1. General Description

A: SPECIFICATION

Specifications for the HEV model are included in the CO (H4DO (w/o HEV)) section. <Ref. to CO(H4DO(w/o HEV))-2, General Description.>

LUBRICATION

LU(H4DO(HEV))

Page
1. General Description 2

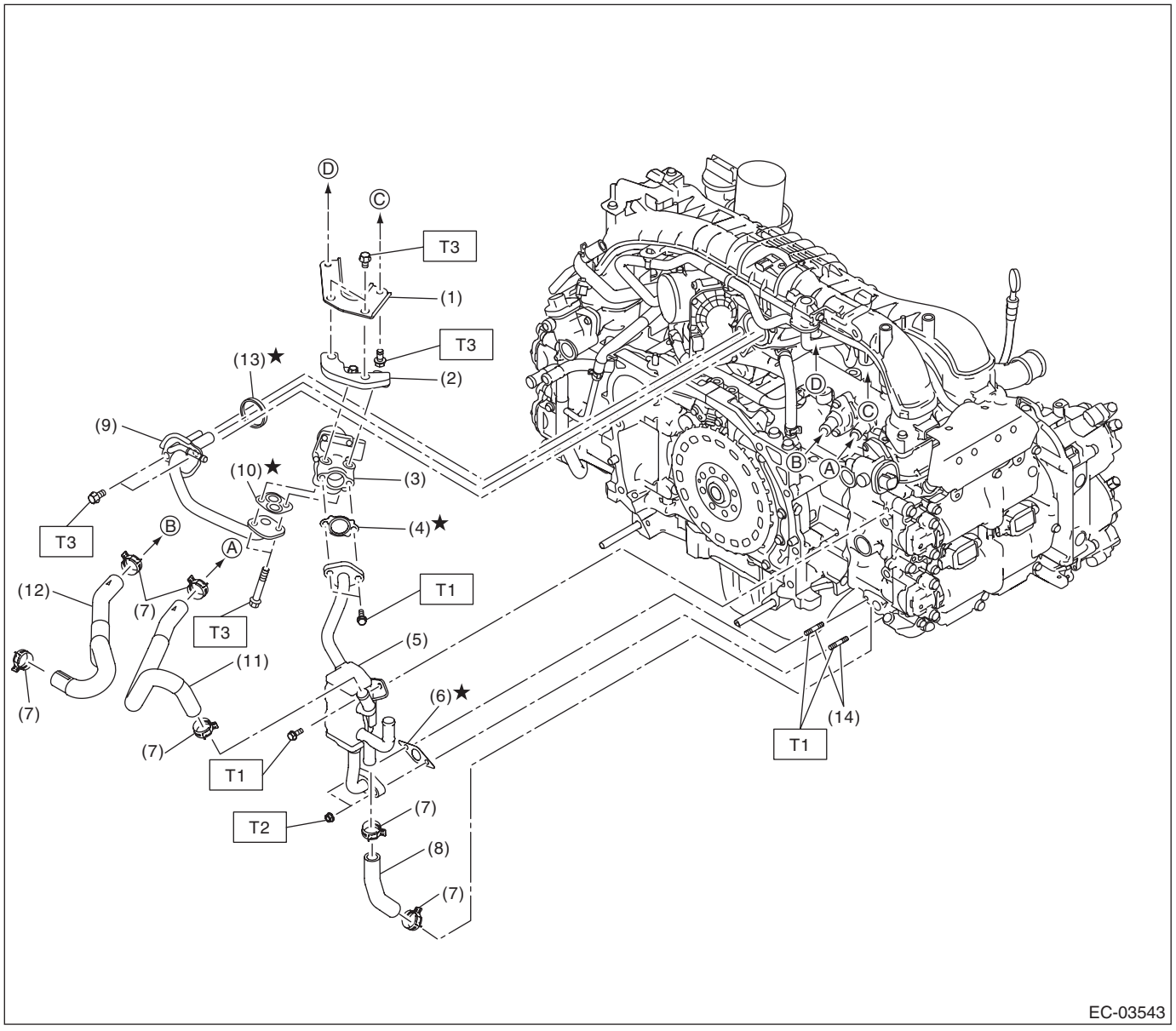
1. General Description

A: COMPONENT

1. CANISTER, PURGE CONTROL SOLENOID VALVE, DRAIN FILTER AND LEAK CHECK VALVE ASSEMBLY

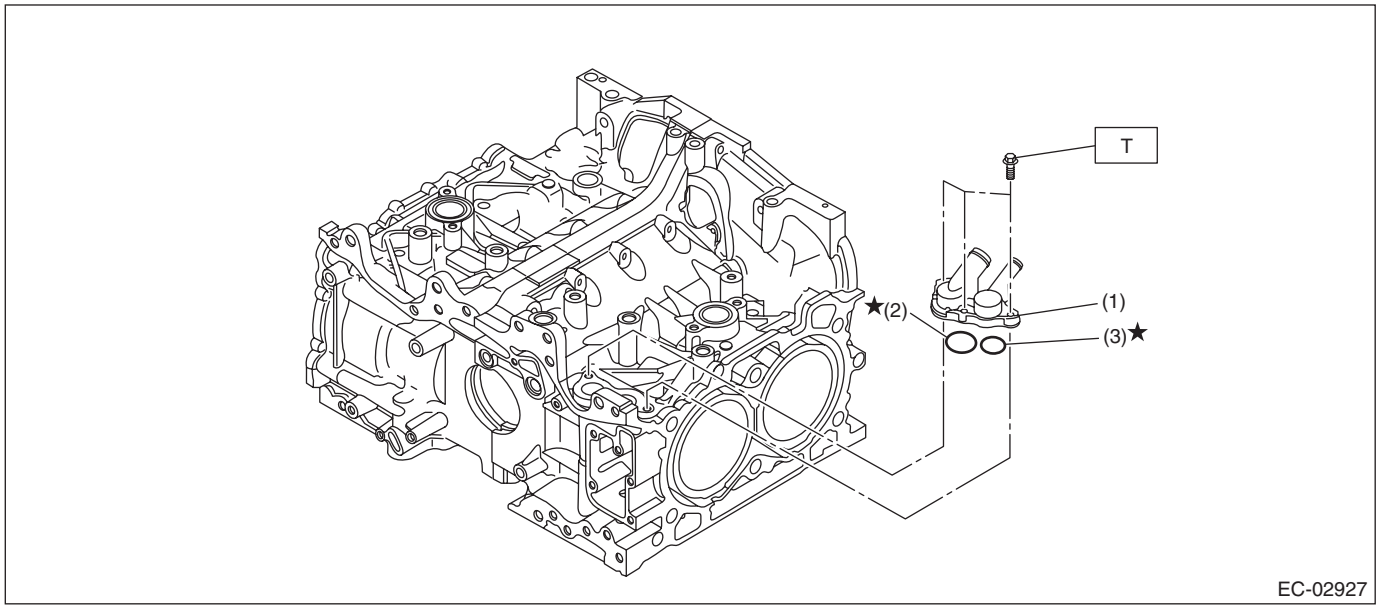
For components of canister, purge control solenoid valve, drain filter, and leak check valve assembly, refer to “FU (H4DO (HEV))”. <Ref. to FU(H4DO(HEV))-3, COMPONENT, General Description.>

2. EXHAUST GAS RECIRCULATION CONTROL CIRCUIT RANGE/PERFORMANCE



(1)	EGR control valve bracket A	(8)	Engine coolant inlet hose	(14)	Stud bolt
(2)	EGR control valve bracket B	(9)	EGR pipe		
(3)	EGR control valve	(10)	Gasket	***Tightening torque: N·m (kgf-m, ft-lb)***	
(4)	Gasket	(11)	Engine coolant outlet hose A	***T1: 6.4 (0.7, 4.7)***	
(5)	EGR cooler	(12)	Engine coolant outlet hose B	***T2: 9 (0.9, 6.6)***	
(6)	Gasket	(13)	Gasket	***T3: 19 (1.9, 14.0)***	
(7)	Clip				

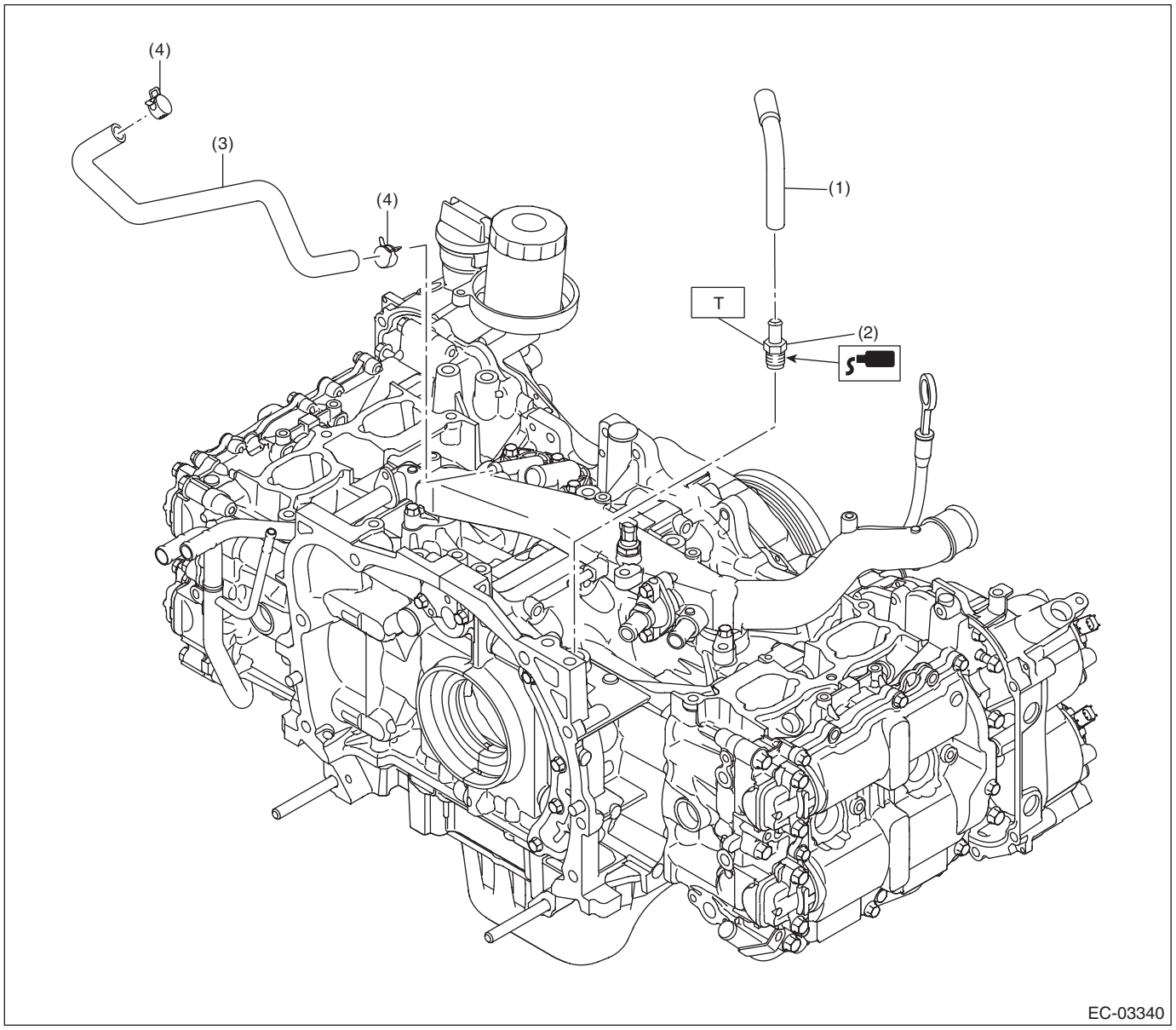
3. PCV SYSTEM 1



(1) PCV connector
(2) O-ring
(3) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T: 6.4 (0.7, 4.7)

4. PCV SYSTEM 2



(1) PCV hose A
(2) PCV valve
(3) PCV hose B
(4) Clip

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

B: CAUTION

- Prior to starting work, pay special attention to the following:
  1. Always wear work clothes, a work cap, and 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.
- 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.
- Be sure to tighten the fasteners including bolts and nuts to the specified torque.

C: PREPARATION TOOL

1. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.

2. Front Catalytic Converter

A: REMOVAL

The front catalytic converter is integrated into the front exhaust pipe; therefore, refer to “Front Exhaust Pipe” for the removal procedure. <Ref. to EX(H4DO(w/o HEV))-6, REMOVAL, Front Exhaust Pipe.>

B: INSTALLATION

The front catalytic converter is integrated into the front exhaust pipe; therefore, refer to “Front Exhaust Pipe” for the installation procedure. <Ref. to EX(H4DO(w/o HEV))-8, INSTALLATION, Front Exhaust Pipe.>

C: INSPECTION

1) Check the connections and welded parts for exhaust leaks.
2) Make sure there are no holes or rusting.

3. Rear Catalytic Converter

A: REMOVAL

The rear catalytic converter is integrated into the center exhaust pipe; therefore, refer to “Center Exhaust Pipe” for the removal procedure. <Ref. to EX(H4DO(w/o HEV))-14, REMOVAL, Center Exhaust Pipe.>

B: INSTALLATION

The rear catalytic converter is integrated into the center exhaust pipe; therefore, refer to “Center Exhaust Pipe” for the installation procedure. <Ref. to EX(H4DO(w/o HEV))-15, INSTALLATION, Center Exhaust Pipe.>

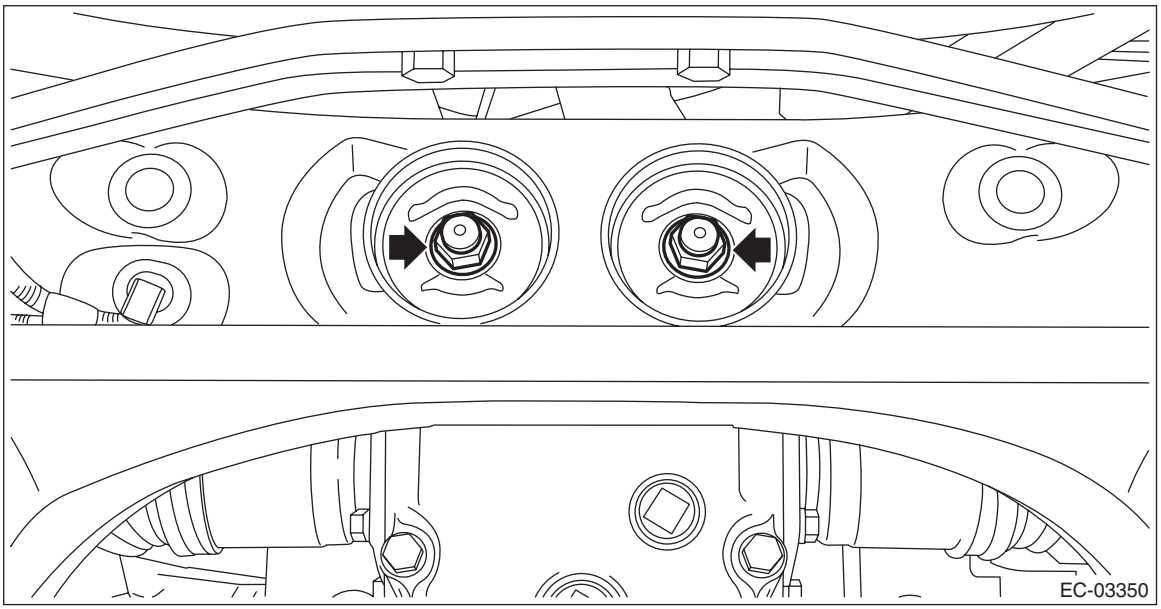
C: INSPECTION

1) Check the connections and welded parts for exhaust leaks.
2) Make sure there are no holes or rusting.

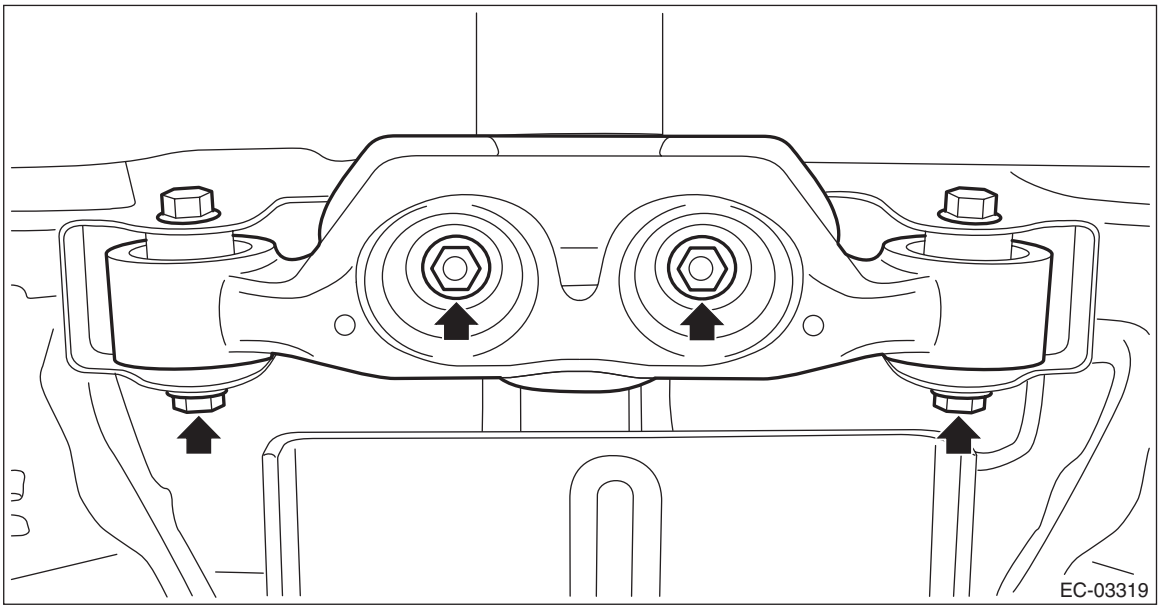
4. Canister

A: REMOVAL

1) Remove the rear wheel LH.
2) Lift up the vehicle.
3) Remove the rear exhaust pipe. <Ref. to EX(H4DO(w/o HEV))-18, REMOVAL, Rear Exhaust Pipe.>
4) Remove the propeller shaft. <Ref. to DS-12, REMOVAL, Propeller Shaft.>
5) Support the rear differential with the transmission jack.
6) Remove the self-locking nuts which hold the rear differential to the rear sub frame assembly.



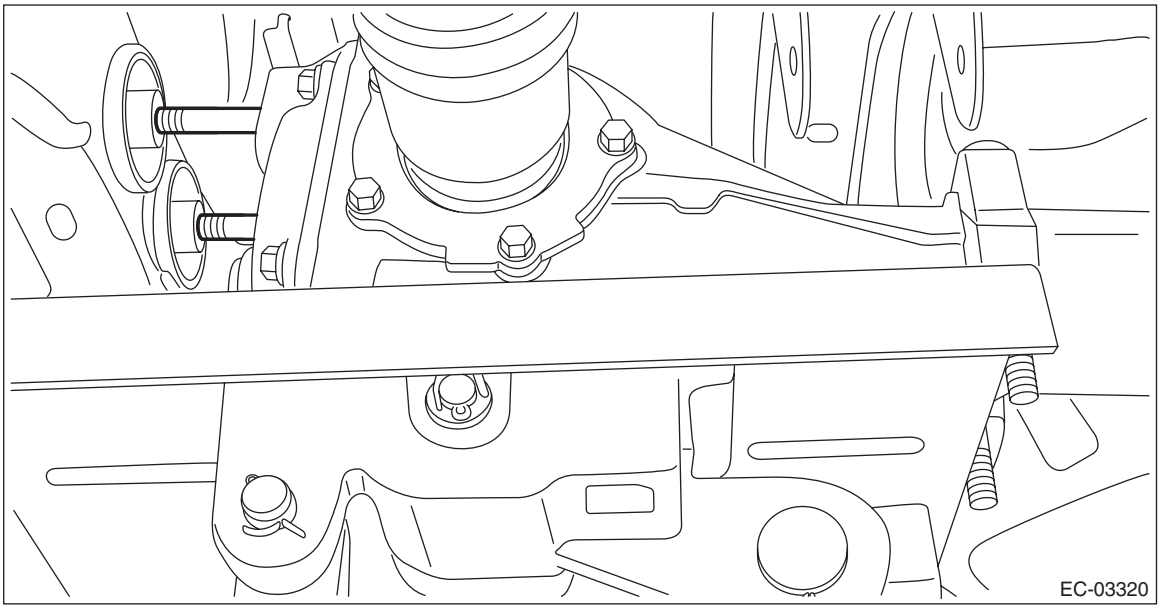
7) Remove the rear differential member from the rear sub frame assembly and the rear differential.



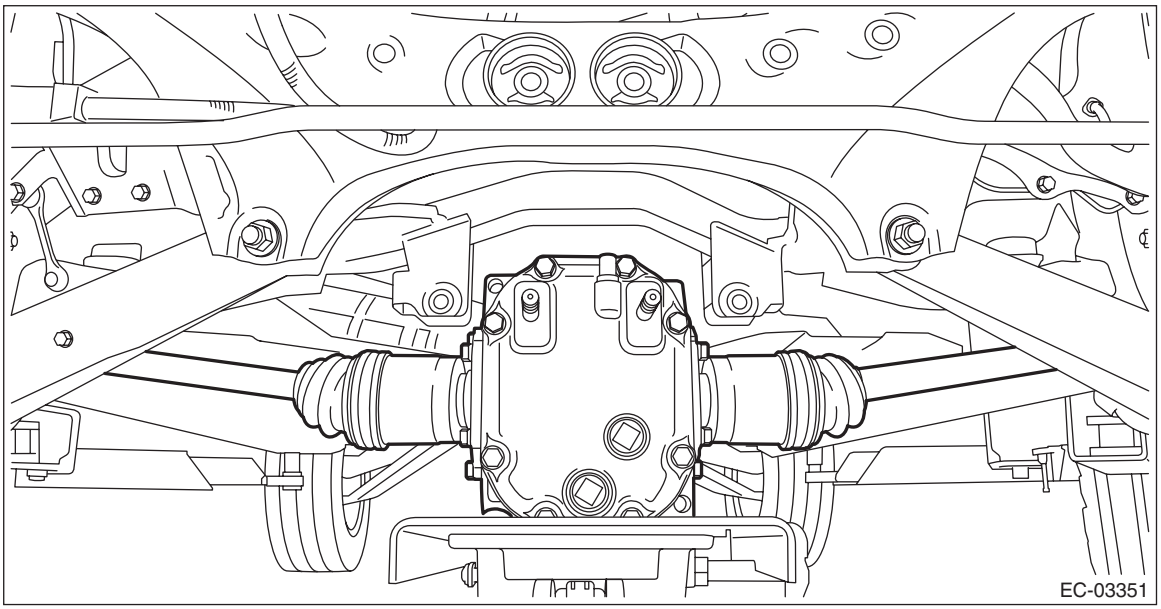
8) Lower the transmission jack gradually until the rear differential is at the position shown in the figure.

NOTE:

• When pulling out the stud bolt from the bushing portion of the rear sub frame assembly, adjust the angle and location of transmission jack and jack stand.

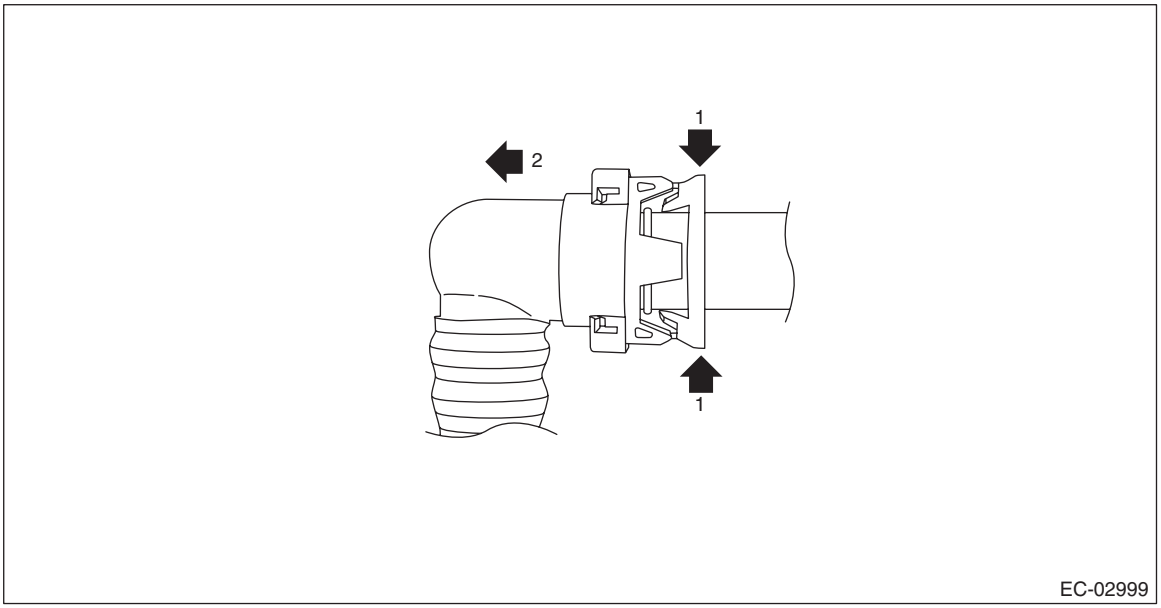


• Do not lower the rear differential excessively. Doing so may add extra load to the drive shaft or cause the falling-off of the drive shaft.



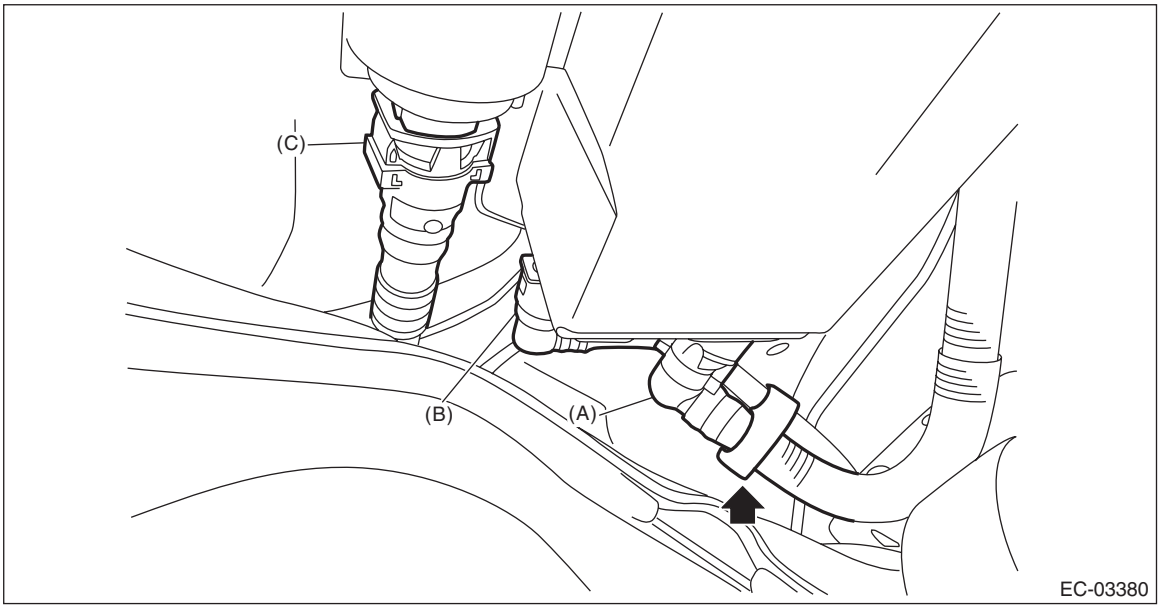
9) Remove the clips from vent tube (A) and purge tube (B).
10) Disconnect the vent tube (A), purge tube (B) and drain tube A (C) from the canister.

