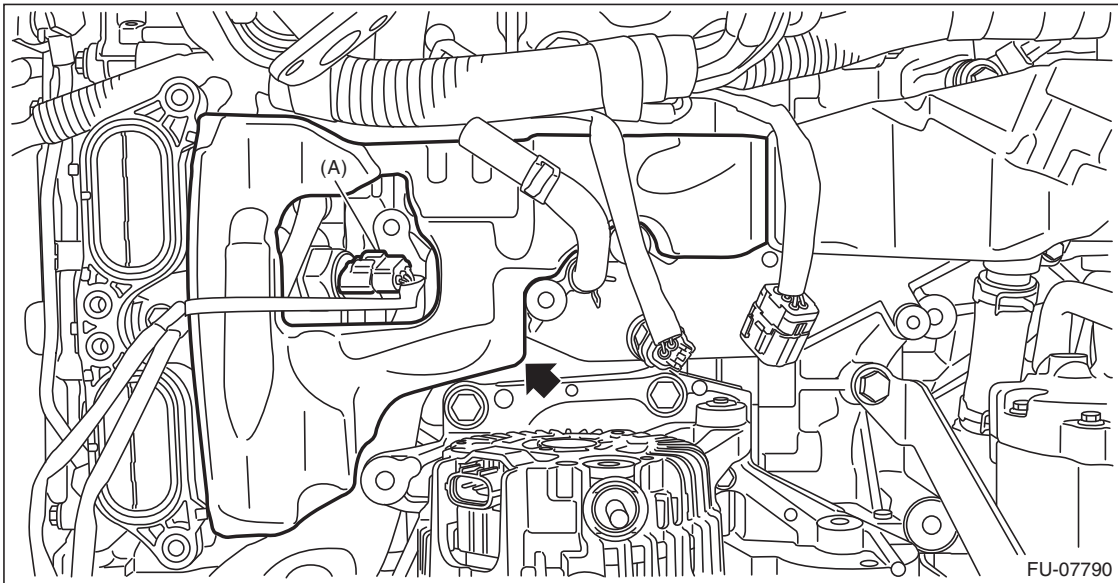
- 8) Remove the EGR control valve.



Fuel Insulator

FUEL INJECTION (FUEL SYSTEMS)

- 9) Disconnect the connector (A) on the fuel pressure sensor, and remove the fuel pipe insulator No. 3.



B: INSTALLATION

1. FUEL PUMP INSULATOR

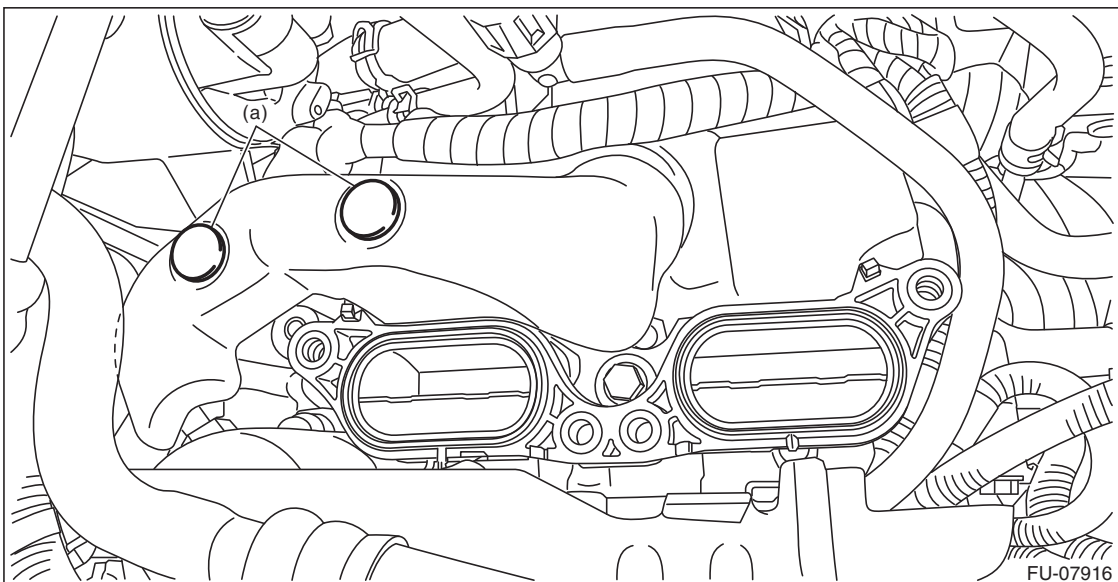
Install in the reverse order of removal.

2. FUEL PIPE INSULATOR NO. 1

Install in the reverse order of removal.

NOTE:

Push the sections (a) for the fuel pipe insulator No. 1, and secure them to the high-pressure fuel delivery pipe.



Fuel Insulator

FUEL INJECTION (FUEL SYSTEMS)

3. FUEL PIPE INSULATOR NO. 2

Install in the reverse order of removal.

4. FUEL PIPE INSULATOR NO. 3

Install in the reverse order of removal.

NOTE:

Use a new gasket.

Tightening torque:

19 N·m (1.9 kgf-m, 14.0 ft-lb)

C: INSPECTION

Check that the fuel insulator has no deformation, cracks or other damages.

7. Fuel Injector

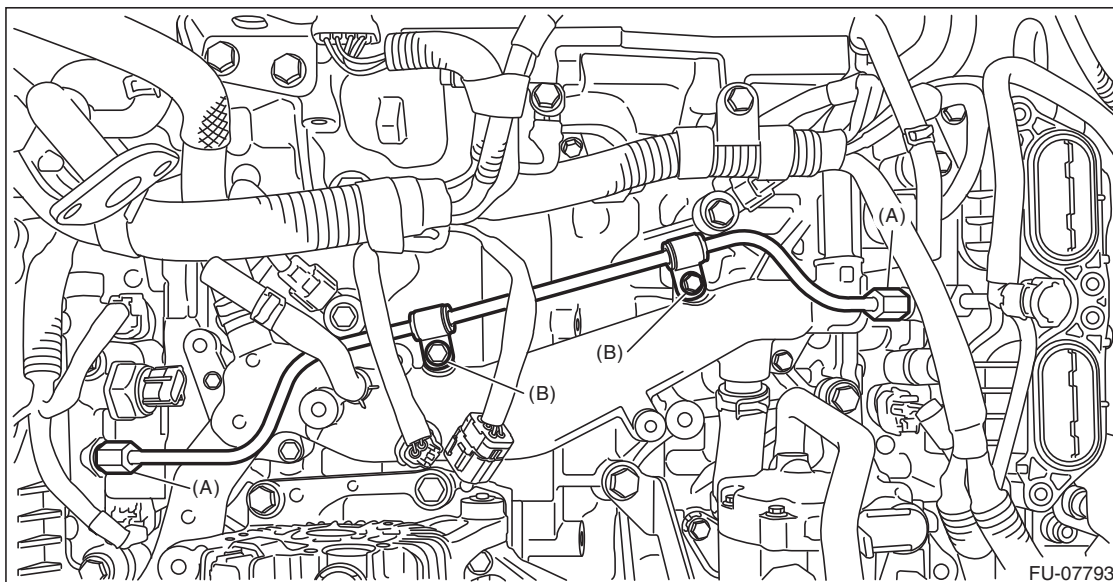
A: REMOVAL

1. FUEL INJECTOR RH

CAUTION:

- Be careful not to spill fuel.
- Catch the fuel from the pipes using a container or cloth.

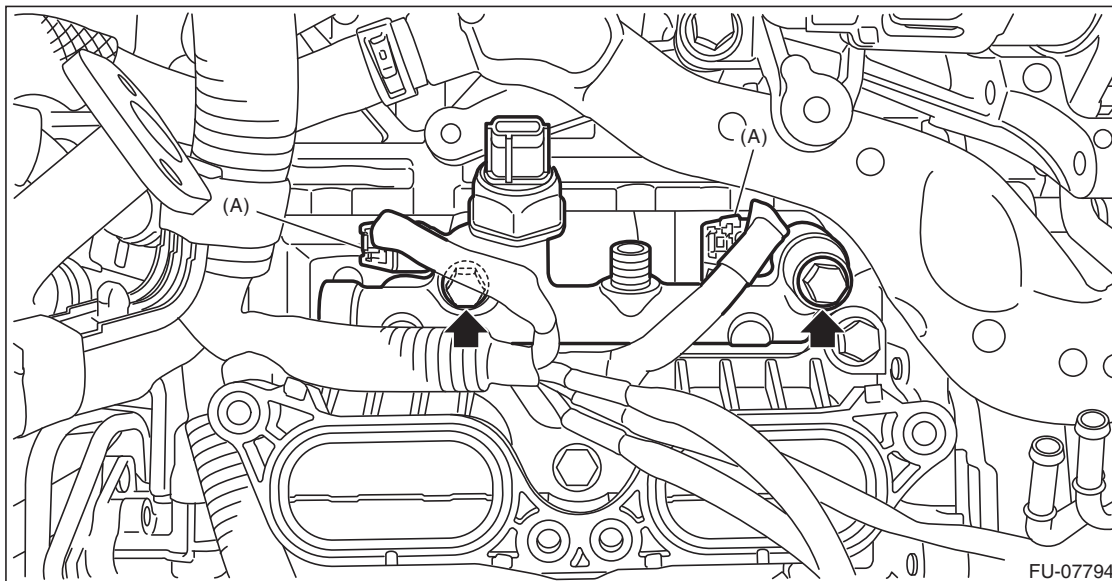
- 1) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 2) Disconnect the ground cable from battery.
- 3) Open the fuel filler lid and remove the fuel filler cap.
- 4) Remove the intake manifold. <Ref. to FU(H4DOTC)-19, REMOVAL, Intake Manifold.>
- 5) Remove the fuel pipe insulator No. 1. <Ref. to FU(H4DOTC)-47, FUEL PIPE INSULATOR NO. 1, REMOVAL, Fuel Insulator.>
- 6) Remove the fuel pipe insulator No. 2. <Ref. to FU(H4DOTC)-47, FUEL PIPE INSULATOR NO. 2, REMOVAL, Fuel Insulator.>
- 7) Remove the fuel pipe insulator No. 3. <Ref. to FU(H4DOTC)-48, FUEL PIPE INSULATOR NO. 3, REMOVAL, Fuel Insulator.>
- 8) Remove the flare nut (A) and bolt (B), and then remove the high-pressure fuel delivery pipe assembly.



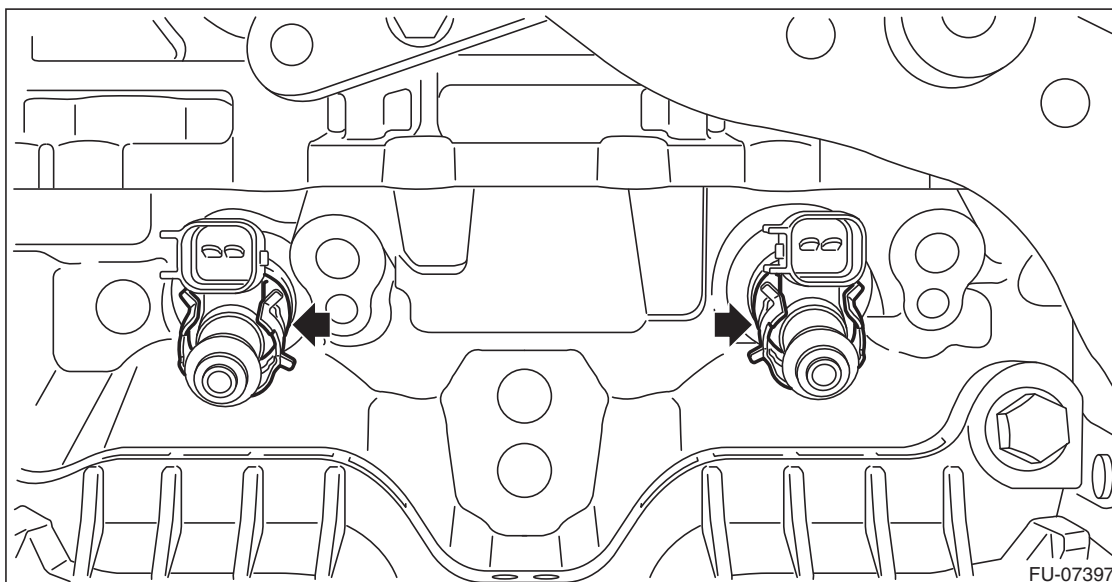
Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

- 9) Disconnect the connector (A) from fuel injector, and remove the fuel injector pipe.



- 10) Remove the holder from the fuel injector.



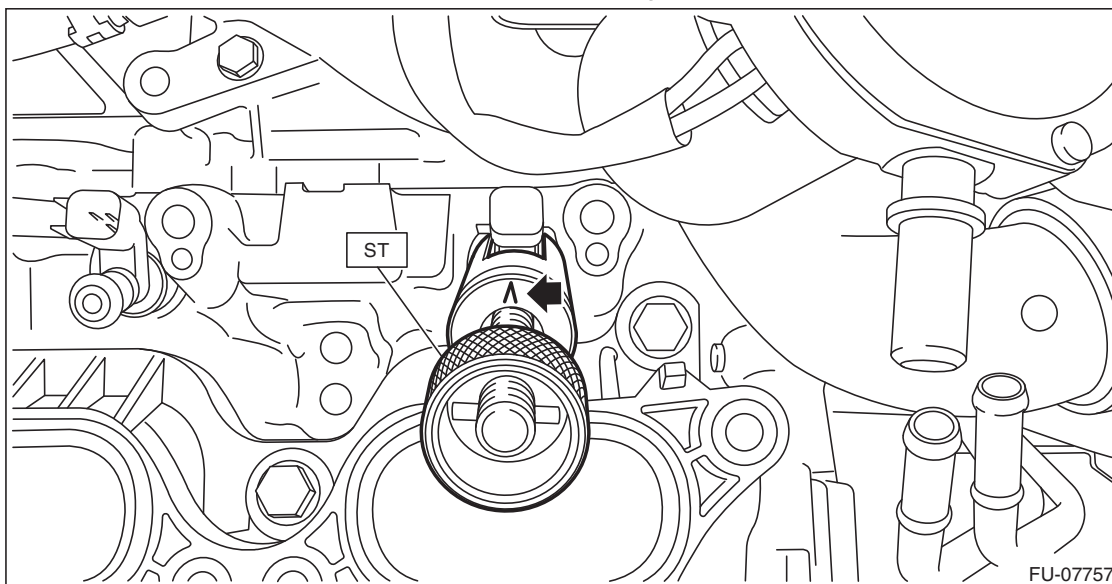
Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

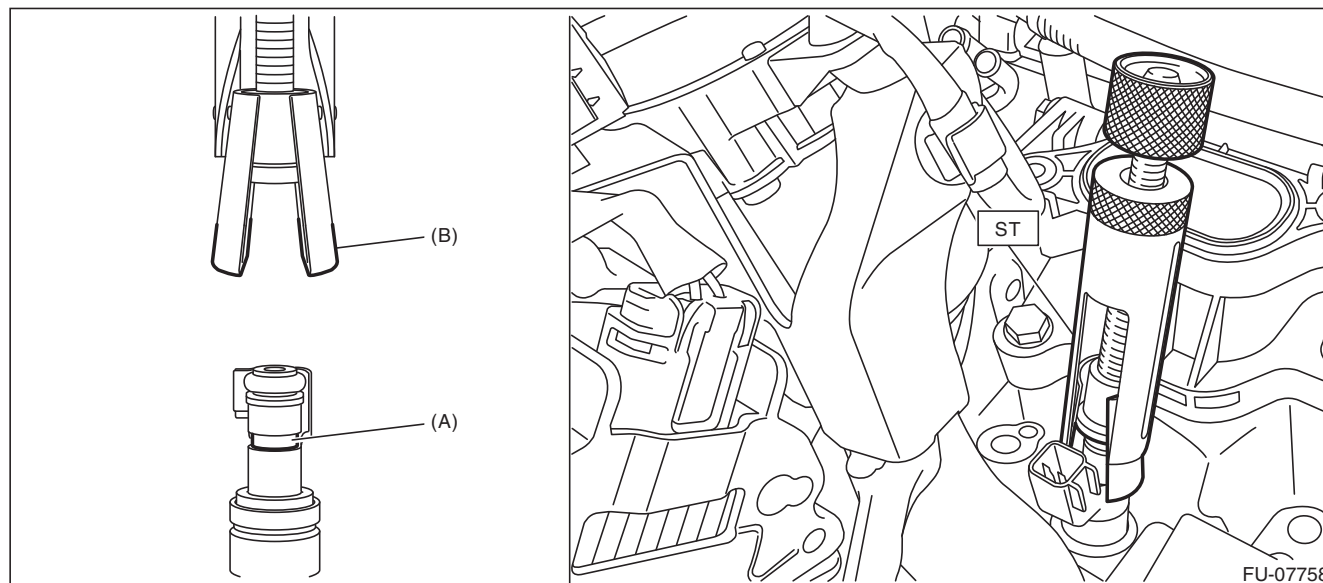
11) Using ST, remove the fuel injector from the cylinder head.

ST 18356AA000 REMOVER INJECTOR

(1) Set the ST so that its mark faces the center of the engine.



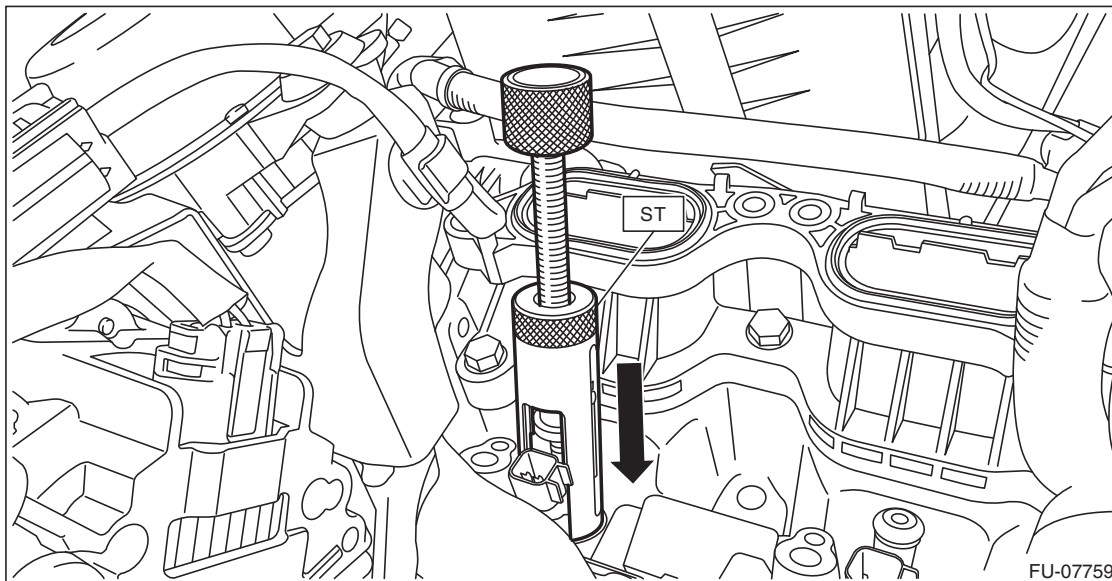
(2) Pinch the fuel injector groove (A) with the claw section (B) of ST.



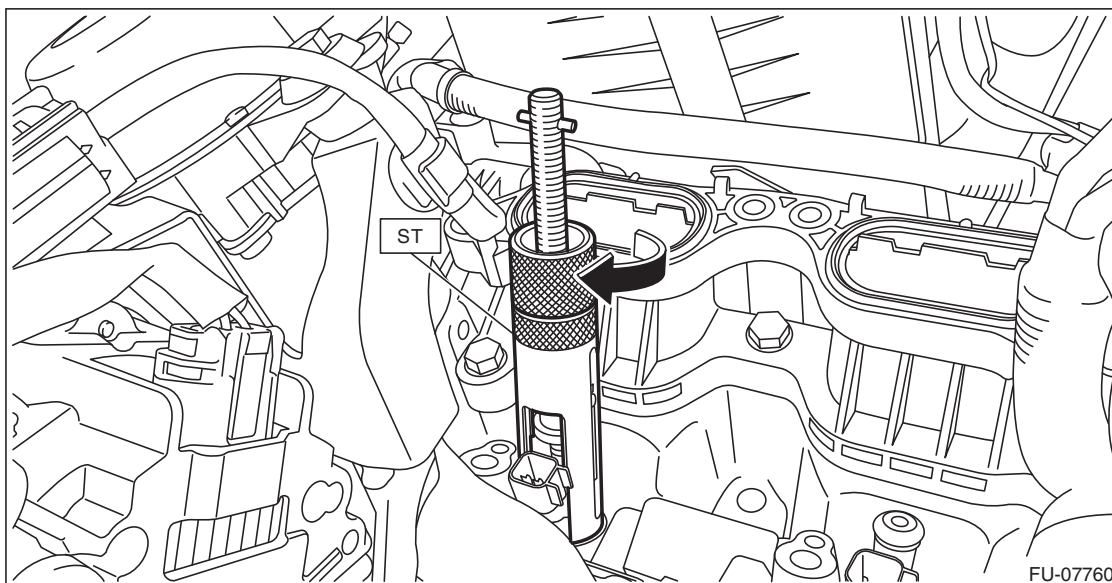
Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

- (3) Press the ST to the cylinder head.



- (4) Screw in the threaded section of the ST clockwise, and remove the fuel injector from the cylinder head.

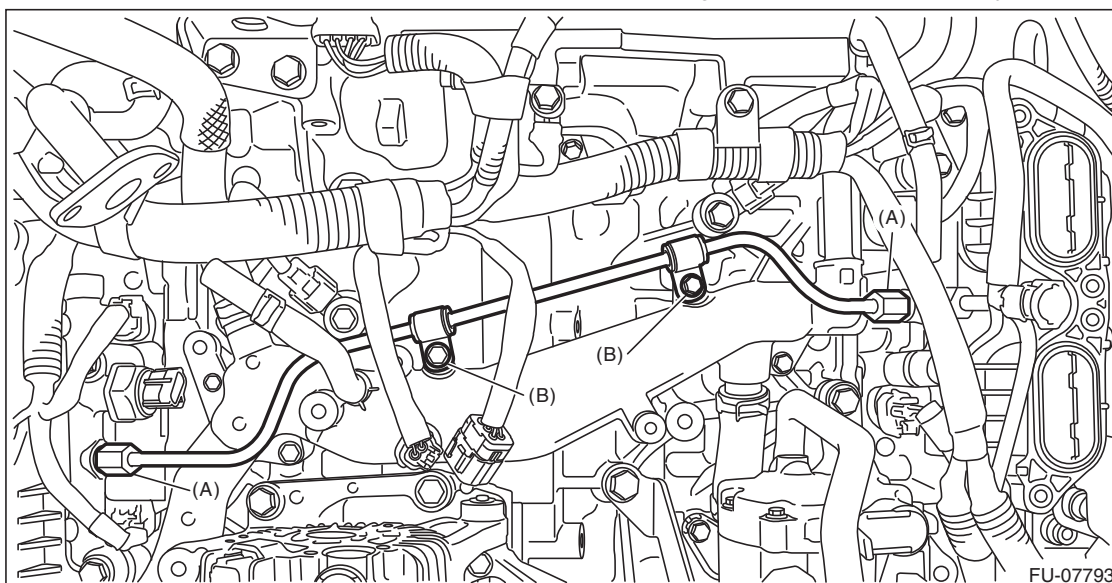


Fuel Injector

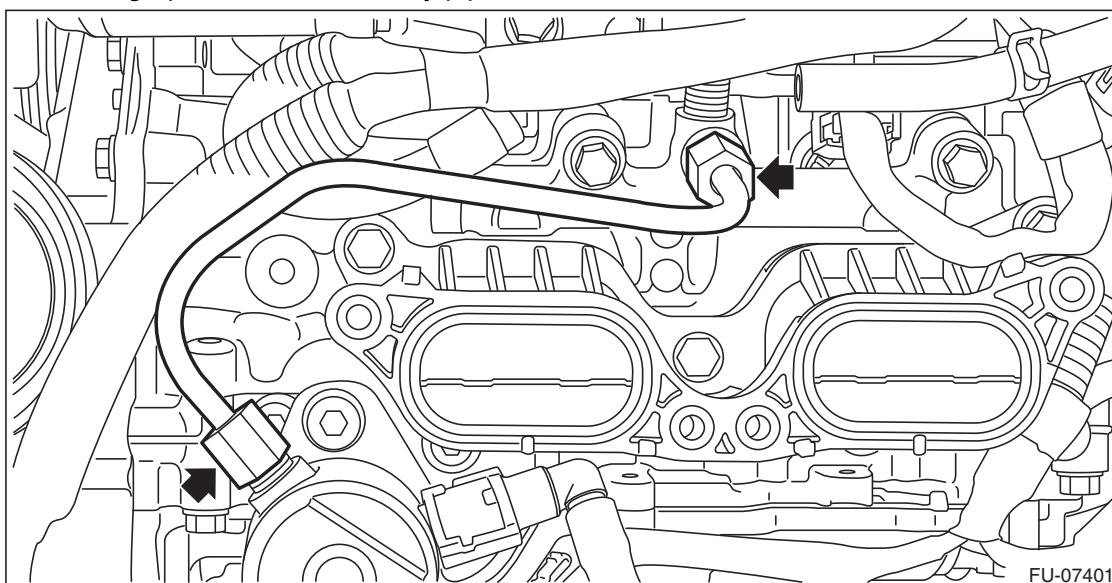
FUEL INJECTION (FUEL SYSTEMS)

2. FUEL INJECTOR LH

- 1) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 2) Disconnect the ground cable from battery.
- 3) Open the fuel filler lid and remove the fuel filler cap.
- 4) Remove the intake manifold. <Ref. to FU(H4DOTC)-19, REMOVAL, Intake Manifold.>
- 5) Remove the fuel pump insulator. <Ref. to FU(H4DOTC)-46, FUEL PUMP INSULATOR, REMOVAL, Fuel Insulator.>
- 6) Remove the fuel pipe insulator No. 1. <Ref. to FU(H4DOTC)-47, FUEL PIPE INSULATOR NO. 1, REMOVAL, Fuel Insulator.>
- 7) Remove the fuel pipe insulator No. 2. <Ref. to FU(H4DOTC)-47, FUEL PIPE INSULATOR NO. 2, REMOVAL, Fuel Insulator.>
- 8) Remove the fuel pipe insulator No. 3. <Ref. to FU(H4DOTC)-48, FUEL PIPE INSULATOR NO. 3, REMOVAL, Fuel Insulator.>
- 9) Remove the flare nut (A) and bolt (B), and then remove the high-pressure fuel delivery pipe assembly.



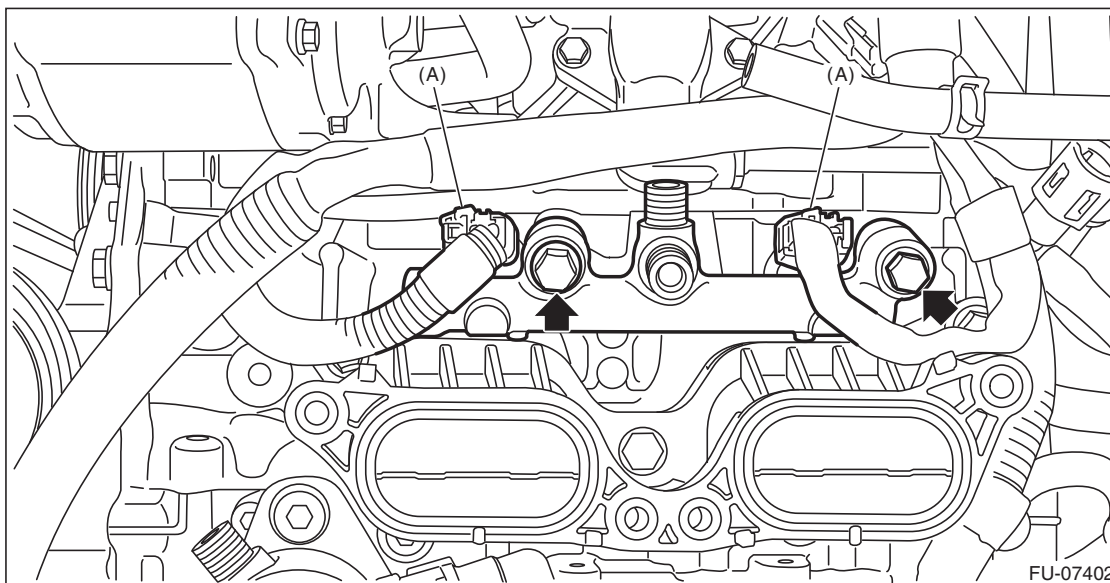
- 10) Remove the high-pressure fuel delivery pipes.



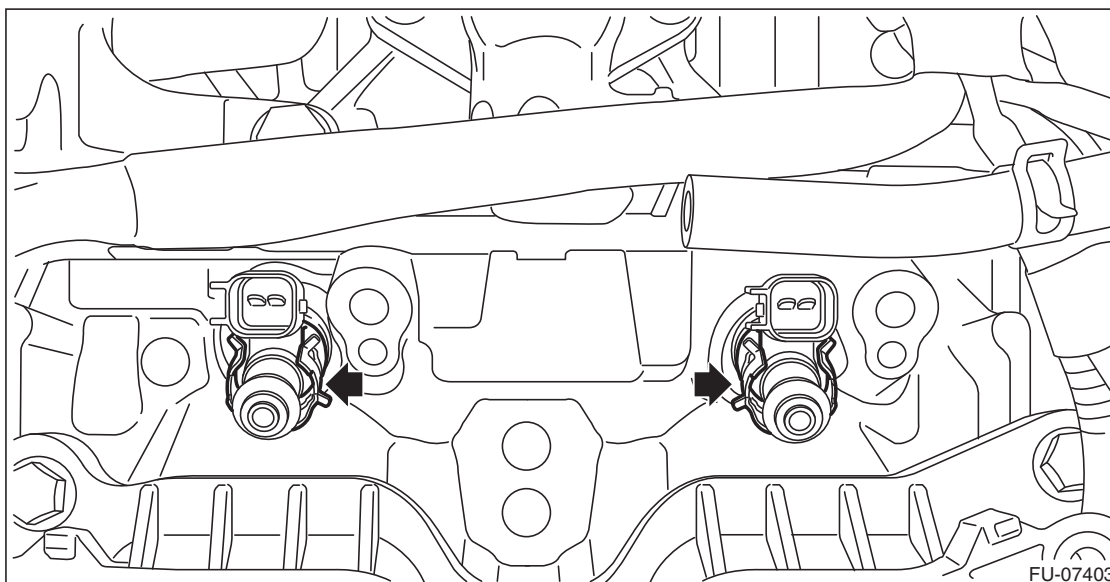
Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

- 11) Disconnect the connector (A) from fuel injector, and remove the fuel injector pipe LH.



- 12) Remove the holder from the fuel injector.



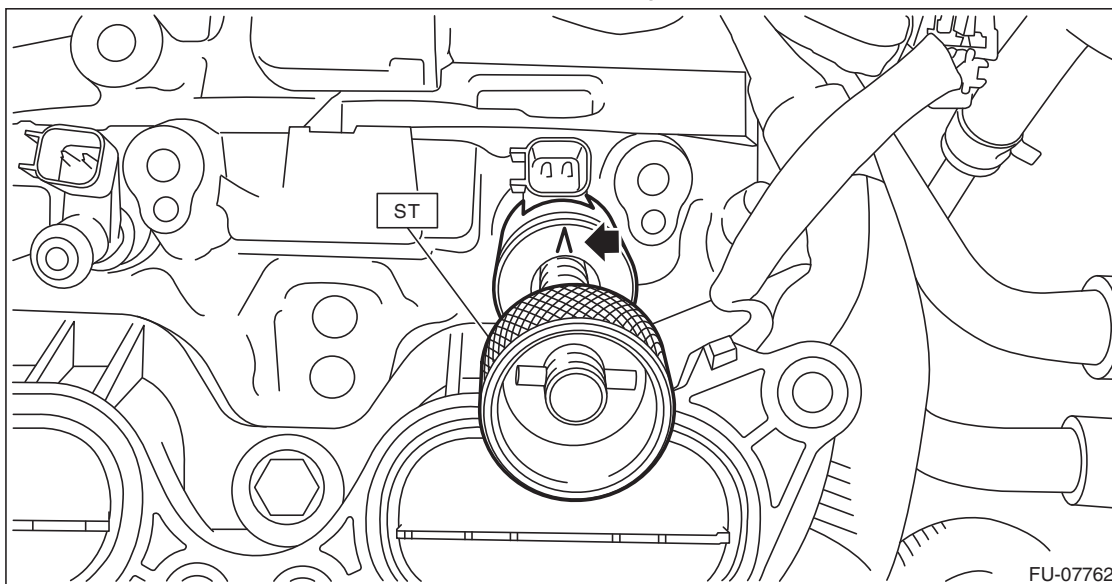
Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

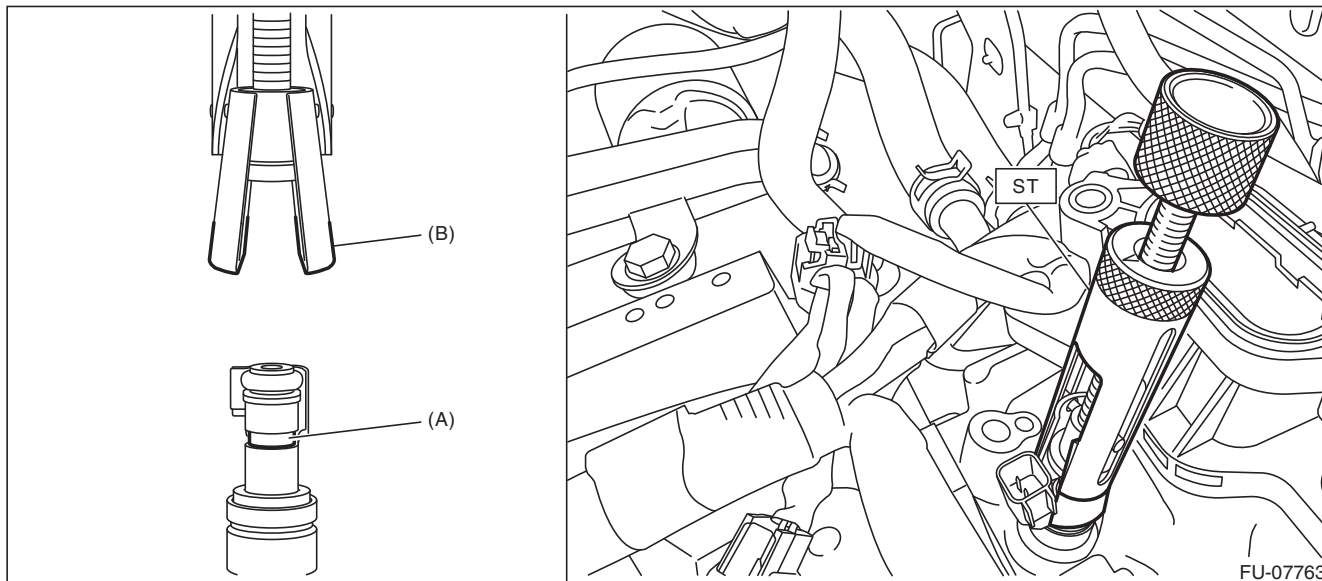
13) Using ST, remove the fuel injector from the cylinder head.

ST 18356AA000 REMOVER INJECTOR

(1) Set the ST so that its mark faces the center of the engine.



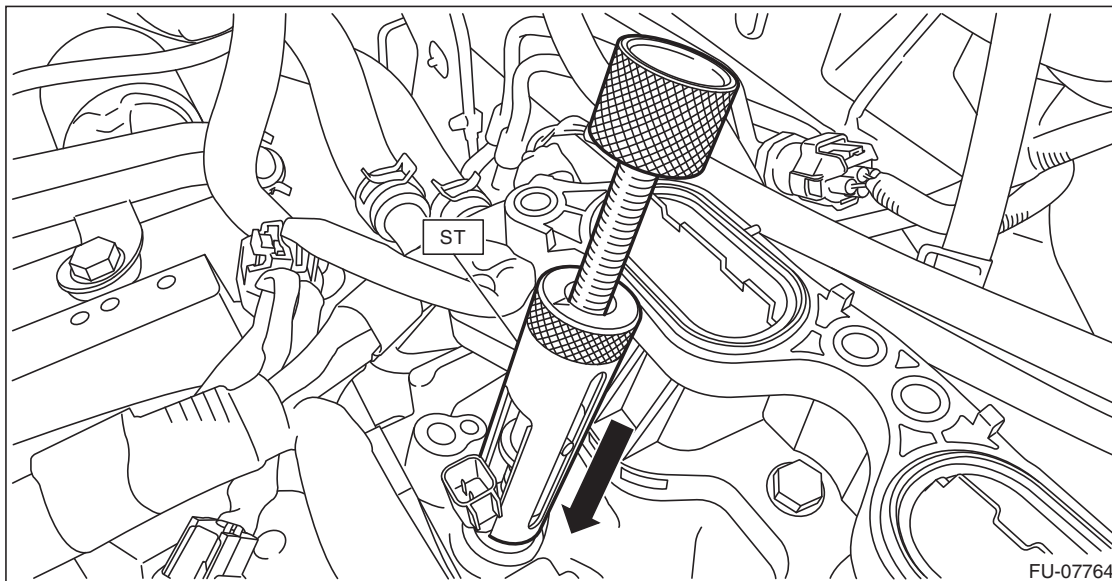
(2) Pinch the fuel injector groove (A) with the claw section (B) of ST.



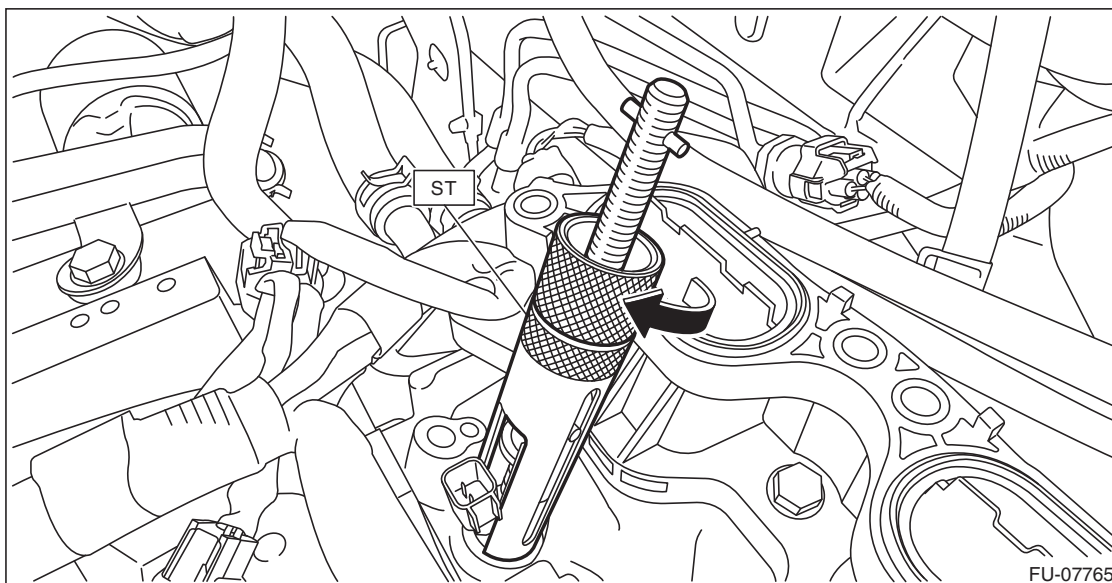
Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

- (3) Press the ST to the cylinder head.



- (4) Screw in the threaded section of the ST clockwise, and remove the fuel injector from the cylinder head.



Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

B: INSTALLATION

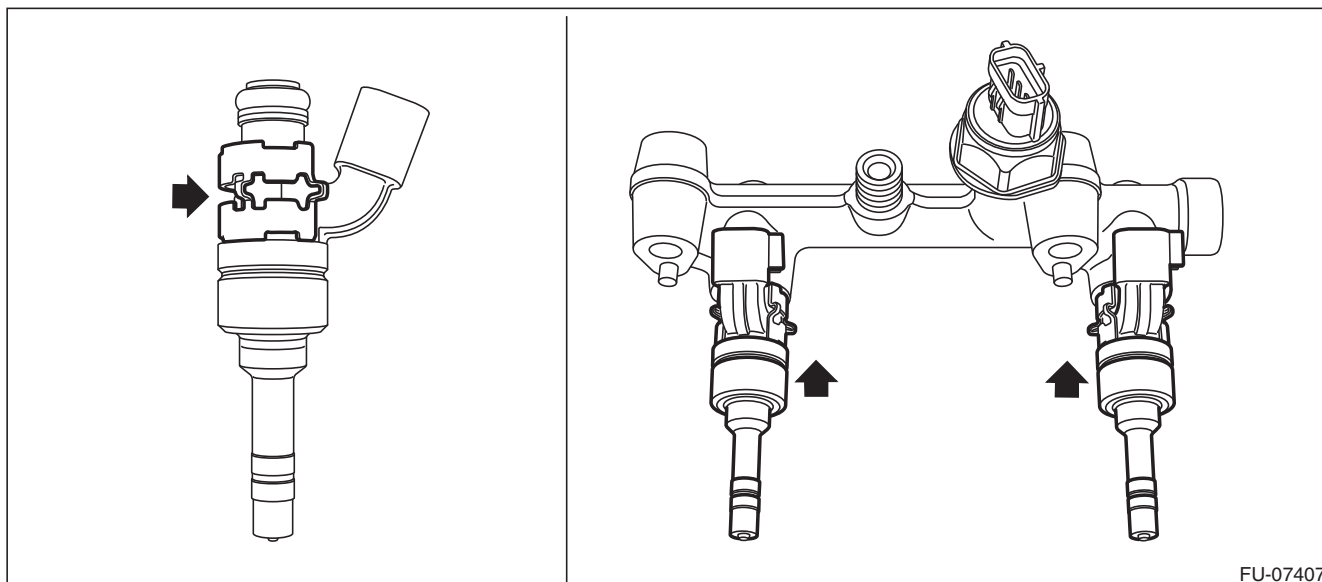
1. FUEL INJECTOR RH

1) Replace injector seal, retainer, and O-ring with a new part. <Ref. to FU(H4DOTC)-64, REPLACEMENT, Fuel Injector.>

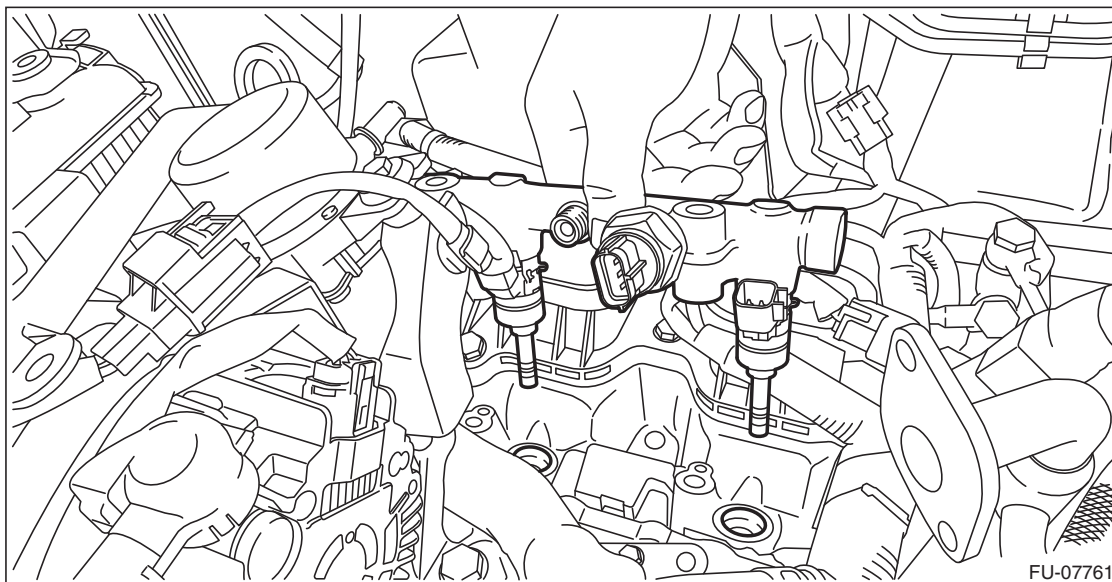
2) Set the holder to the fuel injector, and install it to the fuel injector pipe RH.

NOTE:

Use a new holder.



3) Install the fuel injector pipe RH and fuel injector as a single unit to the cylinder head.



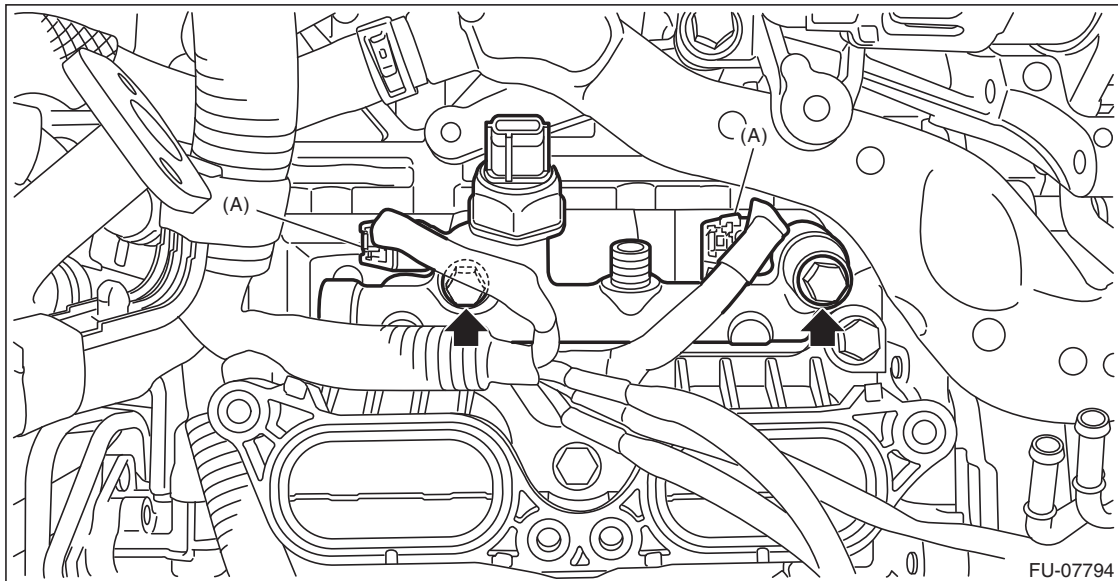
Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

4) Tighten the bolt on fuel pipe RH, and connect the connector (A) to the fuel injector.

Tightening torque:

19 N·m (1.9 kgf-m, 14.0 ft-lb)



5) Install the high-pressure fuel delivery pipe assembly.

NOTE:

Use a new high-pressure fuel delivery pipe assembly.

(1) Temporarily install the flare nuts (A) to the fuel pipe, and secure the high-pressure fuel delivery pipe assembly to the cylinder block using bolts (B).

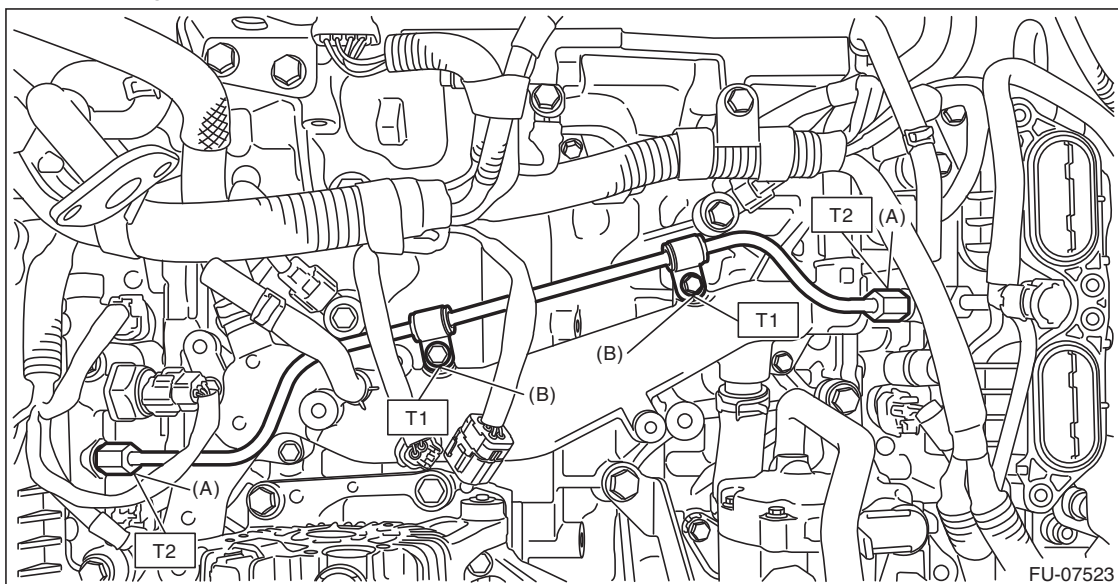
Tightening torque:

T1: 6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

(2) Tighten the flare nuts on both ends (A).

Tightening torque:

T2: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



6) Install the fuel pipe insulator No. 3. <Ref. to FU(H4DOTC)-50, FUEL PIPE INSULATOR NO. 3, INSTALLATION, Fuel Insulator.>

Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

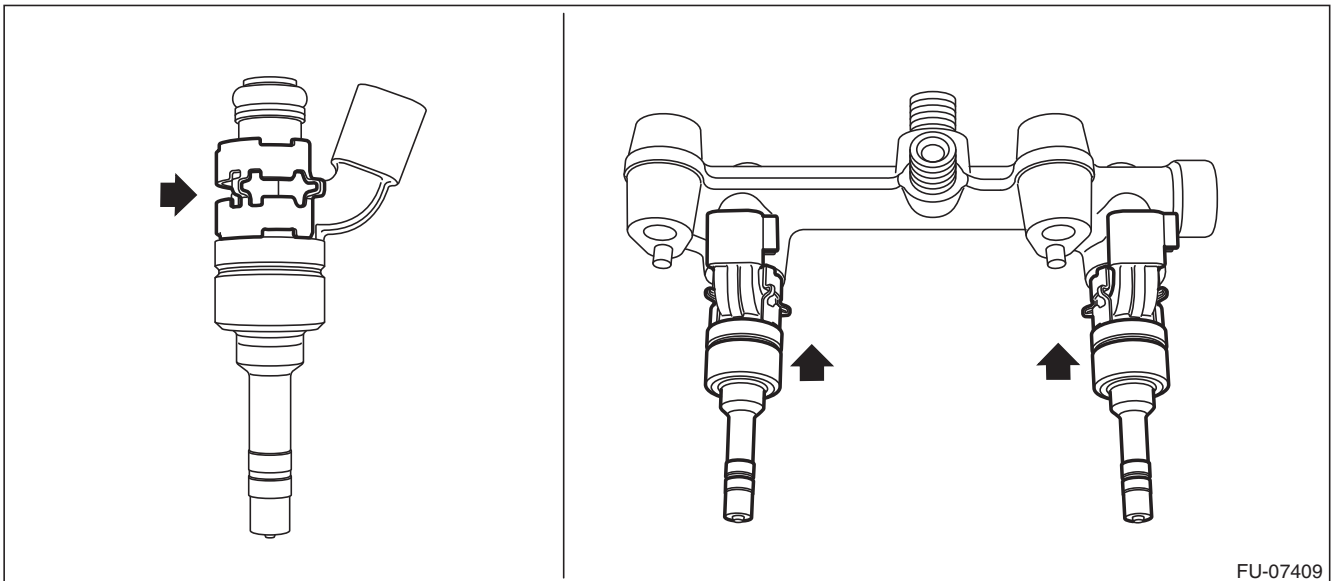
- 7) Install the fuel pipe insulator No. 2. <Ref. to FU(H4DOTC)-50, FUEL PIPE INSULATOR NO. 2, INSTALLATION, Fuel Insulator.>
- 8) Install the fuel pipe insulator No. 1. <Ref. to FU(H4DOTC)-49, FUEL PIPE INSULATOR NO. 1, INSTALLATION, Fuel Insulator.>
- 9) Install the intake manifold. <Ref. to FU(H4DOTC)-29, INSTALLATION, Intake Manifold.>
- 10) Connect the battery ground terminal.

2. FUEL INJECTOR LH

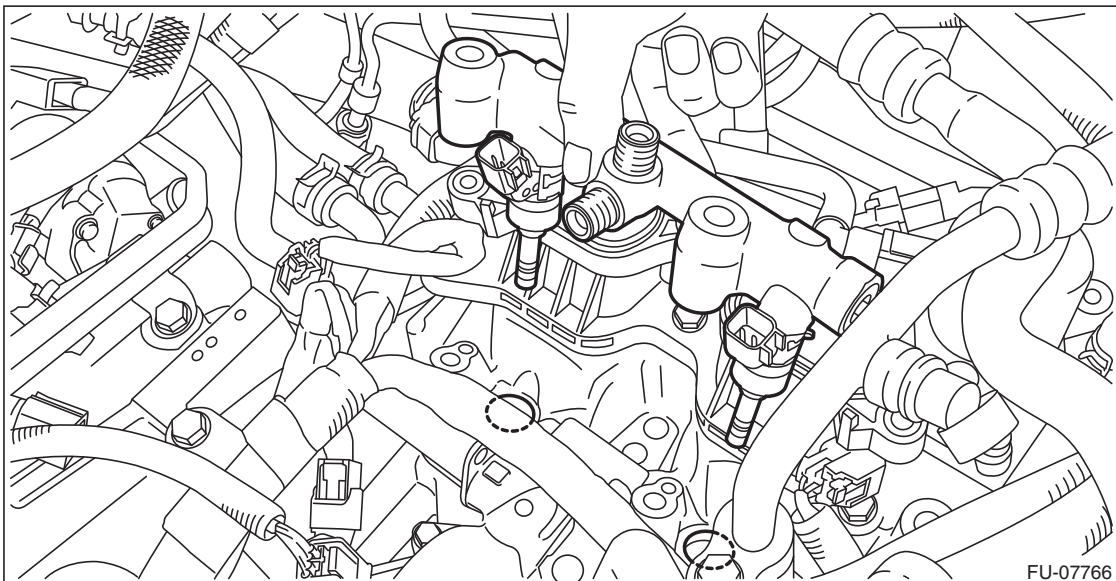
- 1) Replace injector seal, retainer, and O-ring with a new part. <Ref. to FU(H4DOTC)-64, REPLACEMENT, Fuel Injector.>
- 2) Set the holder to the fuel injector, and install it to the fuel injector pipe LH.

NOTE:

Use a new holder.



- 3) Install the fuel injector pipe LH and fuel injector as a single unit to the cylinder head.



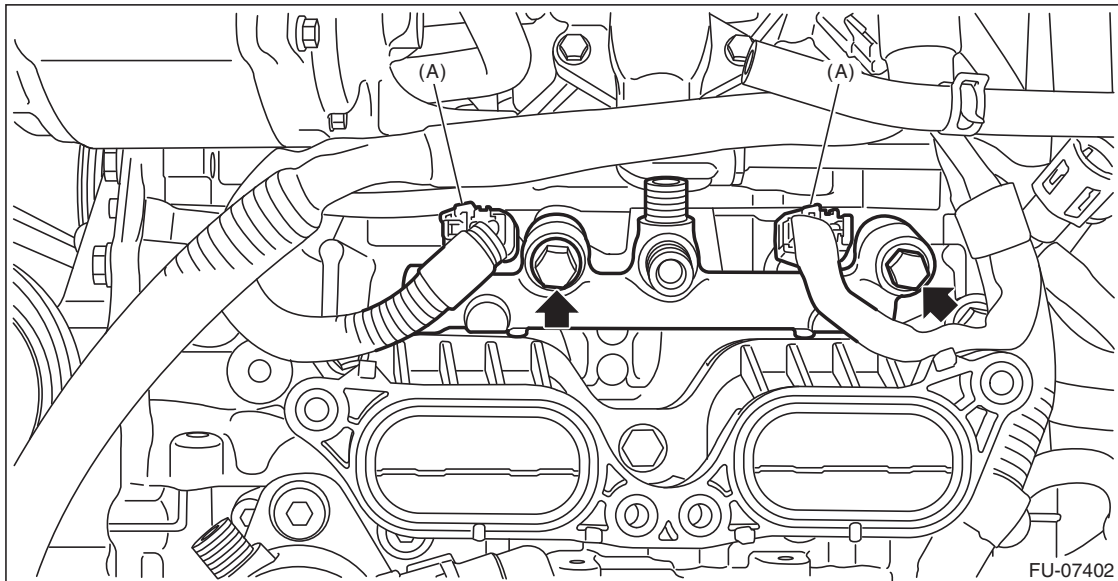
Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

4) Tighten the bolt on fuel injector pipe LH, and connect the connector (A) to the fuel injector.

Tightening torque:

19 N·m (1.9 kgf-m, 14.0 ft-lb)



5) Install the high-pressure fuel delivery pipe assembly.

NOTE:

Use a new high-pressure fuel delivery pipe assembly.

(1) Temporarily install the flare nuts (A) to the fuel pipe, and secure the high-pressure fuel delivery pipe assembly to the cylinder block using bolts (B).

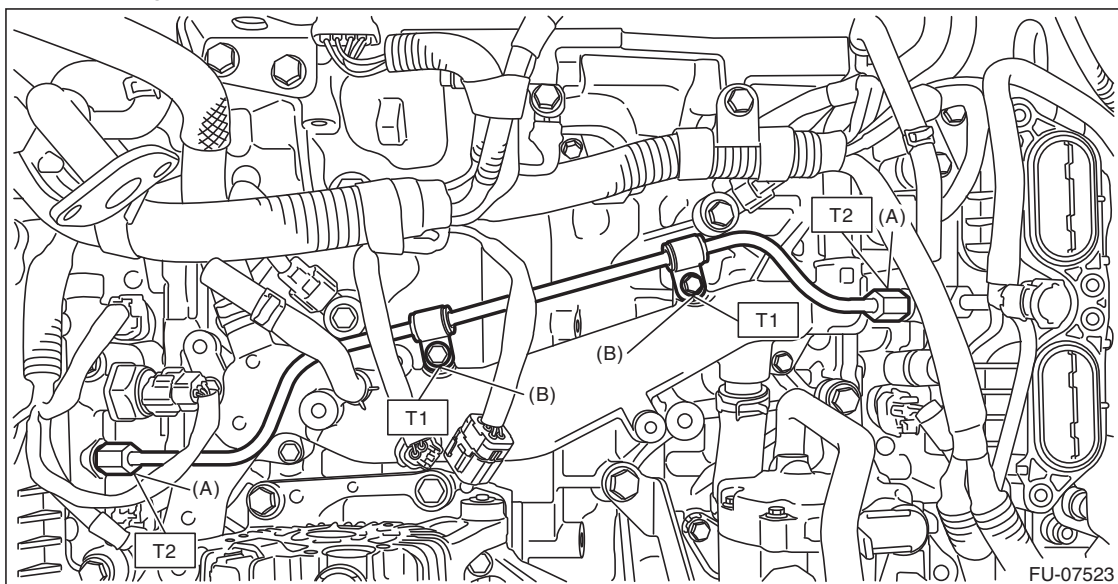
Tightening torque:

T1: 6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

(2) Tighten the flare nuts on both ends (A).

Tightening torque:

T2: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

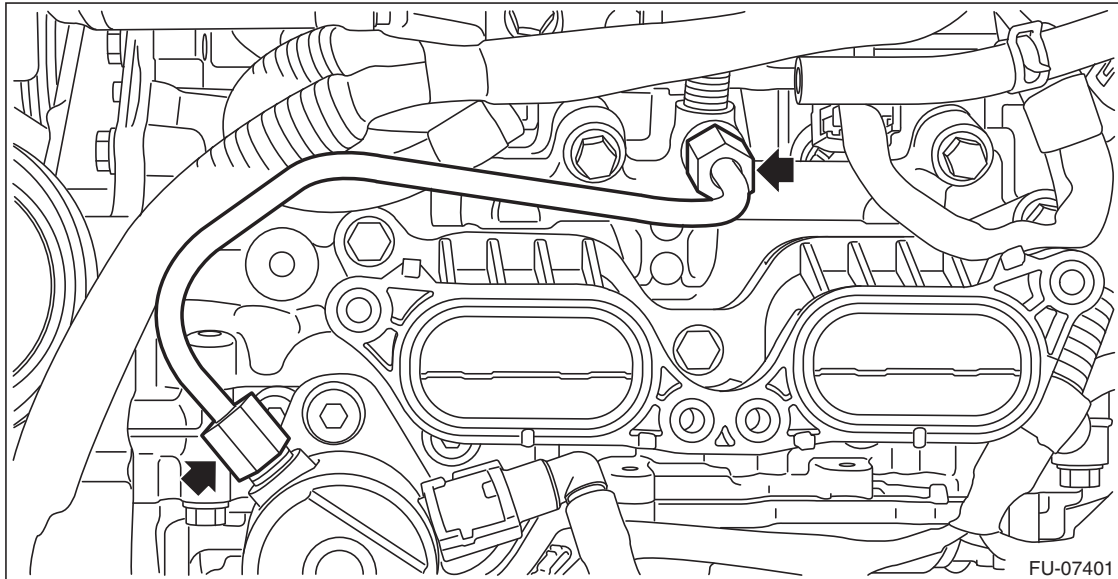
6) Temporarily install the high-pressure fuel delivery pipe, and tighten the flare nuts on both ends.

NOTE:

Use a new high-pressure fuel delivery pipe.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



7) Install the fuel pipe insulator No. 3. <Ref. to FU(H4DOTC)-50, FUEL PIPE INSULATOR NO. 3, INSTALLATION, Fuel Insulator.>

8) Install the fuel pipe insulator No. 2. <Ref. to FU(H4DOTC)-50, FUEL PIPE INSULATOR NO. 2, INSTALLATION, Fuel Insulator.>

9) Install the fuel pipe insulator No. 1. <Ref. to FU(H4DOTC)-49, FUEL PIPE INSULATOR NO. 1, INSTALLATION, Fuel Insulator.>

10) Install the fuel pump insulator. <Ref. to FU(H4DOTC)-49, FUEL PUMP INSULATOR, INSTALLATION, Fuel Insulator.>

11) Install the intake manifold. <Ref. to FU(H4DOTC)-29, INSTALLATION, Intake Manifold.>

12) Connect the battery ground terminal.

Fuel Injector

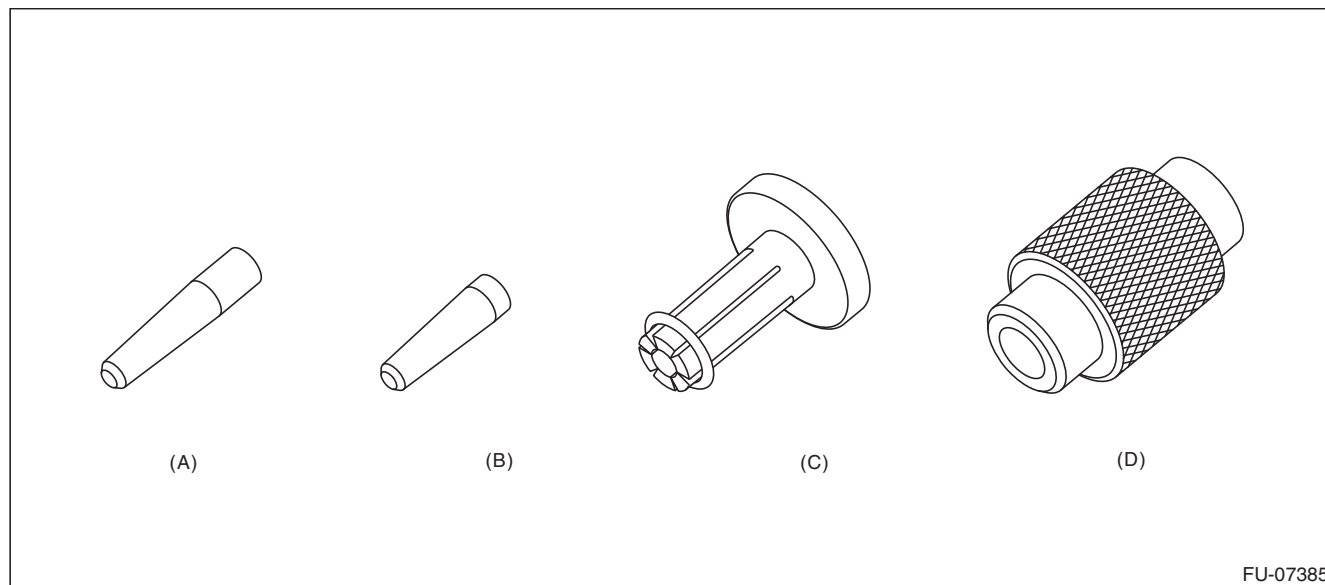
FUEL INJECTION (FUEL SYSTEMS)

C: REPLACEMENT

CAUTION:

- Perform work without using gloves.
- Always use the ST when installing the injector seal.

ST 18683AA000 INSTALLER INJECTOR SEAL



(A) Seal guide A

(B) Seal guide B

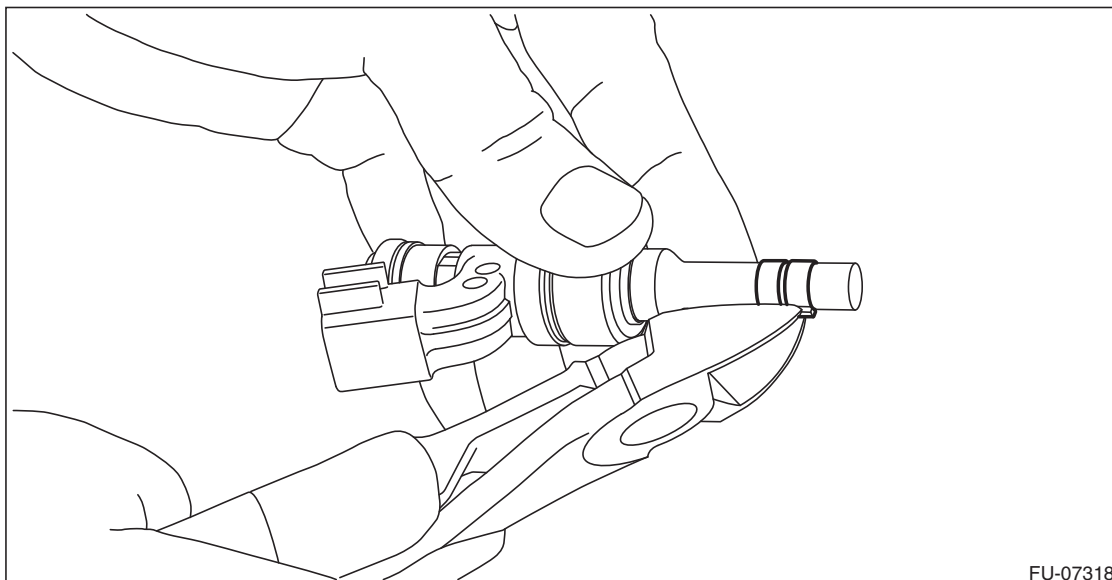
(C) Injector seal installer

(D) Injector seal adjuster

1) Using a pair of nippers, cut off the injector seal by pinching it.

CAUTION:

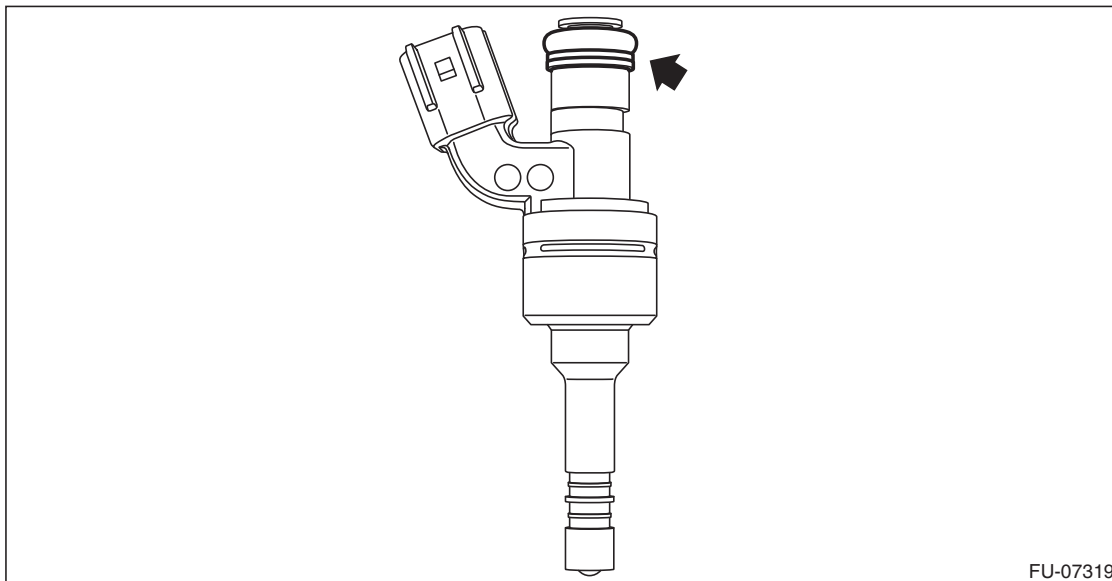
Be careful not to damage the fuel injector.



Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

- 2) Remove the O-ring and backup ring from the fuel injector.

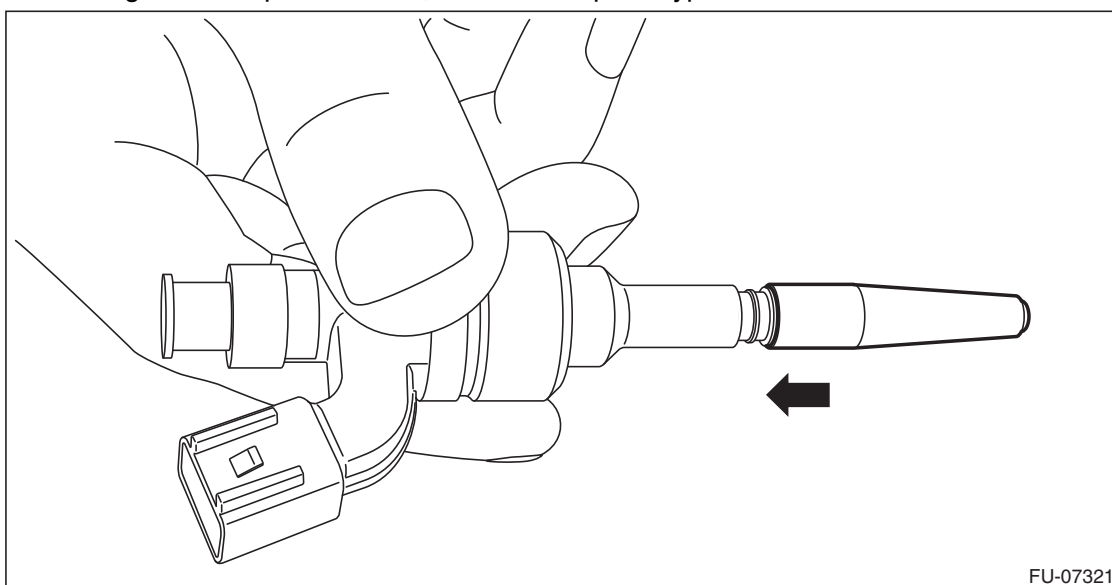


FU-07319

- 3) Attach the seal guide A to the fuel injector.

NOTE:

Two types of seal guides are provided. So, do not mix up the type to be used.



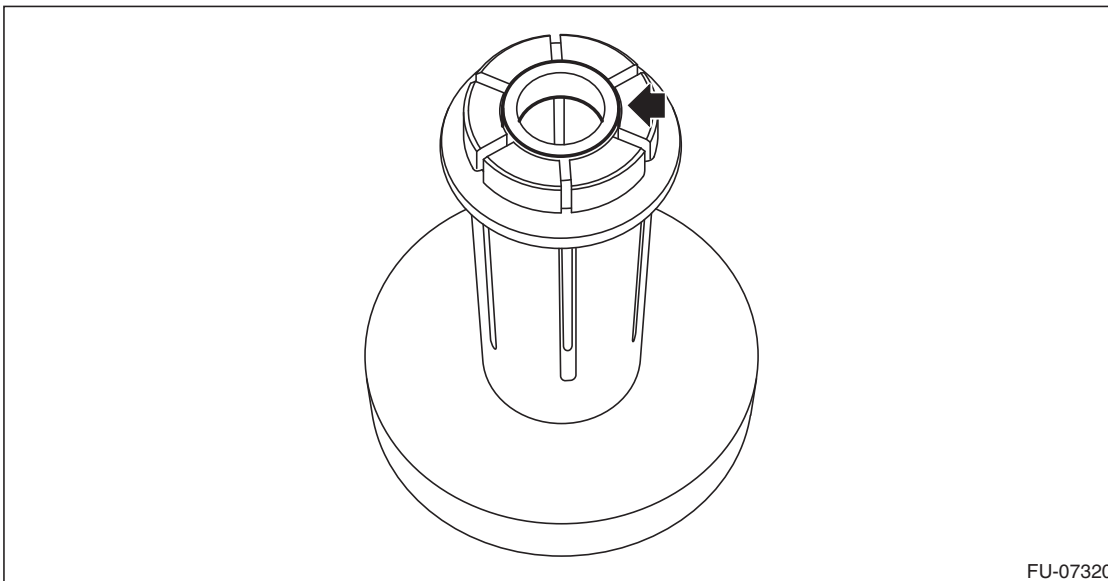
FU-07321

FU(H4DOTC)-65

Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

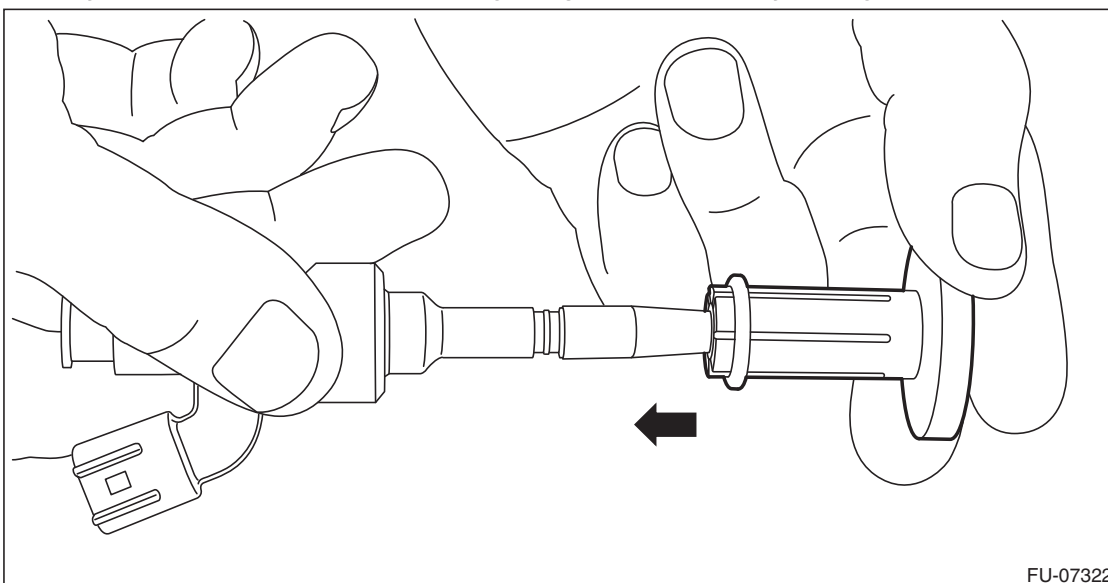
4) Set the injector seal to the injector seal installer.



5) Push in the injector seal installer slowly in the direction of the arrow, and attach the injector seal to the fuel injector.

CAUTION:

- Insert the injector seal straight into the fuel injector.
- Install the injector seal so that it does not go beyond the fuel injector groove.



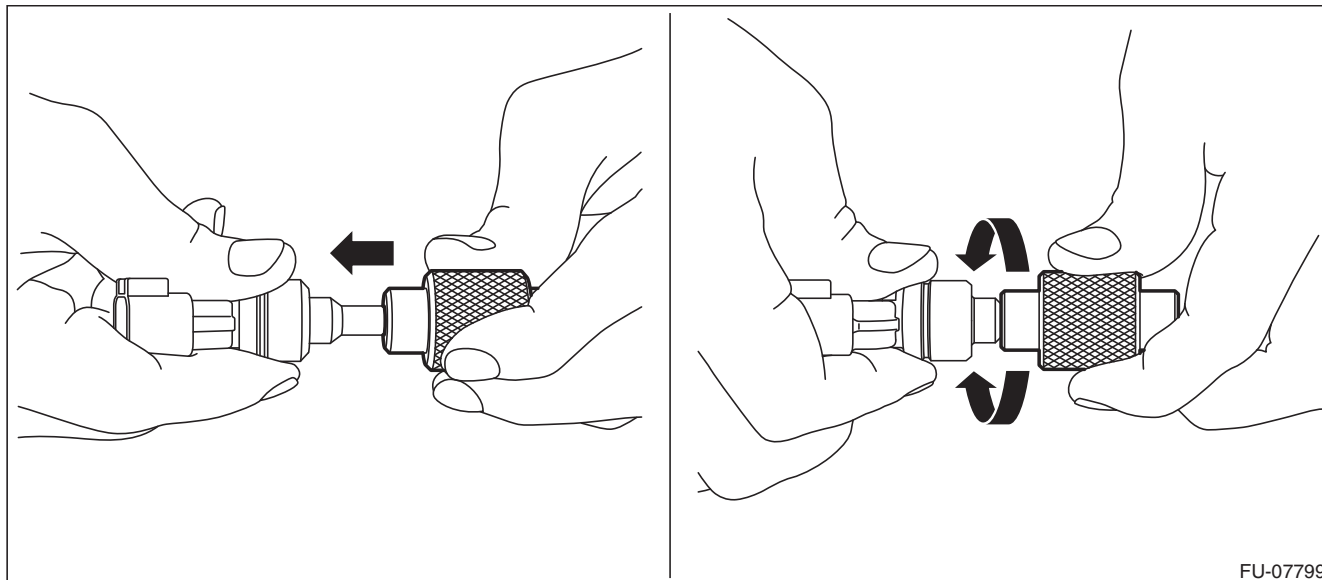
Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

6) While rotating the injector seal adjuster to left and right by 90° for each side, slowly insert it all the way.

NOTE:

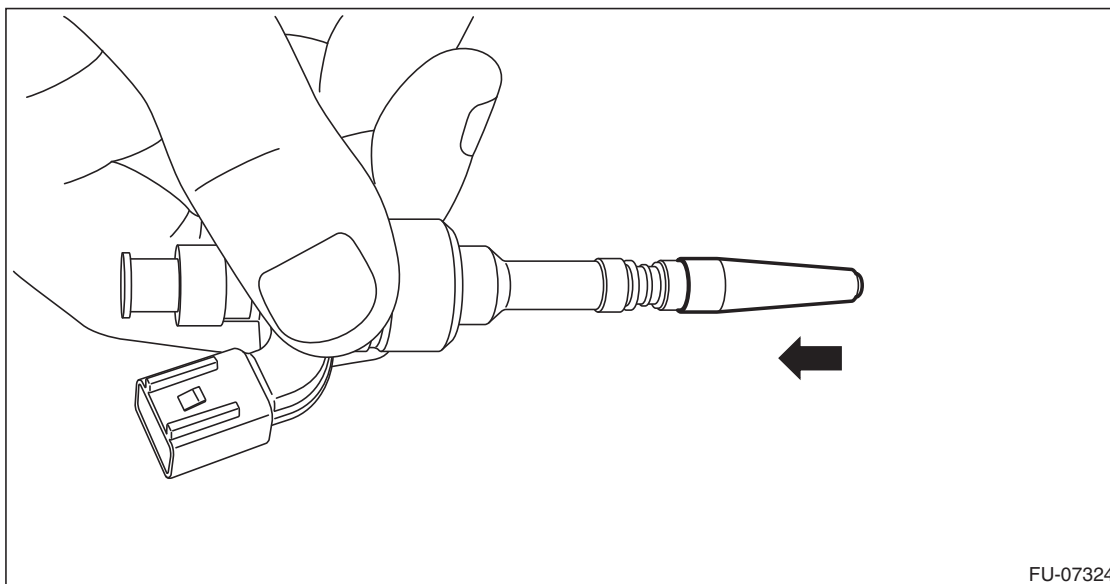
- Apply a thin coat of gasoline to the injector seal and injector seal adjuster.
- With the injector seal adjuster fully inserted, rotate it to left and right approx. ten times by 90° for each side to normalize the injector seal.



7) Attach the seal guide B to the fuel injector.

NOTE:

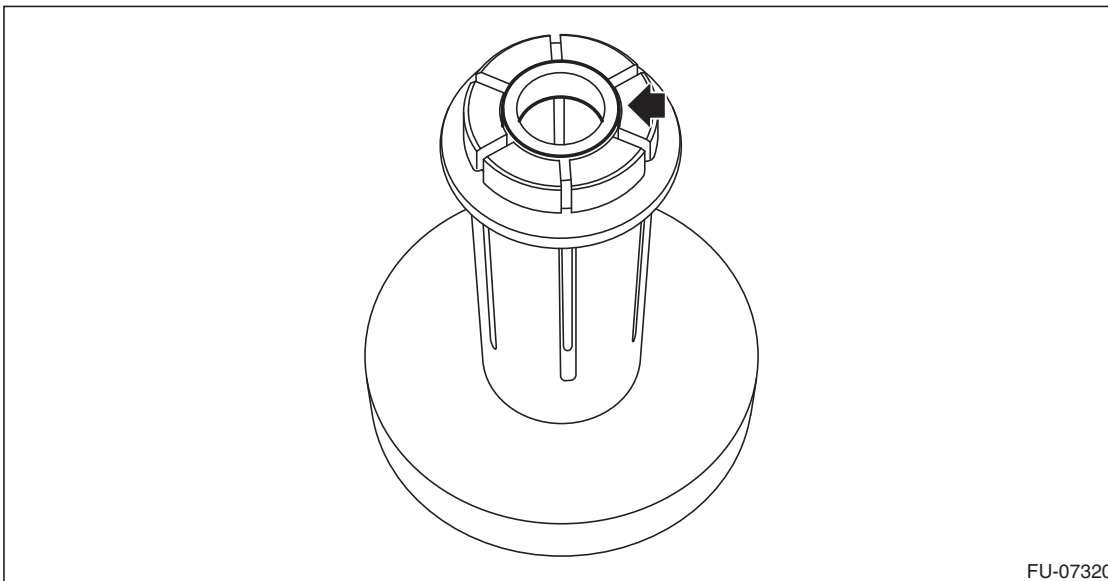
Two types of seal guides are provided. So, do not mix up the type to be used.



Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

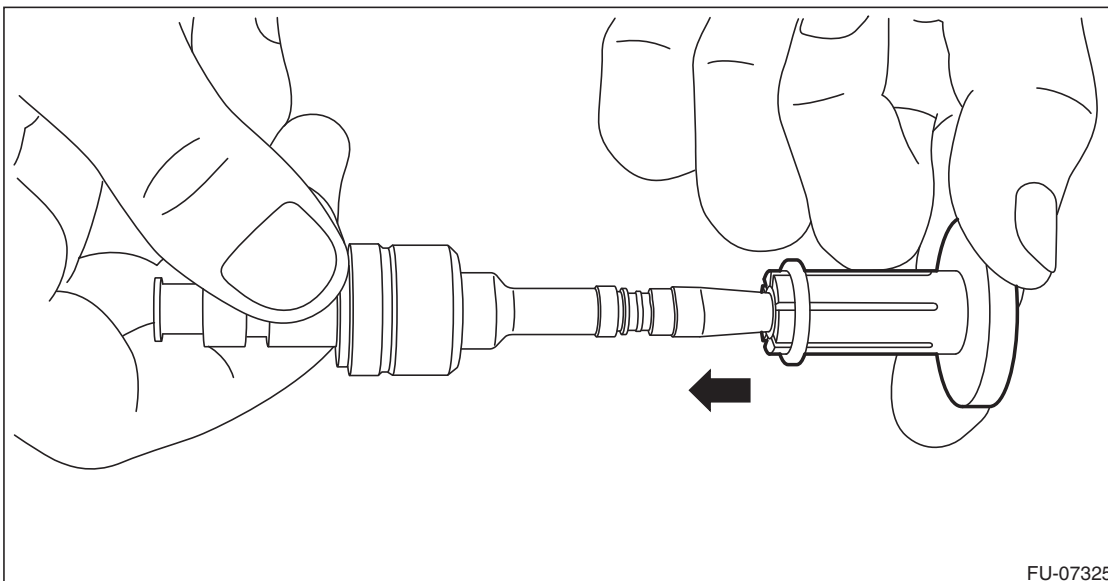
8) Set the injector seal to the injector seal installer.



9) Push in the injector seal installer slowly in the direction of the arrow, and attach the injector seal to the fuel injector.

CAUTION:

- Insert the injector seal straight into the fuel injector.
- Install the injector seal so that it does not go beyond the fuel injector groove.



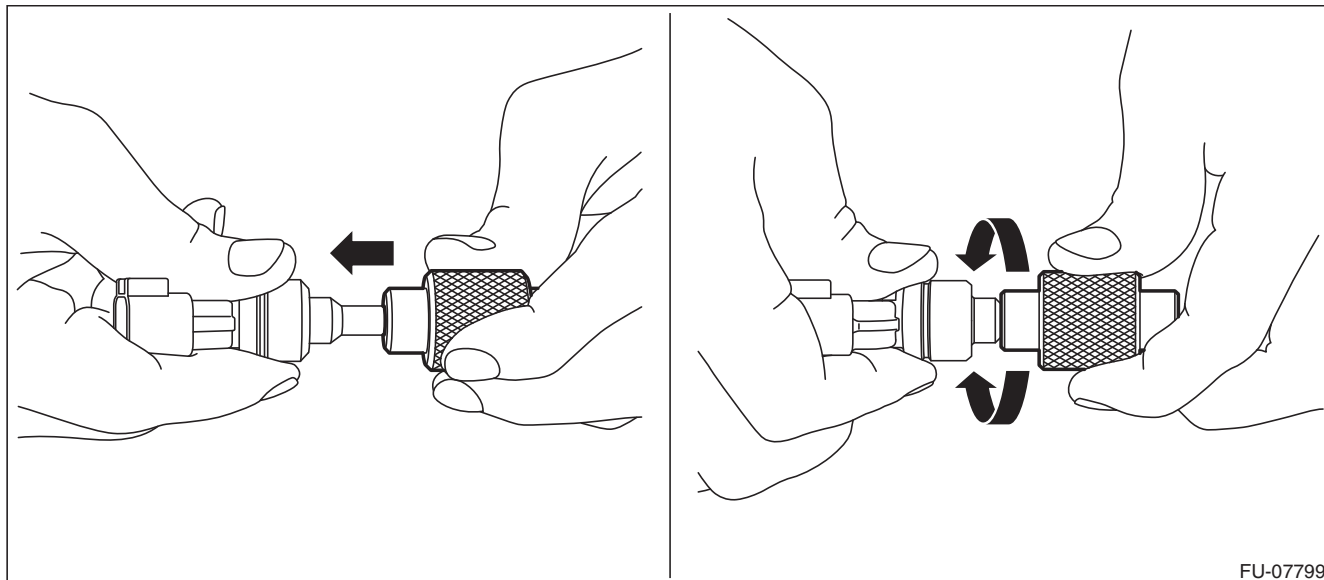
Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

10) While rotating the injector seal adjuster to left and right by 90° for each side, slowly insert it all the way.

NOTE:

- Apply a thin coat of gasoline to the injector seal and injector seal adjuster.
- With the injector seal adjuster fully inserted, rotate it to left and right approx. ten times by 90° for each side to normalize the injector seal.

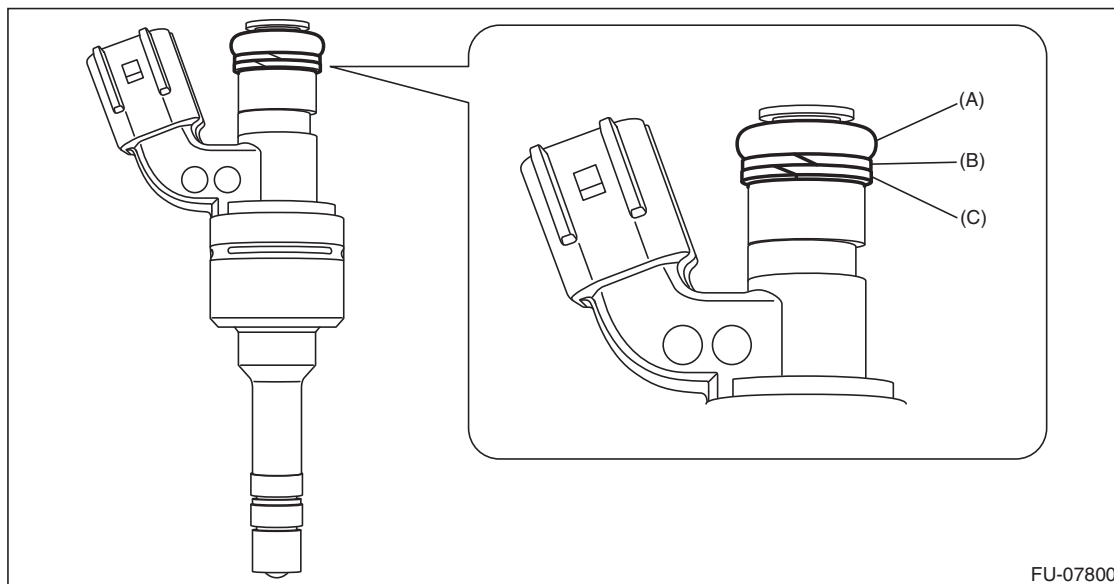


FU-07799

11) Attach two backup rings and O-ring to the fuel injector.

NOTE:

Use new backup rings and O-ring.



FU-07800

(A) O-ring

(B) Backup ring (brown)

(C) Backup ring (white)

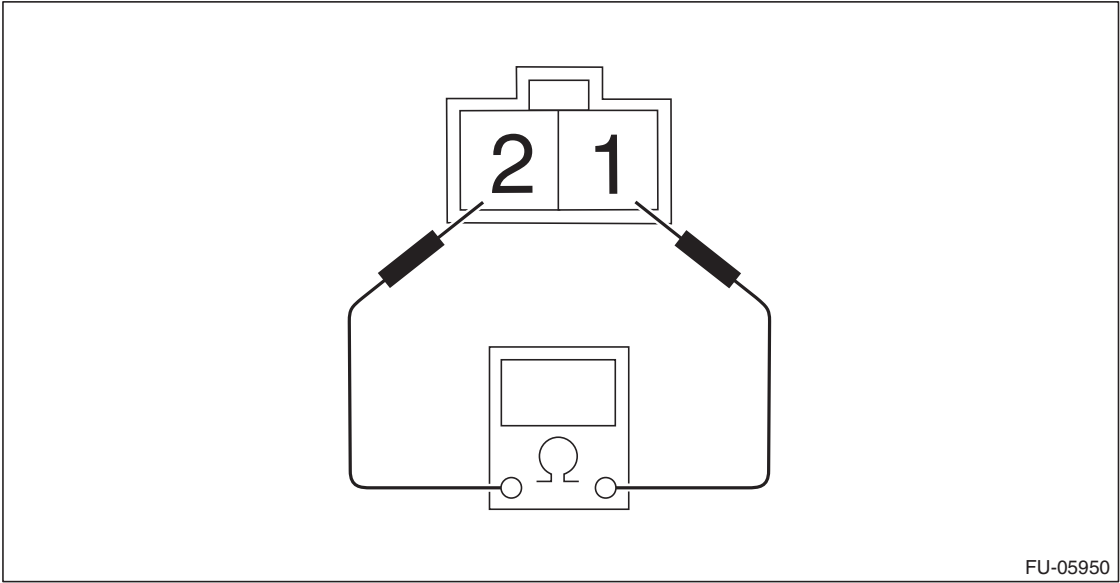


Fuel Injector

FUEL INJECTION (FUEL SYSTEMS)

D: INSPECTION

- 1) Check that the fuel injector has no deformation, cracks or other damages.
- 2) Measure the resistance between fuel injector terminals.



Terminal No.	Standard
1 and 2	Approx. 2.1 Ω (when 20°C (68°F))



Fuel Pressure Sensor

FUEL INJECTION (FUEL SYSTEMS)

8. Fuel Pressure Sensor

A: REMOVAL

CAUTION:

- Be careful not to spill fuel.
- Catch the fuel from the pipes using a container or cloth.

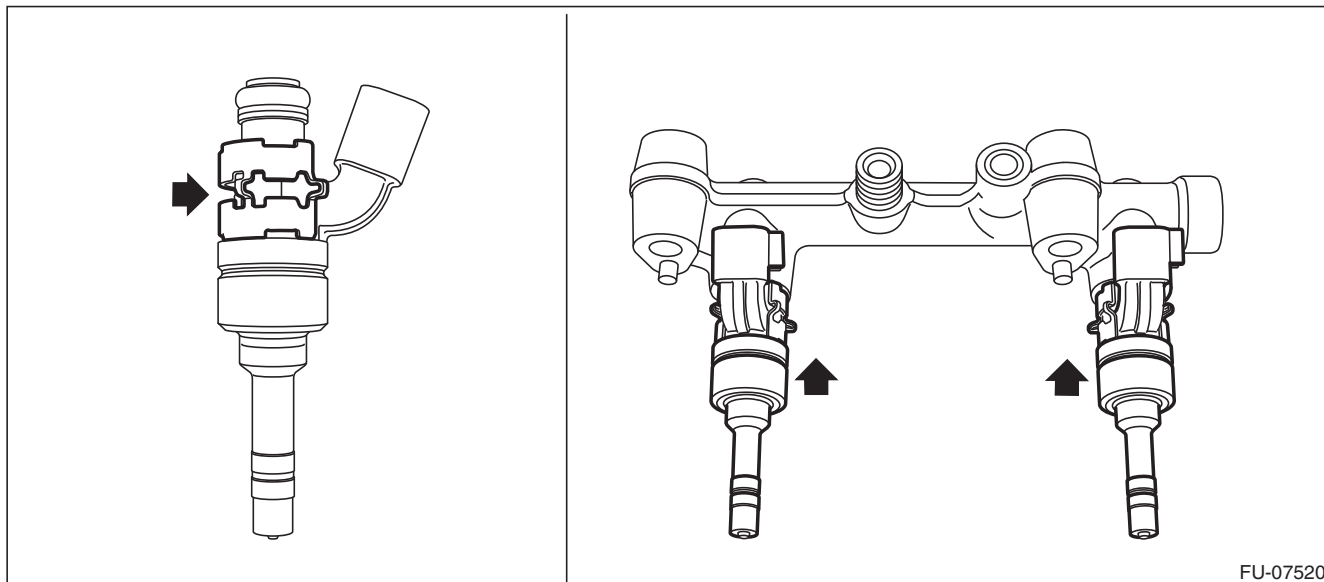
- 1) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 2) Disconnect the ground cable from battery.
- 3) Open the fuel filler lid and remove the fuel filler cap.
- 4) Remove the intake manifold. <Ref. to FU(H4DOTC)-19, REMOVAL, Intake Manifold.>
- 5) Remove the fuel injector RH. <Ref. to FU(H4DOTC)-51, FUEL INJECTOR RH, REMOVAL, Fuel Injector.>

B: INSTALLATION

- 1) Replace injector seal, retainer, and O-ring with a new part. <Ref. to FU(H4DOTC)-64, REPLACEMENT, Fuel Injector.>
- 2) Set the holder to the fuel injector, and install it to the fuel injector pipe RH.

NOTE:

- Use a new holder.
- Use a new fuel injector pipe RH.

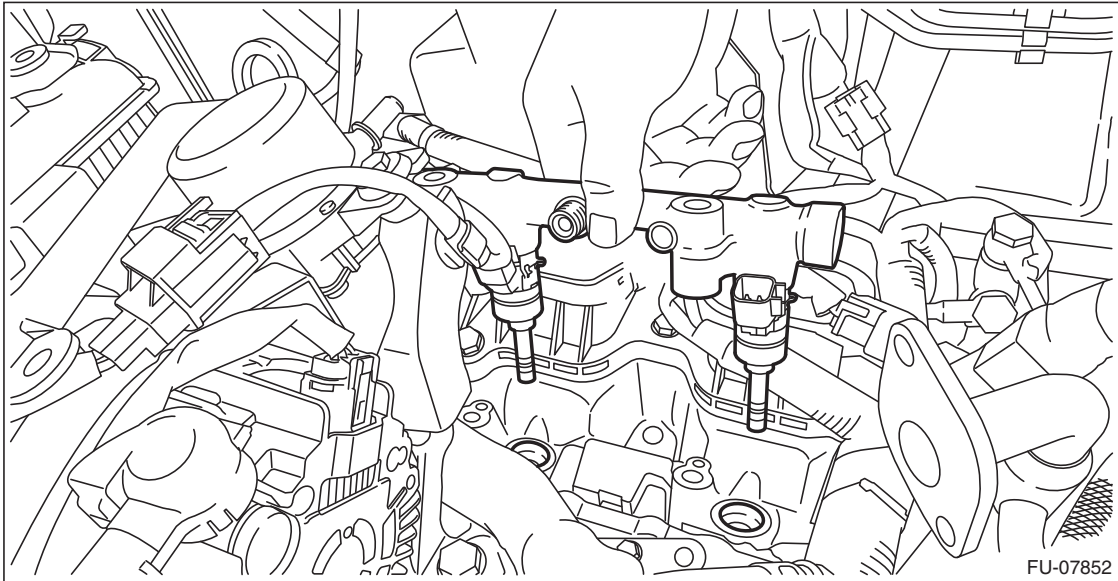


FU-07520

Fuel Pressure Sensor

FUEL INJECTION (FUEL SYSTEMS)

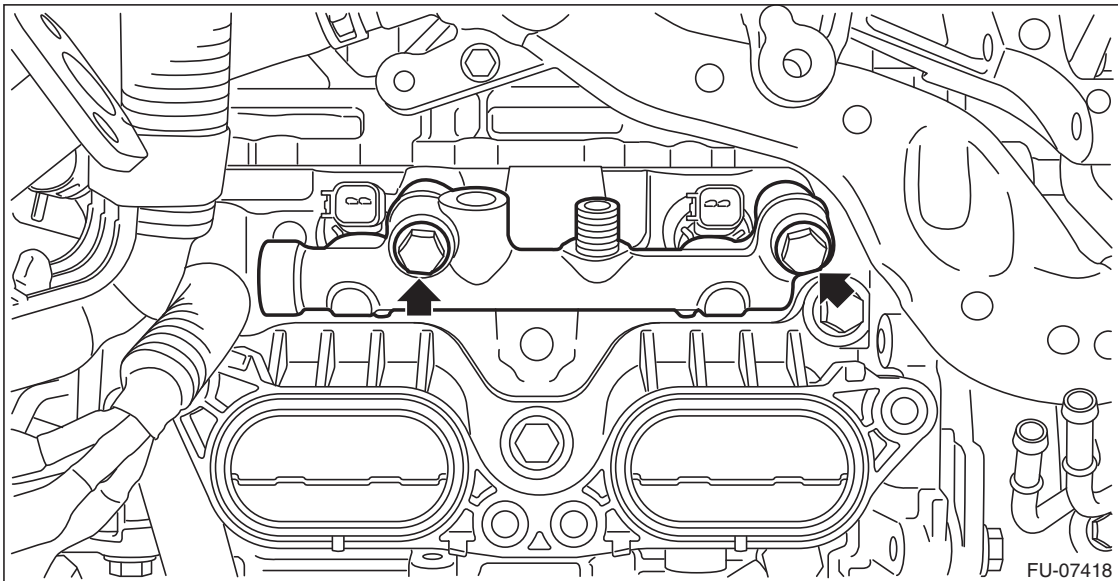
- 3) Install the fuel injector pipe RH and fuel injector as a single unit to the cylinder head.



- 4) Tighten the fuel injector pipe RH.

Tightening torque:

19 N·m (1.9 kgf-m, 14.0 ft-lb)



Fuel Pressure Sensor

FUEL INJECTION (FUEL SYSTEMS)

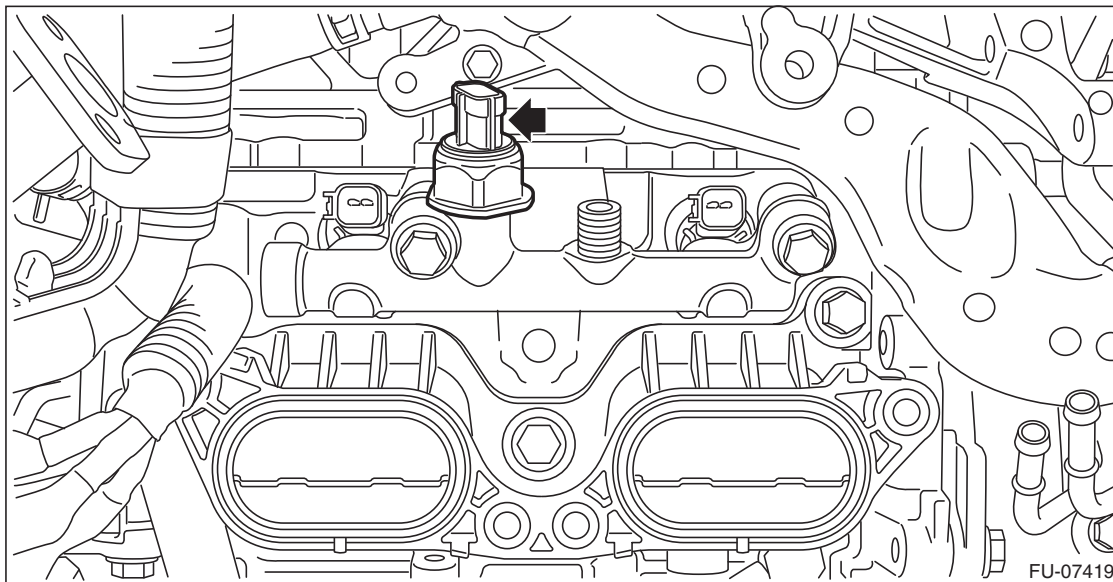
5) Install the fuel pressure sensor to fuel injector pipe RH.

NOTE:

Use a new fuel pressure sensor.

Tightening torque:

46 N·m (4.7 kgf-m, 33.9 ft-lb)



6) Install the high-pressure fuel delivery pipe assembly.

NOTE:

Use a new high-pressure fuel delivery pipe assembly.

(1) Temporarily install the flare nuts (A) to the fuel pipe, and secure the high-pressure fuel delivery pipe assembly to the cylinder block using bolts (B).

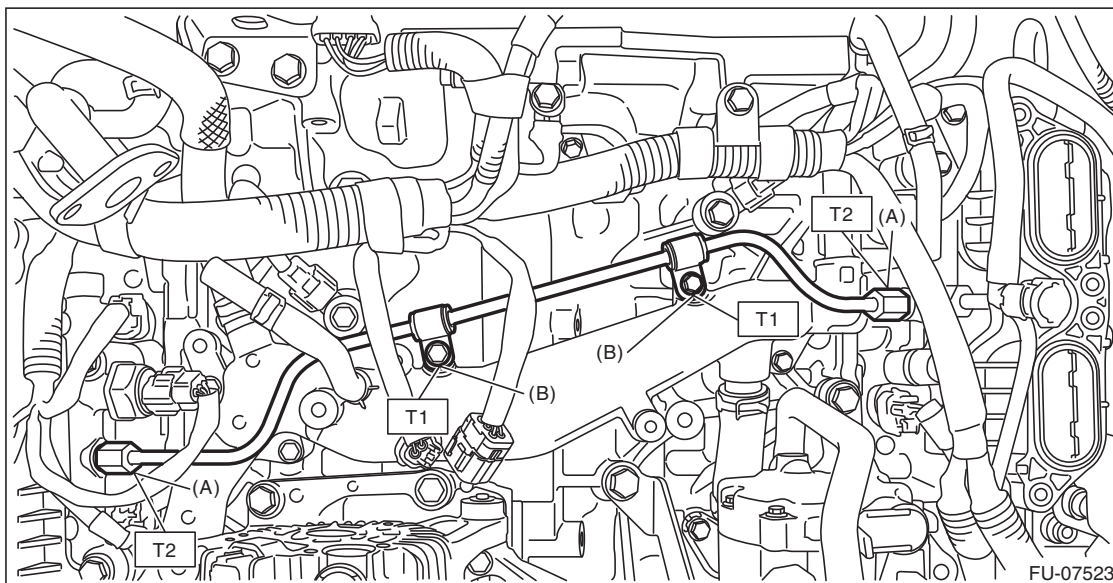
Tightening torque:

T1: 6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

(2) Tighten the flare nuts on both ends (A).

Tightening torque:

T2: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



Fuel Pressure Sensor

FUEL INJECTION (FUEL SYSTEMS)

- 7) Install the fuel pipe insulator No. 3. <Ref. to FU(H4DOTC)-50, FUEL PIPE INSULATOR NO. 3, INSTALLATION, Fuel Insulator.>
- 8) Install the fuel pipe insulator No. 2. <Ref. to FU(H4DOTC)-50, FUEL PIPE INSULATOR NO. 2, INSTALLATION, Fuel Insulator.>
- 9) Install the fuel pipe insulator No. 1. <Ref. to FU(H4DOTC)-49, FUEL PIPE INSULATOR NO. 1, INSTALLATION, Fuel Insulator.>
- 10) Install the intake manifold. <Ref. to FU(H4DOTC)-29, INSTALLATION, Intake Manifold.>
- 11) Connect the battery ground terminal.

C: INSPECTION

Check that the fuel pressure sensor has no deformation, cracks or other damages.

High Pressure Fuel Pump

FUEL INJECTION (FUEL SYSTEMS)

9. High Pressure Fuel Pump

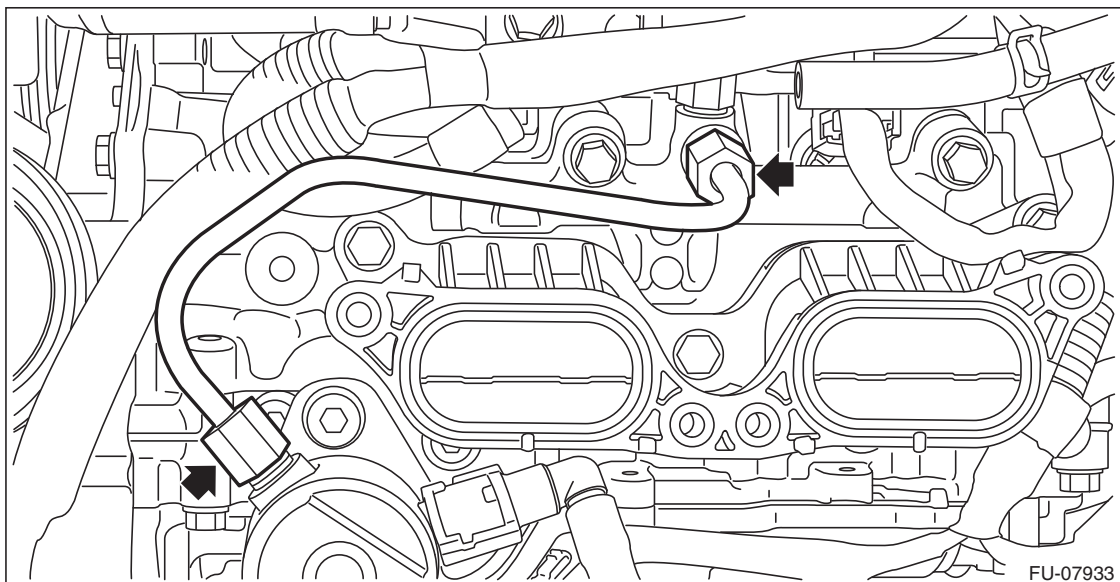
A: REMOVAL

1. HIGH-PRESSURE FUEL PUMP

CAUTION:

- Be careful not to spill fuel.
- Catch the fuel from the pipes using a container or cloth.

- 1) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 2) Disconnect the ground cable from battery.
- 3) Open the fuel filler lid and remove the fuel filler cap.
- 4) Remove the intake manifold. <Ref. to FU(H4DOTC)-19, REMOVAL, Intake Manifold.>
- 5) Remove the fuel pump insulator. <Ref. to FU(H4DOTC)-46, FUEL PUMP INSULATOR, REMOVAL, Fuel Insulator.>
- 6) Remove the fuel pipe insulator No. 1. <Ref. to FU(H4DOTC)-47, FUEL PIPE INSULATOR NO. 1, REMOVAL, Fuel Insulator.>
- 7) Remove the fuel pipe insulator No. 2. <Ref. to FU(H4DOTC)-47, FUEL PIPE INSULATOR NO. 2, REMOVAL, Fuel Insulator.>
- 8) Remove the high-pressure fuel delivery pipes.



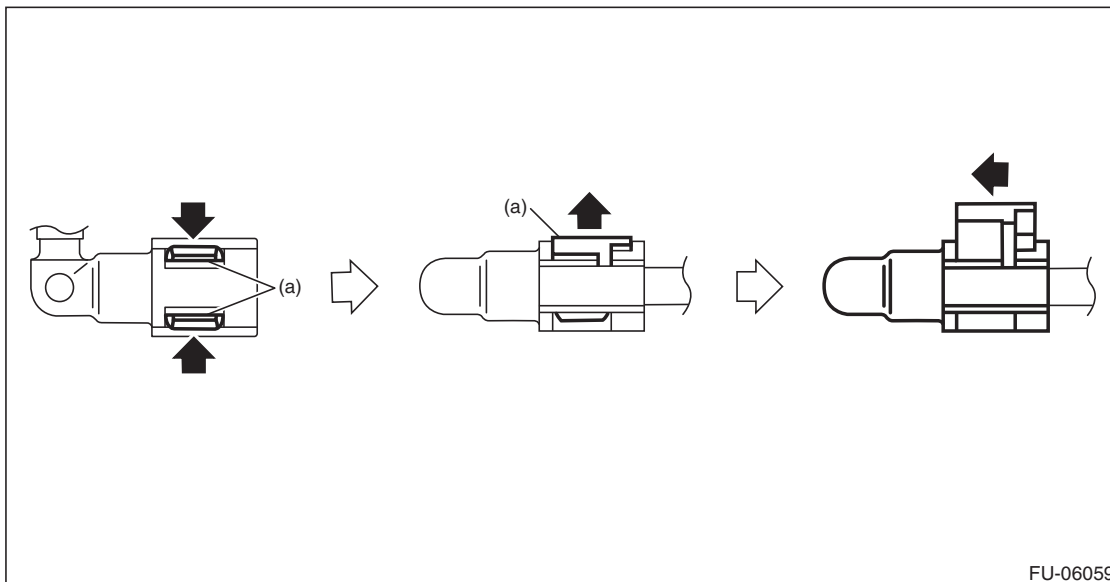
High Pressure Fuel Pump

FUEL INJECTION (FUEL SYSTEMS)

9) Remove the fuel delivery pipe (A) from the high-pressure fuel pump, and disconnect the connector (B) from the high-pressure fuel pump.

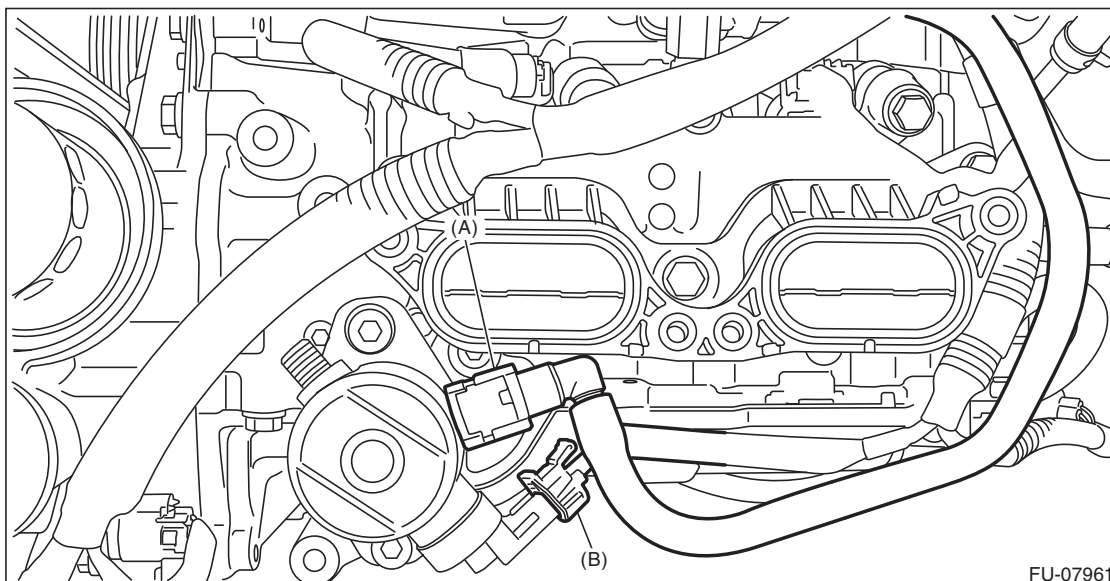
NOTE:

Disconnect the quick connector as shown in the figure.



FU-06059

(a) Slider

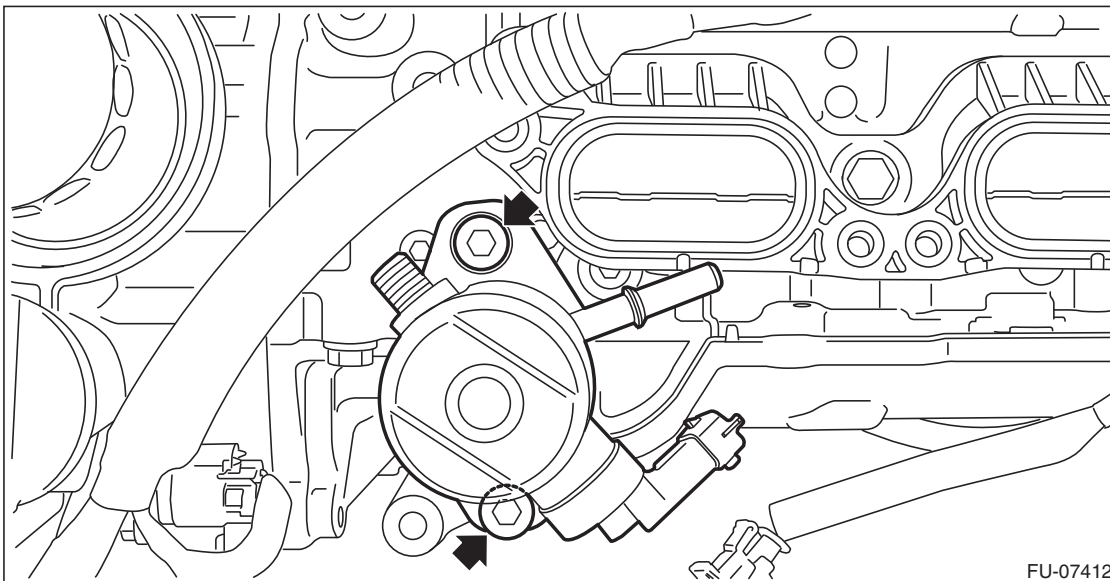


FU-07961

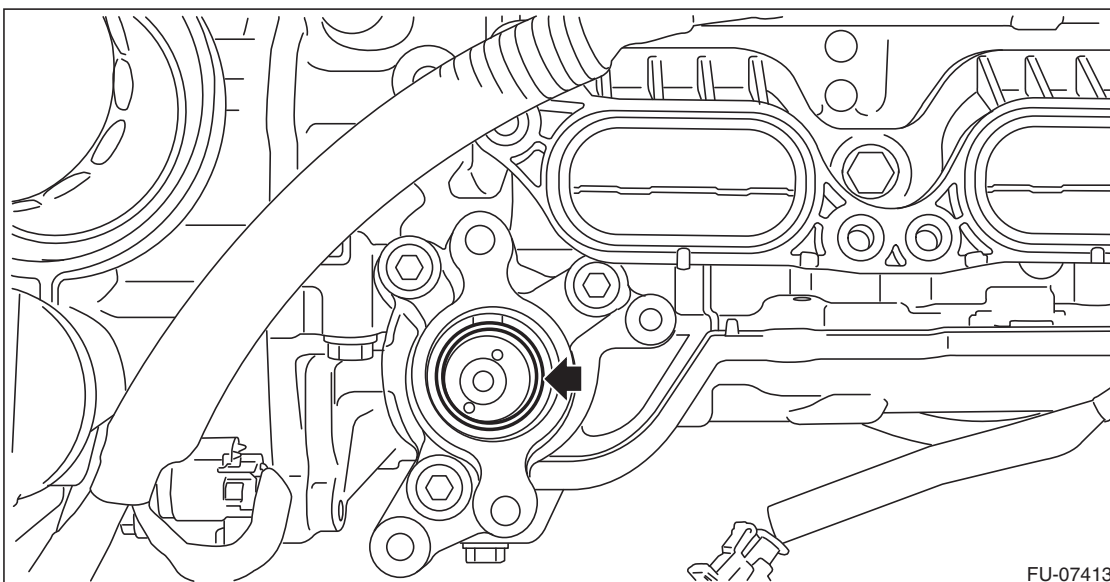
High Pressure Fuel Pump

FUEL INJECTION (FUEL SYSTEMS)

- 10) Using TORX PLUS® bit 40IP, remove the high-pressure fuel pump.



- 11) Remove the fuel pump lifter from the fuel pump case.

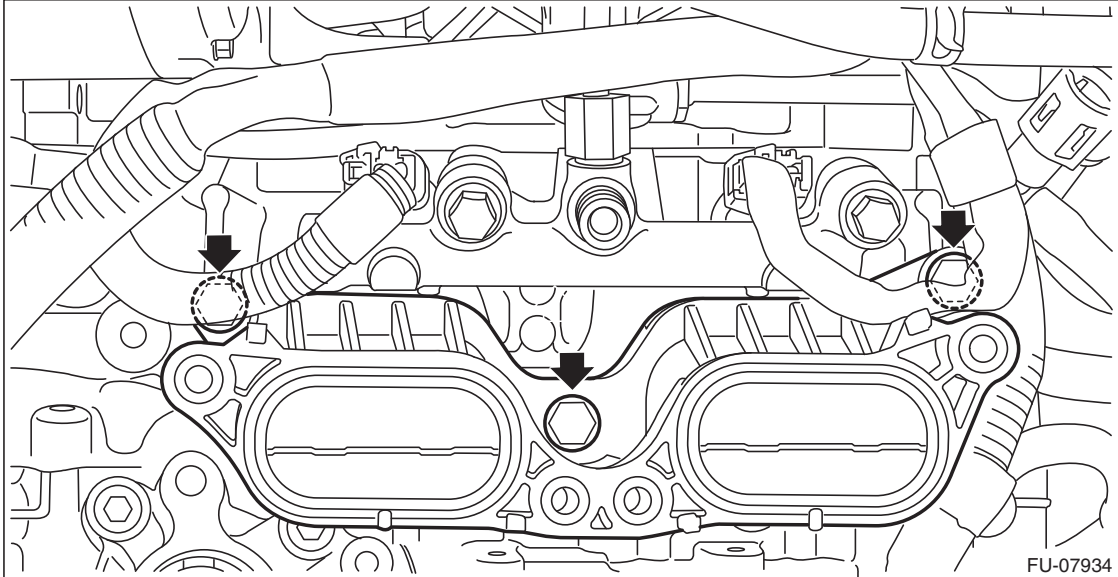


High Pressure Fuel Pump

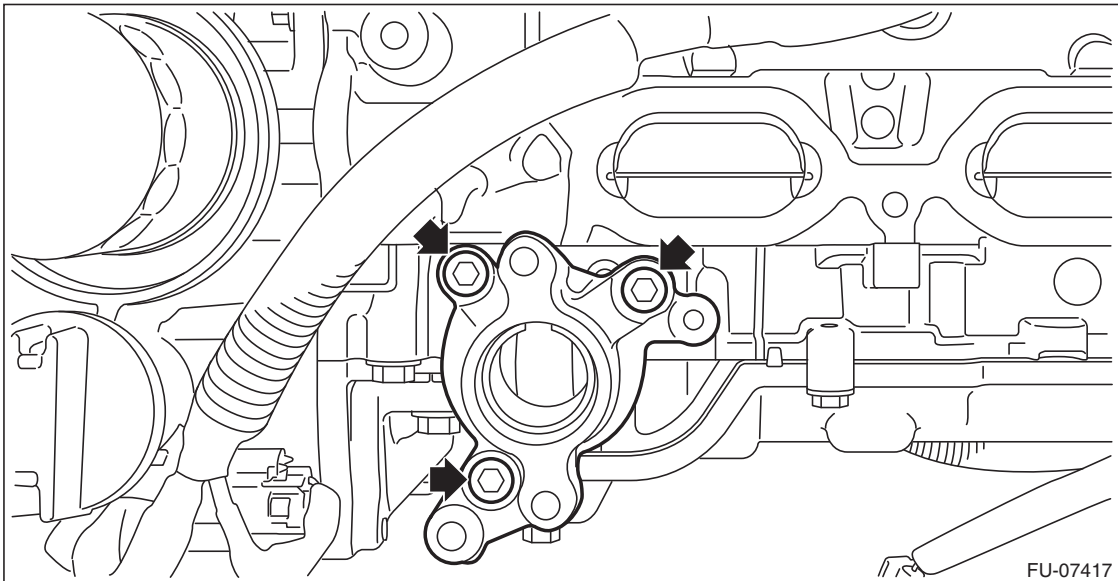
FUEL INJECTION (FUEL SYSTEMS)

2. HIGH-PRESSURE FUEL PUMP CASE

- 1) Remove the high-pressure fuel pump. <Ref. to FU(H4DOTC)-75, HIGH-PRESSURE FUEL PUMP, REMOVAL, High Pressure Fuel Pump.>
- 2) Remove the air intake adapter LH from the cylinder head.



- 3) Remove the high-pressure fuel pump case from the cam carrier assembly LH.



High Pressure Fuel Pump

FUEL INJECTION (FUEL SYSTEMS)

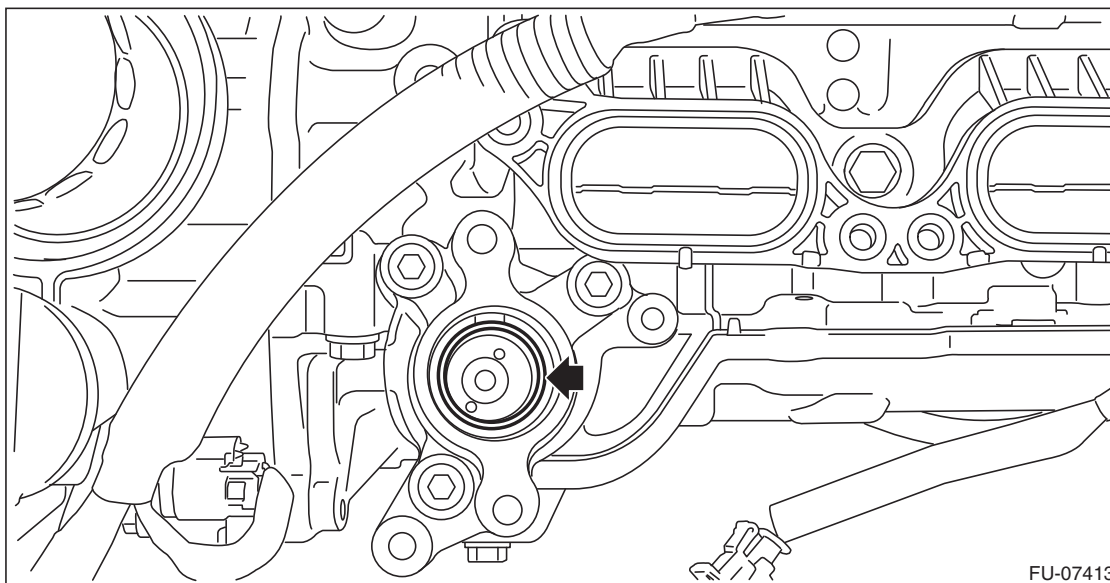
B: INSTALLATION

1. HIGH-PRESSURE FUEL PUMP

1) Install the fuel pump lifter to the high-pressure fuel pump case.

NOTE:

Apply engine oil to the side of the high-pressure fuel pump case and to the bottom surface of the fuel pump lifter.



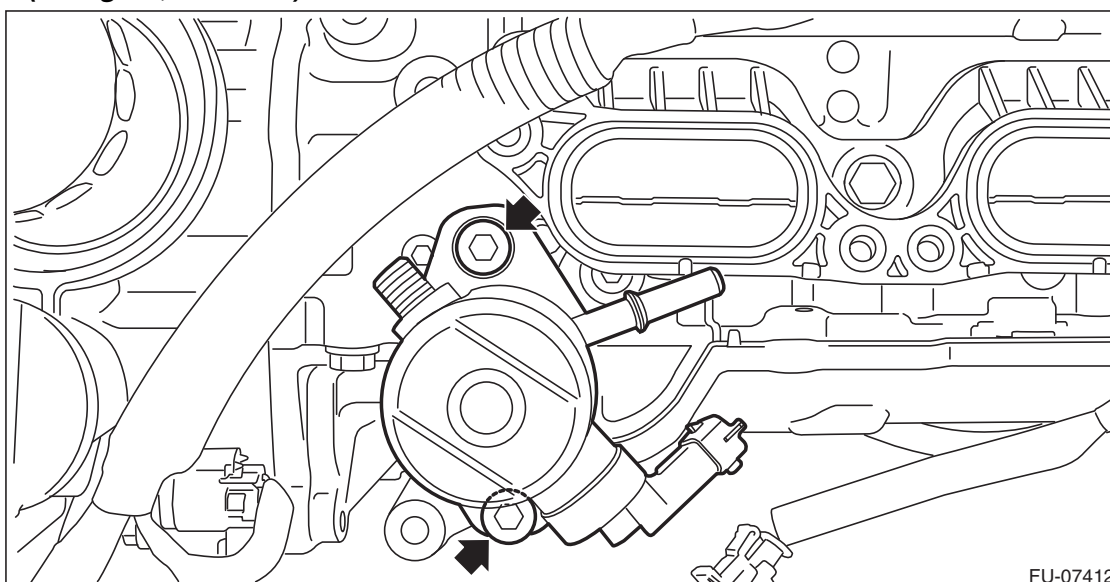
2) Using TORX PLUS® bit 40IP, install the high-pressure fuel pump.

NOTE:

Use new O-rings.

Tightening torque:

21 N·m (2.1 kgf-m, 15.5 ft-lb)



High Pressure Fuel Pump

FUEL INJECTION (FUEL SYSTEMS)

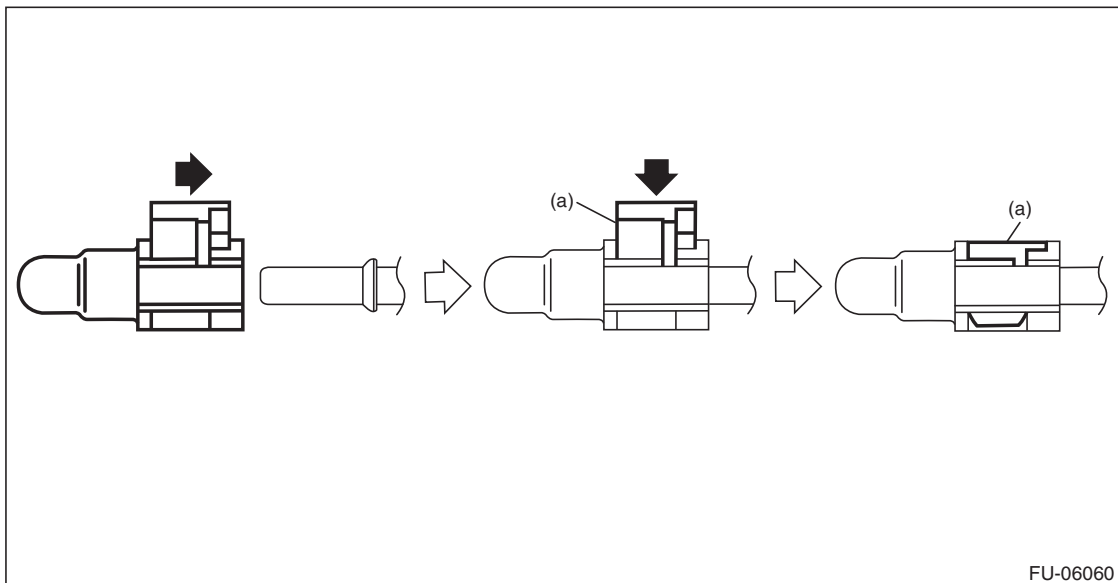
3) Connect the connector (B) to the high-pressure fuel pump, and install the fuel delivery pipe (A) to the high-pressure fuel pump.

CAUTION:

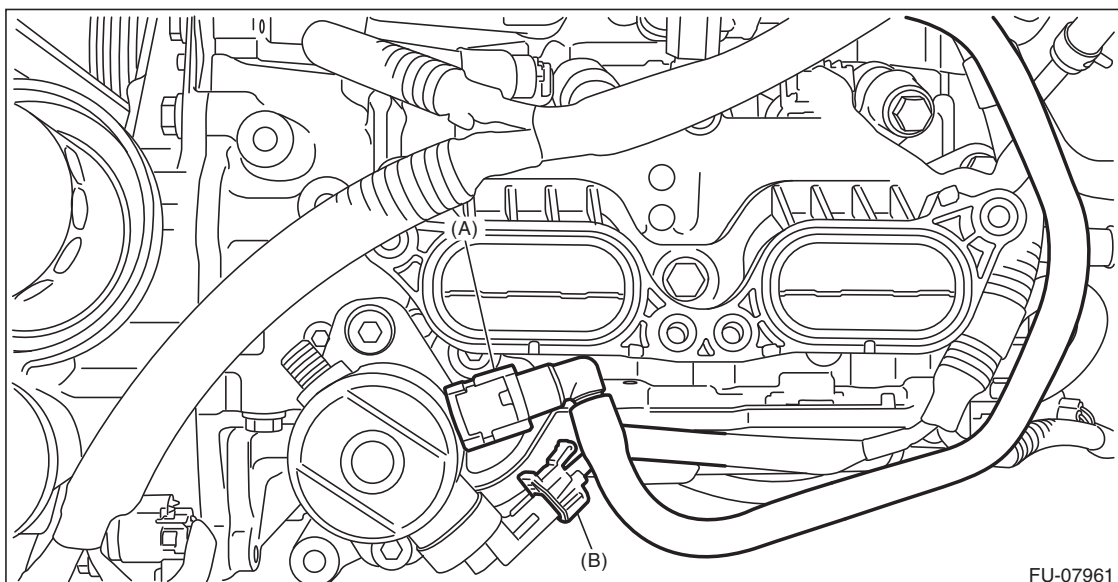
- Check that there is no damage or dust on the quick connector. If necessary, clean the seal surface of the pipe.
- When connecting the quick connector, make sure to insert the pipe all the way in before locking the slider.
- When it is difficult to lock the slider, check that the pipe is fully inserted.
- Make sure that the quick connector is securely connected.

NOTE:

Connect the quick connector as shown in the figure.



(a) Slider



High Pressure Fuel Pump

FUEL INJECTION (FUEL SYSTEMS)

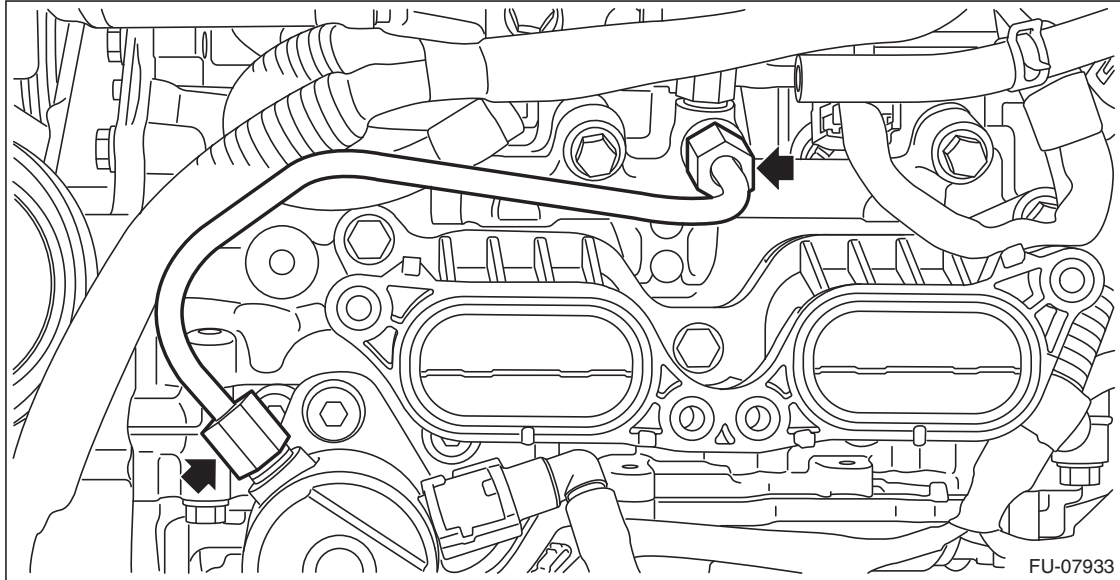
- 4) Temporarily install the high-pressure fuel delivery pipe, and tighten the flare nuts on both ends.

NOTE:

Use a new high-pressure fuel delivery pipe.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



- 5) Install the fuel pipe insulator No. 2. <Ref. to FU(H4DOTC)-50, FUEL PIPE INSULATOR NO. 2, INSTALLATION, Fuel Insulator.>
- 6) Install the fuel pipe insulator No. 1. <Ref. to FU(H4DOTC)-49, FUEL PIPE INSULATOR NO. 1, INSTALLATION, Fuel Insulator.>
- 7) Install the fuel pump insulator. <Ref. to FU(H4DOTC)-49, FUEL PUMP INSULATOR, INSTALLATION, Fuel Insulator.>
- 8) Install the intake manifold. <Ref. to FU(H4DOTC)-29, INSTALLATION, Intake Manifold.>
- 9) Connect the battery ground terminal.

High Pressure Fuel Pump

FUEL INJECTION (FUEL SYSTEMS)

2. HIGH-PRESSURE FUEL PUMP CASE

1) Apply liquid gasket to the mating surfaces of fuel pump case, and install the high-pressure fuel pump case.

NOTE:

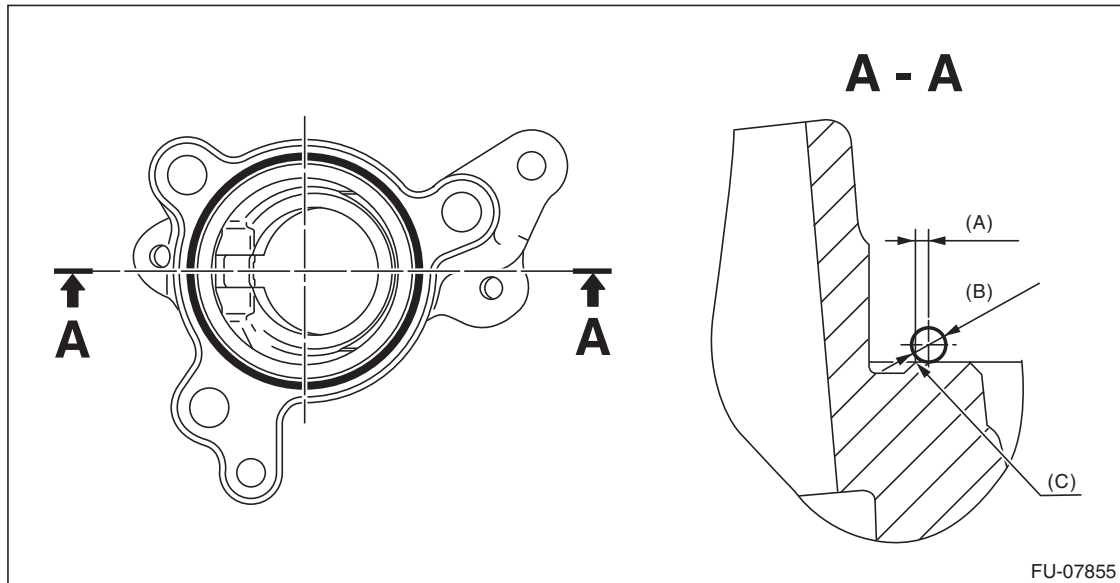
- Clean the mating surface of the high-pressure fuel pump case and cam carrier assembly LH.
- Install within 5 min. after applying liquid gasket.

Liquid gasket:

THREE BOND 1217G (Part No. K0877Y0100) or equivalent

Liquid gasket applying diameter:

3 ± 1 mm (0.1181 ± 0.0394 in)



(A) 1 mm (0.0394 in)

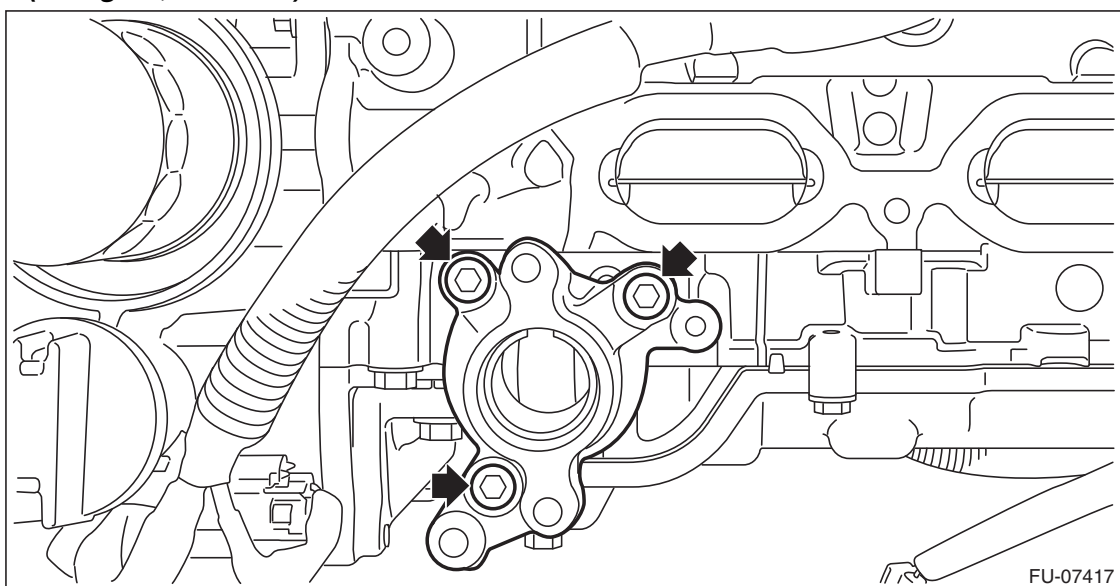
(B) 3 mm (0.1181 in)

(C) Chamfer edge

2) Install the high-pressure fuel pump case to the cam carrier assembly LH.

Tightening torque:

19 N·m (1.9 kgf-m, 14.0 ft-lb)



High Pressure Fuel Pump

FUEL INJECTION (FUEL SYSTEMS)

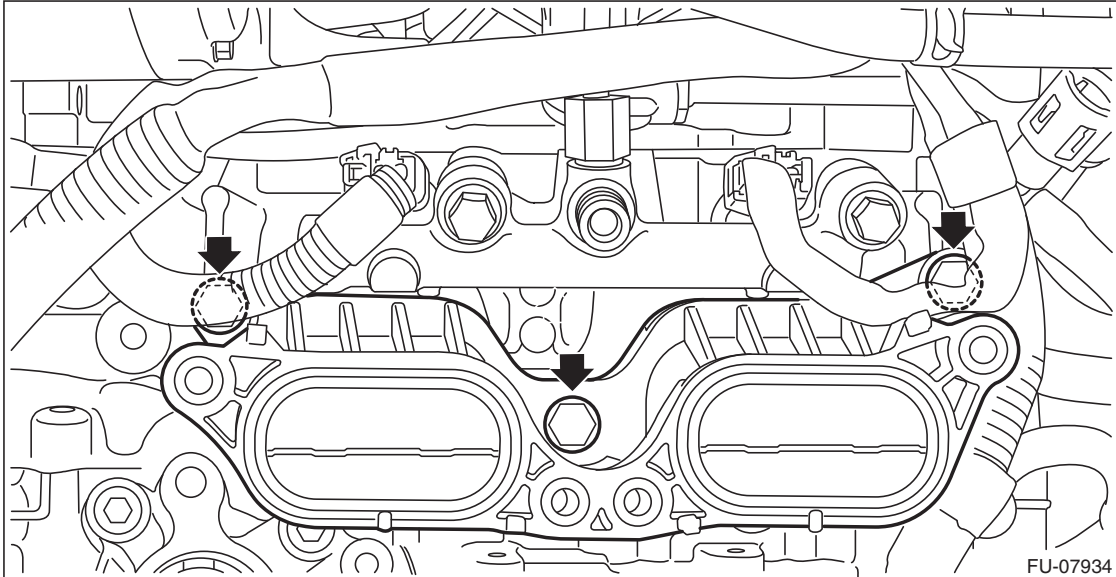
3) Install the air intake adapter LH to cylinder heads.

NOTE:

Use a new gasket.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

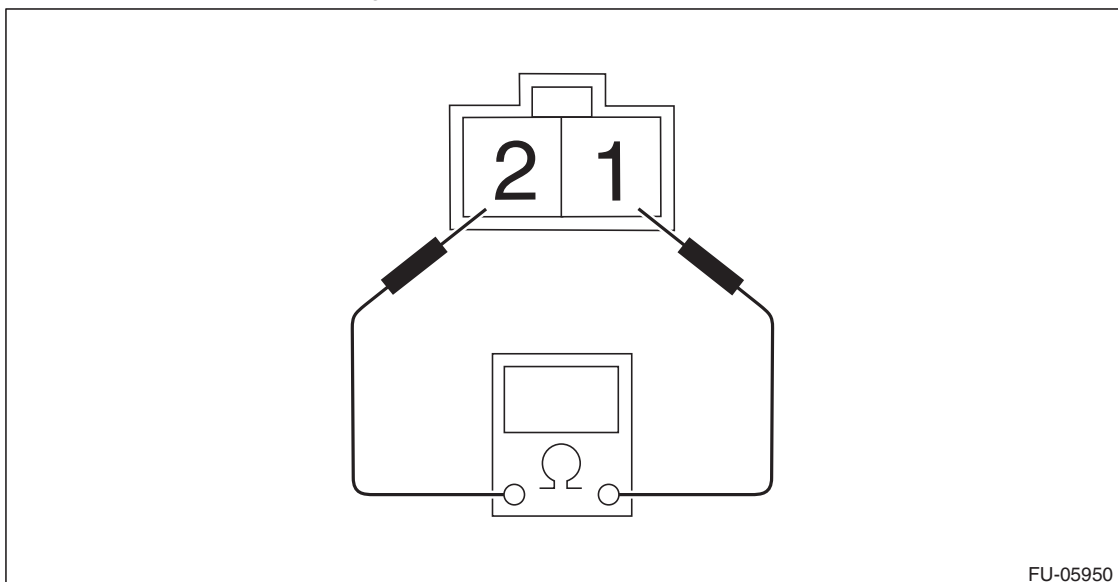


4) Install the high-pressure fuel pump. <Ref. to FU(H4DOTC)-79, HIGH-PRESSURE FUEL PUMP, INSTALLATION, High Pressure Fuel Pump.>

C: INSPECTION

1. CHECK HIGH-PRESSURE FUEL PUMP

- 1) Check that the high-pressure fuel pump has no deformation, cracks or other damages.
- 2) Measure the resistance between high-pressure fuel pump terminals.



Terminal No.	Standard
1 and 2	10±1 Ω (when 20°C (68°F))

High Pressure Fuel Pump

FUEL INJECTION (FUEL SYSTEMS)

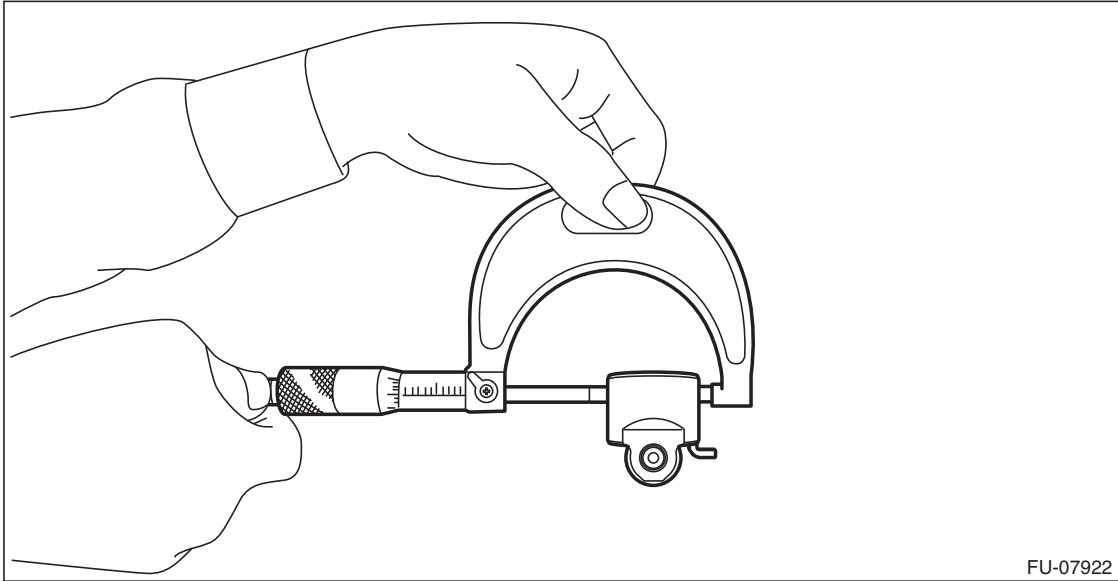
2. CHECK HIGH-PRESSURE FUEL PUMP CASE

- 1) Check that the high-pressure fuel pump case has no deformation, cracks or other damages.
- 2) Check the clearance between the fuel pump lifter and high-pressure fuel pump case bore. Check the clearance between fuel pump lifter and high-pressure fuel pump case bore by measuring the outer diameter of fuel pump lifter and the inner diameter of high-pressure fuel pump case bore respectively.

(1) Measure the outer diameter of fuel pump lifter with a micrometer.

NOTE:

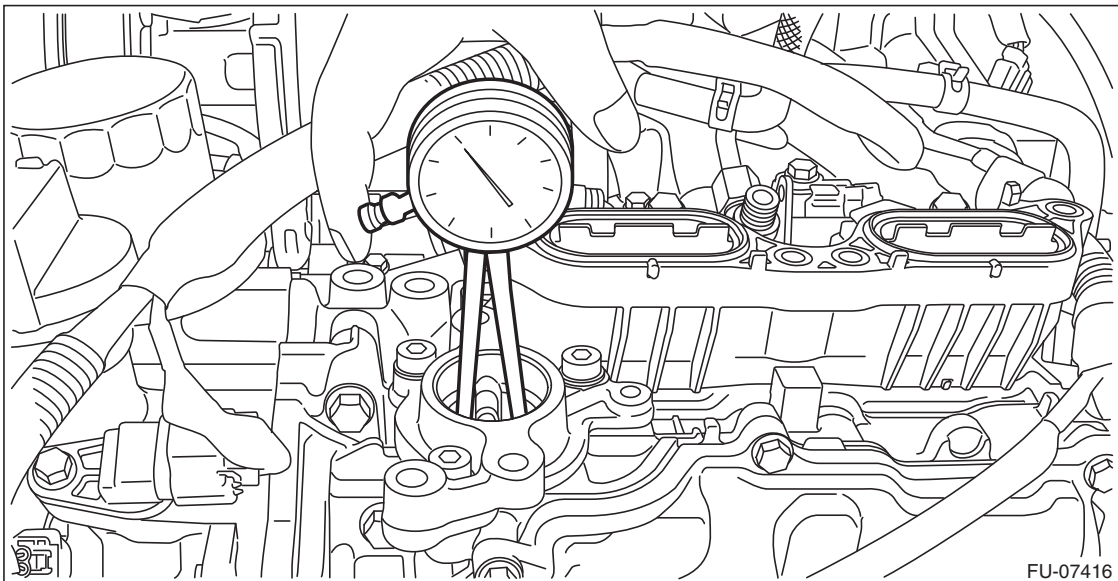
- Measurement should be performed at a temperature of 20°C (68°F).
- Record the measured value.



(2) Using a caliper gauge, measure the inner diameter of high-pressure fuel pump case bore.

NOTE:

- Measurement should be performed at a temperature of 20°C (68°F).
- Record the measured value.



High Pressure Fuel Pump

FUEL INJECTION (FUEL SYSTEMS)

(3) Calculate the clearance between the fuel pump lifter and high-pressure fuel pump case bore. If it is not within the standard, replace the fuel pump lifter and high-pressure fuel pump case as a set.

Clearance between fuel pump lifter and high-pressure fuel pump case bore:

Standard

0.065 — 0.134 mm (0.0026 — 0.0053 in)

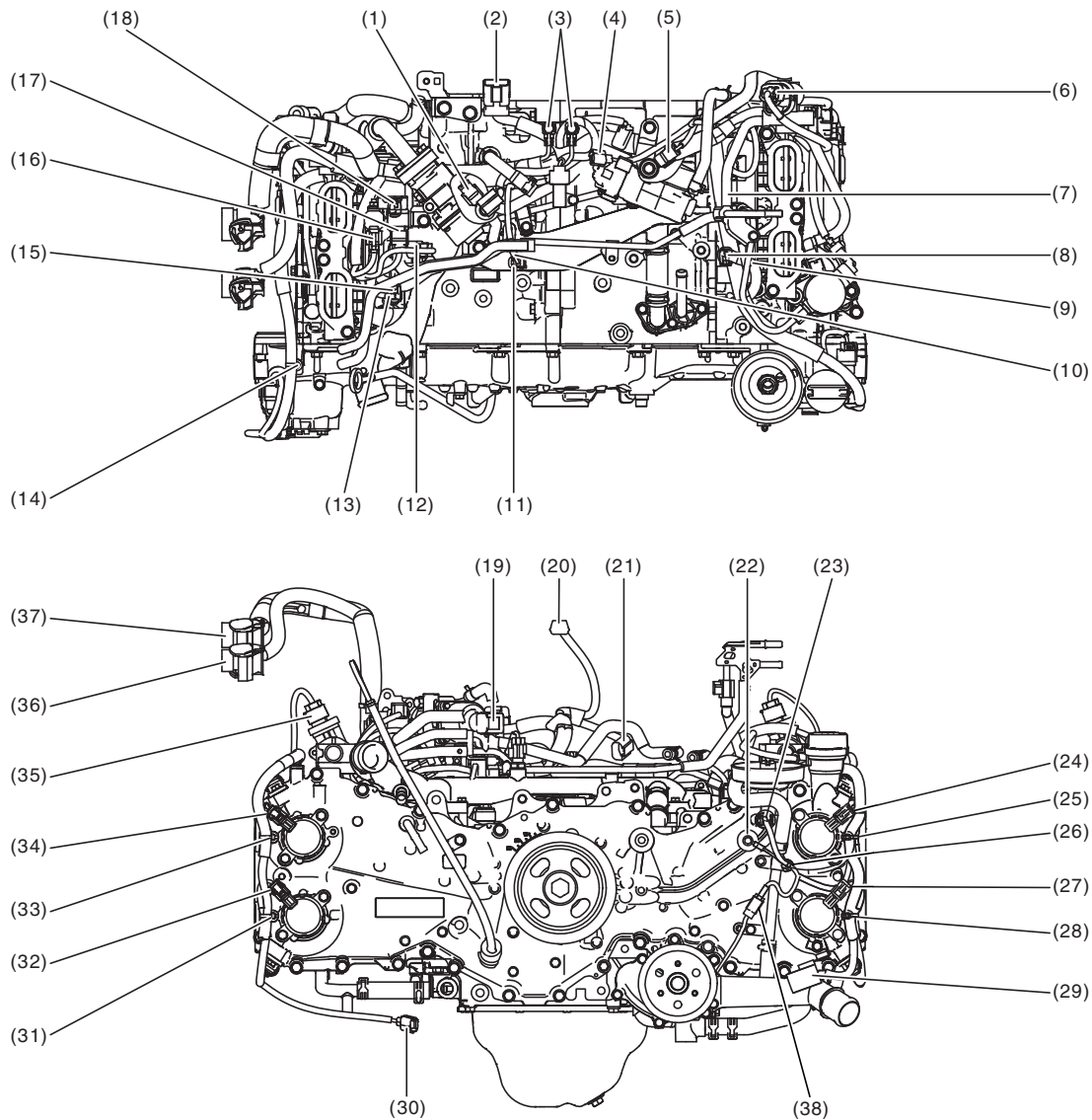
Engine Wiring Harness

FUEL INJECTION (FUEL SYSTEMS)

10.Engine Wiring Harness

A: REMOVAL

- 1) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
 - 2) Disconnect the ground cable from battery.
 - 3) Open the fuel filler lid and remove the fuel filler cap.
 - 4) Remove the intake manifold. <Ref. to FU(H4DOTC)-19, REMOVAL, Intake Manifold.>
 - 5) Disconnect the connector from the engine.
- Structural diagram 1



FU-07851

Engine Wiring Harness

FUEL INJECTION (FUEL SYSTEMS)

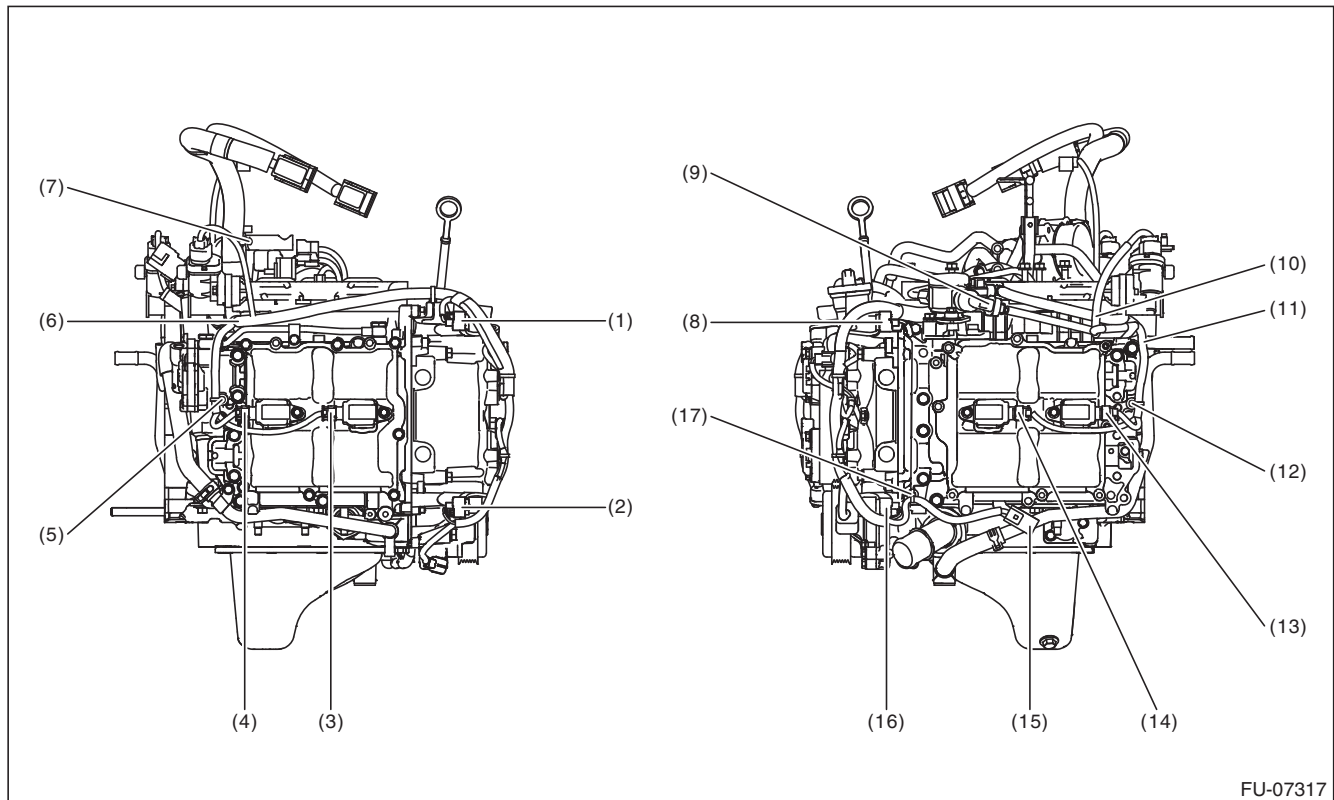
- (1) Knock sensor RH
- (2) Engine harness connector (16P)
- (3) Engine ground (2 locations)
- (4) Crankshaft position sensor
- (5) Knock sensor LH
- (6) Tumble generator valve actuator LH
- (7) Fuel injector (#4)
- (8) Fuel injector (#2)
- (9) White tape
- (10) White tape
- (11) Engine coolant temperature sensor
- (12) Fuel pressure sensor
- (13) White tape
- (14) Remove clip from screw hole.
- (15) Fuel injector (#1)
- (16) Purge control solenoid valve (#2) (black connector)
- (17) Purge control solenoid valve (#1) (blue connector)
- (18) Fuel injector (#3)
- (19) EGR valve
- (20) Manifold absolute pressure and intake air temperature sensor
- (21) Throttle position sensor
- (22) Oil pressure switch
- (23) Engine oil temperature sensor
- (24) Intake oil control solenoid LH
- (25) Remove clip from screw hole.
- (26) Remove clip from the round hole of stay.
- (27) Exhaust oil control solenoid LH
- (28) Remove clip from screw hole.
- (29) Front oxygen (A/F) sensor (Secured to the front oxygen (A/F) sensor bracket.)
- (30) Wastegate solenoid
- (31) Remove clip from screw hole.
- (32) Exhaust oil control solenoid RH
- (33) Remove clip from screw hole.
- (34) Intake oil control solenoid RH
- (35) Tumble generator valve actuator RH
- (36) Engine harness connector (32P)
- (37) Engine harness connector (48P)
- (38) Oil level sensor connector



Engine Wiring Harness

FUEL INJECTION (FUEL SYSTEMS)

- Structural diagram 2



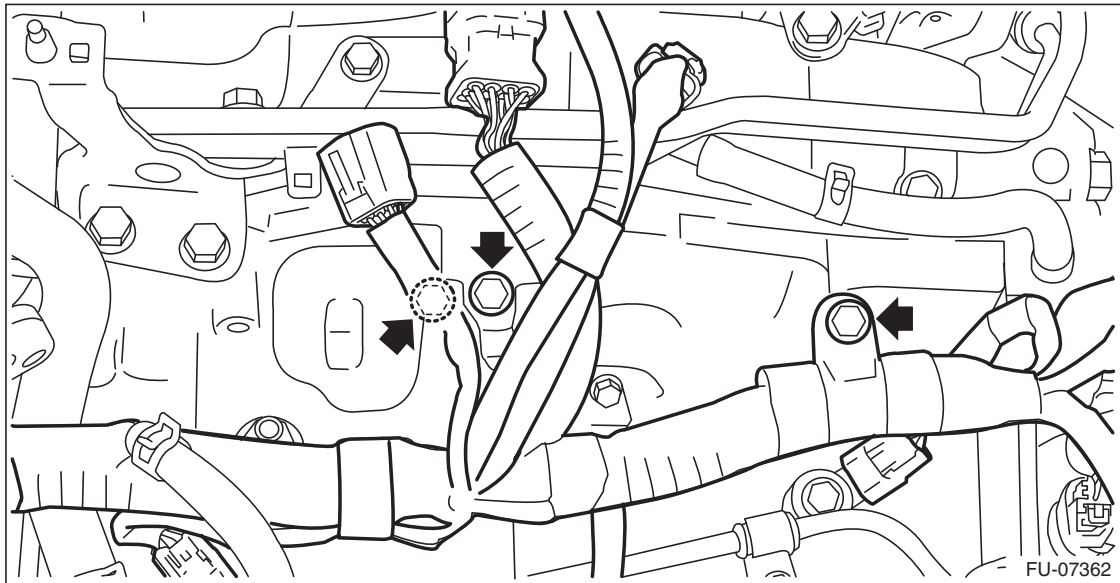
FU-07317

- (1) Intake camshaft position sensor RH
- (2) Exhaust camshaft position sensor RH
- (3) Ignition coil No. 1
- (4) Ignition coil No. 3
- (5) Remove clip from screw hole.
- (6) Tumble generator valve RH
- (7) Remove clip from the round hole.
- (8) Intake camshaft position sensor LH
- (9) High-pressure fuel pump
- (10) Pull out from the outside of the fuel tube.
- (11) Pull out from the lower side of the tumble generator valve LH.
- (12) Remove clip from screw hole.
- (13) Ignition coil No. 4
- (14) Ignition coil No. 2
- (15) Oxygen sensor
- (16) Exhaust camshaft position sensor LH
- (17) Remove clip from screw hole.

Engine Wiring Harness

FUEL INJECTION (FUEL SYSTEMS)

6) Remove the engine wiring harness.



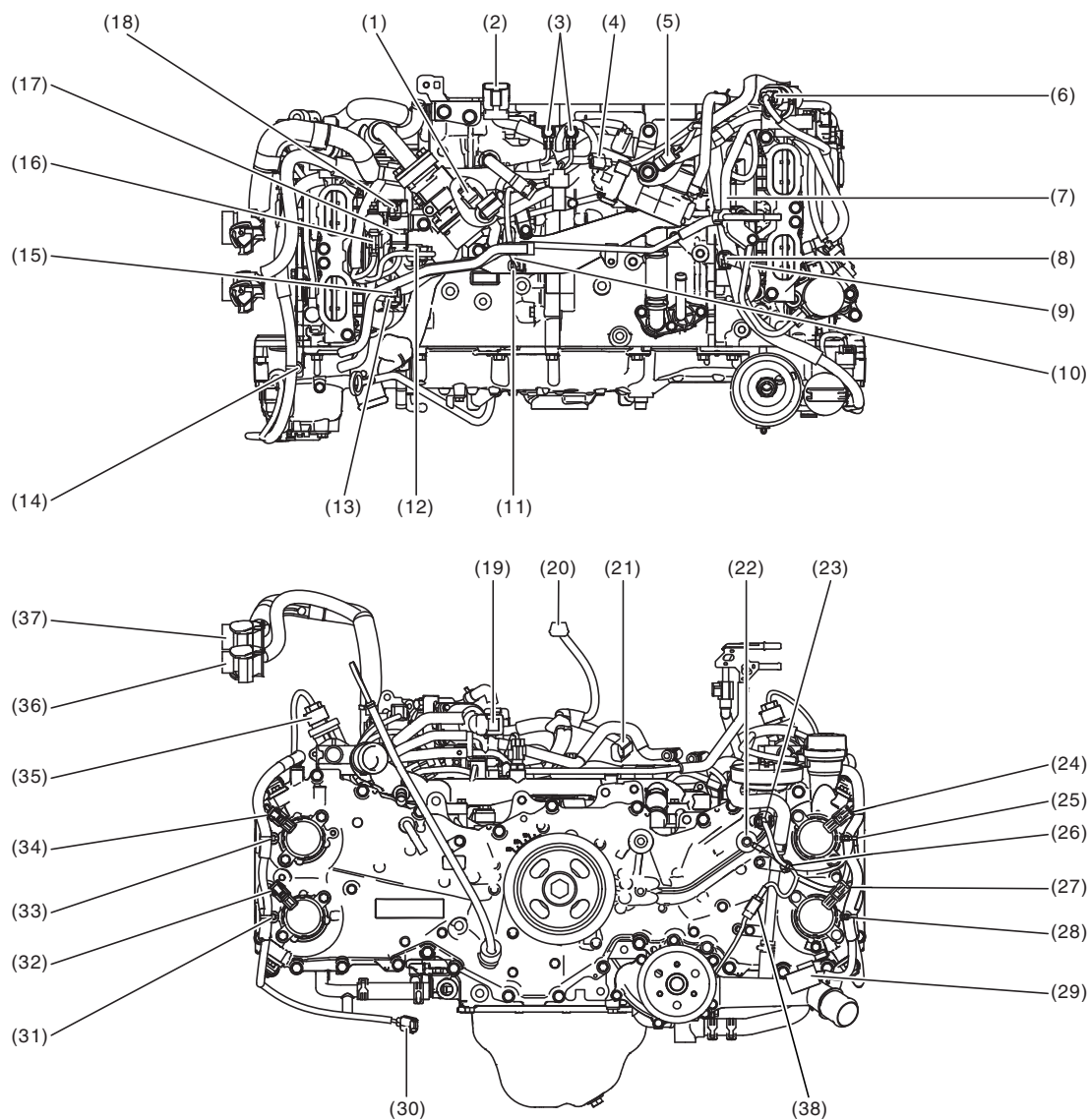
Engine Wiring Harness

FUEL INJECTION (FUEL SYSTEMS)

B: INSTALLATION

1) Set the engine wiring harness to the engine, and connect the connector.