NOTE:
Disconnect the quick connector as shown in the figure.
- Drain tube and vent tube

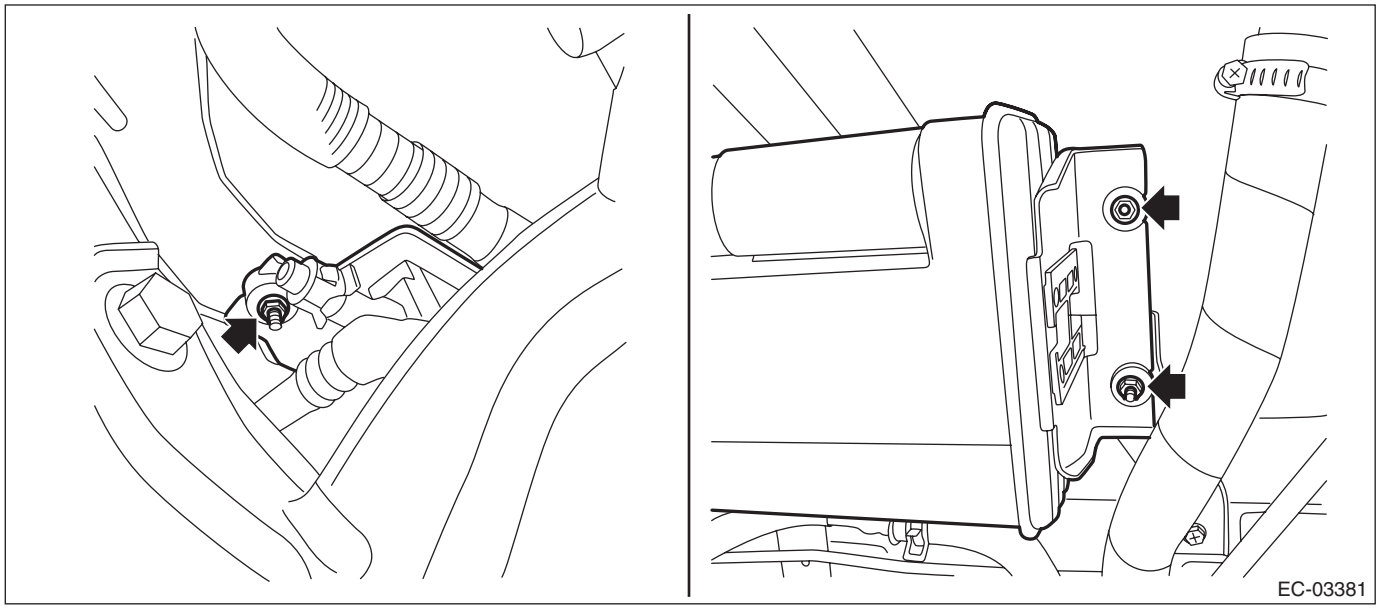


- Purge tube

For information about disconnecting the purge tube, refer to “Fuel Delivery and Evaporation Lines”. <Ref. to FU(H4DO(HEV))-149, REMOVAL, Fuel Delivery and Evaporation Lines.>

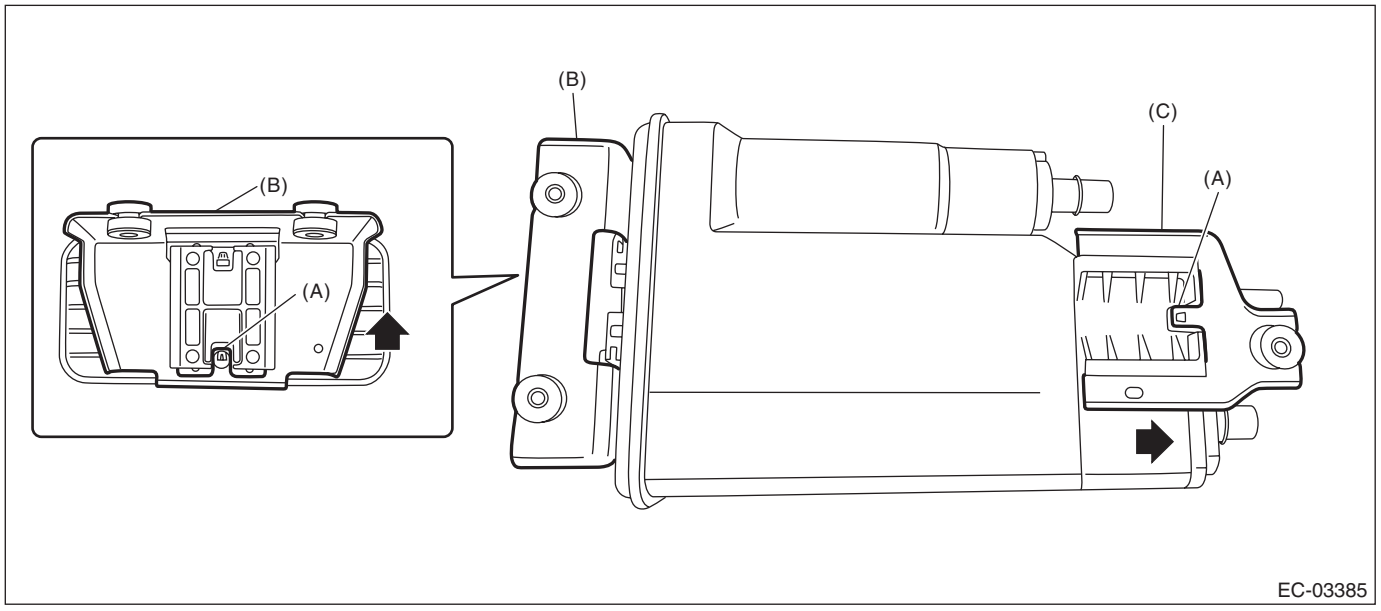


11) Remove the canister assembly from the vehicle and the canister bracket A.

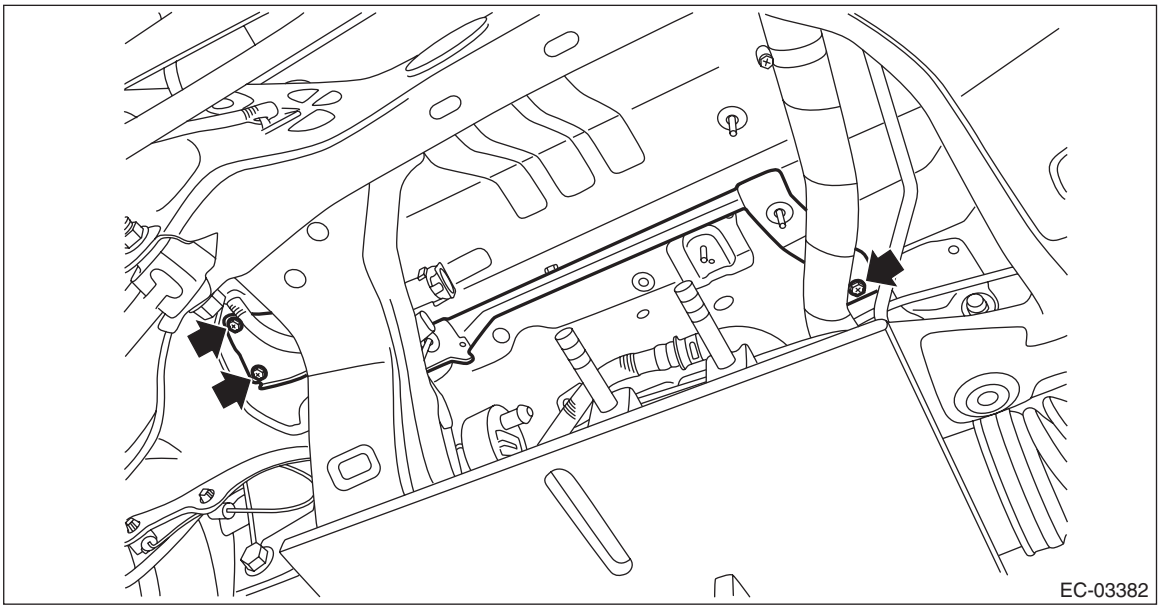


12) Release the claw (A) from the canister, slide it in the direction of the arrow, and remove the canister bracket B (B) and the canister bracket C (C).

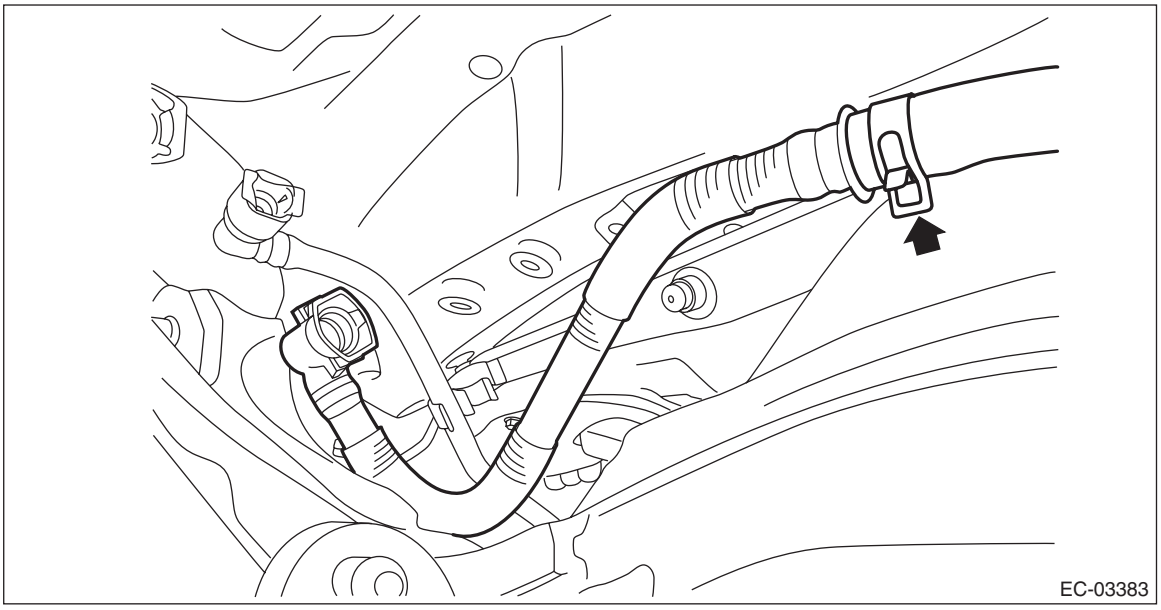
NOTE:
When removing the canister bracket from the canister, use the new canister and canister bracket to install.



13) Remove the canister bracket A from the vehicle.

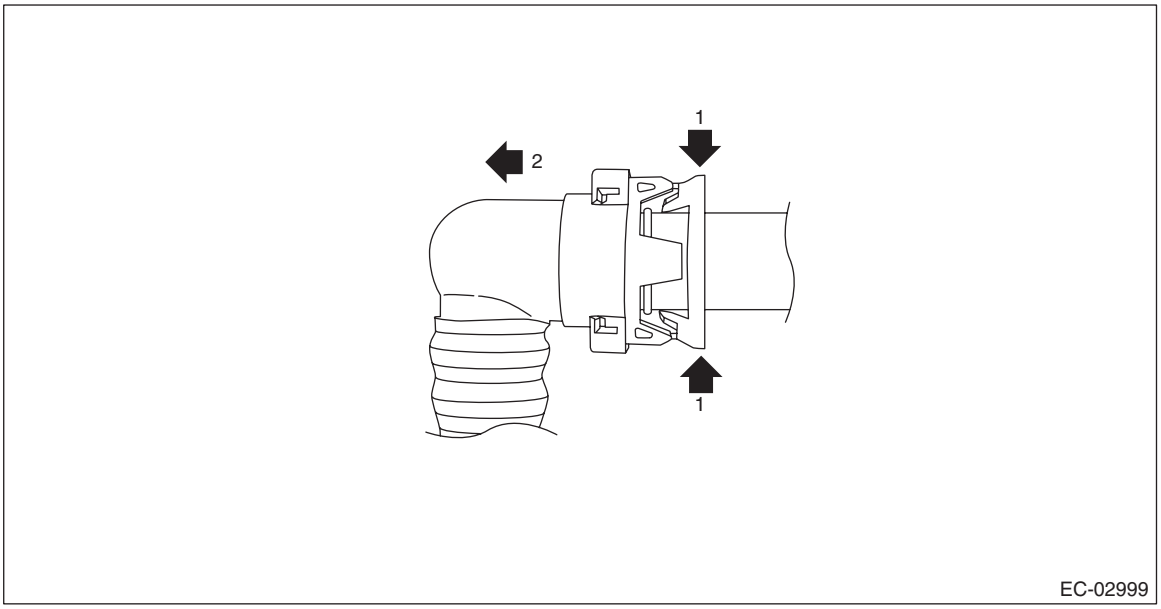


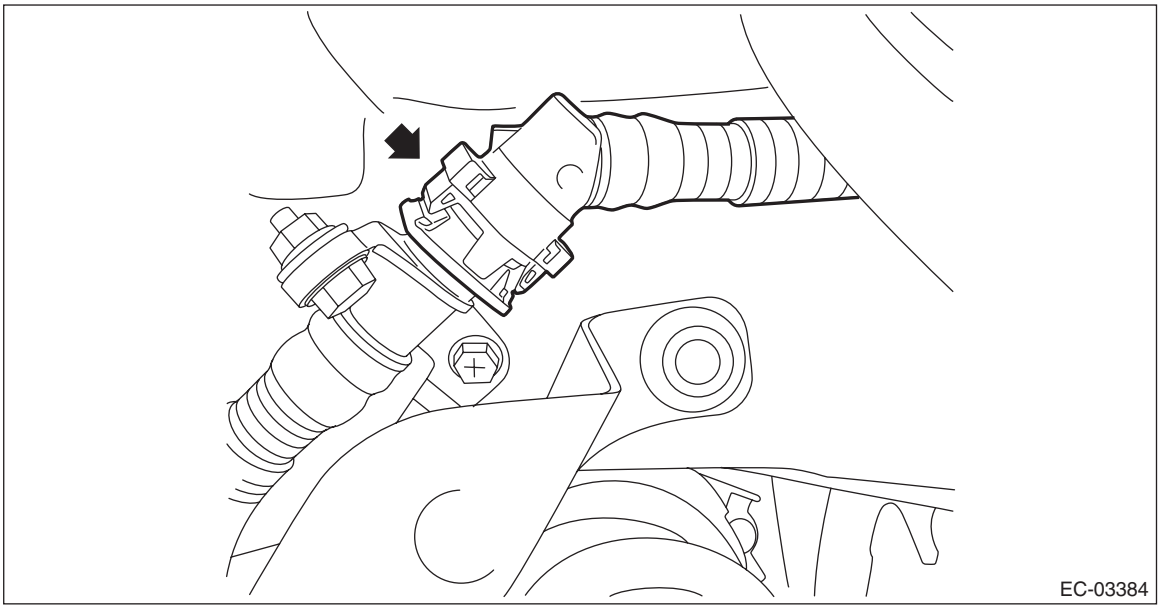
14) Disconnect the vent tube from the vent hose.



15) Disconnect the drain tube A from the drain tube B.

NOTE:
Disconnect the quick connector as shown in the figure.

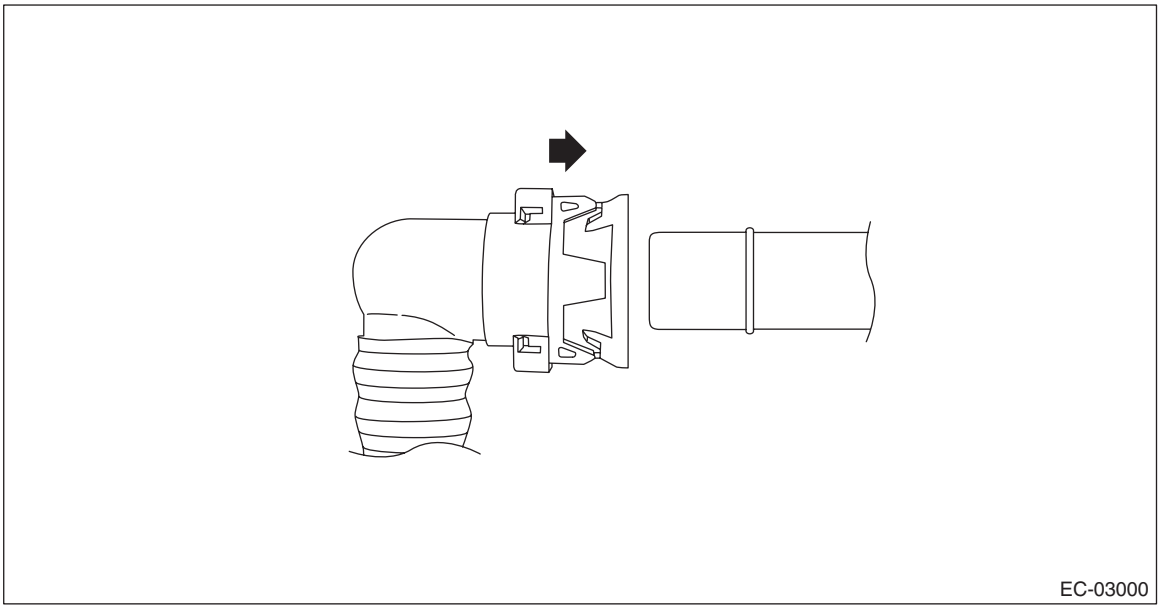


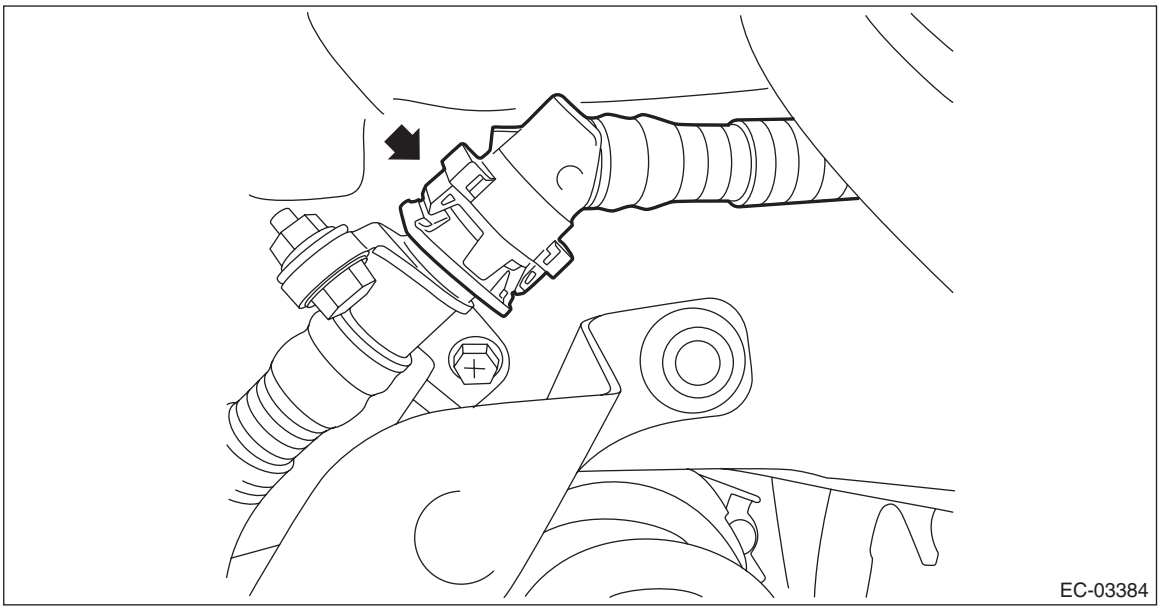


B: INSTALLATION

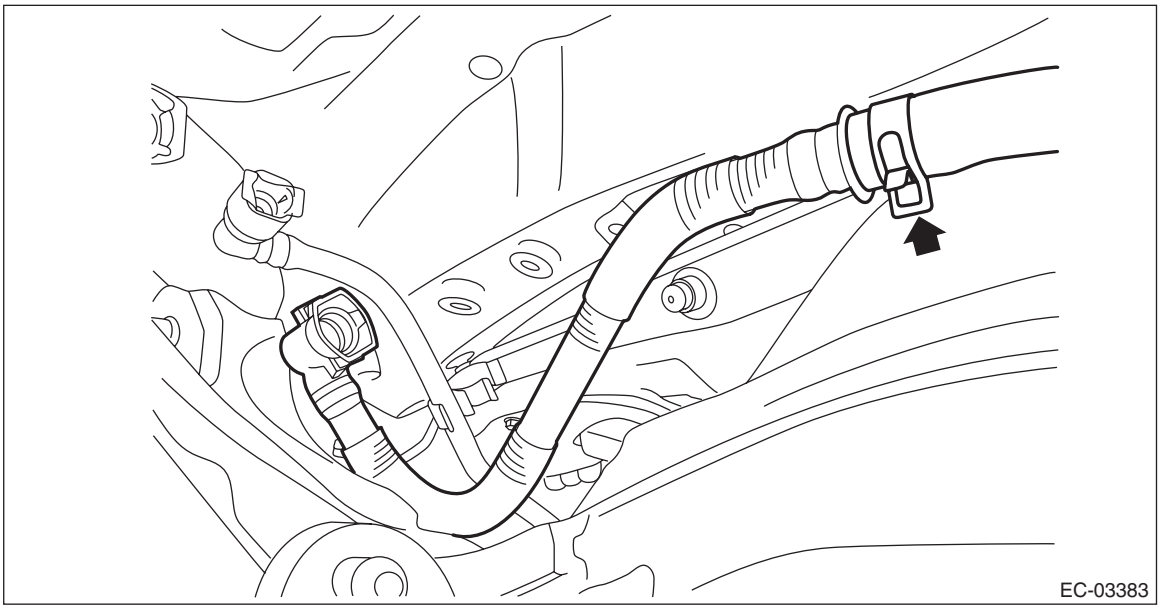
1) Connect the drain tube A to the drain tube B.

NOTE:
Connect the quick connector as shown in the figure.



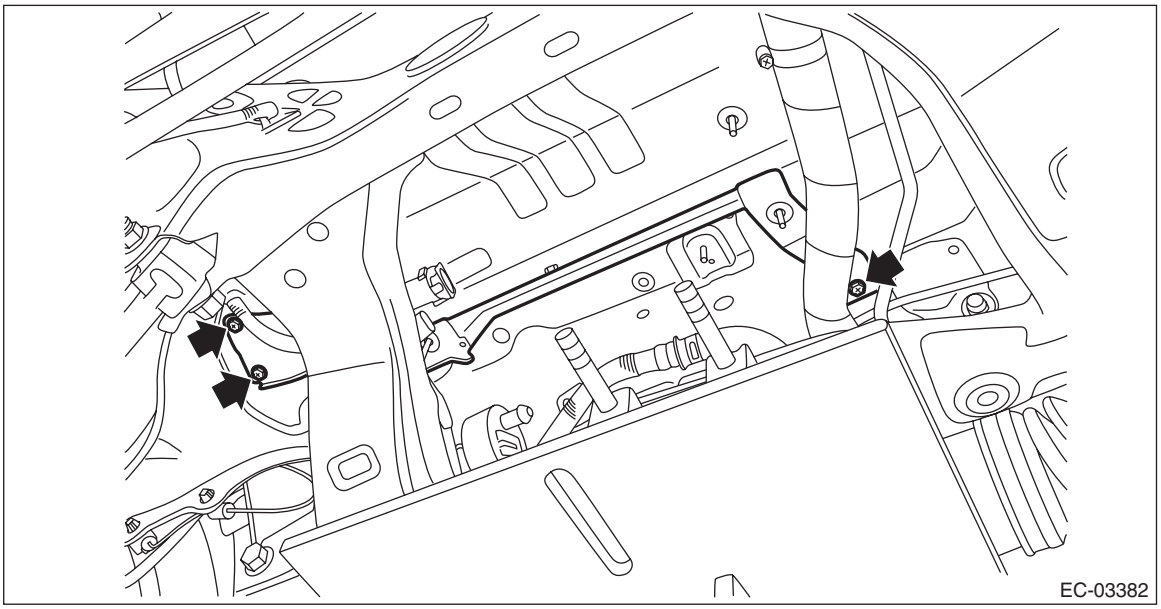


2) Connect the vent tube to the vent hose.



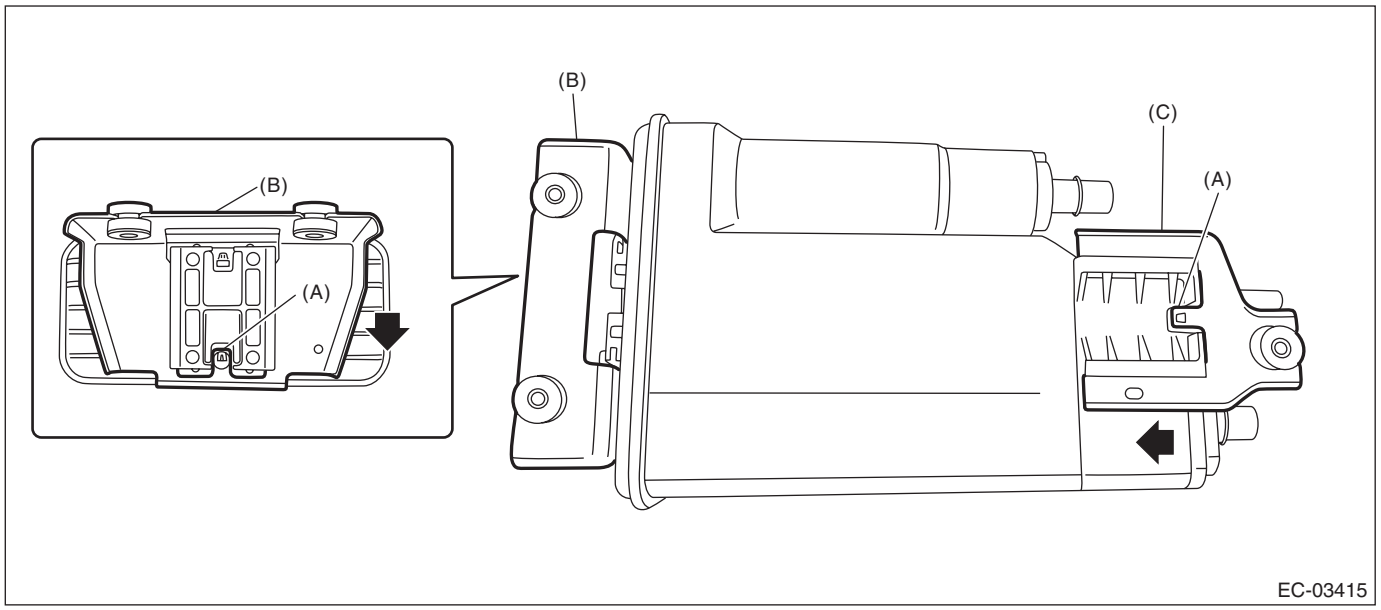
3) Install the canister bracket A to the vehicle.

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



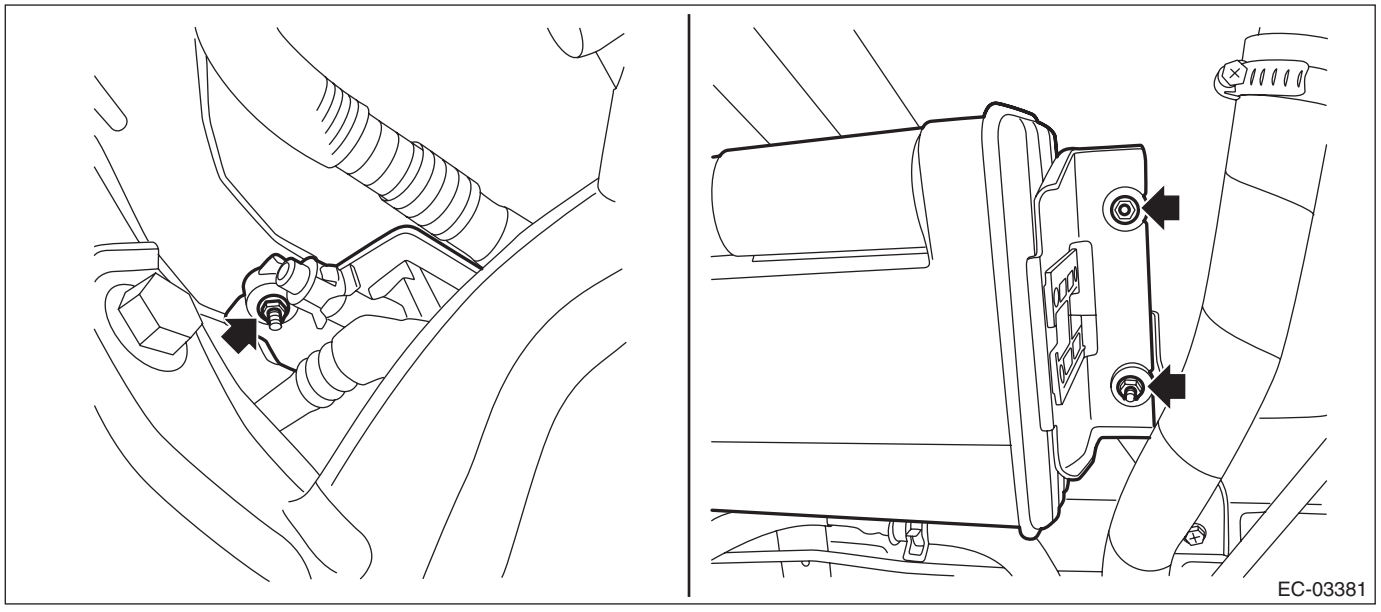
4) Slide in the direction of the arrow, and install the canister bracket B (B) and the canister bracket C (C) to the canister.