- Structural diagram 1



FU-07851

Engine Wiring Harness

FUEL INJECTION (FUEL SYSTEMS)

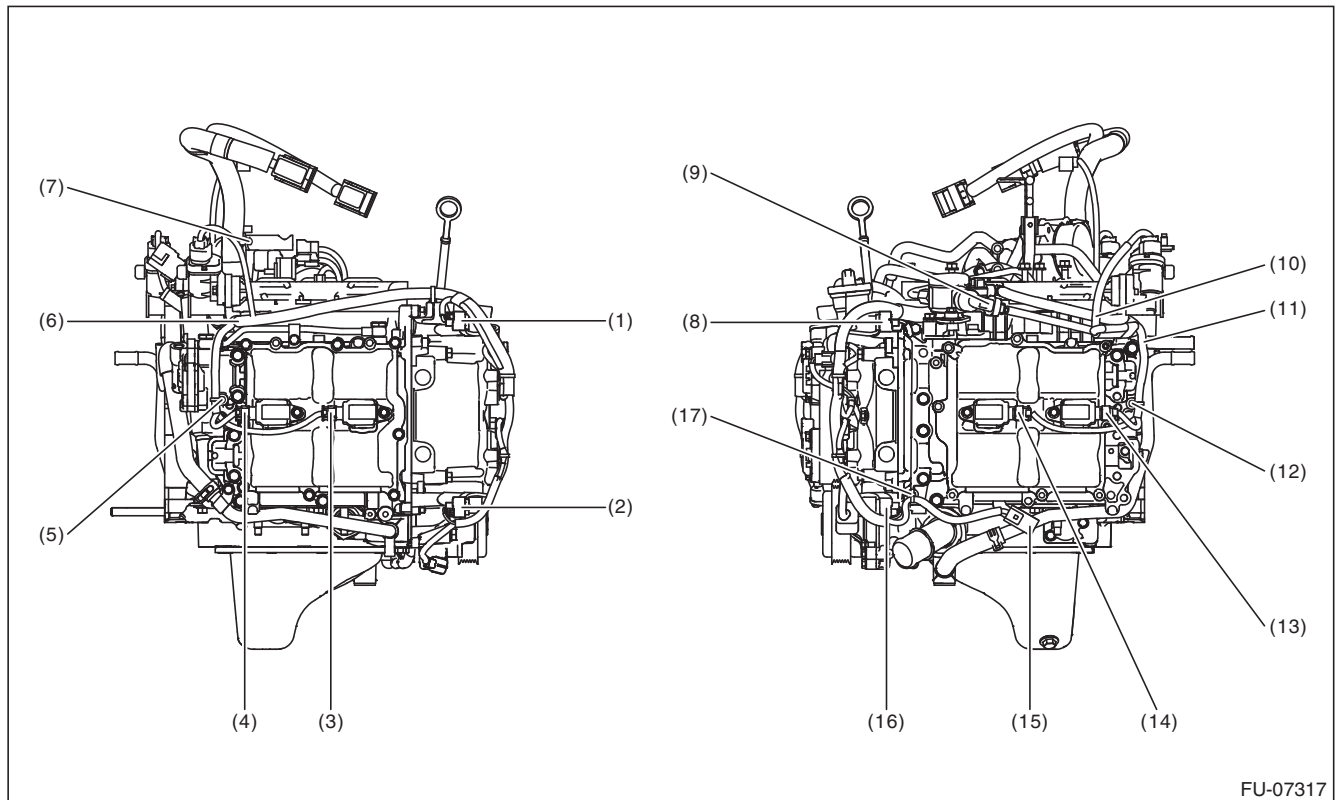
- (1) Knock sensor RH (Routed under the insulator.)
- (2) Engine harness connector (16P) (Secured to engine hanger.)
- (3) Engine ground (2 places) (During installation, let the terminal tip come in contact with the block step.)
- (4) Crankshaft position sensor
- (5) Knock sensor LH (Routed under the insulator.)
- (6) Tumble generator valve actuator LH
- (7) Fuel injector (#4) (Routed under the insulator.)
- (8) Fuel injector (#2) (Routed under the insulator.)
- (9) White tape
- (10) White tape
- (11) Engine coolant temperature sensor
- (12) Fuel pressure sensor
- (13) White tape
- (14) Secure the clip to the screw hole.
- (15) Fuel injector (#1) (Routed under the insulator.)
- (16) Purge control solenoid valve (#2) (black connector)
- (17) Purge control solenoid valve (#1) (blue connector)
- (18) Fuel injector (#3) (Routed under the insulator.)
- (19) EGR valve
- (20) Manifold absolute pressure and intake air temperature sensor
- (21) Throttle position sensor
- (22) Oil pressure switch
- (23) Engine oil temperature sensor
- (24) Intake oil control solenoid LH
- (25) Secure the clip to the screw hole.
- (26) Secure the clip to the round hole of stay.
- (27) Exhaust oil control solenoid LH
- (28) Secure the clip to the screw hole.
- (29) Front oxygen (A/F) sensor (Secured to the front oxygen (A/F) sensor bracket.)
- (30) Wastegate solenoid
- (31) Secure the clip to the screw hole.
- (32) Exhaust oil control solenoid RH
- (33) Secure the clip to the screw hole.
- (34) Intake oil control solenoid RH
- (35) Tumble generator valve actuator RH
- (36) Engine harness connector (32P)
- (37) Engine harness connector (48P)
- (38) Oil level sensor connector



Engine Wiring Harness

FUEL INJECTION (FUEL SYSTEMS)

- Structural diagram 2



- (1) Intake camshaft position sensor RH
- (2) Exhaust camshaft position sensor RH
- (3) Ignition coil No. 1
- (4) Ignition coil No. 3
- (5) Secure the clip to the screw hole.
- (6) Route under the tumble generator valve.
- (7) Secure the clip to the round hole.
- (8) Intake camshaft position sensor LH
- (9) High-pressure fuel pump
- (10) Route outside of the fuel tube.
- (11) Route under the tumble generator valve.
- (12) Secure the clip to the screw hole.
- (13) Ignition coil No. 4
- (14) Ignition coil No. 2
- (15) Oxygen sensor (Secured to the heater pipe.)
- (16) Exhaust camshaft position sensor LH
- (17) Secure the clip to the screw hole.

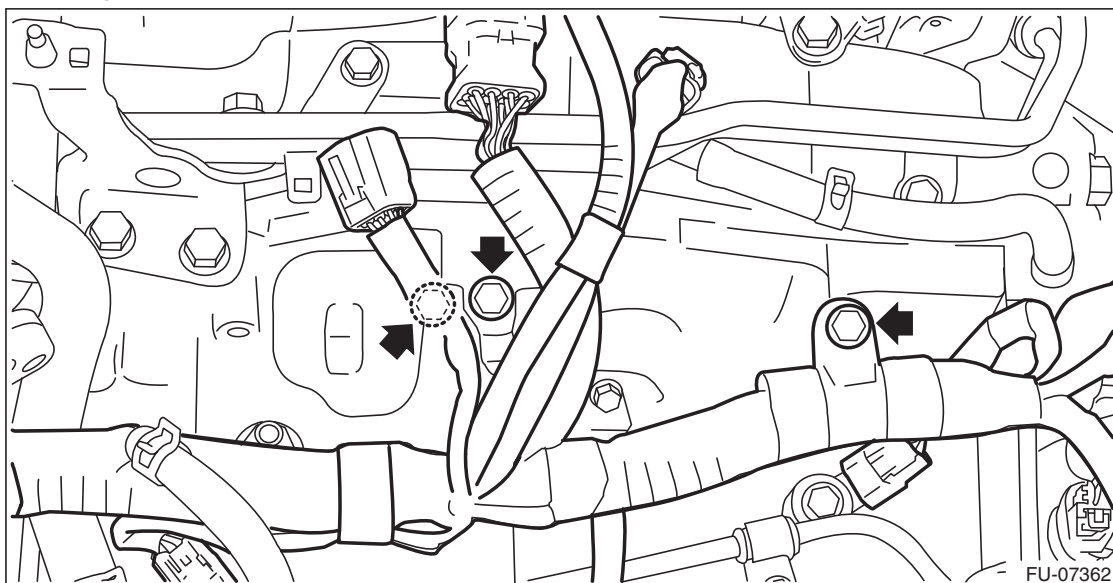
Engine Wiring Harness

FUEL INJECTION (FUEL SYSTEMS)

2) Install the engine wiring harness.

Tightening torque:

19 N·m (1.9 kgf-m, 14.0 ft-lb)



3) Install the intake manifold. <Ref. to FU(H4DOTC)-29, INSTALLATION, Intake Manifold.>

4) Connect the battery ground terminal.

C: INSPECTION

- 1) Check that the engine wiring harness does not have deformation, cracks and any other damage.
- 2) Check the engine wiring harness for contamination or clogging.

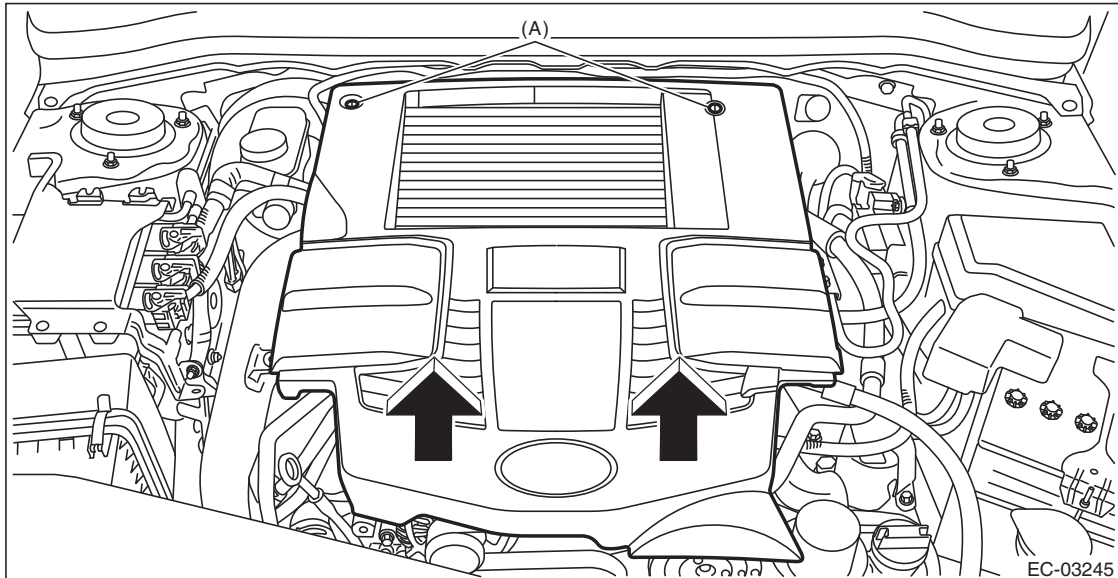
Engine Coolant Temperature Sensor

FUEL INJECTION (FUEL SYSTEMS)

11.Engine Coolant Temperature Sensor

A: REMOVAL

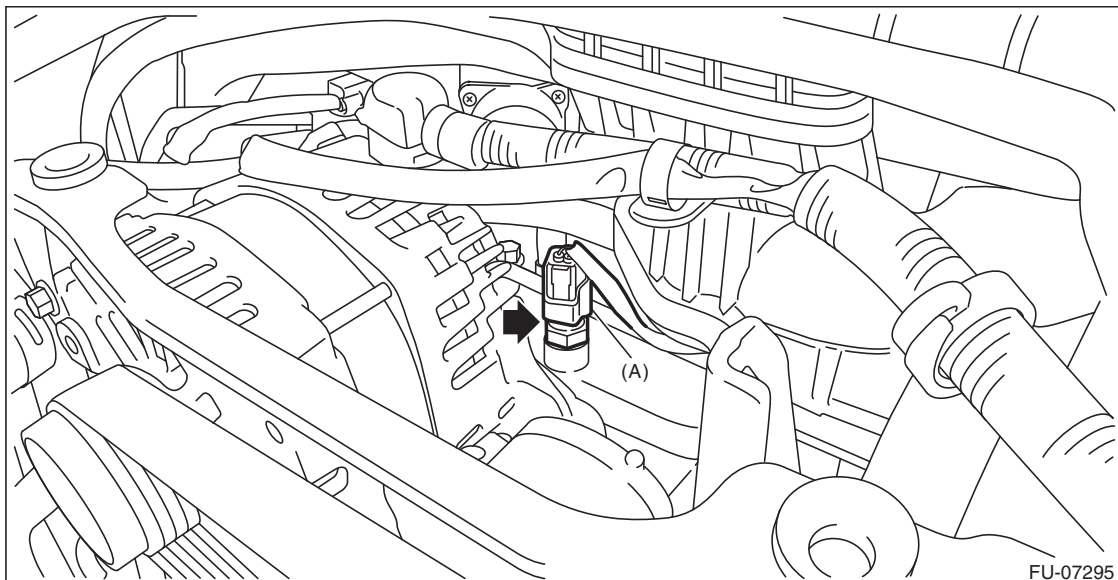
1) Remove the clip (A), lift the front of the collector cover in the direction of arrow, and then remove the collector cover.



2) Disconnect the ground cable from battery.

3) Drain engine coolant. <Ref. to CO(H4DOTC)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

4) Disconnect the connector (A) from the engine coolant temperature sensor, and remove the engine coolant temperature sensor.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:

Use a new gasket.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

Engine Coolant Temperature Sensor

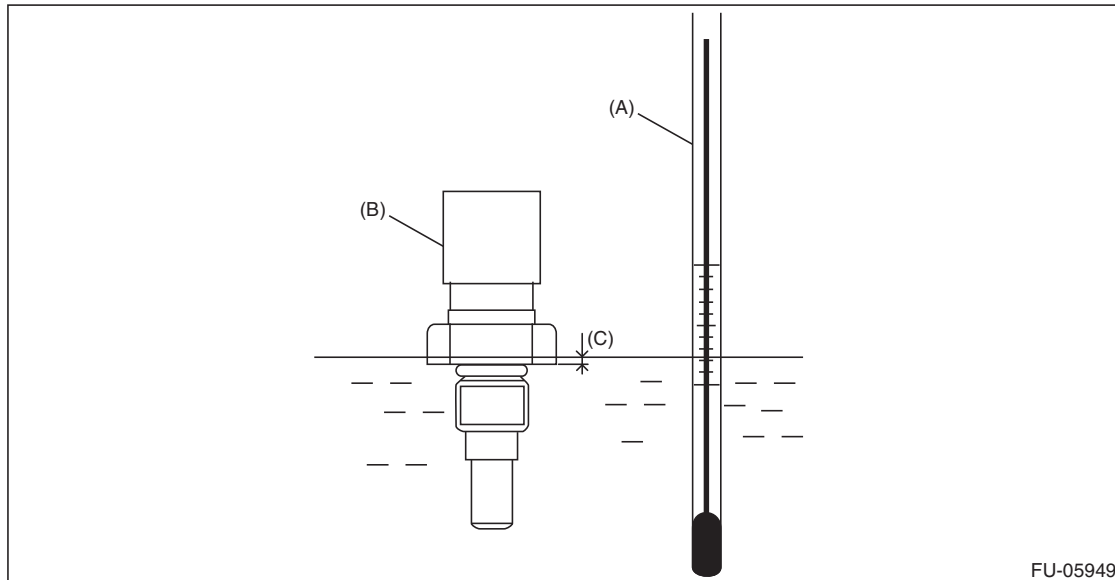
FUEL INJECTION (FUEL SYSTEMS)

C: INSPECTION

- 1) Check that the engine coolant temperature sensor has no deformation, cracks or other damages.
- 2) Immerse the engine coolant temperature sensor and a thermometer in water.

CAUTION:

Take care not to allow water to get into the engine coolant temperature sensor connector. Completely remove any water inside.



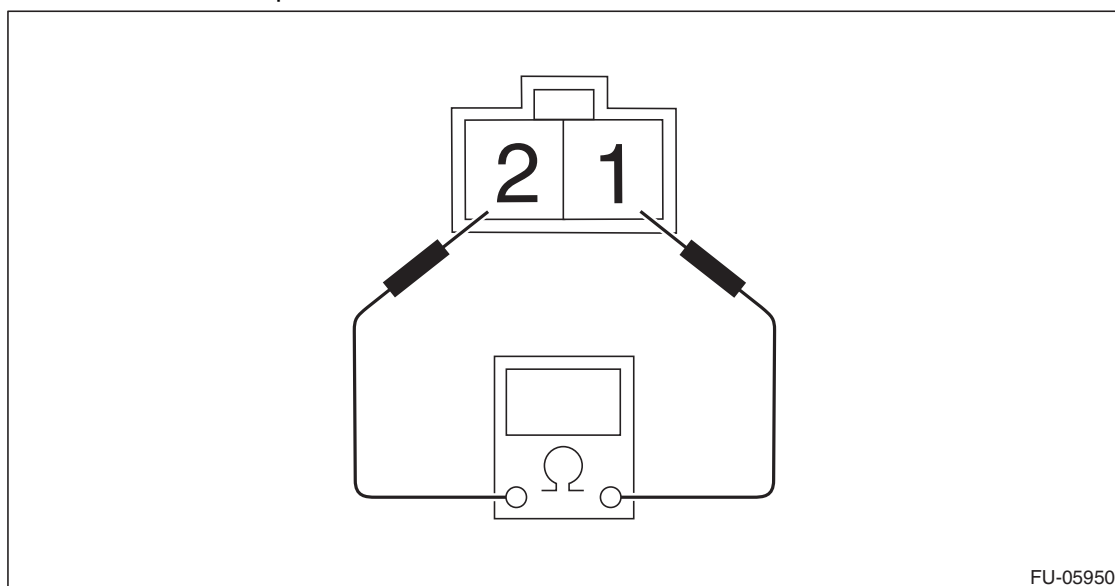
FU-05949

- (A) Thermometer (B) Engine coolant temperature sensor (C) Hexagonal part height: To approx. $\frac{1}{3}$

- 3) Raise water temperature gradually, measure the resistance between the engine coolant temperature sensor terminals when the temperature is 20°C (68°F) and 80°C (176°F).

NOTE:

Agitate the water for even temperature distribution.



FU-05950

Water temperature	Terminal No.	Standard
20°C (68°F)	1 and 2	Approx. 2.45±0.2 kΩ
80°C (176°F)		Approx. 0.318±0.013 kΩ

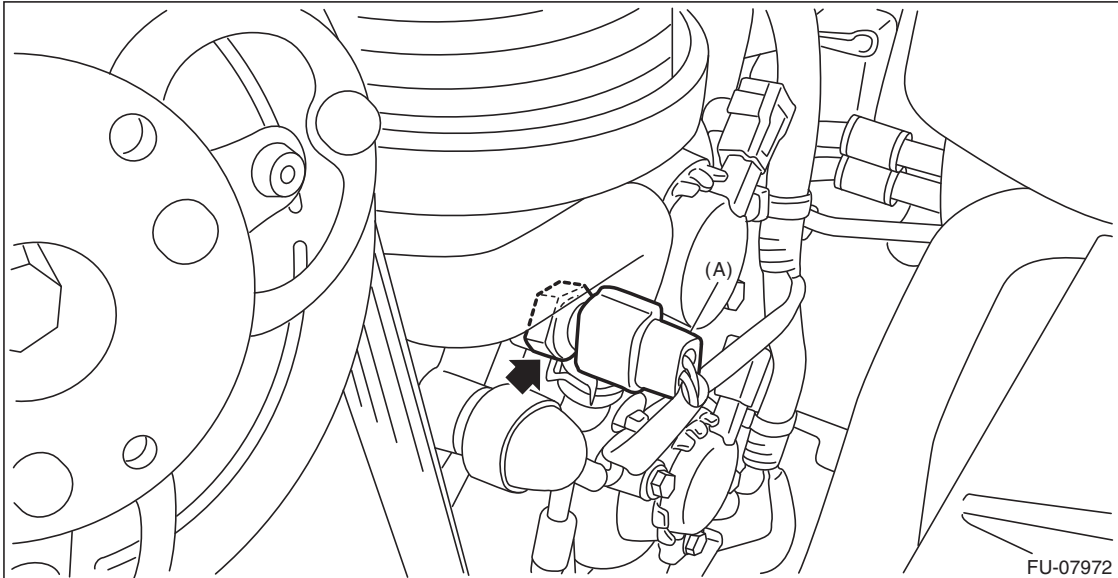
Engine Oil Temperature Sensor

FUEL INJECTION (FUEL SYSTEMS)

12.Engine Oil Temperature Sensor

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Disconnect the connector (A) from the engine oil temperature sensor, and remove the engine coolant temperature sensor from the chain cover.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:

Use a new gasket.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

Engine Oil Temperature Sensor

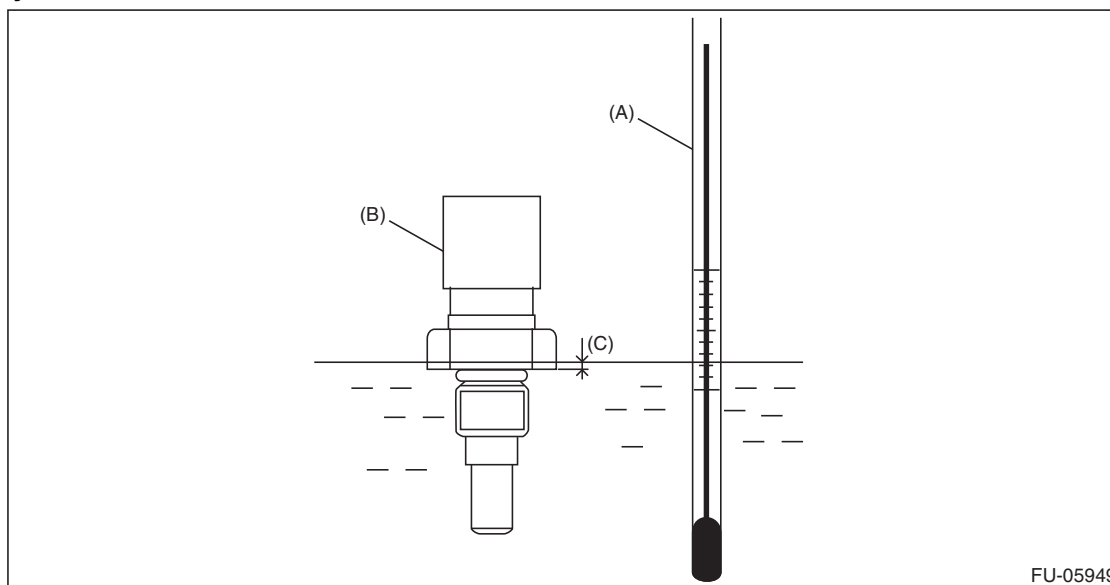
FUEL INJECTION (FUEL SYSTEMS)

C: INSPECTION

- 1) Check that the engine oil temperature sensor has no deformation, cracks or other damages.
- 2) Immerse the engine oil temperature sensor and a thermometer in water.

CAUTION:

Take care not to allow water to get into the engine oil temperature sensor connector. Completely remove any water inside.



(A) Thermometer

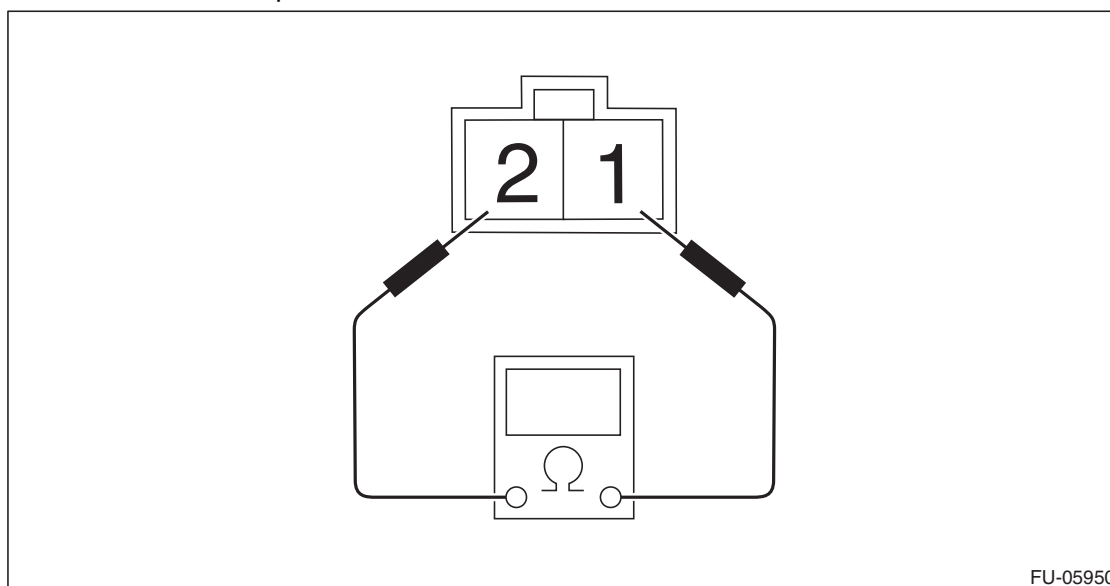
(B) Engine oil temperature sensor

(C) Hexagonal part height: To approx. $\frac{1}{3}$

- 3) Raise water temperature gradually, measure the resistance between the engine oil temperature sensor terminals when the temperature is 20°C (68°F) and 80°C (176°F).

NOTE:

Agitate the water for even temperature distribution.



FU-05950

Water temperature	Terminal No.	Standard
20°C (68°F)	1 and 2	Approx. 2.45±0.2 kΩ
80°C (176°F)		Approx. 0.318±0.013 kΩ

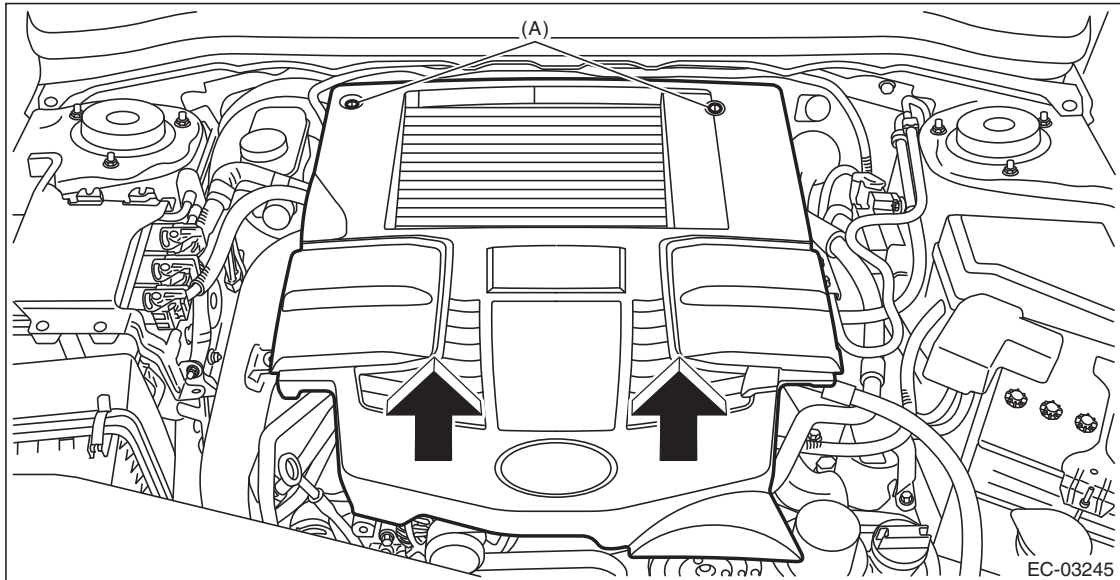
Crankshaft Position Sensor

FUEL INJECTION (FUEL SYSTEMS)

13.Crankshaft Position Sensor

A: REMOVAL

1) Remove the clip (A), lift the front of the collector cover in the direction of arrow, and then remove the collector cover.

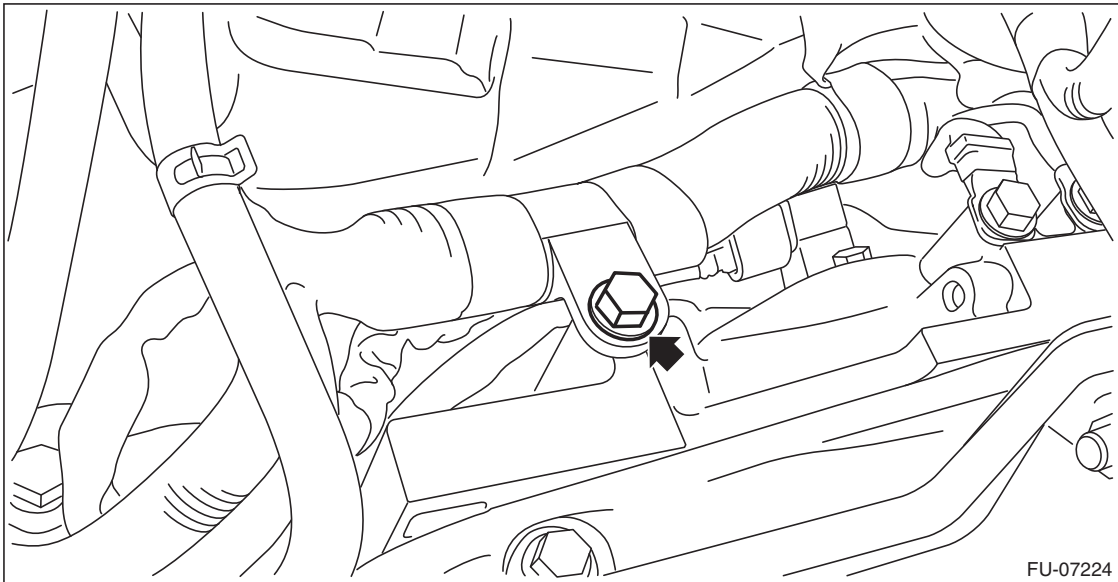


2) Disconnect the ground cable from battery.

3) Remove the intercooler. <Ref. to IN(H4DOTC)-35, REMOVAL, Intercooler.>

4) Remove the throttle body. <Ref. to FU(H4DOTC)-16, REMOVAL, Throttle Body.>

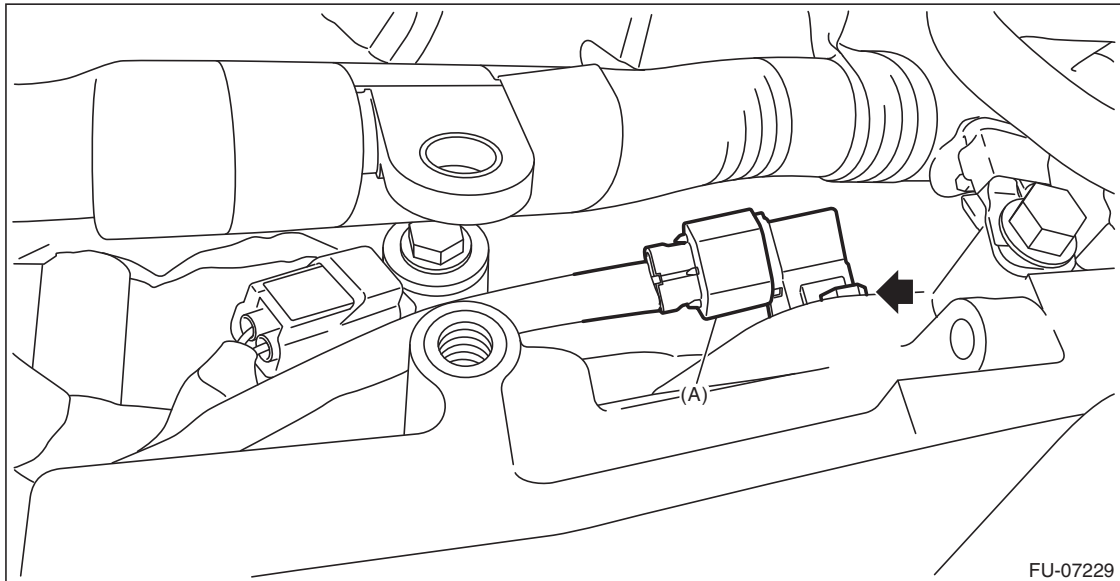
5) Remove the bolts securing the engine harness.



Crankshaft Position Sensor

FUEL INJECTION (FUEL SYSTEMS)

6) Disconnect the connector (A) from the crankshaft position sensor, and remove the crankshaft position sensor from the cylinder block.

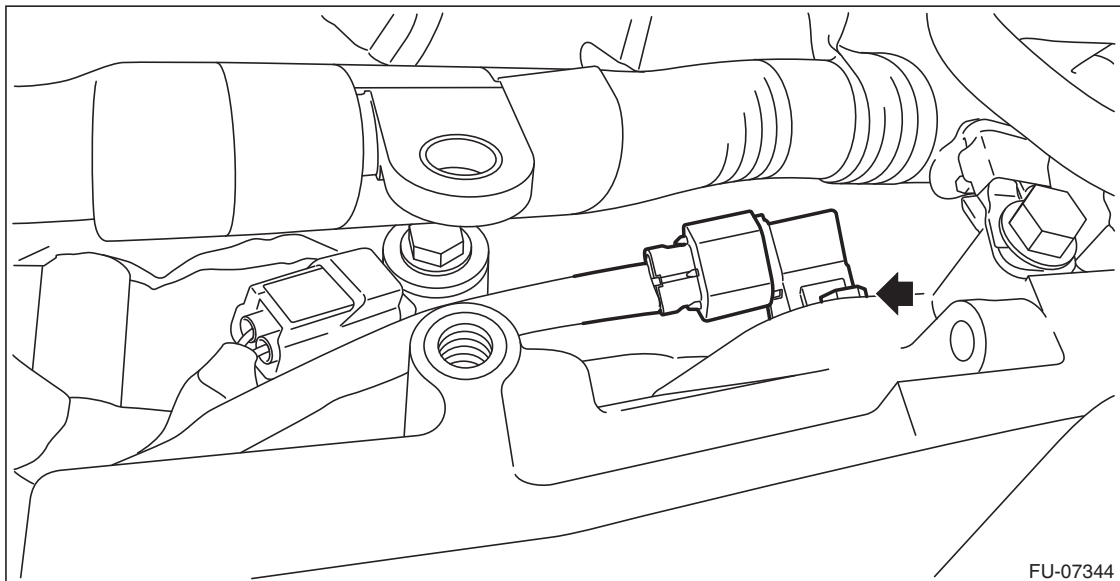


B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:

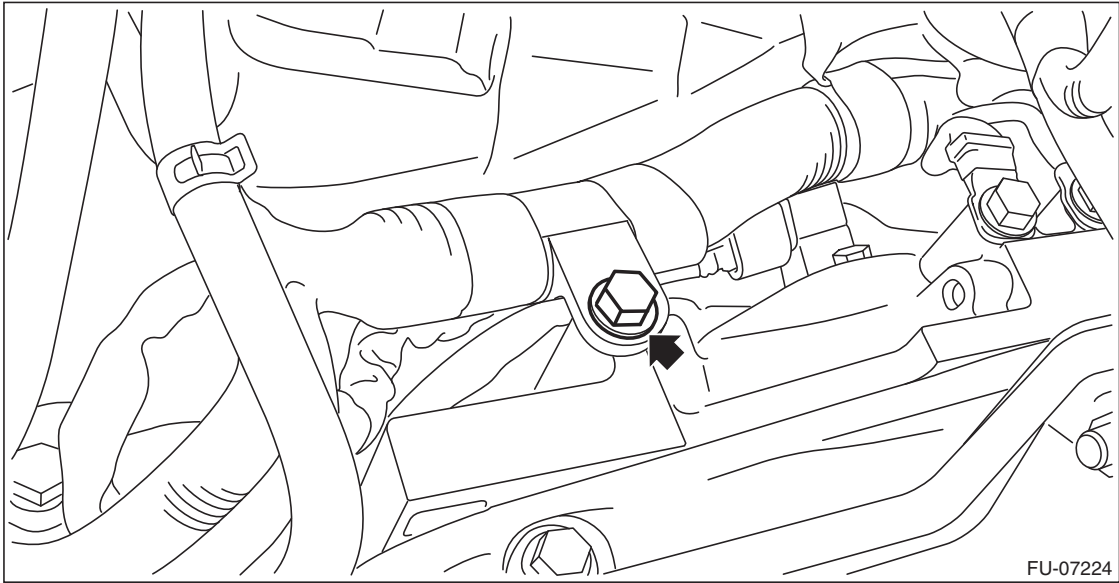
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



Crankshaft Position Sensor

FUEL INJECTION (FUEL SYSTEMS)

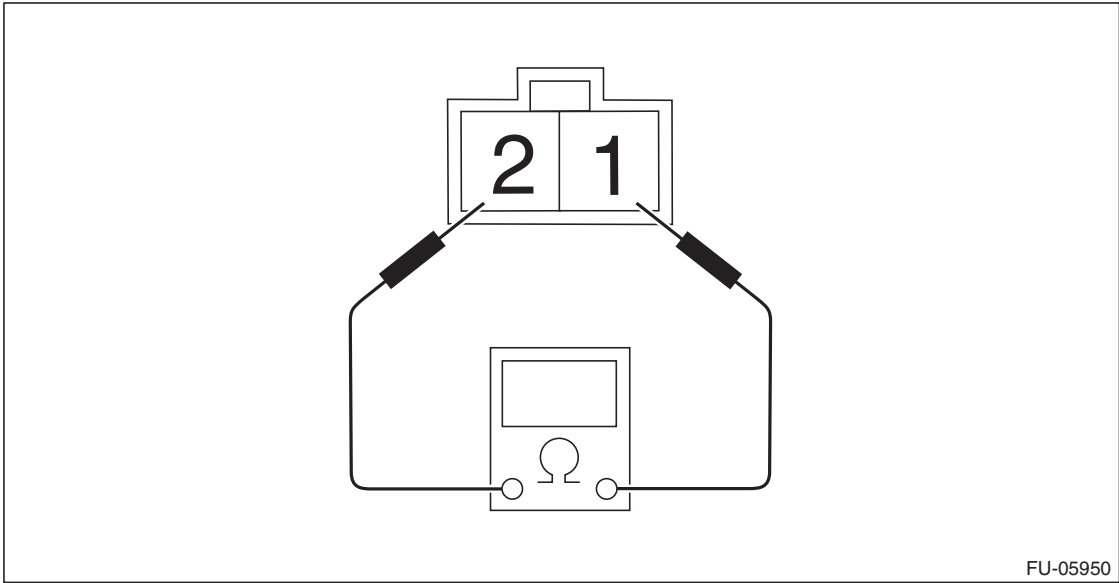
Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



C: INSPECTION

1. CRANKSHAFT POSITION SENSOR (METHOD WITH CIRCUIT TESTER)

Measure the resistance between crankshaft position sensor terminals.



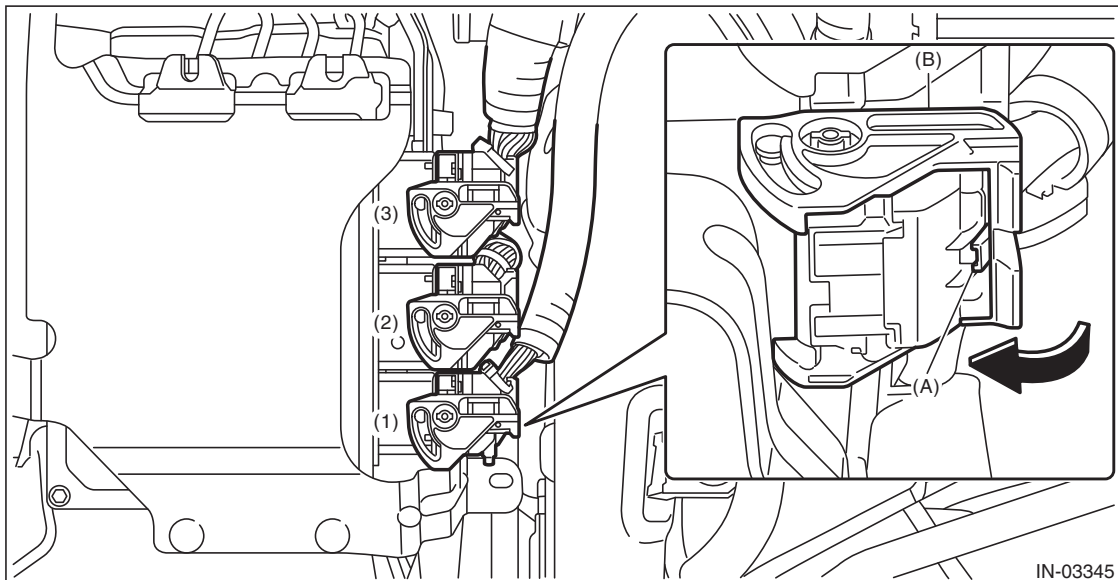
Terminal No.	Standard
1 and 2	2.04±0.204 kΩ

Crankshaft Position Sensor

FUEL INJECTION (FUEL SYSTEMS)

2. CRANKSHAFT POSITION SENSOR (METHOD WITH OSCILLOSCOPE)

- 1) Disconnect the ground cable from battery.
- 2) Prepare an oscilloscope.
- 3) While pressing the section (A) shown in the figure, move the lock lever (B) in the direction of the arrow to disconnect the connectors from the ECM in numerical order as shown in the figure.

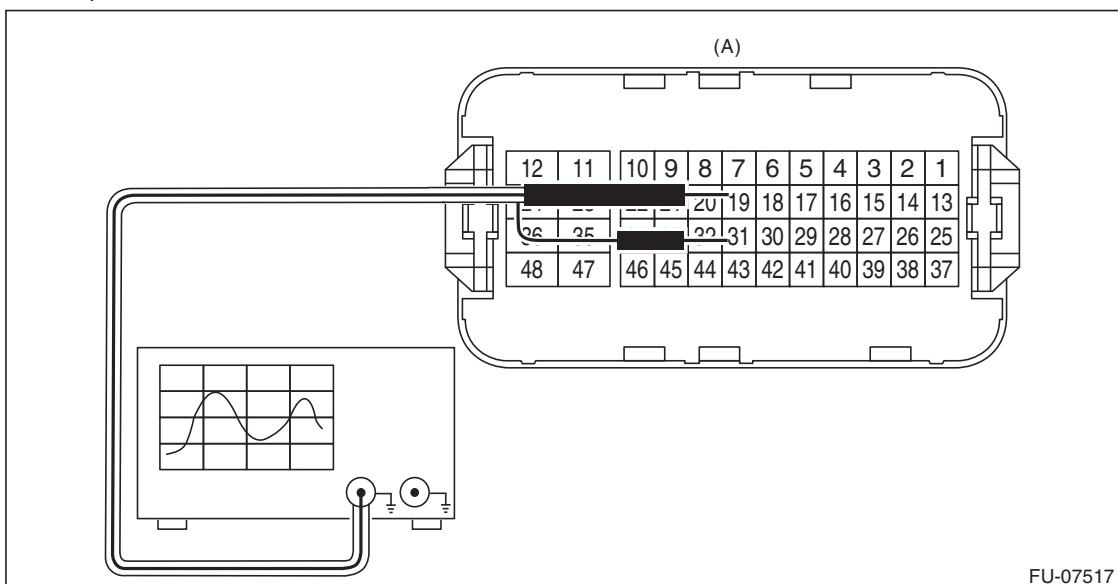


- 4) Install the special tool between the ECM and body harness and the engine harness. <Ref. to EN(H4DOTC)(diag)-6, CAUTION, General Description.>

ST 18460AA030 CHECK BOARD

- 5) Connect the battery ground terminal.

- 6) Connect the probe to ST.



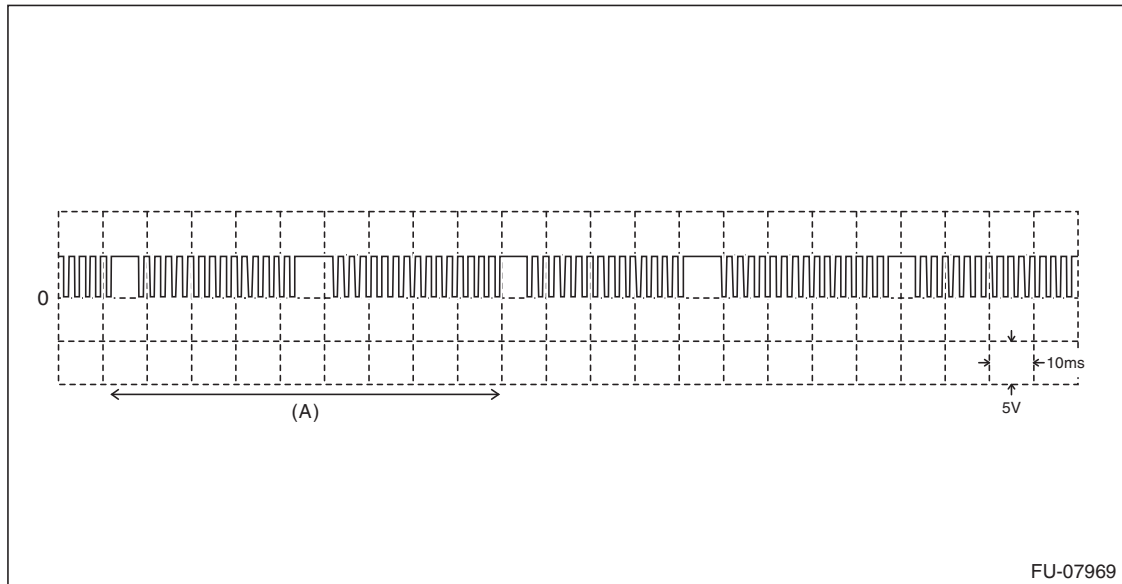
(A) To the check board connector
(ECM connector)

Terminal No.	Probe
19	+
31	-

Crankshaft Position Sensor

FUEL INJECTION (FUEL SYSTEMS)

- 7) Start the engine and let it idle.
- 8) Check the pattern is the same as the waveform and voltage shown below.



(A) One crankshaft rotation

- 9) After inspection, install the related parts in the reverse order of removal.

3. OTHER INSPECTIONS

Check that the crankshaft position sensor has no deformation, cracks or other damages.



Crankshaft Position Sensor Plate

FUEL INJECTION (FUEL SYSTEMS)

14.Crankshaft Position Sensor Plate

A: REMOVAL

The crankshaft position sensor plate is tightened together with the drive plate; therefore, refer to “Drive Plate” for removal procedure. <Ref. to CVT(TR690)-133, REMOVAL, Drive Plate.>

B: INSTALLATION

The crankshaft position sensor plate is tightened together with the drive plate; therefore, refer to “Drive Plate” for installation procedure. <Ref. to CVT(TR690)-134, INSTALLATION, Drive Plate.>

C: INSPECTION

Check that the crankshaft position sensor plate has no deformation, cracks or other damages.

Camshaft Position Sensor

FUEL INJECTION (FUEL SYSTEMS)

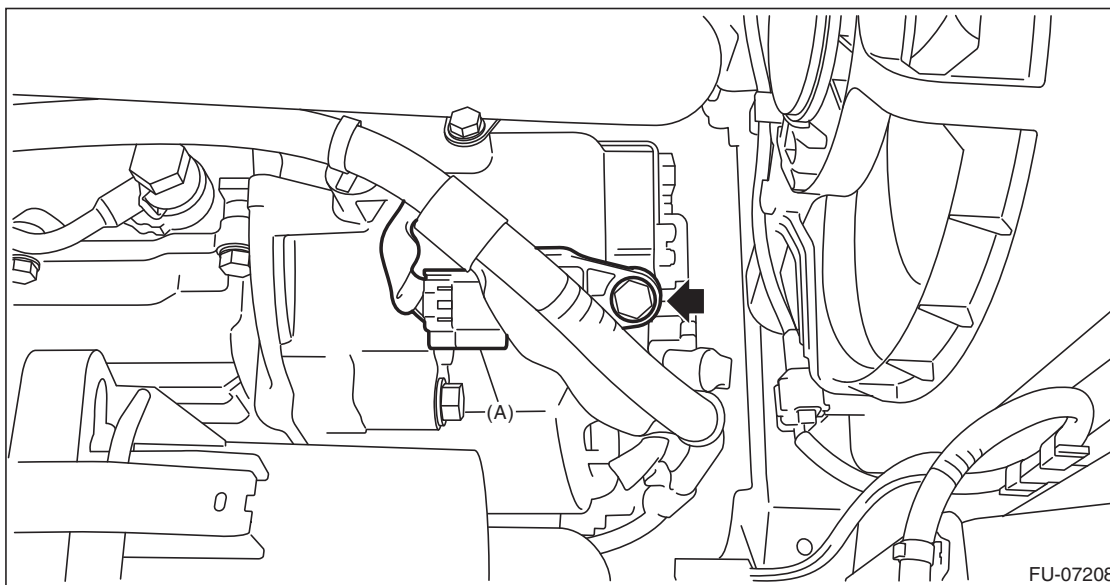
15. Camshaft Position Sensor

A: REMOVAL

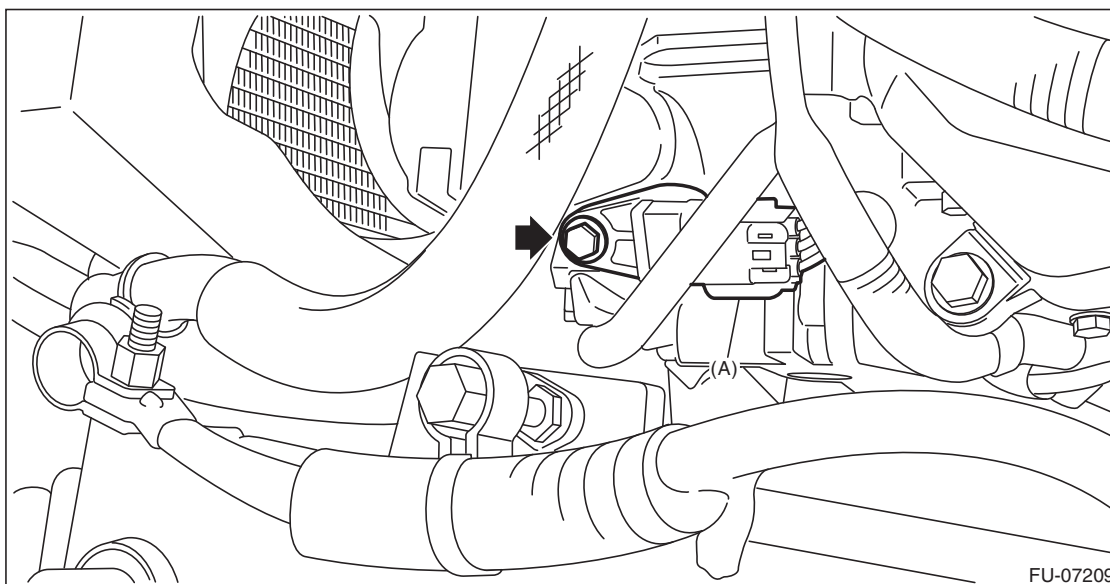
1. INTAKE SIDE

- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake duct (rear). (RH side only) <Ref. to IN(H4DOTC)-19, REMOVAL, Air Intake Duct.>
- 3) Disconnect the connector (A) from the camshaft position sensor, and remove the camshaft position sensor from the chain cover.

- RH side



- LH side



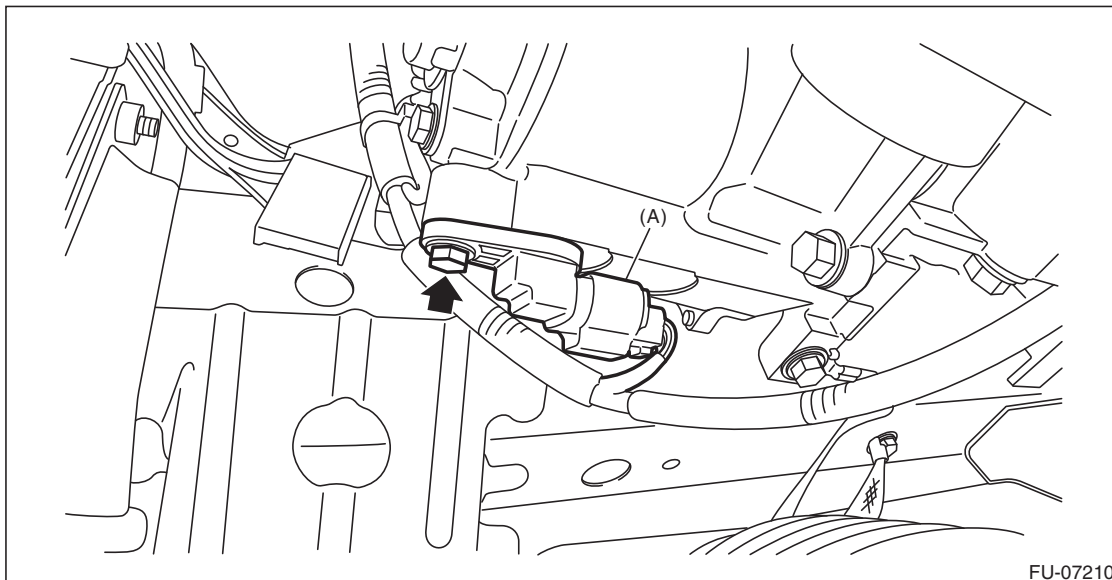
Camshaft Position Sensor

FUEL INJECTION (FUEL SYSTEMS)

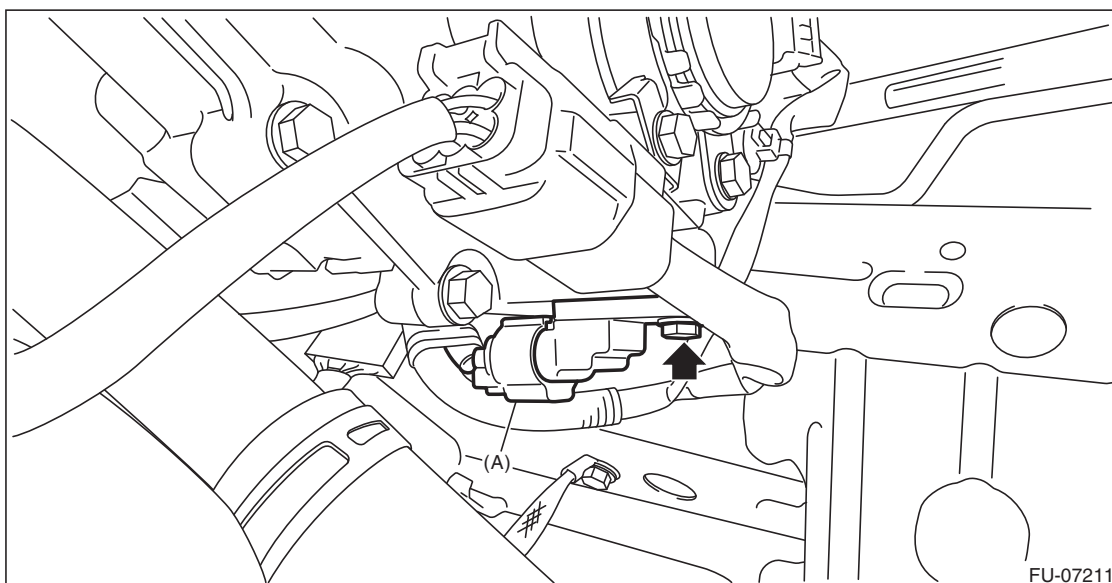
2. EXHAUST SIDE

- 1) Disconnect the ground cable from battery.
- 2) Remove the under cover. <Ref. to EI-22, REMOVAL, Front Under Cover.>
- 3) Disconnect the connector (A) from the camshaft position sensor, and remove the camshaft position sensor from the chain cover.

- RH side



- LH side



B: INSTALLATION

Install in the reverse order of removal.

NOTE:

- Use new O-rings.
- Apply engine oil to O-ring.

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

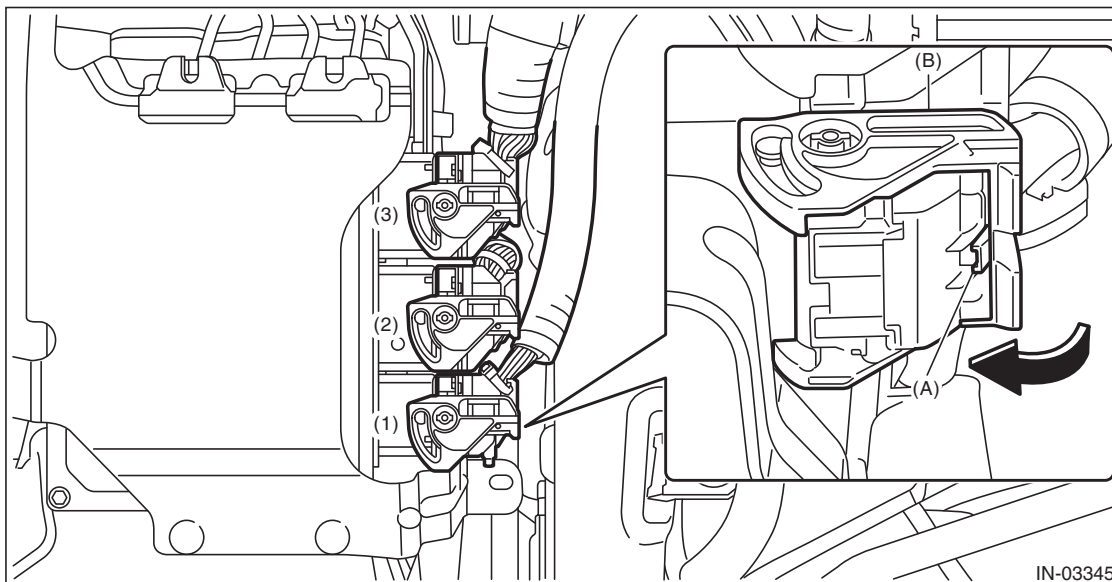
Camshaft Position Sensor

FUEL INJECTION (FUEL SYSTEMS)

C: INSPECTION

1. CAMSHAFT POSITION SENSOR (METHOD WITH OSCILLOSCOPE)

- 1) Disconnect the ground cable from battery.
- 2) Prepare an oscilloscope.
- 3) While pressing the section (A) shown in the figure, move the lock lever (B) in the direction of the arrow to disconnect the connectors from the ECM in numerical order as shown in the figure.



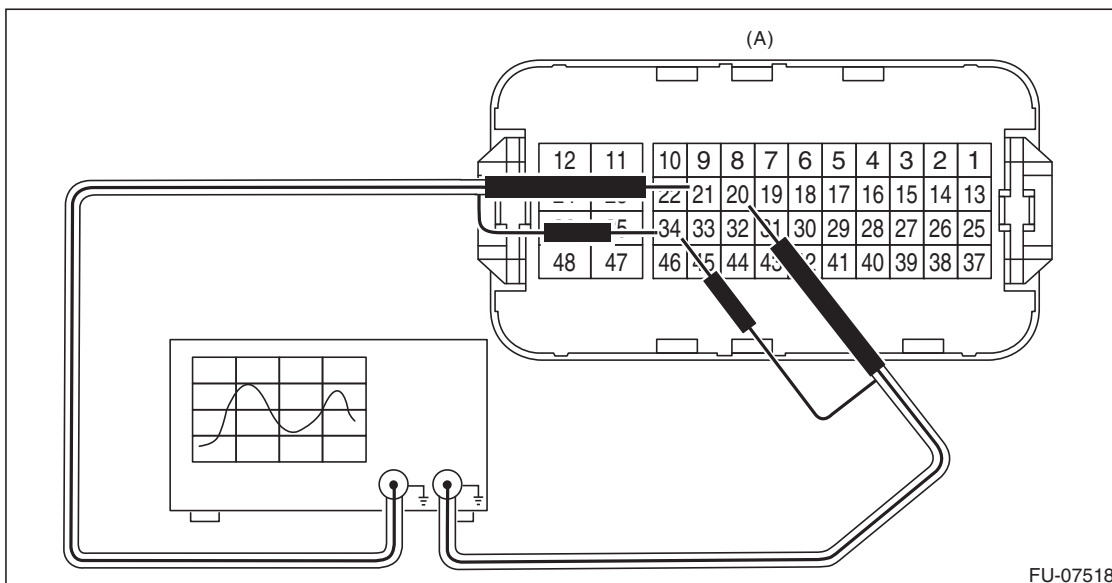
- 4) Install the special tool between the ECM and body harness and the engine harness. <Ref. to EN(H4DOTC)(diag)-6, CAUTION, General Description.>

ST 18460AA030 CHECK BOARD

- 5) Connect the battery ground terminal.

- 6) Connect the probe to ST.

- Intake camshaft position sensor

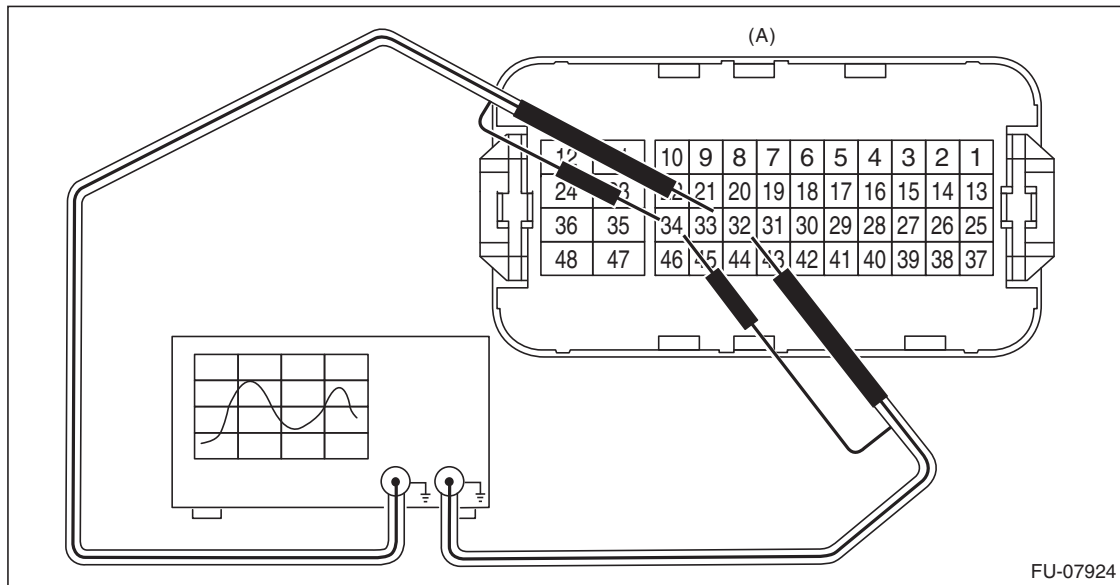


(A) To the check board connector
(ECM connector)

Camshaft Position Sensor

FUEL INJECTION (FUEL SYSTEMS)

- Exhaust camshaft position sensor



- (A) To the check board connector
(ECM connector)

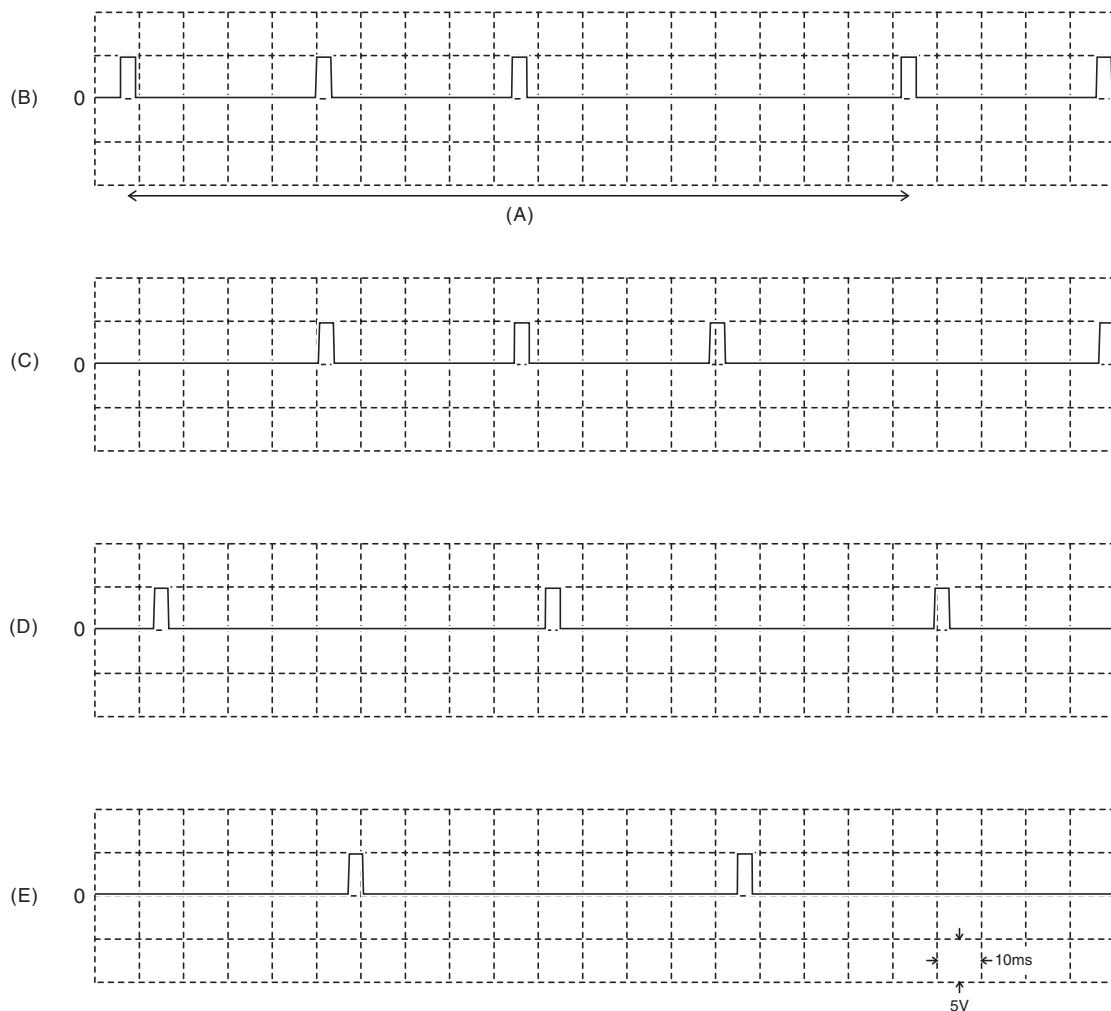
Camshaft position sensor		Terminal No.	Probe
Intake	RH	20	+
	LH	21	+
Exhaust	RH	32	+
	LH	33	+
RH and LH		34	-

- 7) Start the engine and let it idle.

Camshaft Position Sensor

FUEL INJECTION (FUEL SYSTEMS)

8) Check the pattern is the same as the waveform and voltage shown below.



FU-07925

- | | | |
|--|---|---|
| (A) One camshaft rotation | (C) Intake camshaft position sensor LH | (E) Exhaust camshaft position sensor LH |
| (B) Intake camshaft position sensor RH | (D) Exhaust camshaft position sensor RH | |

9) After inspection, install the related parts in the reverse order of removal.

2. OTHER INSPECTIONS

Check that the camshaft position sensor has no deformation, cracks or other damages.

Oil Control Solenoid

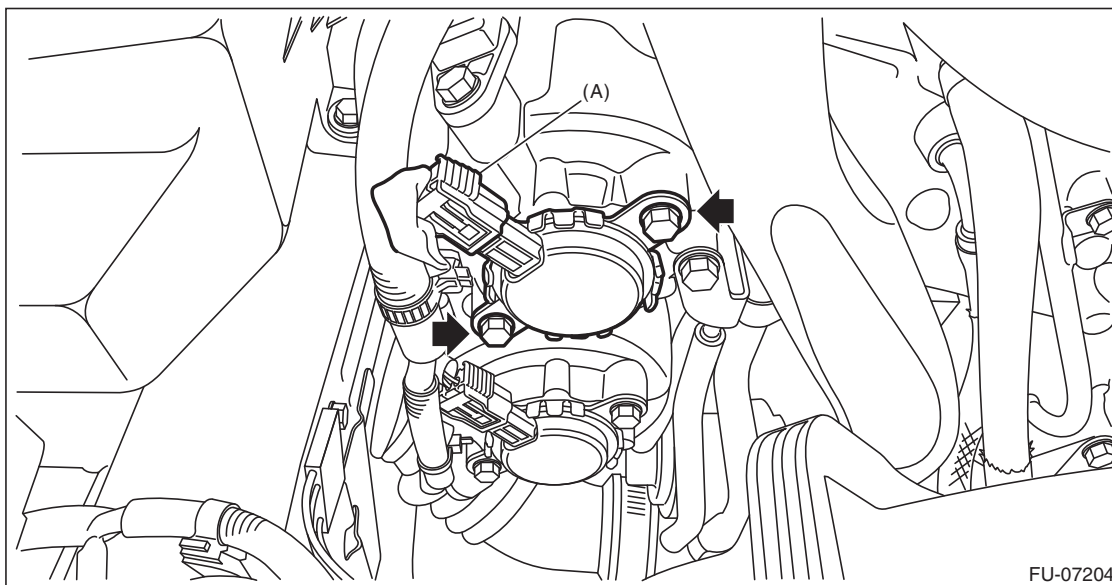
FUEL INJECTION (FUEL SYSTEMS)

16.Oil Control Solenoid

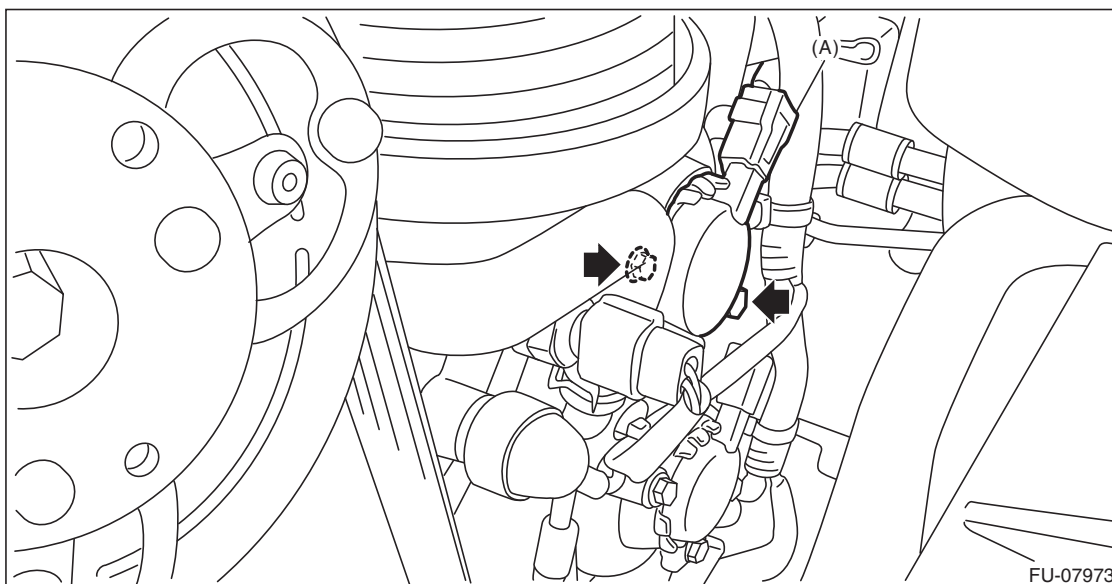
A: REMOVAL

1. INTAKE SIDE

- 1) Disconnect the ground cable from battery.
 - 2) Remove the air intake duct (rear). (RH side only) <Ref. to IN(H4DOTC)-19, REMOVAL, Air Intake Duct.>
 - 3) Disconnect the connector (A) from the oil control solenoid, and remove the oil control solenoid from the chain cover.
- RH side



- LH side



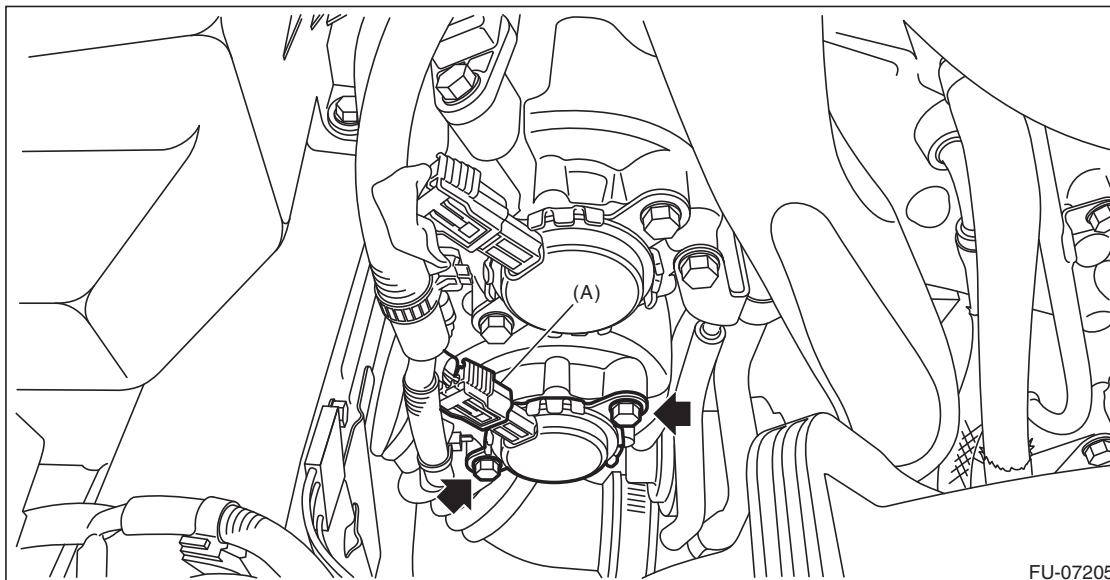
Oil Control Solenoid

FUEL INJECTION (FUEL SYSTEMS)

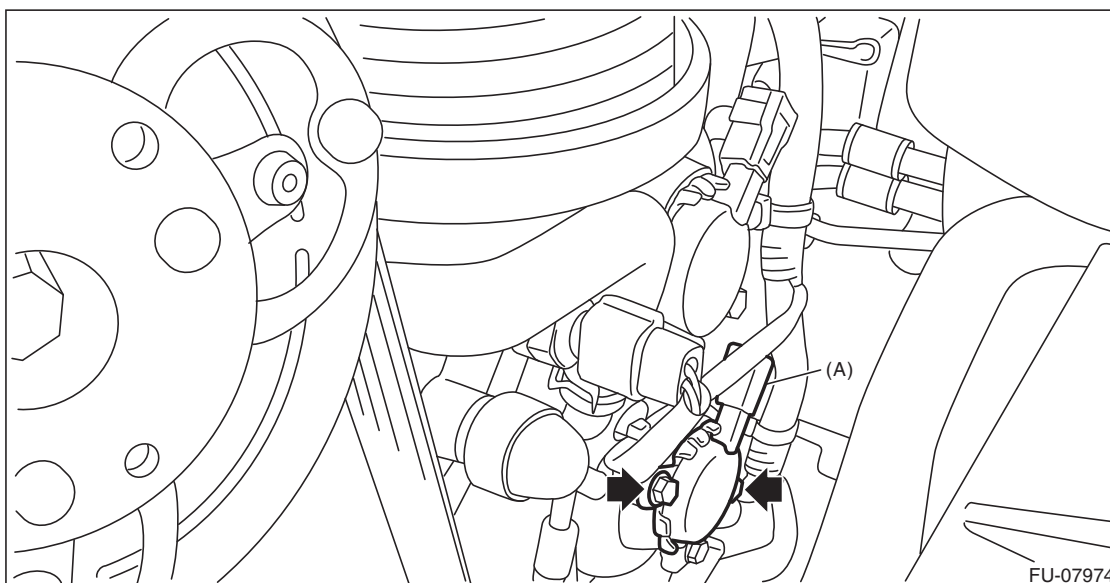
2. EXHAUST SIDE

- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake duct (rear). (RH side only) <Ref. to IN(H4DOTC)-19, REMOVAL, Air Intake Duct.>
- 3) Disconnect the connector (A) from the oil control solenoid, and remove the oil control solenoid from the chain cover.

- RH side



- LH side



B: INSTALLATION

Install in the reverse order of removal.

NOTE:

- Use new O-rings.
- Apply engine oil to O-ring.

Tightening torque:

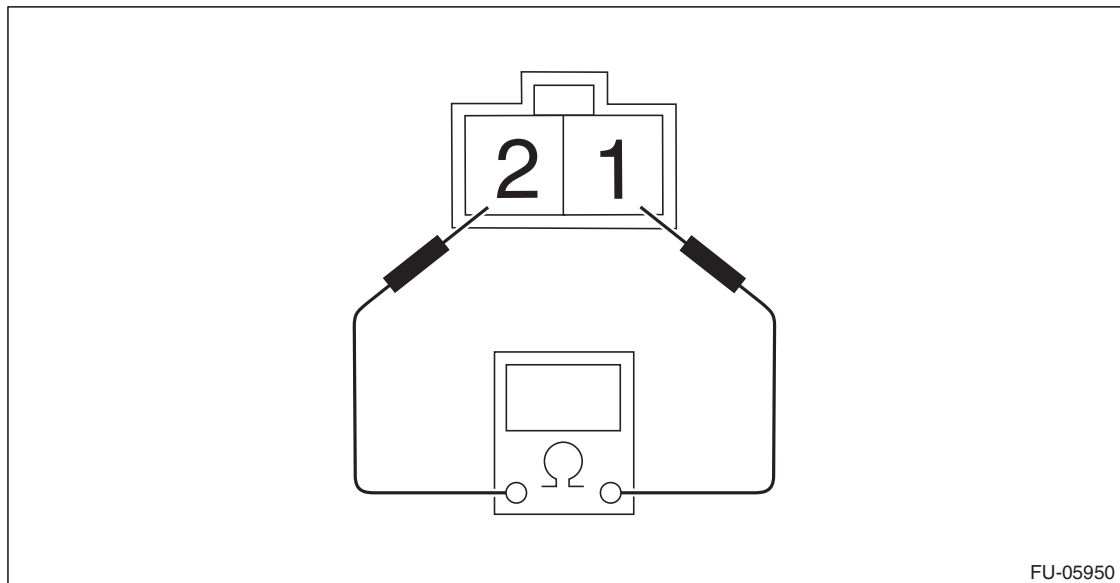
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

Oil Control Solenoid

FUEL INJECTION (FUEL SYSTEMS)

C: INSPECTION

- 1) Check that the oil control solenoid has no deformation, cracks or other damages.
- 2) Measure the resistance between the oil control solenoid terminals.



Terminal No.	Standard
1 and 2	$7.25 \pm 0.4 \Omega$ (when 20°C (68°F))



Knock Sensor

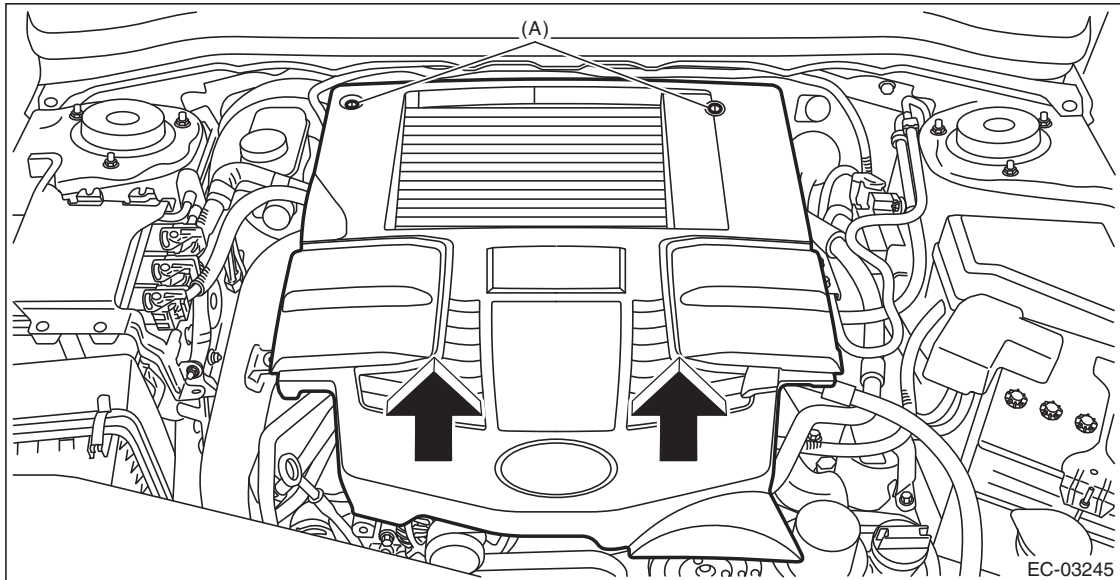
FUEL INJECTION (FUEL SYSTEMS)

17. Knock Sensor

A: REMOVAL

1. RH SIDE

1) Remove the clip (A), lift the front of the collector cover in the direction of arrow, and then remove the collector cover.