NOTE:
- Use a new canister and canister bracket.
- Check that the claw (A) is firmly secured.



5) Install the canister assembly to the vehicle and the canister bracket A.

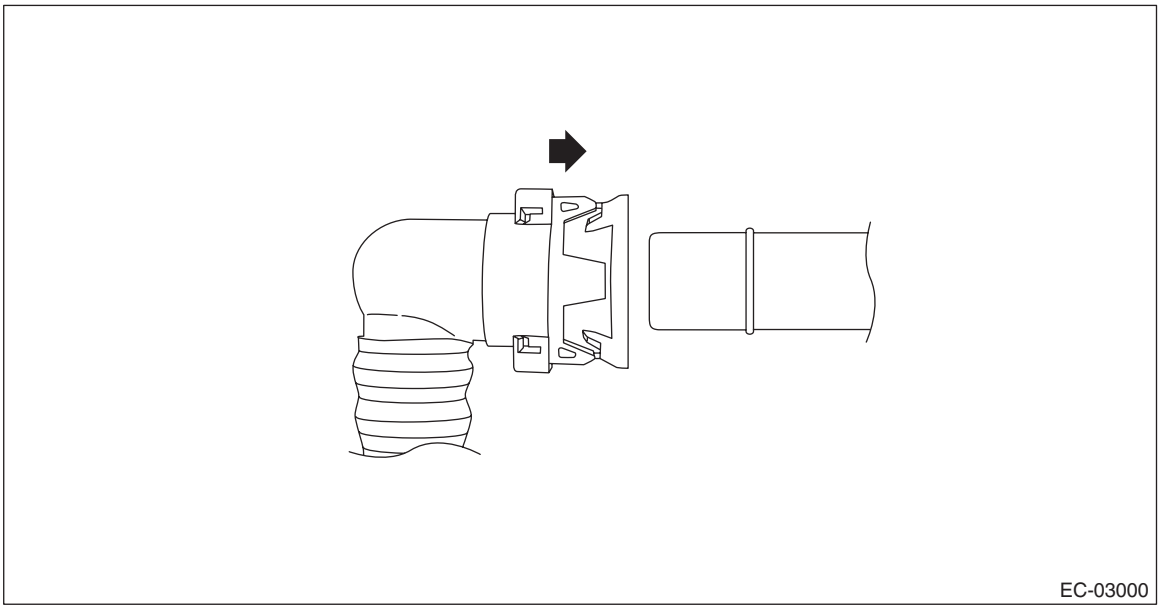
Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



6) Connect the vent tube (A), purge tube (B), and drain tube (C) 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.

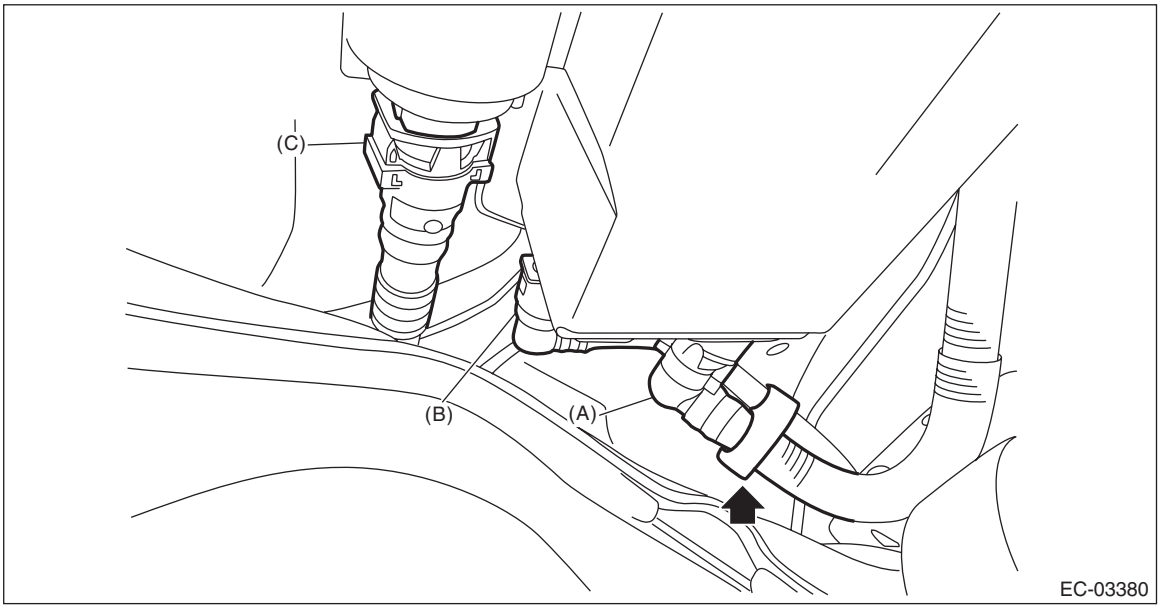
NOTE:
Install the quick connector as shown in the figure.
• Drain tube and vent tube



• Purge tube

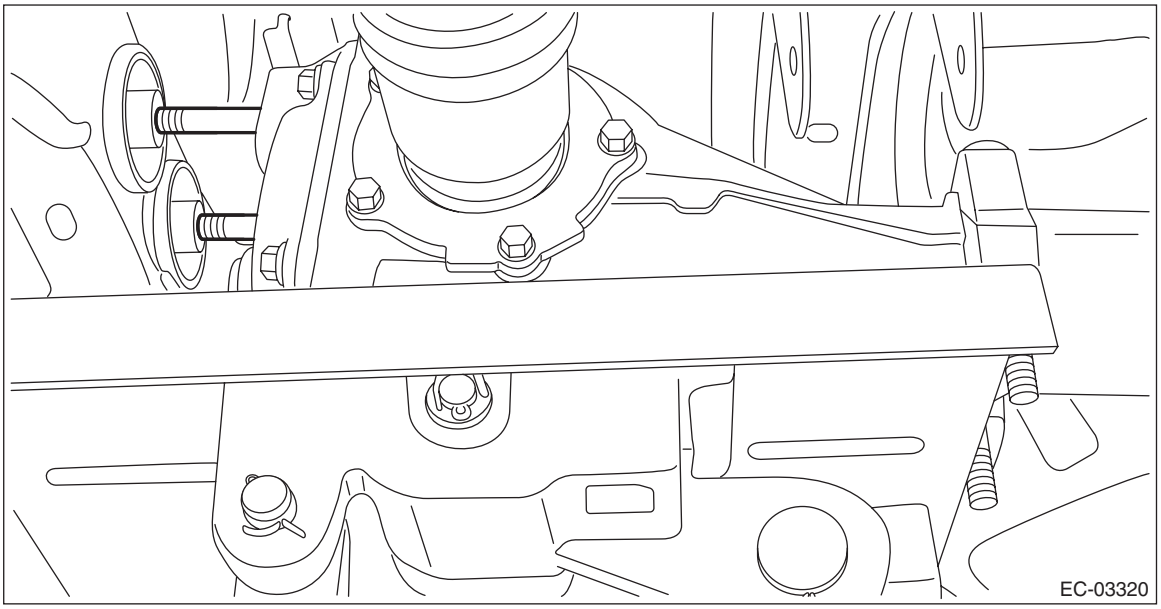
For information about connecting the purge tube, refer to “Fuel Delivery and Evaporation Lines”. <Ref. to FU(H4DO(HEV))-155, CONNECTION OF QUICK CONNECTOR OF PURGE TUBE (CANISTER SIDE), INSTALLATION, Fuel Delivery and Evaporation Lines.>

7) Install the clips to the vent tube (A) and purge tube (B).



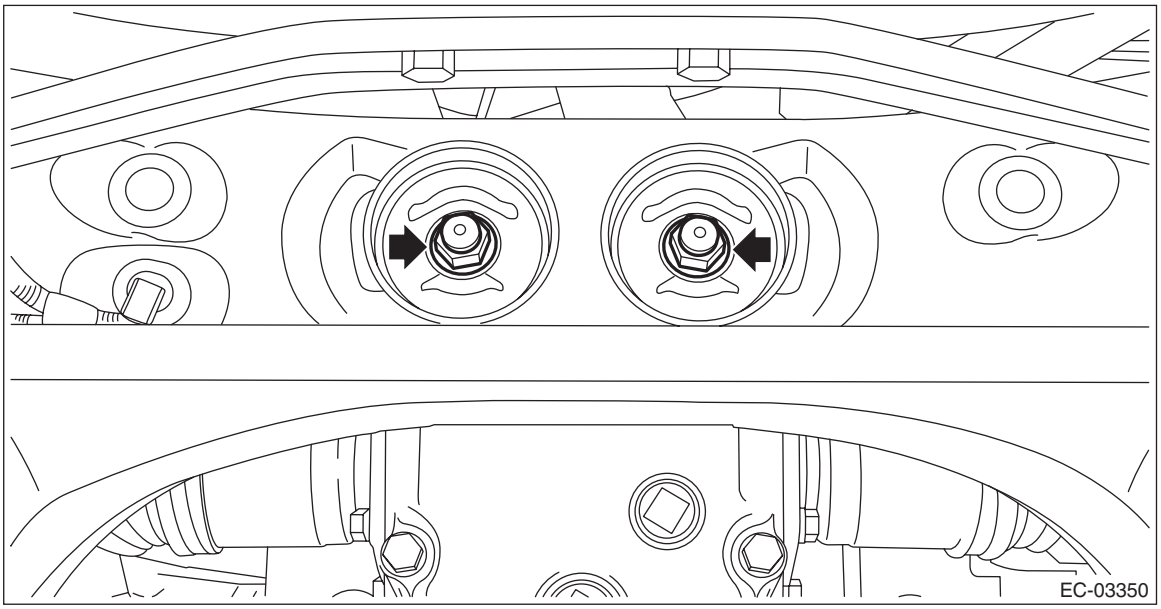
8) Lift up the transmission jack gradually, and set the rear differential to the rear sub frame assembly.

NOTE:
When inserting the stud bolt into the bushing portion of the rear sub frame assembly, adjust the angle and location of transmission jack and jack stand.



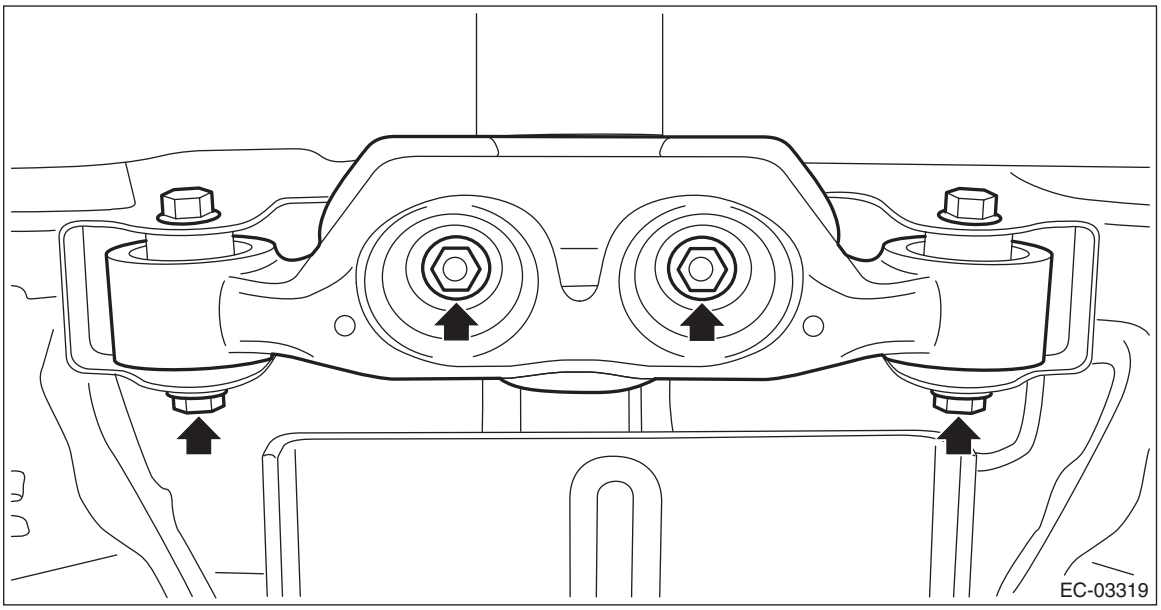
9) Temporarily tighten the self-locking nuts which hold the rear differential to the rear sub frame assembly.

NOTE:
Use a new self-locking nut.



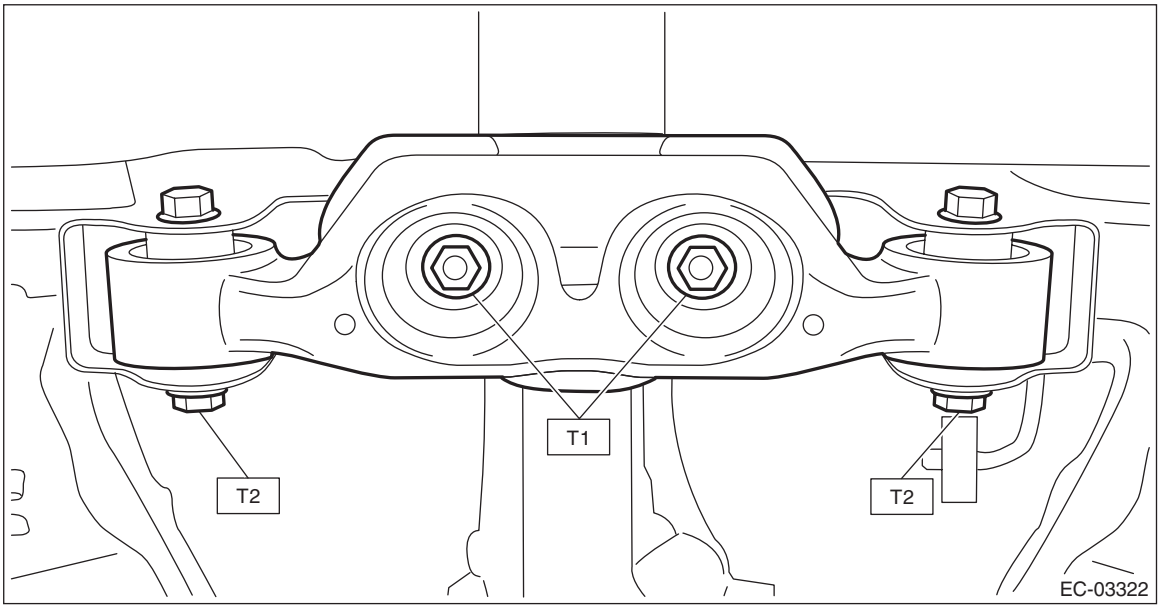
10) Set the rear differential member to the rear sub frame assembly and rear differential, and temporarily tighten the self-lock nuts which secure the rear differential member to the rear sub frame assembly and rear differential.

NOTE:
Use a new self-locking nut.



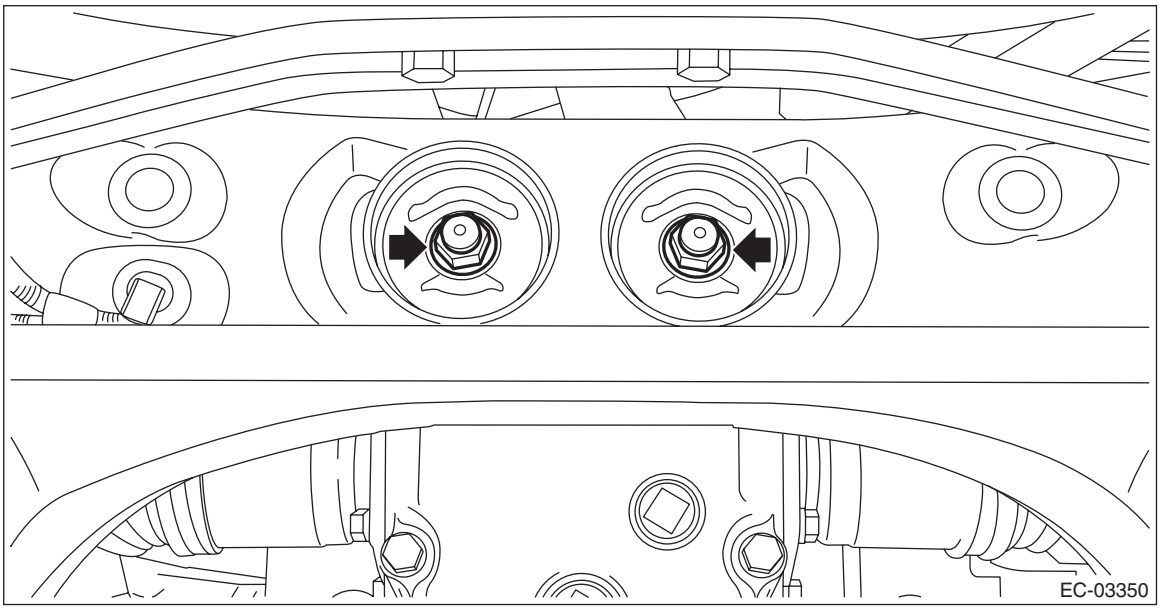
11) Remove the transmission jack from the rear differential.
12) Tighten the self-locking nuts which secure the rear differential member to the rear sub frame assembly and rear differential.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 110 N·m (11.2 kgf-m, 81.1 ft-lb)



13) Tighten the self-locking nuts which secure the rear differential to the rear sub frame assembly.

Tightening torque:
70 N·m (7.1 kgf-m, 51.6 ft-lb)



14) Install the propeller shaft. <Ref. to DS-13, INSTALLATION, Propeller Shaft.>
15) Install the rear exhaust pipe. <Ref. to EX(H4DO(w/o HEV))-20, INSTALLATION, Rear Exhaust Pipe.>
16) Lower the vehicle.

C: INSPECTION

1) Check that the canister has no deformation, cracks or other damages.
2) Check that the tube has no cracks, damage or loose part.

5. Purge Control Solenoid Valve

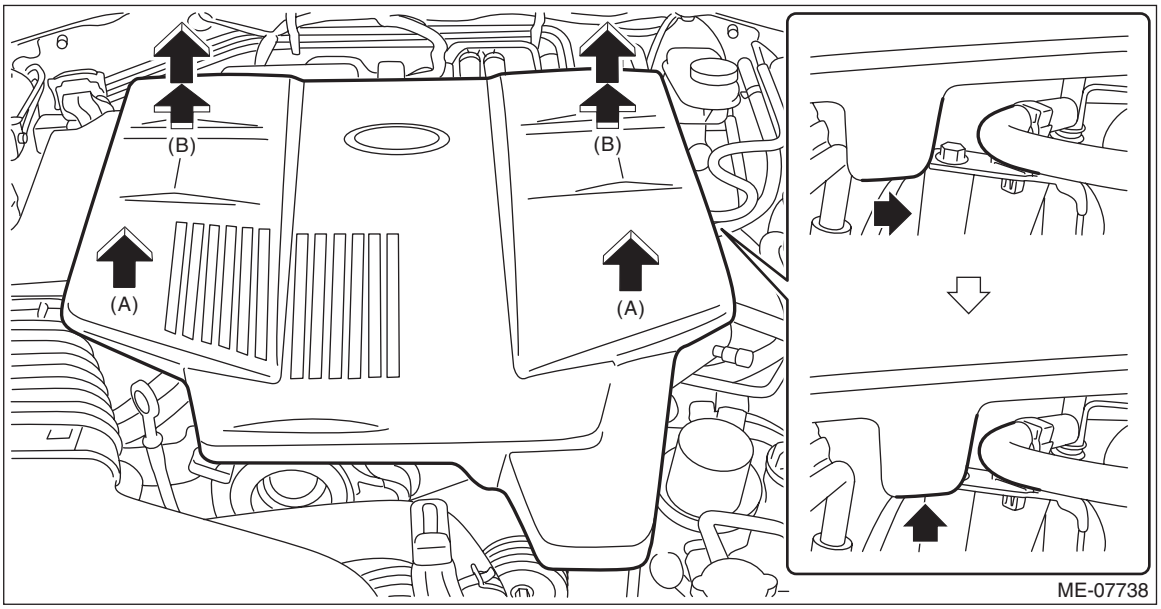
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

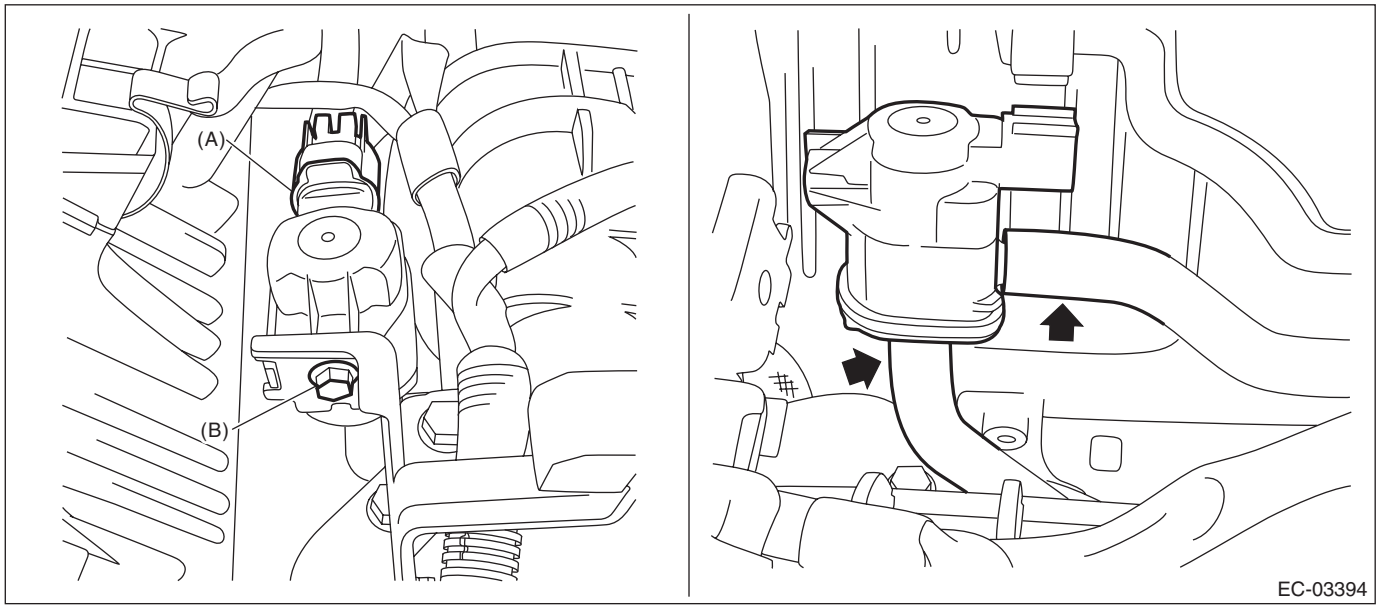
NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



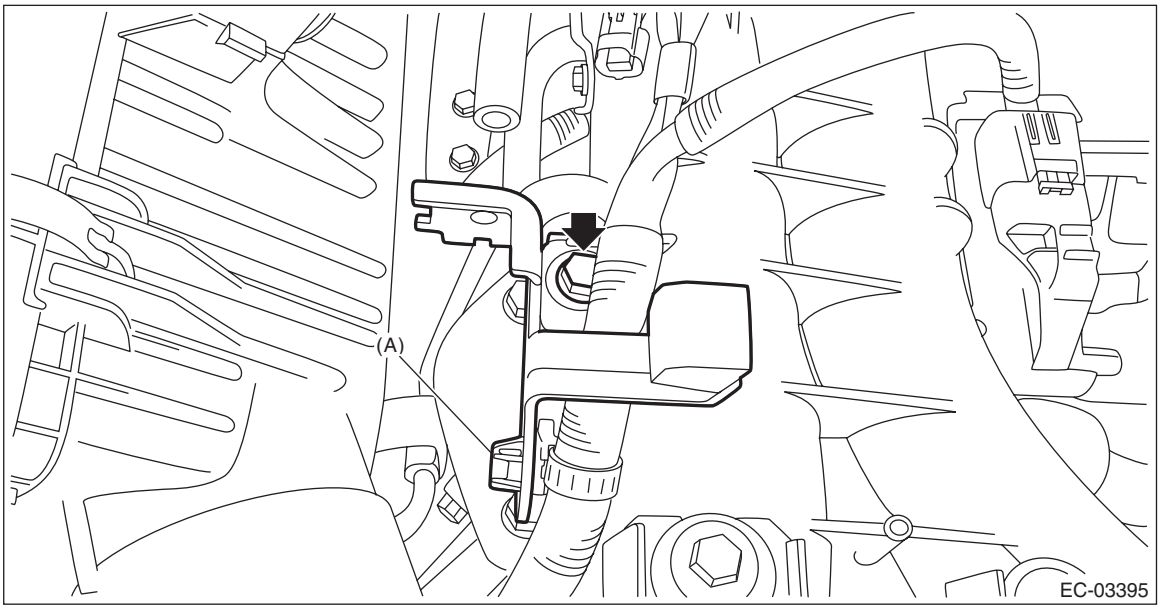
3) Disconnect the connector (A) from the purge control solenoid valve, and remove the bolt (B) which secures the purge control solenoid valve to the purge control solenoid valve bracket.

NOTE:
Hold the purge control solenoid valve unit by hand to prevent it from rotating together.

4) Disconnect the vacuum hose from the purge control solenoid valve, and then remove the purge control solenoid valve.



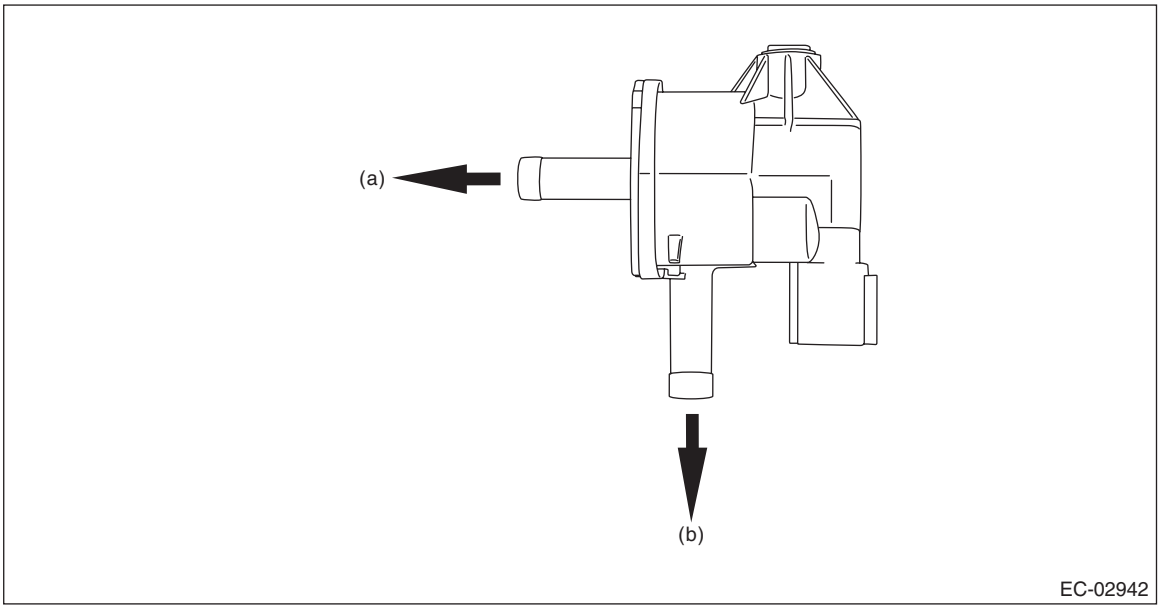
5) Remove the clip (A) securing the engine wiring harness, and remove the purge control solenoid valve bracket from the intake manifold.