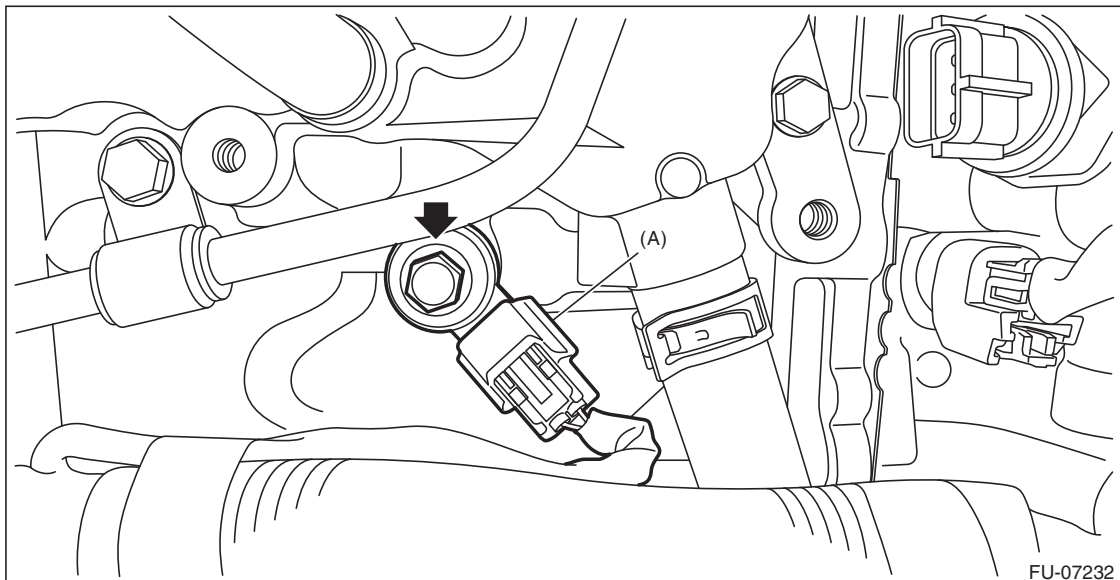


2) Disconnect the ground cable from battery.

3) Remove the intake manifold. <Ref. to FU(H4DOTC)-19, REMOVAL, Intake Manifold.>

4) Remove the fuel pipe insulator No. 3. <Ref. to FU(H4DOTC)-48, FUEL PIPE INSULATOR NO. 3, REMOVAL, Fuel Insulator.>

5) Disconnect the connector (A) from the knock sensor, and remove the knock sensor from the cylinder block.

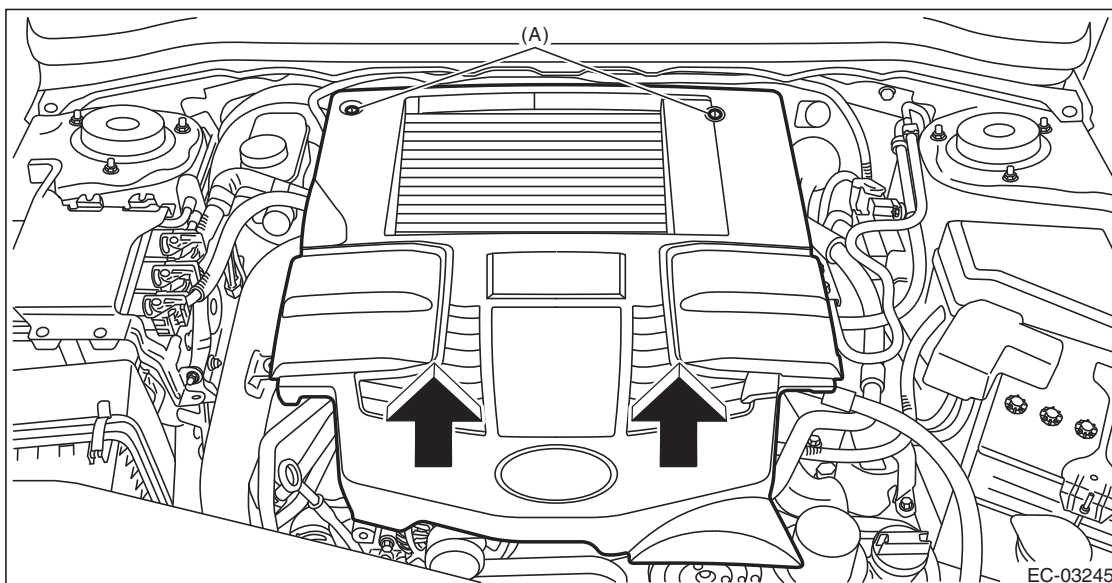


Knock Sensor

FUEL INJECTION (FUEL SYSTEMS)

2. LH SIDE

1) Remove the clip (A), lift the front of the collector cover in the direction of arrow, and then remove the collector cover.

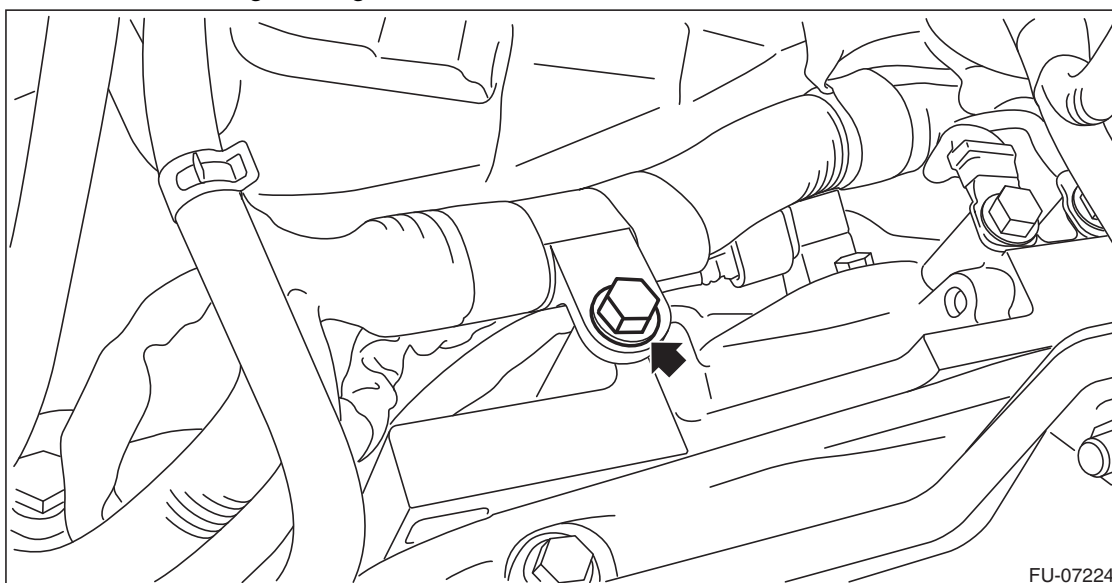


2) Disconnect the ground cable from battery.

3) Remove the intercooler. <Ref. to IN(H4DOTC)-35, REMOVAL, Intercooler.>

4) Remove the throttle body. <Ref. to FU(H4DOTC)-16, REMOVAL, Throttle Body.>

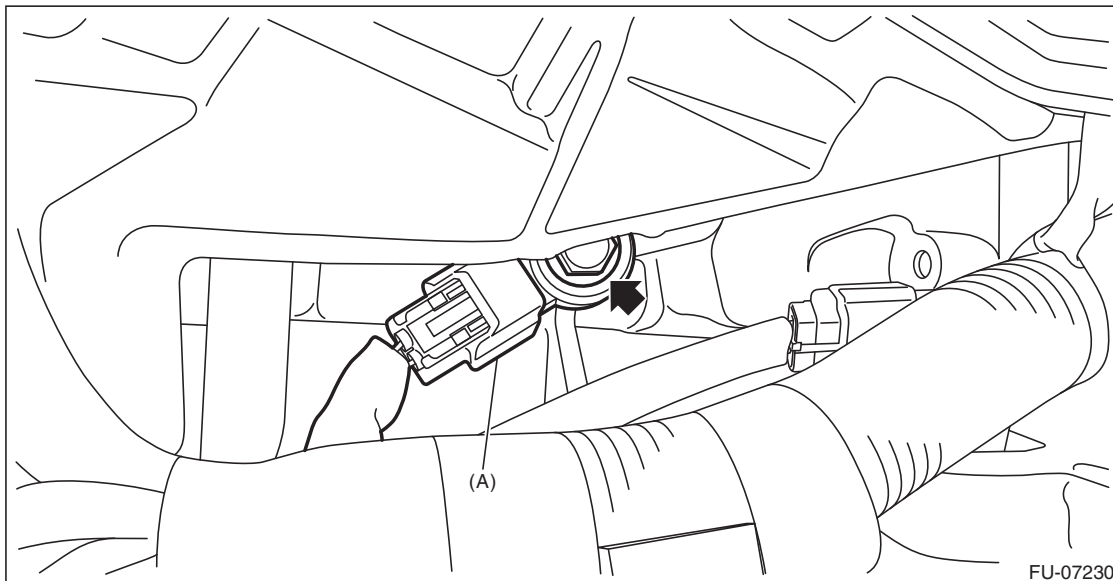
5) Remove the bolts securing the engine harness.



Knock Sensor

FUEL INJECTION (FUEL SYSTEMS)

6) Disconnect the connector (A) from the knock sensor, and remove the knock sensor from the cylinder block.



B: INSTALLATION

1. RH SIDE

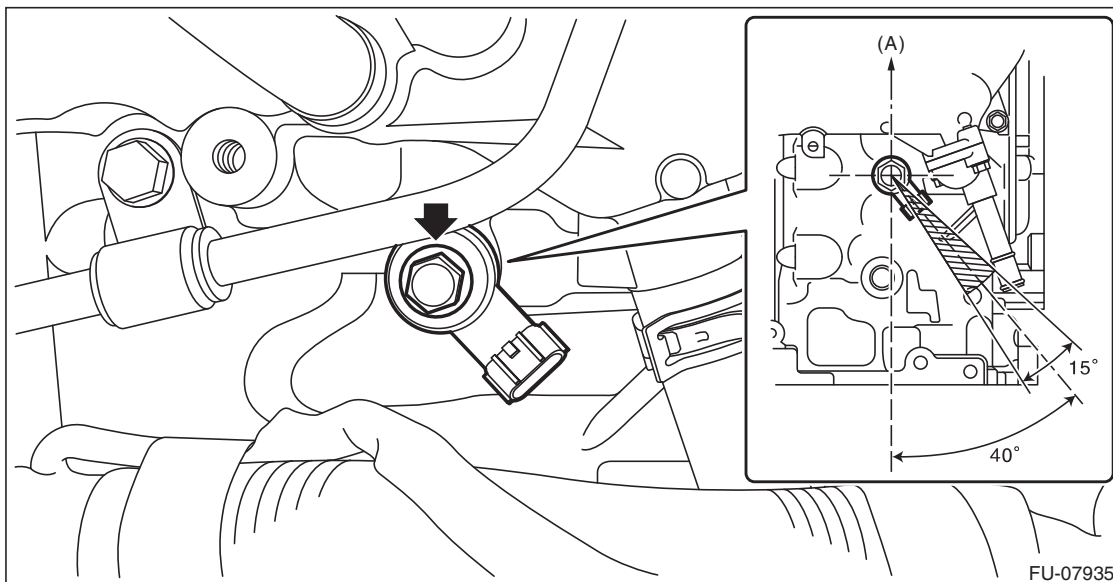
1) Install the knock sensor to the cylinder block.

NOTE:

The knock sensor should be installed so that the center of the connector is positioned at a 32.5° — 47.5° angle relative to the rear of engine.

Tightening torque:

24 N·m (2.4 kgf-m, 17.7 ft-lb)

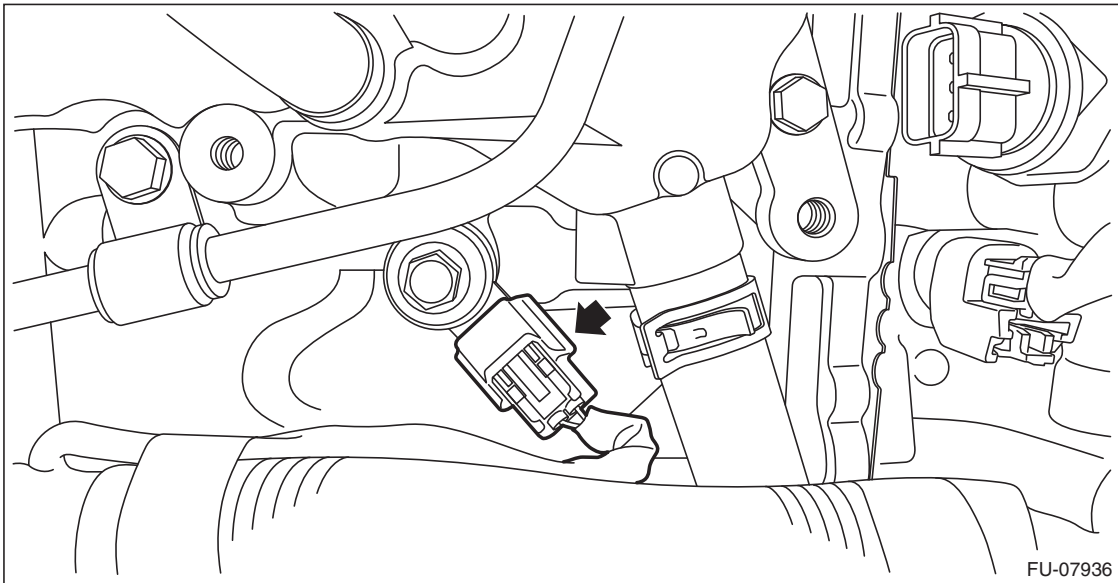


(A) Front of engine

Knock Sensor

FUEL INJECTION (FUEL SYSTEMS)

2) Connect the connector to the knock sensor.



3) Install the fuel pipe insulator No. 3. <Ref. to FU(H4DOTC)-50, FUEL PIPE INSULATOR NO. 3, INSTALLATION, Fuel Insulator.>

4) Install the intake manifold. <Ref. to FU(H4DOTC)-29, INSTALLATION, Intake Manifold.>

5) Connect the battery ground terminal.

6) Install the collector cover.

2. LH SIDE

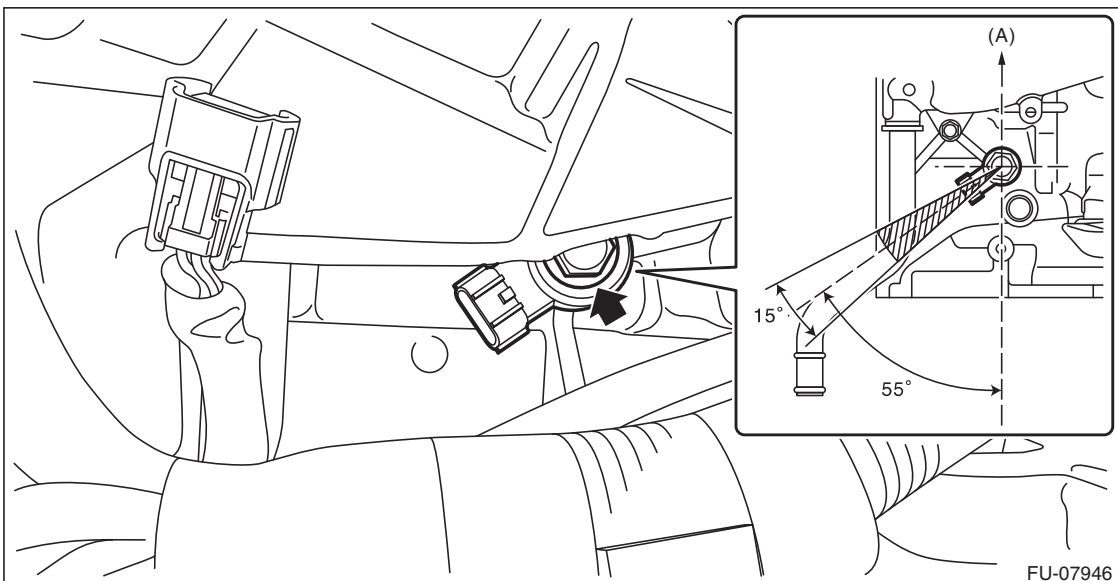
1) Install the knock sensor to the cylinder block.

NOTE:

The knock sensor should be installed so that the center of the connector is positioned at a 47.5 — 62.5° angle relative to the rear of engine.

Tightening torque:

24 N·m (2.4 kgf-m, 17.7 ft-lb)

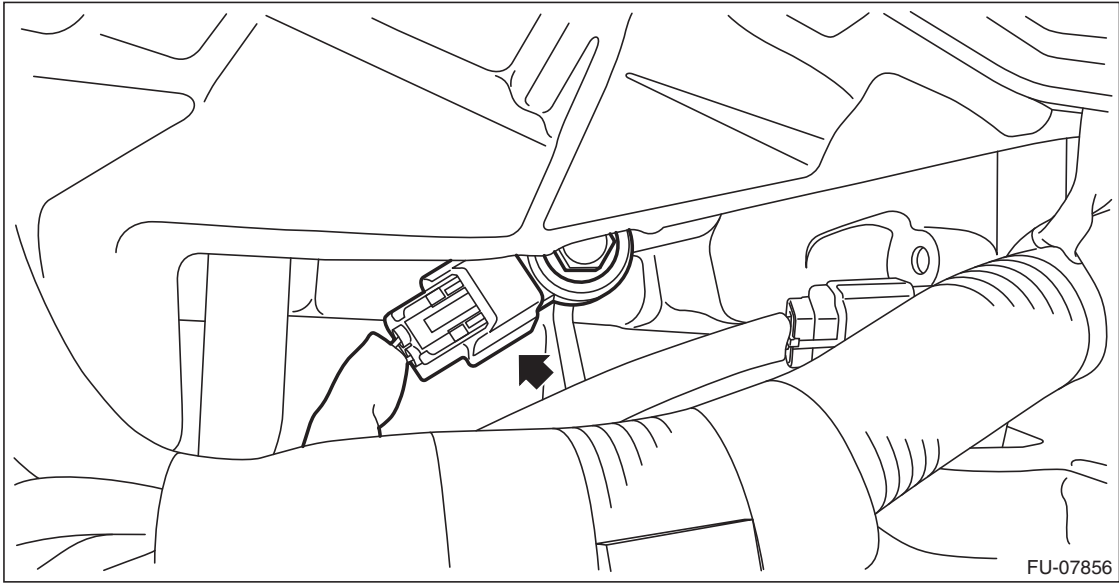


(A) Front of engine

Knock Sensor

FUEL INJECTION (FUEL SYSTEMS)

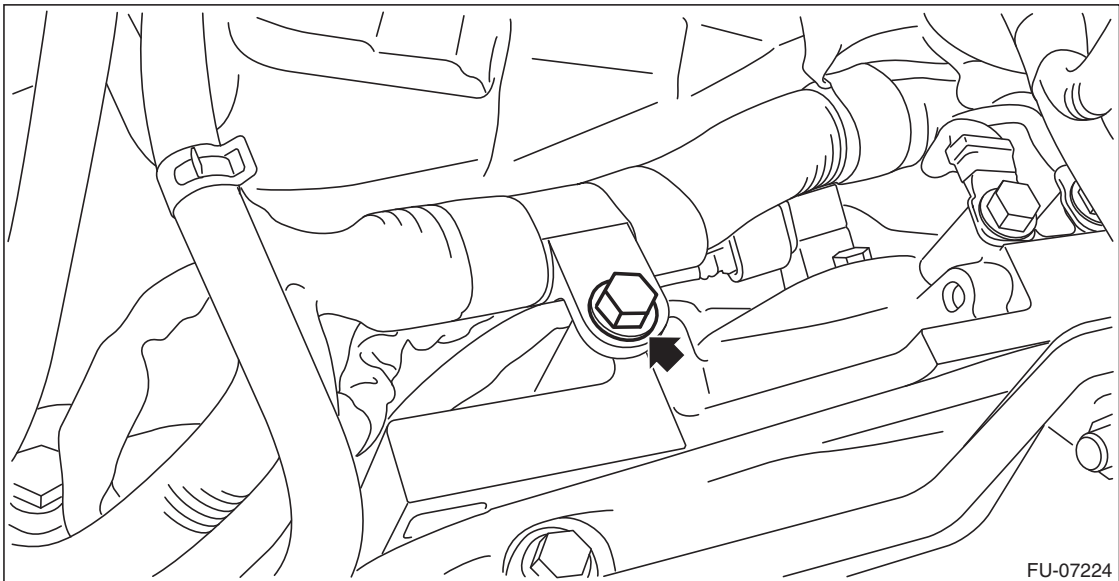
- 2) Connect the connector to the knock sensor.



- 3) Install the bolts securing the engine harness.

Tightening torque:

19 N·m (1.9 kgf-m, 14.0 ft-lb)



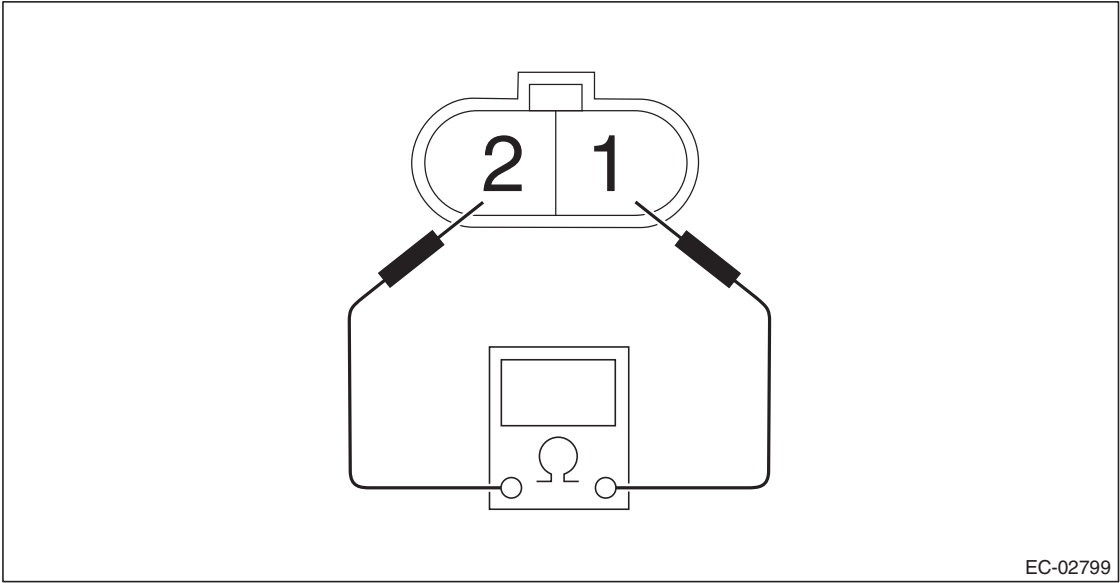
- 4) Install the throttle body. <Ref. to FU(H4DOTC)-17, INSTALLATION, Throttle Body.>
5) Install the intercooler. <Ref. to IN(H4DOTC)-37, INSTALLATION, Intercooler.>
6) Connect the battery ground terminal.
7) Install the collector cover.

Knock Sensor

FUEL INJECTION (FUEL SYSTEMS)

C: INSPECTION

- 1) Check that the knock sensor has no deformation, cracks or other damages.
- 2) Measure the resistance between knock sensor terminals.



Terminal No.	Standard
1 and 2	560±28 kΩ



Throttle Position Sensor

FUEL INJECTION (FUEL SYSTEMS)

18. Throttle Position Sensor

A: SPECIFICATION

Throttle body is a non-disassembled part, so do not remove the throttle position sensor from throttle body. Refer to "Throttle Body" for removal and installation procedure. <Ref. to FU(H4DOTC)-16, REMOVAL, Throttle Body.> <Ref. to FU(H4DOTC)-17, INSTALLATION, Throttle Body.>

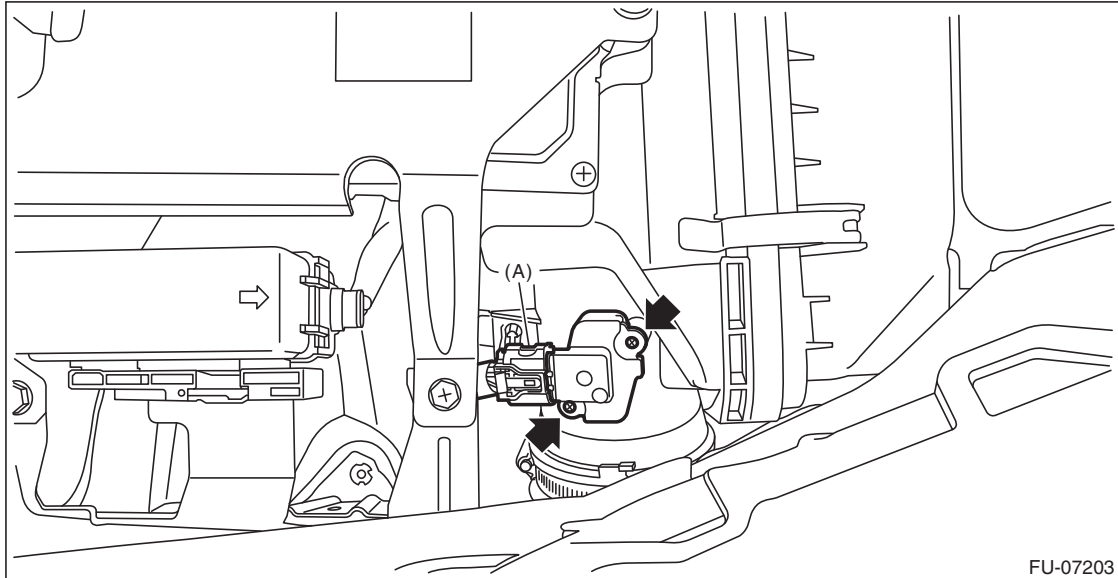
Mass Air Flow and Intake Air Temperature Sensor

FUEL INJECTION (FUEL SYSTEMS)

19. Mass Air Flow and Intake Air Temperature Sensor

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Disconnect the connector (A) from the mass air flow and intake air temperature sensor, and remove the mass air flow and intake air temperature sensor.



B: INSTALLATION

Install in the reverse order of removal.

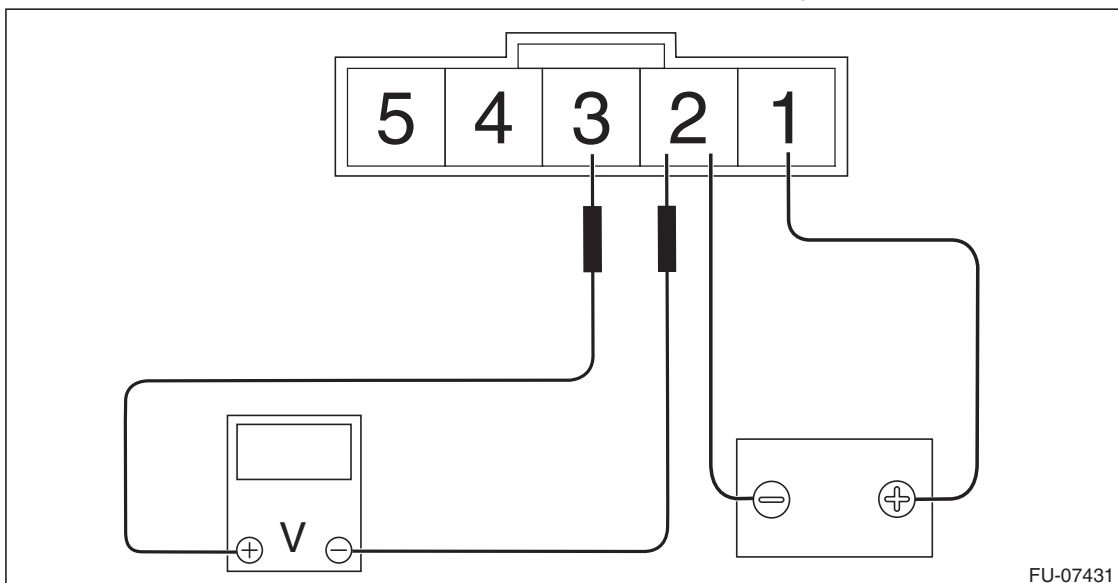
Tightening torque:

1 N·m (0.1 kgf-m, 0.7 ft-lb)

C: INSPECTION

1. CHECK THE MASS AIR FLOW SENSOR UNIT

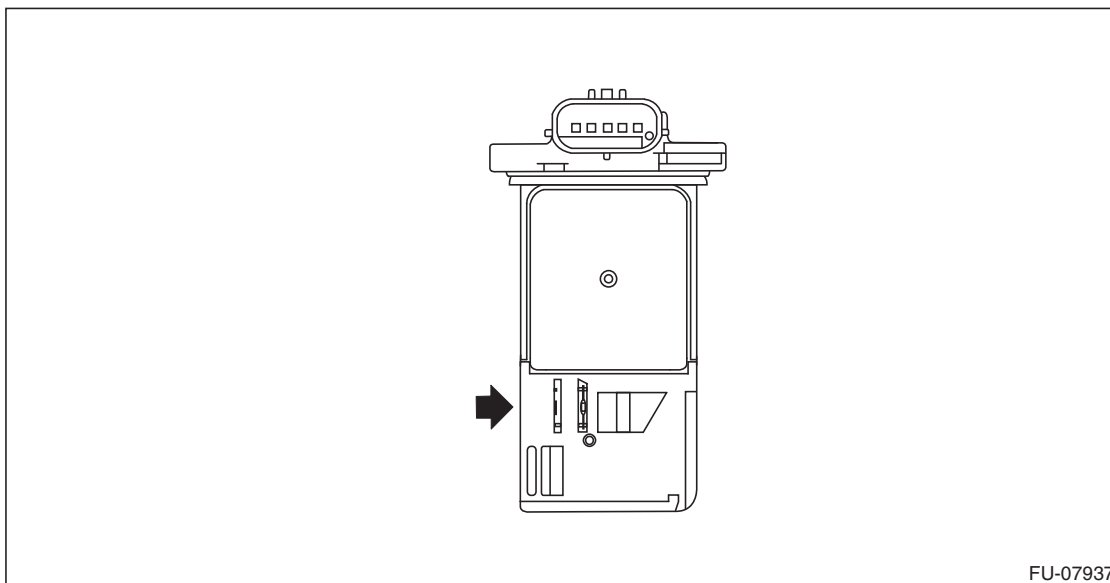
- 1) Connect the battery positive terminal to terminal No. 1 and the battery ground terminal to terminal No. 2, the circuit tester positive terminal to terminal No. 3 and the circuit tester ground terminal to terminal No. 2.



Mass Air Flow and Intake Air Temperature Sensor

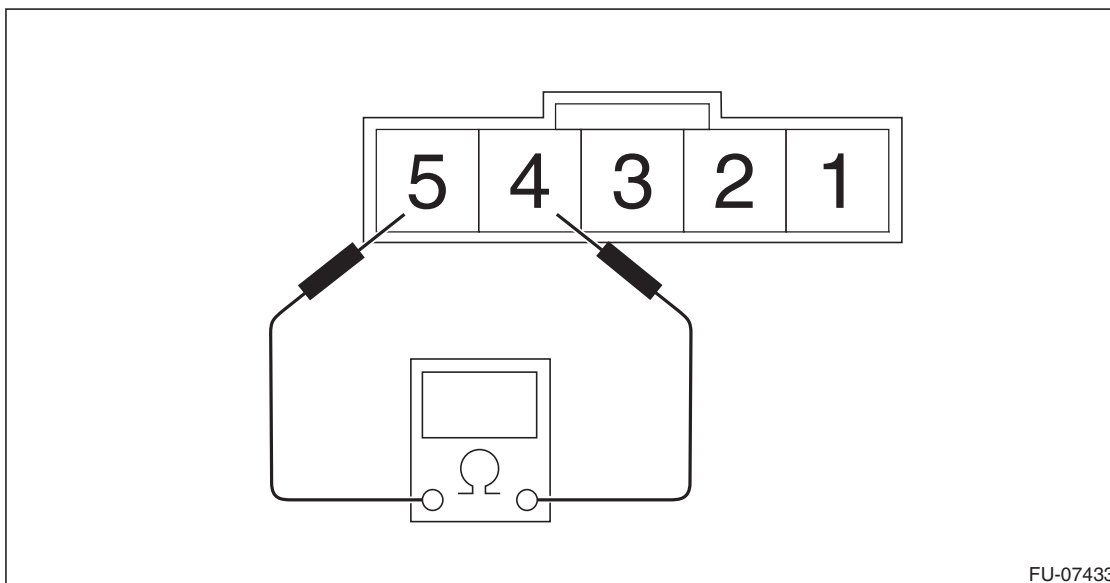
FUEL INJECTION (FUEL SYSTEMS)

2) Check the voltage changes when air is blown to the mass air flow sensor unit in arrow direction.



2. CHECK THE INTAKE AIR TEMPERATURE SENSOR UNIT

Measure the resistance between intake air temperature sensor terminals.



Temperature	Terminal No.	Standard
-20°C (-4°F)	4 and 5	14.7±2.2 kΩ
25°C (77°F)		2.0±0.2 kΩ
60°C (140°F)		0.59±0.09 kΩ

3. OTHER INSPECTIONS

- 1) Check that the mass air flow and intake air temperature sensor has no deformation, cracks or other damages.
- 2) Check that the mass air flow and intake air temperature sensor has no dirt.

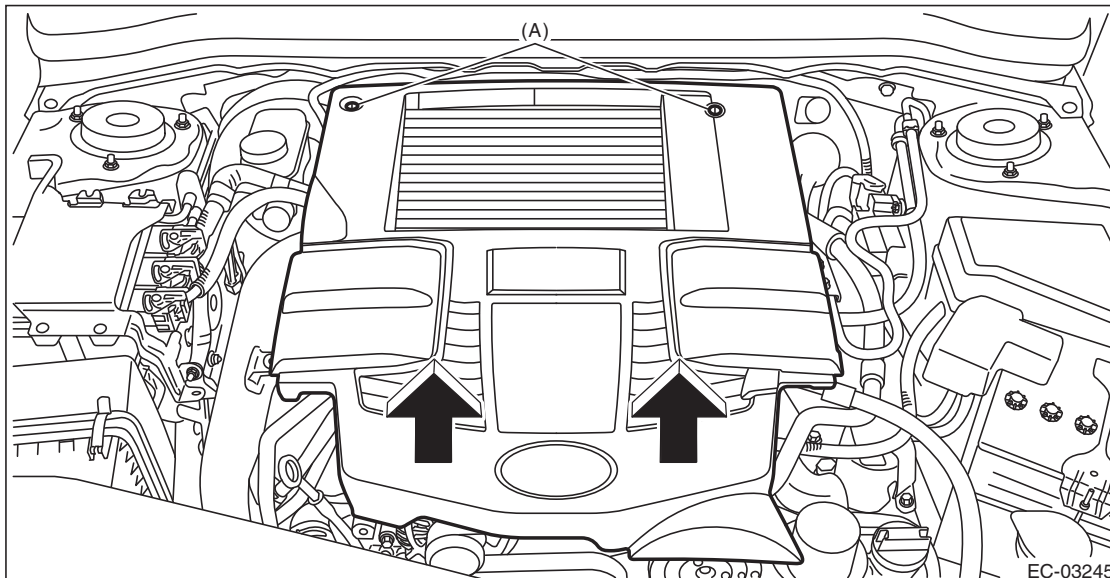
Manifold Absolute Pressure and Intake Air Temperature Sensor

FUEL INJECTION (FUEL SYSTEMS)

20. Manifold Absolute Pressure and Intake Air Temperature Sensor

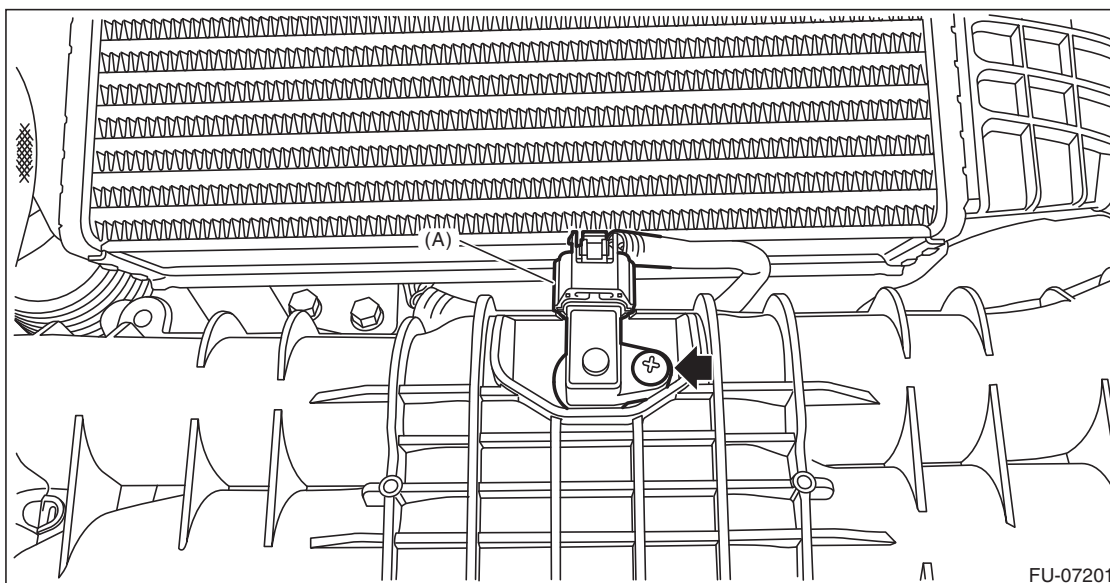
A: REMOVAL

1) Remove the clip (A), lift the front of the collector cover in the direction of arrow, and then remove the collector cover.



2) Disconnect the ground cable from battery.

3) Disconnect the connector (A) from the manifold absolute pressure & intake air temperature sensor, and remove the manifold absolute pressure & intake air temperature sensor from the intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:

Use new O-rings.

Tightening torque:

3.5 N·m (0.4 kgf-m, 2.6 ft-lb)

Manifold Absolute Pressure and Intake Air Temperature Sensor

FUEL INJECTION (FUEL SYSTEMS)

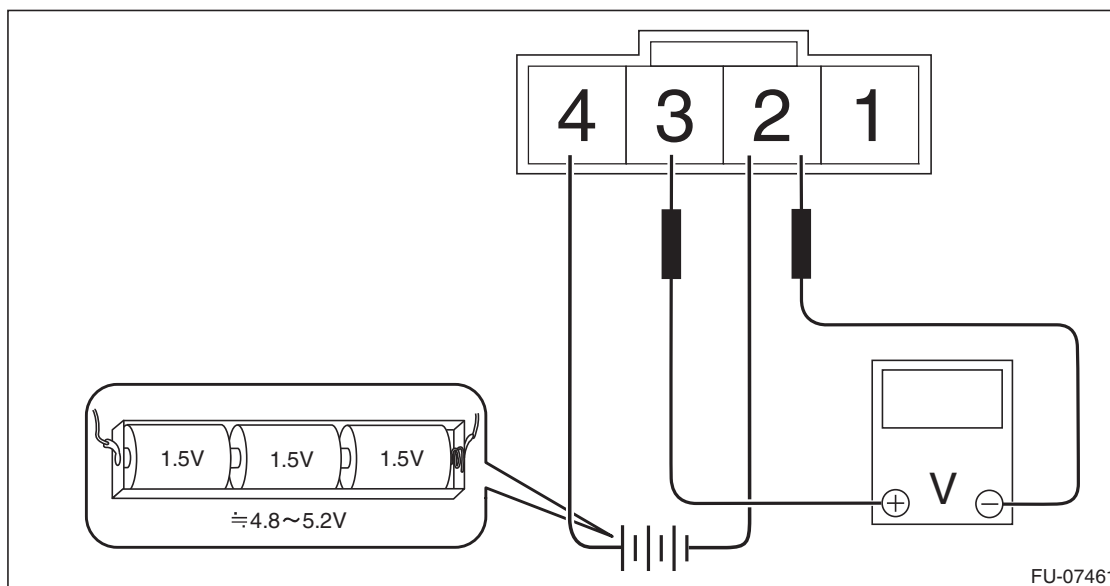
C: INSPECTION

1. CHECK MANIFOLD ABSOLUTE PRESSURE SENSOR

1) Connect dry-cell battery positive terminal to terminal No. 4 and dry-cell battery ground terminal to terminal No. 2, circuit tester positive terminal to terminal No. 3, and the circuit tester negative terminal to terminal No. 2.

NOTE:

- Use new dry-cell batteries.
- Using circuit tester, check the voltage of a single dry-cell battery is 1.6 V or more. And also check the voltage of three batteries in series is between 4.8 V and 5.2 V.



2) Check the voltage at a normal atmospheric pressure.

NOTE:

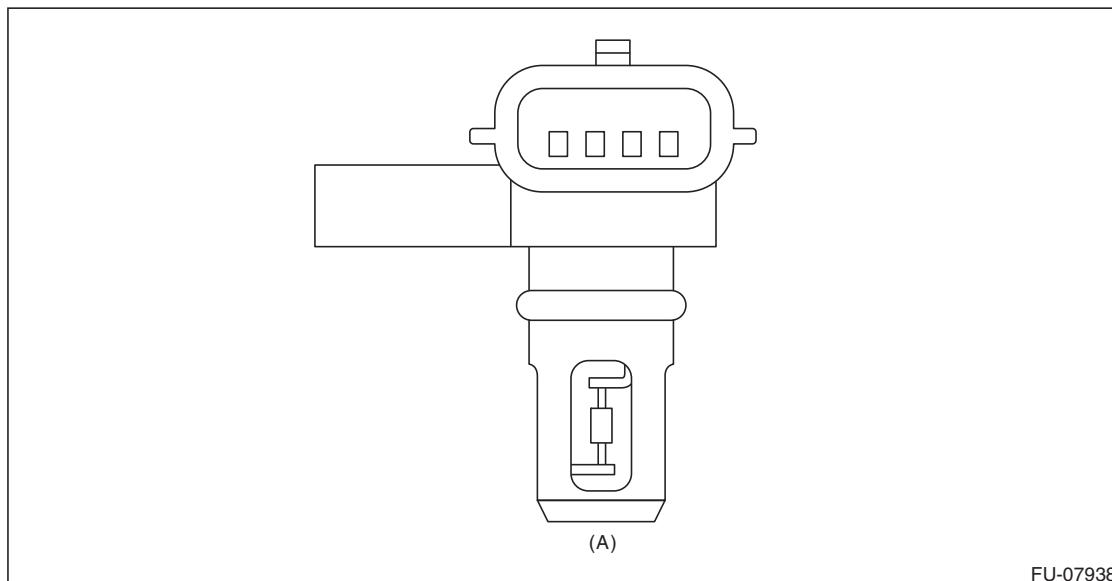
The atmospheric pressure at higher altitude is lower than normal. Therefore, the voltage is lower than the standard value.

Terminal No.	Standard
3 (+) and 2 (-)	Approx. 4.2 V (when 25°C (77°F))

Manifold Absolute Pressure and Intake Air Temperature Sensor

FUEL INJECTION (FUEL SYSTEMS)

3) Connect the Mighty Vac to the pressure port (A) of manifold absolute pressure & intake air temperature sensor.



FU-07938

4) Check the voltage when generating vacuum and positive pressure using Mighty Vac.

CAUTION:

Do not apply vacuum of less than -88 kPa (-0.9 kgf/cm^2 , -12.8 psi). Doing so may damage the manifold absolute pressure & intake air temperature sensor.

NOTE:

When vacuum occurs at the pressure port of manifold absolute pressure & intake air temperature sensor, the voltage will drop from the value as in step 3). When positive pressure occurs, on the other hand, the voltage will rise.

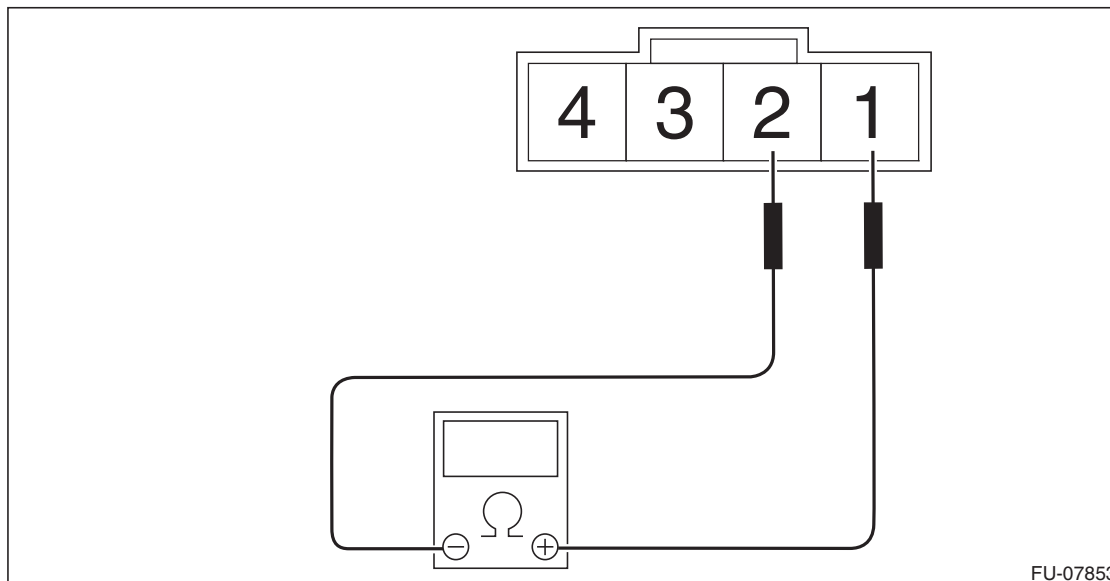
Pressure	Terminal No.	Standard
-88 kPa (-0.9 kgf/cm^2 , -12.8 psi)	3 (+) and 2 (-)	Approx. 1 V (when 25°C (77°F))

Manifold Absolute Pressure and Intake Air Temperature Sensor

FUEL INJECTION (FUEL SYSTEMS)

2. CHECK MANIFOLD TEMPERATURE SENSOR UNIT

1) Measure the resistance between engine coolant temperature sensor terminals.



Temperature	Terminal No.	Standard
-20°C (-4°F)	1 and 2	Approx. 14.7±2.2 kΩ
25°C (77°F)		Approx. 2.0±0.2 kΩ
60°C (140°F)		Approx. 0.59±0.09 kΩ

3. OTHER INSPECTIONS

Check that the manifold pressure & intake air temperature sensor has no deformation, cracks or other damages.

Wastegate Control Solenoid Valve

FUEL INJECTION (FUEL SYSTEMS)

21. Wastegate Control Solenoid Valve

A: REMOVAL

For removal procedures of wastegate control solenoid valve, refer to "Intake Duct No. 1." <Ref. to IN(H4DOTC)-20, INTAKE DUCT NO. 1, REMOVAL, Intake Duct.> <Ref. to IN(H4DOTC)-32, INTAKE DUCT NO. 1, DISASSEMBLY, Intake Duct.>

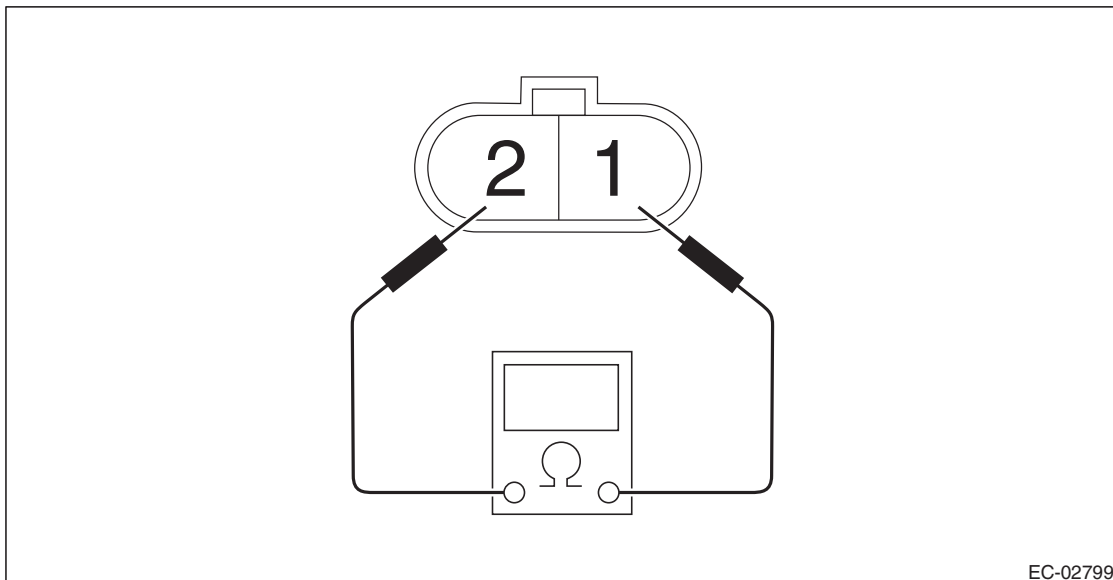
B: INSTALLATION

For installation procedures of wastegate control solenoid valve, refer to "Intake Duct No. 1." <Ref. to IN(H4DOTC)-26, INTAKE DUCT NO. 1, INSTALLATION, Intake Duct.> <Ref. to IN(H4DOTC)-33, INTAKE DUCT NO. 1, ASSEMBLY, Intake Duct.>

C: INSPECTION

1. WASTEGATE CONTROL SOLENOID VALVE

- 1) Check that the wastegate control solenoid valve has no deformation, cracks or other damages.
- 2) Check the resistance between the wastegate control solenoid valve terminals.

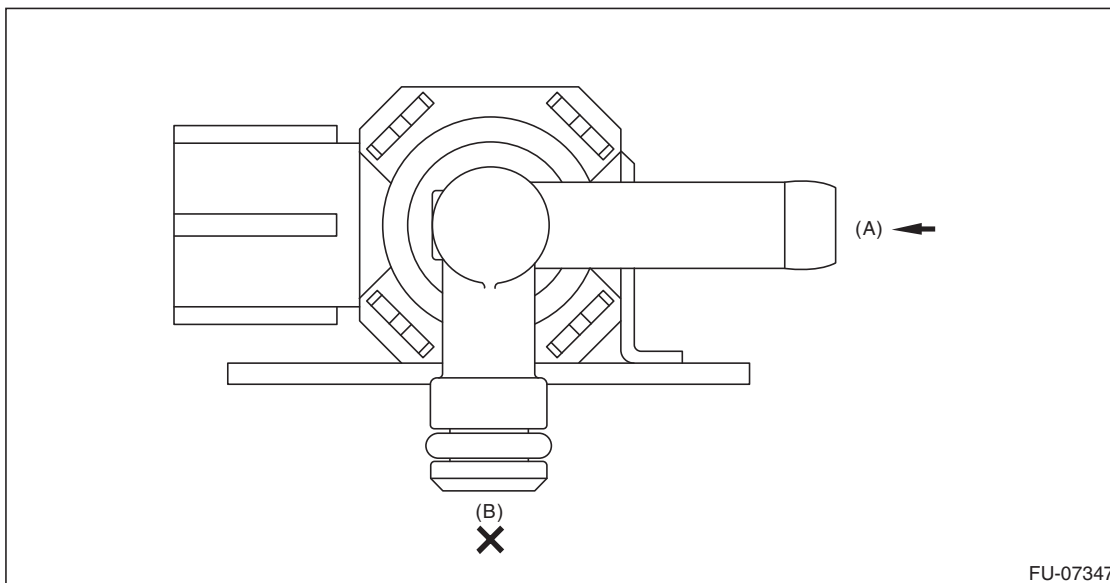


Terminal No.	Standard
1 and 2	24±3 Ω (when 20°C (68°F))

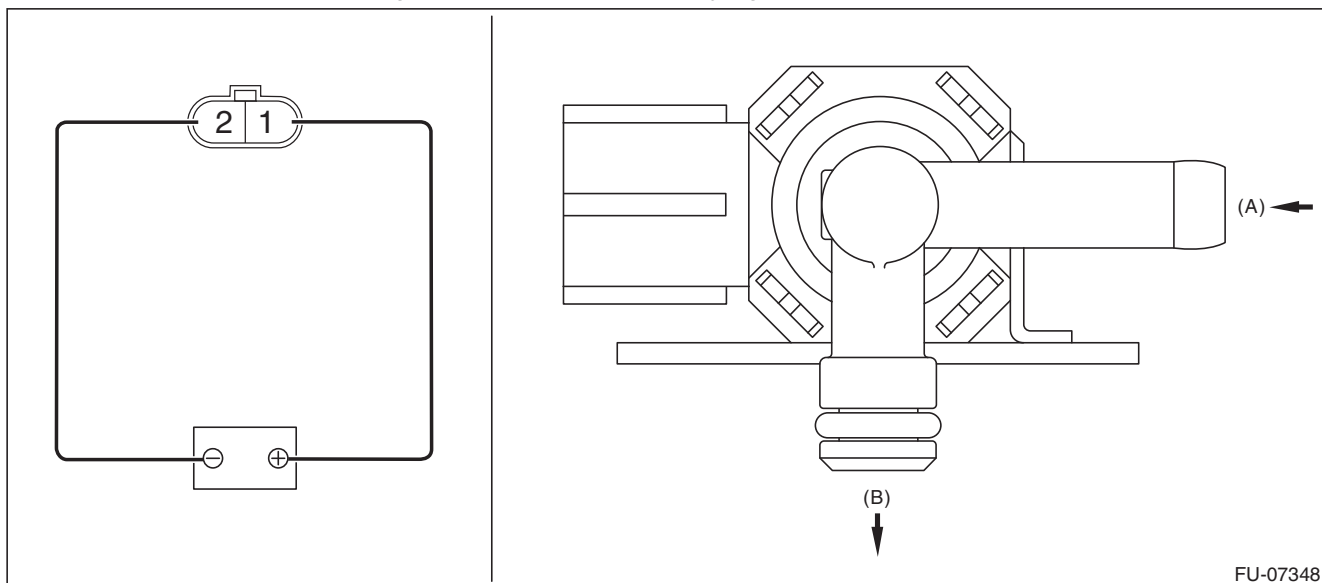
Wastegate Control Solenoid Valve

FUEL INJECTION (FUEL SYSTEMS)

3) Check that air does not come out from (B) when air is blown into (A).



4) Connect the battery positive terminal to the terminal No. 1 and the battery negative terminal to the terminal No. 2. Check that air is discharged from (B), when supplying air to (A).



2. OTHER INSPECTIONS

Check that the air control hose has no cracks, damage or loose part.

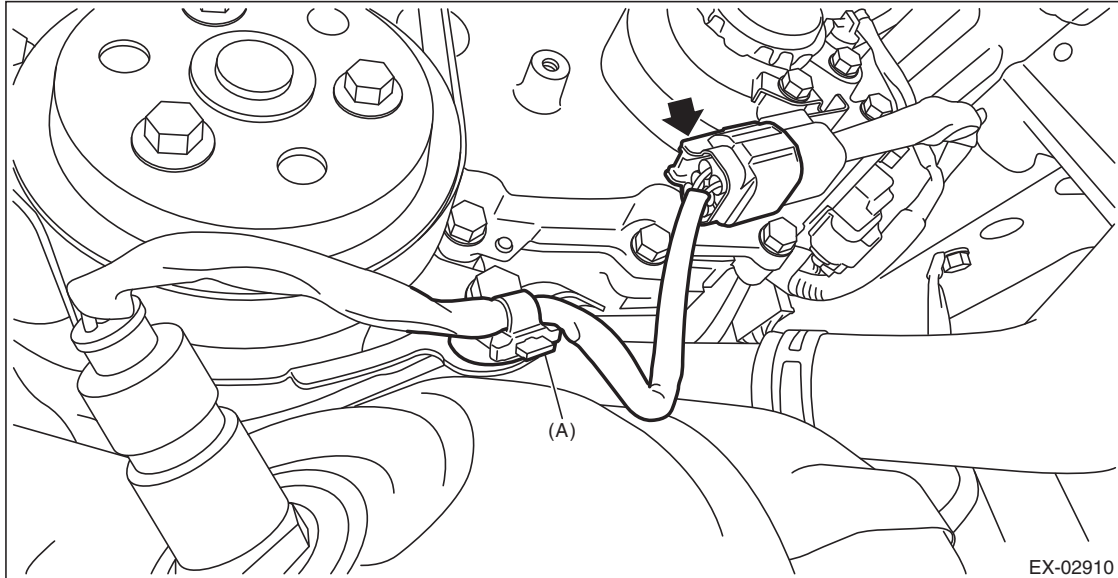
Front Oxygen (A/F) Sensor

FUEL INJECTION (FUEL SYSTEMS)

22.Front Oxygen (A/F) Sensor

A: REMOVAL

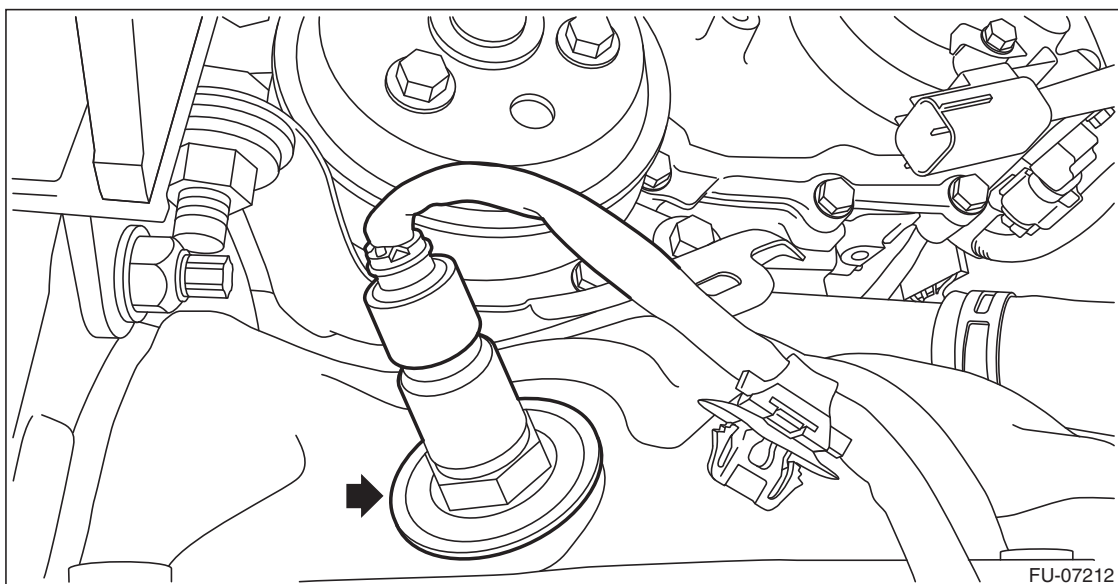
- 1) Disconnect the ground cable from battery.
- 2) Remove the radiator sub fan and fan motor assembly. <Ref. to CO(H4DOTC)-55, REMOVAL, Radiator Sub Fan and Fan Motor.>
- 3) Lift up the vehicle.
- 4) Remove the under cover. <Ref. to EI-22, REMOVAL, Front Under Cover.>
- 5) Disconnect the connector on the front oxygen (A/F) sensor from the engine harness, and remove the clip (A) securing the front oxygen (A/F) sensor harness to the water pump cover.



- 6) Apply spray-type lubricant to the threaded portion of front oxygen (A/F) sensor, and leave it for one minute or more.
- 7) Remove the front oxygen (A/F) sensor.

CAUTION:

When removing the front oxygen (A/F) sensor, wait until exhaust pipe cools, otherwise it will damage the exhaust pipe.



Front Oxygen (A/F) Sensor

FUEL INJECTION (FUEL SYSTEMS)

B: INSTALLATION

CAUTION:

If lubricant is spilt over the exhaust pipe, wipe it off with cloth to avoid emission of smoke or causing a fire.

1) Before installing front oxygen (A/F) sensor, apply anti-seize compound only to the threaded portion of front oxygen (A/F) sensor to make the next removal easier.

CAUTION:

Never apply anti-seize compound to the protector of front oxygen (A/F) sensor.

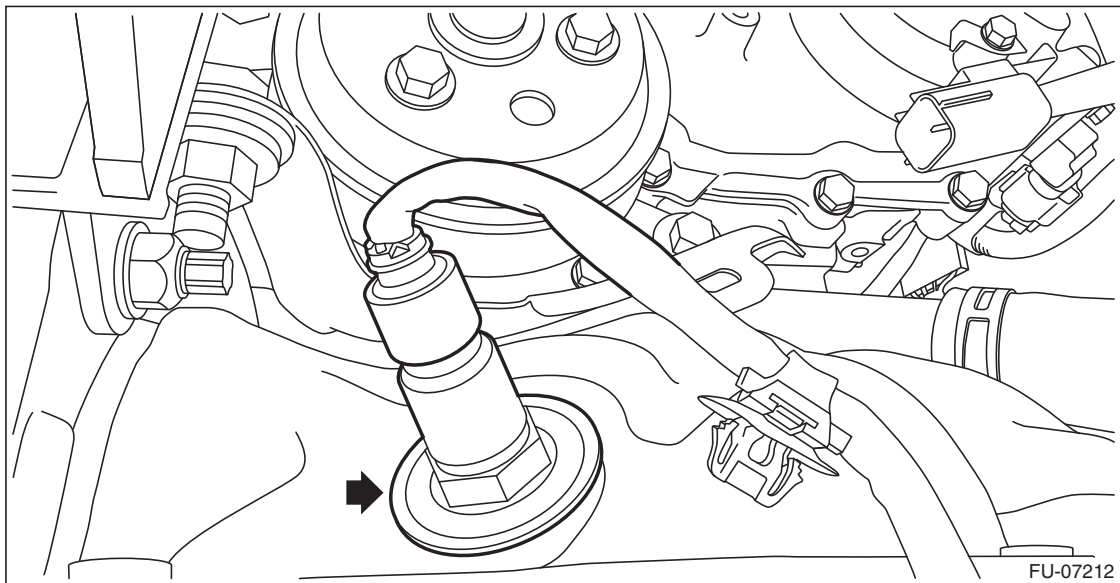
Anti-seize compound:

NEVER-SEEZ NSN, JET LUBE SS-30 or equivalent

2) Install the front oxygen (A/F) sensor.

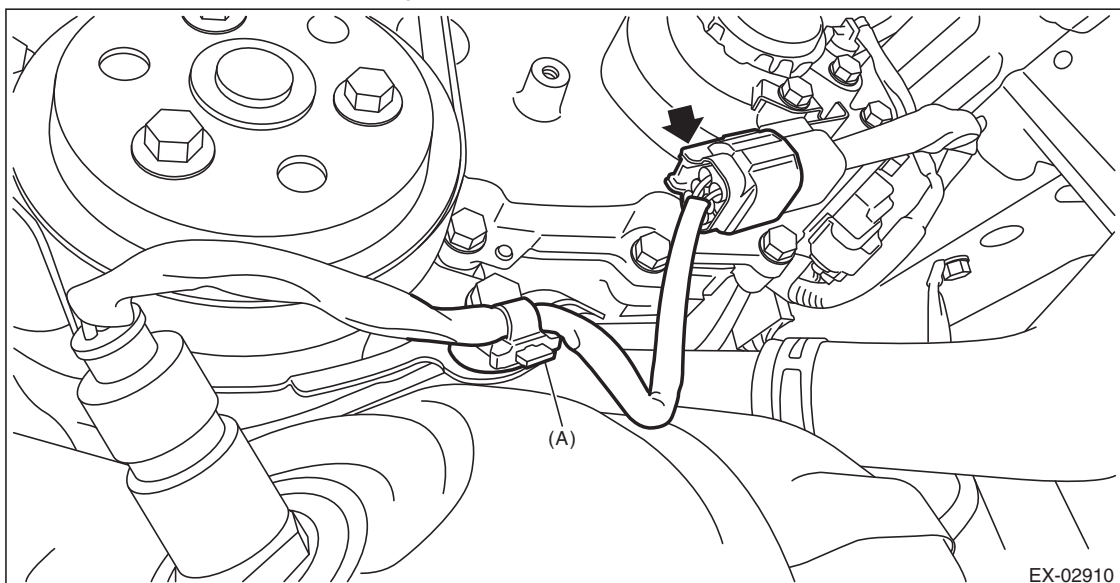
Tightening torque:

21 N·m (2.1 kgf-m, 15.5 ft-lb)



3) Lift up the vehicle.

4) Secure the front oxygen (A/F) sensor harness to the water pump cover using clip (A), and connect the front oxygen (A/F) sensor connector to the engine harness.



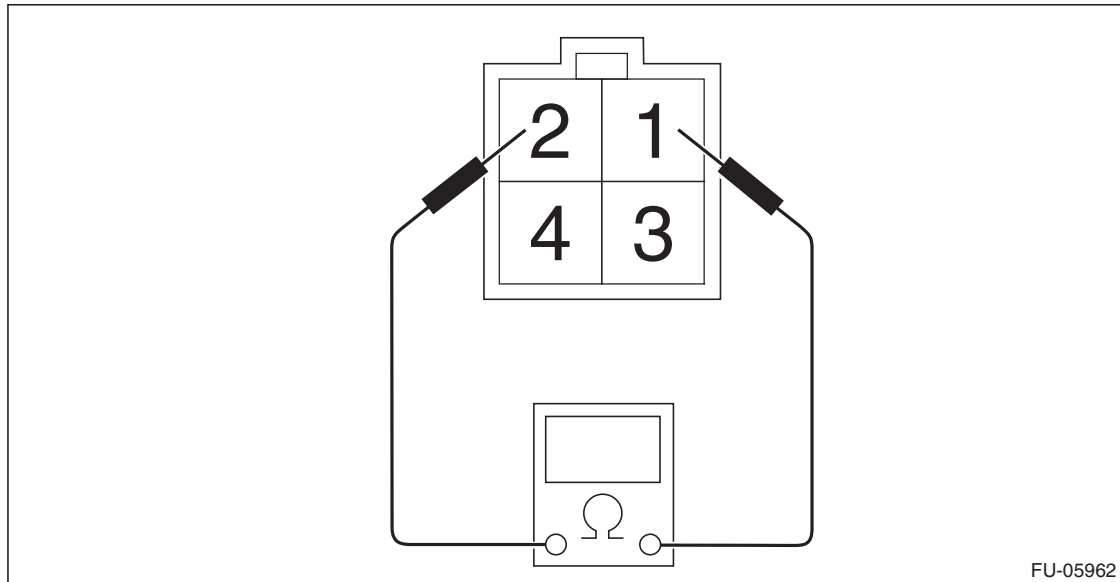
Front Oxygen (A/F) Sensor

FUEL INJECTION (FUEL SYSTEMS)

- 5) Install the under cover. <Ref. to EI-22, INSTALLATION, Front Under Cover.>
- 6) Lower the vehicle.
- 7) Install the radiator sub fan and fan motor assembly. <Ref. to CO(H4DOTC)-55, INSTALLATION, Radiator Sub Fan and Fan Motor.>
- 8) Connect the battery ground terminal.

C: INSPECTION

- 1) Check that the front oxygen (A/F) sensor has no deformation, cracks or other damages.
- 2) Measure the resistance between front oxygen (A/F) sensor terminals.



Terminal No.	Standard
1 and 2	$2.2^{+0.45}_{-0.22} \Omega$ (when 20°C (68°F))

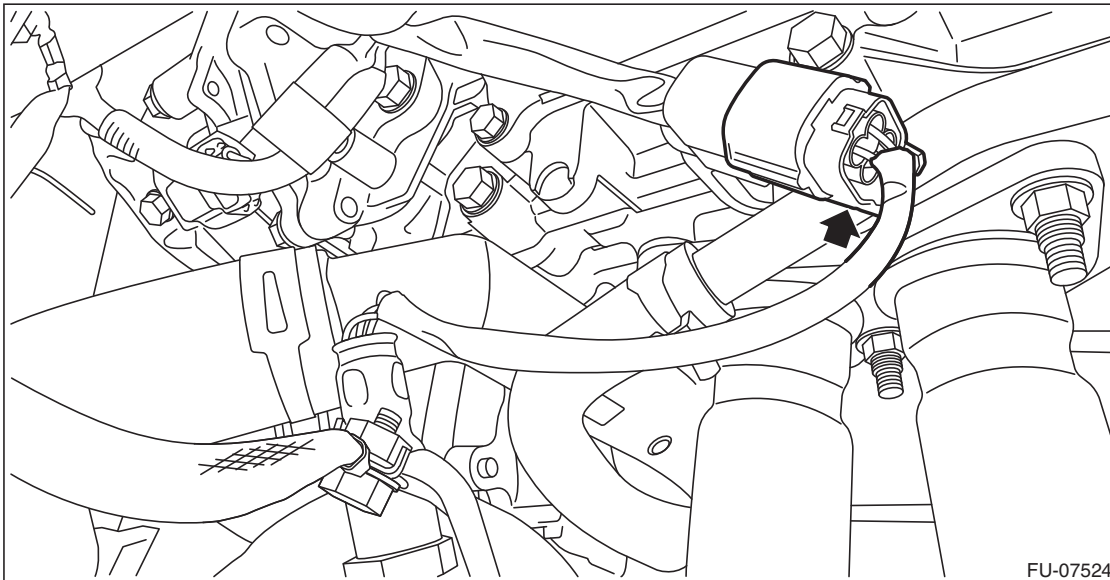
Rear Oxygen Sensor

FUEL INJECTION (FUEL SYSTEMS)

23.Rear Oxygen Sensor

A: REMOVAL

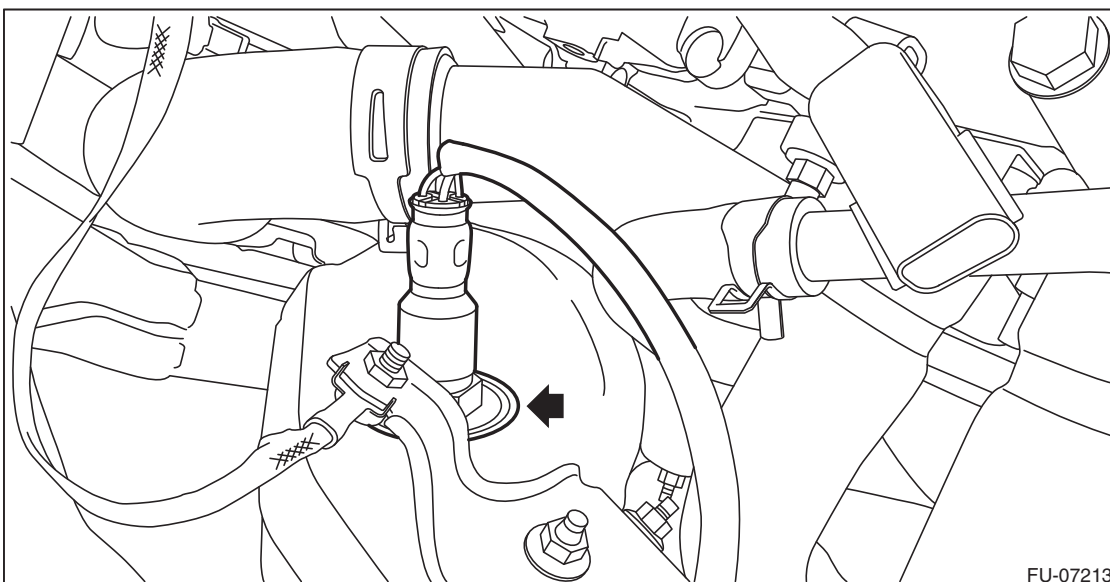
- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle.
- 3) Remove the under cover. <Ref. to EI-22, REMOVAL, Front Under Cover.>
- 4) Disconnect the connector on the rear oxygen sensor from the engine harness.



- 5) Apply spray-type lubricant to the threaded portion of rear oxygen sensor, and leave it for one minute or more.
- 6) Remove the rear oxygen sensor.

CAUTION:

When removing the rear oxygen sensor, wait until exhaust pipe cools, otherwise it will damage the exhaust pipe.



Rear Oxygen Sensor

FUEL INJECTION (FUEL SYSTEMS)

B: INSTALLATION

CAUTION:

If lubricant is spilt over the exhaust pipe, wipe it off with cloth to avoid emission of smoke or causing a fire.

1) Before installing rear oxygen sensor, apply the anti-seize compound only to the threaded portion of rear oxygen sensor to make the next removal easier.

CAUTION:

Never apply anti-seize compound to the protector of rear oxygen sensor.

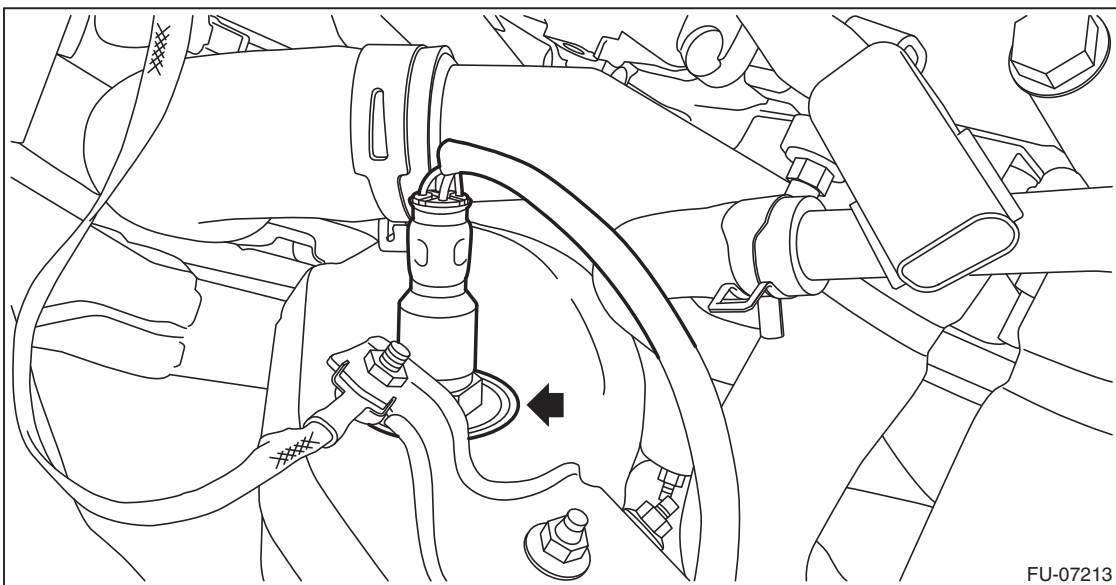
Anti-seize compound:

NEVER-SEEZ NSN, JET LUBE SS-30 or equivalent

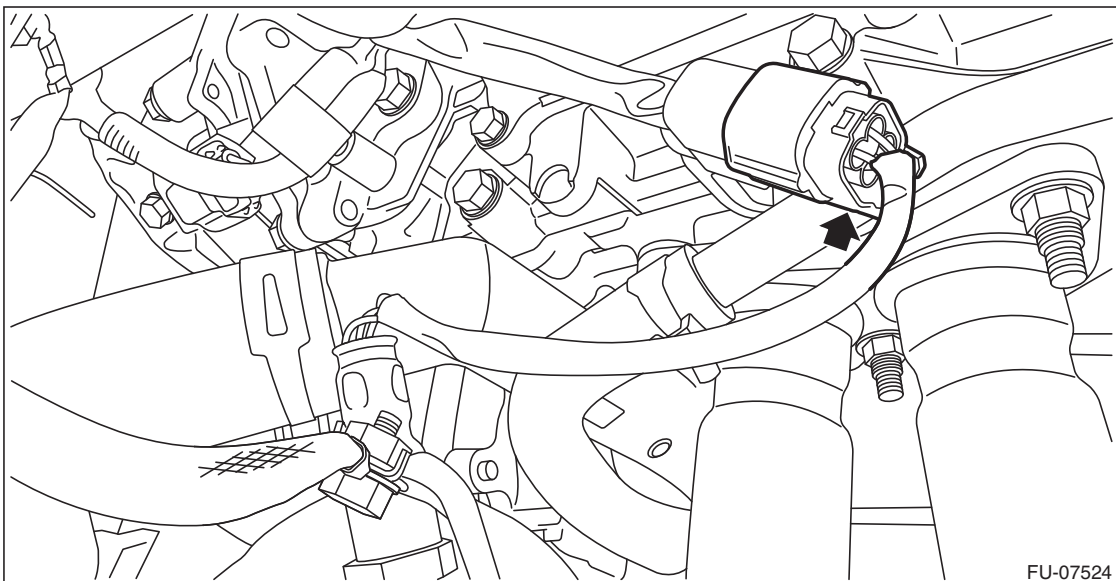
2) Install the rear oxygen sensor.

Tightening torque:

21 N·m (2.1 kgf-m, 15.5 ft-lb)



3) Connect the rear oxygen sensor connector to the engine harness.



4) Install the under cover. <Ref. to EI-22, INSTALLATION, Front Under Cover.>

5) Lower the vehicle.

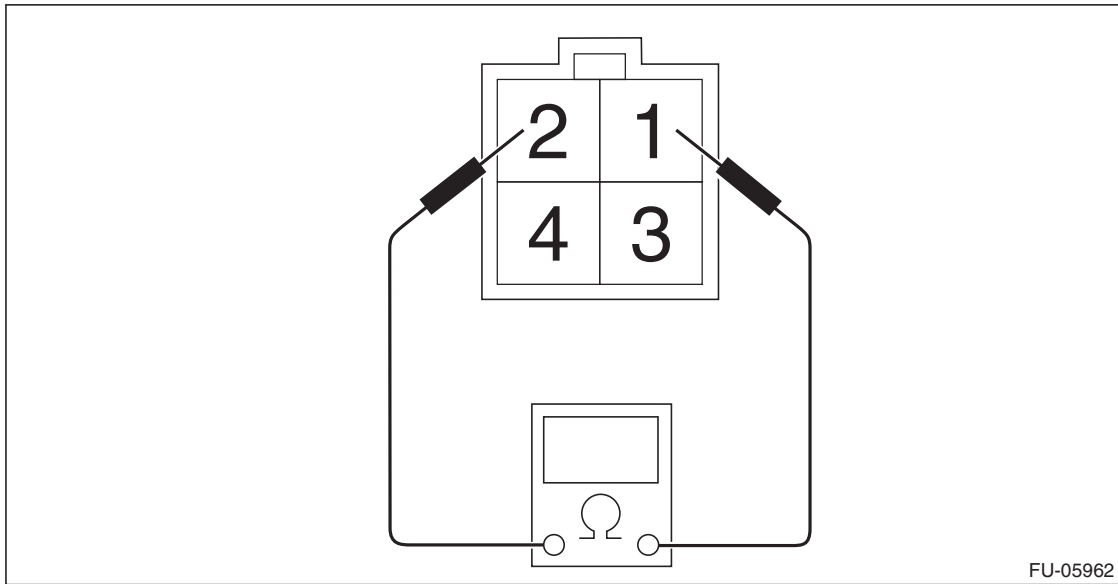
6) Connect the battery ground terminal.

Rear Oxygen Sensor

FUEL INJECTION (FUEL SYSTEMS)

C: INSPECTION

- 1) Check that the rear oxygen sensor has no deformation, cracks or other damages.
- 2) Measure the resistance between rear oxygen sensor terminals.