B: INSTALLATION

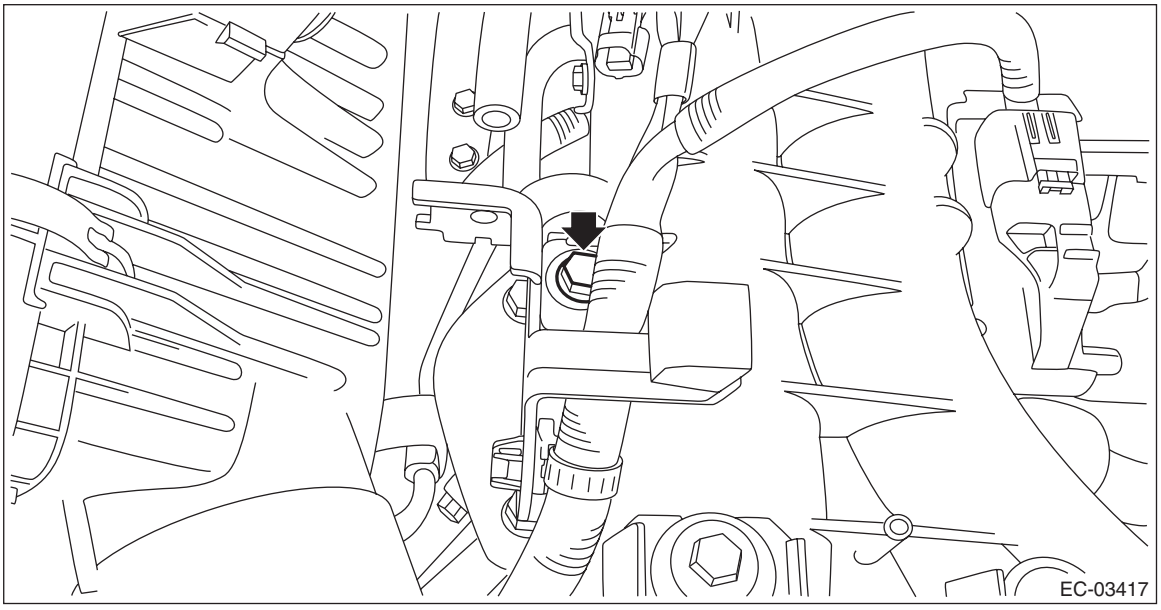
Install in the reverse order of removal.

NOTE:
- Hold the purge control solenoid valve unit by hand to prevent it from rotating together.
- Connect the vacuum hose as shown in the figure.

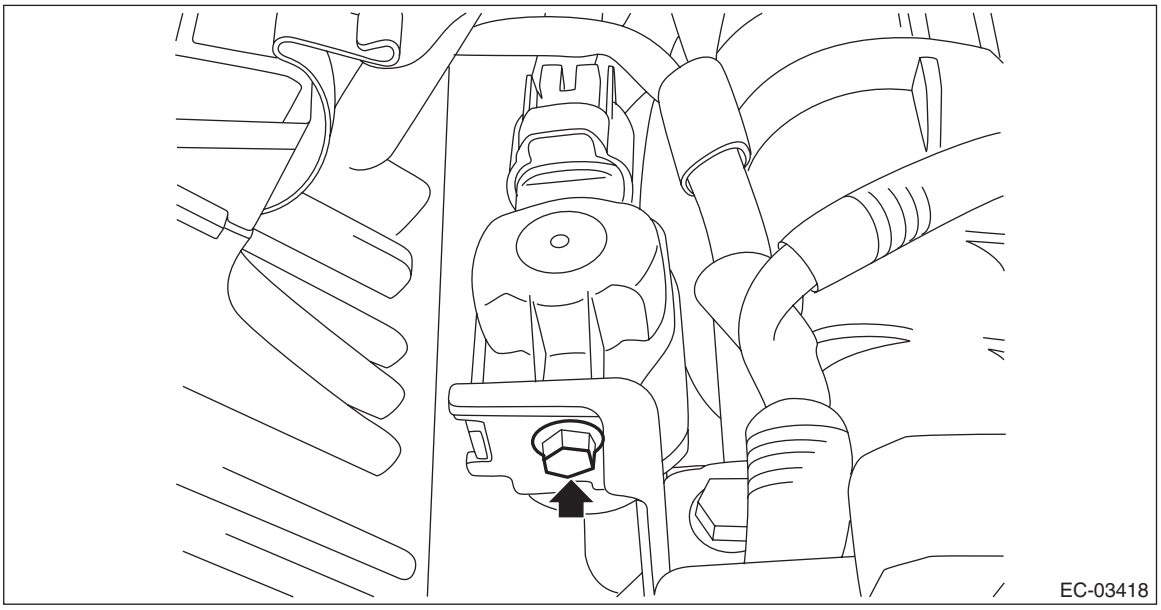


(a) To EGR pipe (b) To fuel pipe

Tightening torque:
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



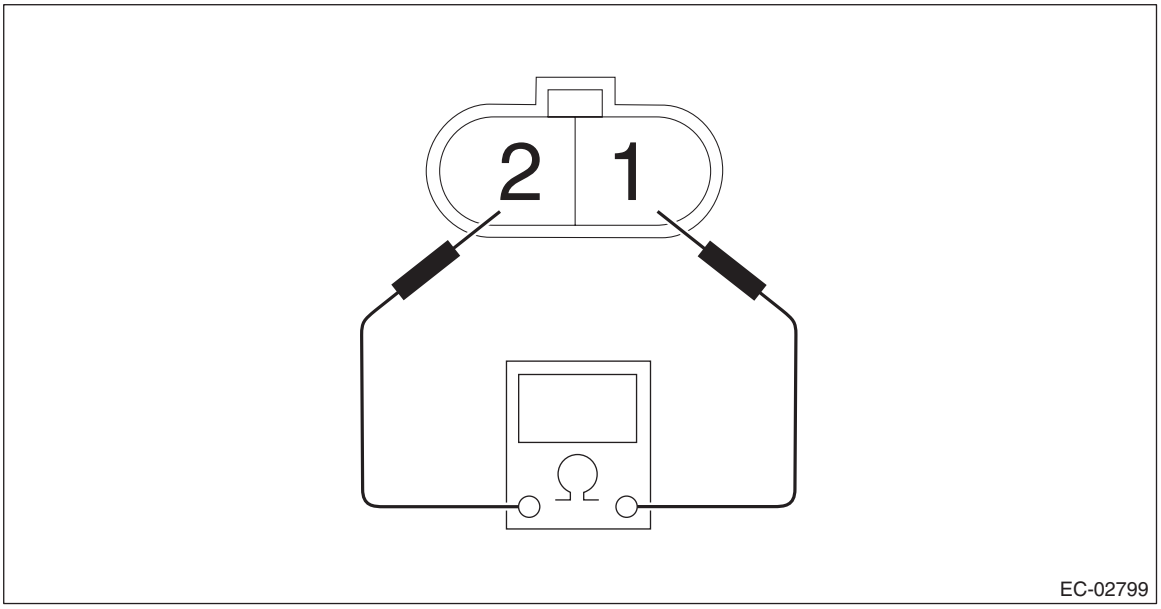
Tightening torque:
3.4 N·m (0.3 kgf-m, 2.5 ft-lb)



C: INSPECTION

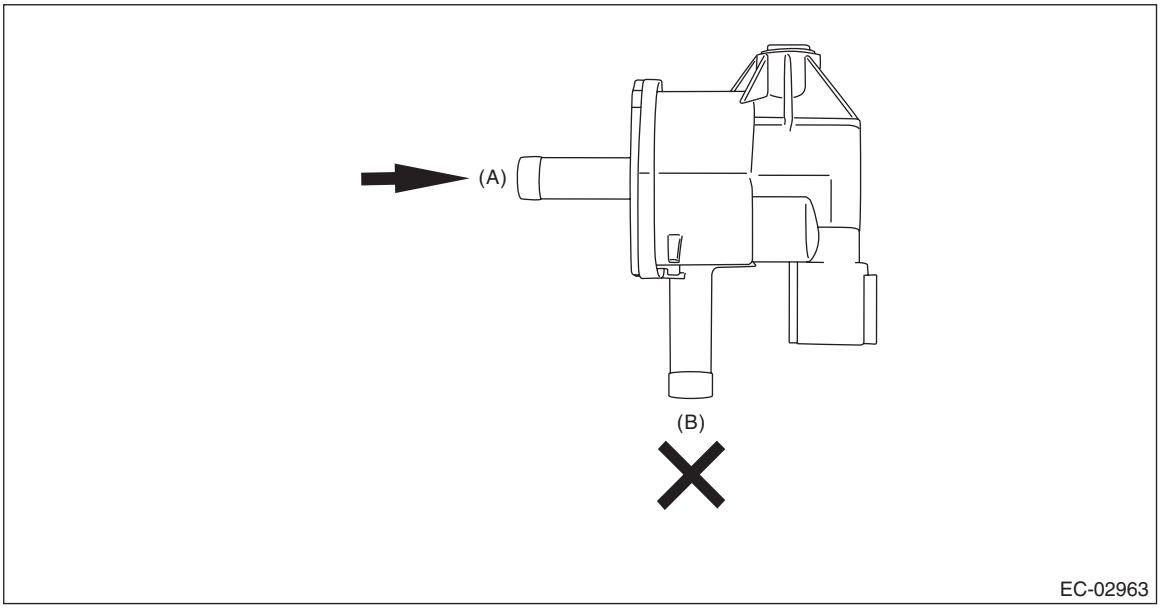
1. PURGE CONTROL SOLENOID VALVE

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

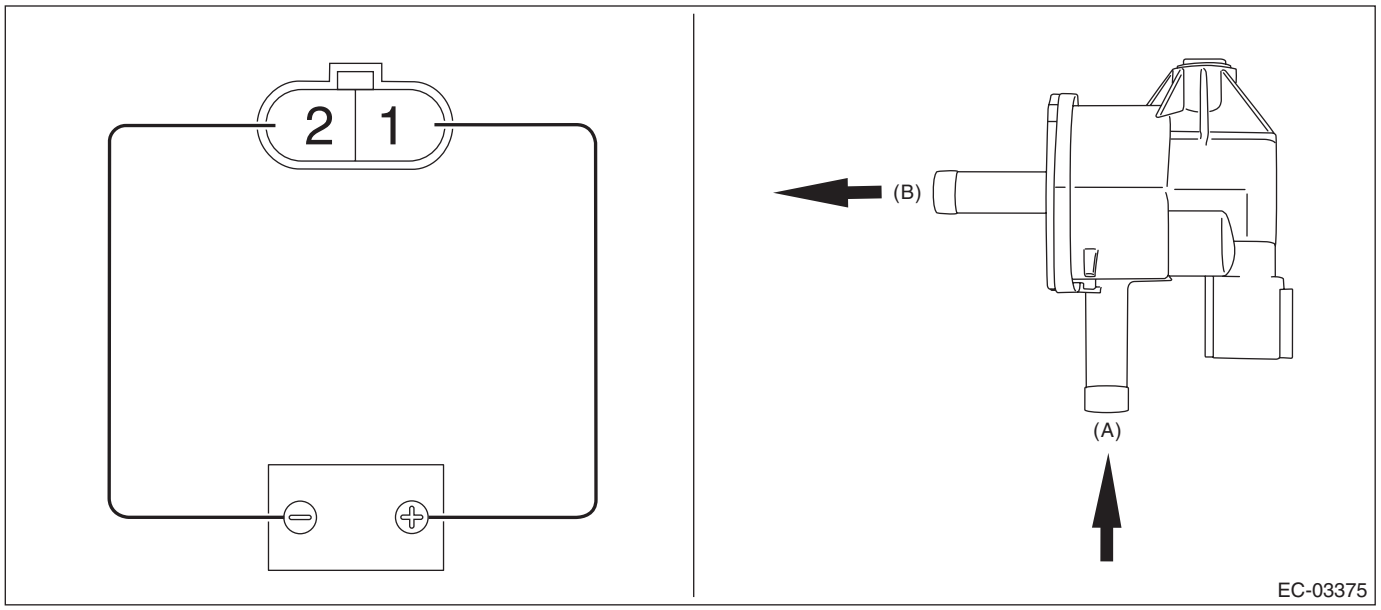


Terminal No.	Standard
1 and 2	24.5±1.5 Ω (when 20°C (68°F))

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 the vacuum hose for cracks, damage or looseness.

6. EGR Control Valve

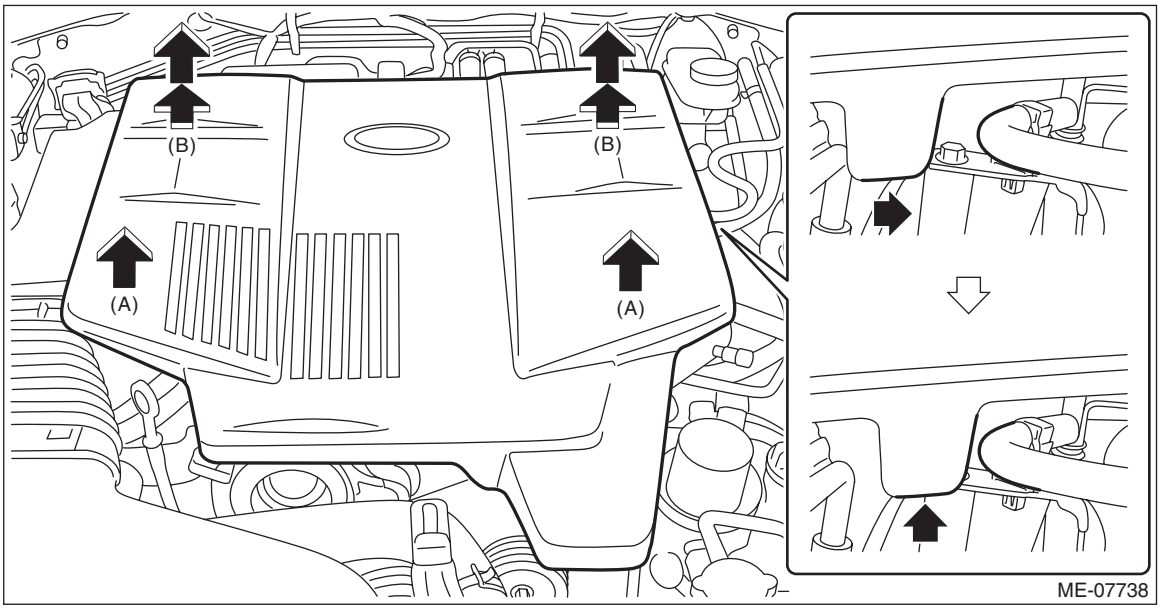
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

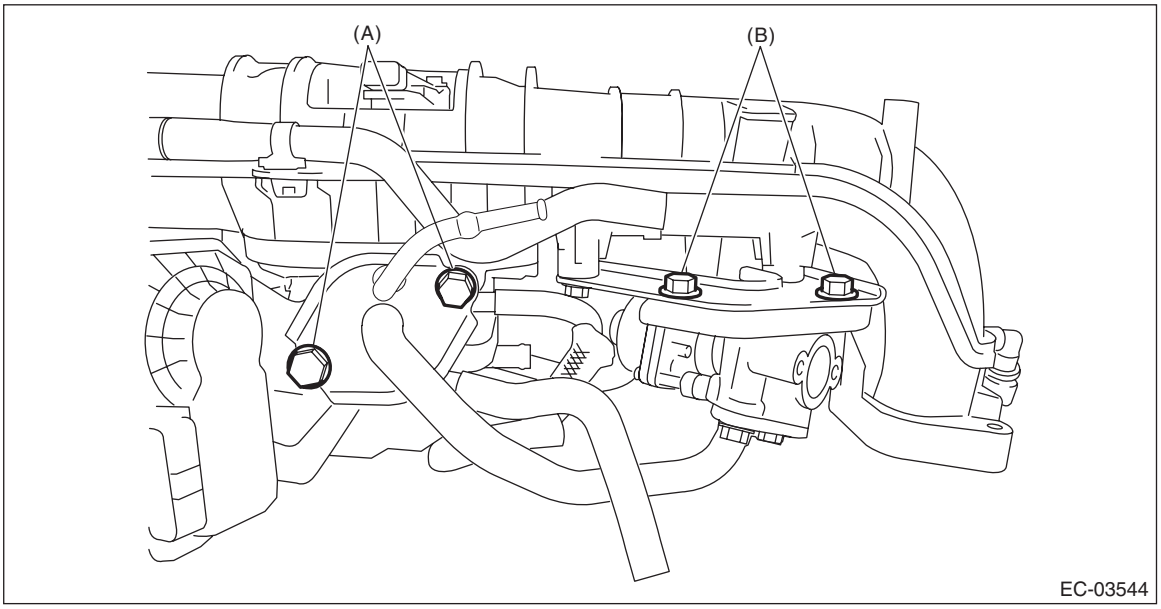
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.

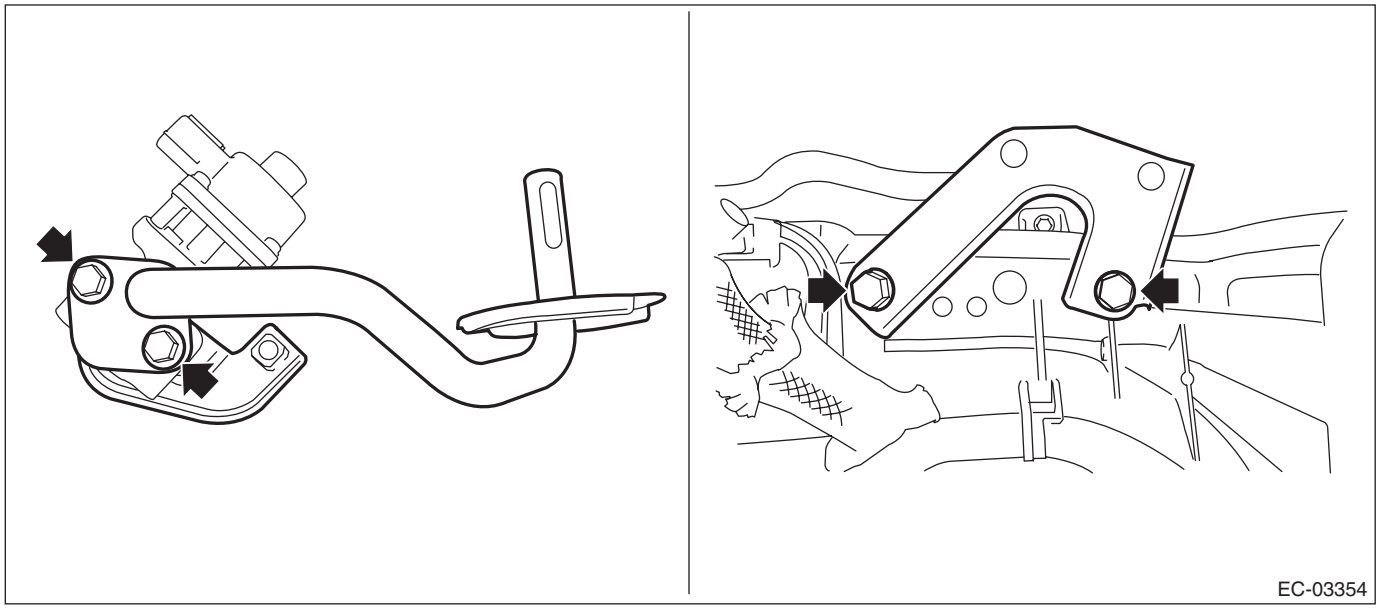


3) Remove the intake manifold. <Ref. to FU(H4DO(HEV))-19, REMOVAL, Intake Manifold.>
4) Remove the bolt (A) which holds the EGR pipe to the intake manifold.
5) Remove the bolt (B) which secures the EGR control valve bracket B to the EGR control valve bracket A, and remove the EGR control valve together with the EGR pipe from the intake manifold.



6) Remove the bolts securing the EGR pipe and the EGR control valve bracket B from the EGR control valve.

7) Remove the EGR control valve bracket A from the intake manifold.



B: INSTALLATION

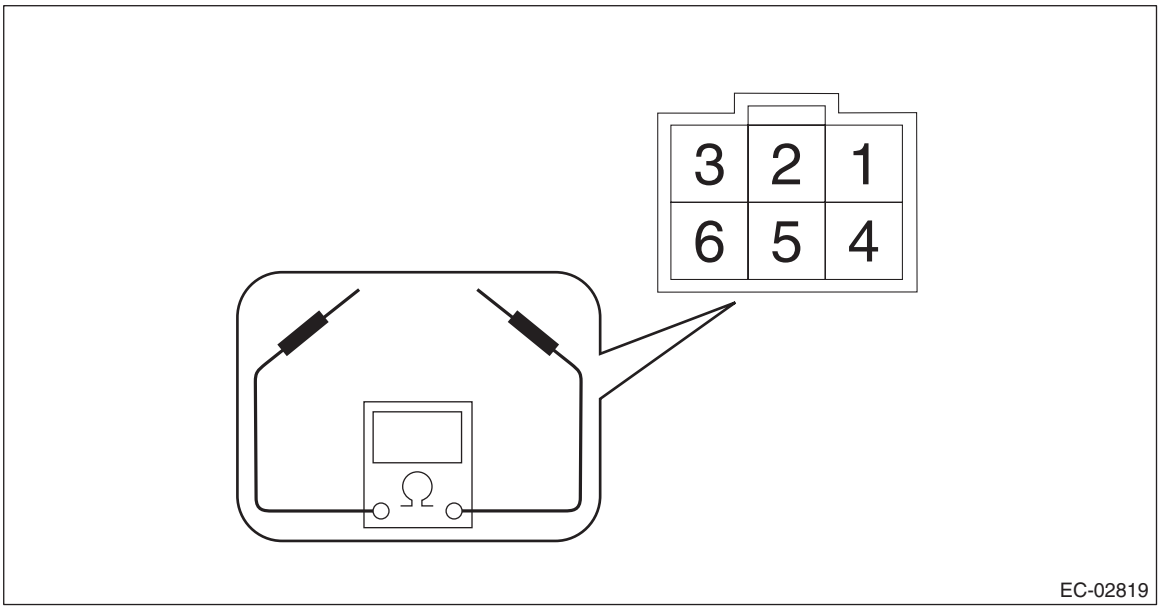
Install in the reverse order of removal.

NOTE:
Use a new gasket.

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

C: INSPECTION

1) Check that the EGR control valve and EGR control valve bracket have no deformation, cracks or other damages.
2) Measure the resistance between EGR control valve terminals.



Terminal No.	Standard
2 and 1	22±2 Ω
2 and 3	22±2 Ω
5 and 4	22±2 Ω
5 and 6	22±2 Ω

7. EGR Pipe

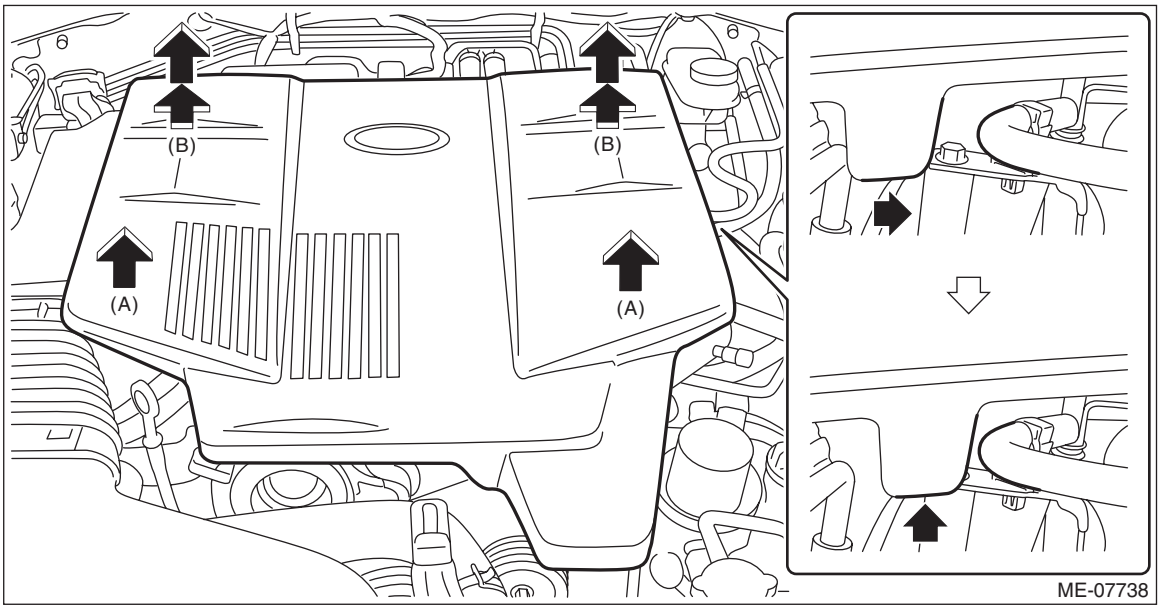
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

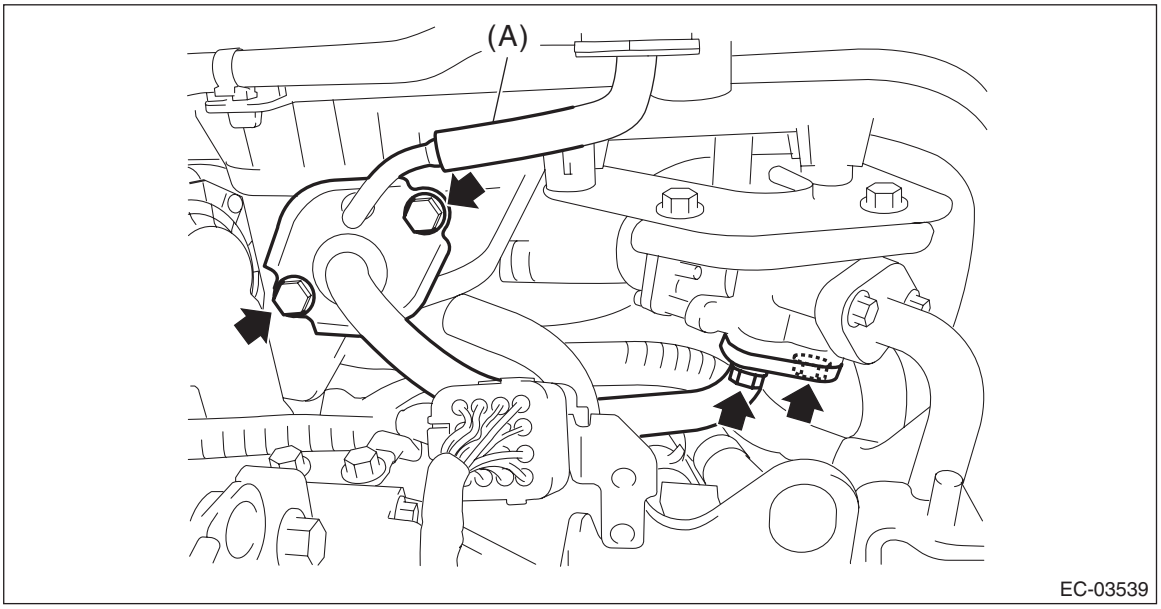
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



3) Remove the air cleaner case. <Ref. to IN(H4DO(HEV))-6, REMOVAL, Air Cleaner Case.>
4) Disconnect the vacuum hose (A) from EGR pipe.
5) Remove the bolts which secure the EGR pipe to the intake manifold and EGR control valve, and remove the EGR pipe.



B: INSTALLATION

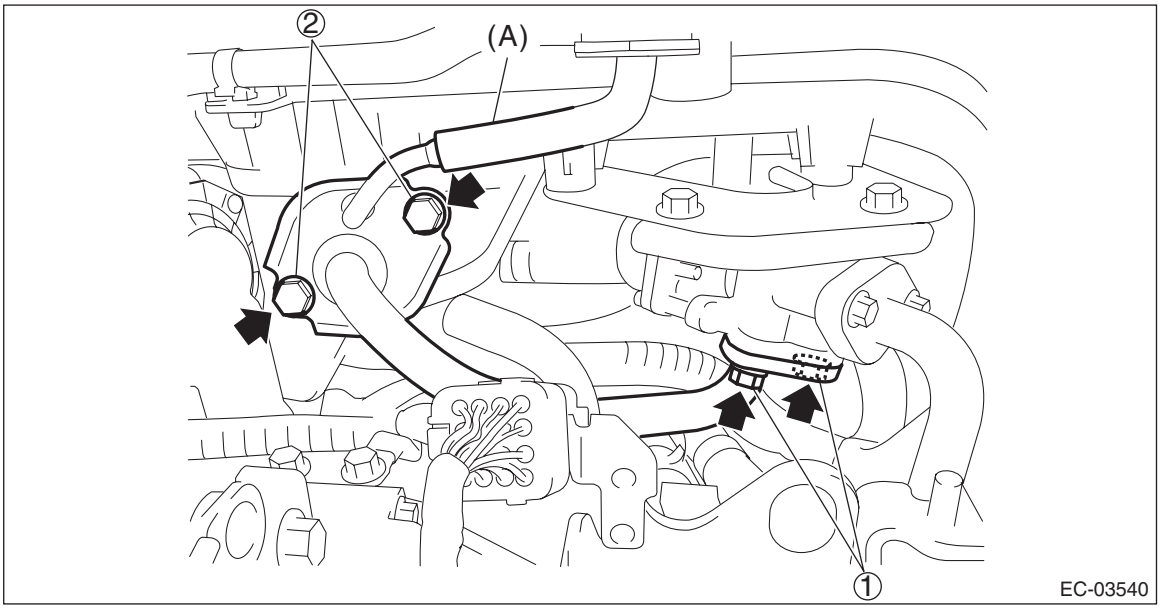
1) Set the EGR pipe to the intake manifold and EGR control valve, and temporarily tighten the bolts which secure the EGR pipe.

NOTE:
Use a new gasket.

2) Tighten the bolts which secure the EGR pipe to the intake manifold and EGR control valve in numerical order as shown in the figure.

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

3) Connect the vacuum hose (A) to EGR pipe.



4) Install the air cleaner case. <Ref. to IN(H4DO(HEV))-8, INSTALLATION, Air Cleaner Case.>
5) Install the collector cover.
6) Connect the battery ground terminal. <Ref. to NT-5, BATTERY, NOTE, Note.>

C: INSPECTION

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

8. EGR Cooler

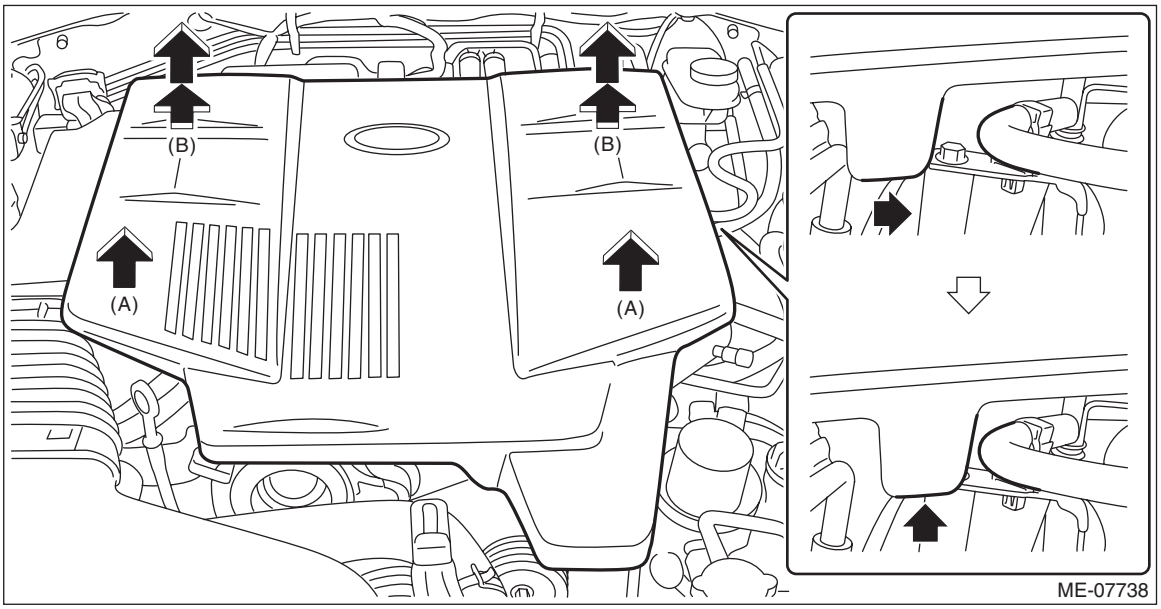
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

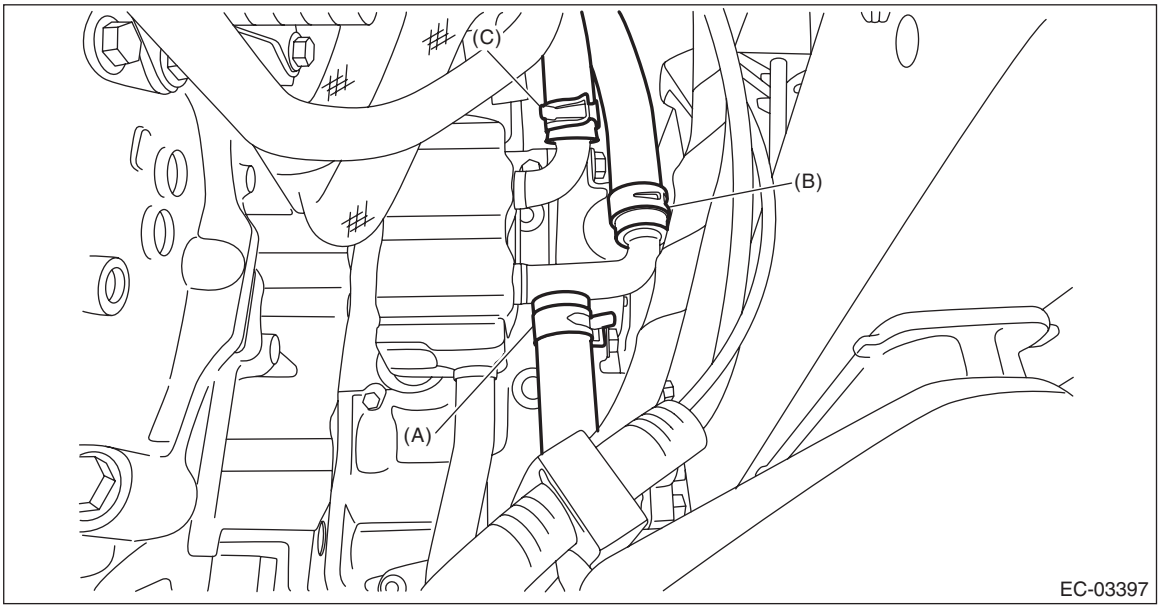
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

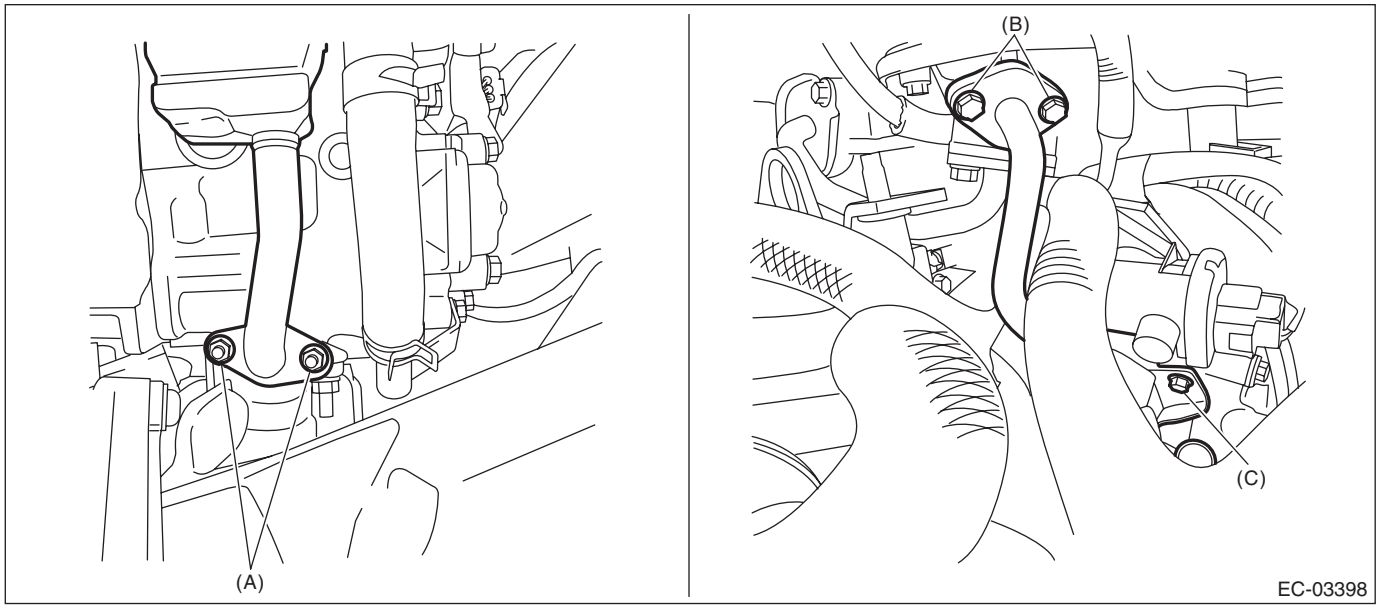
NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



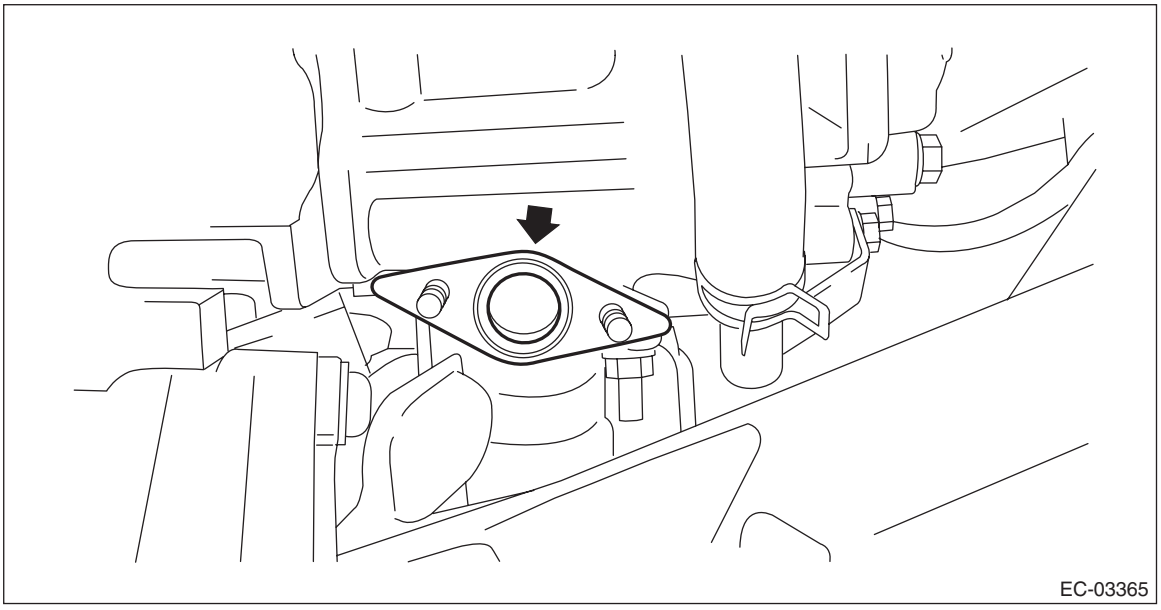
3) Drain engine coolant. <Ref. to CO(H4DO(w/o HEV))-16, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
4) Remove the air cleaner case. <Ref. to IN(H4DO(HEV))-6, REMOVAL, Air Cleaner Case.>
5) Disconnect the engine coolant inlet hose A (A), engine coolant inlet hose B (B) and engine coolant outlet hose (C) from the EGR cooler.



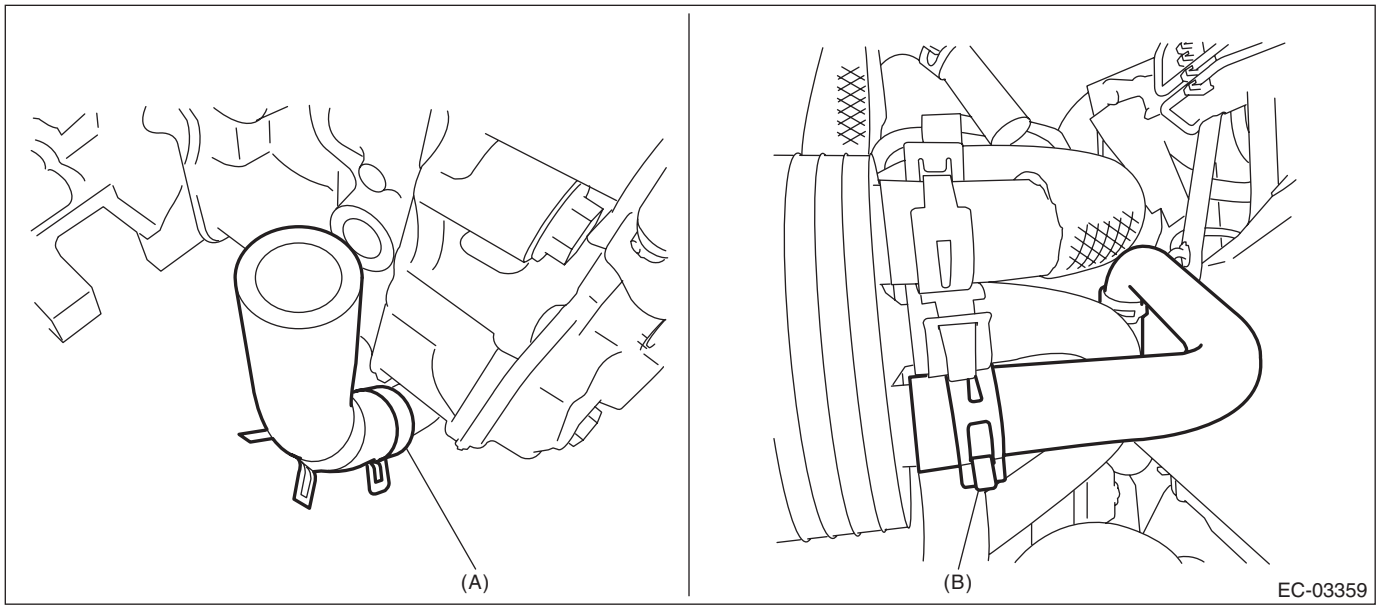
6) Remove the nut (A) which secures the EGR cooler to the cylinder head RH.
7) Remove the bolts (B) securing the EGR cooler to the EGR control valve.
8) Remove the bolt (C) which secures the EGR cooler to the cylinder head RH, and remove the EGR cooler.



9) Remove the gasket from the stud bolt.

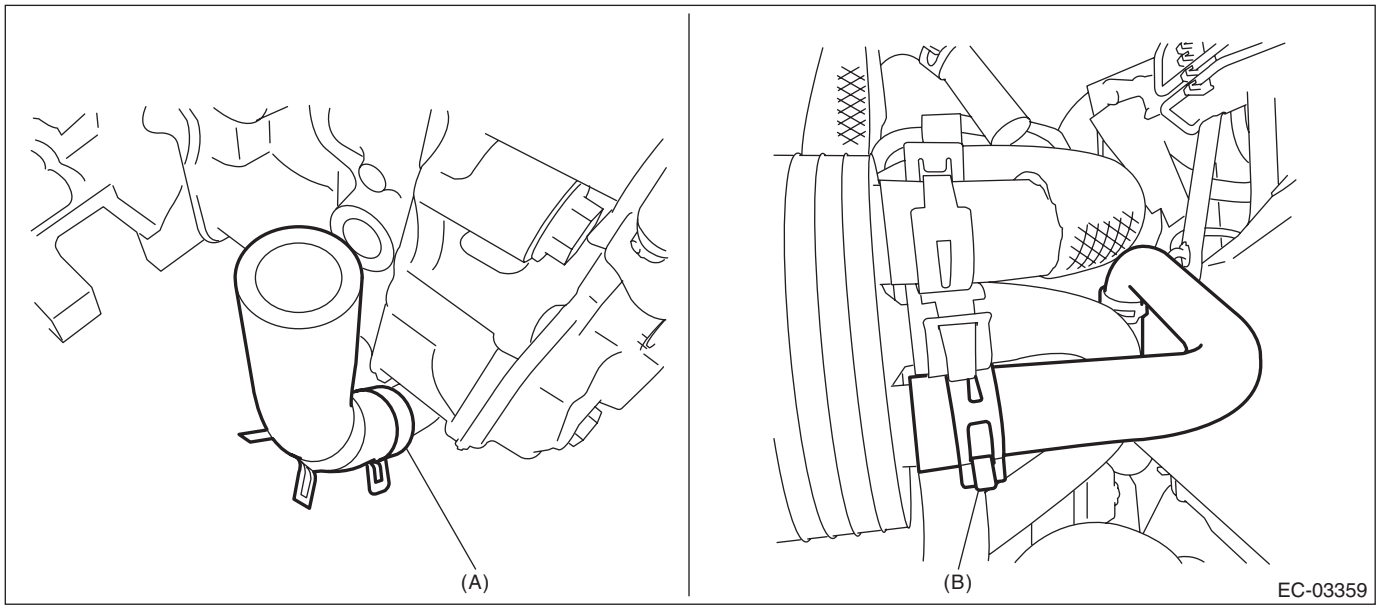


10) Disconnect the engine coolant inlet hose (A) from the water pipe RH.
11) Disconnect the engine coolant inlet hose B (B) from the CVTF cooler (with warmer feature).



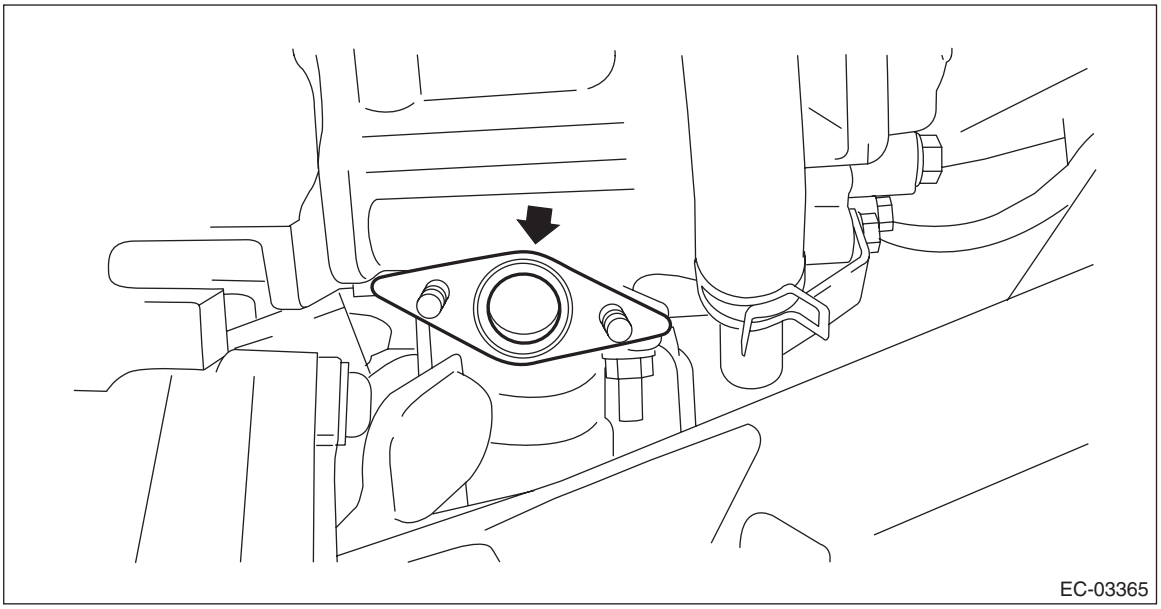
B: INSTALLATION

1) Connect the engine coolant inlet hose (A) to the water pipe RH.
2) Connect the engine coolant inlet hose B (B) to the CVTF cooler (with warmer feature).



3) Set the gasket to the stud bolt.

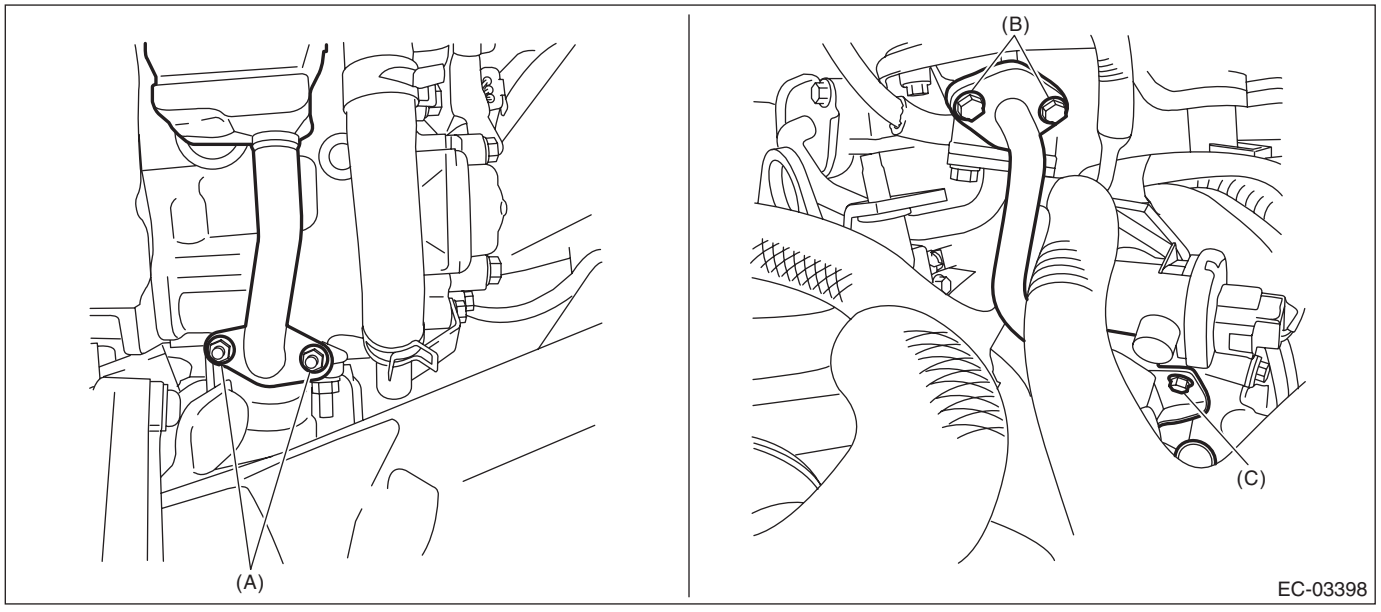
NOTE:
Use a new gasket.



4) Set the EGR cooler on the vehicle.

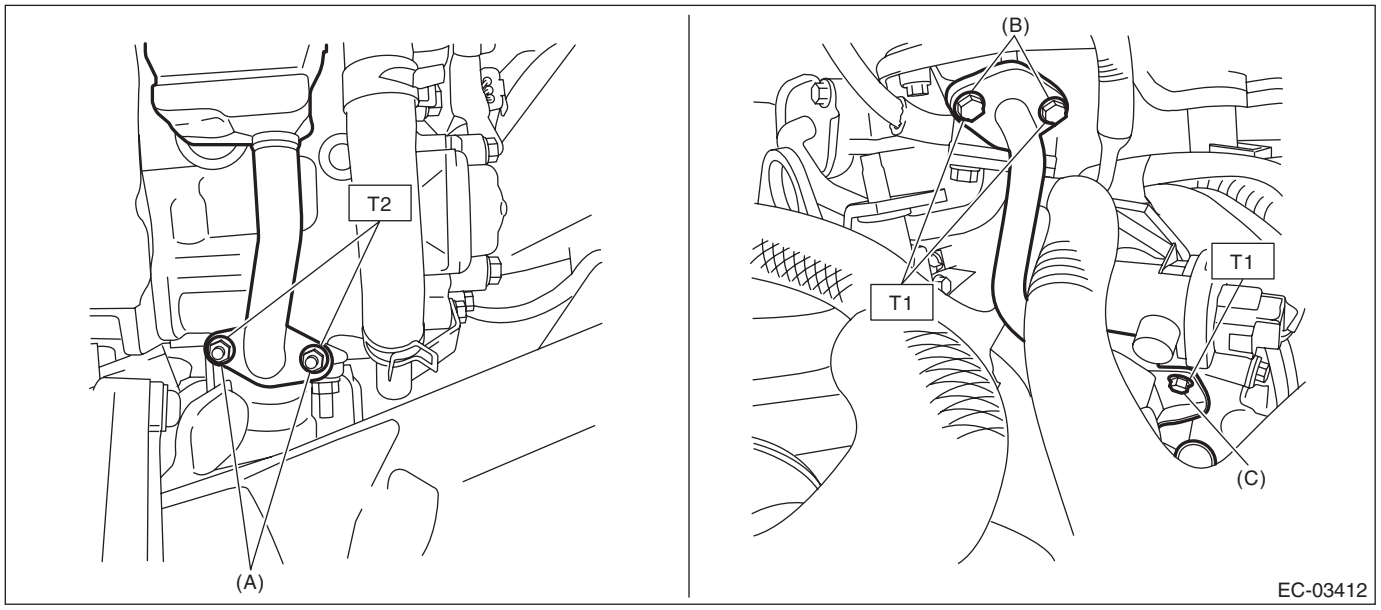
NOTE:
Use a new gasket.

5) Temporarily tighten the bolt (C) which secures the EGR cooler to the cylinder head RH.
6) Temporarily tighten the bolt (B) which secures the EGR cooler to the EGR control valve.
7) Temporarily tighten the nut (A) which secures the EGR cooler to the cylinder head RH.

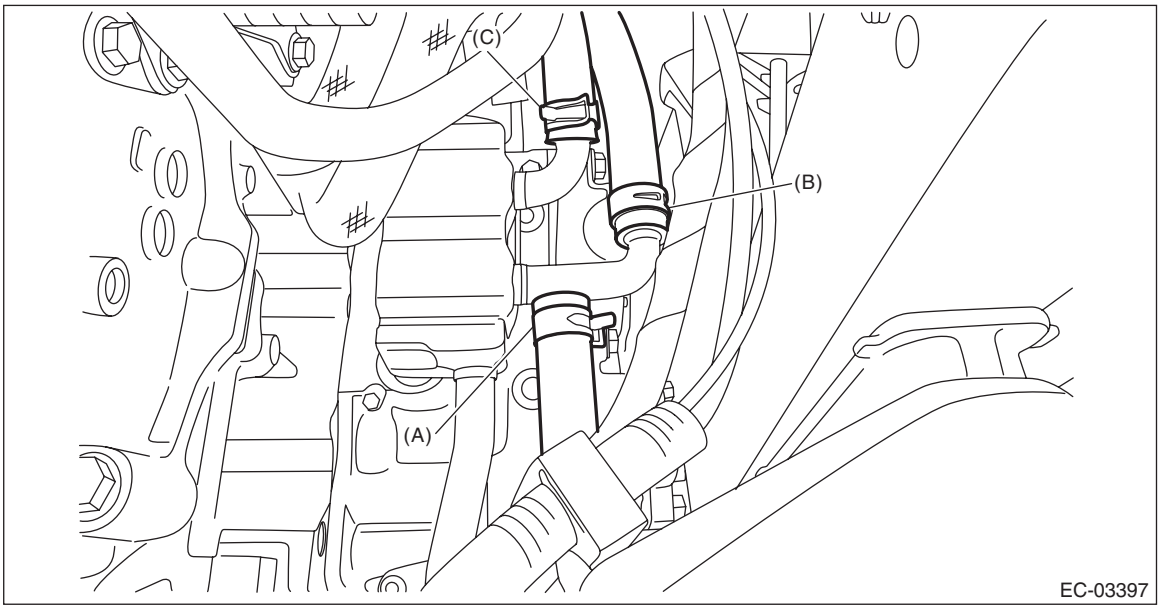


8) Tighten the nut (A) which secures the EGR cooler to the cylinder head RH.
9) Tighten the bolt (C) which secures the EGR cooler to the cylinder head RH.
10) Tighten the bolt (B) which secures the EGR cooler to the EGR control valve.

Tightening torque:
T1: 6.4 N·m (0.7 kgf-m, 4.7 ft-lb)
T2: 9 N·m (0.9 kgf-m, 6.6 ft-lb)



11) Connect the engine coolant inlet hose A (A), engine coolant inlet hose B (B) and engine coolant outlet hose (C) to the EGR cooler.



12) Install the air cleaner case. <Ref. to IN(H4DO(HEV))-8, INSTALLATION, Air Cleaner Case.>
13) Fill engine coolant. <Ref. to CO(H4DO(w/o HEV))-16, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
14) Install the collector cover.
15) Connect the battery ground terminal. <Ref. to NT-5, BATTERY, NOTE, Note.>

C: INSPECTION

1) Check that the EGR cooler has no deformation, cracks or other damages.
2) Check that the hose has no cracks, damage or loose part.