Terminal No.	Standard
1 and 2	Approx. 5.6 Ω (when 20°C (68°F))



SI-DRIVE (SUBARU Intelligent Drive) Selector

FUEL INJECTION (FUEL SYSTEMS)

24.SI-DRIVE (SUBARU Intelligent Drive) Selector

A: SPECIFICATION

SI-DRIVE (SUBARU Intelligent Drive) selector is integrated as a unit with the cruise control command switch. For removal, installation and inspection, refer to "Cruise Control Command Switch". <Ref. to ES-19, REMOVAL, Cruise Control Command Switch.> <Ref. to ES-22, INSTALLATION, Cruise Control Command Switch.> <Ref. to ES-23, INSPECTION, Cruise Control Command Switch.>

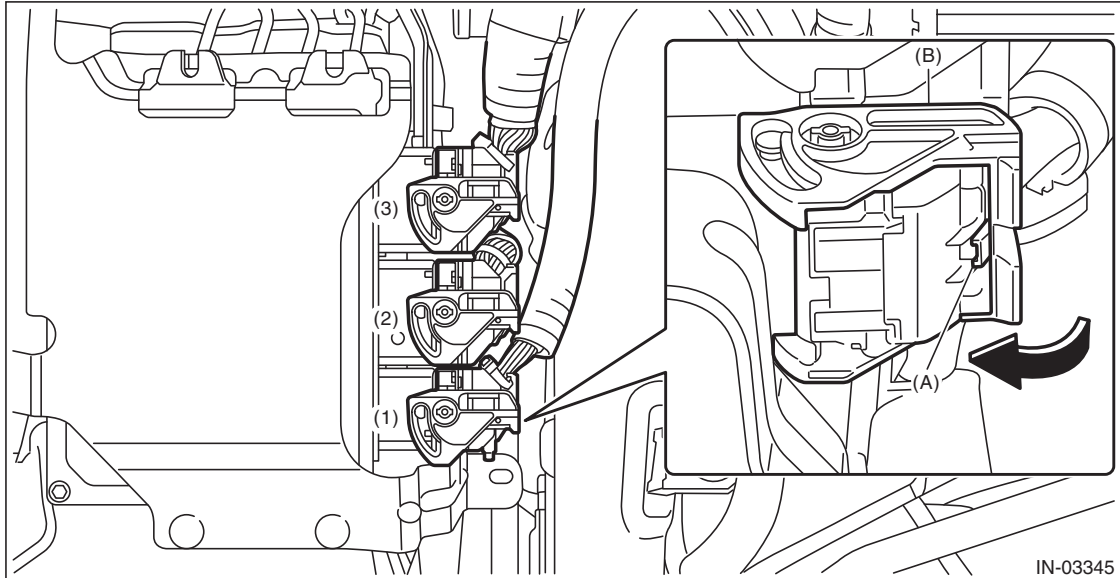
Engine Control Module (ECM)

FUEL INJECTION (FUEL SYSTEMS)

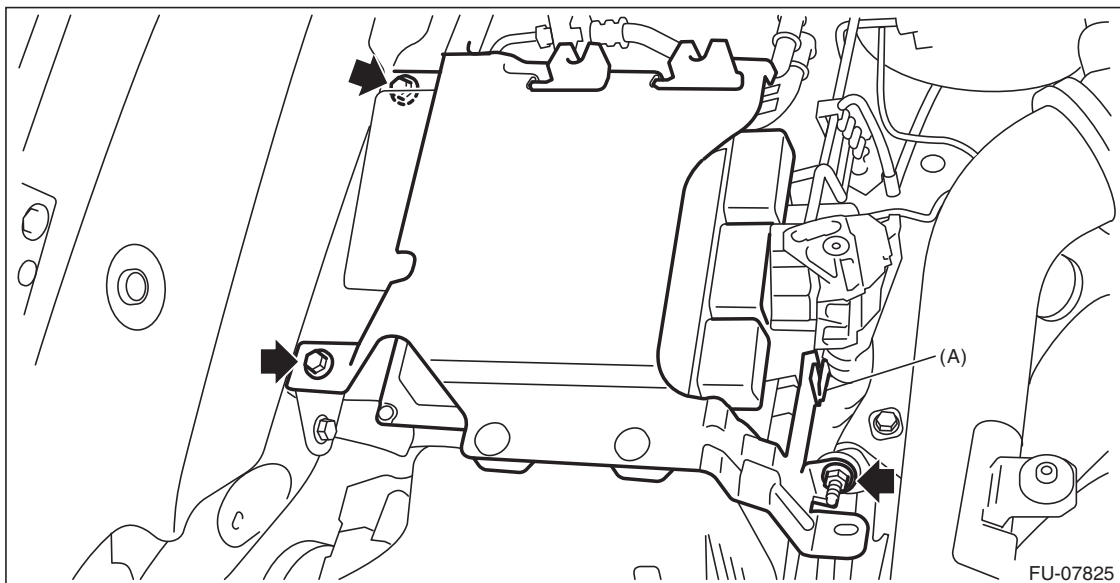
25.Engine Control Module (ECM)

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) While pressing the section (A) shown in the figure, move the lock lever (B) in the direction of the arrow to disconnect the connectors from the ECM in numerical order as shown in the figure.



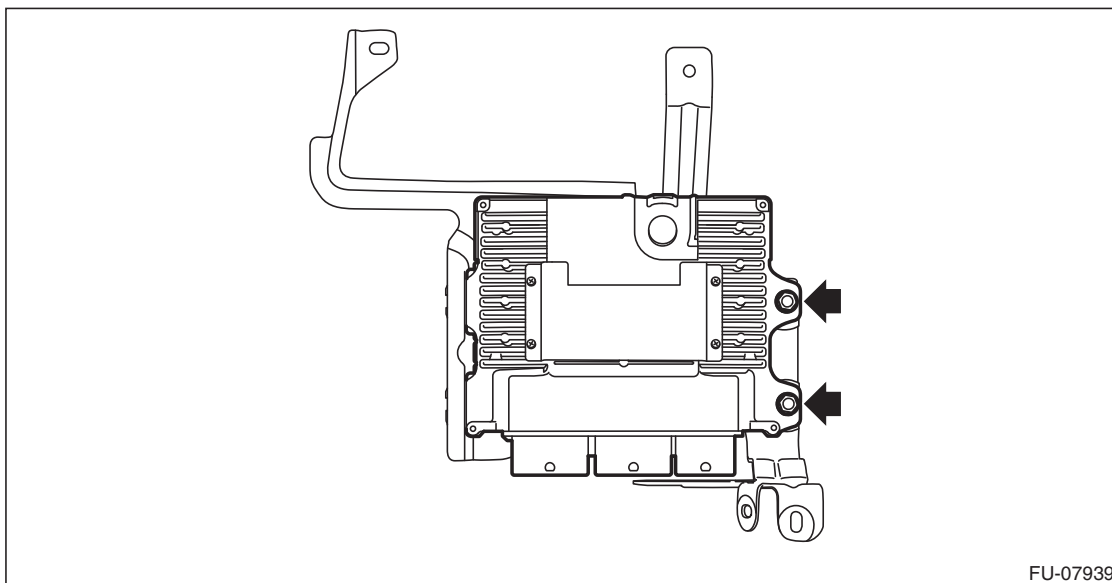
- 3) Remove the bolt, nut, and clip (A), and remove the ECM.



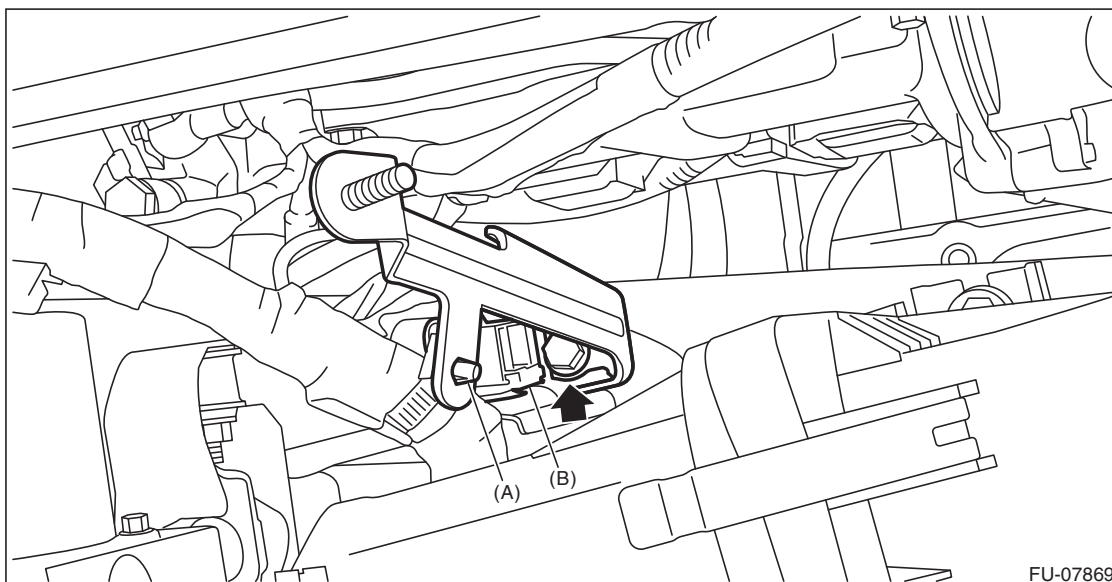
Engine Control Module (ECM)

FUEL INJECTION (FUEL SYSTEMS)

- 4) Remove the ECM from the bracket.



- 5) Remove clip (A) and connector (B), and remove the ECM bracket.



Engine Control Module (ECM)

FUEL INJECTION (FUEL SYSTEMS)

B: INSTALLATION

Install in the reverse order of removal.

CAUTION:

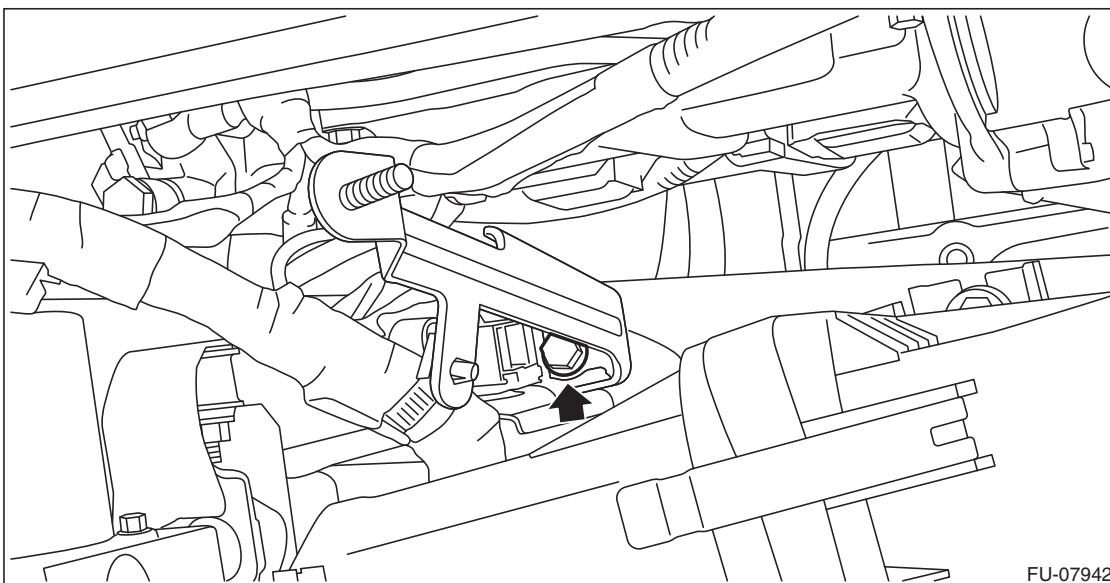
When the ECM of model with immobilizer has been replaced, be sure to perform the registration of immobilizer system. (Refer to the "REGISTRATION MANUAL FOR IMMOBILIZER".)

NOTE:

When replacing the ECM, be careful not to use the ECM of wrong specification to avoid any damage on the fuel injection system.

Tightening torque:

33 N·m (3.4 kgf-m, 24.3 ft-lb)

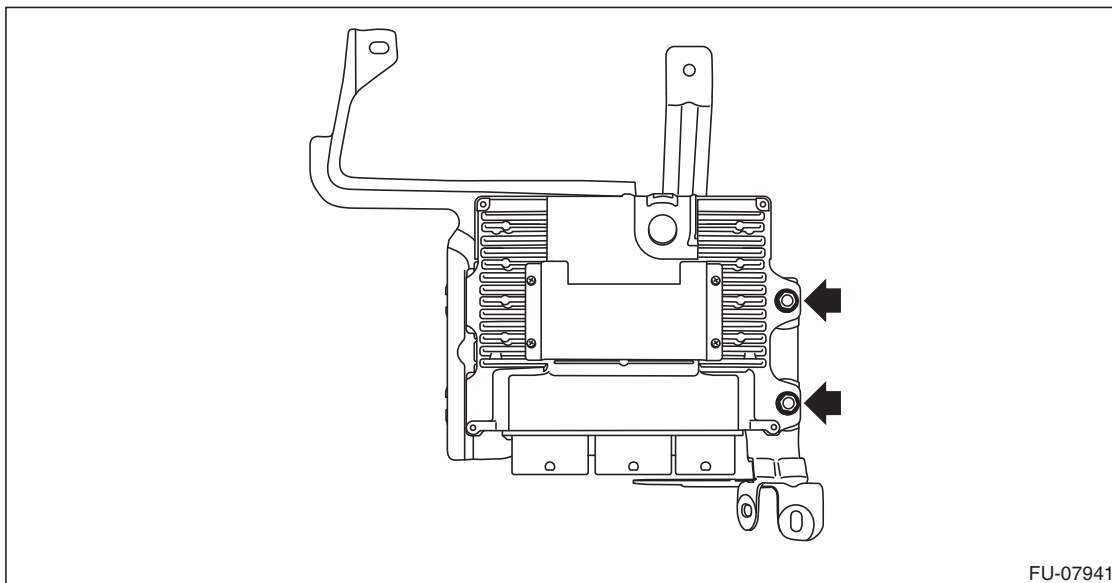


Engine Control Module (ECM)

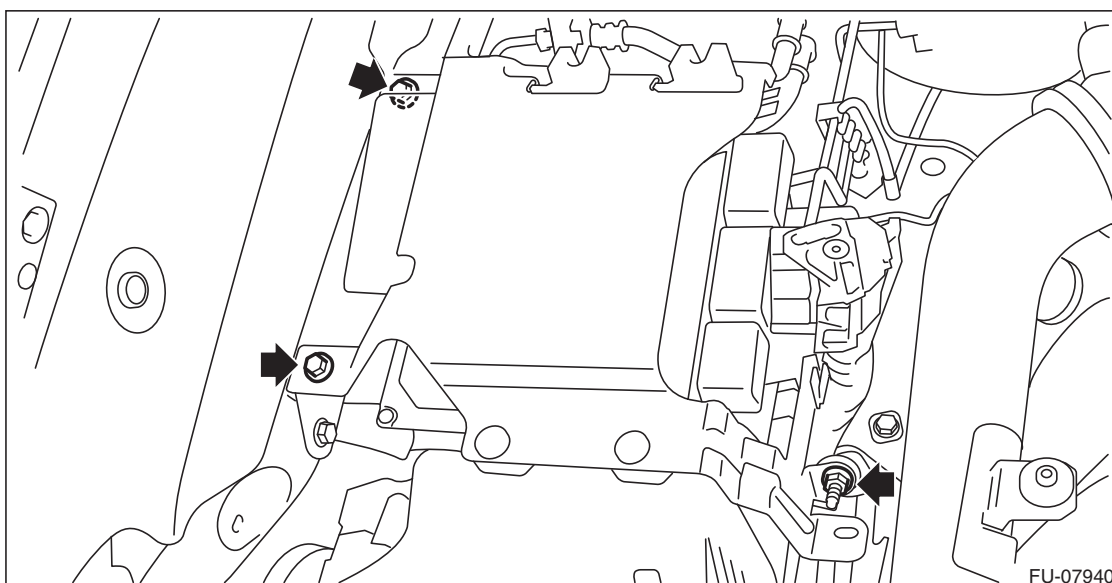
FUEL INJECTION (FUEL SYSTEMS)

Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



FU-07941



FU-07940

C: INSPECTION

Check that the ECM has no deformation, cracks or other damages.

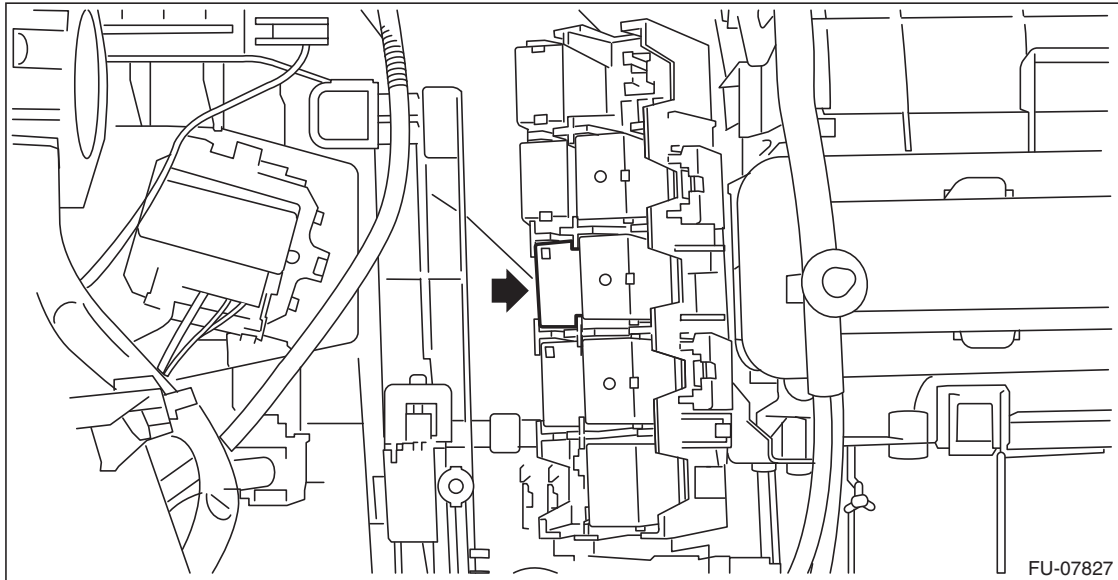
Main Relay

FUEL INJECTION (FUEL SYSTEMS)

26.Main Relay

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the glove box. <Ref. to EI-61, REMOVAL, Glove Box.>
- 3) Remove the main relay.

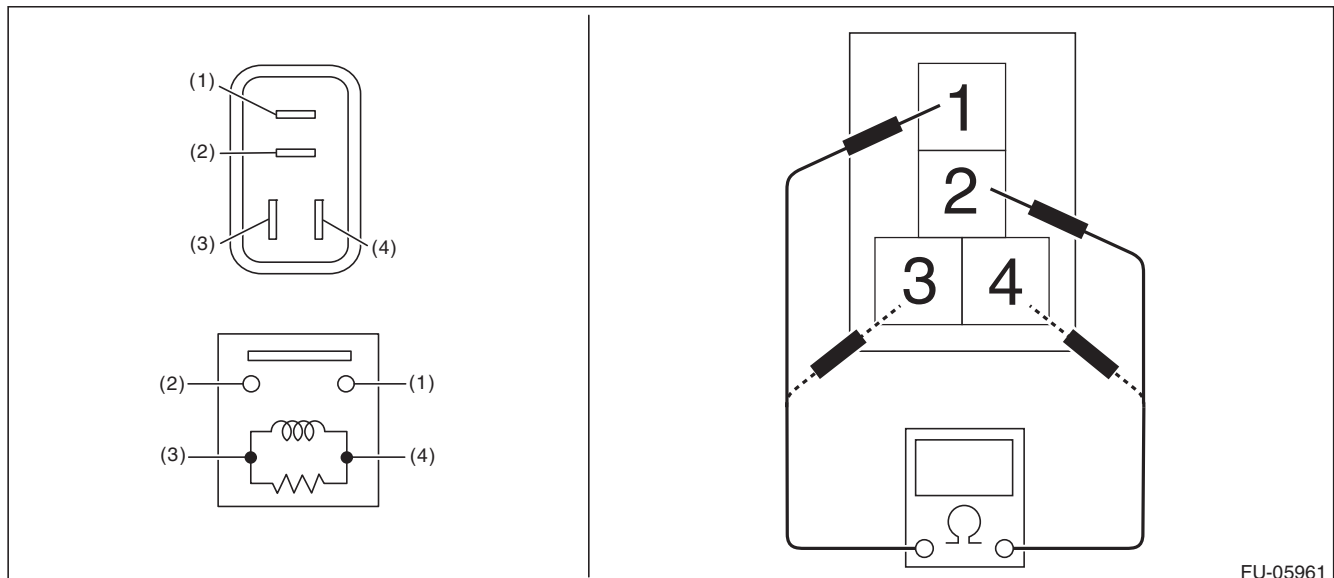


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

- 1) Check that the main relay has no deformation, cracks or other damages.
- 2) Measure the resistance between main relay terminals.

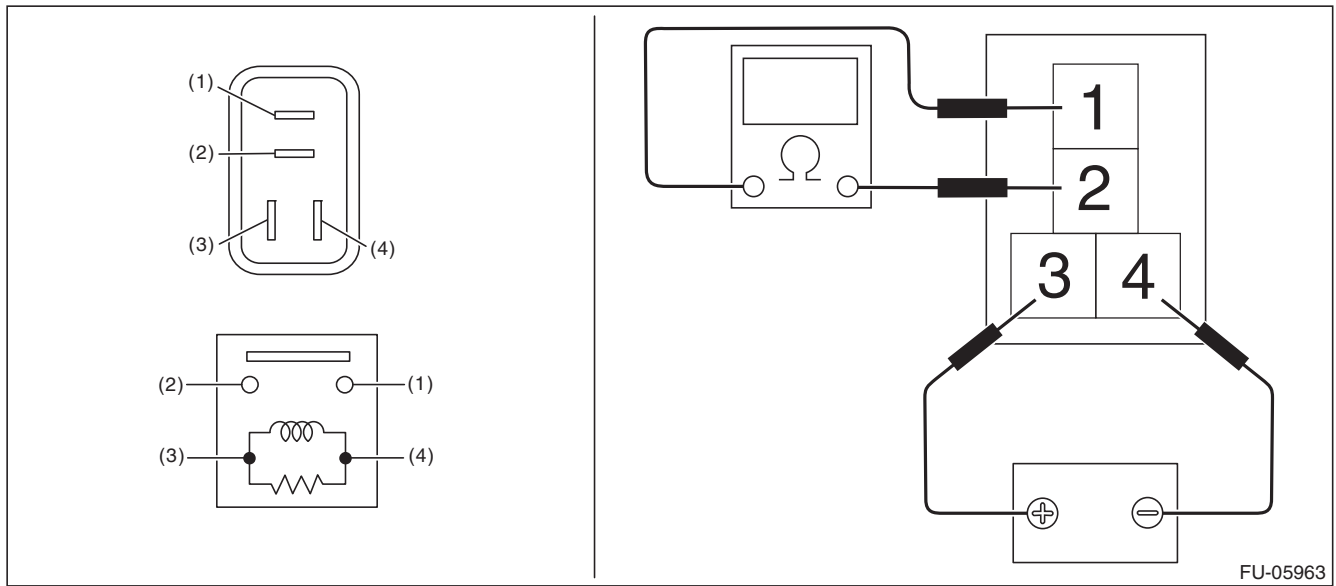


Terminal No.	Standard
1 and 2	1 M Ω or more
3 and 4	130.4 — 230.8 Ω (when 20°C (68°F))

Main Relay

FUEL INJECTION (FUEL SYSTEMS)

3) Connect battery positive terminal to terminal No. 3 and battery ground terminal to terminal No. 4, and measure the resistance between the main relay terminals.



Terminal No.	Standard
1 and 2	Less than 1 Ω



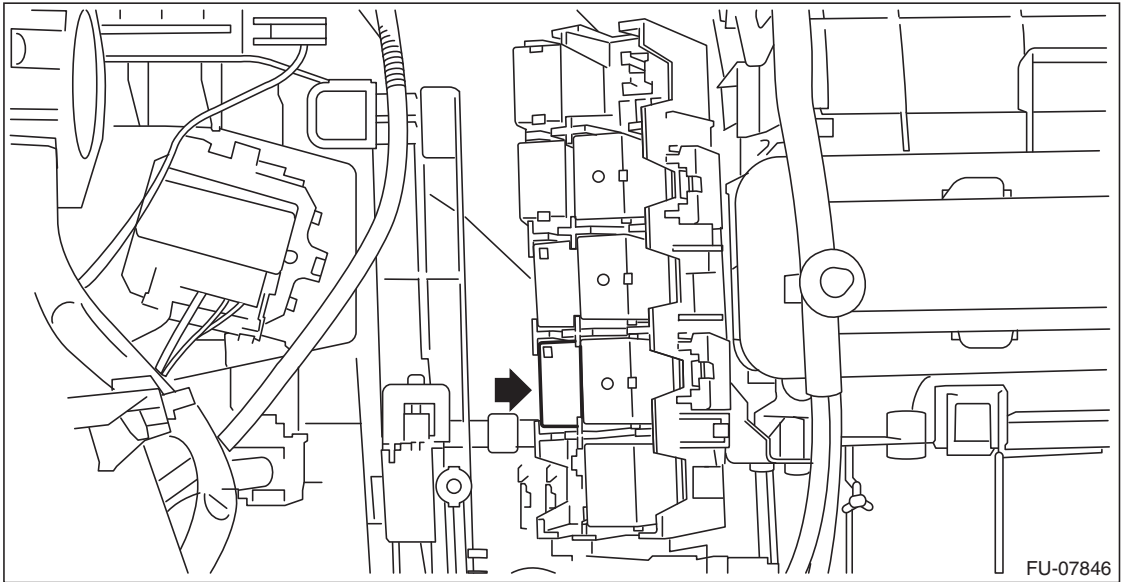
IG Relay

FUEL INJECTION (FUEL SYSTEMS)

27.IG Relay

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the glove box. <Ref. to EI-61, REMOVAL, Glove Box.>
- 3) Remove the main relay.

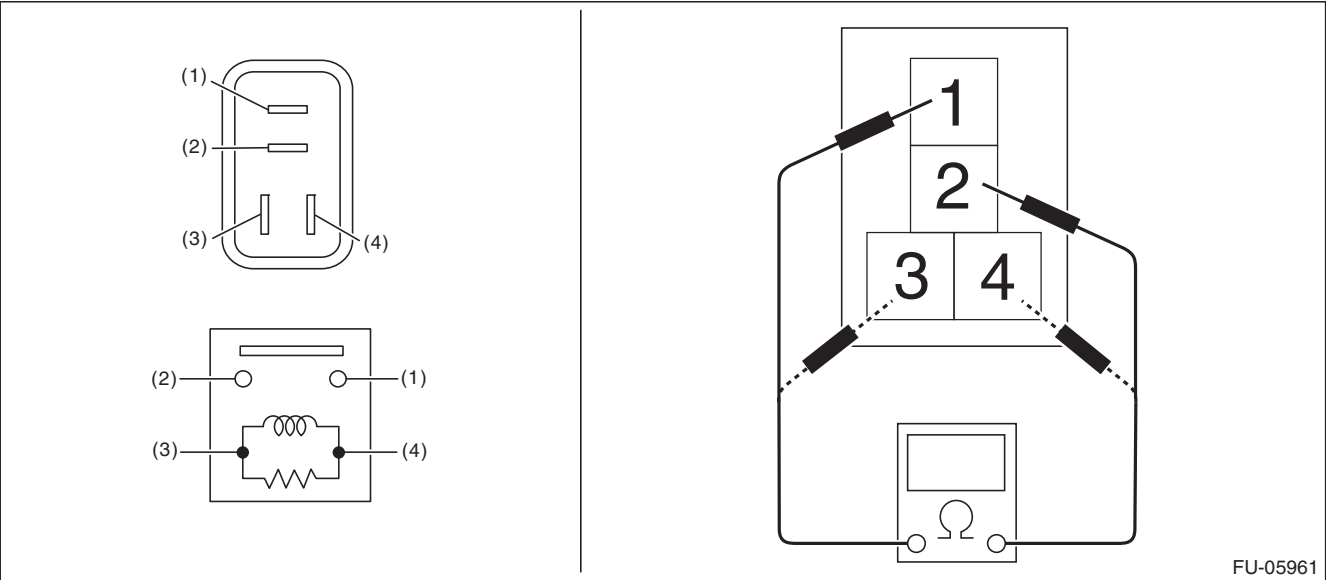


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

- 1) Check that the IG relay has no deformation, cracks or other damages.
- 2) Measure the resistance between the IG relay terminals.

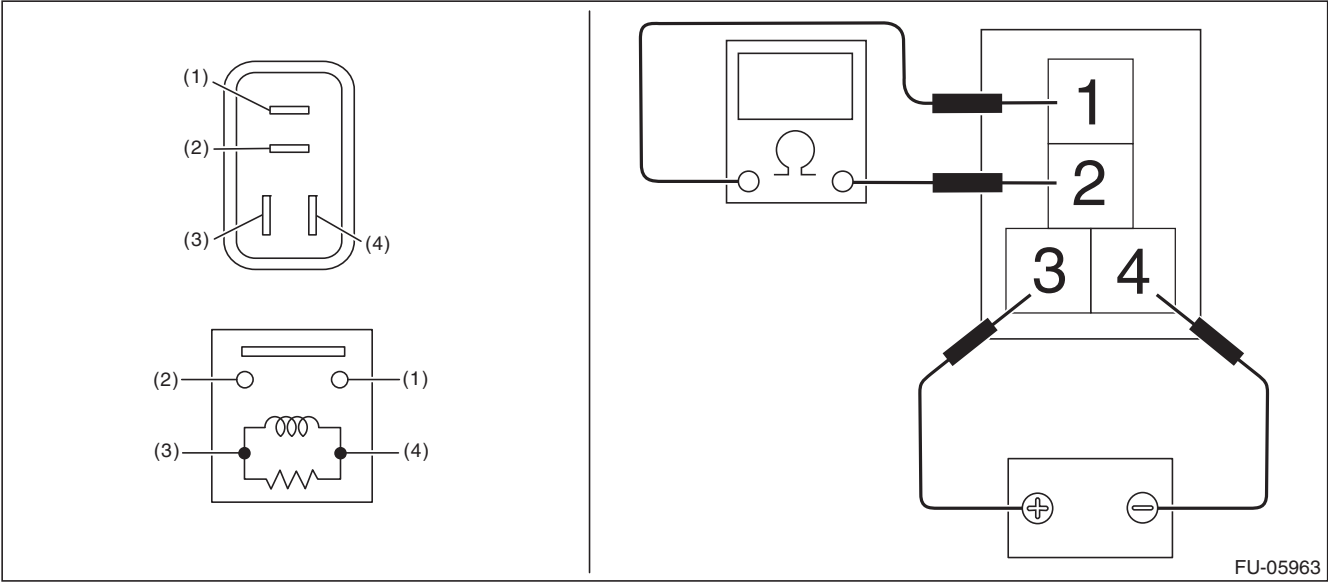


Terminal No.	Standard
1 and 2	1 MΩ or more
3 and 4	130.4 — 230.8 Ω (when 20°C (68°F))

IG Relay

FUEL INJECTION (FUEL SYSTEMS)

3) Connect battery positive terminal to terminal No. 3 and battery ground terminal to terminal No. 4, and measure the resistance between IG relay terminals.



Terminal No.	Standard
1 and 2	Less than 1 Ω



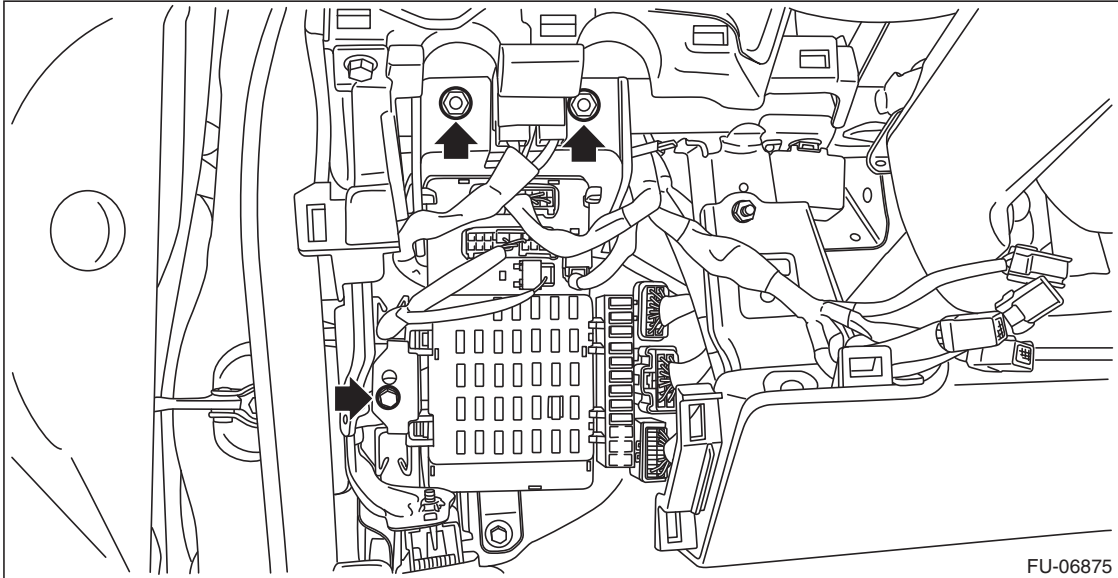
Oxygen Sensor Relay

FUEL INJECTION (FUEL SYSTEMS)

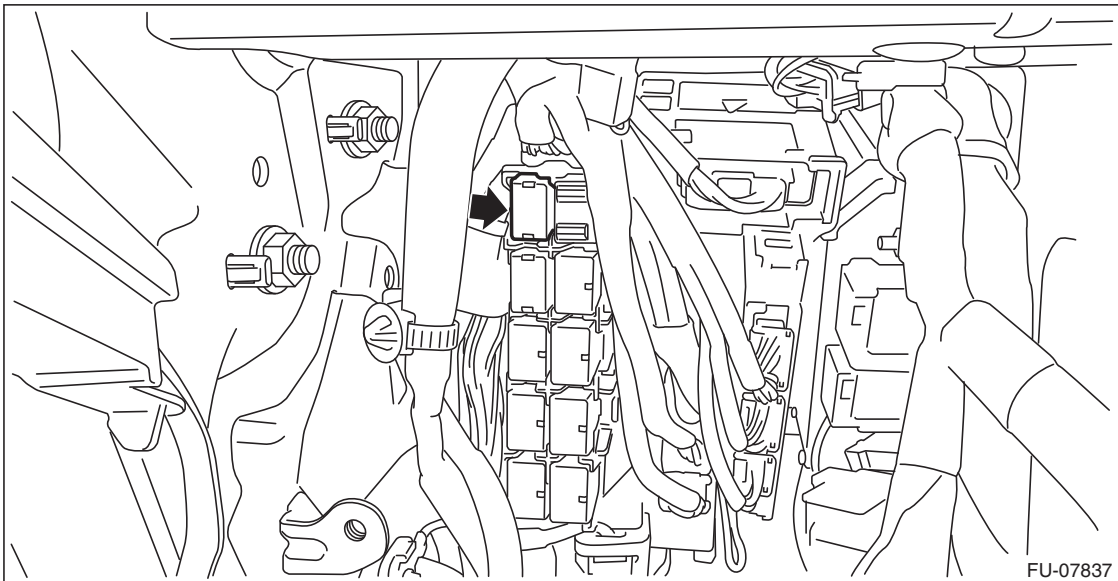
28. Oxygen Sensor Relay

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the instrument panel lower cover. <Ref. to EI-59, REMOVAL, Instrument Panel Lower Cover.>
- 3) Remove the nut and bolt, and move the fuse block downwards.



- 4) Remove the oxygen sensor relay from the relay block.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:

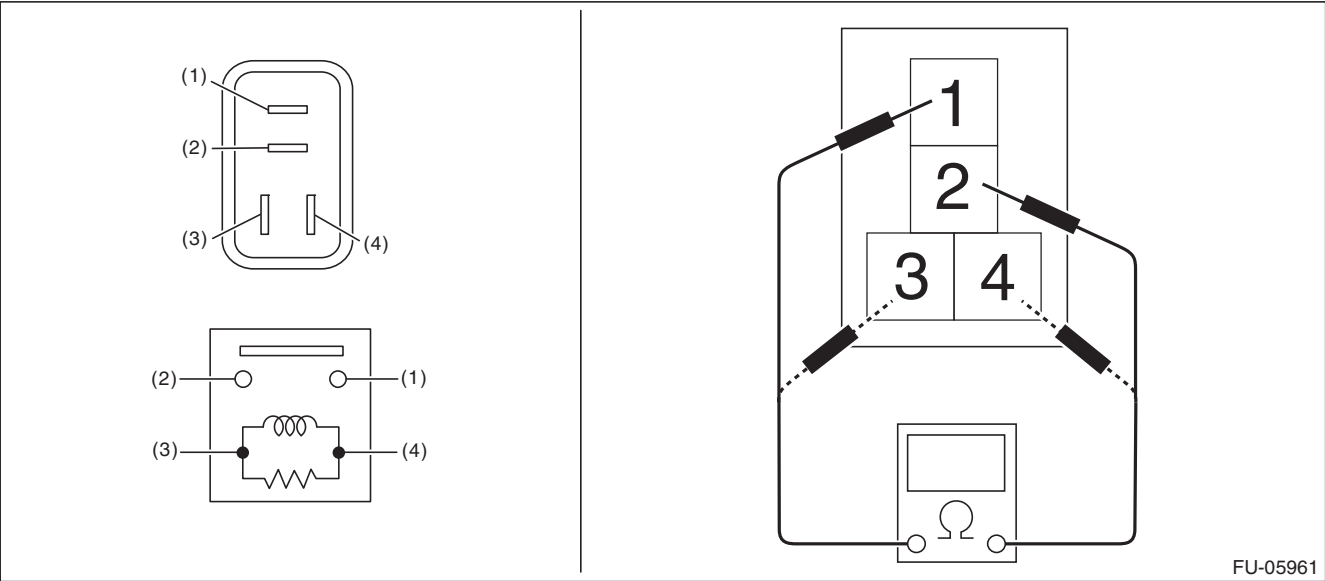
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

Oxygen Sensor Relay

FUEL INJECTION (FUEL SYSTEMS)

C: INSPECTION

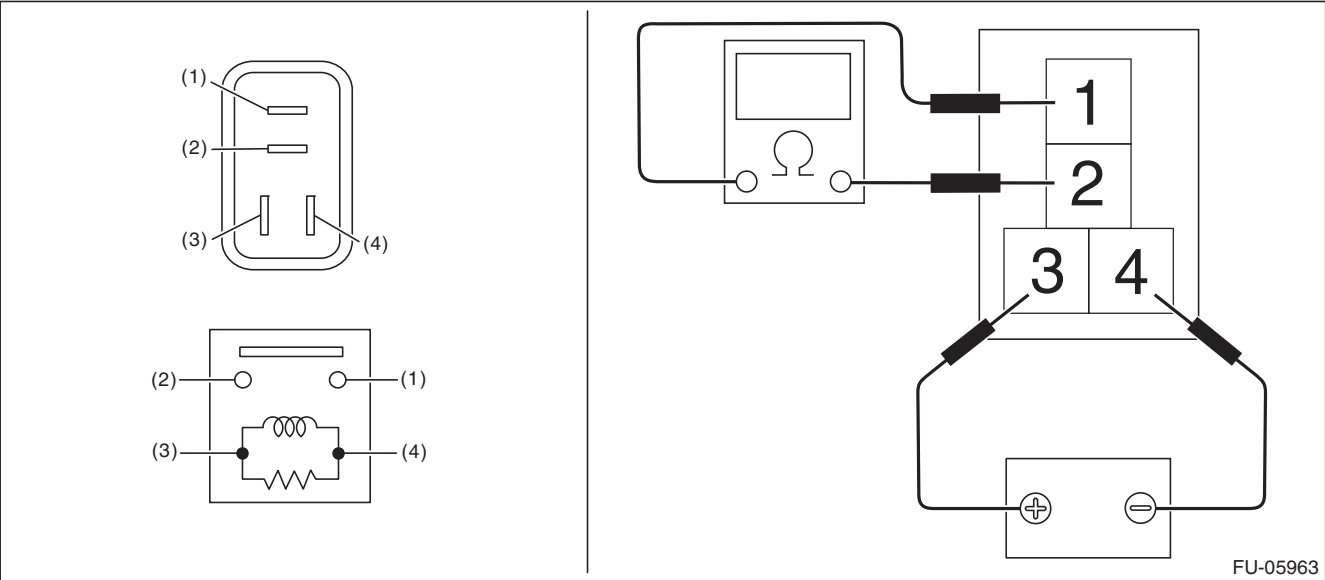
- 1) Check that the oxygen sensor relay has no deformation, cracks or other damages.
- 2) Measure the resistance between oxygen sensor relay terminals.



FU-05961

Terminal No.	Standard
1 and 2	1 M Ω or more
3 and 4	93.8 — 136.4 Ω (when 20°C (68°F))

- 3) Connect battery positive terminal to terminal No. 3 and battery ground terminal to terminal No. 4, and measure the resistance between oxygen sensor relay terminals.



FU-05963

Terminal No.	Standard
1 and 2	Less than 1 Ω

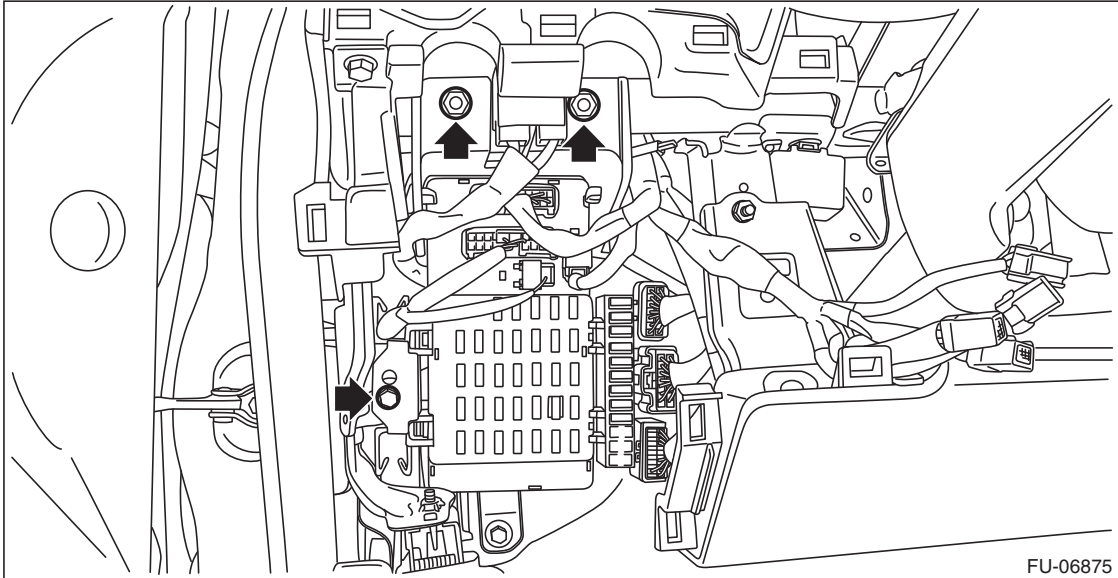
Electronic Throttle Control Relay

FUEL INJECTION (FUEL SYSTEMS)

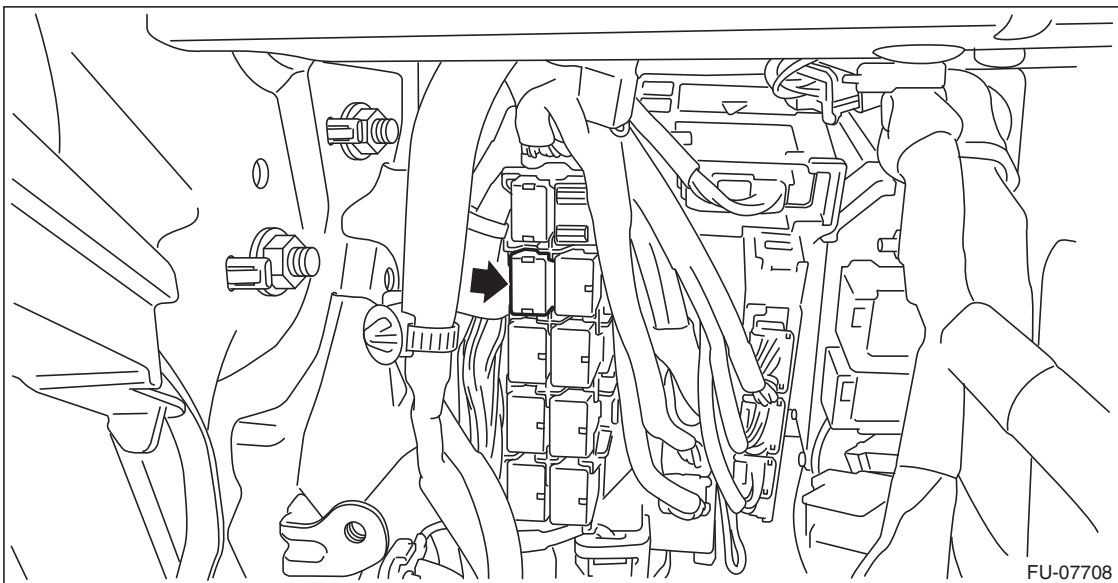
29. Electronic Throttle Control Relay

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the instrument panel lower cover. <Ref. to EI-59, REMOVAL, Instrument Panel Lower Cover.>
- 3) Remove the nut and bolt, and move the fuse block downwards.



- 4) Remove the electronic throttle control relay from the relay block.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:

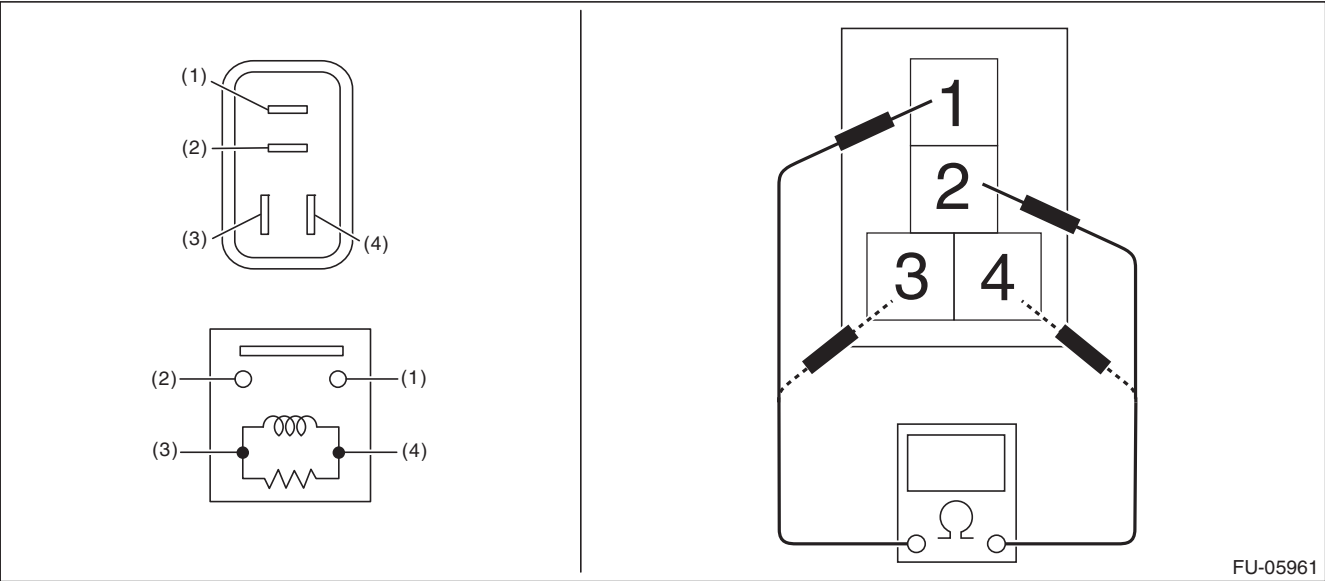
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

Electronic Throttle Control Relay

FUEL INJECTION (FUEL SYSTEMS)

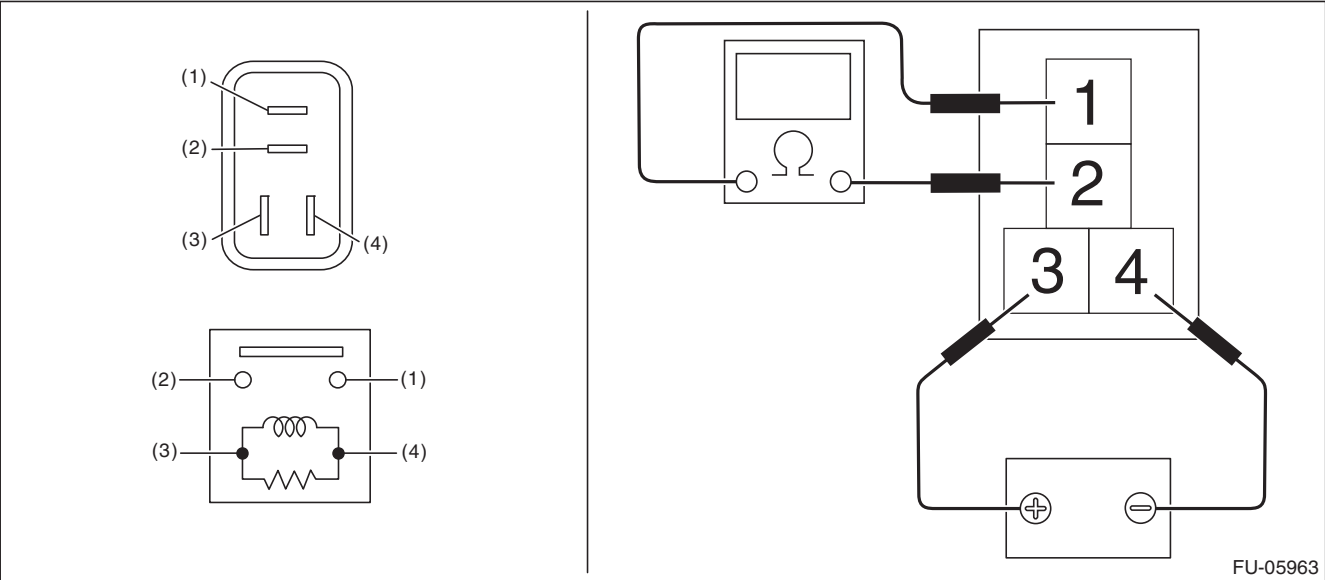
C: INSPECTION

- 1) Check that the electronic throttle control relay has no deformation, cracks or other damages.
- 2) Measure the resistance between electronic throttle control relay terminals.



Terminal No.	Standard
1 and 2	1 M Ω or more
3 and 4	93.8 — 136.4 Ω (when 20°C (68°F))

- 3) Connect battery positive terminal to terminal No. 3 and battery ground terminal to terminal No. 4, and measure the resistance between the electronic throttle control relay terminals.



Terminal No.	Standard
1 and 2	Less than 1 Ω

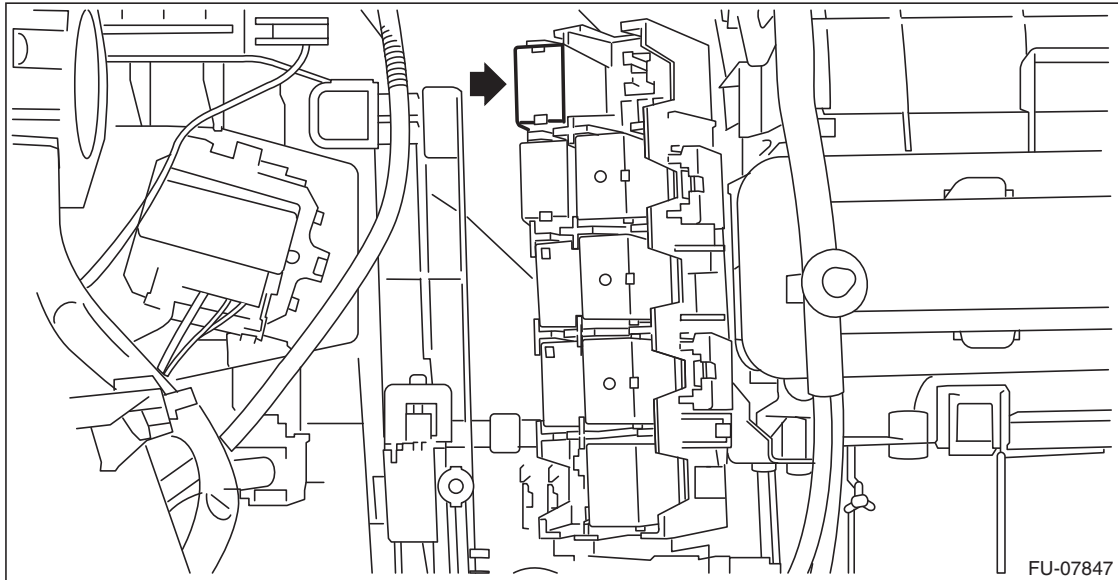
Fuel Pump Relay

FUEL INJECTION (FUEL SYSTEMS)

30.Fuel Pump Relay

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the glove box. <Ref. to EI-61, REMOVAL, Glove Box.>
- 3) Remove the fuel pump relay.

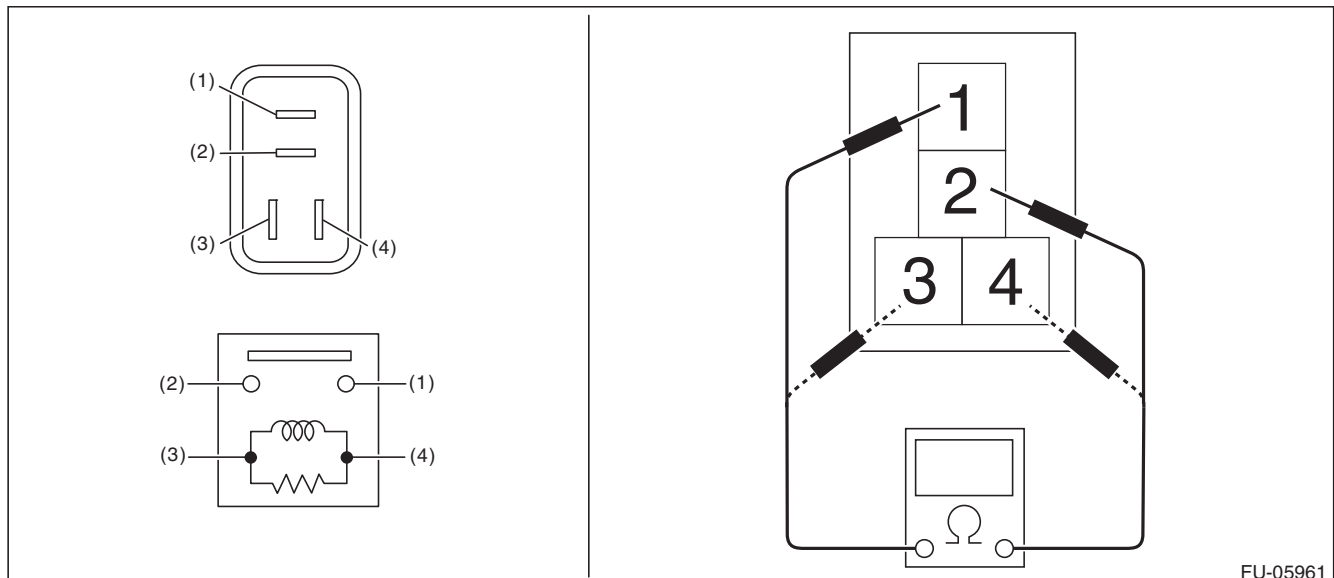


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

- 1) Check that the fuel pump relay has no deformation, cracks or other damages.
- 2) Measure the resistance between fuel pump relay terminals.

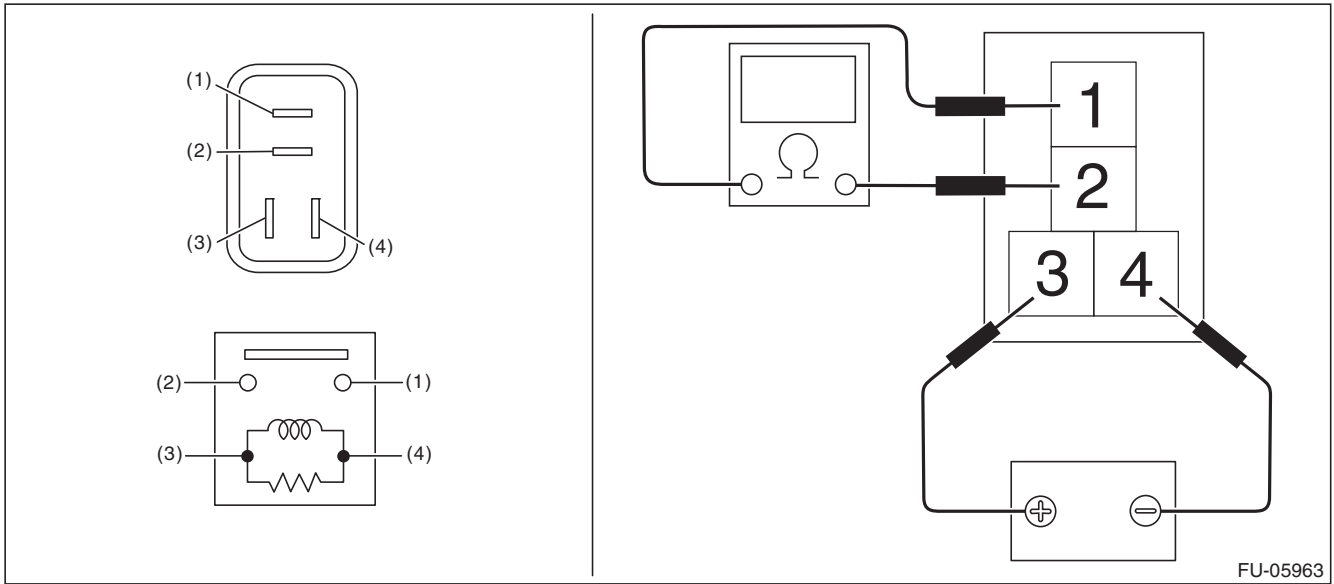


Terminal No.	Standard
1 and 2	1 M Ω or more
3 and 4	93.8 — 136.4 Ω (when 20°C (68°F))

Fuel Pump Relay

FUEL INJECTION (FUEL SYSTEMS)

3) Connect battery positive terminal to terminal No. 3 and battery ground terminal to terminal No. 4, and measure the resistance between the fuel pump relay terminals.



Terminal No.	Standard
1 and 2	Less than 1 Ω



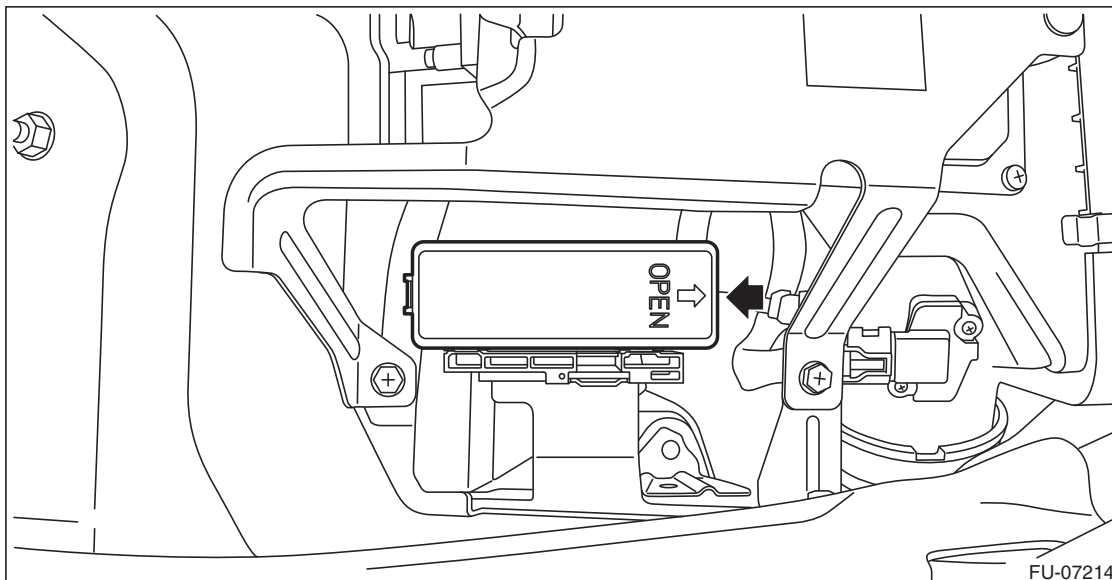
Fuel Injector Relay

FUEL INJECTION (FUEL SYSTEMS)

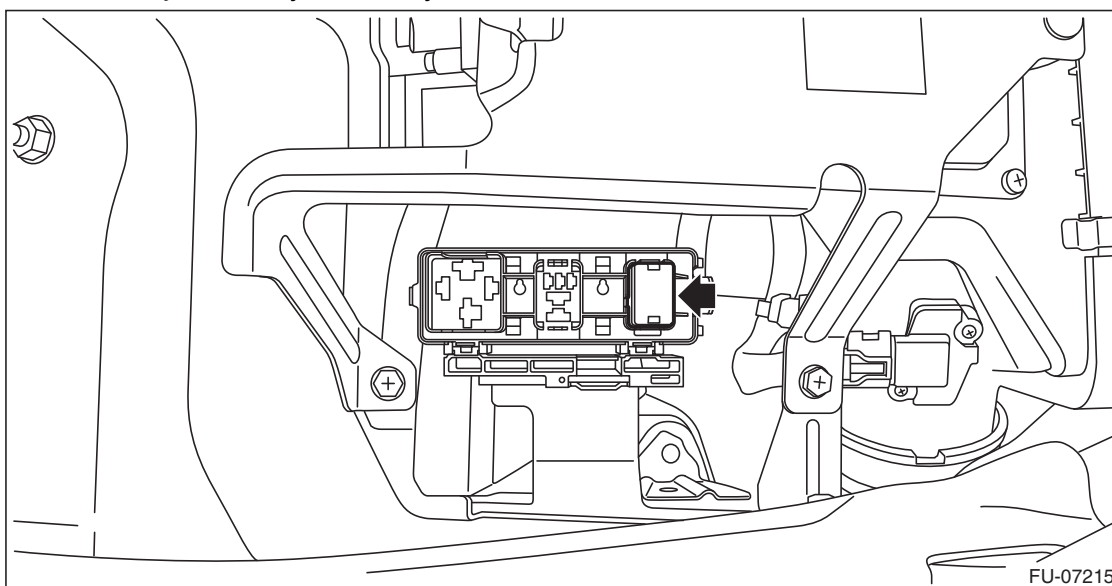
31. Fuel Injector Relay

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the cover from the relay block on the front side of the front strut RH.



- 3) Remove the fuel injector relay from relay block.



B: INSTALLATION

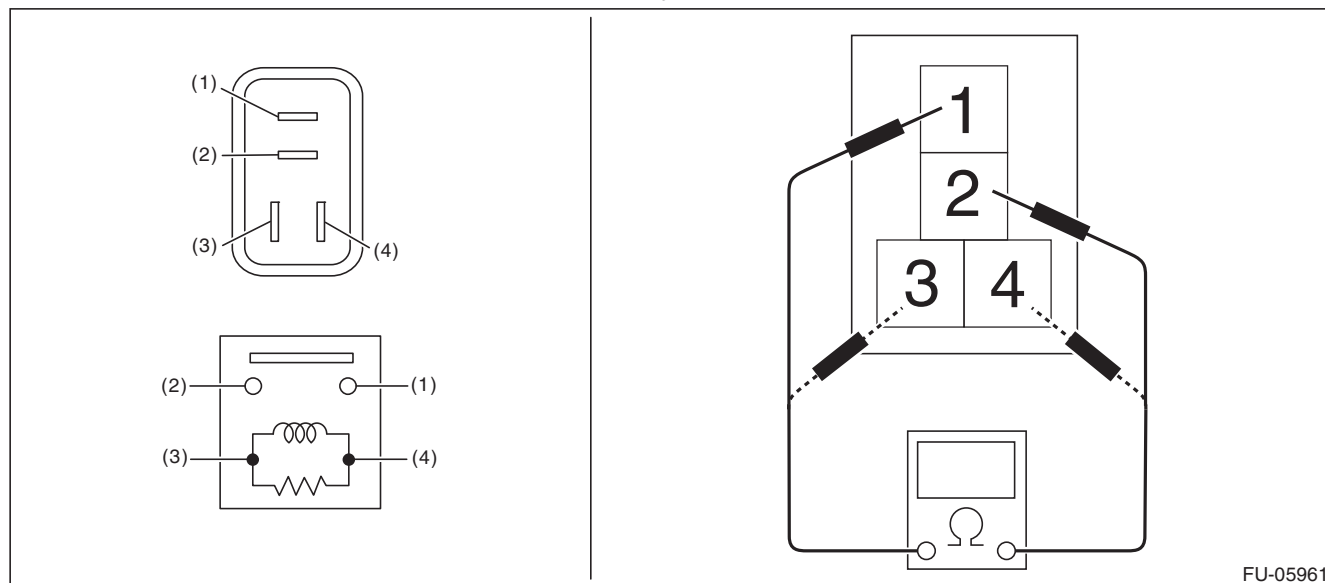
Install in the reverse order of removal.

Fuel Injector Relay

FUEL INJECTION (FUEL SYSTEMS)

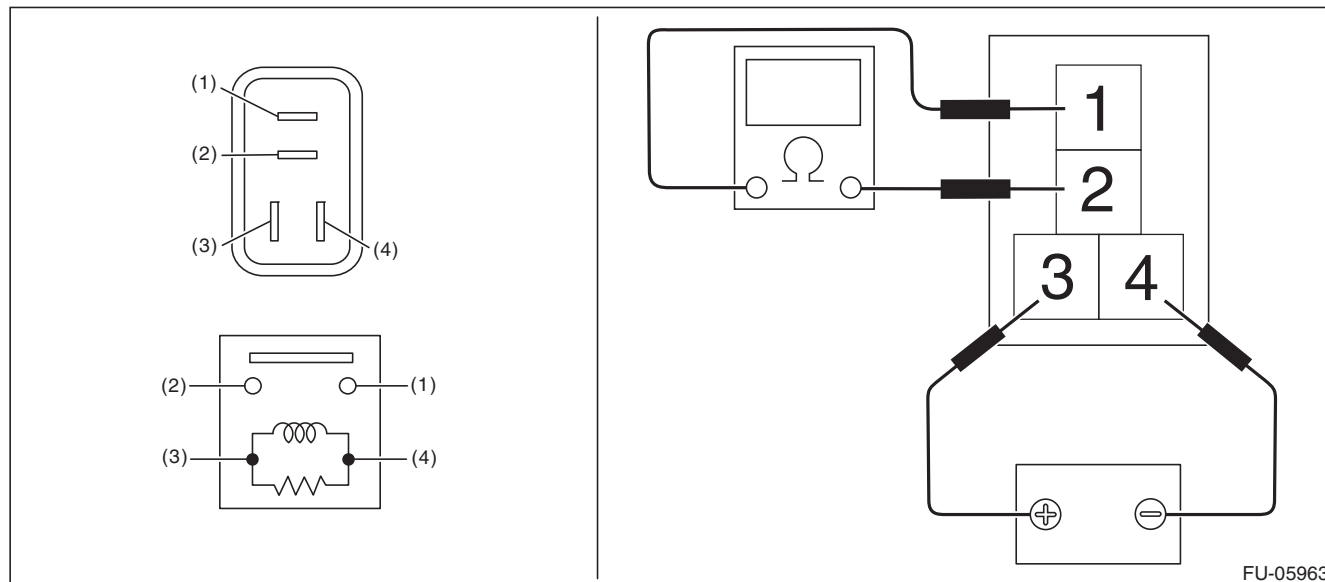
C: INSPECTION

- 1) Check that the fuel injector relay has no deformation, cracks or other damages.
- 2) Measure the resistance between fuel injector relay terminals.



Terminal No.	Standard
1 and 2	1 M Ω or more
3 and 4	93.8 — 136.4 Ω (when 20°C (68°F))

- 3) Connect battery positive terminal to terminal No. 3 and battery ground terminal to terminal No. 4, and measure the resistance between the fuel injector relay terminals.



Terminal No.	Standard
1 and 2	Less than 1 Ω

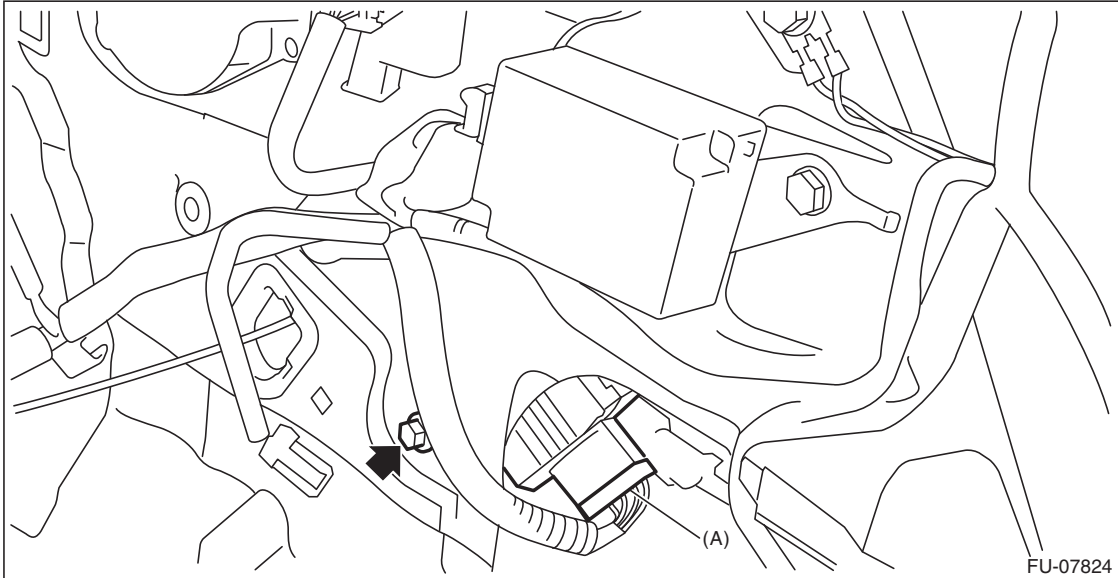
Fuel Pump Control Unit

FUEL INJECTION (FUEL SYSTEMS)

32. Fuel Pump Control Unit

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the right side rear quarter trim. <Ref. to EI-102, REMOVAL, Rear Quarter Trim.>
- 3) Disconnect the connector (A), and remove the fuel pump control unit.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:

5 N·m (0.5 kgf-m, 3.7 ft-lb)

C: INSPECTION

Check that the fuel pump control unit has no deformation, cracks or other damages.

33.Fuel

A: PROCEDURE

1. RELEASING OF FUEL PRESSURE

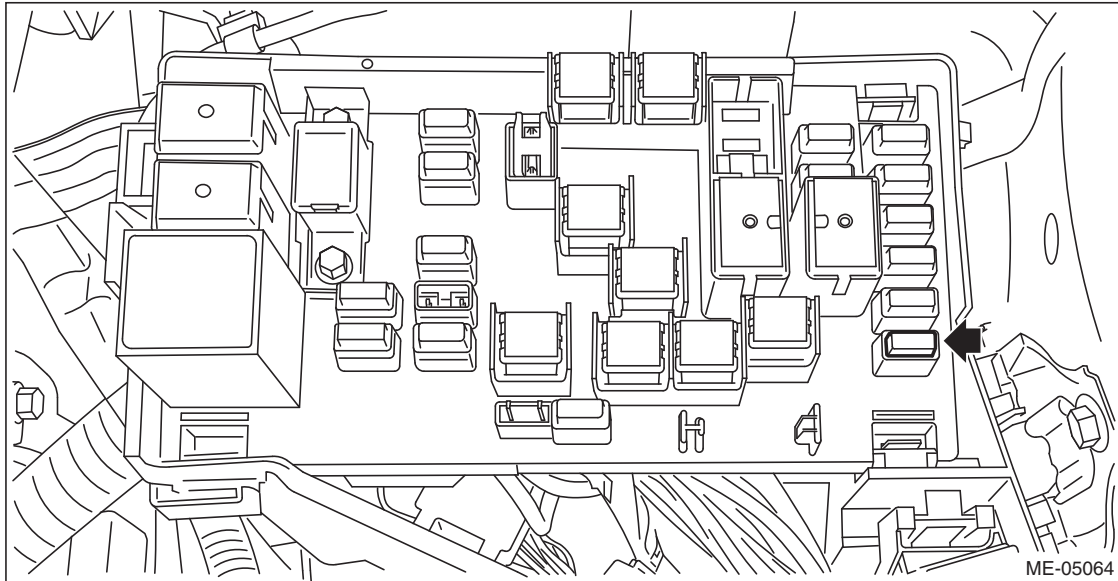
WARNING:

Place "NO OPEN FLAMES" signs near the working area.

CAUTION:

Be careful not to spill fuel.

- 1) Remove the fuse of fuel pump from main fuse box.



- 2) Start the engine and run it until it stalls.
- 3) After the engine stalls, crank it for five more seconds.
- 4) Turn the ignition switch to OFF.
- 5) Install the fuse of fuel pump to the main fuse box.
- 6) Make sure that the malfunction indicator light is not lit.

NOTE:

When the fuel pressure is released, the malfunction indicator light illuminates and DTC (P0087) may be stored in ECM. When the malfunction indicator light has illuminated, perform the Clear Memory Mode. <Ref. to EN(H4DOTC)(diag)-60, Clear Memory Mode.>

2. DRAINING FUEL (WITH SUBARU SELECT MONITOR)

WARNING:

Place "NO OPEN FLAMES" signs near the working area.

CAUTION:

Be careful not to spill fuel.

NOTE:

- If the fuel pump cannot be driven, refer to the procedures for draining from the fuel filler hose. <Ref. to FU(H4DOTC)-153, DRAINING FUEL (THROUGH THE FUEL FILLER HOSE), PROCEDURE, Fuel.>
 - Be careful not to let the battery run-out.
- 1) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>

Fuel

FUEL INJECTION (FUEL SYSTEMS)

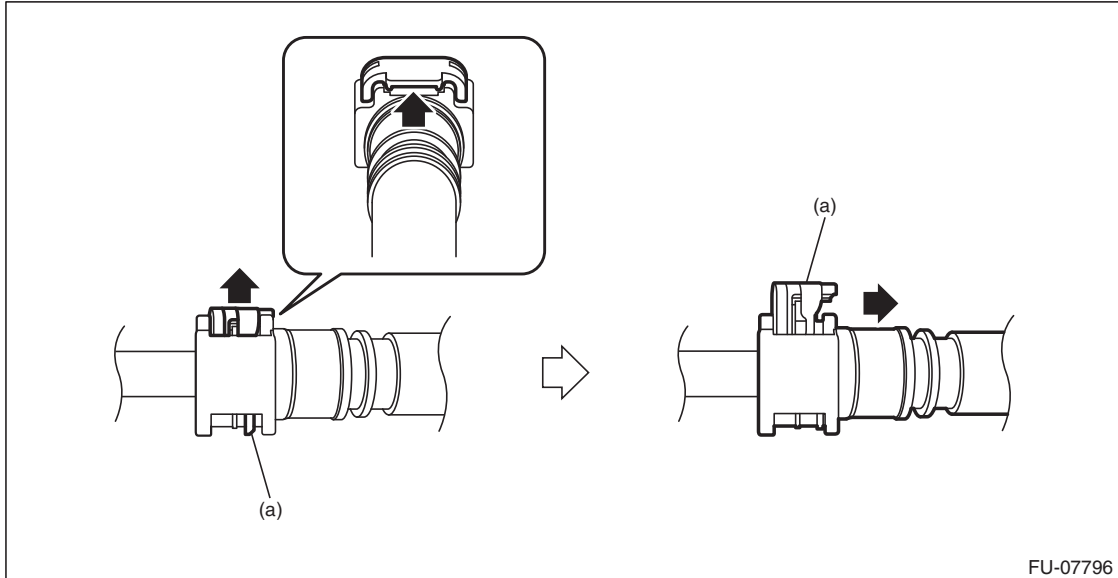
2) Disconnect the fuel delivery tube from the fuel pipe assembly, and remove the clip (A) securing the fuel delivery tube.

CAUTION:

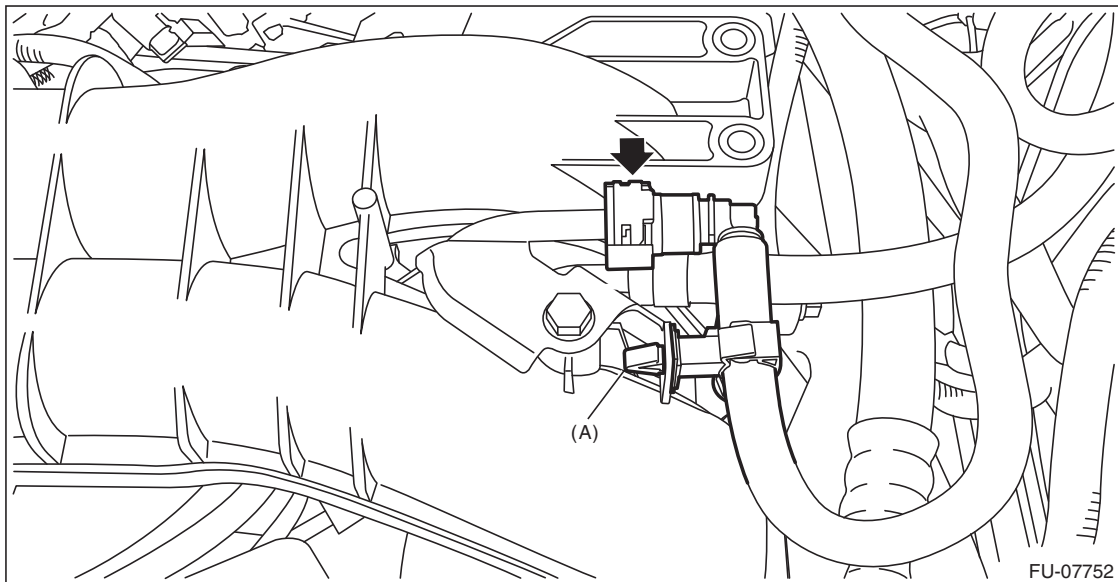
- Be careful not to spill fuel.
- Catch the fuel from the tubes using a container or cloth.

NOTE:

Disconnect the quick connector as shown in the figure.



(a) Slider



3) Connect ST to the fuel delivery tube.

ST 18471AA000 FUEL PIPE ADAPTER

4) Connect the gasoline proof hose to ST and put the end of the hose in the container.

5) Drive the fuel pump and drain the fuel using Subaru Select Monitor.

CAUTION:

Be careful not to spill fuel.

NOTE:

For detailed operation procedures, refer to "PC application help for Subaru Select Monitor".

6) Install the related parts in the reverse order after draining the fuel.

3. DRAINING FUEL (THROUGH THE FUEL FILLER HOSE)

WARNING:

Place "NO OPEN FLAMES" signs near the working area.

CAUTION:

- Be careful not to spill fuel.
- Fuel may remain in the fuel filler pipe. Drain the fuel from the fuel filler pipe through the fill opening using the gasoline proof pump and the gasoline proof hose (ø10 or less) before the operation.

1) Lift up the vehicle.

2) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-45, REMOVAL, Rear Exhaust Pipe.>
<Ref. to EX(H4DOTC)-48, REMOVAL, Muffler.>

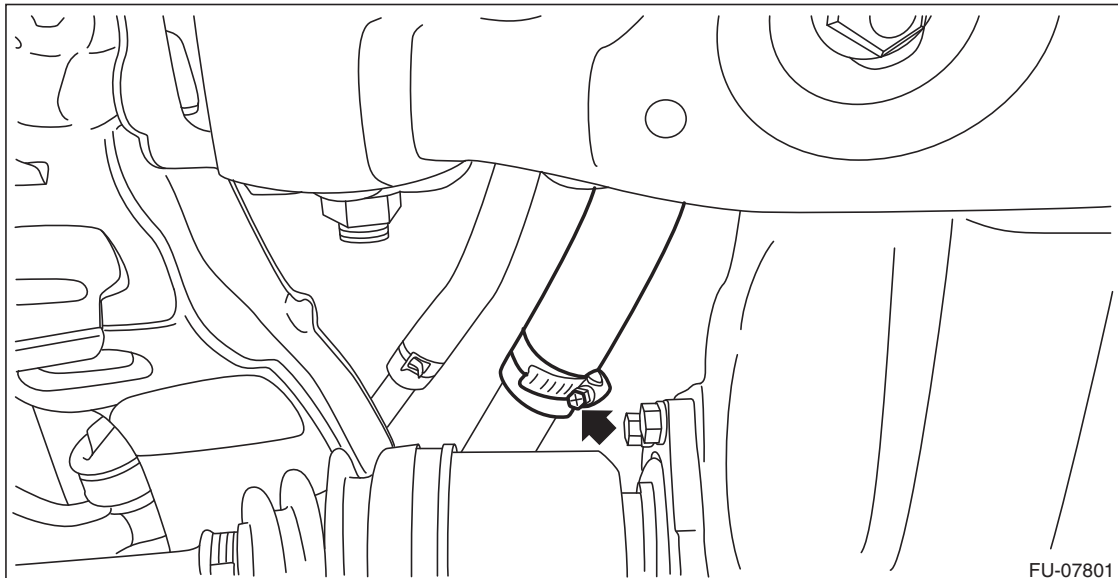
3) Open the fuel filler lid and remove the fuel filler cap.

4) Drain the fuel from the fuel filler pipe through the filler opening using the gasoline proof pump and the gasoline proof hose (ø10 or less).

5) Disconnect the fuel filler hose from the fuel filler pipe assembly.

CAUTION:

- Be careful not to spill fuel.
- Catch the fuel from hoses using a container or cloth.



6) Set the container under the vehicle and insert the gasoline proof hose (ø10 or less) into the fuel filler hose to drain the fuel.

CAUTION:

Be careful not to spill fuel.

Fuel

FUEL INJECTION (FUEL SYSTEMS)

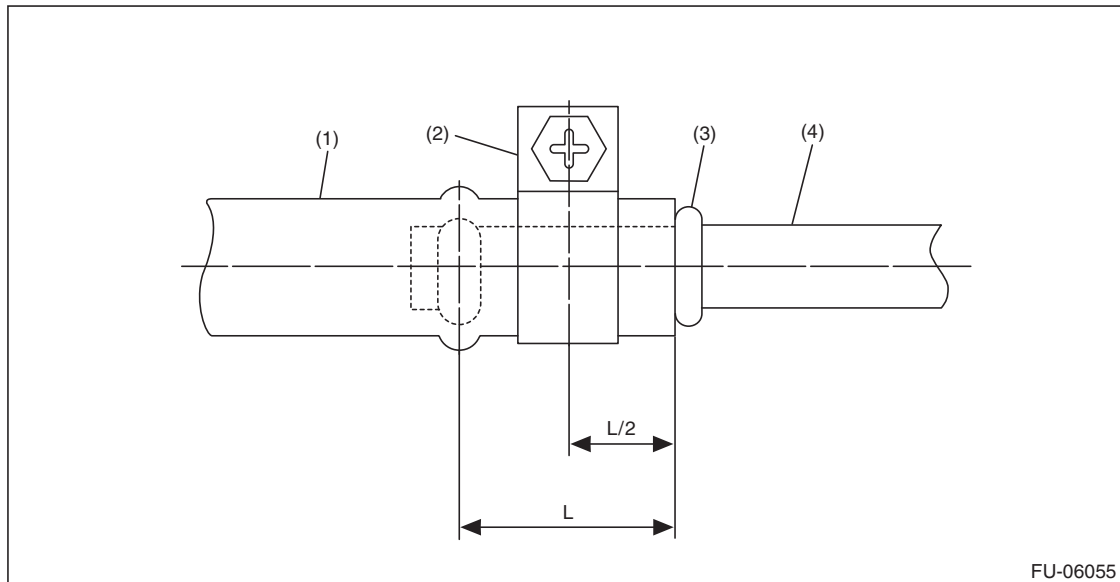
7) Install the related parts in the reverse order after draining the fuel.