9. Fuel Level Sensor

A: REMOVAL

For removal procedures, refer to the “FU (H4DO (HEV))” section. <Ref. to FU(H4DO(HEV))-128, REMOVAL, Fuel Level Sensor.>

B: INSTALLATION

For installation procedures, refer to the “FU (H4DO (HEV))” section. <Ref. to FU(H4DO(HEV))-129, INSTALLATION, Fuel Level Sensor.>

C: INSPECTION

For inspection procedures, refer to the “FU (H4DO (HEV))” section. <Ref. to FU(H4DO(HEV))-130, INSPECTION, Fuel Level Sensor.>

10.Fuel Sub Level Sensor

A: REMOVAL

For removal procedures, refer to the “FU (H4DO (HEV))” section. <Ref. to FU(H4DO(HEV))-131, REMOVAL, Fuel Sub Level Sensor.>

B: INSTALLATION

For installation procedures, refer to the “FU (H4DO (HEV))” section. <Ref. to FU(H4DO(HEV))-135, INSTALLATION, Fuel Sub Level Sensor.>

C: INSPECTION

For inspection procedures, refer to the “FU (H4DO (HEV))” section. <Ref. to FU(H4DO(HEV))-137, INSPECTION, Fuel Sub Level Sensor.>

11.Drain Filter

A: REMOVAL

The drain filter is installed to the leak check valve assembly. Refer to “Leak Check Valve Assembly” for removal procedure. <Ref. to EC(H4DO(HEV))-39, REMOVAL, Leak Check Valve Assembly.>

B: INSTALLATION

The drain filter is installed to the leak check valve assembly. Refer to “Leak Check Valve Assembly” for installation procedure. <Ref. to EC(H4DO(HEV))-42, INSTALLATION, Leak Check Valve Assembly.>

C: INSPECTION

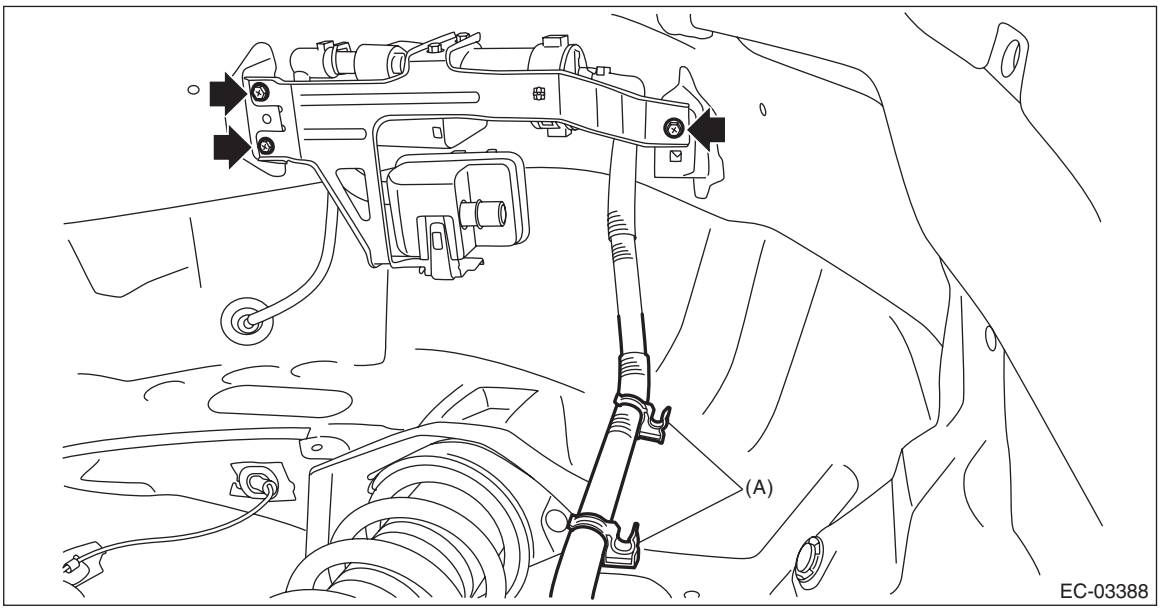
1) Check that the drain filer and drain bracket have no deformation, crack, or other damage.
2) Check that the drain tube has no cracks, damage or loose part.
3) Check that no foreign substances are clogged in the drain filter.

12.Leak Check Valve Assembly

A: REMOVAL

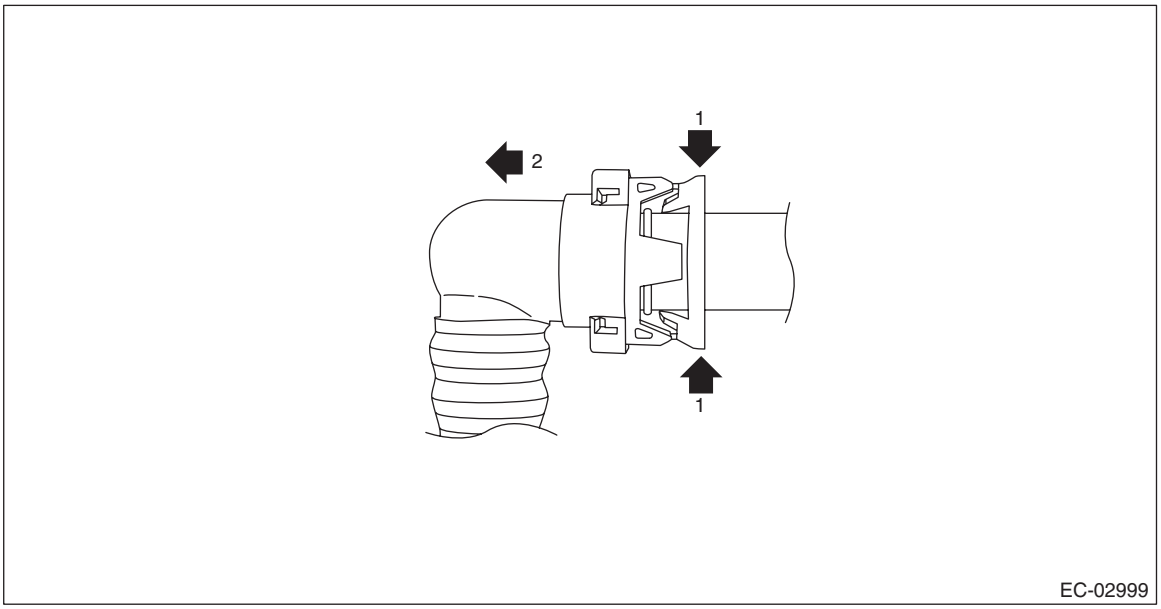
1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

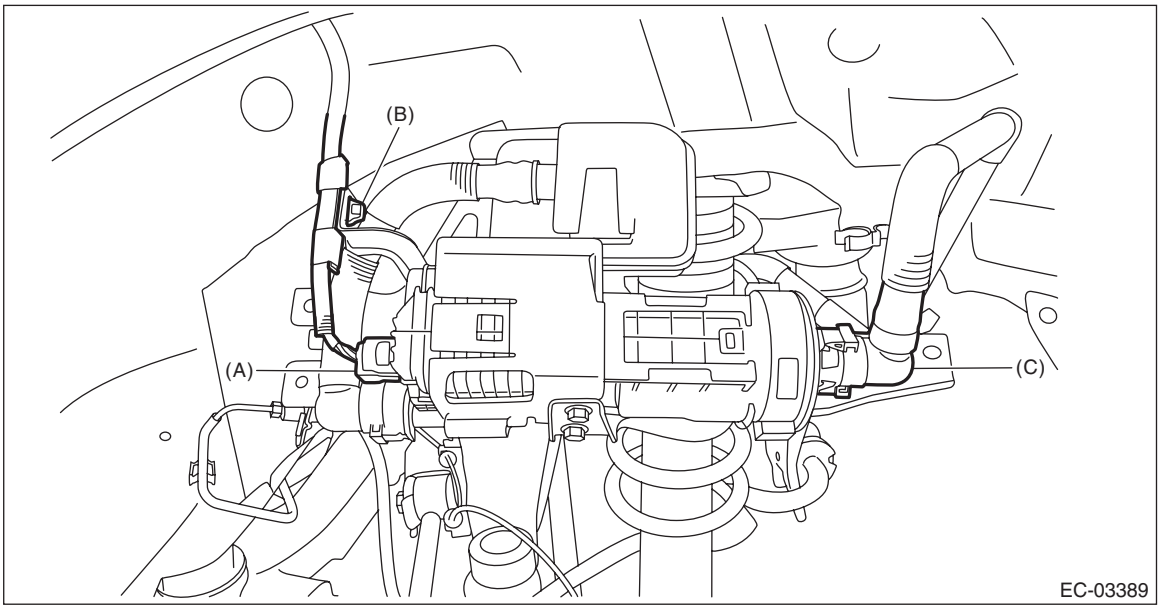
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Remove the rear wheel LH.
3) Lift up the vehicle.
4) Remove the rear mud guard LH. <Ref. to EI-33, REMOVAL, Mud Guard.>
5) Remove the drain tube B from the tube clamp (A).
6) Hold the leak check valve assembly, and remove the bolts securing the leak check valve assembly.



7) Disconnect the connector (A) from the leak check valve assembly, and remove the clip (B) securing the harness.
8) Disconnect the drain tube B (C) from the leak check valve assembly.

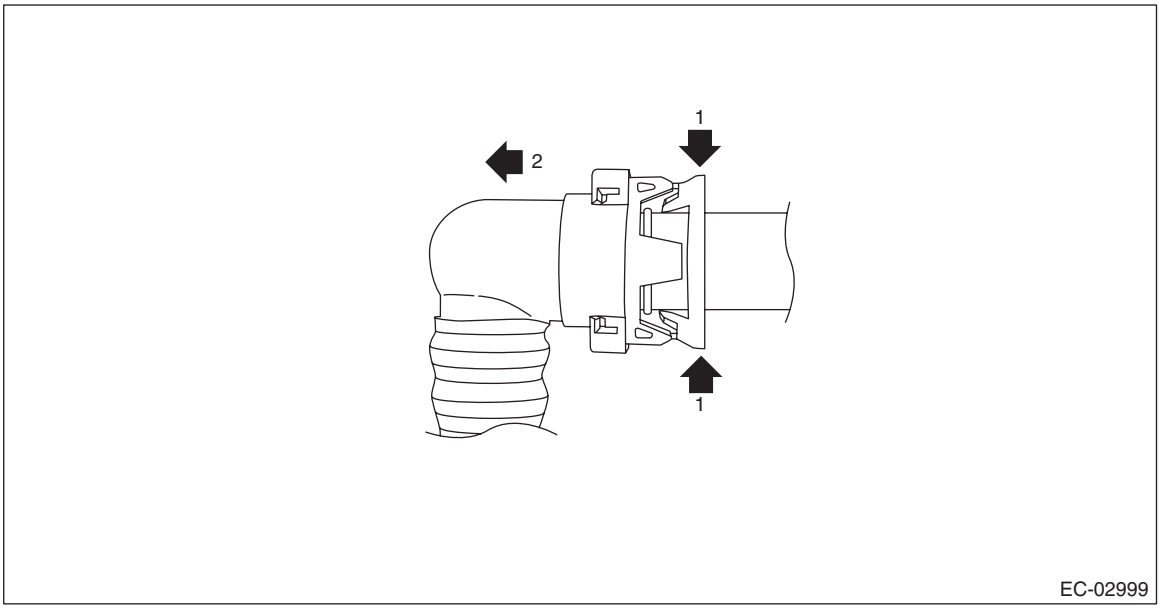
NOTE:
Disconnect the quick connector as shown in the figure.



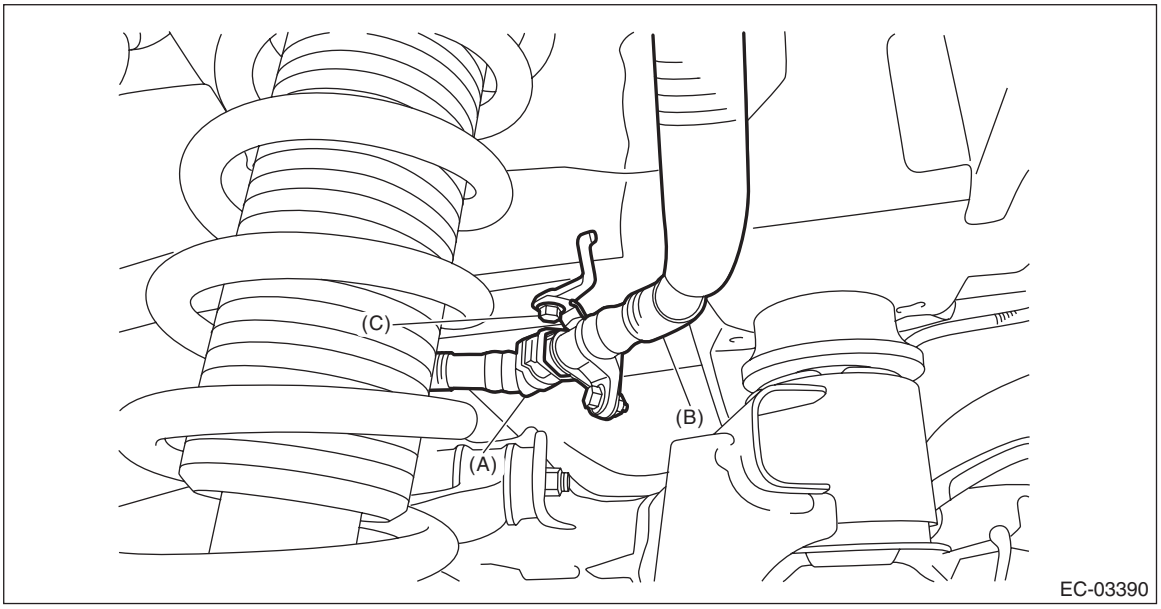


9) Disconnect the drain tube A (A) from the drain tube B (B).

NOTE:
Disconnect the quick connector as shown in the figure.



10) Remove the bolt (C) which secures to the vehicle, and remove the drain tube B (B).



B: INSTALLATION

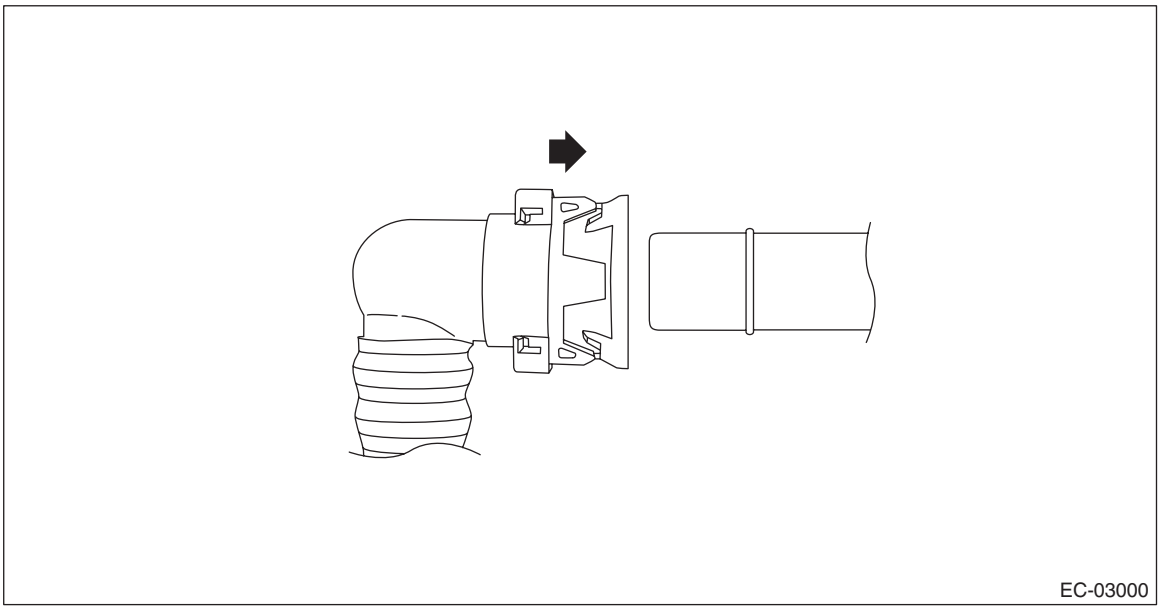
1) Install the drain tube B (B) to the vehicle using the bolt (C).

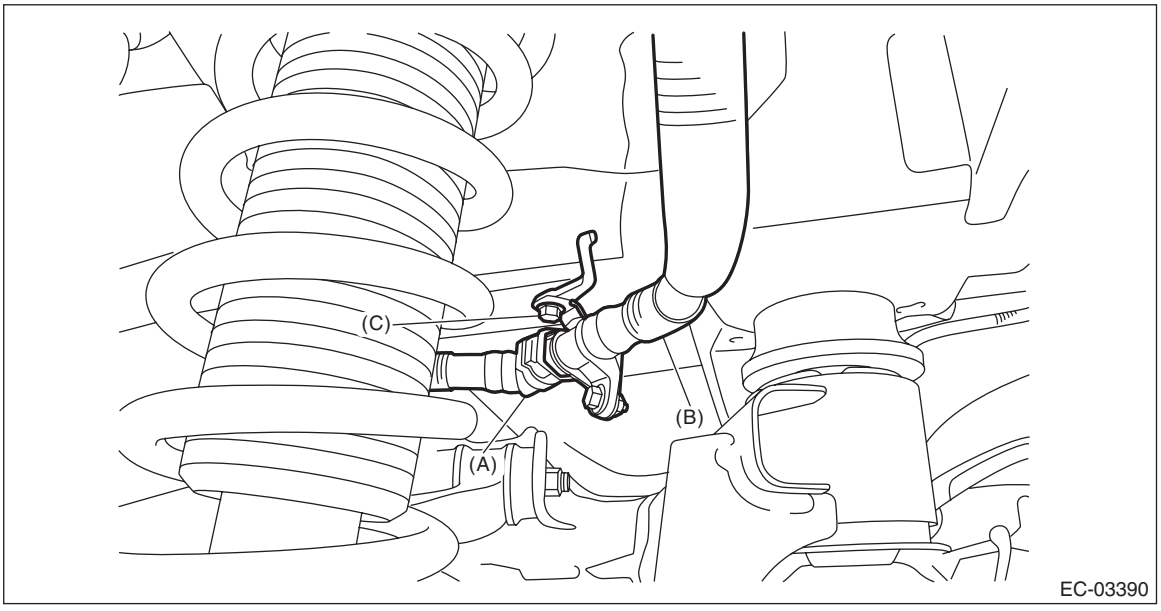
Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

2) Connect the drain tube A (A) to the drain tube B (B).

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.


EC-03000

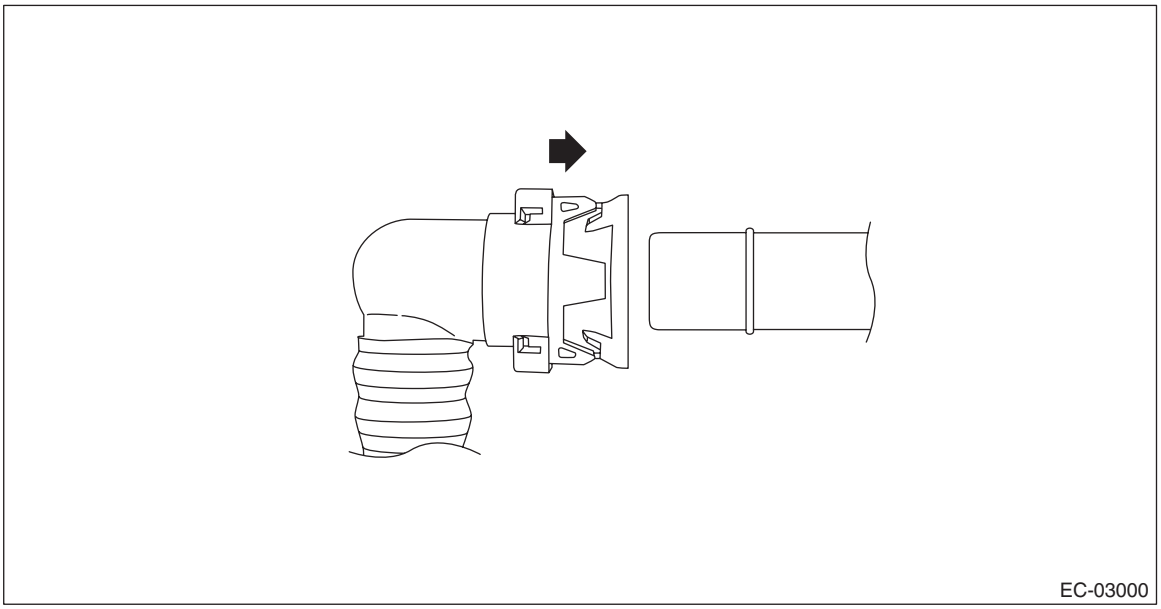


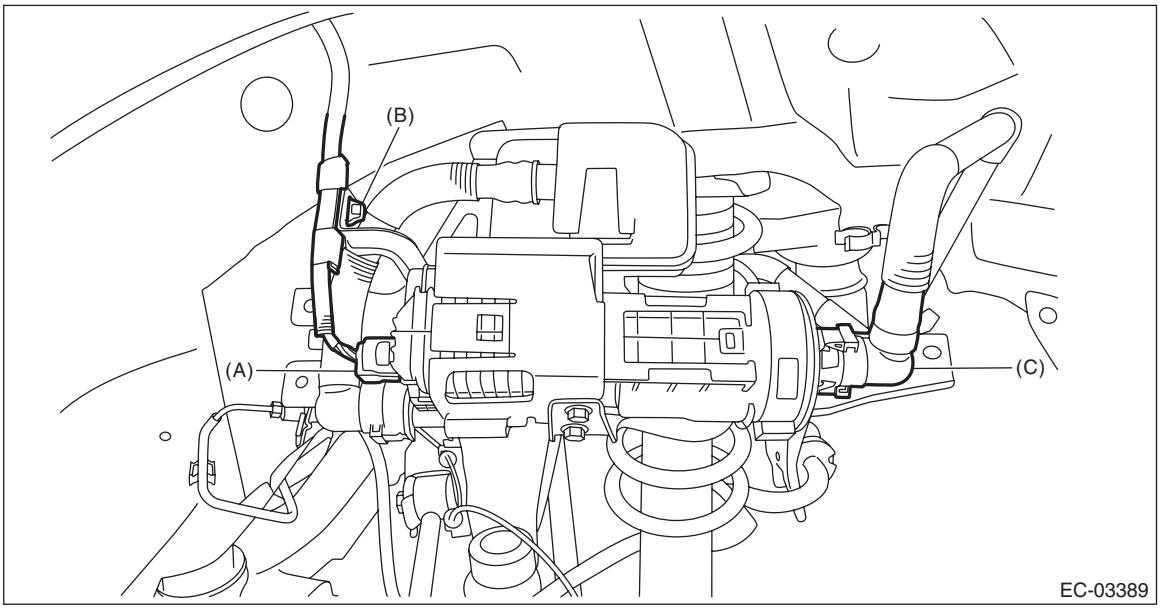
EC-03390

3) Connect the connector (A) to the leak check valve assembly, and install the clip (B) securing the harness.
4) Connect the drain tube B (C) to the leak check valve 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.


EC-03000

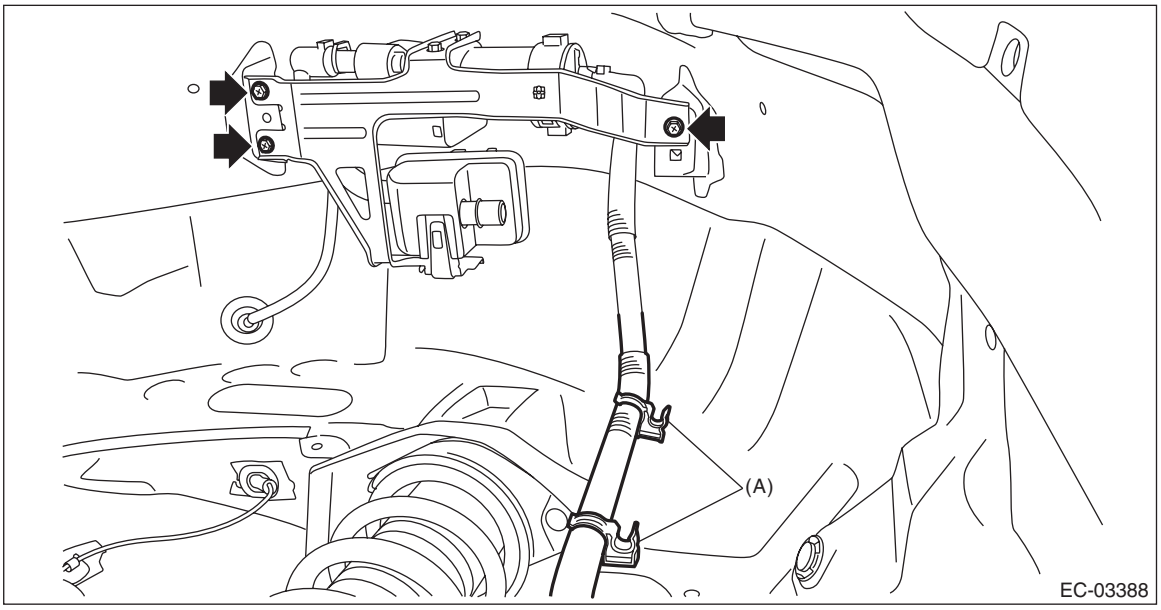


EC-03389

5) Install the leak check valve assembly to the vehicle.

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

6) Install the drain tube B to the tube clamp (A).

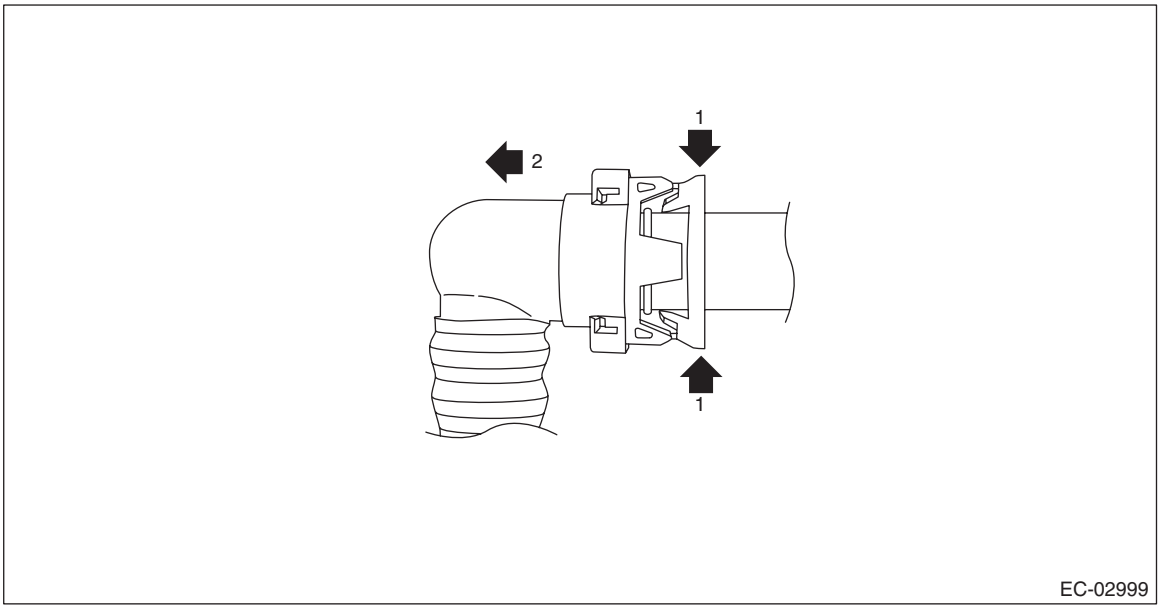


7) Install the rear mud guard LH. <Ref. to EI-33, INSTALLATION, Mud Guard.>
8) Lower the vehicle.
9) Install the rear wheel LH.
10) Connect the battery ground terminal. <Ref. to NT-5, BATTERY, NOTE, Note.>

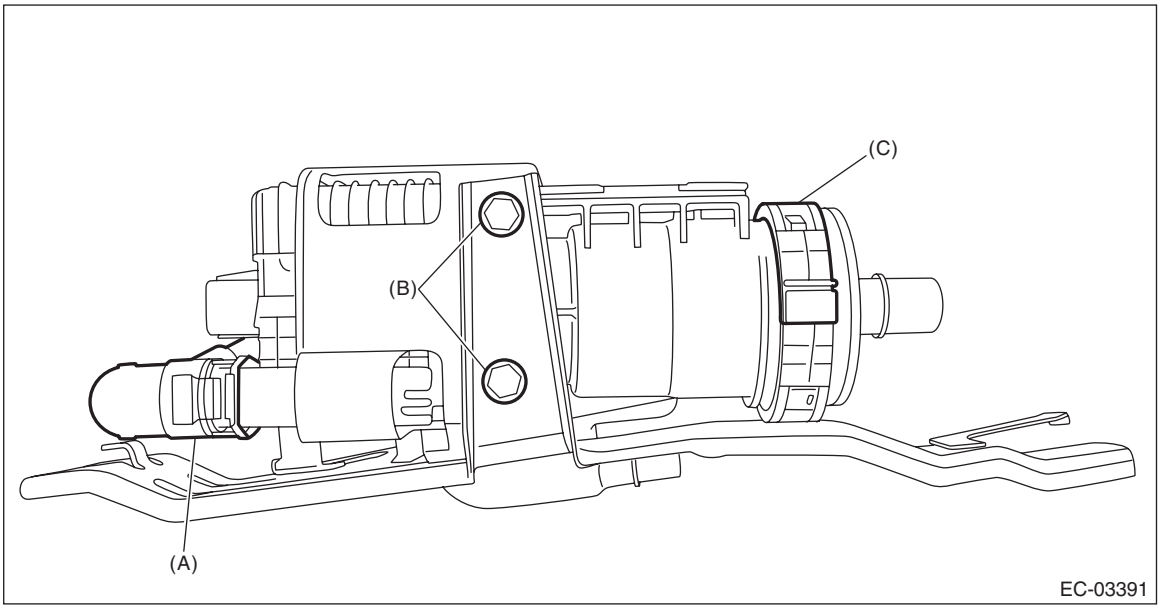
C: DISASSEMBLY

1) Disconnect the drain tube (A) from the leak check valve assembly.