NOTE:

Correctly insert the fuel filler hose to the spool, and then install the clamp as shown.

Tightening torque:

2.5 N·m (0.3 kgf-m, 1.8 ft-lb)



- (1) Fuel filler hose
(2) Clamp

- (3) Spool

- (4) Fuel filler pipe



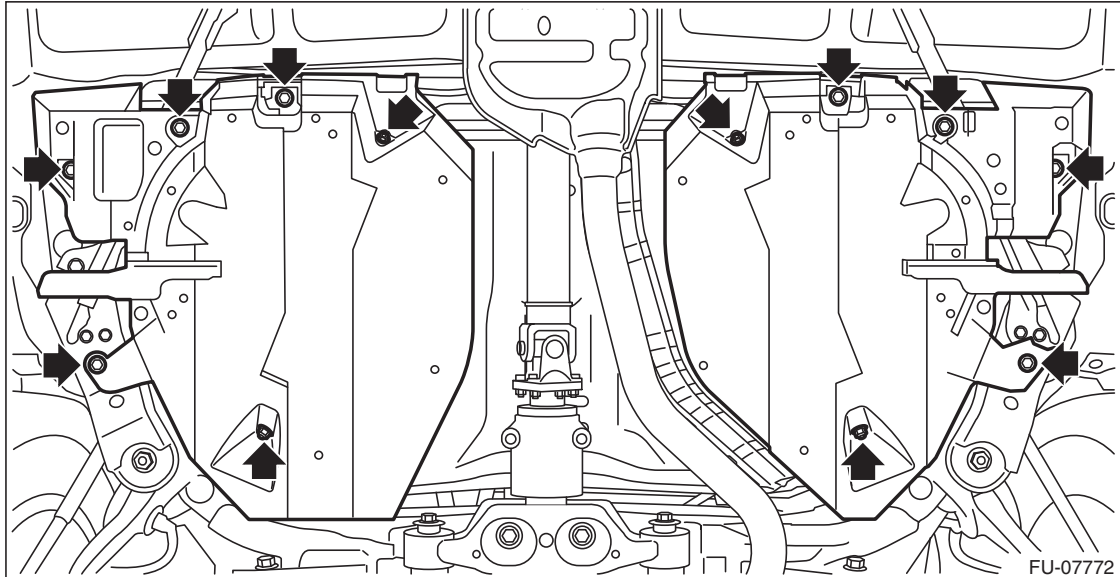
Fuel Tank Protector

FUEL INJECTION (FUEL SYSTEMS)

34. Fuel Tank Protector

A: REMOVAL

- 1) Lift up the vehicle.
- 2) Remove the bolt and nuts and remove the fuel tank protector.



B: INSTALLATION

Install in the reverse order of removal.

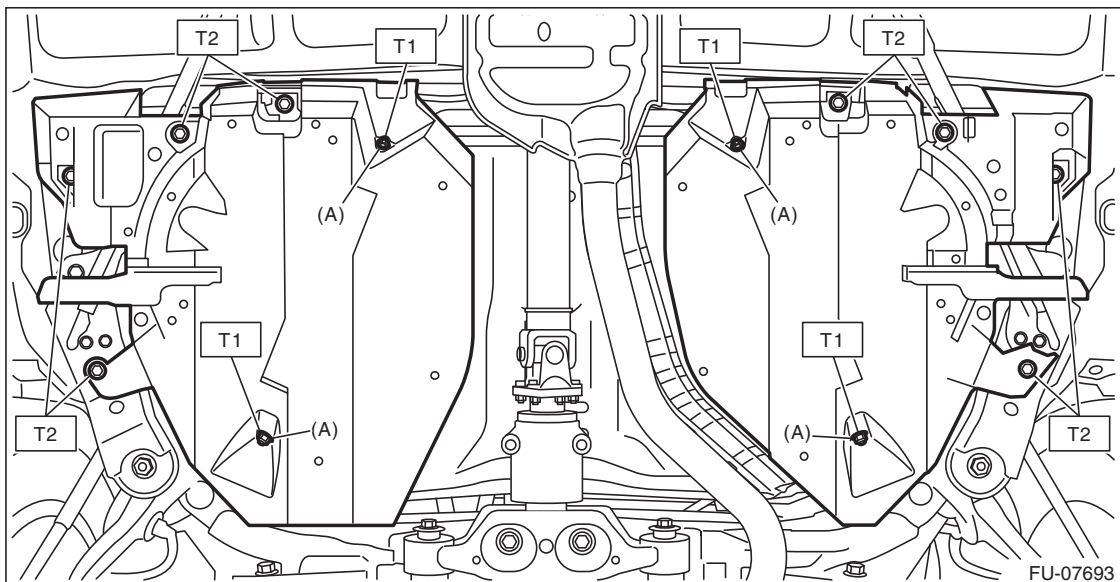
NOTE:

Use a new self-locking nut.

Tightening torque:

T1: 9 N·m (0.9 kgf-m, 6.6 ft-lb)

T2: 18 N·m (1.8 kgf-m, 13.3 ft-lb)



(A) Self-locking nut

Fuel Tank

FUEL INJECTION (FUEL SYSTEMS)

35.Fuel Tank

A: REMOVAL

WARNING:

Place "NO OPEN FLAMES" signs near the working area.

CAUTION:

- Be careful not to spill fuel.
- Catch the fuel from the tubes using a container or cloth.

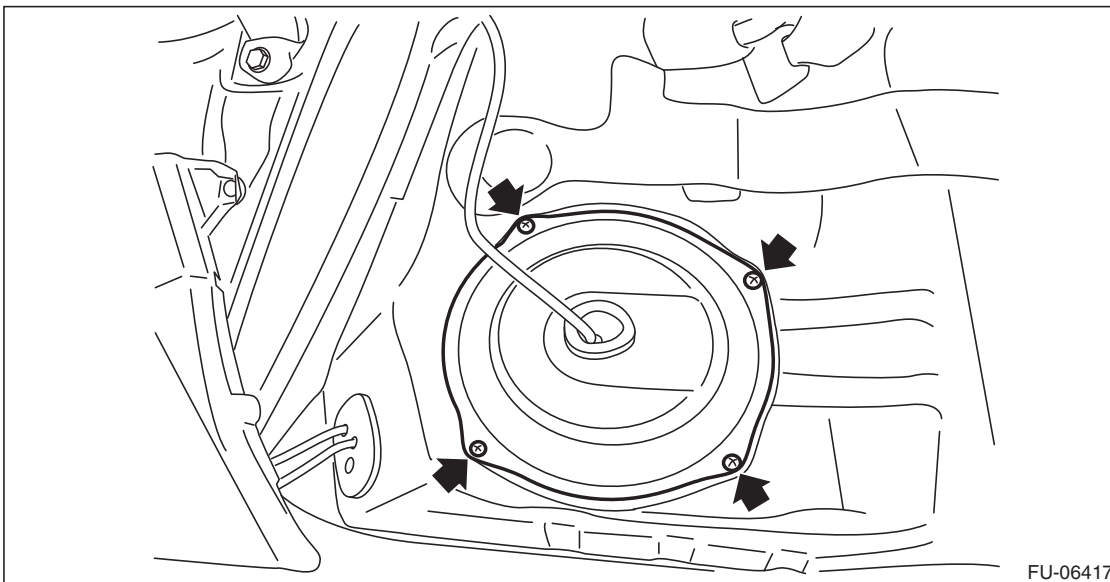
1) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>

2) Drain fuel. <Ref. to FU(H4DOTC)-151, DRAINING FUEL (WITH SUBARU SELECT MONITOR), PROCEDURE, Fuel.>

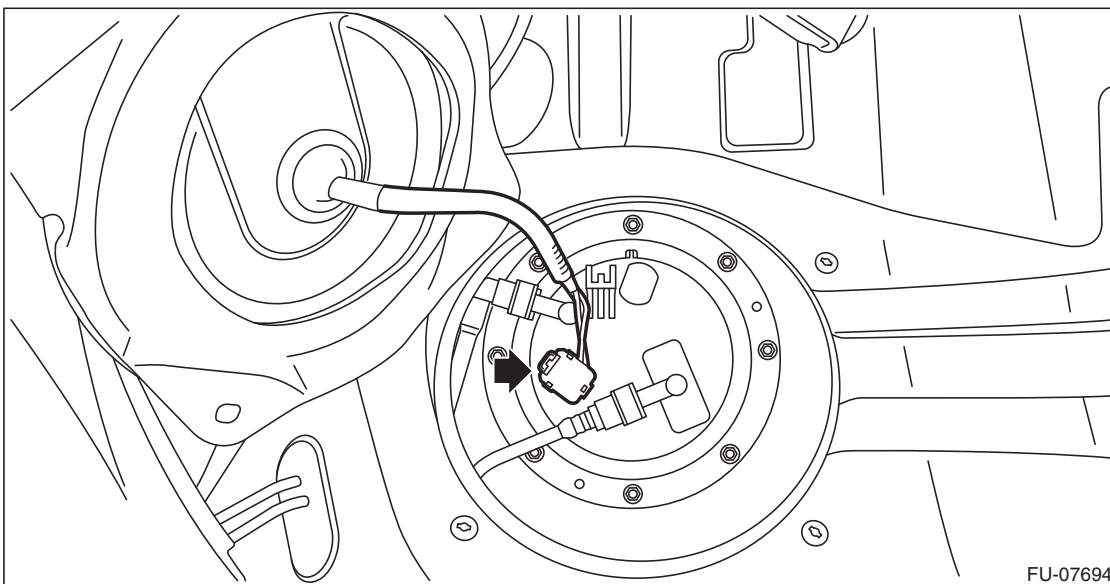
3) Disconnect the ground cable from battery.

4) Remove the rear seat cushion. <Ref. to SE-32, REMOVAL, Rear Seat.>

5) Remove the service hole cover of fuel pump.



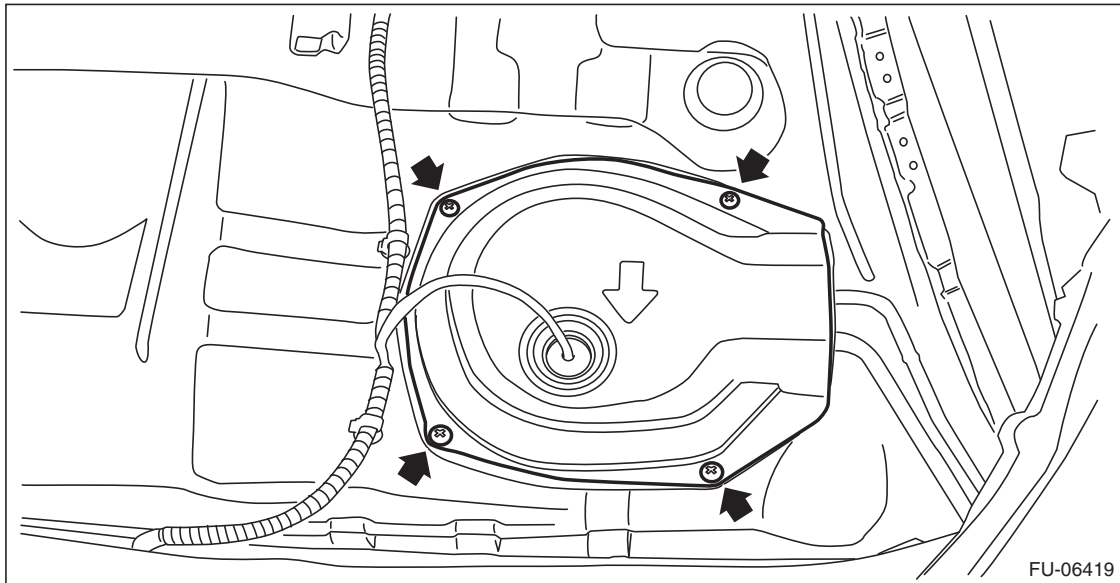
6) Disconnect connectors from the fuel pump, and move aside the service hole cover.



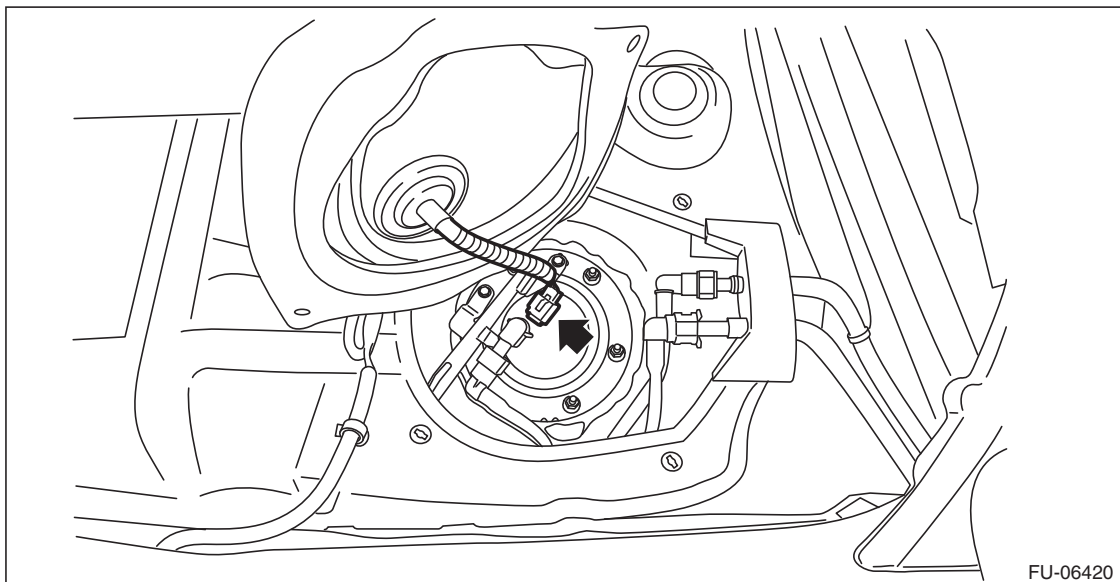
Fuel Tank

FUEL INJECTION (FUEL SYSTEMS)

- 7) Remove the service hole cover of fuel sub level sensor.



- 8) Disconnect the connector from the fuel sub level sensor, and move aside the service hole cover.



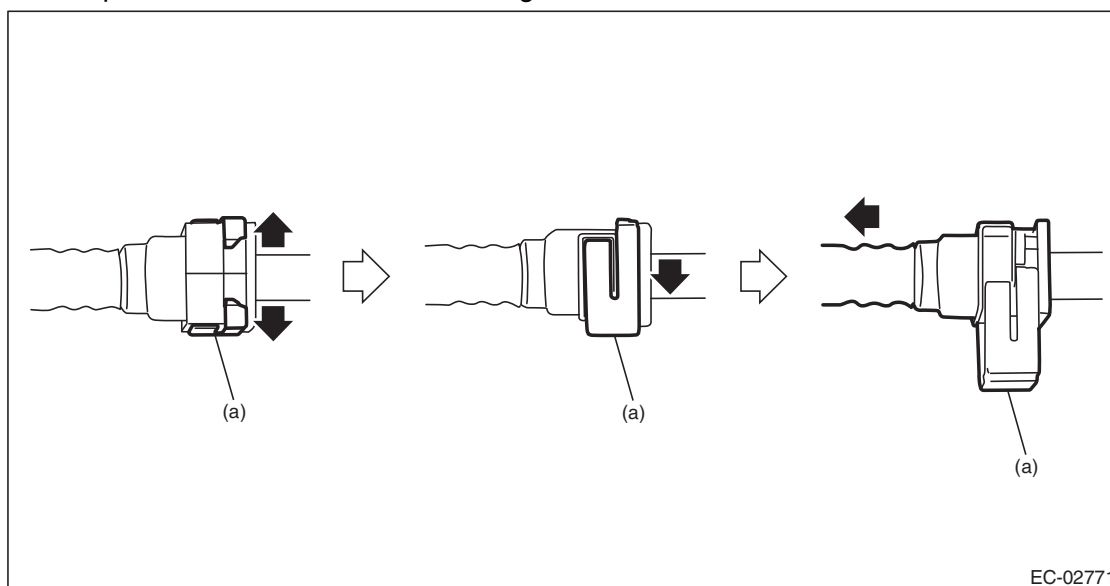
Fuel Tank

FUEL INJECTION (FUEL SYSTEMS)

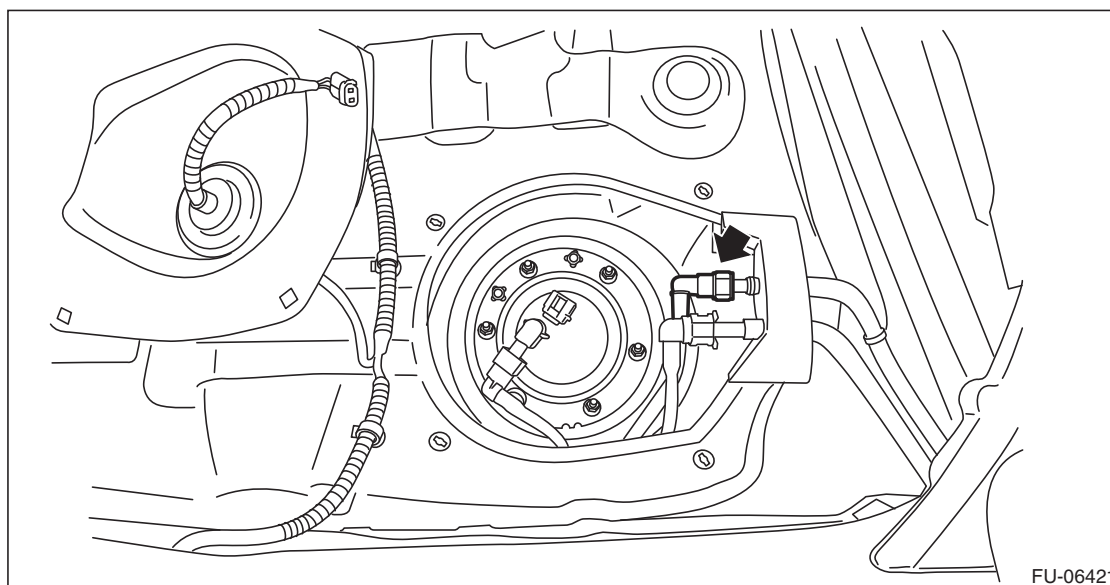
9) Disconnect the quick connector on the fuel delivery tube.

NOTE:

Disconnect the quick connector as shown in the figure.



(a) Slider



10) Lift up the vehicle.

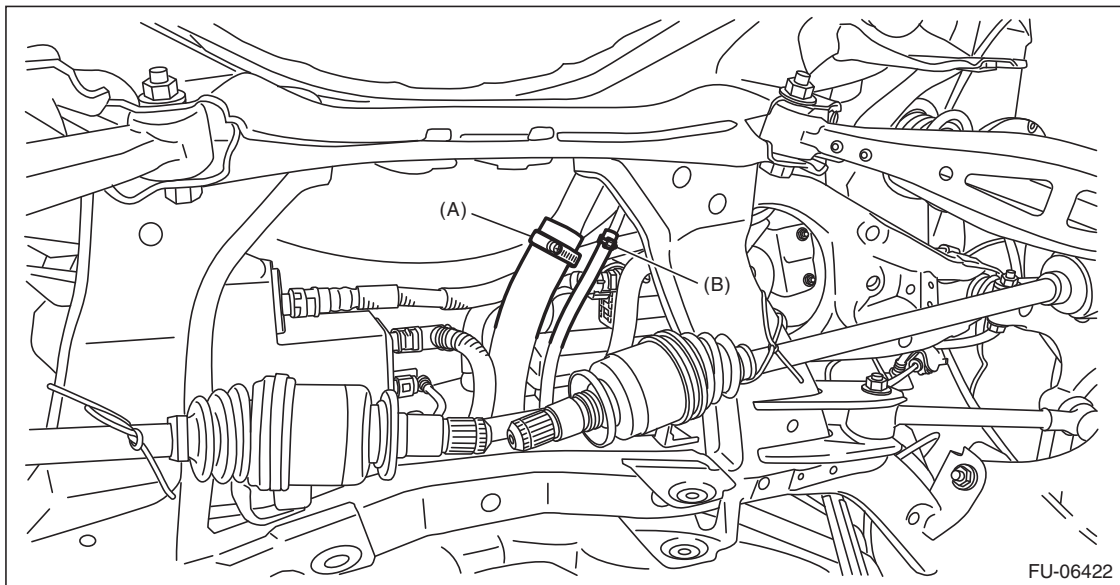
11) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-45, REMOVAL, Rear Exhaust Pipe.>
<Ref. to EX(H4DOTC)-48, REMOVAL, Muffler.>

12) Remove the rear differential. <Ref. to DI-22, REMOVAL, Rear Differential (T-type).>

Fuel Tank

FUEL INJECTION (FUEL SYSTEMS)

- 13) Disconnect fuel filler hose (A) and air vent hose (B) from the fuel filler pipe assembly.



FU-06422



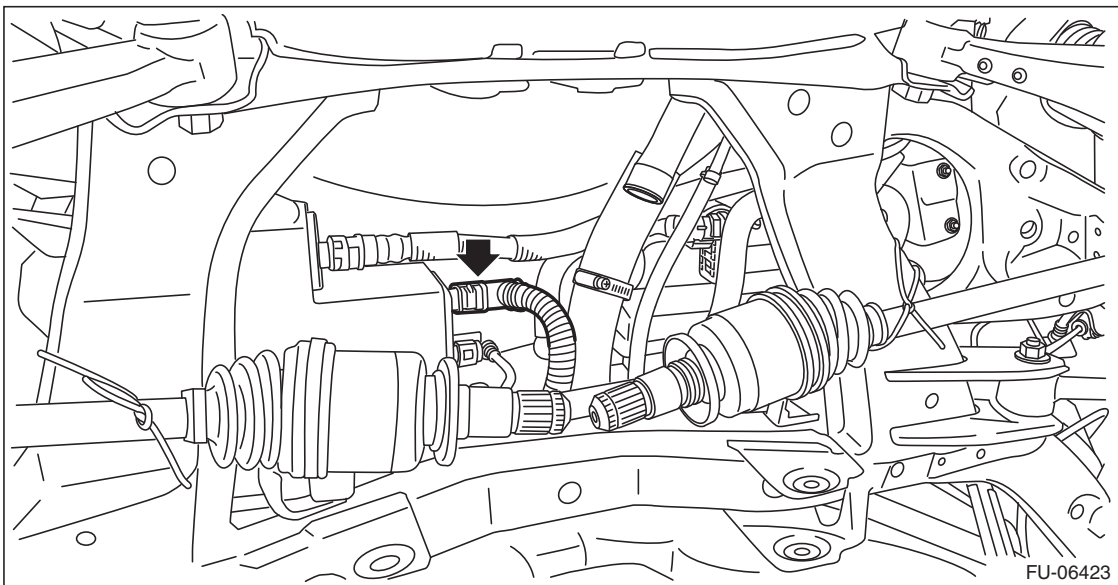
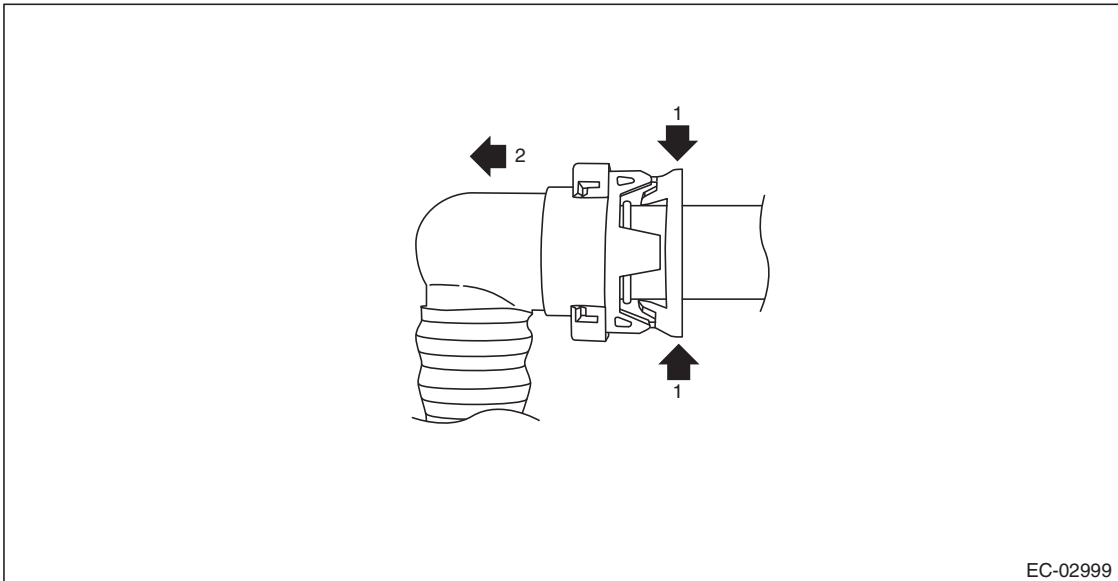
Fuel Tank

FUEL INJECTION (FUEL SYSTEMS)

14) Disconnect the vent tube from canister.

NOTE:

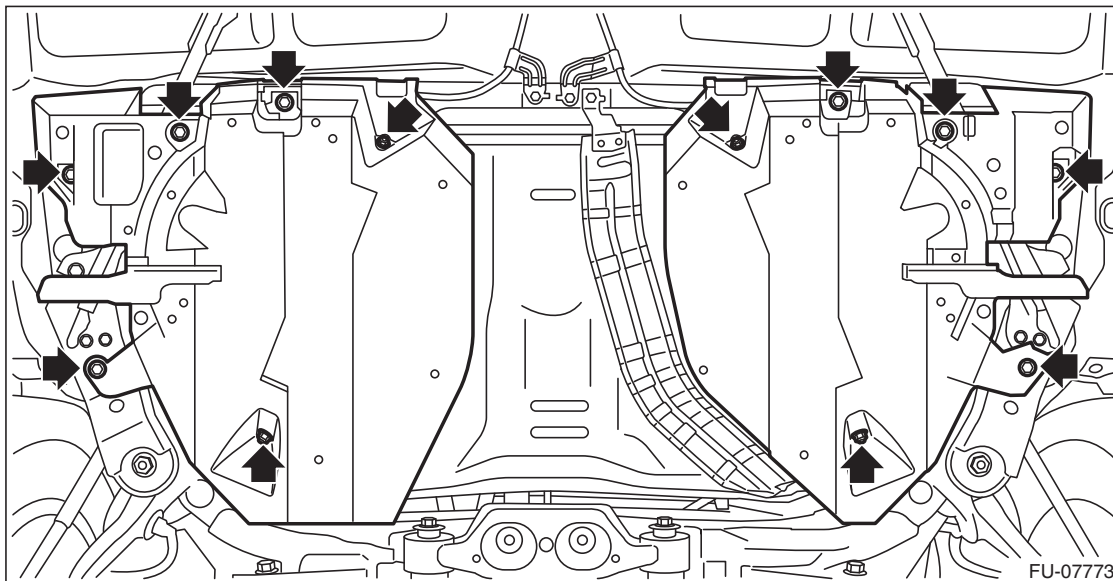
Disconnect the quick connector as shown in the figure.



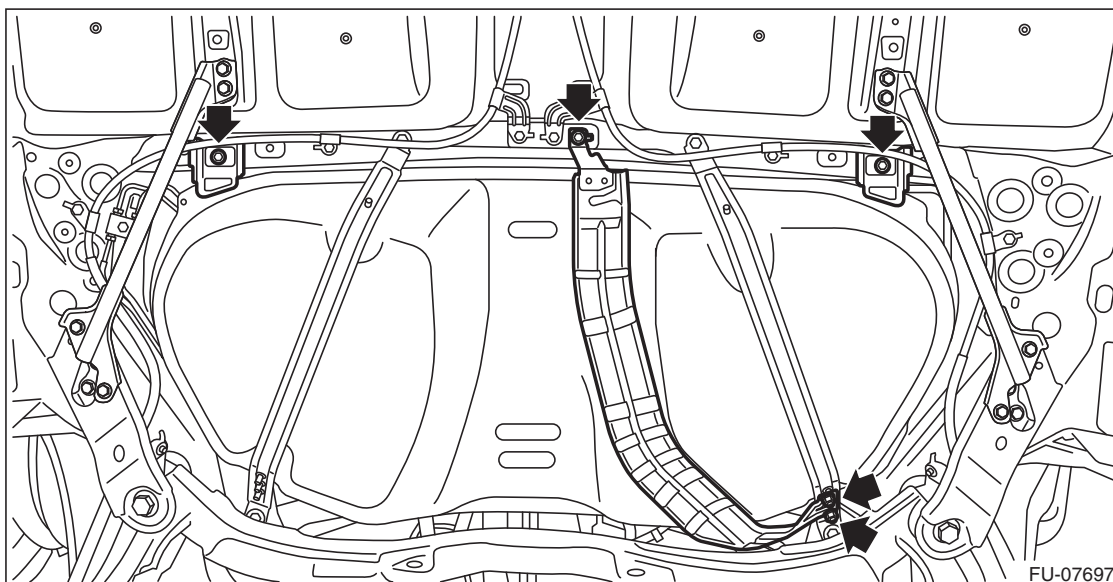
Fuel Tank

FUEL INJECTION (FUEL SYSTEMS)

15) Remove the fuel tank protector.



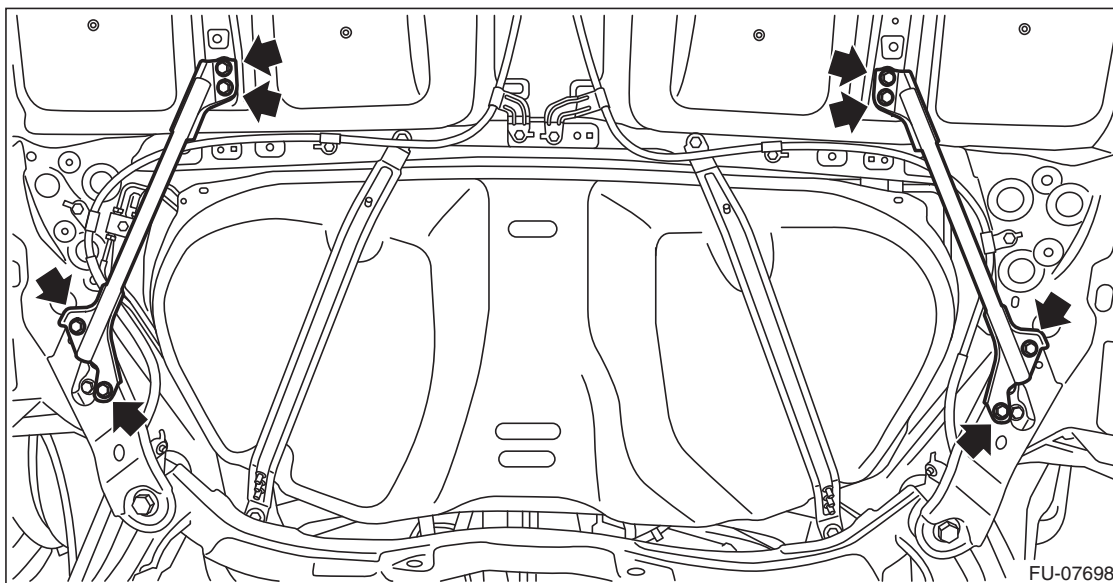
16) Remove the heat shield cover and stopper.



Fuel Tank

FUEL INJECTION (FUEL SYSTEMS)

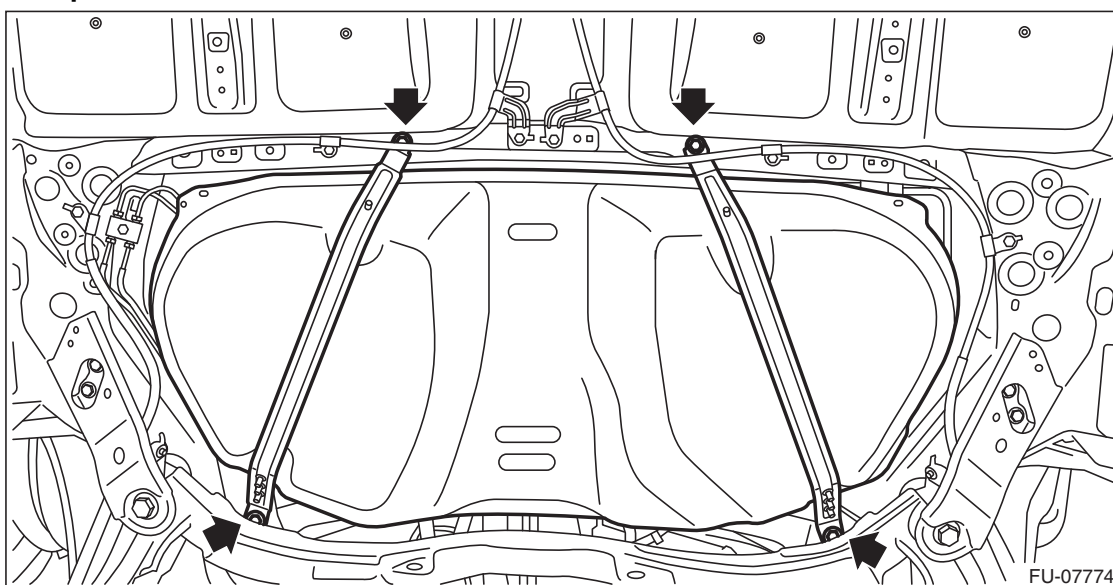
17) Remove the stay - rear frame COMPL.



18) Support the fuel tank with a transmission jack, remove the bolts from the fuel tank band, and remove the fuel tank from the vehicle.

WARNING:

- A helper is required to perform this work.
- Fuel may remain in the fuel tank. This will cause the left and right sides to be unbalanced. Be careful not to drop the fuel tank.



Fuel Tank

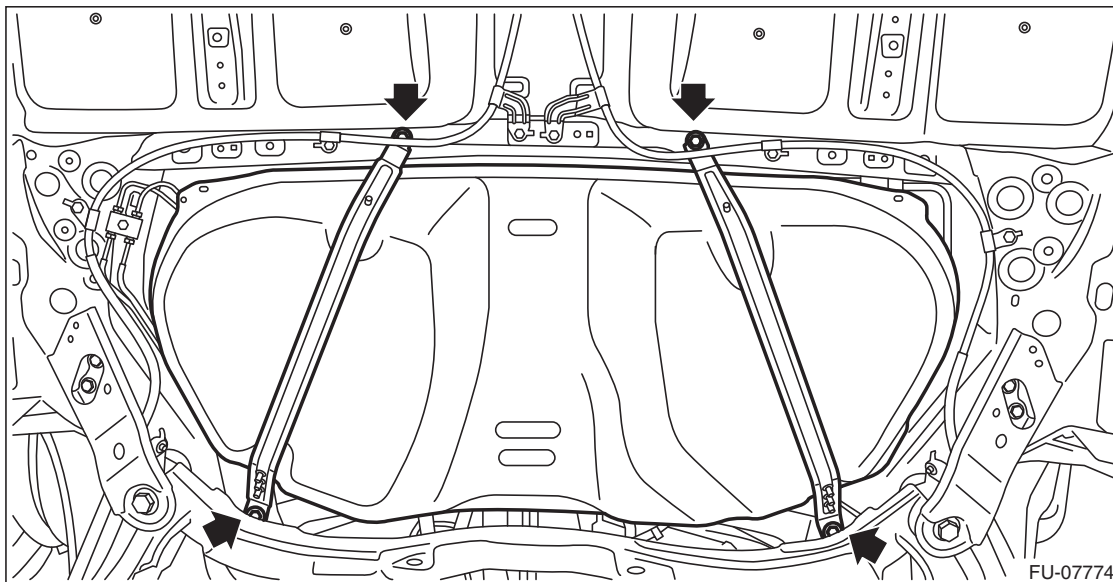
FUEL INJECTION (FUEL SYSTEMS)

B: INSTALLATION

1) Support the fuel tank with a transmission jack, set the fuel tank in place, and temporarily tighten the bolts of the fuel tank band.

WARNING:

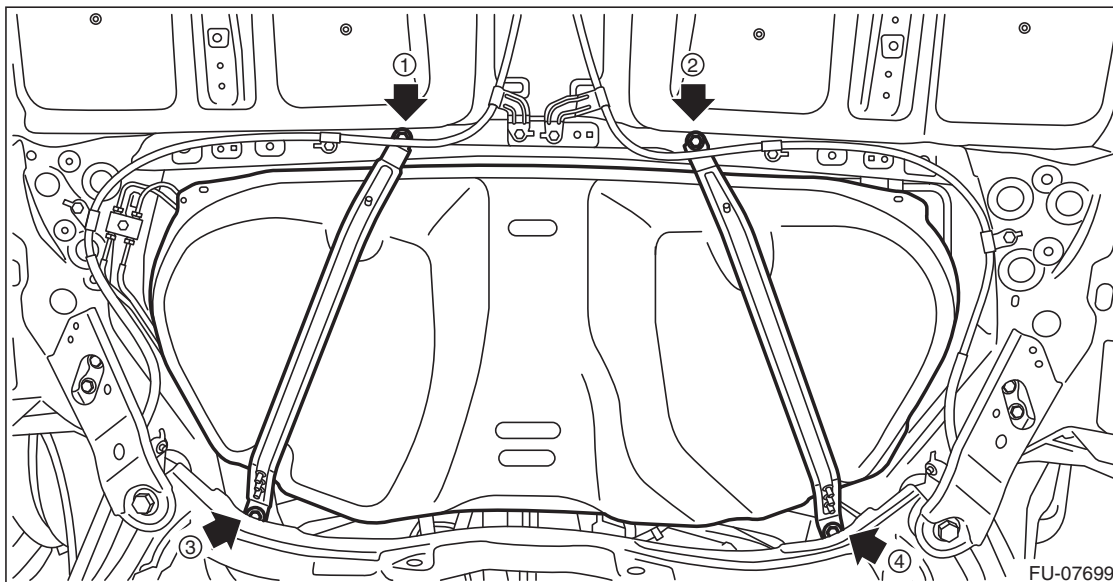
A helper is required to perform this work.



2) Tighten the bolts of the fuel tank band in the order shown in the figure.

Tightening torque:

33 N·m (3.4 kgf-m, 24.3 ft-lb)



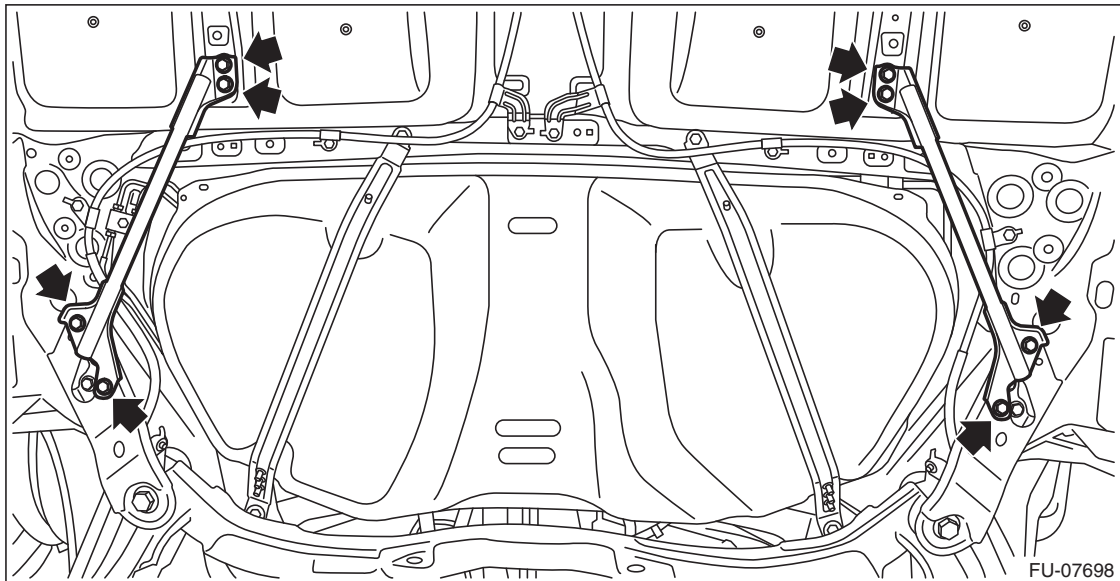
Fuel Tank

FUEL INJECTION (FUEL SYSTEMS)

3) Install the stay - rear frame COMPL.

Tightening torque:

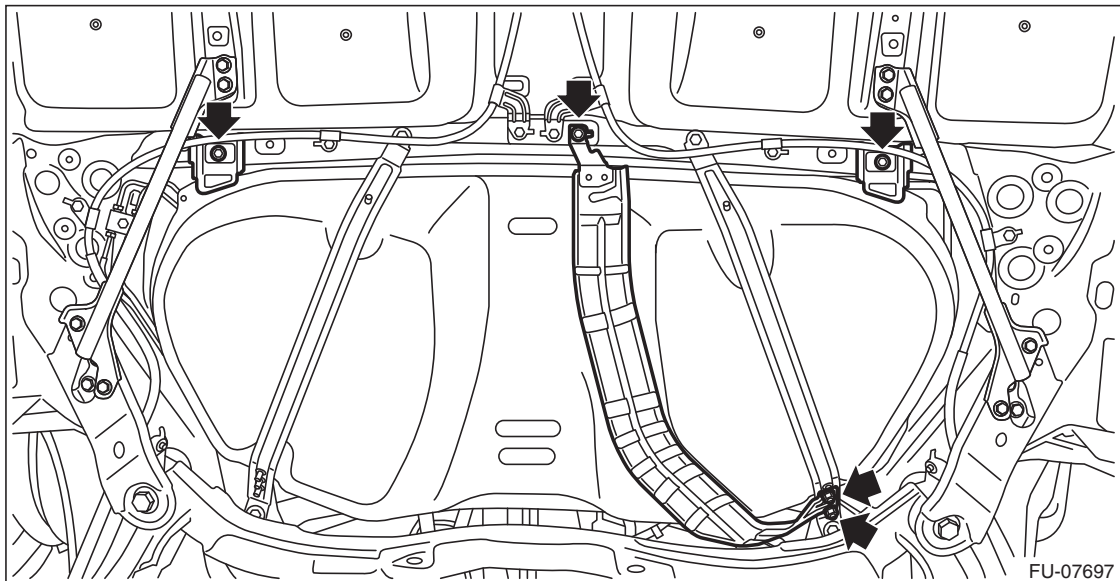
33 N·m (3.4 kgf-m, 24.3 ft-lb)



4) Install the heat shield cover and stopper.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



Fuel Tank

FUEL INJECTION (FUEL SYSTEMS)

5) Install the fuel tank protector.

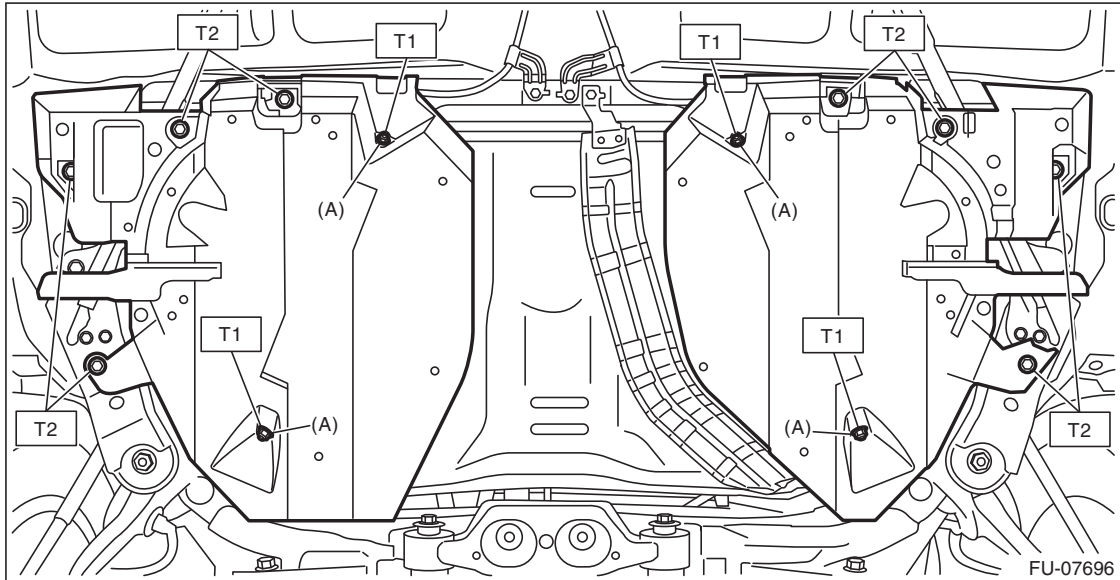
NOTE:

Use a new self-locking nut.

Tightening torque:

T1: 9 N·m (0.9 kgf-m, 6.6 ft-lb)

T2: 18 N·m (1.8 kgf-m, 13.3 ft-lb)



(A) Self-locking nut

Fuel Tank

FUEL INJECTION (FUEL SYSTEMS)

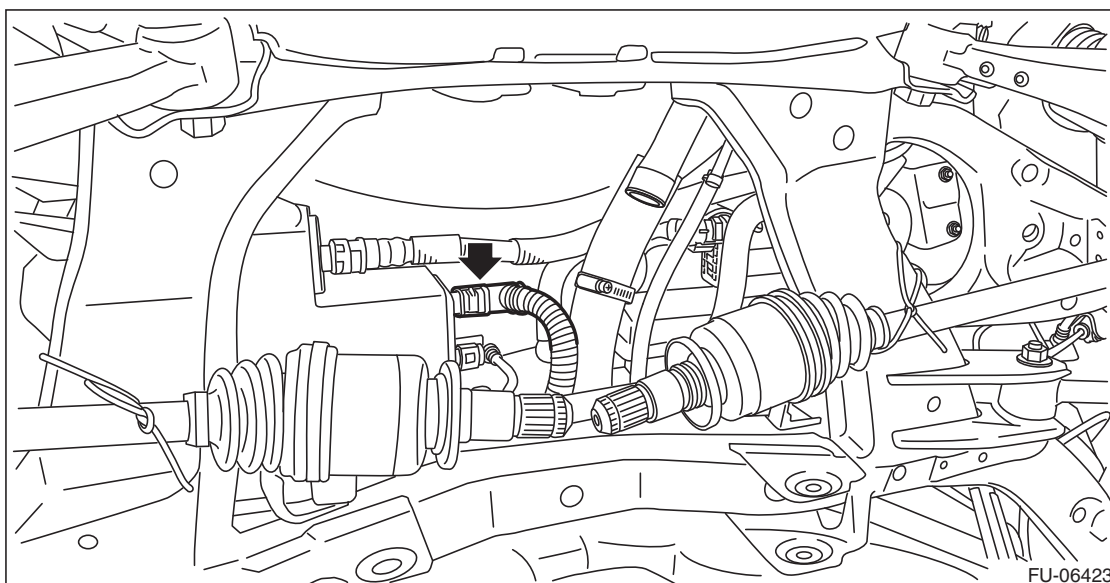
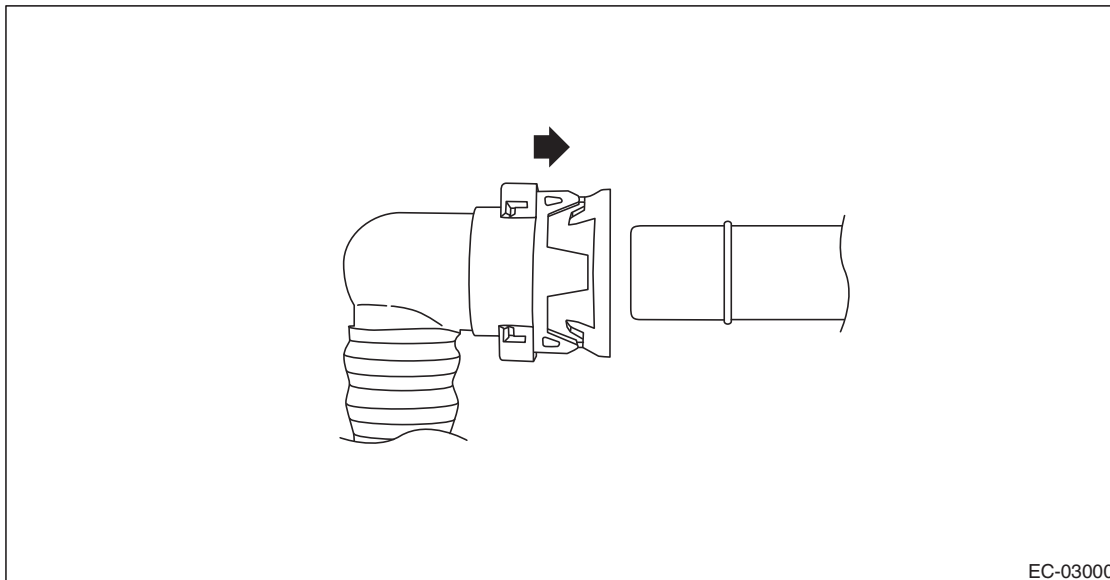
6) Connect the vent tube to the canister.

CAUTION:

- Check that there is no damage or dust on the quick connector. If necessary, clean the seal surface of the pipe.
- Make sure that the quick connector is securely connected.

NOTE:

Connect the quick connector as shown in the figure.



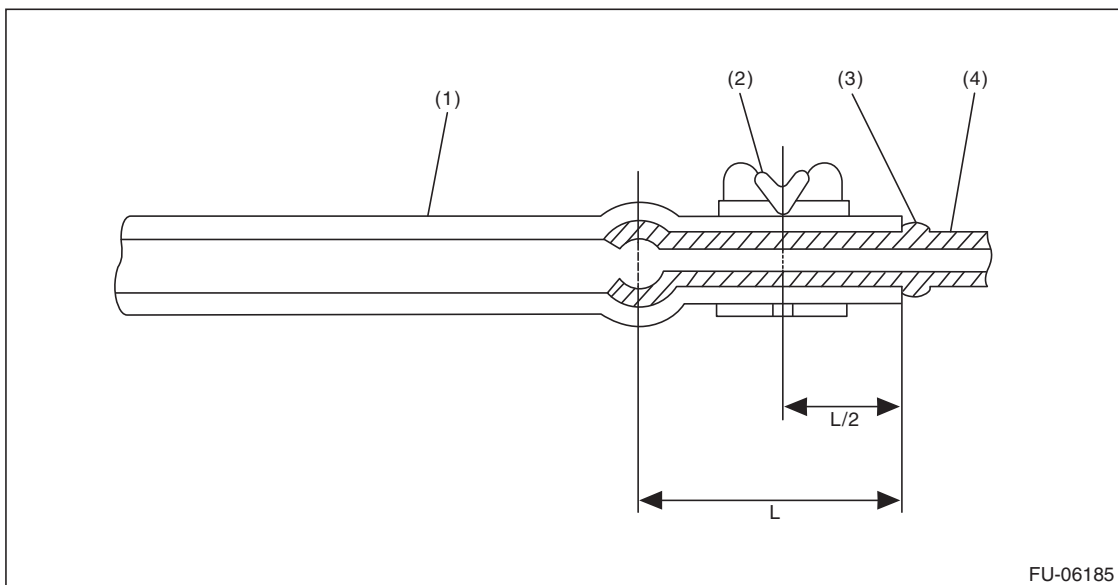
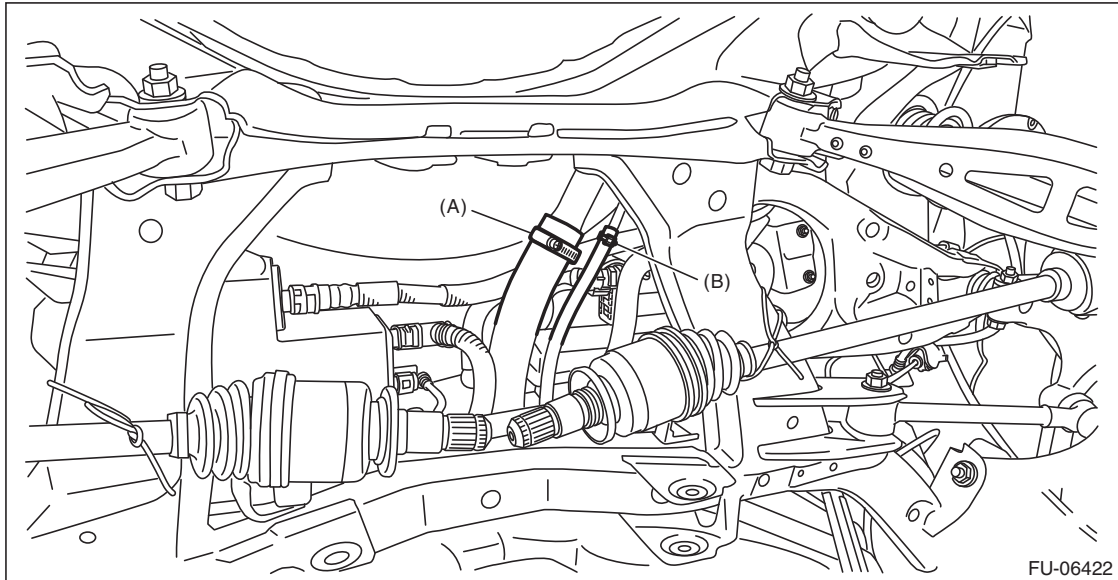
Fuel Tank

FUEL INJECTION (FUEL SYSTEMS)

7) Securely insert the fuel filler hose (A) and evaporation hose (B) until the hose end contacts the spool, then attach the clamp or clip as shown in the figure.

Tightening torque:

2.5 N·m (0.3 kgf-m, 1.8 ft-lb)



- | | | |
|-------------------|-----------|----------|
| (1) Hose | (3) Spool | (4) Pipe |
| (2) Clamp or clip | | |

8) Install the rear differential. <Ref. to DI-24, INSTALLATION, Rear Differential (T-type).>

Fuel Tank

FUEL INJECTION (FUEL SYSTEMS)

9) Install the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-46, INSTALLATION, Rear Exhaust Pipe.>
<Ref. to EX(H4DOTC)-50, INSTALLATION, Muffler.>

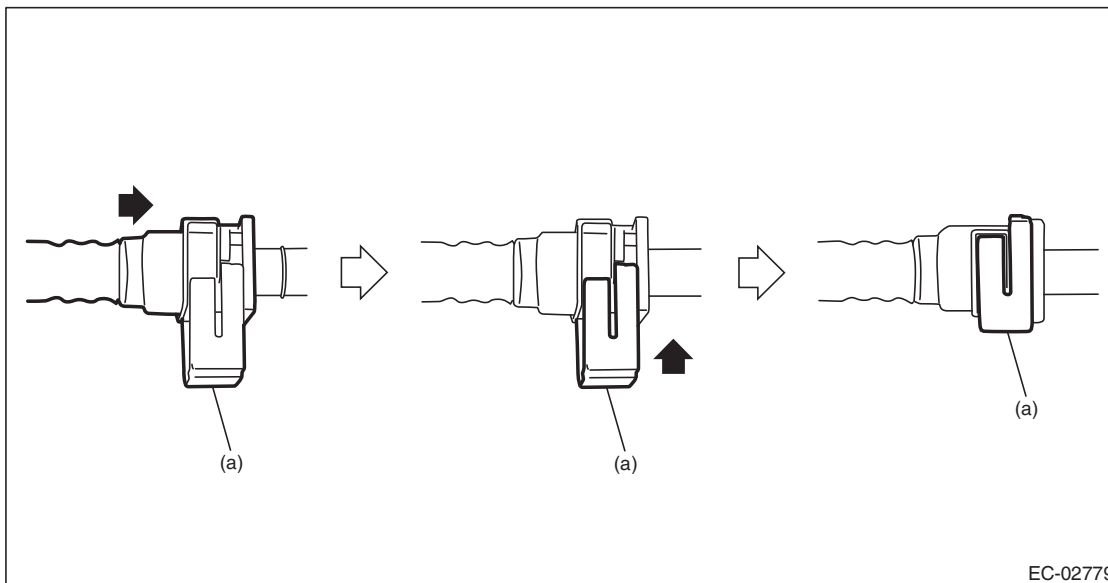
10) Connect the quick connector of the fuel delivery tube.

CAUTION:

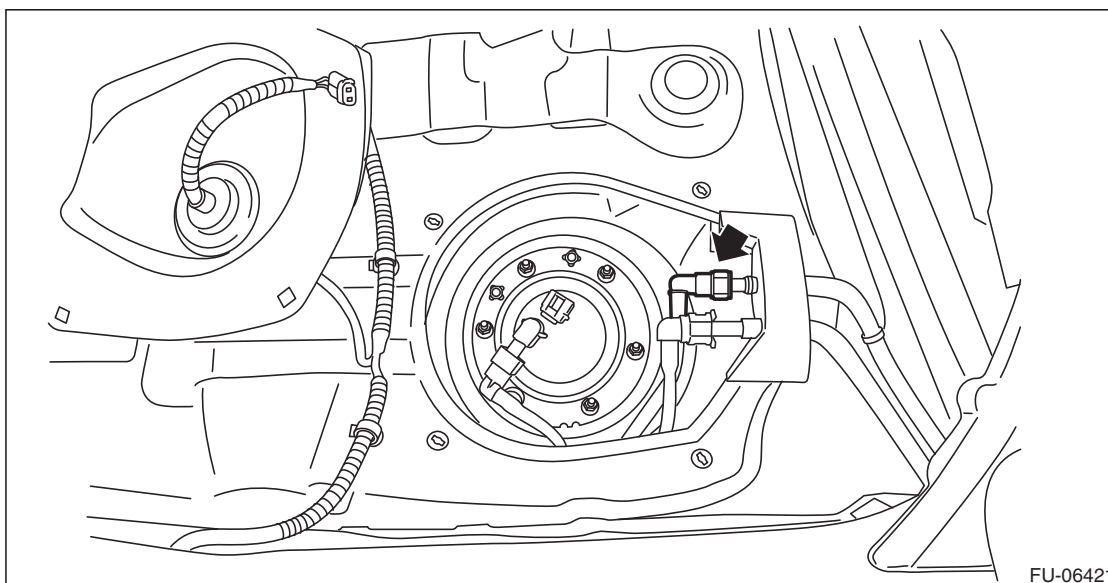
- Check that there is no damage or dust on the quick connector. If necessary, clean the seal surface of the pipe.
- When connecting the quick connector, make sure to insert the pipe all the way in before locking the slider.
- When it is difficult to lock the slider, check that the pipe is fully inserted.
- Make sure that the quick connector is securely connected.

NOTE:

Connect the quick connector as shown in the figure.



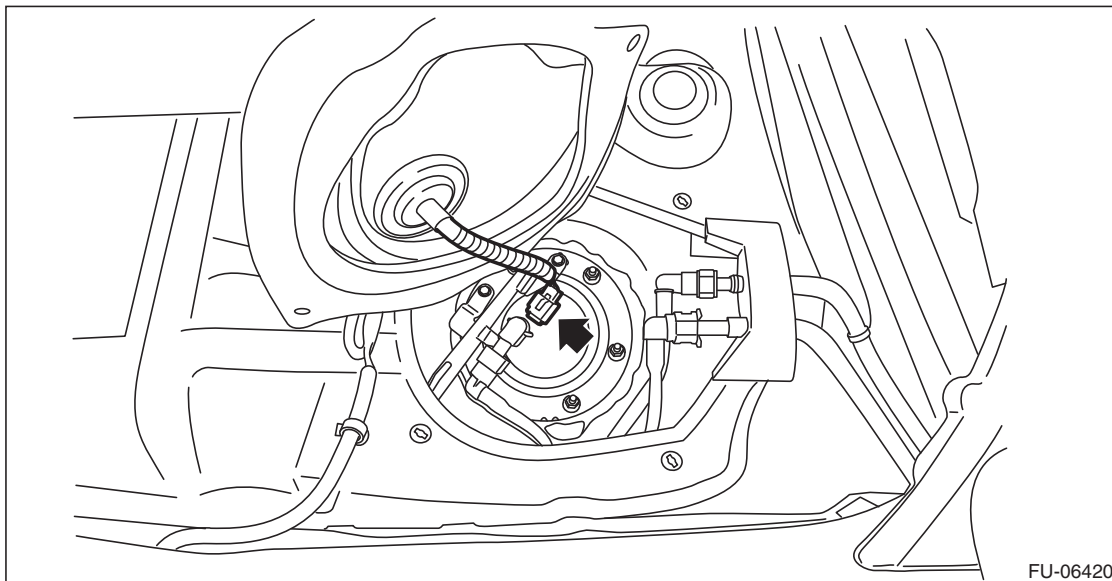
(a) Slider



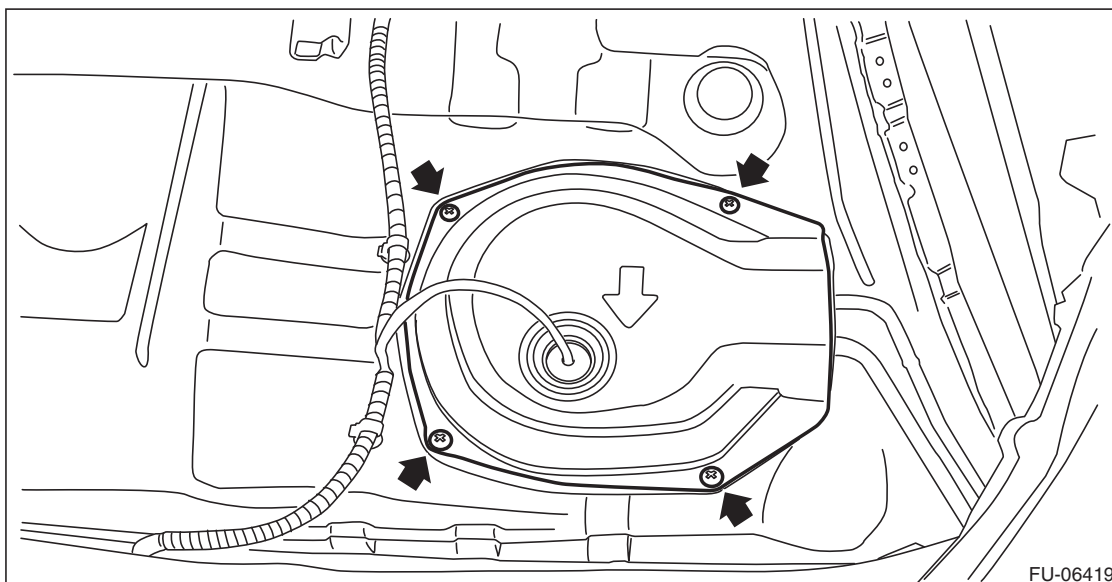
Fuel Tank

FUEL INJECTION (FUEL SYSTEMS)

- 11) Connect the connector to the fuel sub level sensor.



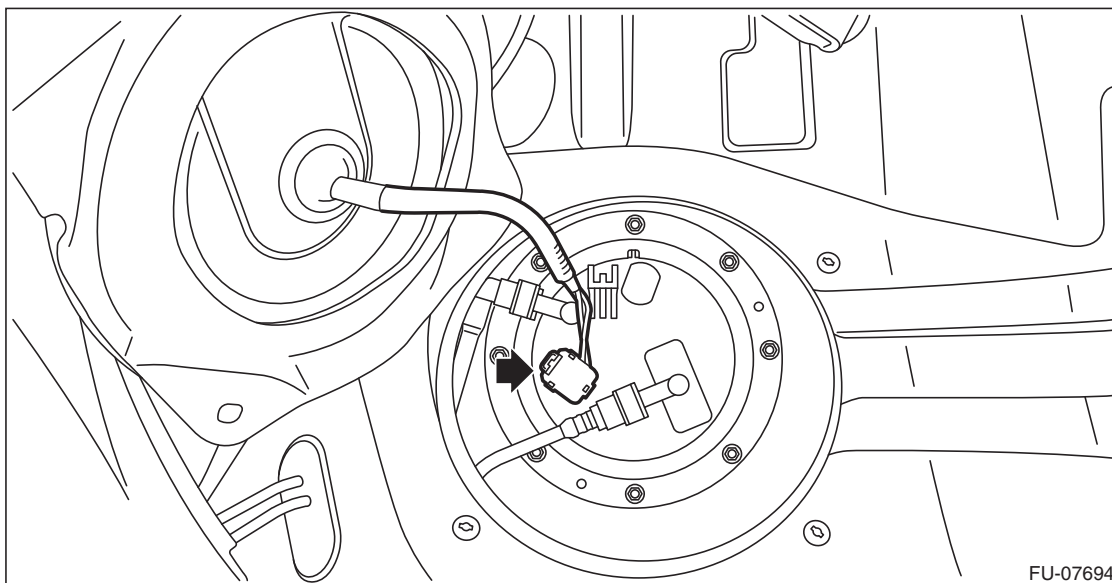
- 12) Install the service hole cover of fuel sub level sensor.



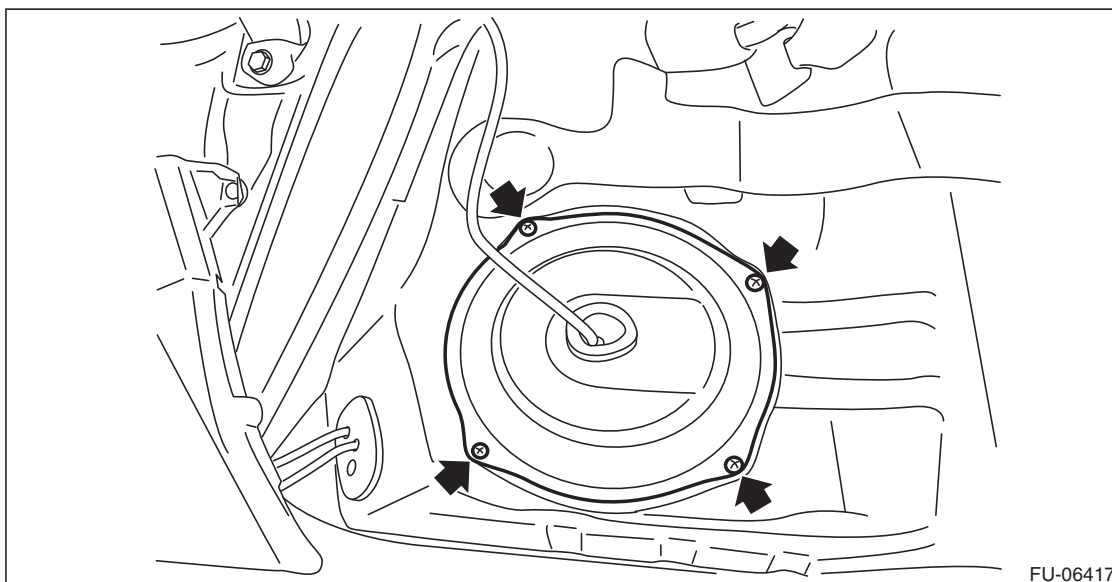
Fuel Tank

FUEL INJECTION (FUEL SYSTEMS)

13) Connect the connector to the fuel pump.



14) Install the service hole cover of fuel pump.



15) Install the rear seat cushion. <Ref. to SE-35, INSTALLATION, Rear Seat.>

16) Connect the battery ground terminal.

C: INSPECTION

- 1) Check that the fuel tank and fuel pipe have no deformation, cracks and other damages.
- 2) Check that the fuel hose has no cracks, damage or loose part.

Fuel Filler Pipe

FUEL INJECTION (FUEL SYSTEMS)

36. Fuel Filler Pipe

A: REMOVAL

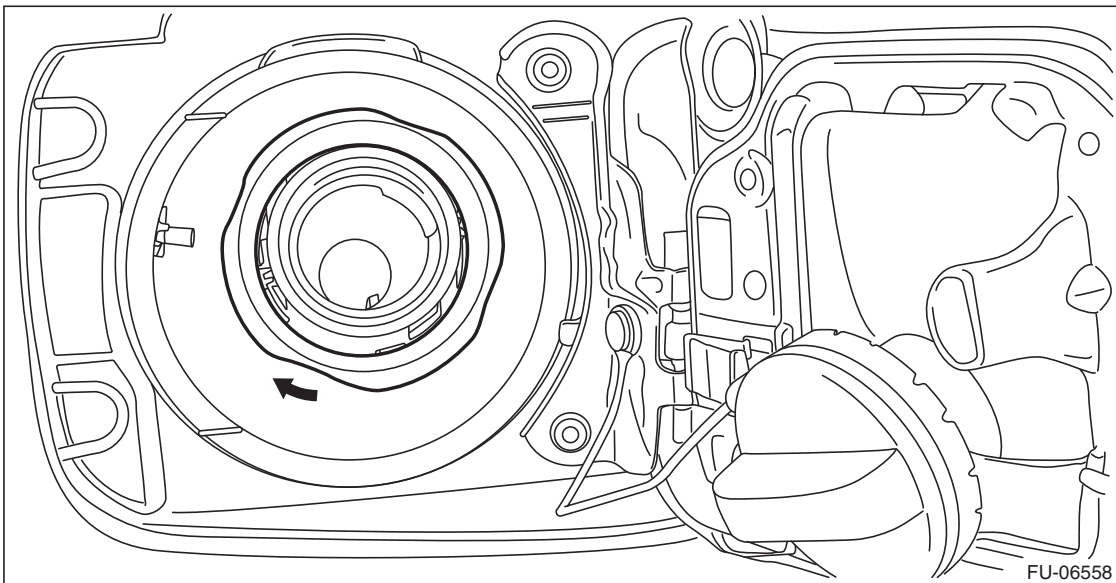
WARNING:

Place "NO OPEN FLAMES" signs near the working area.

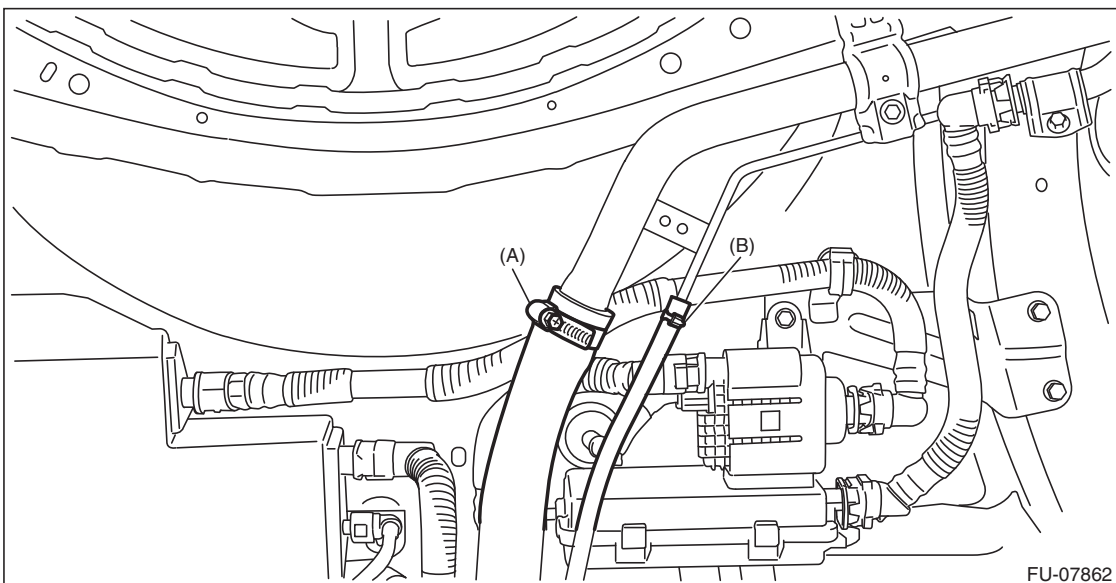
CAUTION:

Be careful not to spill fuel.

- 1) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 2) Drain fuel. <Ref. to FU(H4DOTC)-151, DRAINING FUEL (WITH SUBARU SELECT MONITOR), PROCEDURE, Fuel.>
- 3) Disconnect the ground cable from battery.
- 4) Open the fuel filler lid and remove the fuel filler cap.
- 5) Turn the fuel filler pipe protector in the direction of the arrow to unlock and remove it.



- 6) Remove the rear sub frame assembly. <Ref. to RS-9, REMOVAL, Rear Sub Frame.>
- 7) Remove the rear mud guard RH. <Ref. to EI-23, REMOVAL, Mud Guard.>
- 8) Disconnect fuel filler hose (A) and air vent hose (B) from the fuel filler pipe assembly.



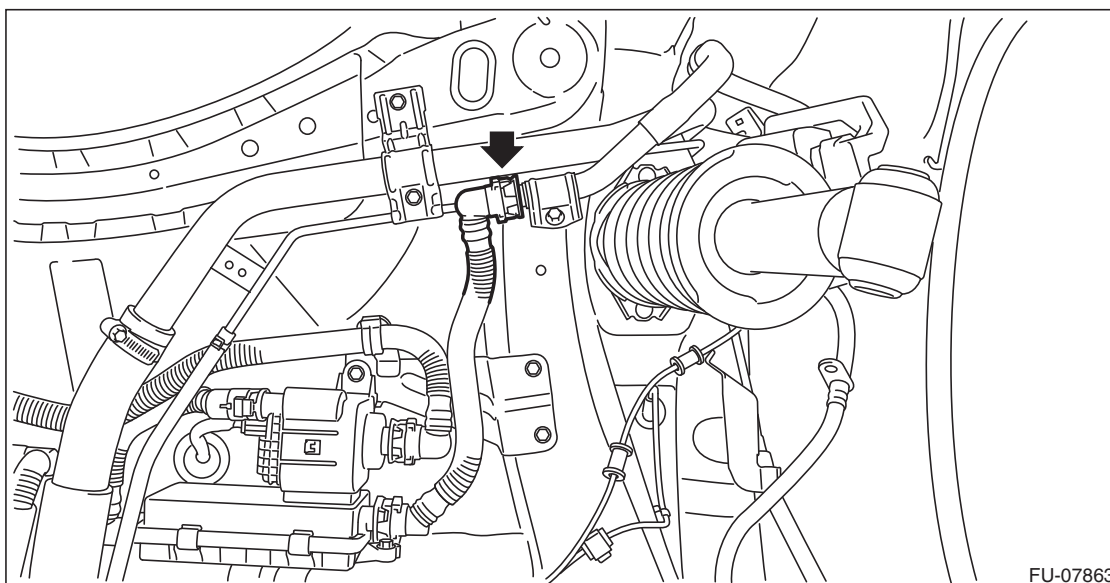
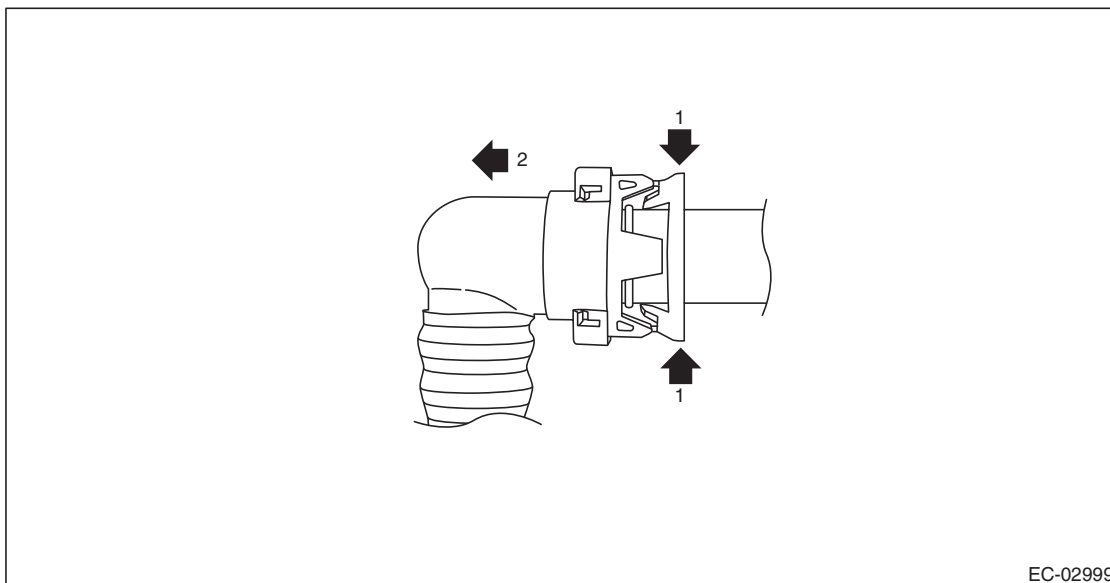
Fuel Filler Pipe

FUEL INJECTION (FUEL SYSTEMS)

9) Disconnect the quick connectors for the drain pipe from the fuel filler pipe assembly.

NOTE:

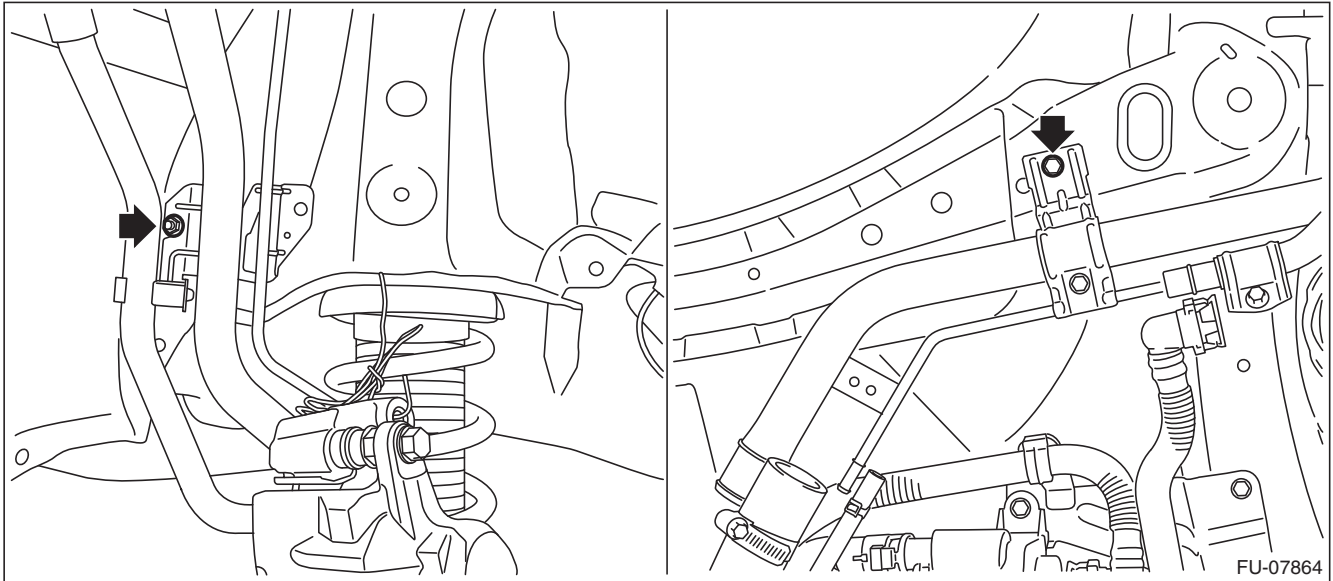
Disconnect the quick connector as shown in the figure.



Fuel Filler Pipe

FUEL INJECTION (FUEL SYSTEMS)

10) Remove the bolts and nuts which secure the fuel filler pipe assembly to the vehicle.



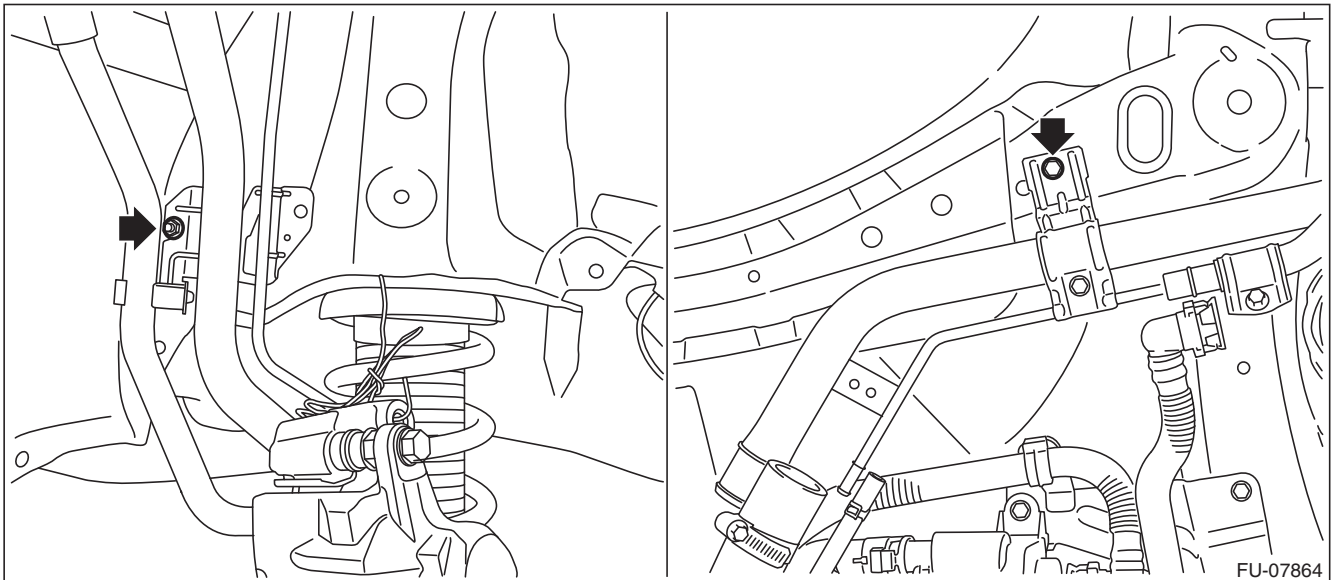
11) Remove the fuel filler pipe assembly from the underside of the vehicle.

B: INSTALLATION

- 1) Open the fuel filler lid.
- 2) Insert the fuel filler pipe assembly into the rubber saucer from inside of the rear fender.
- 3) Install the fuel filler pipe assembly to the vehicle.

Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



Fuel Filler Pipe

FUEL INJECTION (FUEL SYSTEMS)

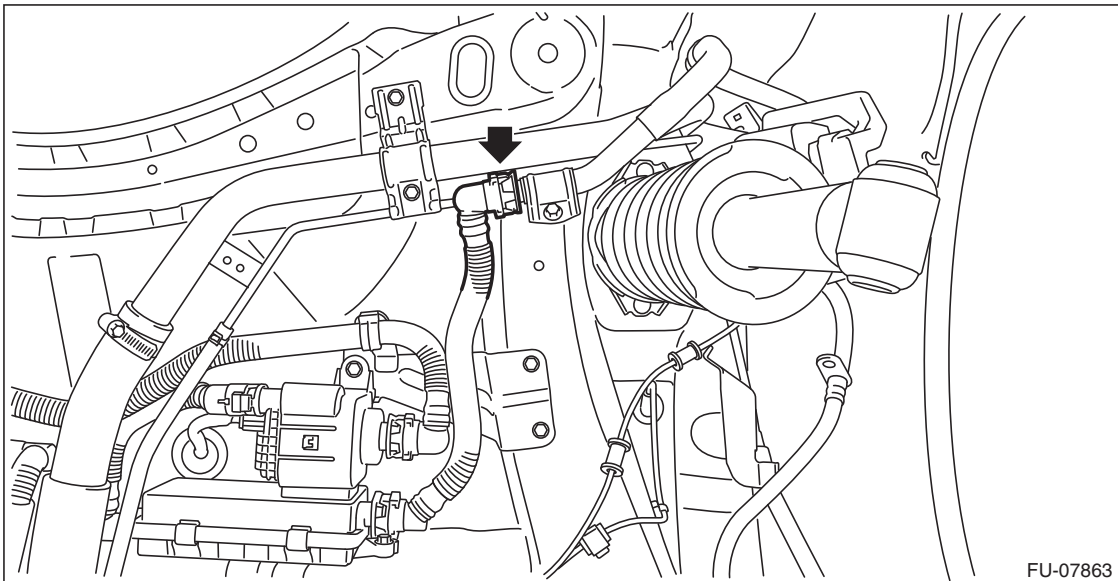
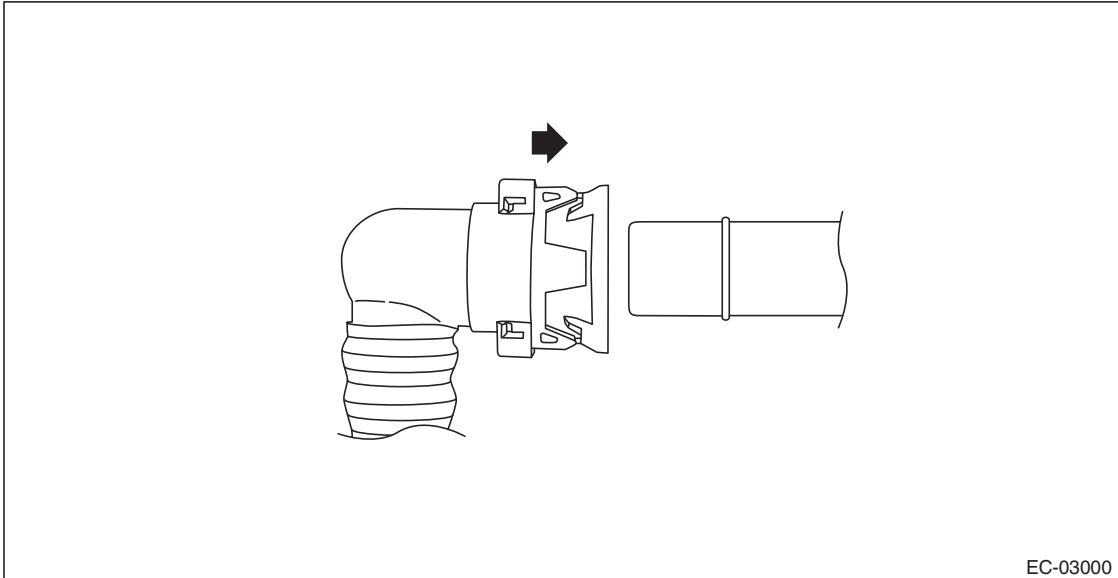
4) Connect the quick connector for drain pipe to the fuel filler pipe assembly.

CAUTION:

- Check that there is no damage or dust on the quick connector. If necessary, clean the seal surface of the pipe.
- Make sure that the quick connector is securely connected.

NOTE:

Connect the quick connector as shown in the figure.



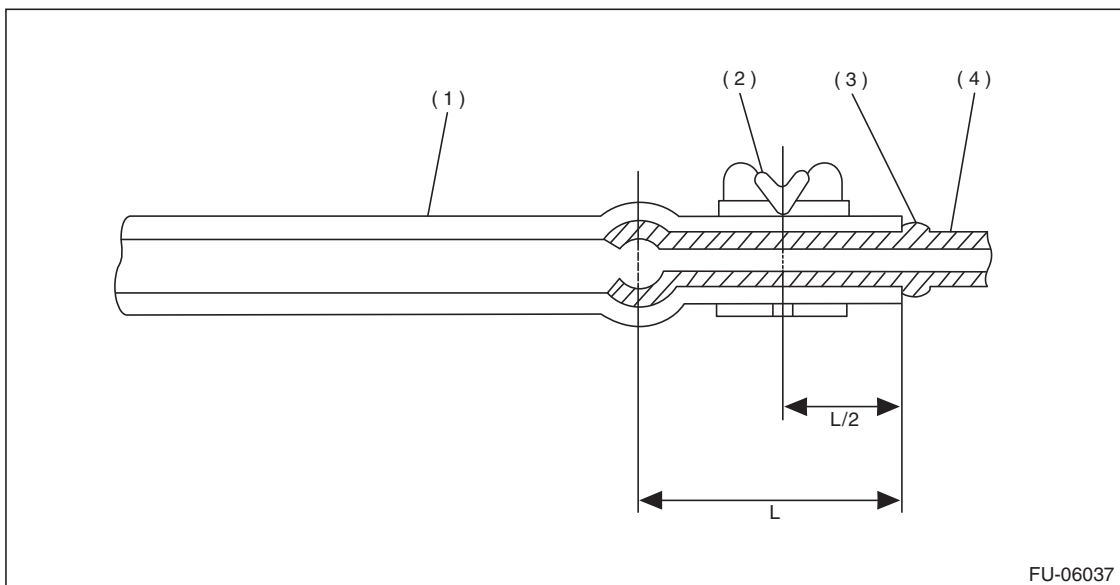
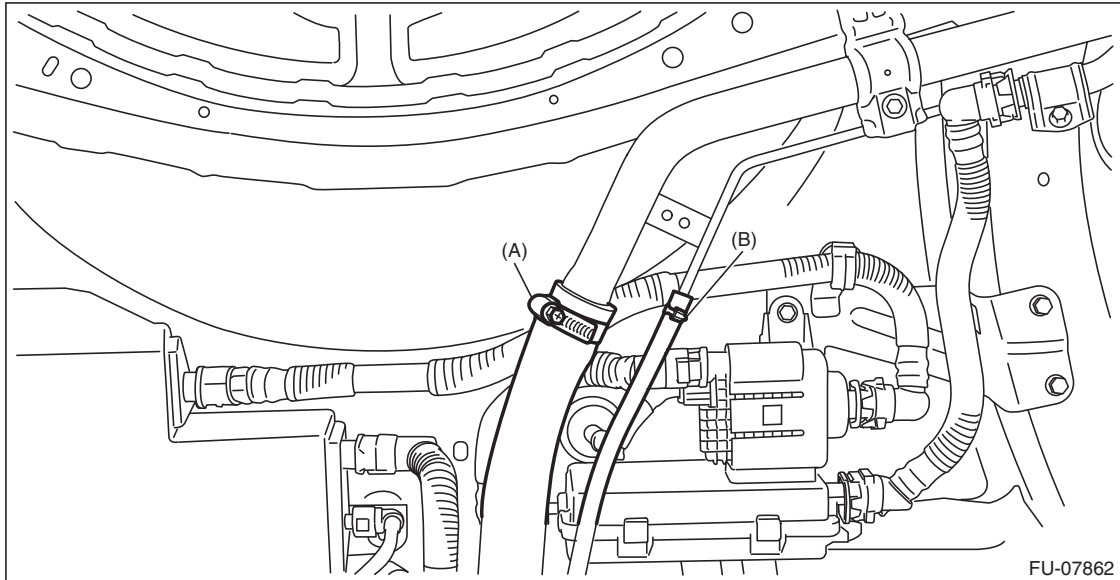
Fuel Filler Pipe

FUEL INJECTION (FUEL SYSTEMS)

5) Securely insert the fuel filler hose (A) and air vent hose (B) to the spool, then install the clamp or clip as shown in the figure.

Tightening torque:

2.5 N·m (0.3 kgf-m, 1.8 ft-lb)



- (1) Hose (2) Clamp or clip (3) Spool (4) Pipe

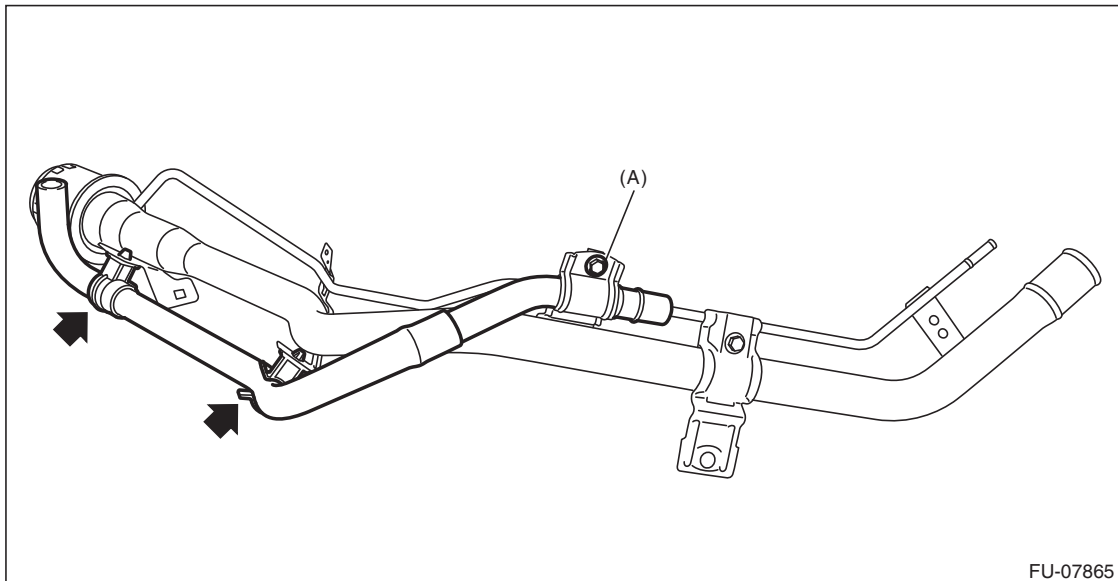
6) Install the rear mud guard RH. <Ref. to EI-23, INSTALLATION, Mud Guard.>
7) Install the rear sub frame assembly. <Ref. to RS-14, INSTALLATION, Rear Sub Frame.>
8) Connect the battery ground terminal.
9) Inspect the wheel alignment and adjust if necessary. <Ref. to FS-7, Wheel Alignment.>
10) Perform reinitialization of the auto headlight beam leveler system. (Model with auto headlight beam leveler) <Ref. to LI-16, PROCEDURE, Auto Headlight Beam Leveler System.>
11) Adjust the steering angle sensor. <Ref. to VDC-23, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

Fuel Filler Pipe

FUEL INJECTION (FUEL SYSTEMS)

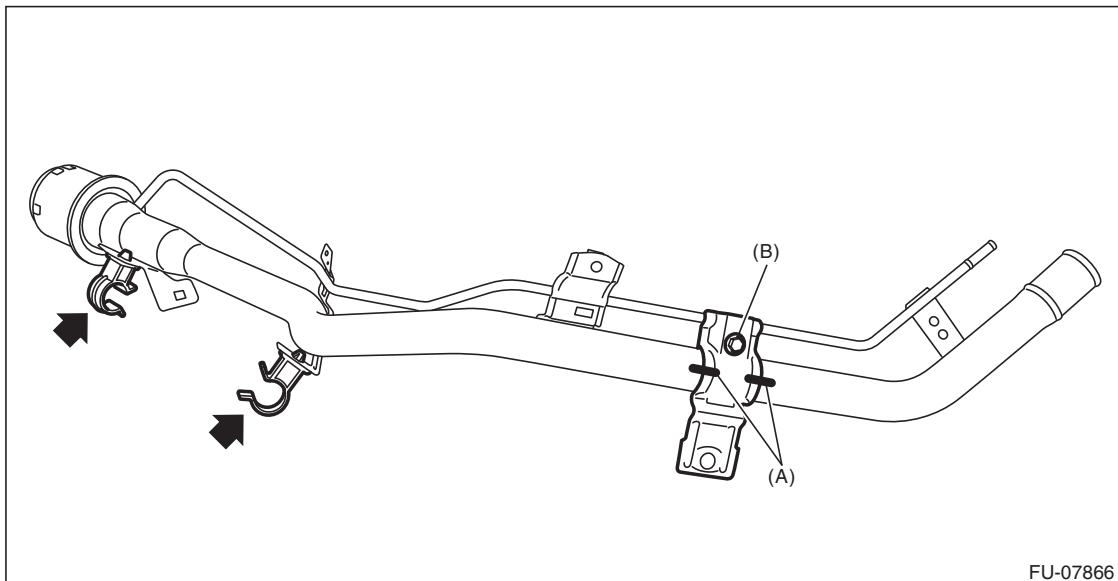
C: DISASSEMBLY

1) Remove the bracket bolt (A) securing the drain pipe, and remove the drain hose from the clip for the fuel filler pipe.



2) Using a marker pen, make alignment marks (A) on the fuel filler pipe and the bracket.

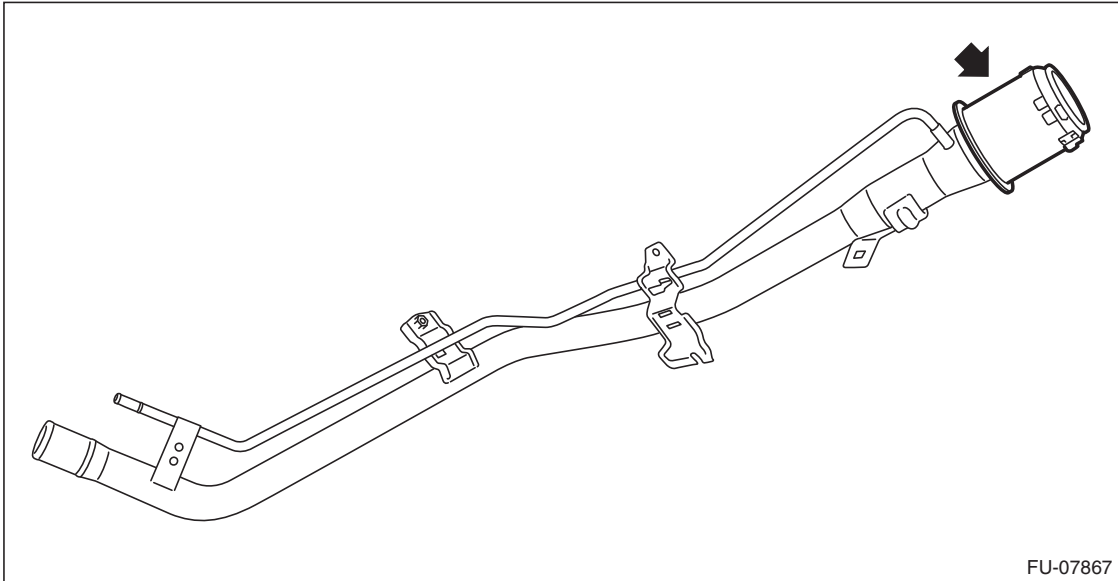
3) Remove the bracket bolt (B) securing the fuel filler pipe, and remove the clip from the fuel filler pipe.



Fuel Filler Pipe

FUEL INJECTION (FUEL SYSTEMS)

4) Remove the neck holder from the fuel filler pipe.



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D: ASSEMBLY

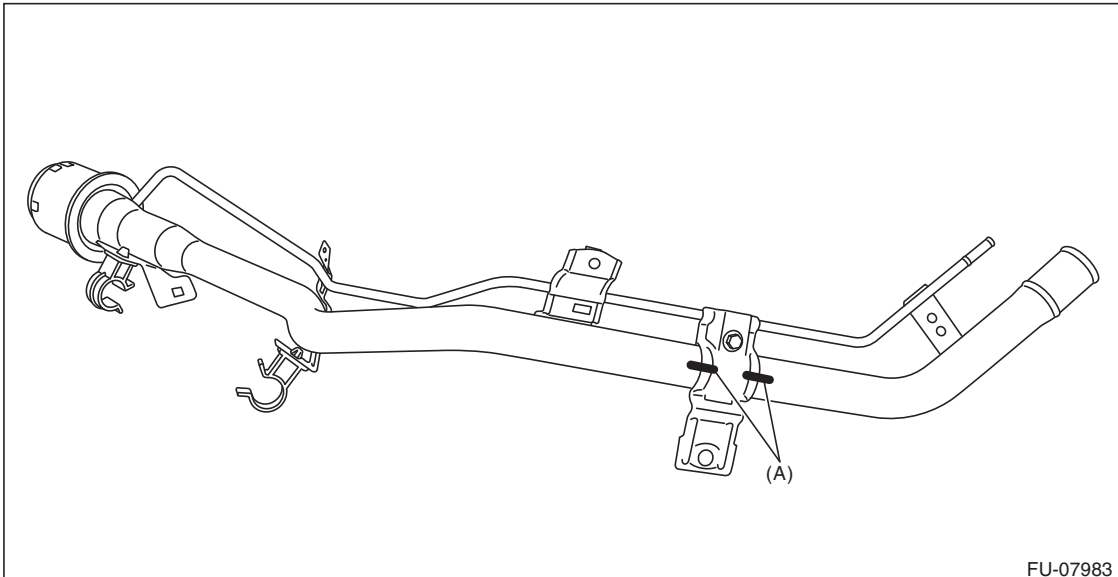
Assemble in the reverse order of disassembly.

NOTE:

- Use a new neck holder.
- Install the bracket to the fuel filler pipe by aligning the alignment marks (A).

Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



FU-07983

E: INSPECTION

- 1) Check that the fuel filler pipe assembly has no deformation, cracks or other damages.
- 2) Check that the fuel hose has no cracks, damage or loose part.

Fuel Pump

FUEL INJECTION (FUEL SYSTEMS)

37. Fuel Pump

A: REMOVAL

WARNING:

Place "NO OPEN FLAMES" signs near the working area.

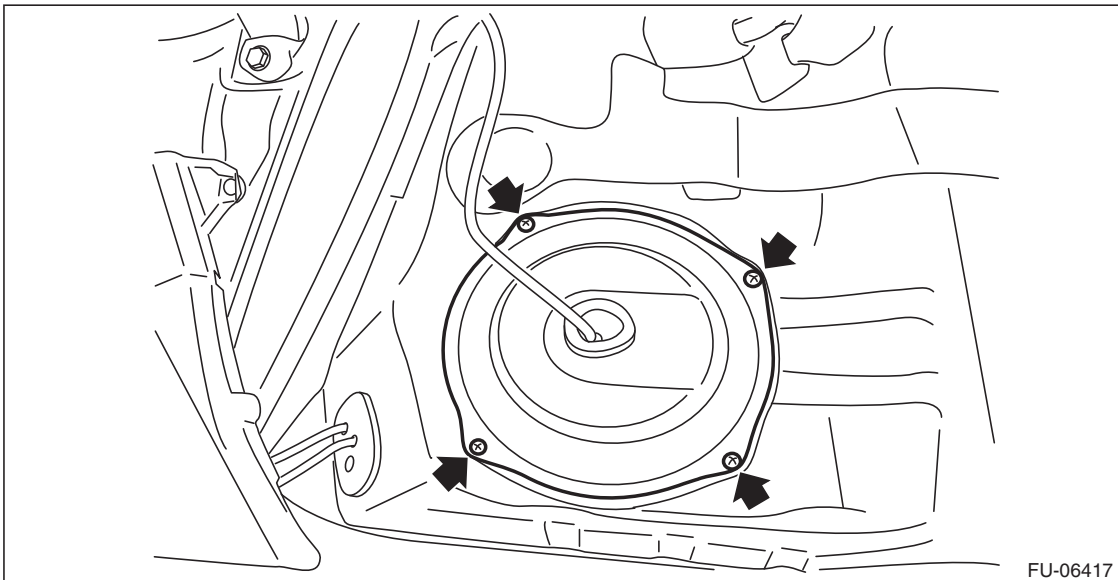
CAUTION:

- Be careful not to spill fuel.
- Catch the fuel from the tubes using a container or cloth.
- If the fuel gauge indicates that two thirds or more of the fuel is remaining, be sure to drain fuel before starting work to avoid the fuel to spill.

NOTE:

Fuel pump assembly consists of fuel pump, fuel filter and fuel level sensor.

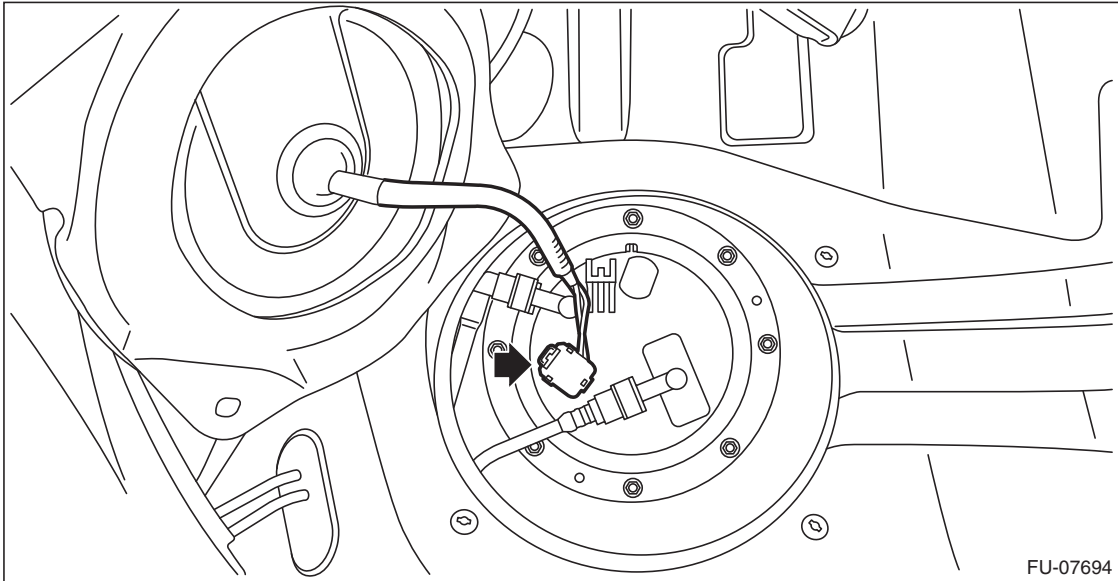
- 1) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 2) Drain fuel. <Ref. to FU(H4DOTC)-151, DRAINING FUEL (WITH SUBARU SELECT MONITOR), PROCEDURE, Fuel.>
- 3) Disconnect the ground cable from battery.
- 4) Remove the rear seat cushion. <Ref. to SE-32, REMOVAL, Rear Seat.>
- 5) Remove the service hole cover of fuel pump.



Fuel Pump

FUEL INJECTION (FUEL SYSTEMS)

- 6) Disconnect connectors from the fuel pump, and move aside the service hole cover.



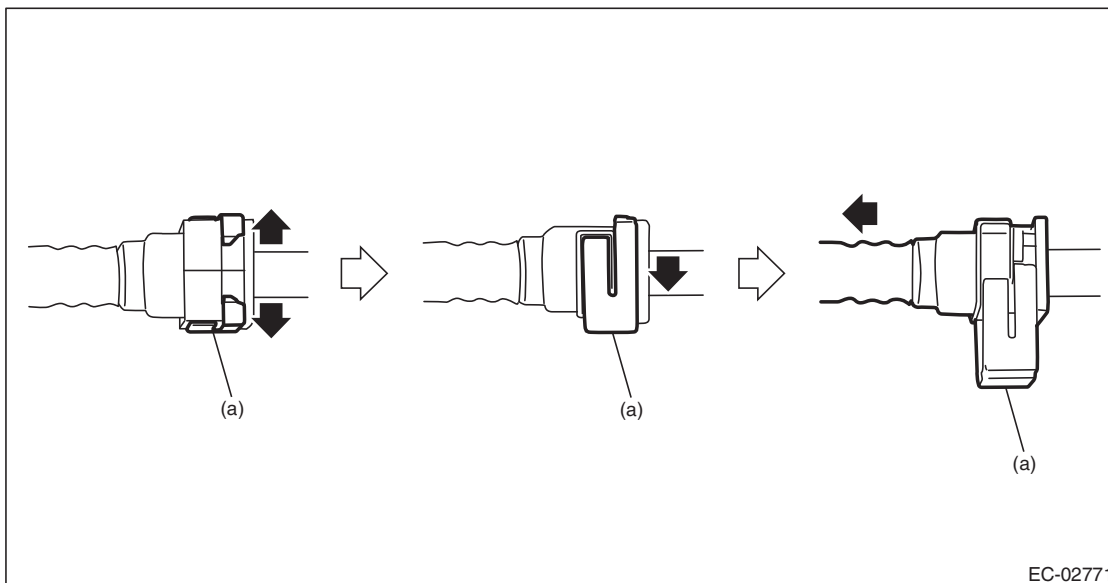
Fuel Pump

FUEL INJECTION (FUEL SYSTEMS)

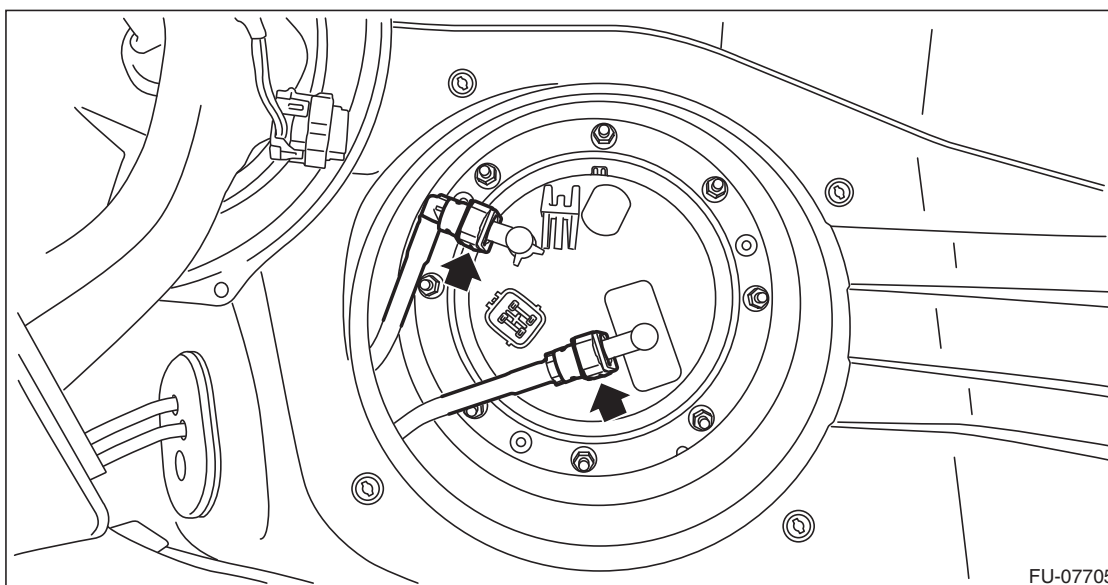
7) Disconnect the quick connector of fuel delivery tube and jet pump tube.

NOTE:

Disconnect the quick connector as shown in the figure.



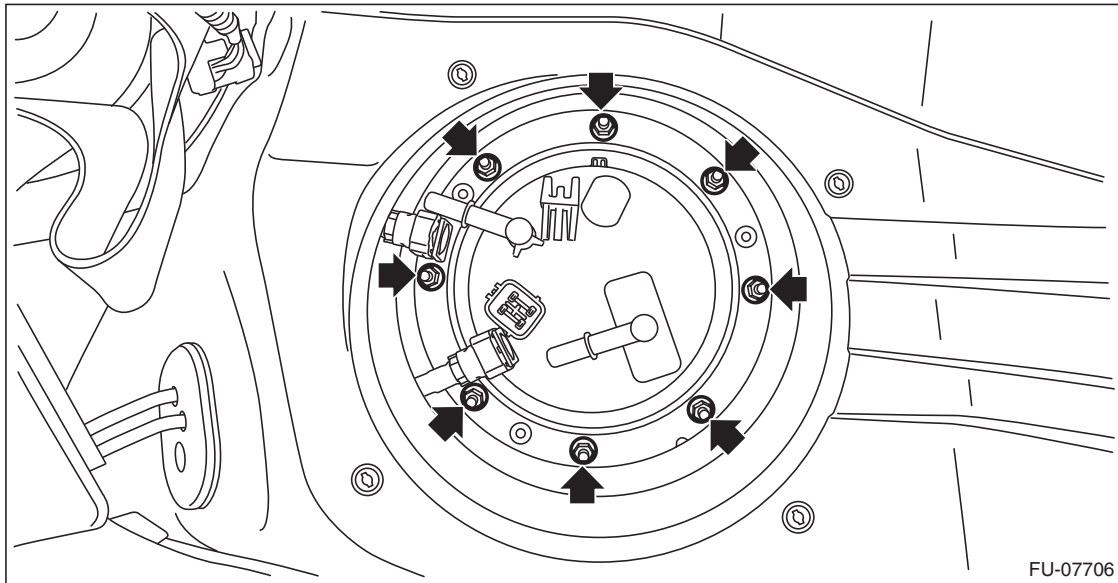
(a) Slider



Fuel Pump

FUEL INJECTION (FUEL SYSTEMS)

8) Remove the nuts which hold the fuel pump upper plate to the fuel tank.



9) Remove the fuel pump assembly from the fuel tank.

B: INSTALLATION

Install in the reverse order of removal while being careful of the following.

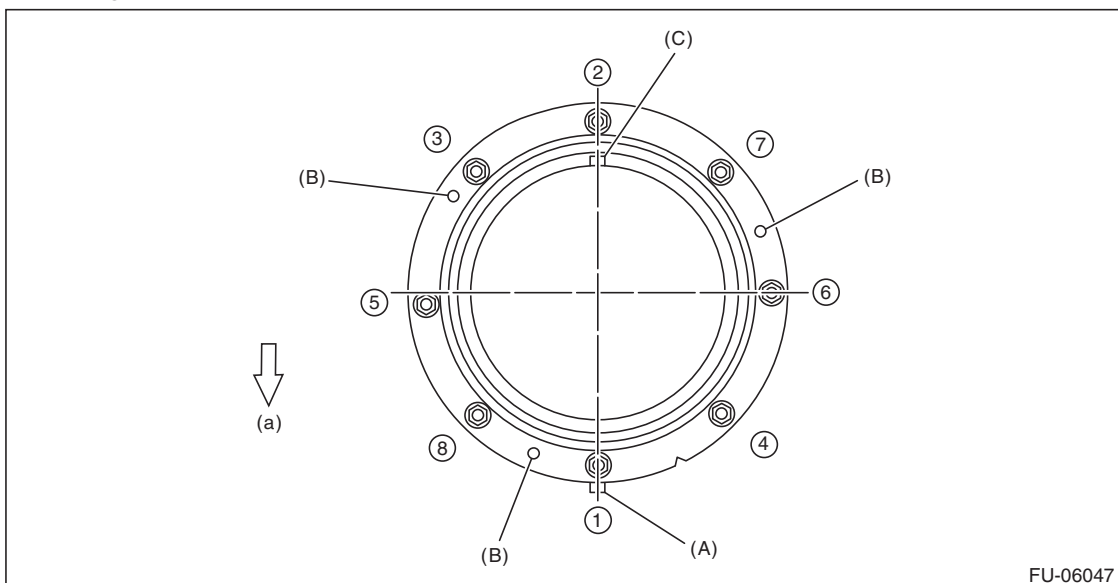
- Make sure the sealing portion is free from fuel or foreign matter before installation.
- Align protrusion (A) of the gasket to the position shown in the figure.
- Insert the protrusion (B) of gasket to the fuel pump upper plate. (3 places)
- Align the protrusion (C) of fuel pump assembly with the cutout on the fuel pump upper plate.
- Tighten the nuts to the specified torque in the order as shown in the figure.

NOTE:

Use a new gasket.

Tightening torque:

4.4 N·m (0.4 kgf-m, 3.2 ft-lb)



(a) Front side of vehicle

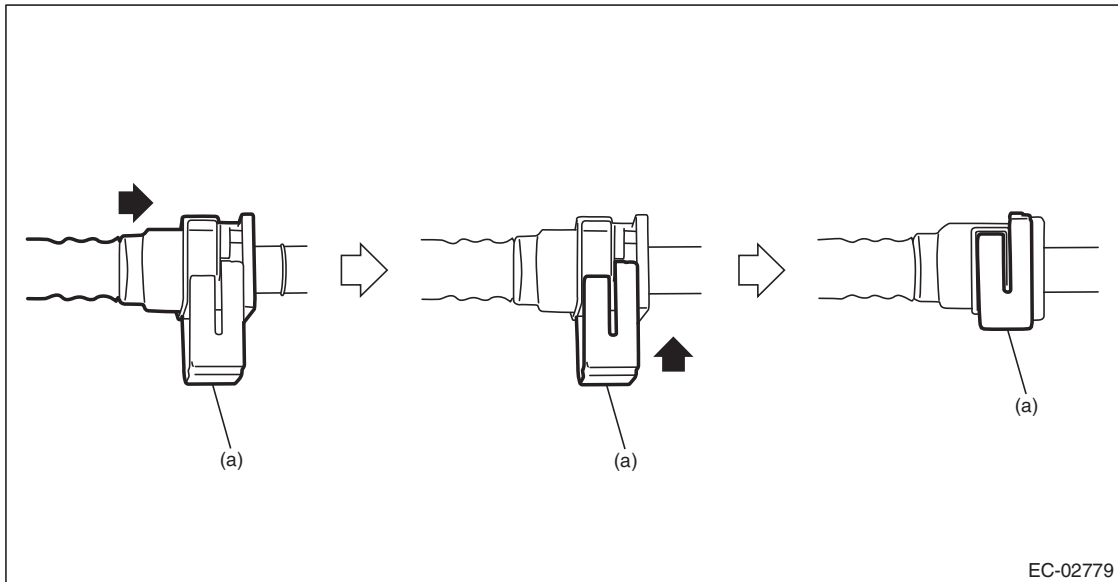
Fuel Pump

FUEL INJECTION (FUEL SYSTEMS)

- Connect the quick connector as shown in the figure.

CAUTION:

- Check that there is no damage or dust on the quick connector. If necessary, clean the seal surface of the pipe.
- When connecting the quick connector, make sure to insert the pipe all the way in before locking the slider.
- When it is difficult to lock the slider, check that the pipe is fully inserted.
- Make sure that the quick connector is securely connected.



(a) Slider

Fuel Pump

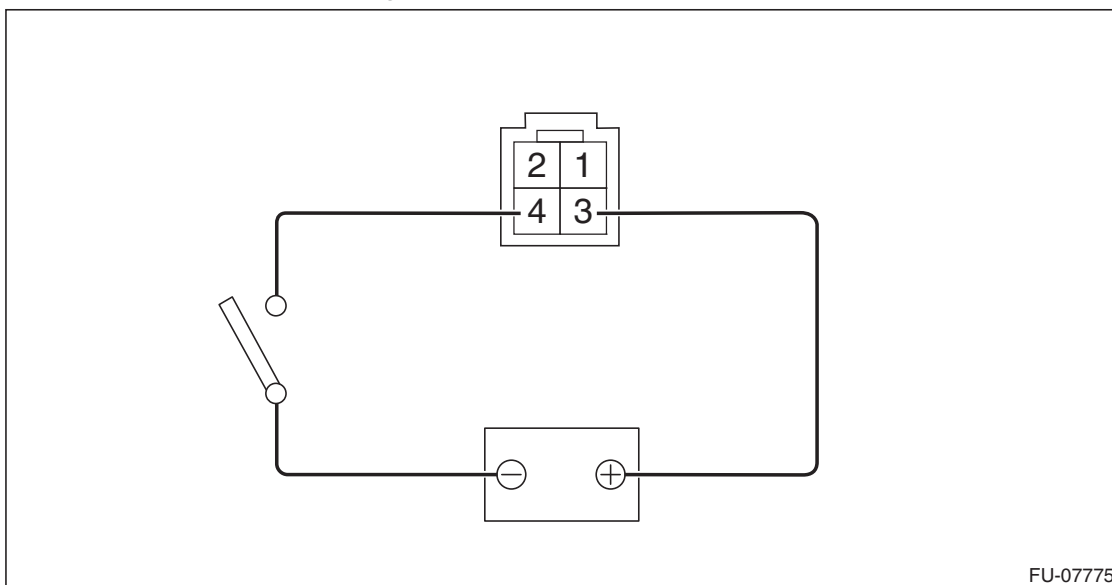
FUEL INJECTION (FUEL SYSTEMS)

C: INSPECTION

- 1) Check that the fuel pump has no deformation, cracks or other damages.
- 2) Connect the battery positive terminal to terminal No. 3 and the battery ground terminal to terminal No. 4, and inspect the fuel pump operation.

WARNING:

- Wipe off fuel completely.
- Keep the battery as far apart from fuel pump as possible.
- Do not run the fuel pump for a long time under non-load condition.



FU-07775



Fuel Level Sensor

FUEL INJECTION (FUEL SYSTEMS)

38. Fuel Level Sensor

A: REMOVAL

WARNING:

Place "NO OPEN FLAMES" signs near the working area.

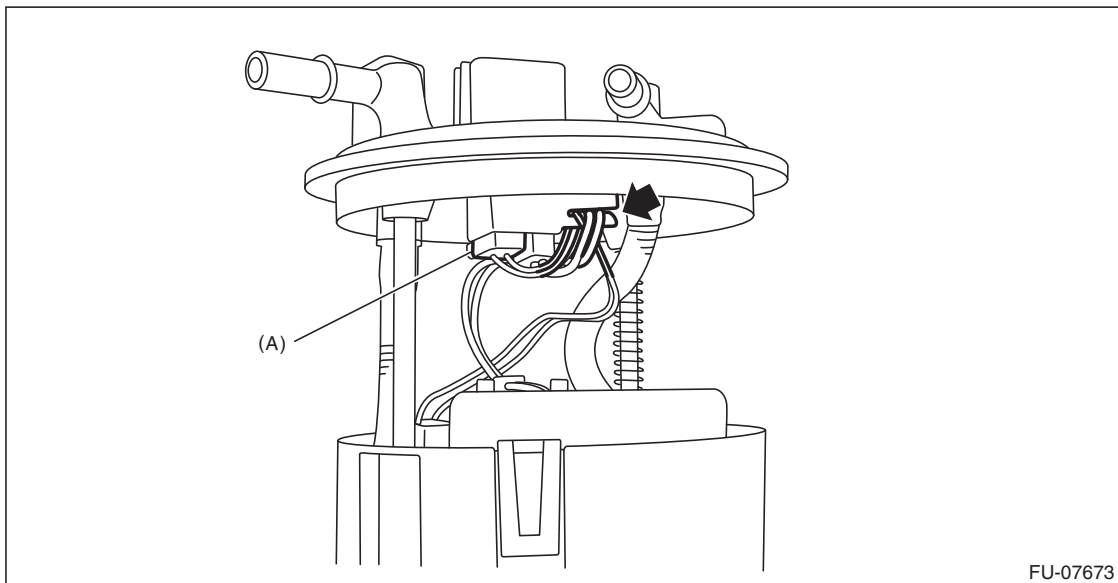
CAUTION:

- Be careful not to spill fuel.
- If the fuel gauge indicates that two thirds or more of the fuel is remaining, be sure to drain fuel before starting work to avoid the fuel to spill.

NOTE:

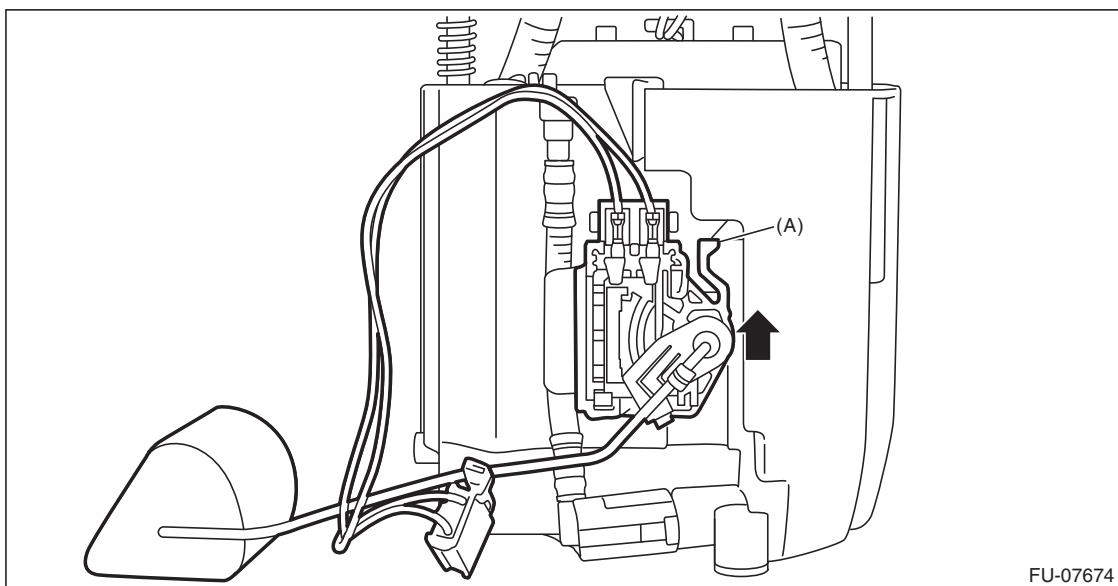
The fuel level sensor is built in fuel pump assembly.

- 1) Remove the fuel pump assembly. <Ref. to FU(H4DOTC)-178, REMOVAL, Fuel Pump.>
- 2) Disconnect the fuel level sensor connector (A), and pull out the connector cable and fuel level sensor harness from the clip.



FU-07673

- 3) While pressing the claw (A) of the fuel level sensor, slide the fuel level sensor in the direction of the arrow, and remove the fuel level sensor.



FU-07674

Fuel Level Sensor

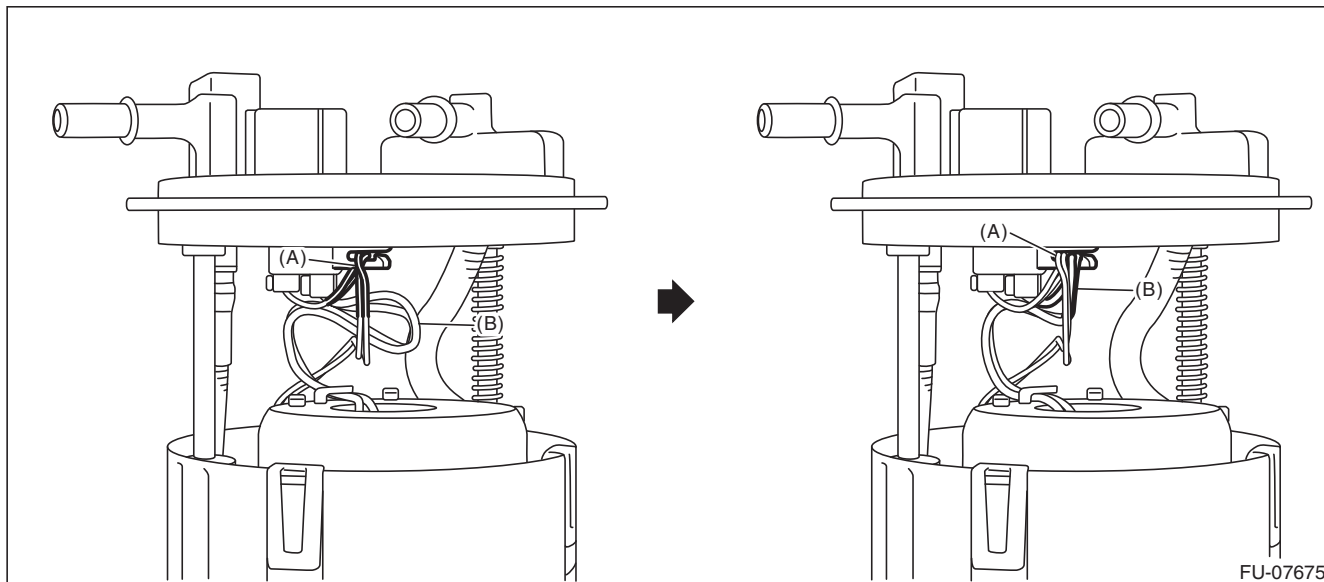
FUEL INJECTION (FUEL SYSTEMS)

B: INSTALLATION

Install in the reverse order of removal.

CAUTION:

Be sure to install the fuel level sensor harness to the clip first, then install the connector cable. Otherwise, malfunction may occur.



(A) Fuel level sensor harness

(B) Connector cable

FU-07675

Fuel Level Sensor

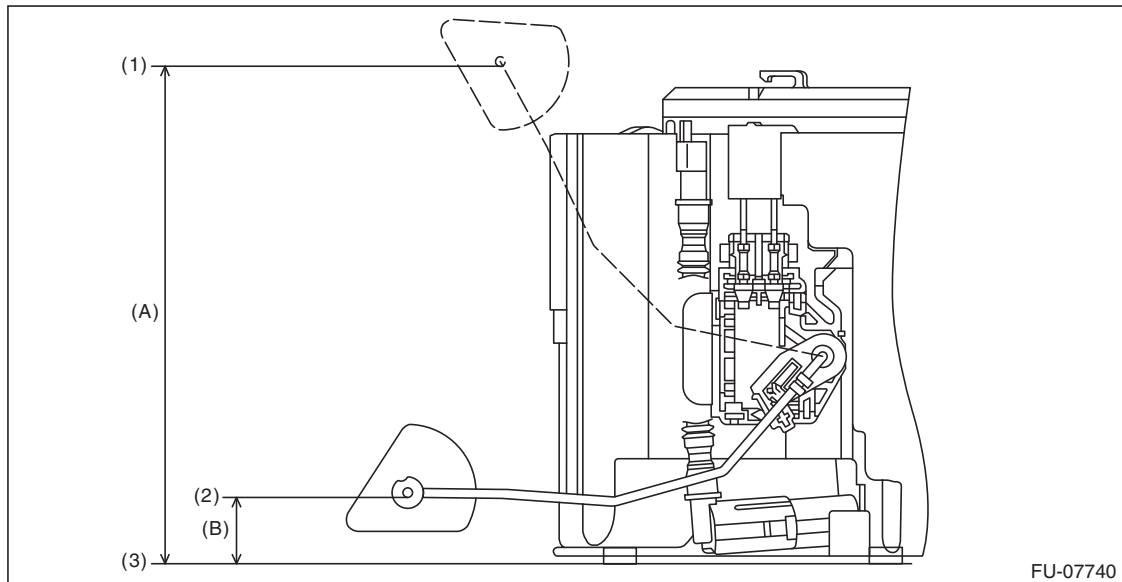
FUEL INJECTION (FUEL SYSTEMS)

C: INSPECTION

- 1) Check that the fuel level sensor has no damage.
- 2) Measure the fuel level sensor float position.

NOTE:

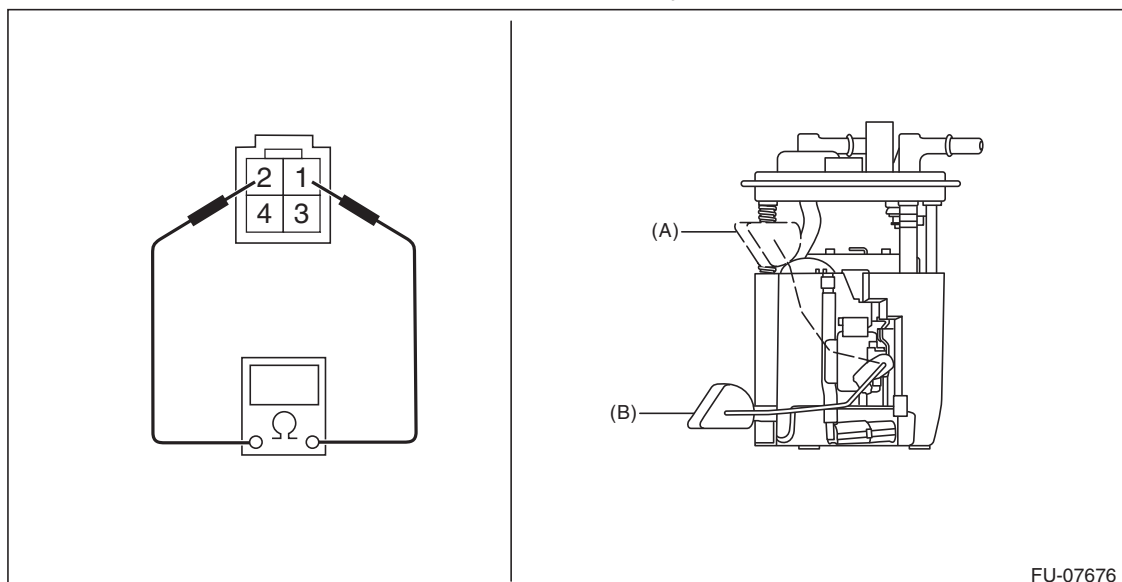
When inspecting the fuel level sensor, perform the work with the sensor installed to the fuel pump.



- (1) FULL (2) EMPTY (3) Fuel tank seating surface

Float position	Standard
FULL to Fuel tank seating surface (A)	133.0±4 mm (5.236±0.157 in)
EMPTY to Fuel tank seating surface (B)	21.6±4 mm (0.850±0.157 in)

- 3) Check the resistance between fuel level sensor terminals by the connector on top of the fuel pump.



Float position	Terminal No.	Standard
FULL (A)	1 and 2	8.7±1.0 Ω
EMPTY (B)		139.1±2.0 Ω

39. Fuel Sub Level Sensor

A: REMOVAL

WARNING:

Place "NO OPEN FLAMES" signs near the working area.

CAUTION:

- Be careful not to spill fuel.
- Catch the fuel from the tubes using a container or cloth.
- If the fuel gauge indicates that two thirds or more of the fuel is remaining, be sure to drain fuel before starting work to avoid the fuel to spill.

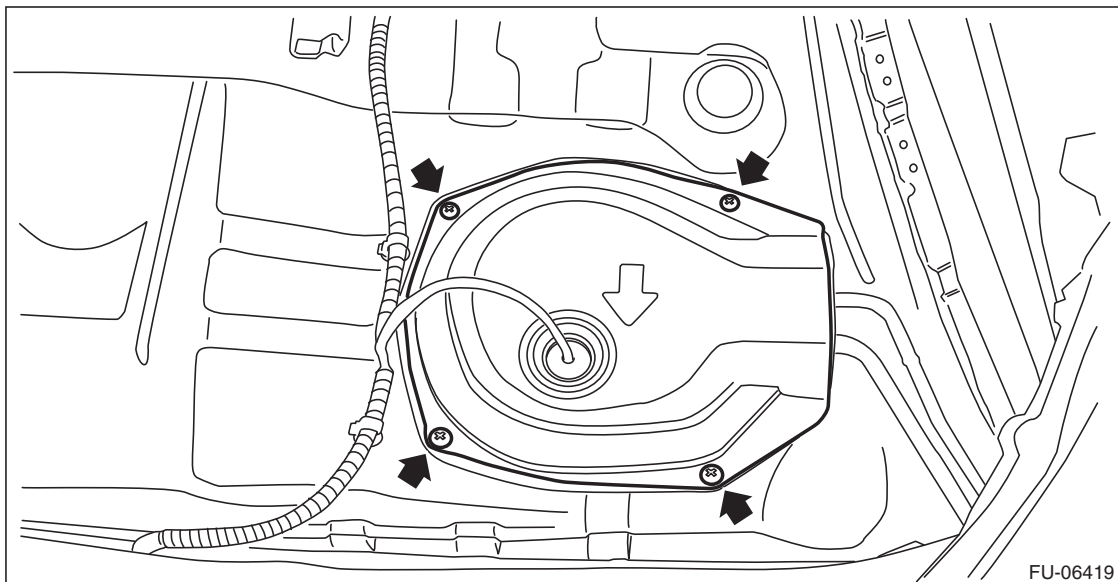
1) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>

2) Drain fuel. <Ref. to FU(H4DOTC)-151, DRAINING FUEL (WITH SUBARU SELECT MONITOR), PROCEDURE, Fuel.>

3) Disconnect the ground cable from battery.

4) Remove the rear seat cushion. <Ref. to SE-32, REMOVAL, Rear Seat.>

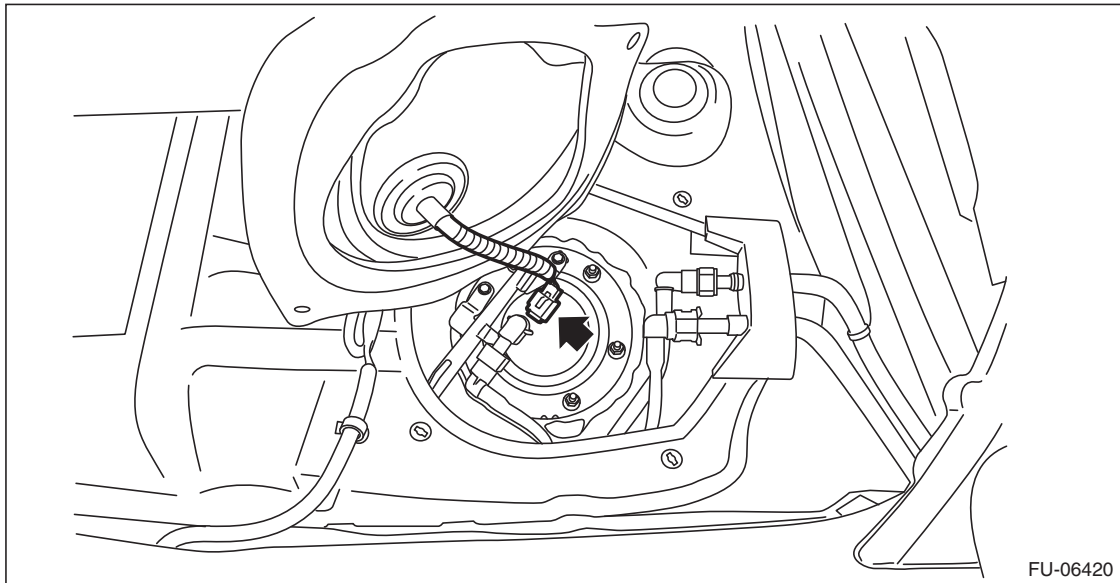
5) Remove the service hole cover of fuel sub level sensor.



Fuel Sub Level Sensor

FUEL INJECTION (FUEL SYSTEMS)

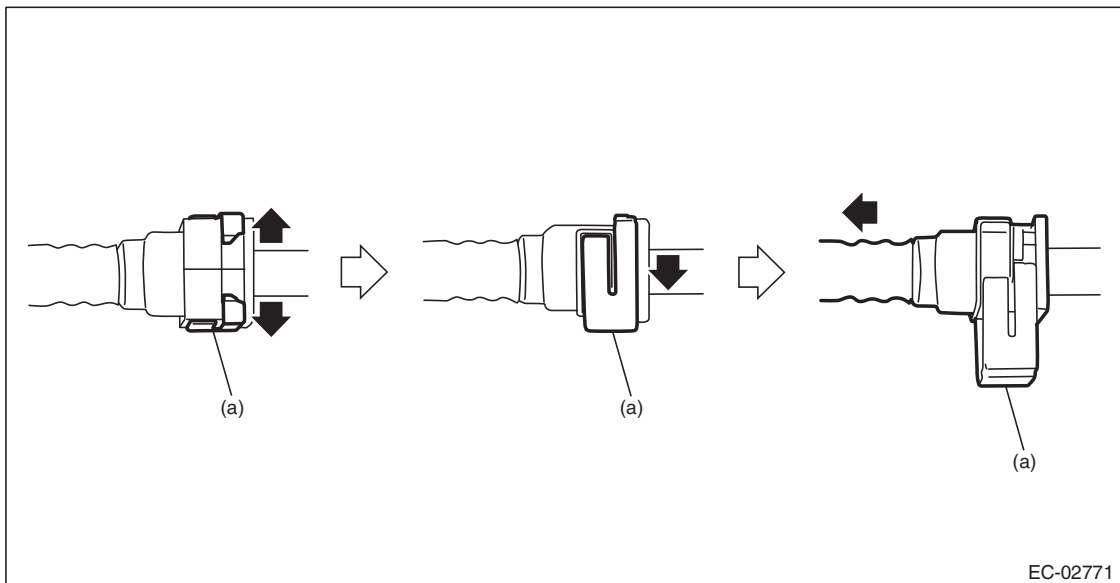
- 6) Disconnect the connector from the fuel sub level sensor, and move aside the service hole cover.



- 7) Disconnect the quick connector of the jet pump tube.

NOTE:

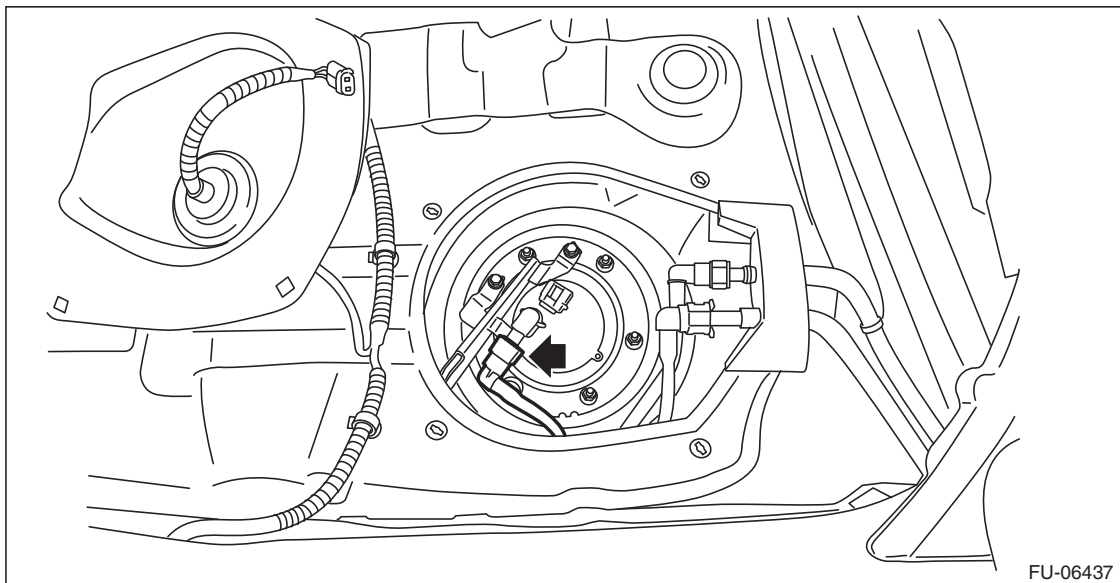
Disconnect the quick connector as shown in the figure.



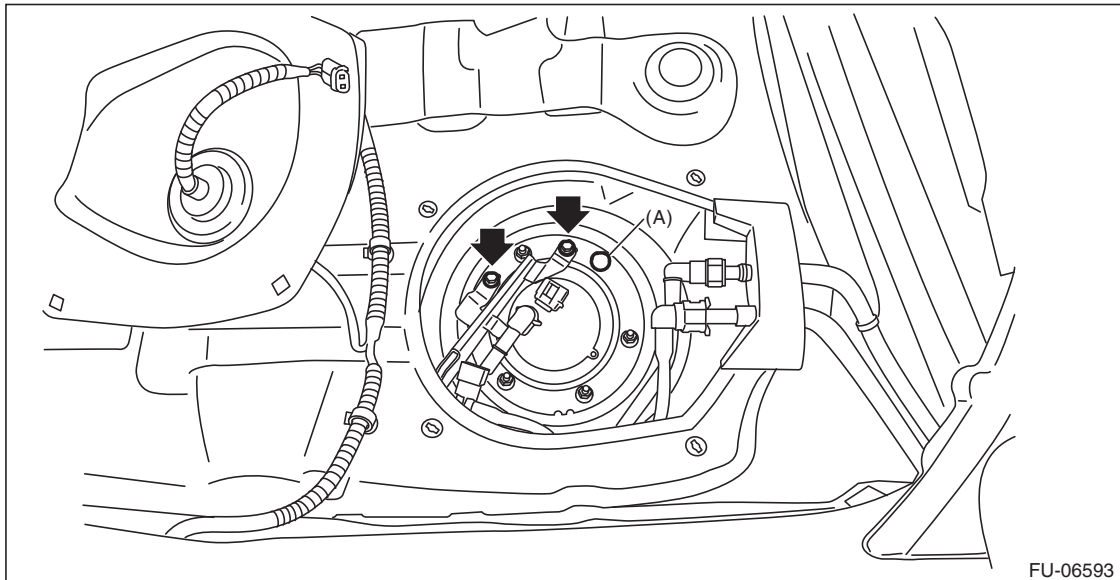
(a) Slider

Fuel Sub Level Sensor

FUEL INJECTION (FUEL SYSTEMS)



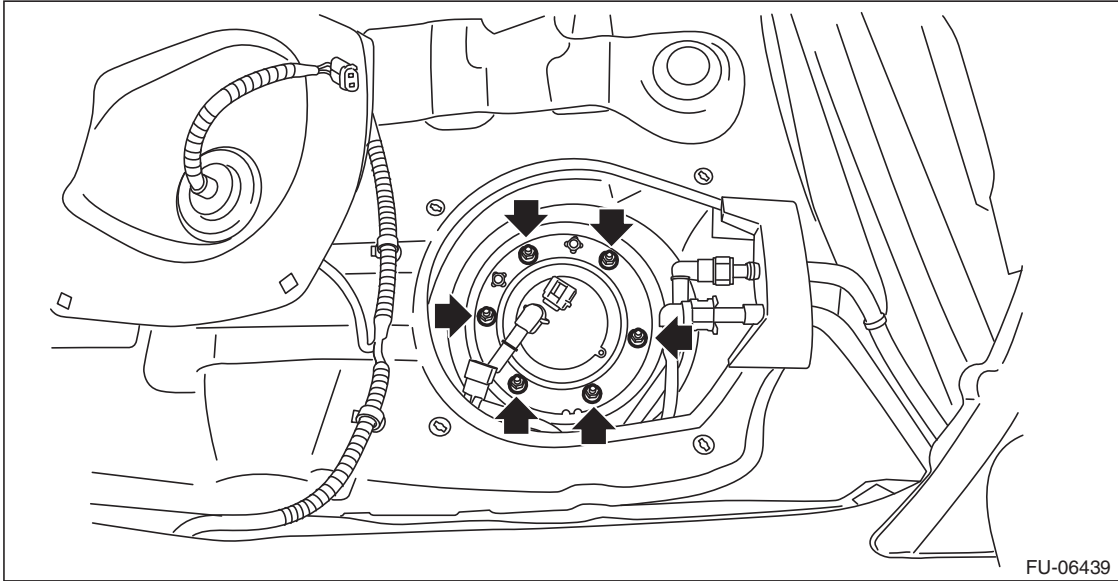
- 8) Remove the fuel sub level sensor protector, and remove the rubber cap (A) from nut.



Fuel Sub Level Sensor

FUEL INJECTION (FUEL SYSTEMS)

9) Remove the bolts and nuts which hold fuel sub level sensor protector and fuel sub level sensor upper plate to the fuel tank.



10) Remove the fuel sub level sensor from the fuel tank.



Fuel Sub Level Sensor

FUEL INJECTION (FUEL SYSTEMS)

B: INSTALLATION

Install in the reverse order of removal while being careful of the following.

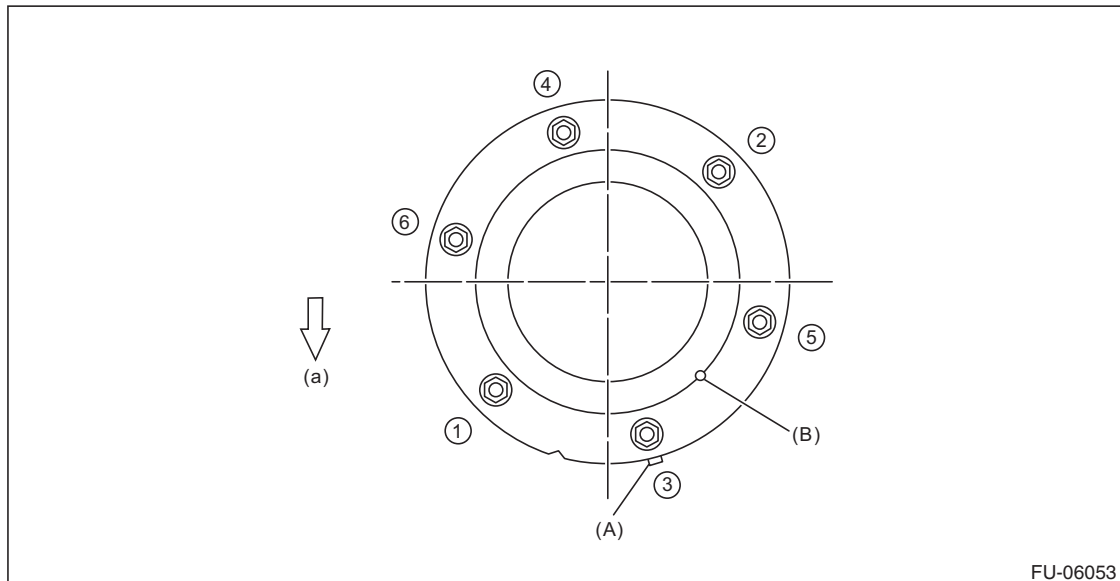
- Make sure the sealing portion is free from fuel or foreign matter before installation.
- Align protrusion (A) of the gasket to the position shown in the figure.
- Align protrusion (B) of the fuel sub level sensor to the cutout in the fuel sub level sensor upper plate.
- Tighten the nuts and bolts to the specified torque in the order as shown in the figure.
- After tightening, install the rubber cap (C) at the position shown in the figure.

NOTE:

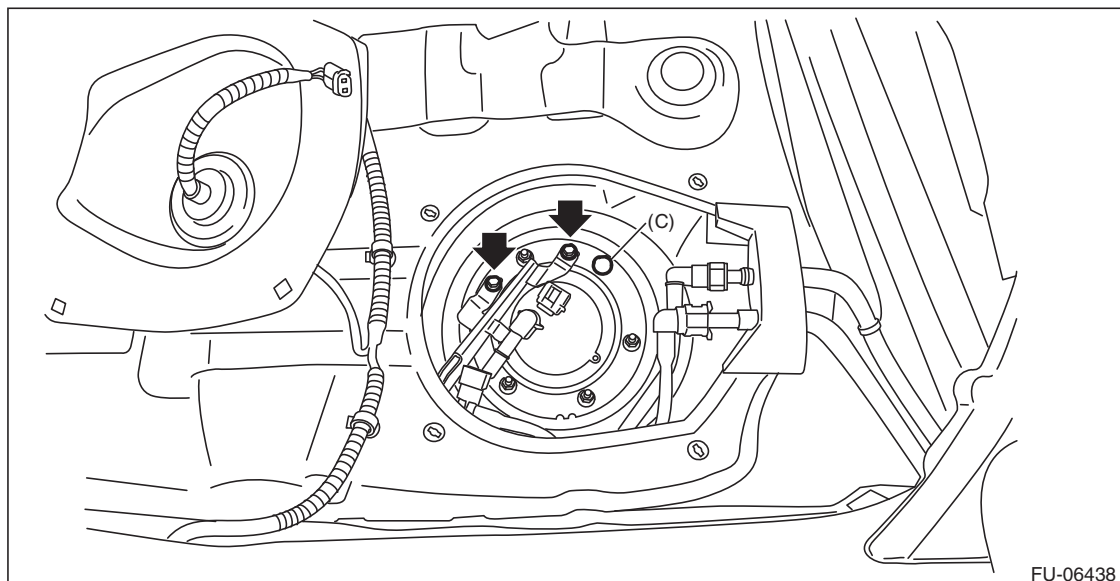
- Use a new gasket.
- Do not forget to install rubber cap (C).

Tightening torque:

4.4 N·m (0.4 kgf-m, 3.2 ft-lb)



(a) Front side of vehicle



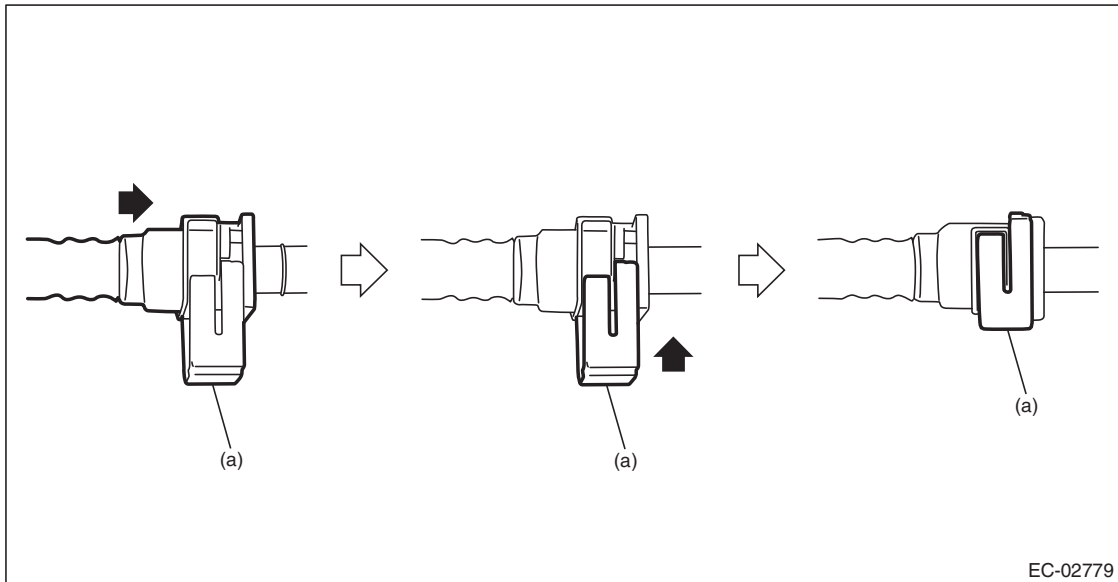
Fuel Sub Level Sensor

FUEL INJECTION (FUEL SYSTEMS)

- Connect the quick connector as shown in the figure.

CAUTION:

- Check that there is no damage or dust on the quick connector. If necessary, clean the seal surface of the pipe.
- When connecting the quick connector, make sure to insert the pipe all the way in before locking the slider.
- When it is difficult to lock the slider, check that the pipe is fully inserted.
- Make sure that the quick connector is securely connected.



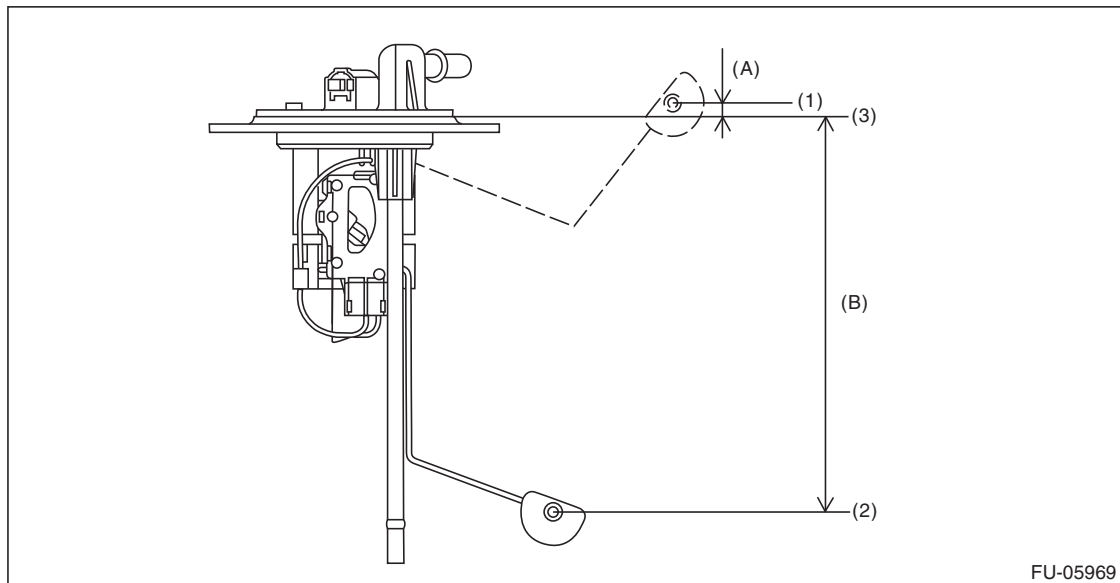
(a) Slider

Fuel Sub Level Sensor

FUEL INJECTION (FUEL SYSTEMS)

C: INSPECTION

- 1) Check that the fuel sub level sensor has no damage.
- 2) Measure the fuel sub level sensor float position.



FU-05969

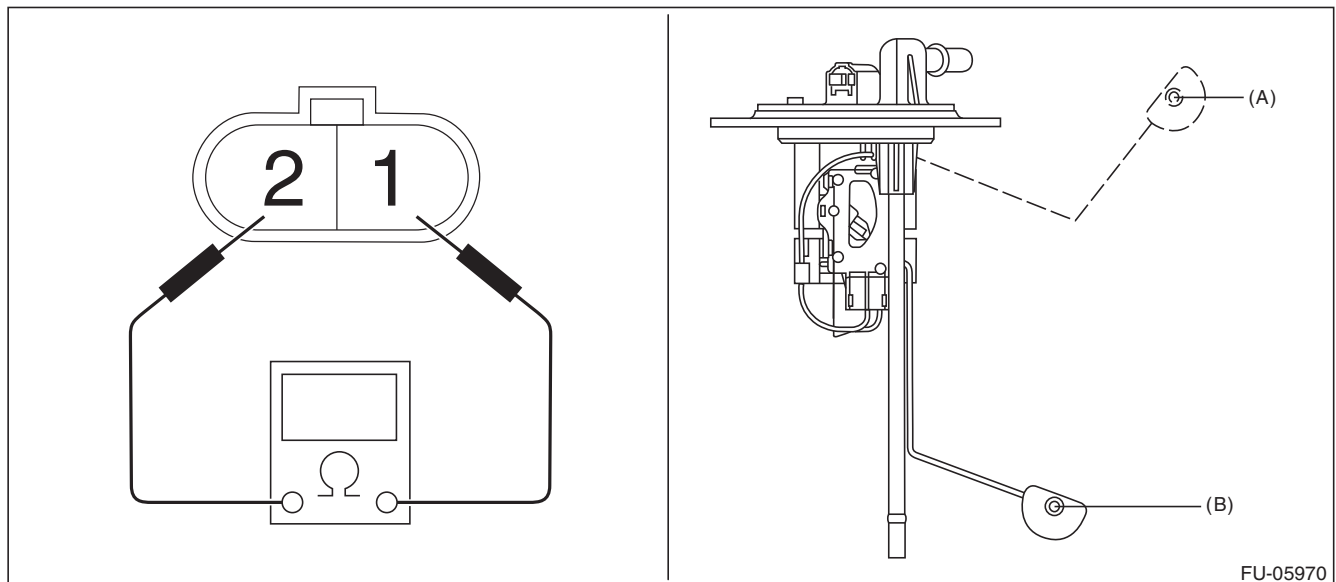
(1) FULL

(2) EMPTY

(3) Datum points

Float position	Standard
FULL to Datum point (A)	5.31 ± 3.5 mm (0.209 $\pm$ 0.138 in)
EMPTY to Datum point (B)	160.6 ± 3.5 mm (6.32 $\pm$ 0.138 in)

- 3) Measure the resistance between fuel sub level sensor terminals.



FU-05970

Float position	Terminal No.	Standard
FULL (A)	1 and 2	8.7 ± 1.0 Ω
EMPTY (B)		270.9 ± 4.0 Ω

Fuel Filter

FUEL INJECTION (FUEL SYSTEMS)

40. Fuel Filter

A: REMOVAL

WARNING:

Place "NO OPEN FLAMES" signs near the working area.

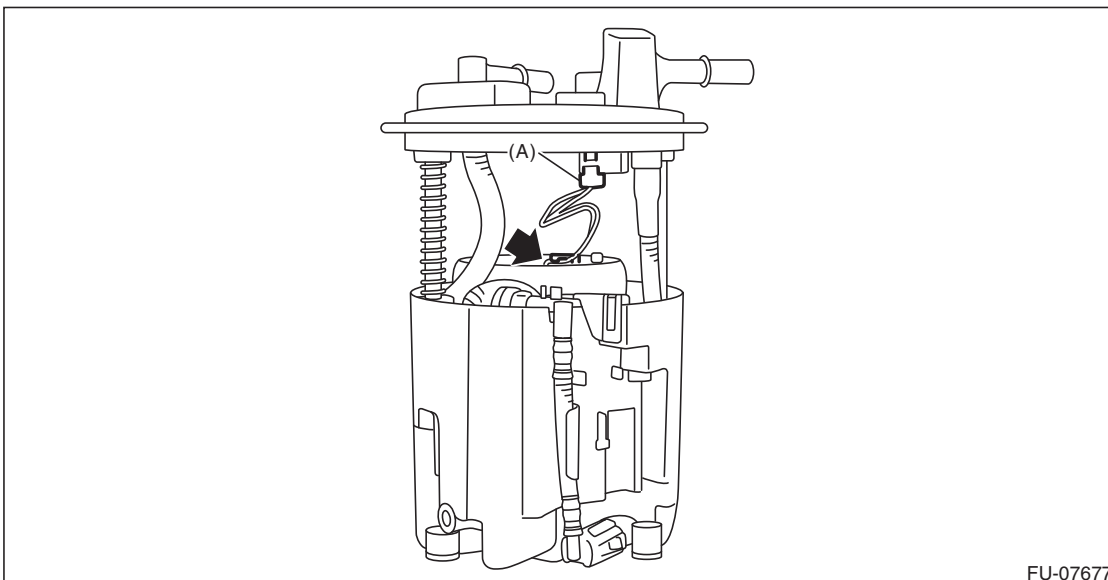
CAUTION:

- Be careful not to spill fuel.
- If the fuel gauge indicates that two thirds or more of the fuel is remaining, be sure to drain fuel before starting work to avoid the fuel to spill.
- Be careful not to drop or apply any impact to the fuel pump during work. This may deteriorate its performance.

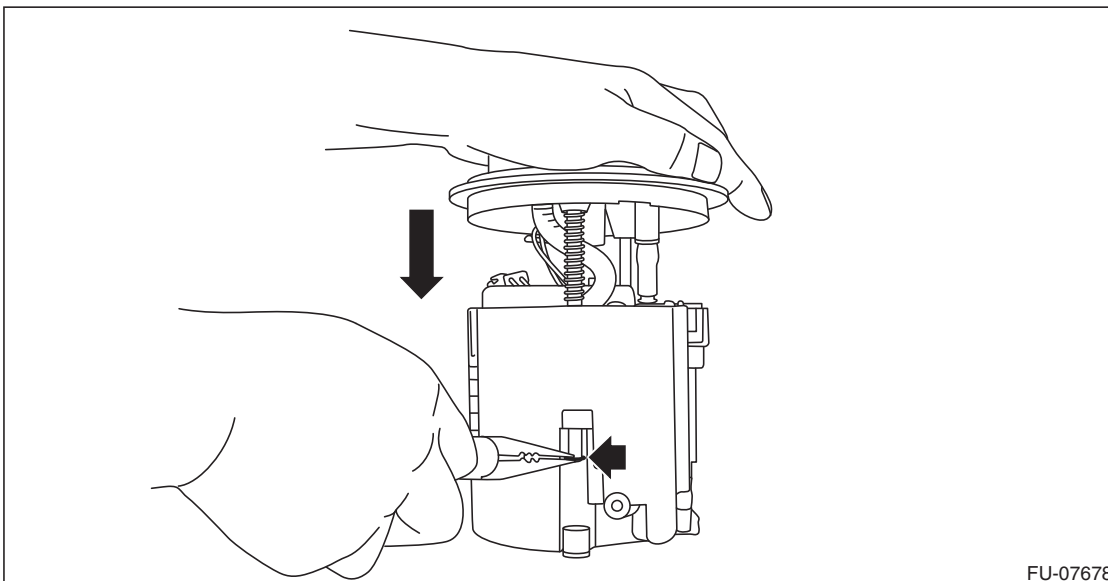
NOTE:

The fuel filter is built in fuel pump assembly.

- 1) Remove the fuel pump assembly. <Ref. to FU(H4DOTC)-178, REMOVAL, Fuel Pump.>
- 2) Remove the fuel level sensor. <Ref. to FU(H4DOTC)-184, REMOVAL, Fuel Level Sensor.>
- 3) Remove the connector cable from the clip, and disconnect the connector (A) of the connector cable.



- 4) Push the fuel filter assembly in the direction of the arrow to compress, and detach the connecting clip.