NOTE:
Disconnect the quick connector as shown in the figure.

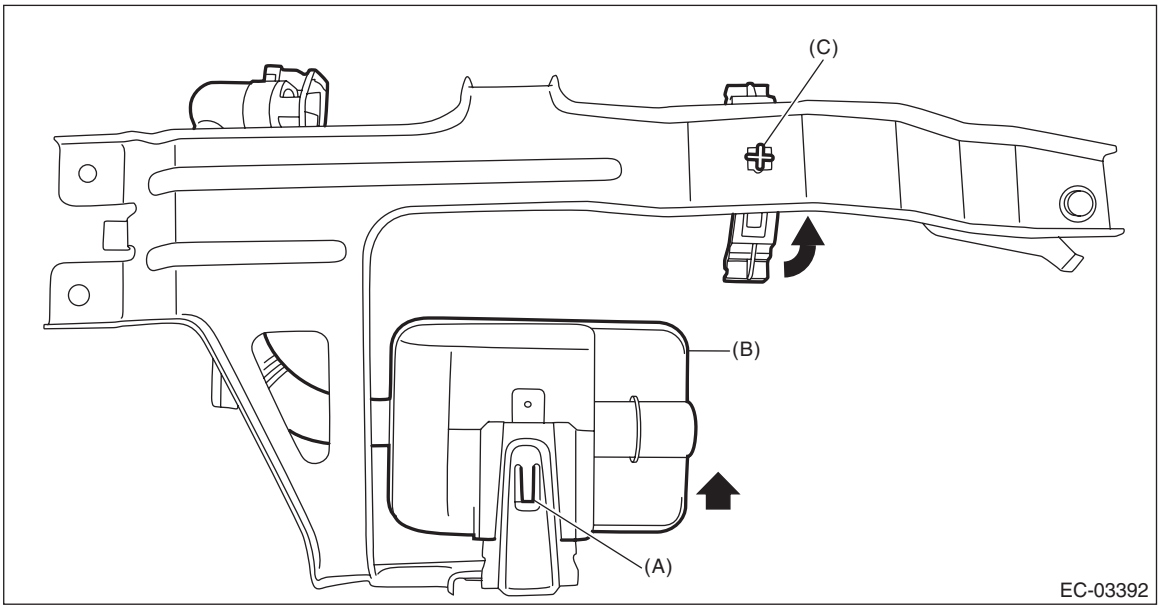


2) Remove the bolt (B) securing the leak check valve assembly to the drain bracket.
3) Remove the clamp B (C) which secures the leak check valve assembly, and remove the leak check valve assembly.



4) Release the claw (A), and slide the drain filter (B) from the drain bracket in the direction of the arrow to remove.

NOTE:
When removing the drain filter from the drain bracket, use the new drain bracket and drain filter to install.
5) Turn the clamp A (C) from the drain bracket in the direction of arrow to remove.

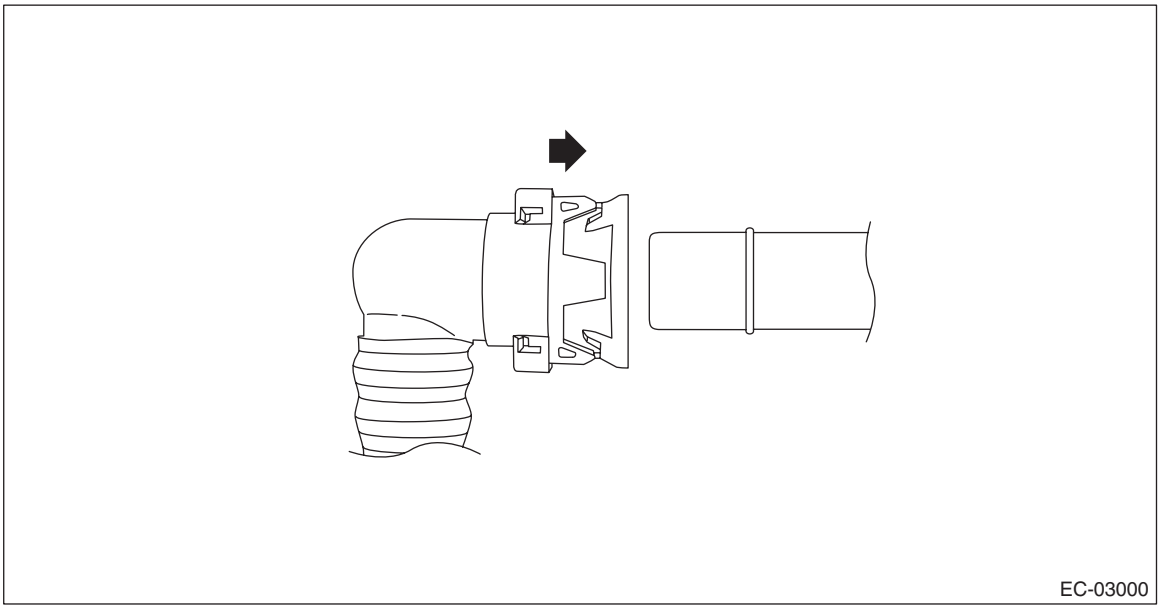


D: ASSEMBLY

Assemble in the reverse order of disassembly.

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:
• Use a new drain bracket and drain filter.
• Connect the quick connector as shown in the figure.

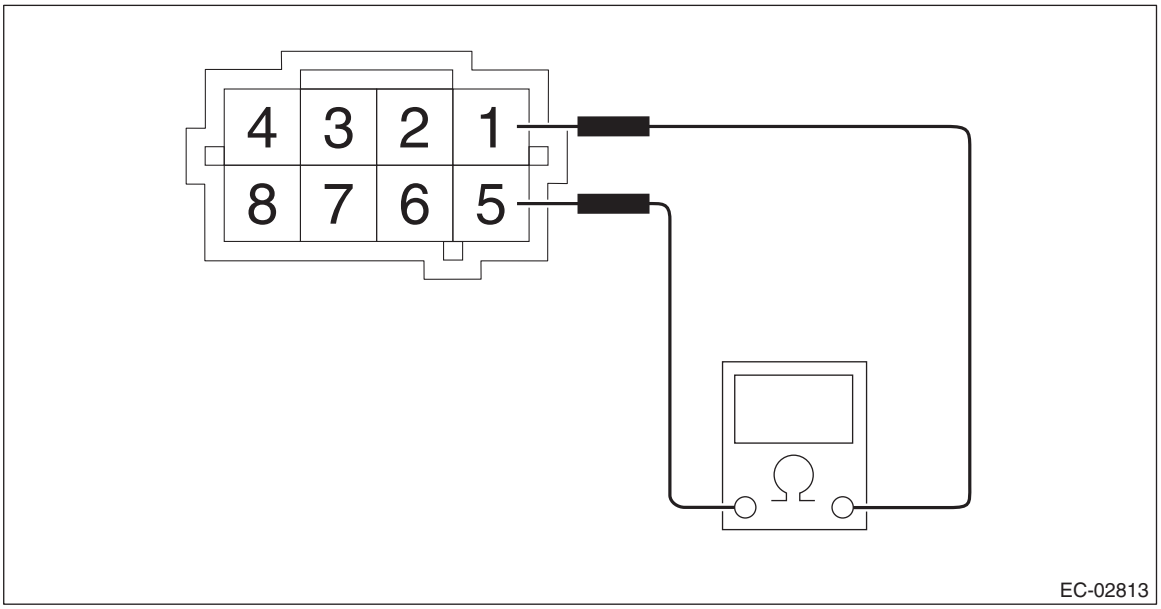


Tightening torque:
5.4 N·m (0.6 kgf-m, 4.0 ft-lb)

E: INSPECTION

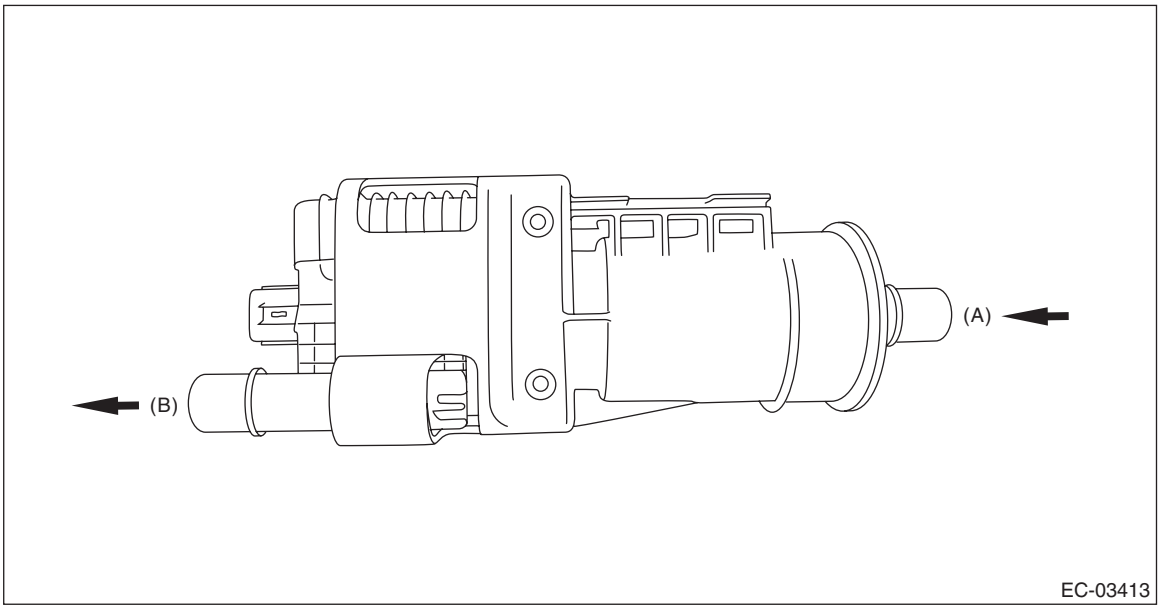
1. CHECK SWITCHING VALVE

1) Check the resistance between switching valve terminals.

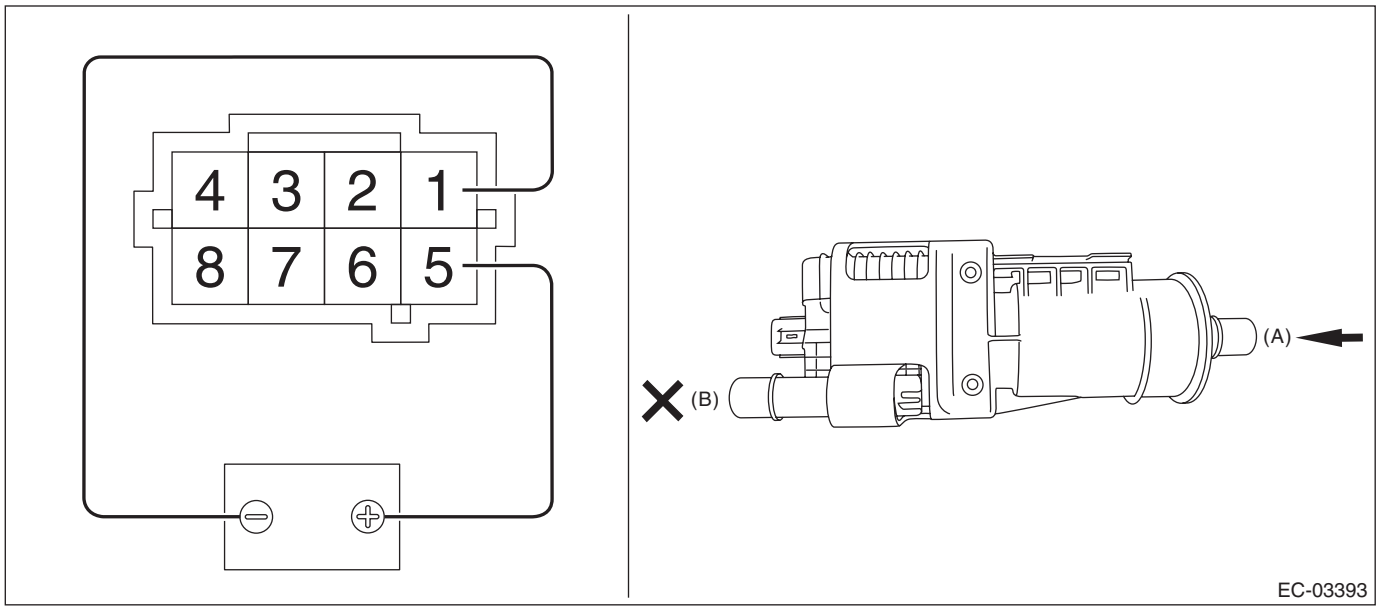


Terminal No.	Standard
1 and 5	27^{+3}_{-2} Ω (when 20°C (68°F))
	31±4 Ω (60°C (140°F))

2) Check that air is discharged from (B) when air is blown into (A).



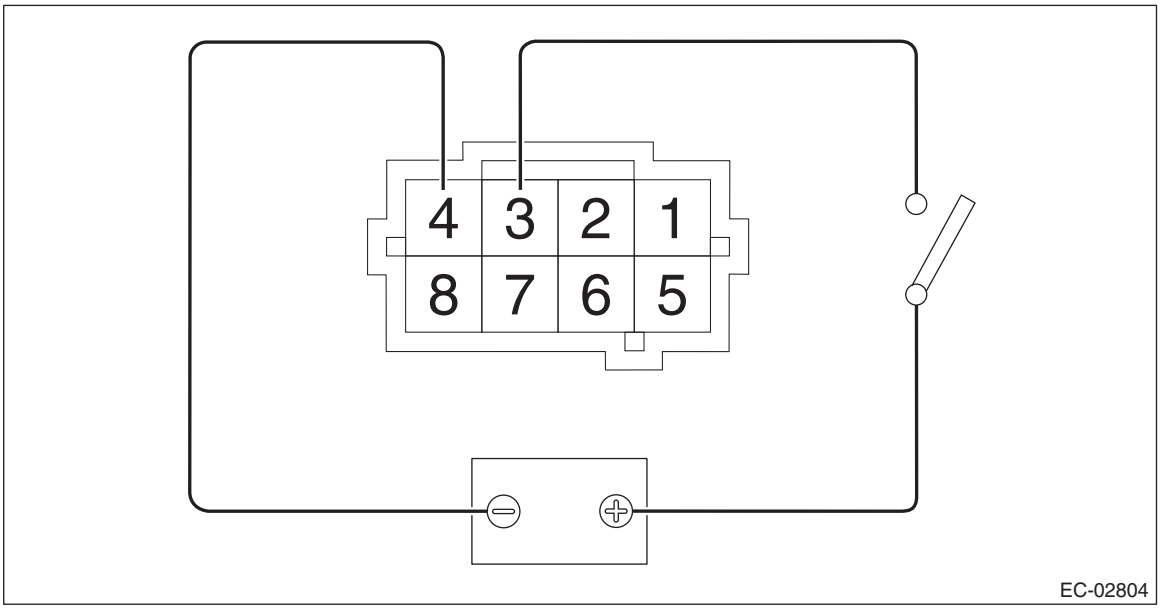
3) Connect the battery positive terminal to the terminal No. 5 and the battery negative terminal to the terminal No. 1. Check that air does not come out from (B) when air is blown into (A).



2. CHECK VACUUM PUMP

1) Connect the battery positive terminal to terminal No. 3 and the battery ground terminal to terminal No. 4, and inspect the vacuum pump operation.

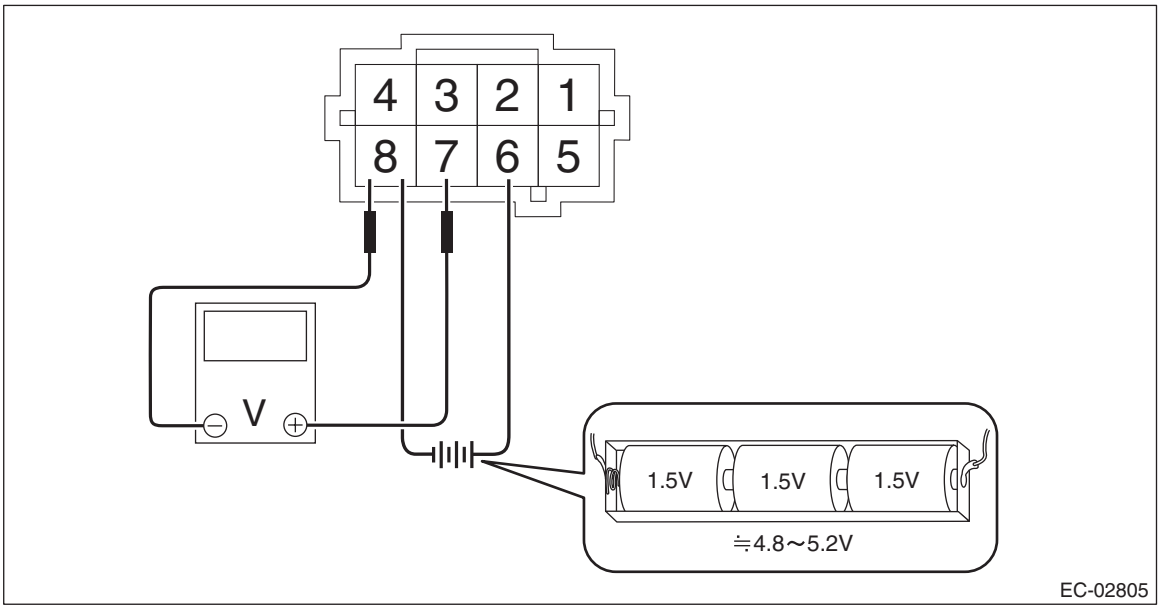
CAUTION:
Do not operate the vacuum pump for 5 minutes or more.



3. CHECK PRESSURE SENSOR

1) Connect dry-cell battery positive terminal to terminal No. 6 and dry-cell battery ground terminal to terminal No. 8, circuit tester positive terminal to terminal No. 7 and the circuit tester negative terminal to terminal No. 8.

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.
- For power supply, 5 V DC voltage source can also be used.

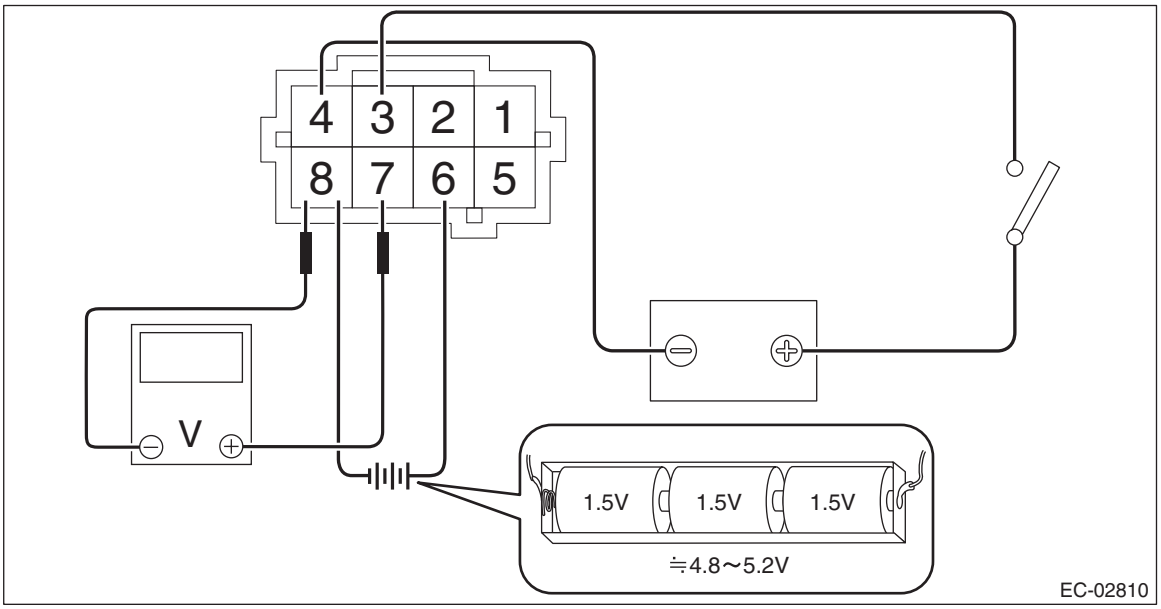


2) Check the voltage at a normal atmospheric pressure.

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

Terminal No.	Standard
7 (+) and 8 (–)	Approx. 3.5 V (when 25°C (77°F))

3) Connect the battery positive terminal to terminal No. 3 and the battery ground terminal to terminal No. 4, and check that there is a voltage drop from the voltage measured in step 2) when the vacuum pump is operated.



4. OTHER INSPECTIONS

1) Check that the leak check valve assembly has no deformation, cracks or other damages.
2) Check that the tube has no cracks, damage or loose part.

13.PCV Hose

A: REMOVAL

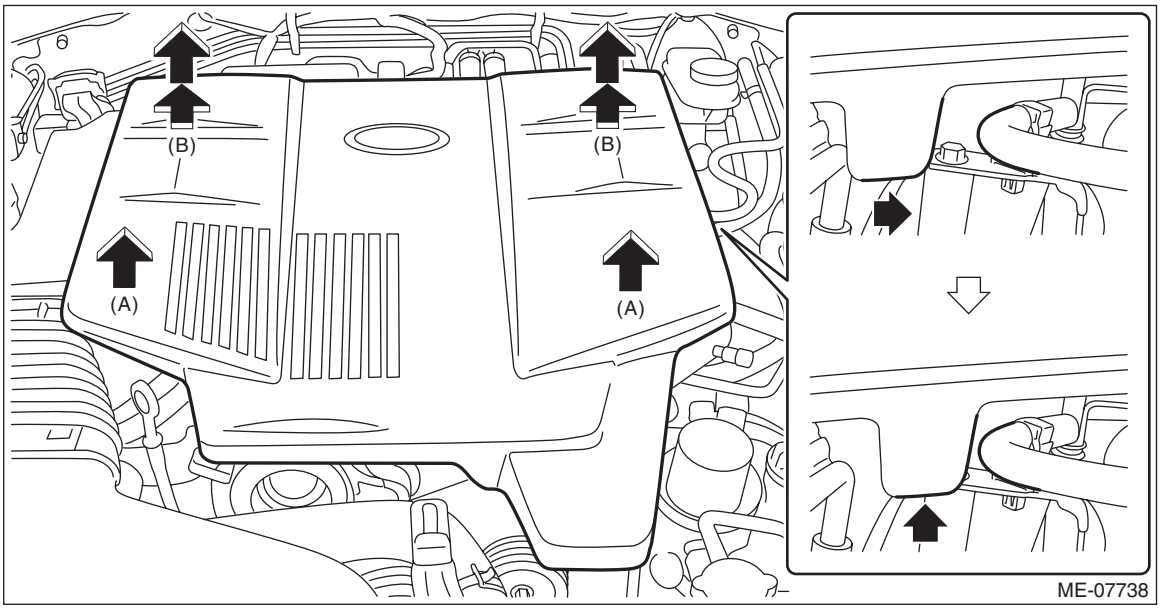
CAUTION:
Do not remove except when the PCV hose is broken.

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

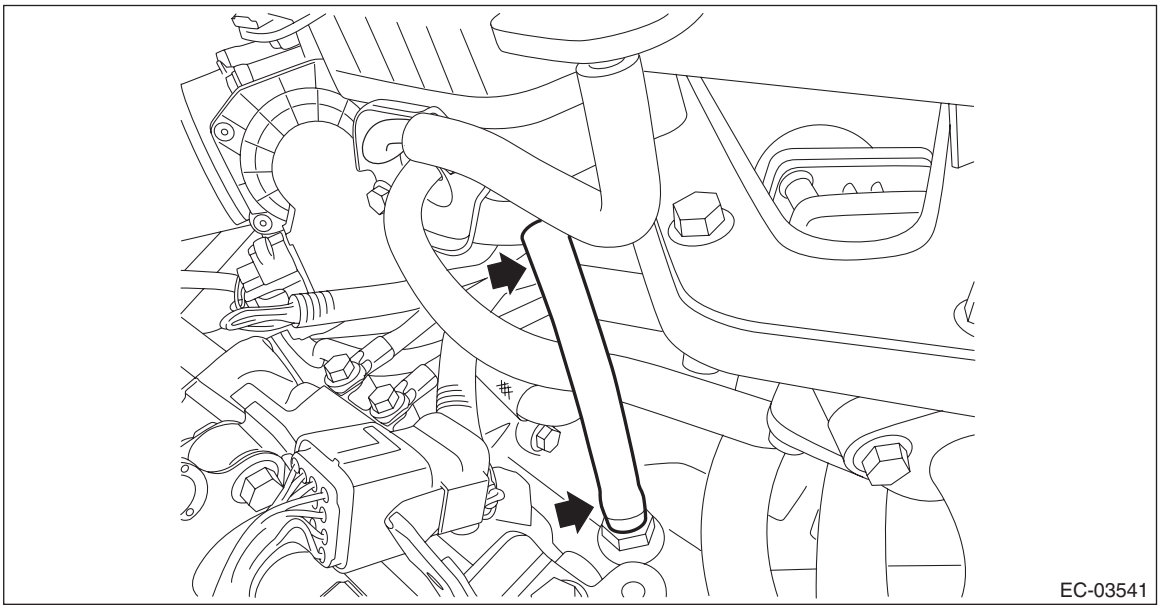
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.

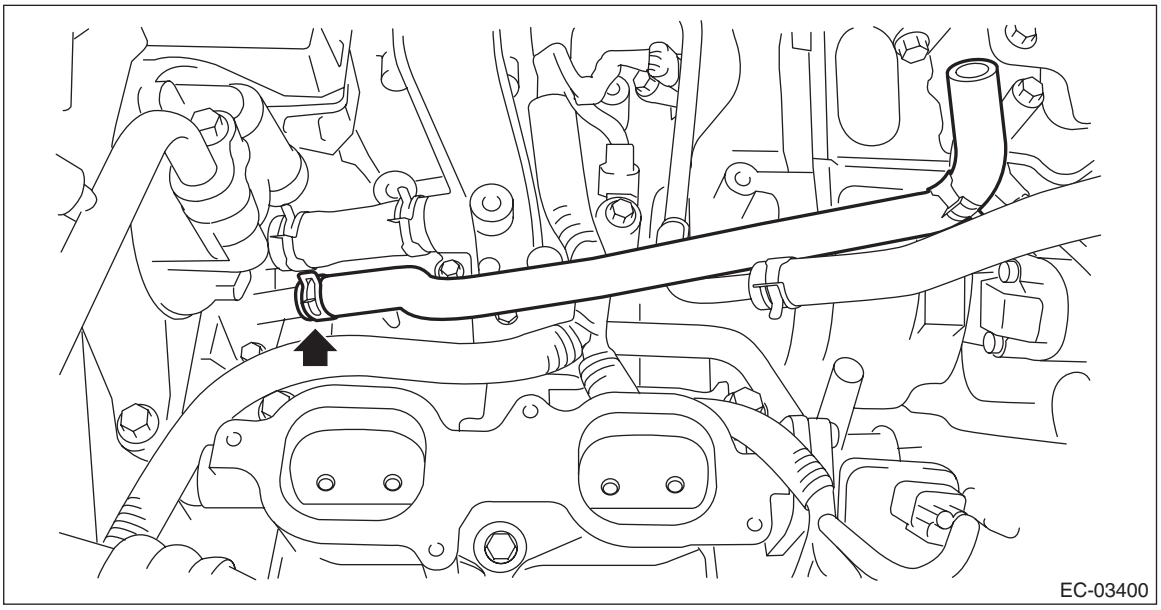


3) Remove the air cleaner case. <Ref. to IN(H4DO(HEV))-6, REMOVAL, Air Cleaner Case.>
4) Disconnect the PCV hose A from the intake manifold and the PCV valve, and then remove the PCV hose A.