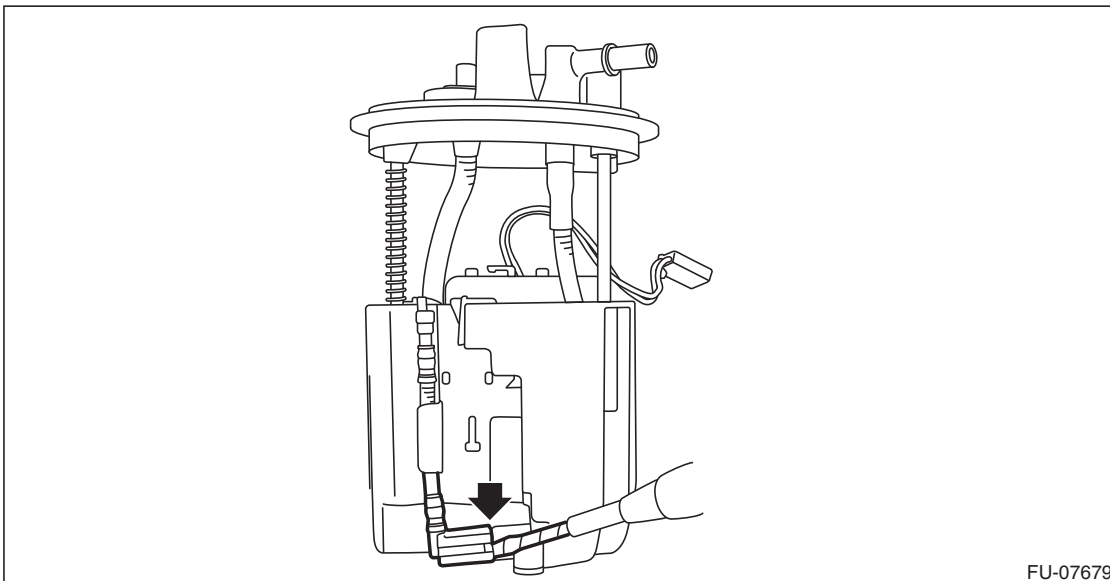


FU(H4DOTC)-194

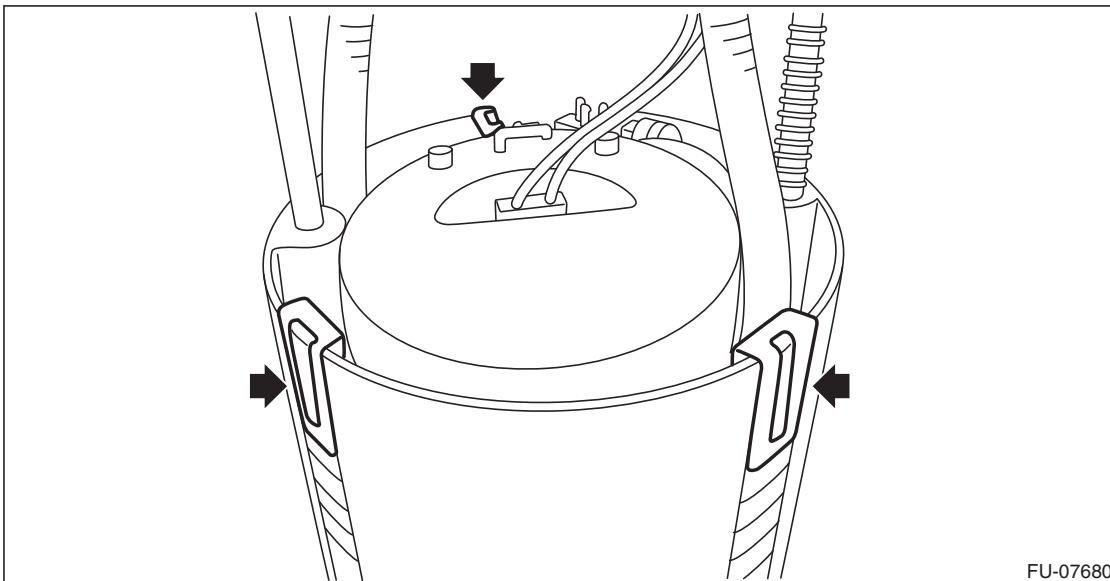
Fuel Filter

FUEL INJECTION (FUEL SYSTEMS)

- 5) Release the claw using a flat tip screwdriver or similar tool wrapped with a protection tape, and remove the tube assembly from the fuel chamber assembly.



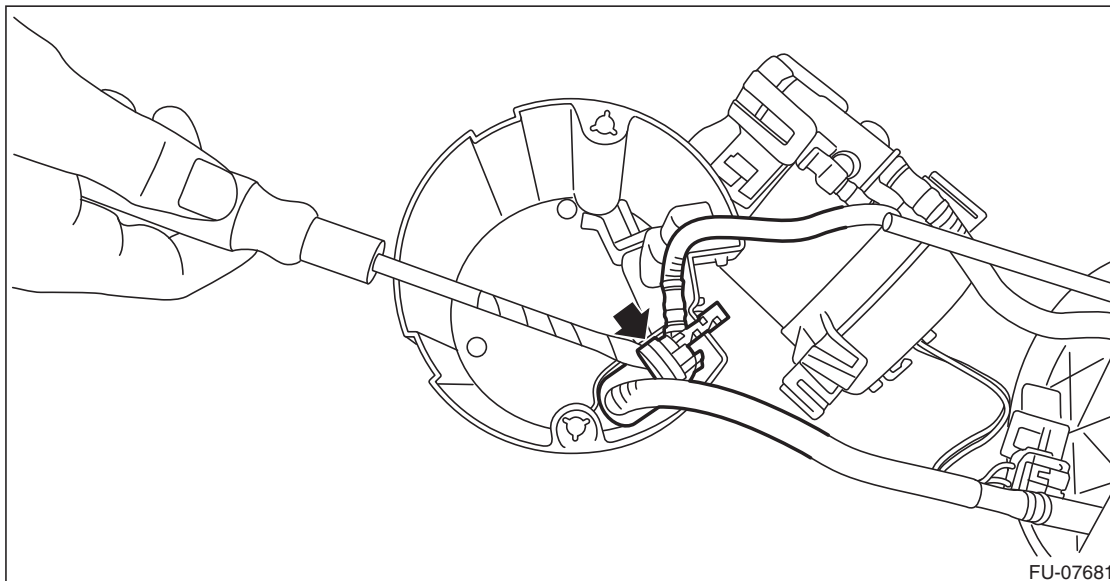
- 6) Release three claws on the fuel pump holder from the fuel chamber assembly, and raise the fuel filter assembly.



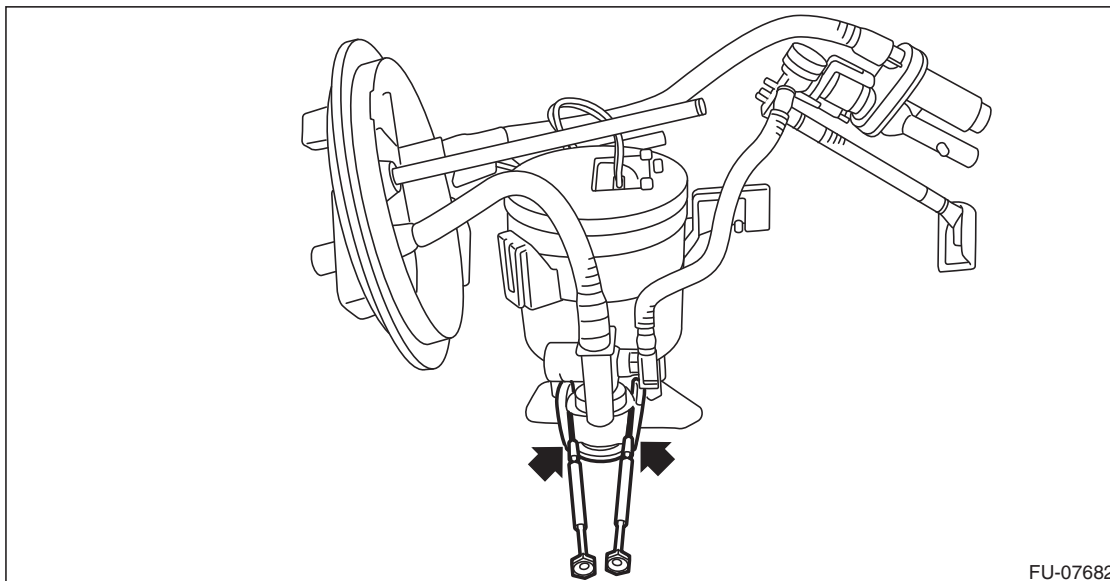
Fuel Filter

FUEL INJECTION (FUEL SYSTEMS)

7) Using a flat tip screwdriver or similar tool wrapped with a protection tape, remove the tube assembly from the fuel chamber assembly, and separate the fuel filter assembly and fuel chamber assembly.



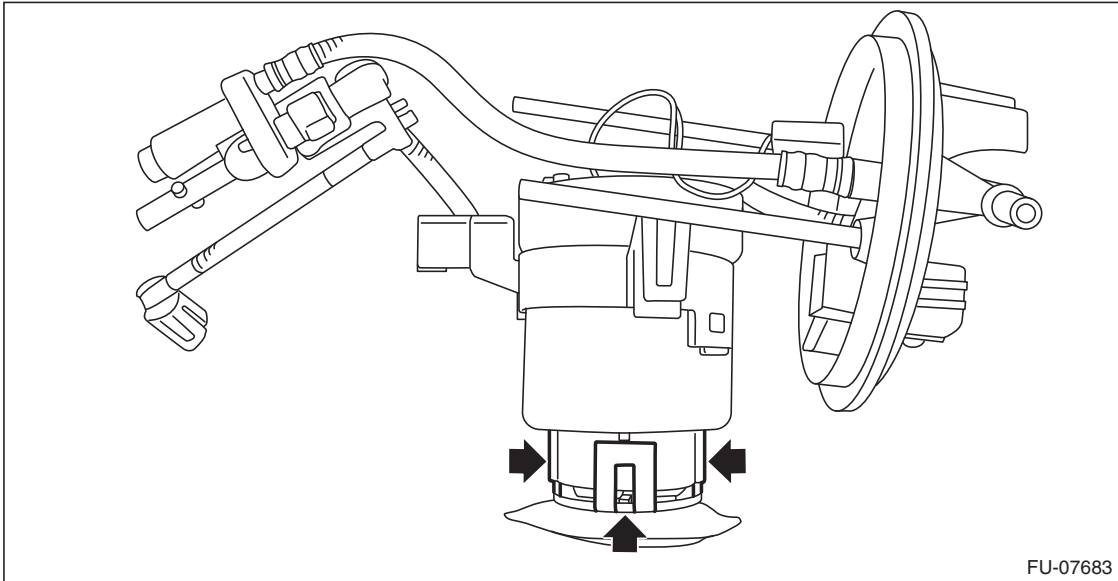
8) Using a precision driver or similar tool wrapped with a protection tape, expand the claws on the fuel pump.



Fuel Filter

FUEL INJECTION (FUEL SYSTEMS)

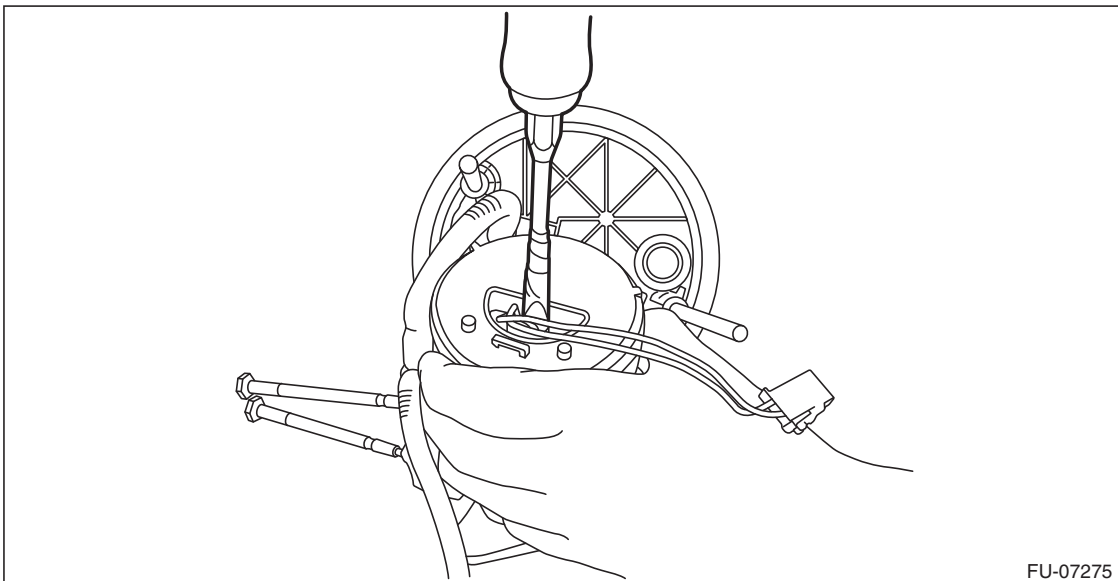
9) Release the claws on the fuel pump.



10) Using a flat tip screwdriver or similar tool wrapped with a protection tape, press on the fuel pump and remove the fuel pump together with the fuel pump holder from the fuel filter assembly.

CAUTION:

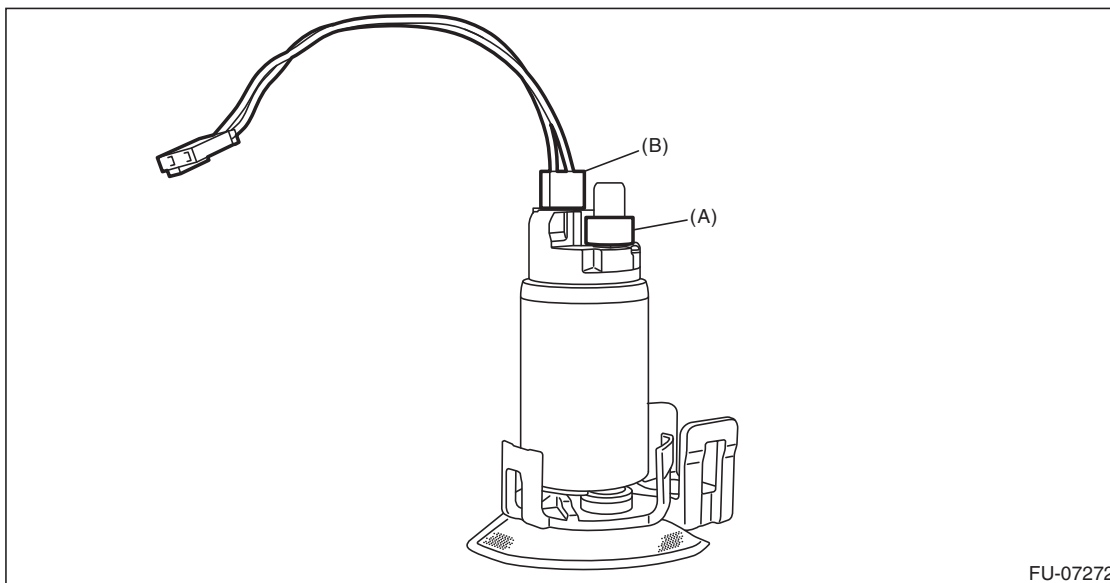
If O-rings remain on the fuel filter assembly side, carefully remove them with a precision screwdriver or similar tool wrapped with a protection tape.



Fuel Filter

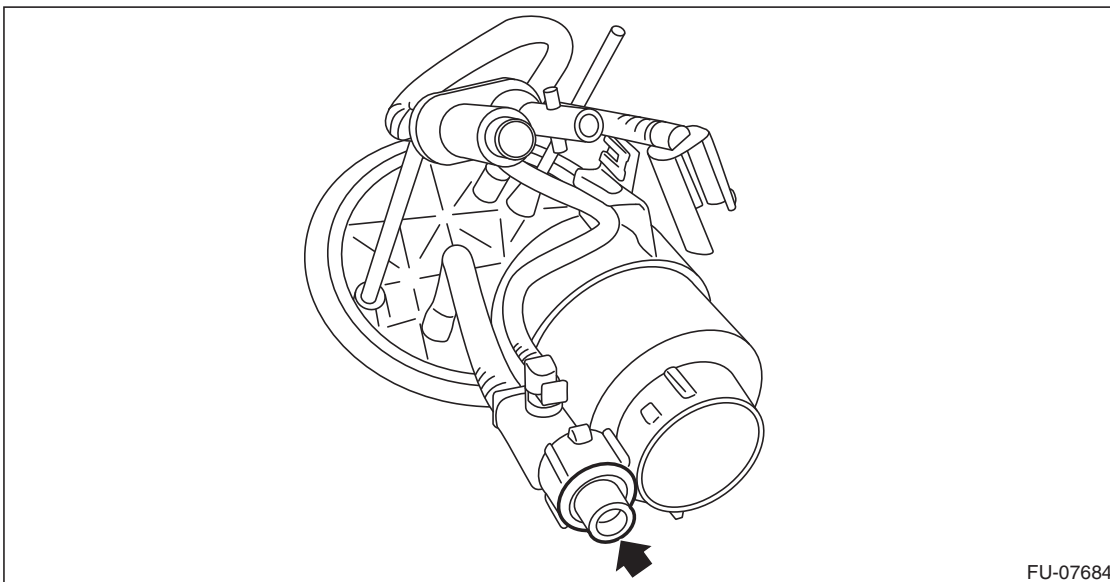
FUEL INJECTION (FUEL SYSTEMS)

- 11) Remove the spacer (A) and connector cable (B) from the fuel pump.



FU-07272

- 12) Remove the pressure regulator from the fuel filter assembly.



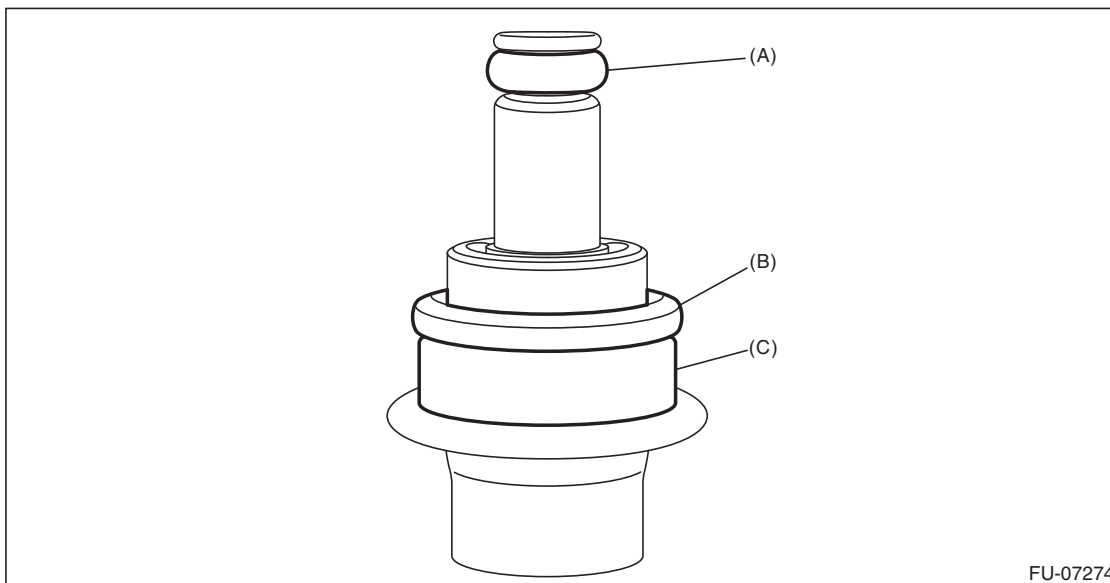
FU-07684



Fuel Filter

FUEL INJECTION (FUEL SYSTEMS)

13) Remove O-ring (A), O-ring (B), and backup ring (C) from the pressure regulator.

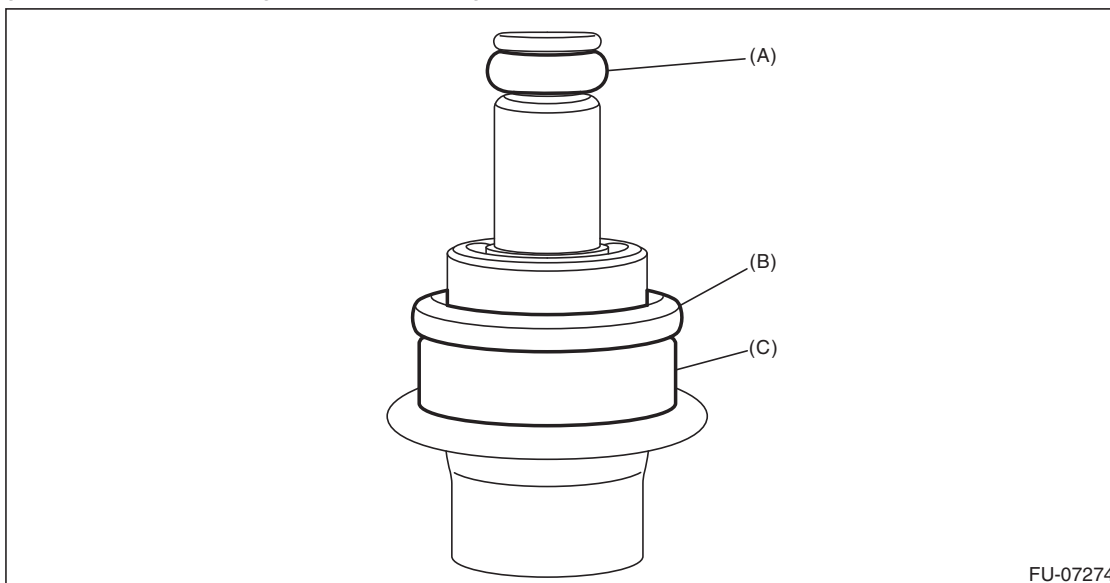


B: INSTALLATION

1) Install O-ring (A), O-ring (B), and backup ring (C) to the pressure regulator.

NOTE:

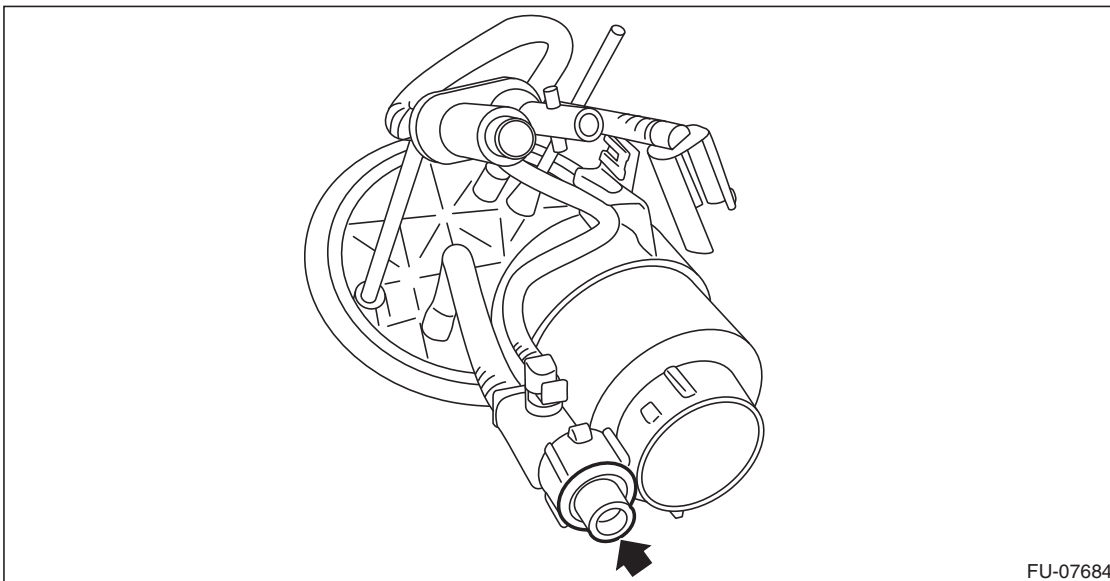
- Use new O-rings.
- Apply gasoline to the O-ring and backup ring.



Fuel Filter

FUEL INJECTION (FUEL SYSTEMS)

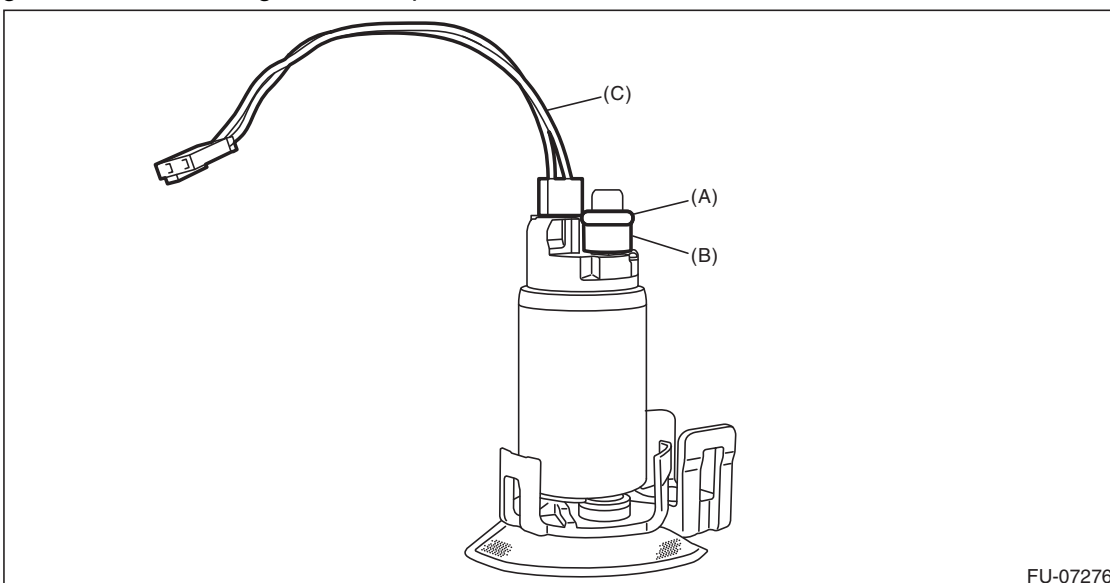
2) Install the pressure regulator to the fuel filter assembly.



3) Install O-ring (A), spacer (B), and connector cable (C) to the fuel pump.

NOTE:

- Use new O-rings and the connector cable.
- Apply gasoline to the O-rings and the spacer.



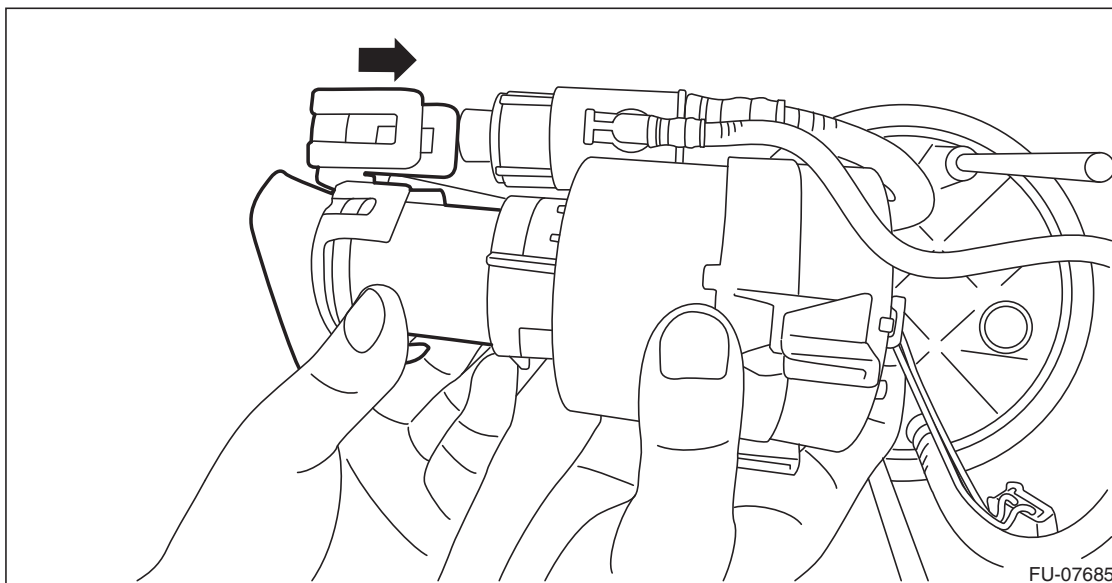
Fuel Filter

FUEL INJECTION (FUEL SYSTEMS)

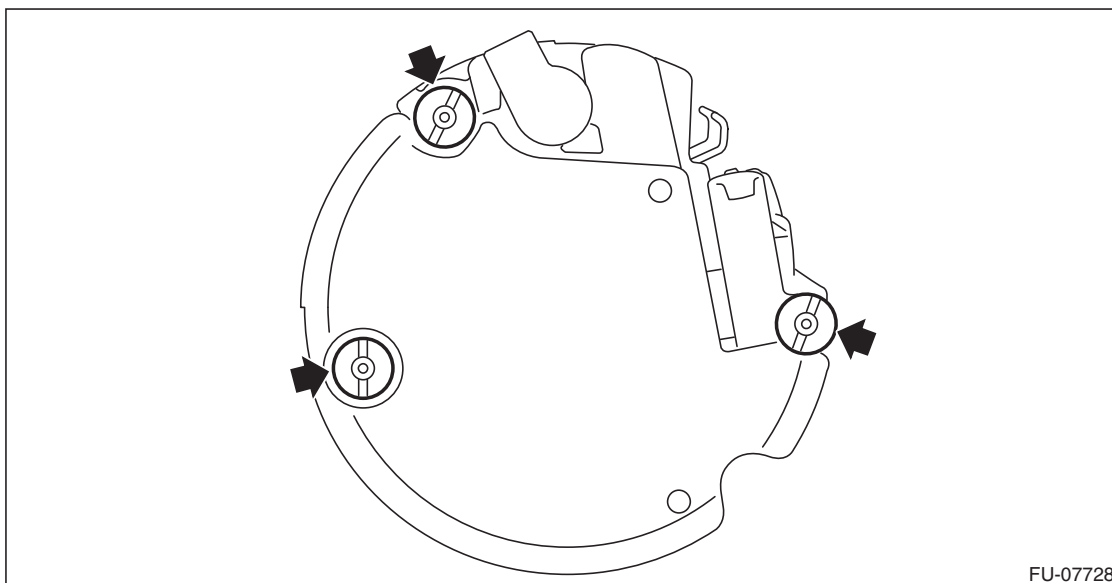
4) Install the fuel pump to the fuel filter assembly.

NOTE:

After installation, make sure five claws are correctly engaged in each position.



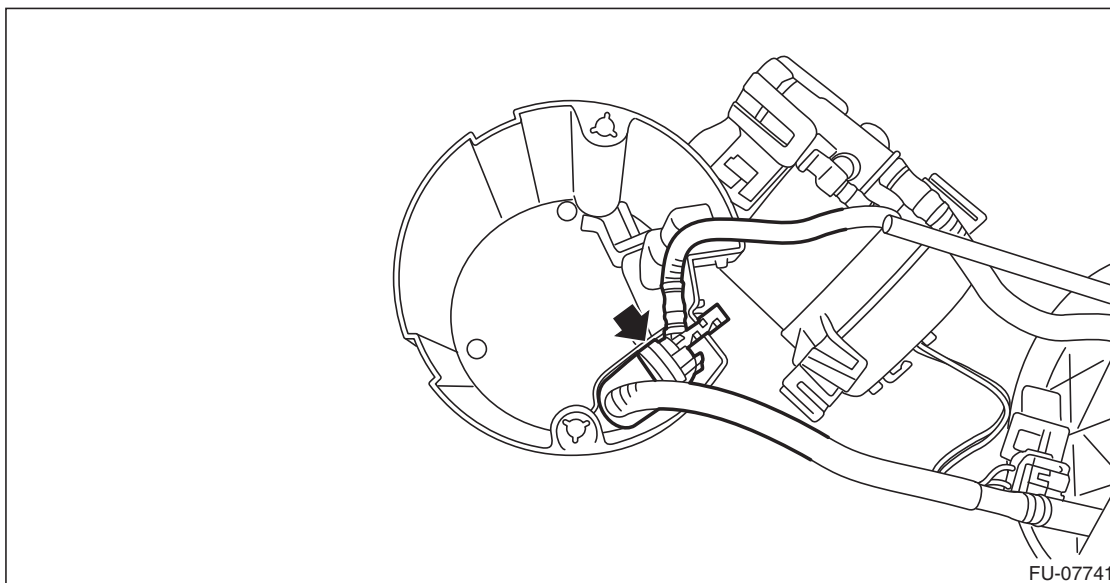
5) Check that the cushions of the fuel chamber assembly for dislocation. If any of them is dislocated, install a new cushion.



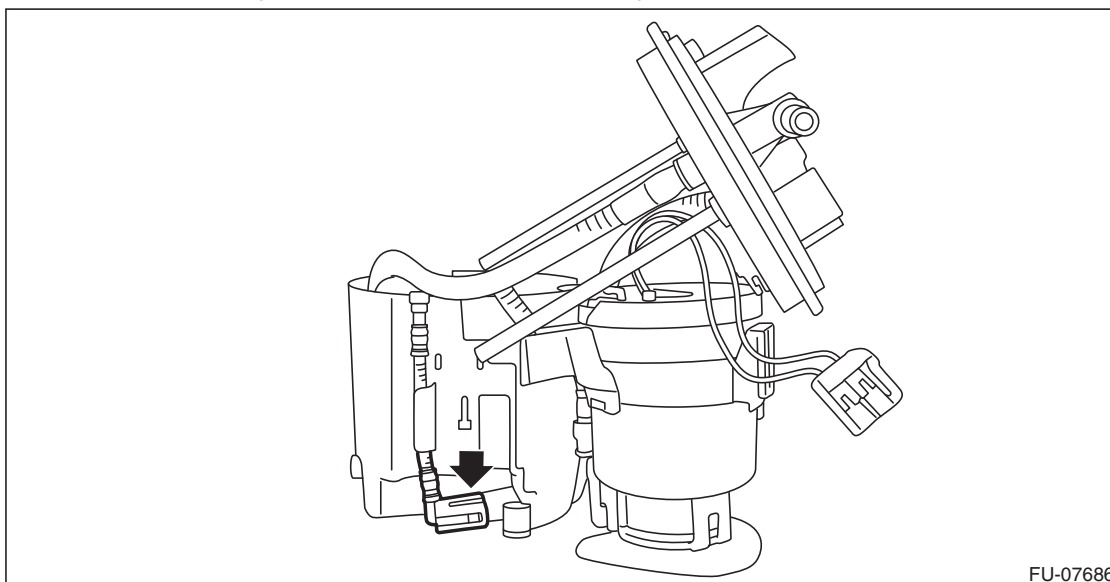
Fuel Filter

FUEL INJECTION (FUEL SYSTEMS)

- 6) Slowly press in and install the tube assembly to the fuel chamber assembly until a clicking sound is heard.



- 7) Connect the tube assembly to the fuel chamber assembly.



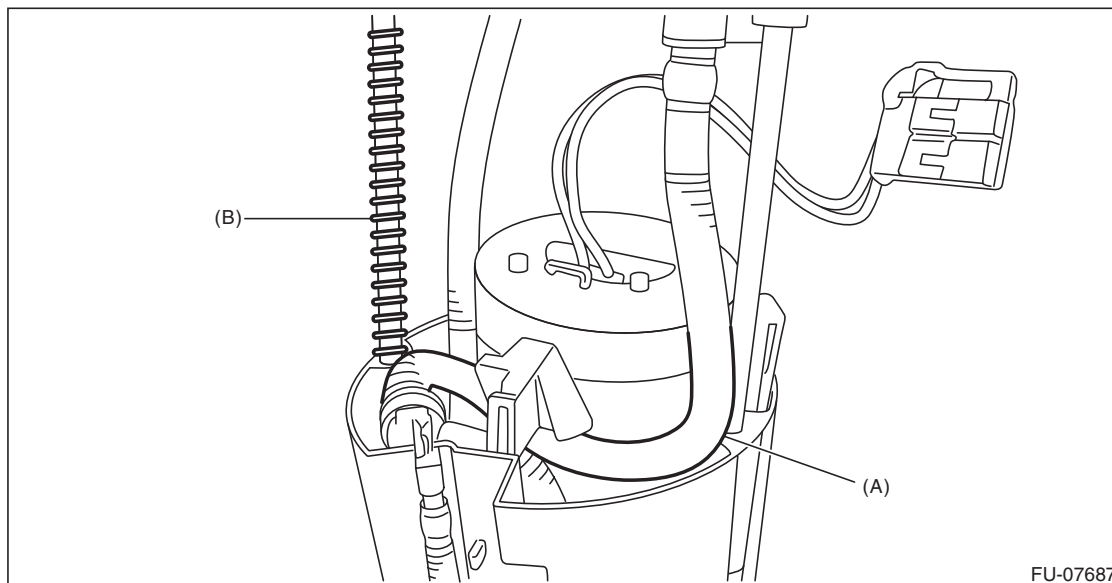
Fuel Filter

FUEL INJECTION (FUEL SYSTEMS)

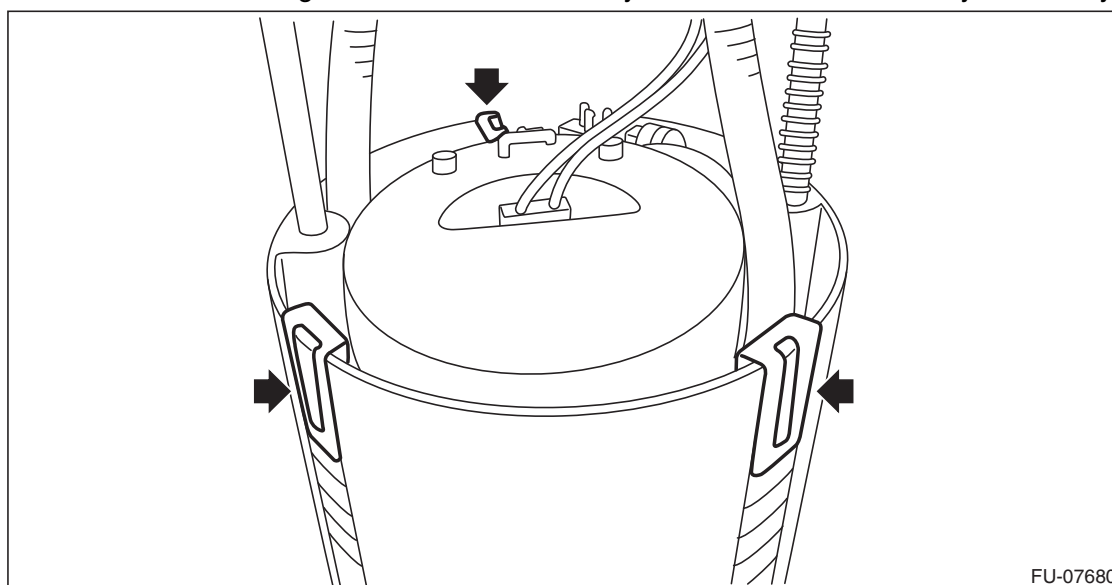
8) Install the fuel filter assembly to the fuel chamber assembly.

NOTE:

- Set the tube (A) and spring (B) for the fuel filter assembly as shown in the figure.



- Check that the claw connecting the fuel camber assembly and the fuel filter assembly is securely fastened.



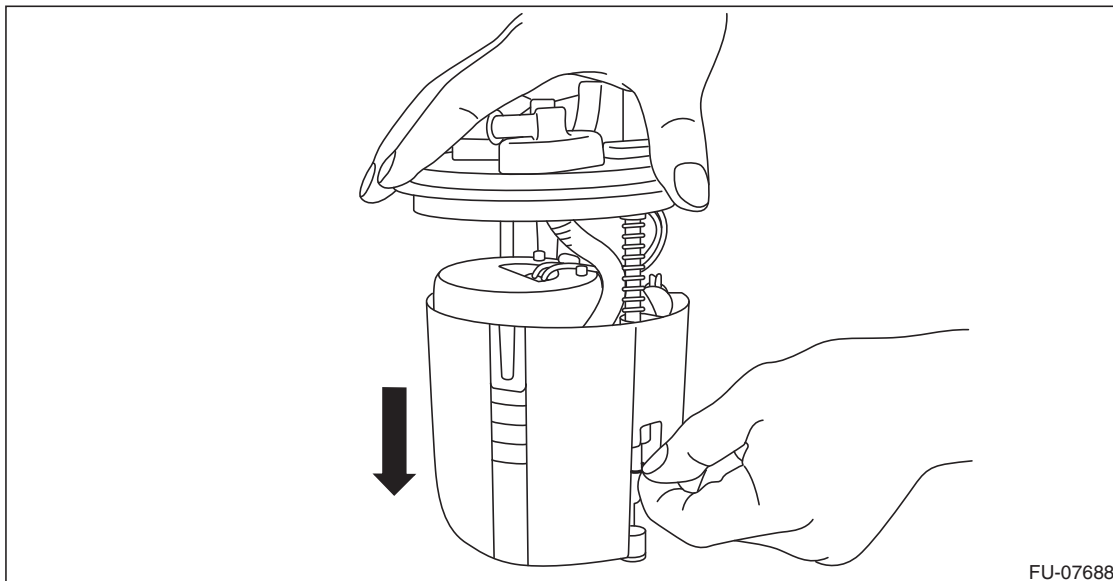
Fuel Filter

FUEL INJECTION (FUEL SYSTEMS)

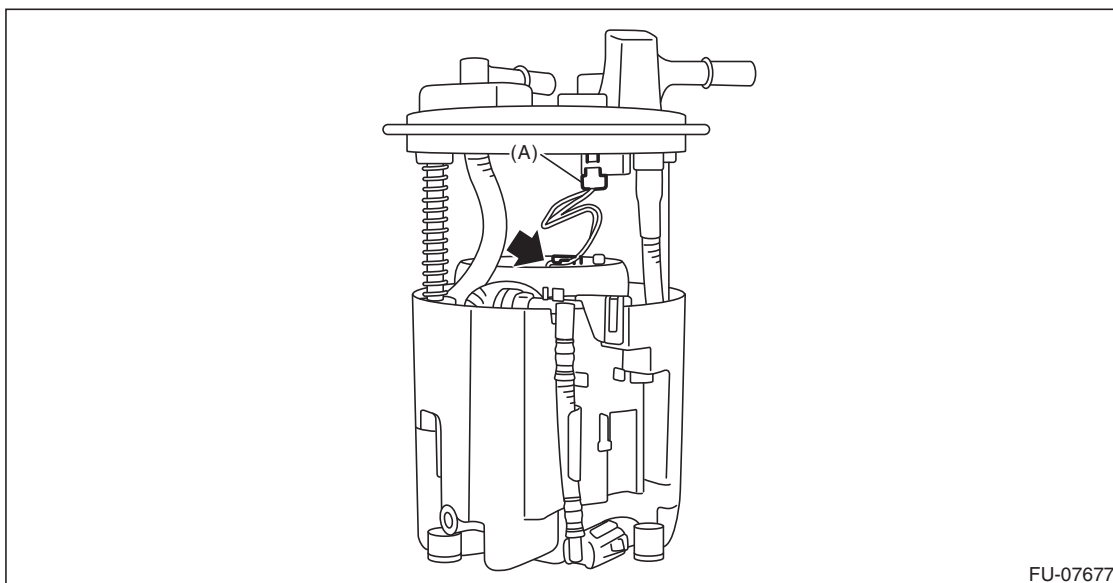
9) Push the fuel filter assembly in the direction of the arrow to compress, and attach the clip.

NOTE:

Use a new clip.



10) Secure the connector cable with the clip, and connect the connector (A) of the connector cable.



11) Install the fuel level sensor. <Ref. to FU(H4DOTC)-185, INSTALLATION, Fuel Level Sensor.>

12) Inspect the fuel level sensor. <Ref. to FU(H4DOTC)-186, INSPECTION, Fuel Level Sensor.>

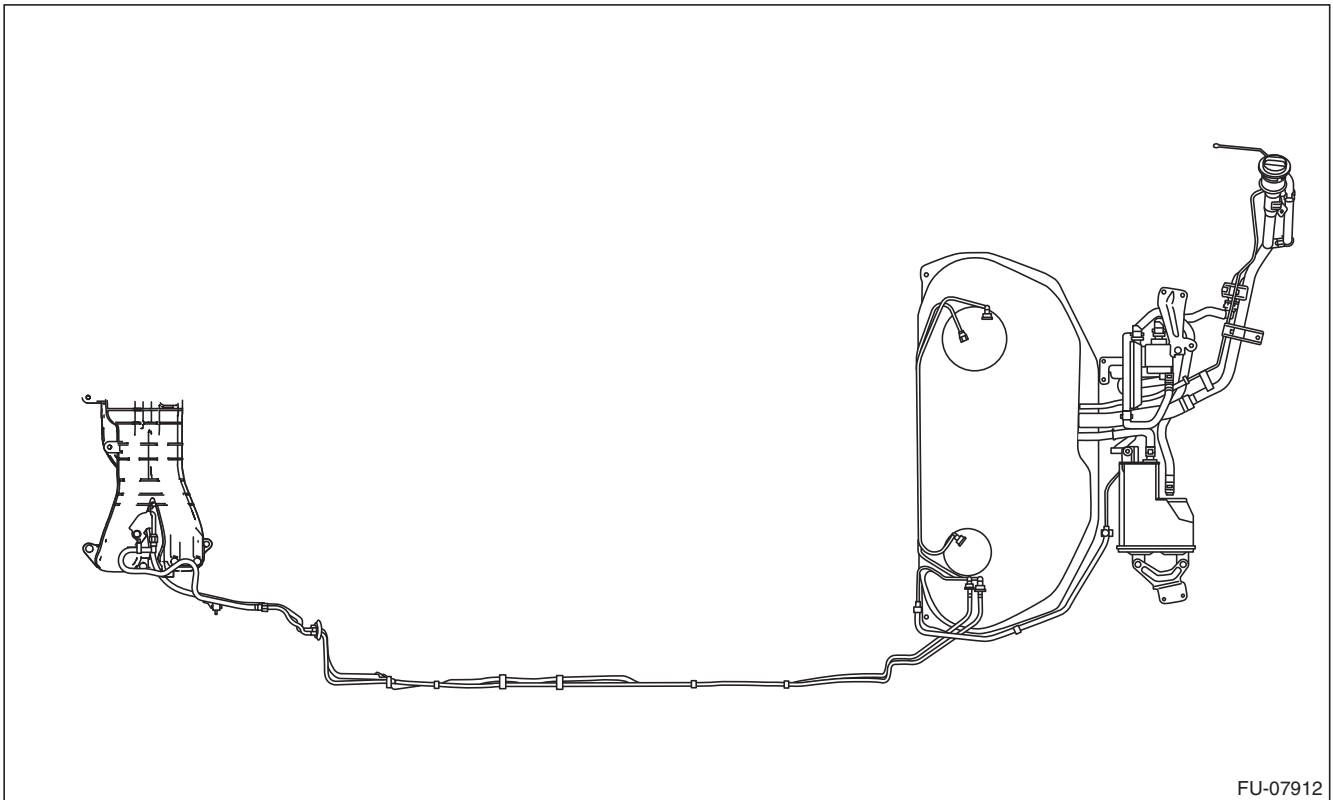
13) Install the fuel pump assembly. <Ref. to FU(H4DOTC)-181, INSTALLATION, Fuel Pump.>

Fuel Delivery and Evaporation Lines

FUEL INJECTION (FUEL SYSTEMS)

41. Fuel Delivery and Evaporation Lines

A: REMOVAL



WARNING:

Place “NO OPEN FLAMES” signs near the working area.

CAUTION:

Be careful not to spill fuel.

- 1) Release the fuel pressure. <Ref. to FU(H4DOTC)-151, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 2) Open the fuel filler lid and remove the fuel filler cap.
- 3) Remove the floor mat. <Ref. to EI-124, REMOVAL, Floor Mat.>

Fuel Delivery and Evaporation Lines

FUEL INJECTION (FUEL SYSTEMS)

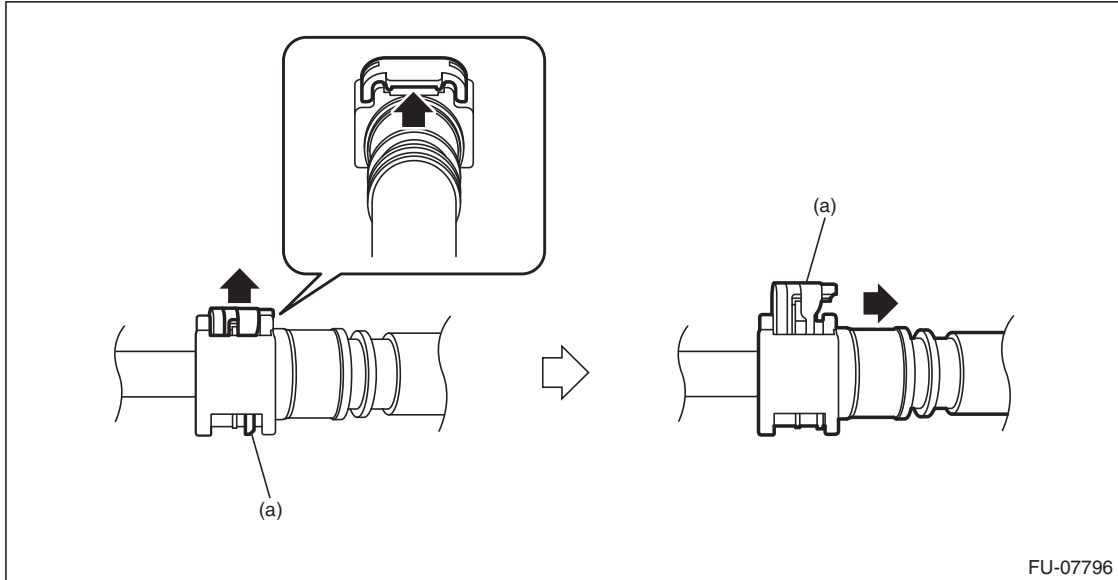
4) In the engine compartment, disconnect the fuel delivery tube (A) and evaporation hose (B).

CAUTION:

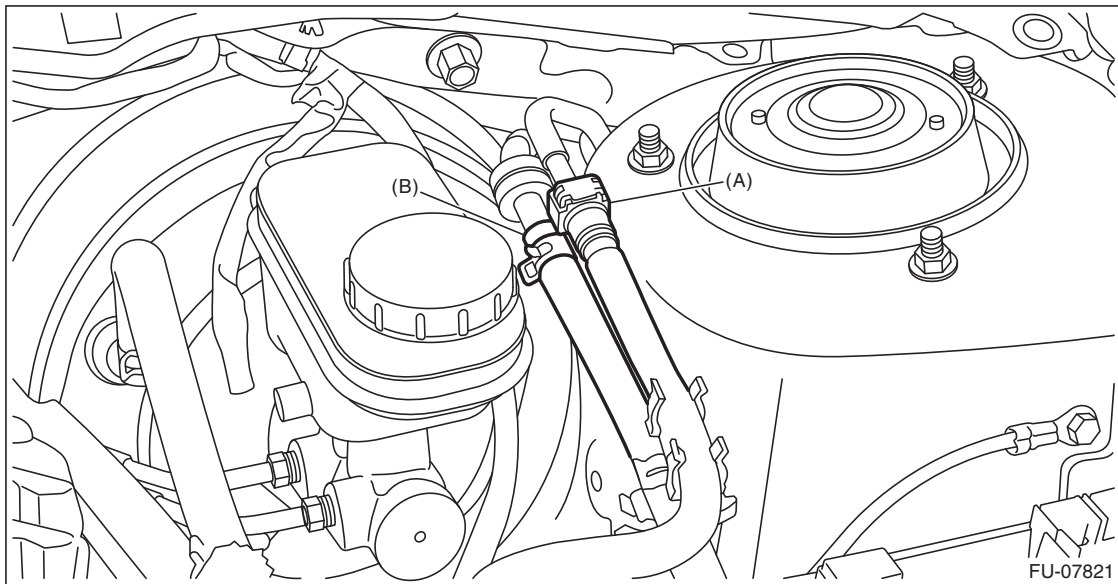
- Be careful not to spill fuel.
- Catch the fuel from the tubes using a container or cloth.

NOTE:

Disconnect the quick connector as shown in the figure.



(a) Slider



5) Remove the fuel tank. <Ref. to FU(H4DOTC)-156, REMOVAL, Fuel Tank.>



Fuel Delivery and Evaporation Lines

FUEL INJECTION (FUEL SYSTEMS)

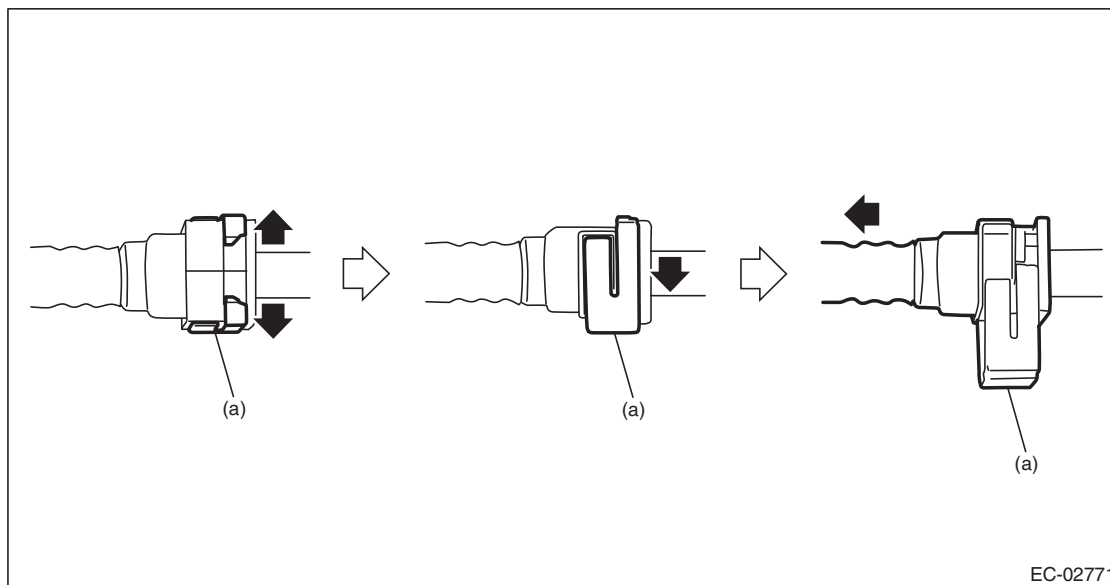
6) Disconnect the quick connector, and remove the fuel delivery tube and jet pump tube from the fuel tank.

CAUTION:

- Be careful not to spill fuel.
- Catch the fuel from the tubes using a container or cloth.

NOTE:

Disconnect the quick connector as shown in the figure.



(a) Slider

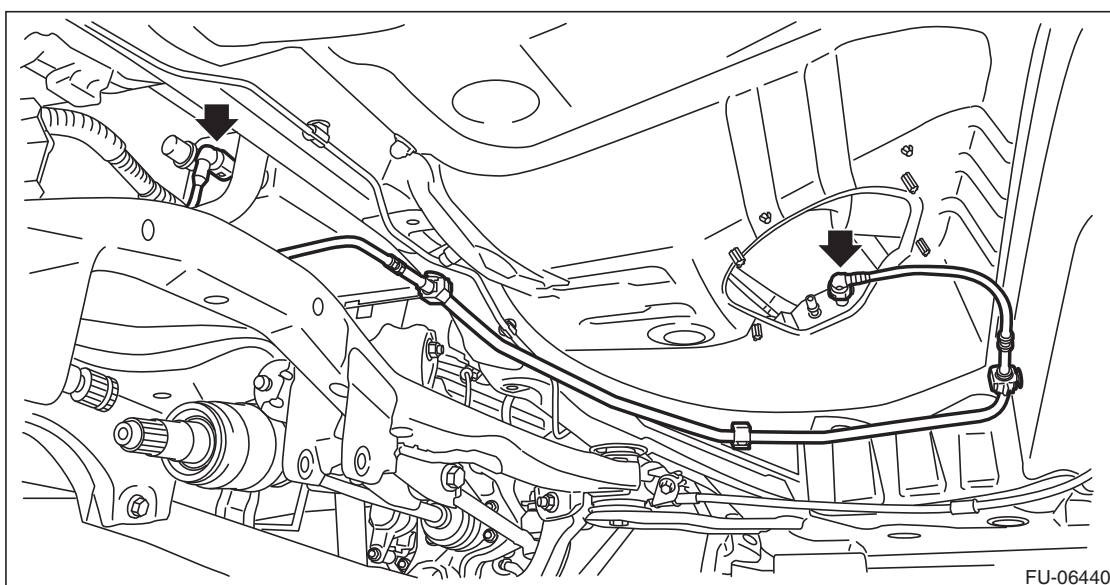
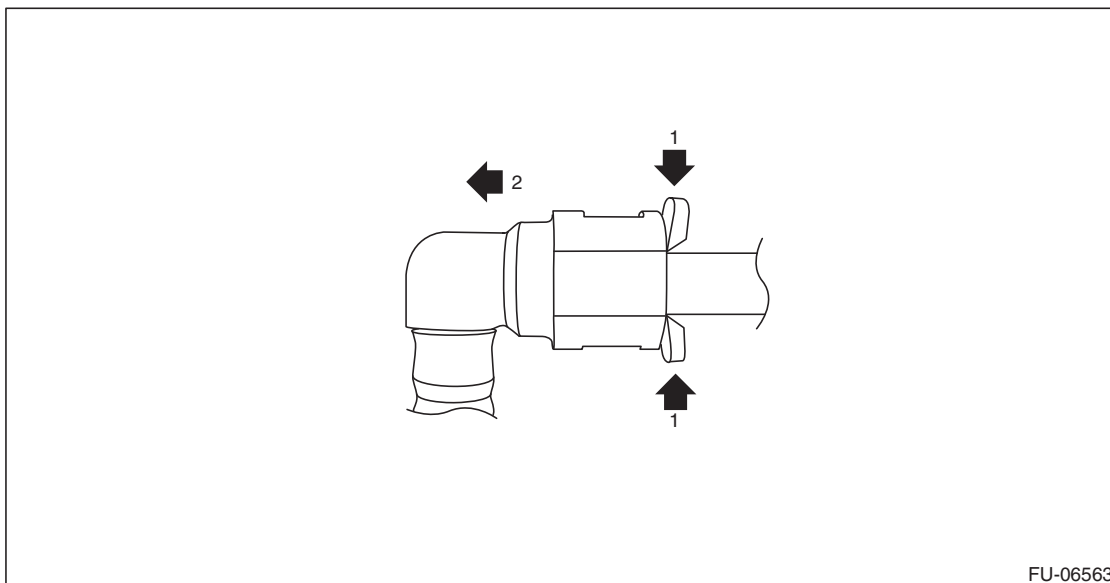
Fuel Delivery and Evaporation Lines

FUEL INJECTION (FUEL SYSTEMS)

7) Disconnect the quick connector and remove the purge pipe.

NOTE:

Disconnect the quick connector as shown in the figure.

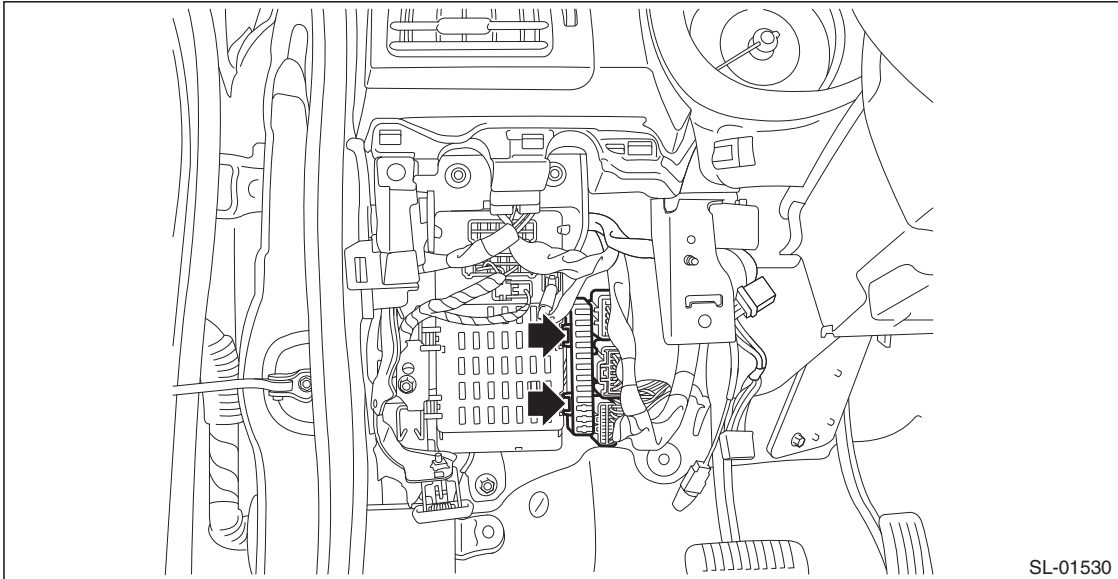


Fuel Delivery and Evaporation Lines

FUEL INJECTION (FUEL SYSTEMS)

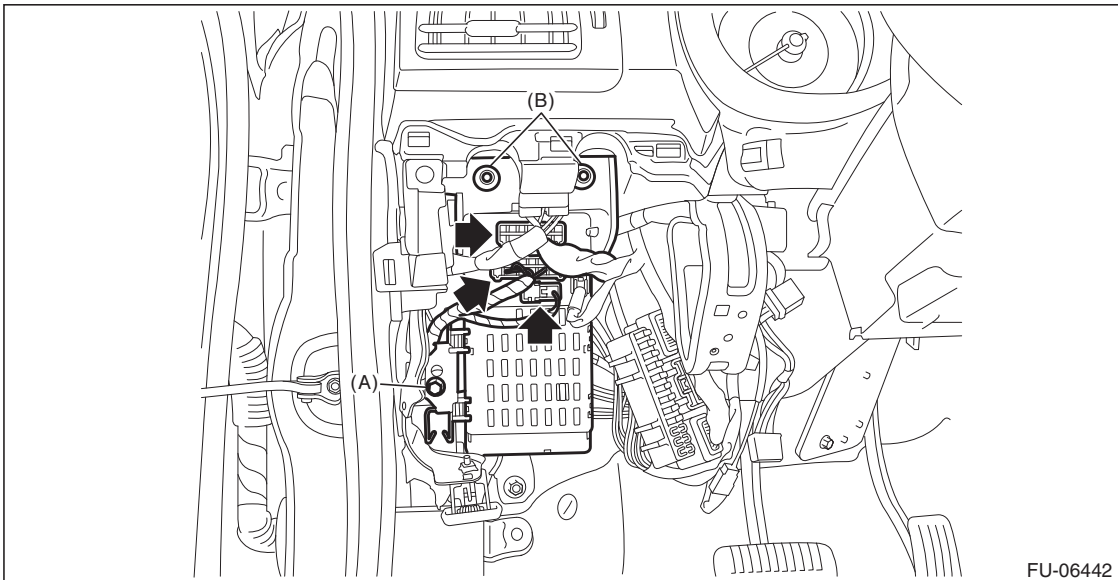
8) Remove the body integrated unit.

- (1) Remove the knee airbag module. <Ref. to AB-39, REMOVAL, Knee Airbag Module.>
- (2) Release the lock and remove the fuse holder from the relay & fuse box.



(3) Disconnect the connectors from the relay & fuse box.

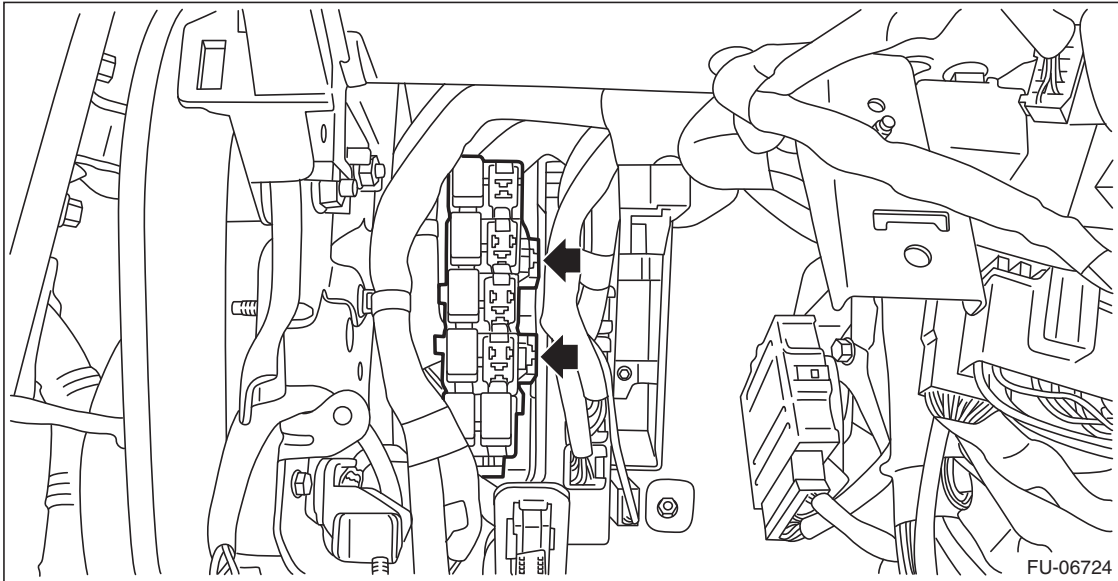
(4) Remove the bolts (A) and nuts (B), and remove the relay & fuse box.



Fuel Delivery and Evaporation Lines

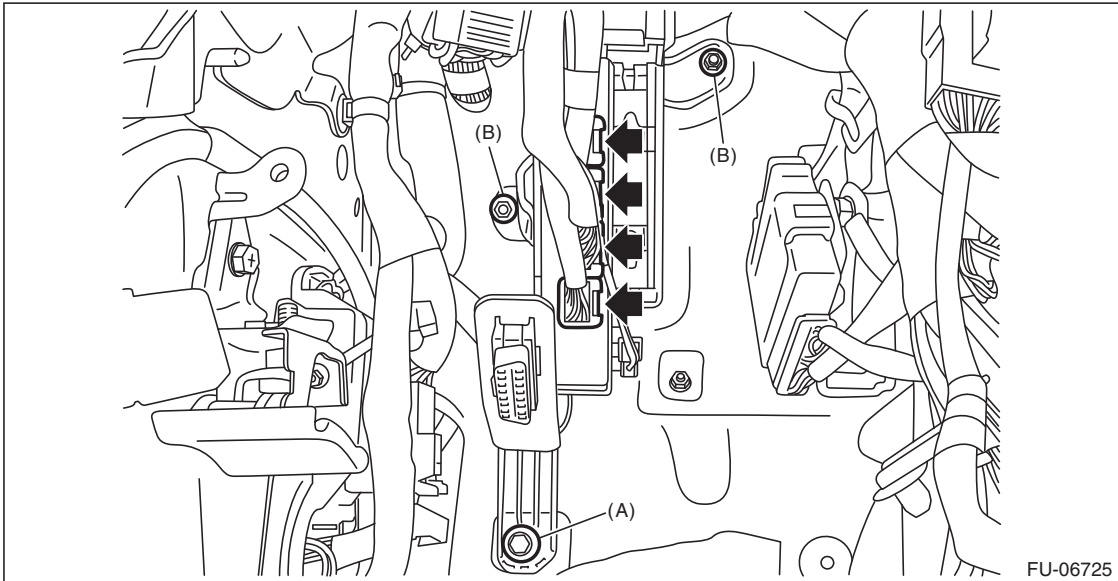
FUEL INJECTION (FUEL SYSTEMS)

- (5) Release the lock and remove the relay block.



- (6) Disconnect the connector from body integrated unit.

- (7) Remove the bolt (A) and nut (B), and remove the body integrated unit along with the bracket.



- 9) Remove the fuel pipe assembly from vehicle.

Fuel Delivery and Evaporation Lines

FUEL INJECTION (FUEL SYSTEMS)

B: INSTALLATION

Install in the reverse order of removal while being careful of the following.

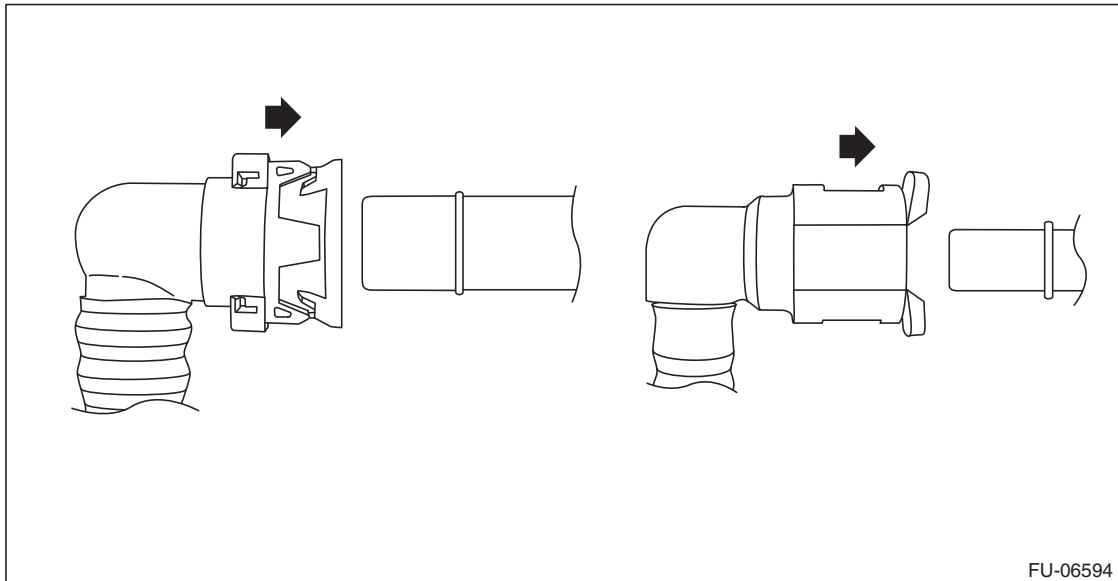
1. CONNECTING THE EVAPORATION LINE QUICK CONNECTOR

NOTE:

Connect the quick connector as shown in the figure.

CAUTION:

- Check that there is no damage or dust on the quick connector. If necessary, clean the seal surface of the pipe.
- Make sure that the quick connector is securely connected.



Fuel Delivery and Evaporation Lines

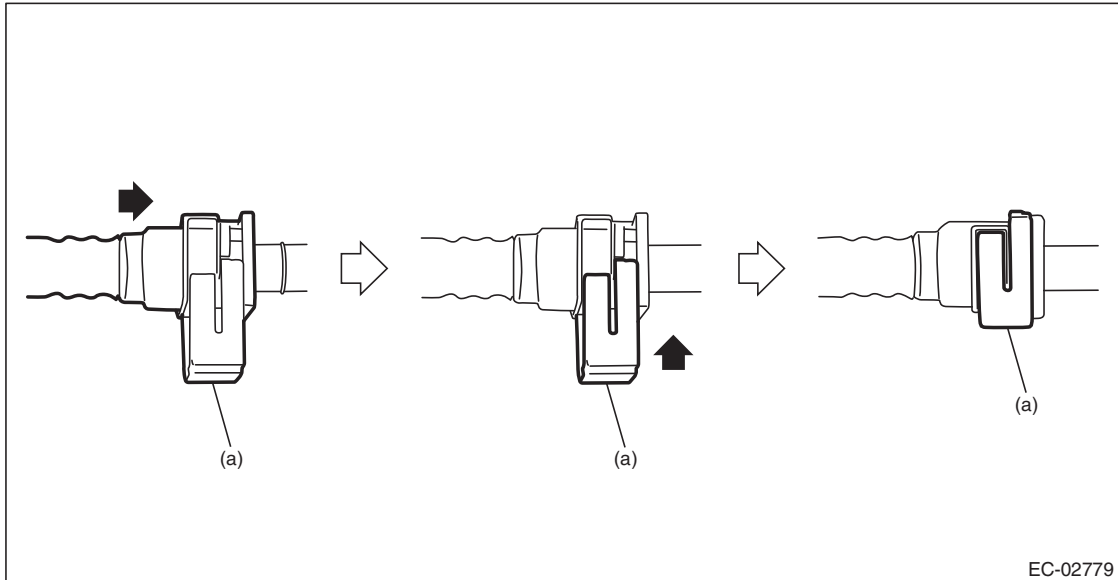
FUEL INJECTION (FUEL SYSTEMS)

2. CONNECTING THE FUEL LINE QUICK CONNECTOR

Connect the quick connector as shown in the figure.

CAUTION:

- Check that there is no damage or dust on the quick connector. If necessary, clean the seal surface of the pipe.
- When connecting the quick connector, make sure to insert the pipe all the way in before locking the slider.
- When it is difficult to lock the slider, check that the pipe is fully inserted.
- Make sure that the quick connector is securely connected.



(a) Slider

Fuel Delivery and Evaporation Lines

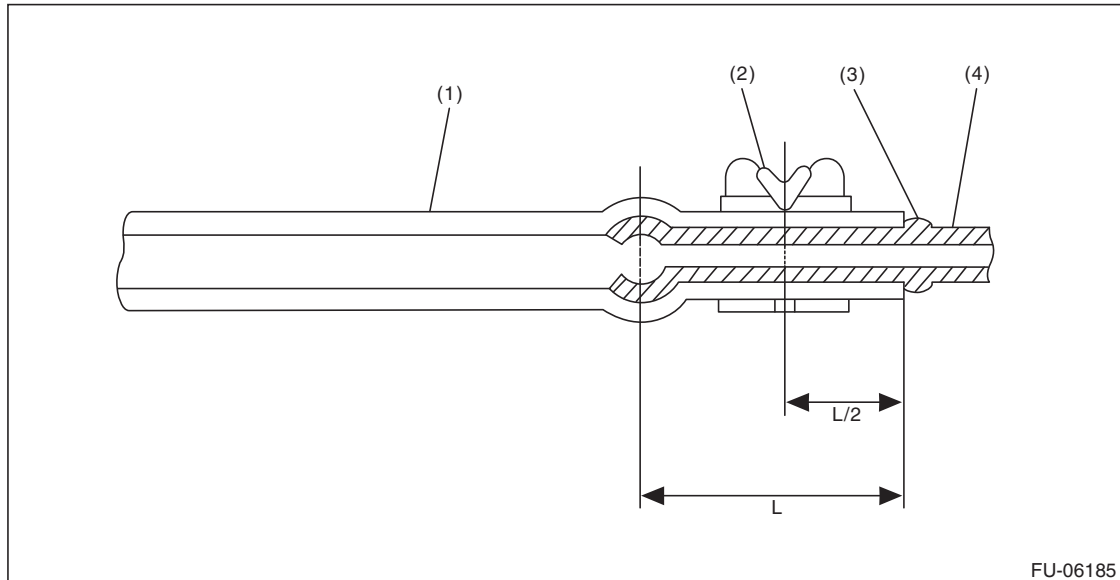
FUEL INJECTION (FUEL SYSTEMS)

3. EVAPORATION HOSE CONNECTION

Connect the evaporation hose by inserting it to the pipe until the hose reaches the spool or bump.

NOTE:

If there is no spool nor bump, connect the evaporation hose by inserting it at 2.8 mm (1.1 in) to the pipe.



- (1) Hose
- (2) Clip

- (3) Spool or bump

- (4) Pipe



Fuel Delivery and Evaporation Lines

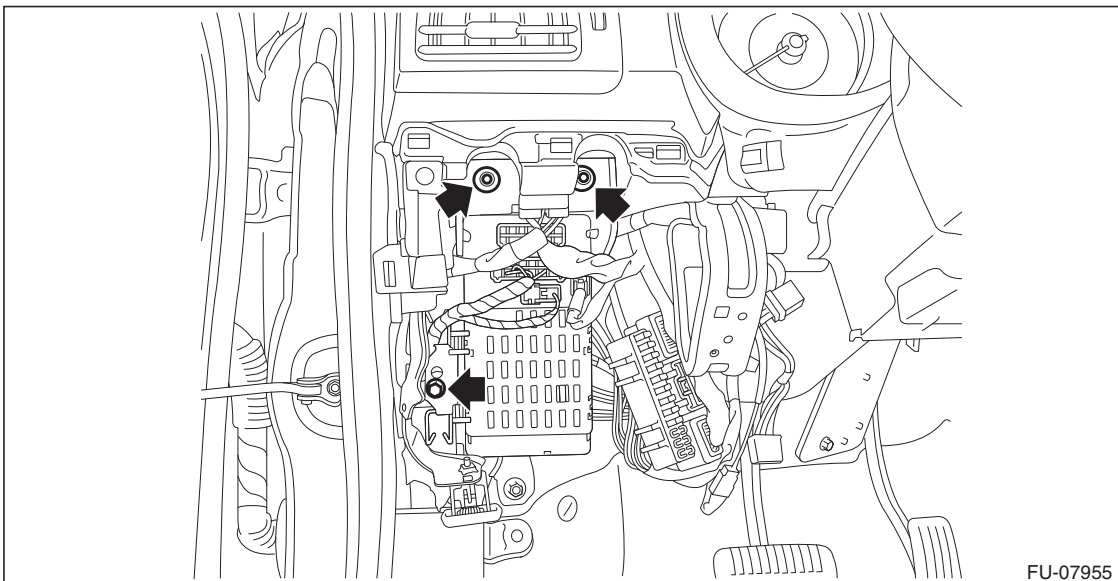
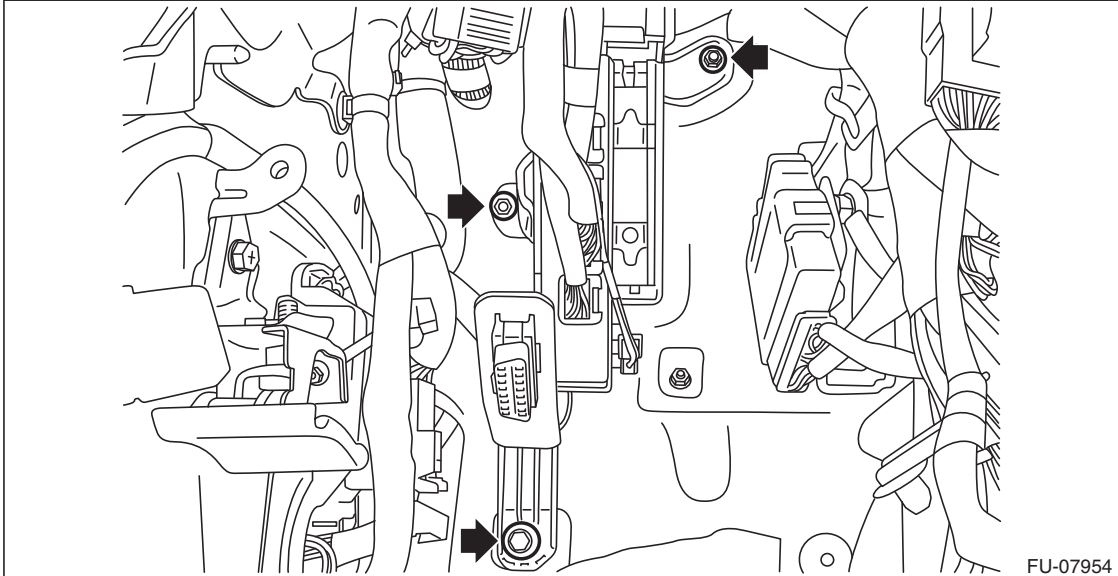
FUEL INJECTION (FUEL SYSTEMS)

4. BODY INTEGRATED UNIT INSTALLATION

Tighten the bolts and nuts in the figure to the torque specified below.

Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



C: INSPECTION

- 1) Check that the fuel pipe has no deformation, cracks or other damages.
- 2) Check that the hose and tube have no cracks, damage or loose part.

Fuel System Trouble in General

FUEL INJECTION (FUEL SYSTEMS)

42. Fuel System Trouble in General

A: INSPECTION

Trouble	Possible cause	Corrective action
Insufficient fuel supply to fuel injector	a. Fuel pump does not operate.	
	○ Defective terminal contact	Inspect contact, especially ground, and tighten it securely.
	○ Trouble in electromagnetic or electronic circuit parts	Replace the faulty parts.
	b. Decline of fuel pump function	Replace the fuel pump.
	c. Clogged fuel filter	Replace the fuel filter. Clean or replace the fuel tank if necessary.
	d. Clogged or bent fuel line pipe, hose or tube	Clean, correct or replace the fuel line pipe, hose or tube.
	e. Air is mixed in fuel system.	Check the fuel line connections, correct or replace the defective part.
	f. Damaged diaphragm of pressure regulator	Replace the pressure regulator.
Leakage or blow out of fuel	a. Loose connections of fuel line pipe, hose or tube	Check the fuel line connections, correct or replace the defective part.
	b. Cracked fuel line pipe, hose or tube	Replace the fuel line pipe, hose or tube.
	c. Cracked fuel tank or defective welding part	Replace the fuel tank.
	d. Clogged or bent fuel line pipe, hose or tube	Clean, correct or replace the fuel line pipe, hose or tube.
Gasoline smell inside of compartment	a. Loose connections of fuel line pipe, hose or tube	Check the fuel line connections, correct or replace the defective part.
	b. Improper installation of rubber saucer	Correct or replace the rubber saucer.
	c. Defective canister	Replace the canister.
Defective fuel gauge	a. Defective operation of fuel level sensor	Replace the fuel level sensor.
	b. Defective operation of combination meter <Ref. to IDI(diag)-2, COMBINATION METER, PROCEDURE, Basic Diagnostic Procedure.>	Replace the combination meter.
	c. Defective operation of integrated unit	Replace the integrated unit.
Noise	a. Large operation noise or vibration of fuel pump	Replace the fuel pump.

NOTE:

- When the vehicle is left unattended for an extended period of time, water may accumulate in the fuel tank. Fill fuel fully to prevent the problem.
- In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop to 0°C (32°F) or less throughout the winter season, use a water removing agent in the fuel system to prevent freezing fuel system and accumulating water.
- When water is accumulated in fuel filter, fill the water removing agent in the fuel tank.
- Before using water removing agent, follow the cautions noted on the bottle.

Fuel System Trouble in General

FUEL INJECTION (FUEL SYSTEMS)