5) Remove the intake manifold. <Ref. to FU(H4DO(HEV))-19, REMOVAL, Intake Manifold.>

6) Remove the PCV hose B from the PCV connector.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

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

14.PCV Valve

A: REMOVAL

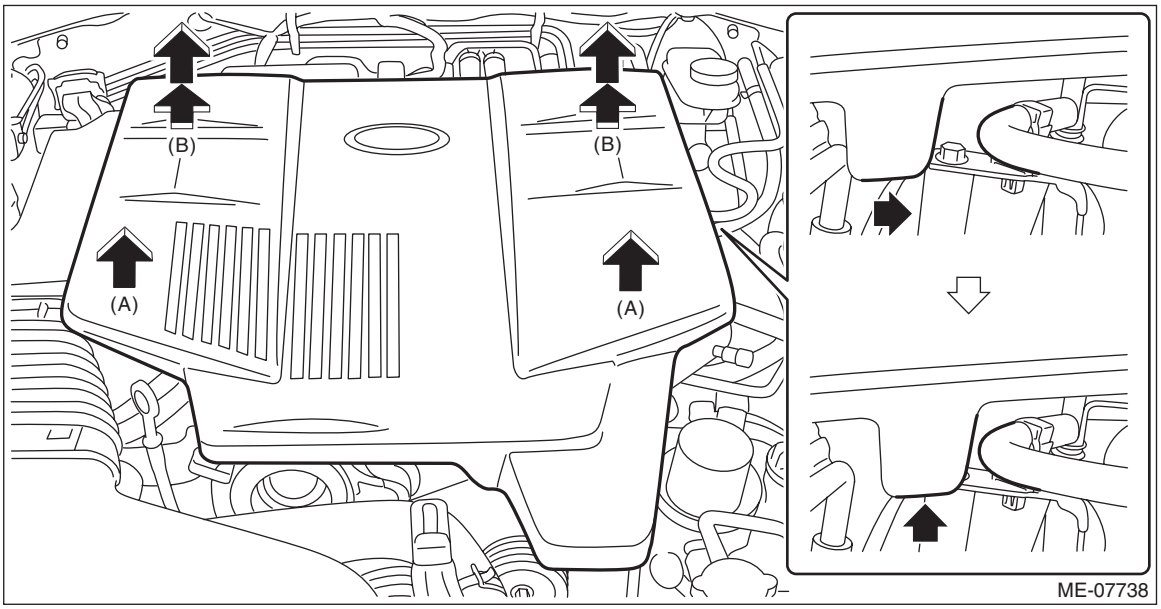
CAUTION:
Do not remove unless the PCV valve is broken.

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

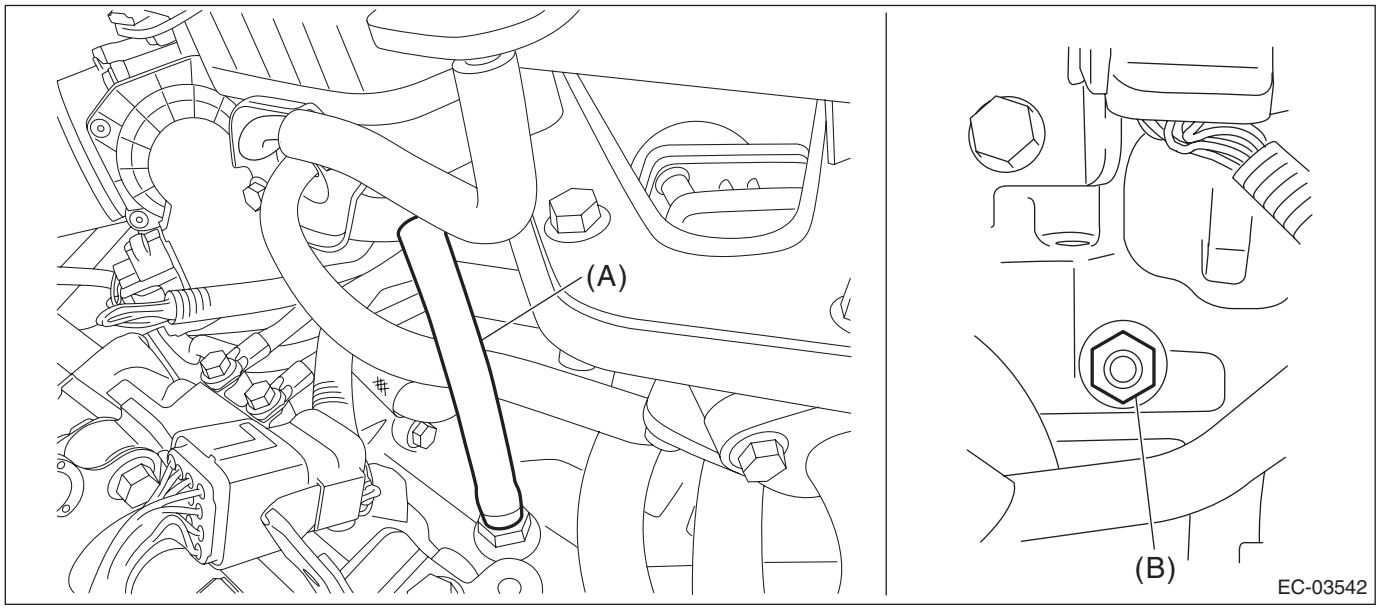
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



3) Remove the air cleaner case. <Ref. to IN(H4DO(HEV))-6, REMOVAL, Air Cleaner Case.>
4) Disconnect the PCV hose A (A) from the intake manifold and the PCV valve, and then remove the PCV hose A (A).
5) Remove the PCV valve (B) from the cylinder block RH.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Apply liquid gasket to the bolt threads of PCV valve.

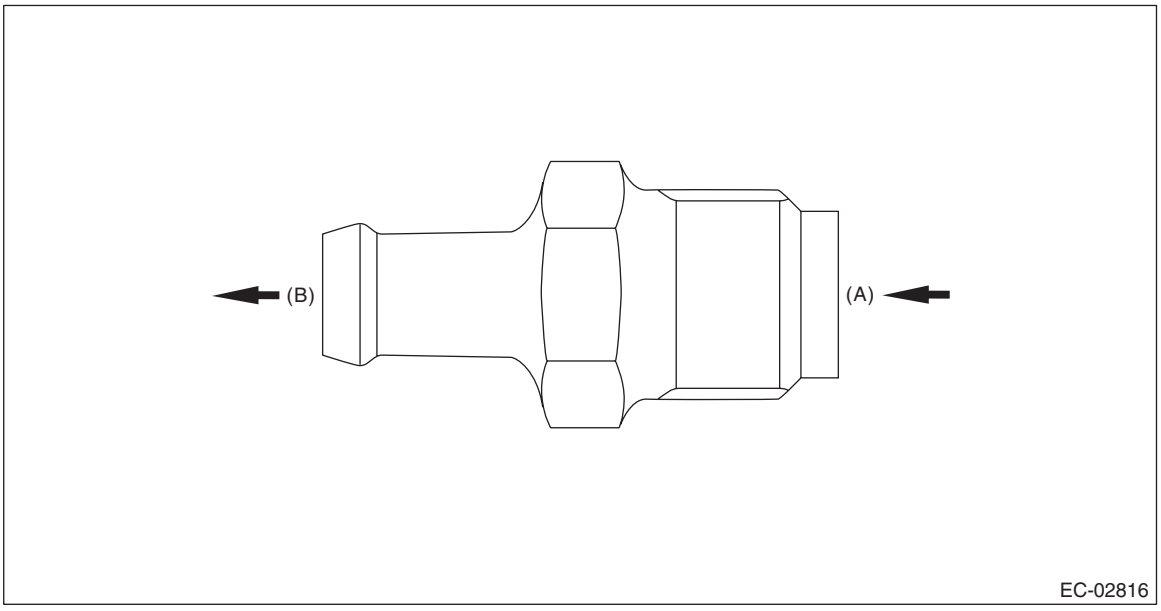
Liquid gasket:
THREE BOND 1324 (Part No. 004403042) or equivalent

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

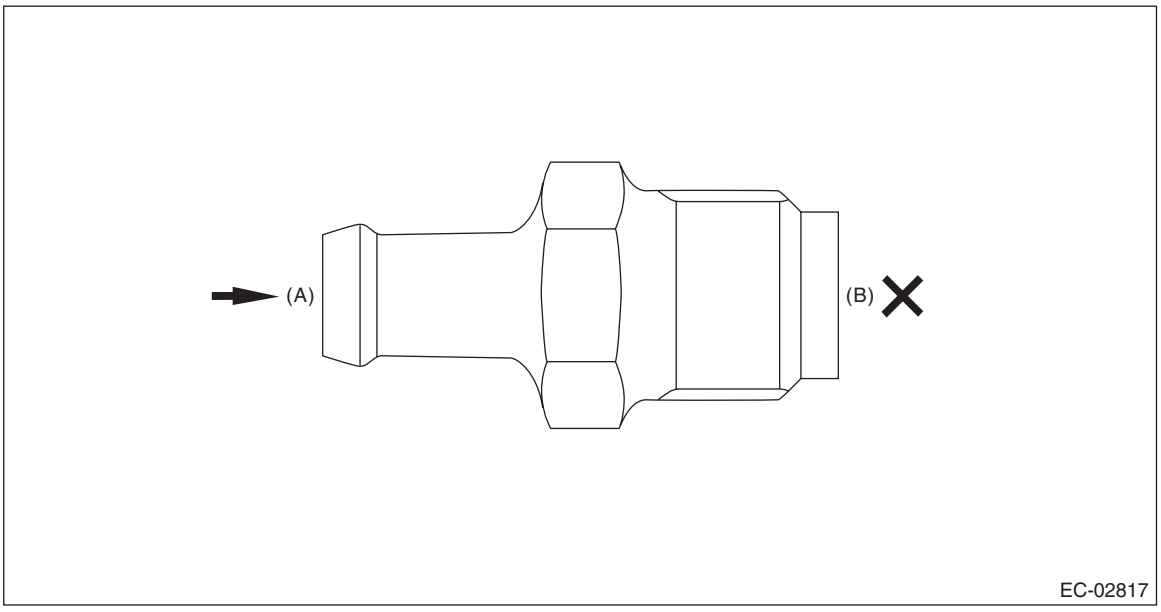
C: INSPECTION

1. PCV VALVE

1) Check that the PCV valve has no deformation, cracks or other damages.
2) Check that air is discharged from (B) when air is blown into (A).



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



2. OTHER INSPECTIONS

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

INTAKE (INDUCTION)

IN(H4DO(HEV))

Page

1. General Description 2
2. Air Cleaner Element 4
3. Air Cleaner Case 6
4. Air Intake Boot 10
5. Air Intake Duct 15
6. Intake Duct 16
7. Resonator Chamber 18

1. Basic Diagnostic Procedure

A: PROCEDURE

1. ENGINE

	Step	Check	Yes	No
1	**CHECK ENGINE START FAILURE.** 1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to EN(H4DO HEV)(diag)-4, CHECK, Check List for Interview.> 2) Start the engine.	Does the engine start?	Go to step **2**.	Inspection using “Diagnostics for Engine Starting Failure” <Ref. to EN(H4DO HEV)(diag)-70, Diagnostics for Engine Starting Failure.>
2	**CHECK ILLUMINATION OF MALFUNCTION INDICATOR LIGHT.**	Does the malfunction indicator light illuminate?	Go to step **3**.	Inspection using “General Diagnostic Table”. <Ref. to EN(H4DO HEV)(diag)-398, INSPECTION, General Diagnostic Table.>
3	**CHECK COMMUNICATION STATUS.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor or general scan tool to the data link connector. 3) Turn the ignition switch to ON, and run the Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed procedures, refer to “Subaru Select Monitor”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Does Subaru Select Monitor or general scan tool communicate with vehicle normally?	Go to step **4**.	Inspection using “Basic Diagnostic Procedure” of LAN system <Ref. to LAN(HEV)(diag)-2, Basic Diagnostic Procedure.>

	Step	Check	Yes	No
4	**CHECK DTC.** Read DTC using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor Refer to "Read Diagnostic Trouble Code (DTC)" for detailed operation procedure. <Ref. to EN(H4DO HEV)(diag)-51, Read Diagnostic Trouble Code (DTC).> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is DTC displayed on Subaru Select Monitor or general scan tool?	Record DTC, time stamp, and freeze frame data, then repair the trouble cause. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).> After repair, go to the next step. Go to step **5**. NOTE: • For the time stamp, refer to LAN section. <Ref. to LAN(HEV)(diag)-6, TIME STAMP, CAUTION, General Description.> • Depending on DTCs, time stamp may not be stored.	Repair the related parts. NOTE: If DTC is not shown on display although the malfunction indicator light illuminates, perform the diagnosis of malfunction indicator light circuit or combination meter. <Ref. to EN(H4DO HEV)(diag)-68, Malfunction Indicator Light.>
5	**PERFORM DIAGNOSIS.** 1) Perform the Clear Memory Mode. <Ref. to EN(H4DO HEV)(diag)-66, Clear Memory Mode.> 2) Perform the Inspection Mode or Drive Cycle. <Ref. to EN(H4DO HEV)(diag)-52, Inspection Mode.> <Ref. to EN(H4DO HEV)(diag)-55, Drive Cycle.>	Is DTC displayed on Subaru Select Monitor or general scan tool?	Inspect using "Diagnostic Procedure with Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-102, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

2. Check List for Interview

A: CHECK

1. CHECK LIST NO. 1

Check the following item when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name		Engine No.	
Date of purchase		Fuel type	
Date of repair		Odometer reading	km
V.I.N.			miles
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Various/Others:		
Ambient air temperature	°C (°F)		
	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Place	❑ Highway ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Downhill ❑ Rough road ❑ Others:		
Engine temperature	❑ Cold ❑ During warming-up ❑ After warming-up ❑ Any temperature ❑ Others:		
Engine speed	rpm		
Vehicle speed	km/h (MPH)		
Driving conditions	❑ Not affected ❑ At starting ❑ While idling ❑ At racing ❑ While accelerating ❑ While cruising ❑ While decelerating ❑ While turning (RH/LH)		
Headlight	❑ ON/❑ OFF	Rear defogger	❑ ON/❑ OFF
Blower	❑ ON/❑ OFF	Audio	❑ ON/❑ OFF
A/C compressor	❑ ON/❑ OFF	Rear entertainment system	❑ ON/❑ OFF
Radiator fan	❑ ON/❑ OFF	Car phone	❑ ON/❑ OFF
Front wiper	❑ ON/❑ OFF	Wireless device	❑ ON/❑ OFF
Rear wiper	❑ ON/❑ OFF		

2. CHECK LIST NO. 2

Check the following item about the vehicle's state when the malfunction indicator light turns on.

NOTE:
Use copies of this page for interviewing customers.

a) Other warning lights or indicators illuminate.: ❑ Yes / ❑ No
❑ Fuel level warning light ❑ Charge warning light ❑ Engine coolant temperature warning light ❑ Oil pressure warning light ❑ ATF temperature warning light or Sport indicator light ❑ Driver's control center differential indicator light ❑ ABS warning light ❑ VDC warning light ❑ Cruise indicator light ❑ SI-CRUISE warning light ❑ EyeSight warning light ❑ Immobilizer indicator light ❑ STEERING warning light ❑ Electronic parking brake warning light ❑ Glow indicator light ❑ Sedimenter warning light ❑ Auto Start Stop indicator light ❑ Auto Start Stop OFF indicator light ❑ Hybrid fail lamp ❑ Others:
b) Fuel level
• Lack of fuel: ❑ Yes / ❑ No • Indicator position of fuel gauge: • Experienced running out of fuel: ❑ Yes / ❑ No
c) Intentional connecting or disconnecting of harness connectors or spark plug cords: ❑ Yes / ❑ No
• What:
d) Intentional connecting or disconnecting of hoses: ❑ Yes / ❑ No
• What:
e) Installing parts other than genuine parts: ❑ Yes / ❑ No
• What: • Where:
f) Occurrence of noise: ❑ Yes / ❑ No
• From where: • What kind:
g) Occurrence of smell: ❑ Yes / ❑ No
• From where: • What kind:
h) Intrusion of water into engine compartment or passenger compartment: ❑ Yes / ❑ No
i) Troubles occurred
❑ Engine does not start. ❑ Engine stalls during idling. ❑ Engine stalls while driving. ❑ Engine speed decreases. ❑ Engine speed does not decrease. ❑ Rough idling ❑ Poor acceleration ❑ Back fire ❑ After fire ❑ Does not shift. ❑ Excessive shift shock

3. General Description

A: CAUTION

1) Airbag system wiring harness is routed near the ECM, main relay and fuel pump relay.

CAUTION:
• Do not use electrical test equipment on the airbag system circuits.
• Be careful not to damage the airbag system wiring harness when servicing the ECM, TCM, main relay and fuel pump relay.

2) Never connect the battery in reverse polarity. Doing so will damage the ECM instantly, and other parts will also be damaged.

NOTE:
• When connecting 12 volt auxiliary battery, wait for one minute or more after disconnecting connectors.
• When disconnecting or connecting 12 volt auxiliary battery, make sure to avoid battery terminal from multiple contacts with cable within one minute.
• When trouble occurs in vehicle by connection of 12 volt auxiliary battery terminal, disconnect 12 volt auxiliary battery terminal and reconnect after one minute or more. Then confirm the trouble has been solved.

3) Before connecting 12 volt auxiliary battery, make sure that no obstacles exist within the operation range of active grille shutter. Active grille shutter may be activated when 12 volt auxiliary battery is connected.

4) Do not disconnect the battery cables while the engine is running. A large counter electromotive force will be generated in the generator, and this voltage may damage electronic parts such as ECM etc.

5) When disconnecting the connectors of the electrical components, always be sure to turn the ignition switch to OFF. Perform the Clear Memory Mode after connecting the connectors. <Ref. to EN(H4DO HEV)(diag)-66, Clear Memory Mode.>

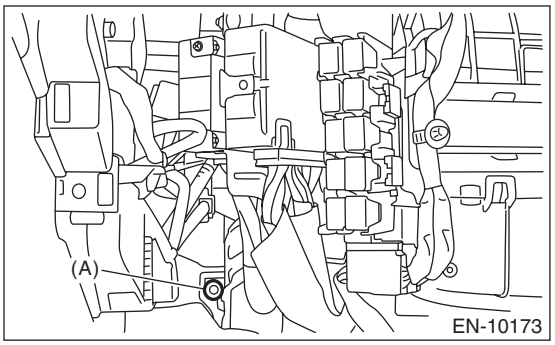
6) When measuring the voltage or resistance of individual sensor or all electrical control modules, use a tapered pin with a diameter of 0.6 mm (0.024 in) or less and touch it to the tip of terminal. Never insert the tapered pin into the terminal because it deforms inside which may lead to malfunction.

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

NOTE:
When replacing the ECM of the models with immobilizer, immobilizer system must be registered. For detailed procedures, refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.

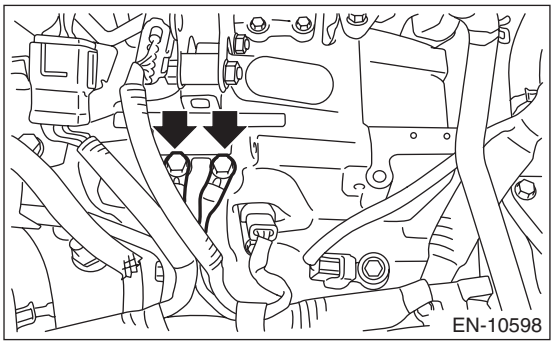
7) Take care not to allow water to get into the connectors when servicing or washing the vehicle in rainy weather. Avoid exposure to water even if the connectors are waterproof.

8) Use ECM mounting stud bolts for the grounding point when measuring voltage and resistance inside the passenger compartment.



(A) Stud bolt

9) Use the engine ground terminal or engine assembly for the grounding point when measuring the voltage and resistance in engine compartment.



10) All parts related to the engine control system are precision parts. Do not drop or otherwise apply impact. Do not reuse the parts that are dropped accidentally.

11) Do not connect the wiring of electrical parts directly to the battery terminals. It may cause erroneous operation of the charge control, leading to early deterioration of the battery or discharged battery.

12) Observe the following cautions when installing a radio in vehicle.

CAUTION:
• The antenna must be kept as far apart as possible from the ECM. <Ref. to EN(H4DO HEV)(diag)-9, CONTROL MODULE, LOCATION, Electrical Component Location.>
• The antenna feeder must be placed as far apart as possible from the ECM and engine control system harness.
• Carefully adjust the antenna for correct matching.
• When mounting a large power type radio, pay special attention to the three items mentioned above.
• Incorrect installation of the radio may affect the operation of ECM.
13) When disconnecting the fuel hose, be sure to release the fuel pressure beforehand. <Ref. to FU(H4DO(HEV))-98, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
14) Warning lights may illuminate when performing driving test with jacked-up or lifted-up condition, but this is not a system malfunction. The reason for this is the rotating speed difference between the front and rear wheels. After diagnosis of engine control system, perform the VDC memory clear procedure of self-diagnosis function. <Ref. to VDC(diag)-25, Clear Memory Mode.>

B: INSPECTION

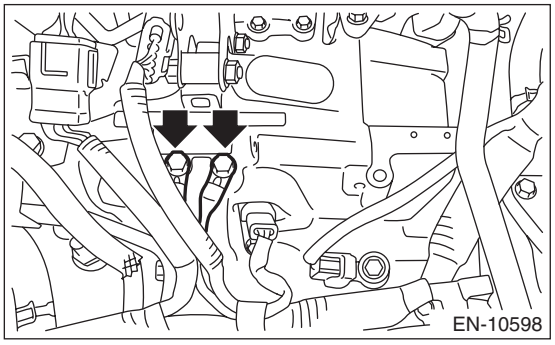
Before performing diagnostics, check the following item which might affect engine problems.

1. 12 VOLT AUXILIARY BATTERY

1) Check the battery. <Ref. to SC(H4DO(HEV))-43, INSPECTION, Battery.>
2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. ENGINE GROUND

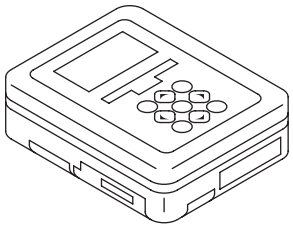
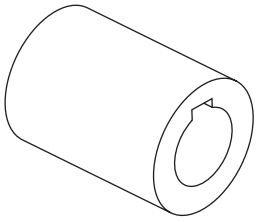
Make sure that the engine ground terminal has no contamination, corrosion or looseness and is properly connected to the engine.



C: NOTE

• The on-board diagnostic (OBD) system detects and indicates a fault in various inputs and outputs of the complex electronic control. Malfunction indicator light in the combination meter indicates occurrence of a fault or trouble.
• Further, against any failure of sensors that would cause the vehicle to stop running, the fail-safe function is provided to ensure the minimal drivability.
• The OBD system incorporated with the vehicles within this type of engine complies with OBD-II regulations. The OBD system monitors the components and the system malfunction listed in “Engine Section” which affects on emissions.
• When the system decides that a malfunction occurs, malfunction indicator light illuminates. At the same time of the malfunction indicator light illumination or blinking, a DTC and a freeze frame engine conditions are stored into on-board computer.
• The OBD system stores freeze frame engine condition data (engine load, engine coolant temperature, fuel trim, engine speed and vehicle speed, etc.) into on-board computer when it detects a malfunction.
• Freeze frame engine condition data are stored until the DTCs are cleared. However when such malfunctions as fuel trim fault and misfire are detected with the freeze frame engine condition data stored, they are rewritten into those related to the fuel trim fault and misfire.
• When the malfunction does not occur again for three consecutive driving cycles*, malfunction indicator light is turned off, but DTC remains at on-board computer.
*: One driving cycle means the period between the ignition switch ON and the ignition switch OFF after driving.
• When performing diagnosis, connect the Subaru Select Monitor to the vehicle.

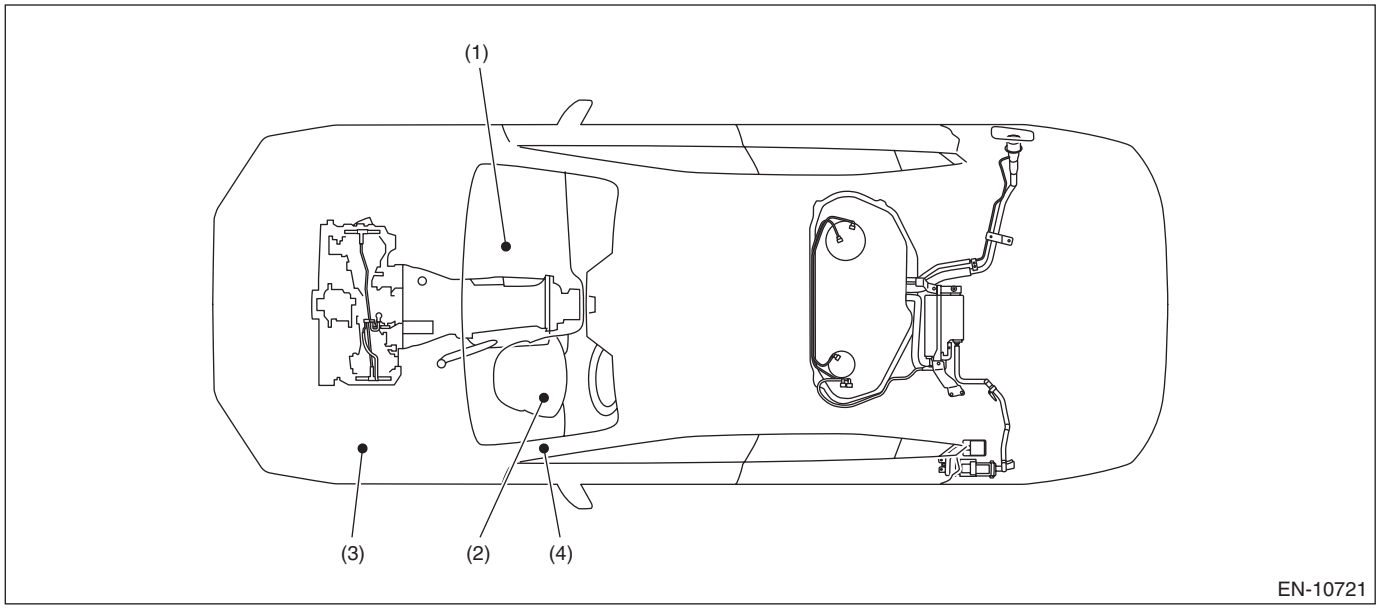
D: PREPARATION TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for setting of each function and trouble-shooting for electrical system. NOTE: For detailed operation procedures of Subaru Select Monitor III, refer to “PC application help for Subaru Select Monitor”.
 ST18252AA000	18252AA000	CRANKSHAFT SOCKET	Used for rotating crankshaft.

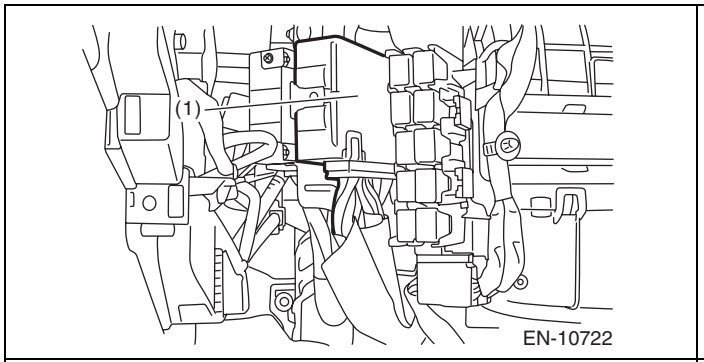
4. Electrical Component Location

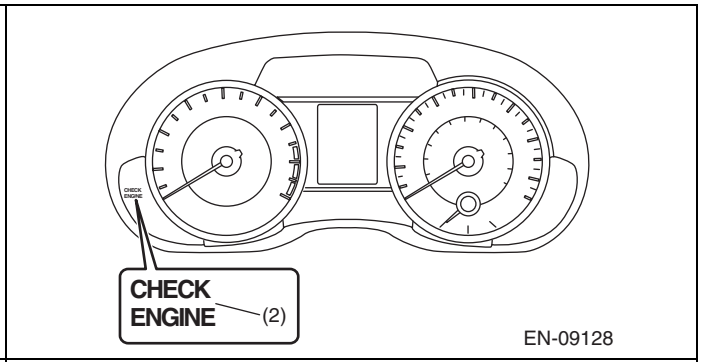
A: LOCATION

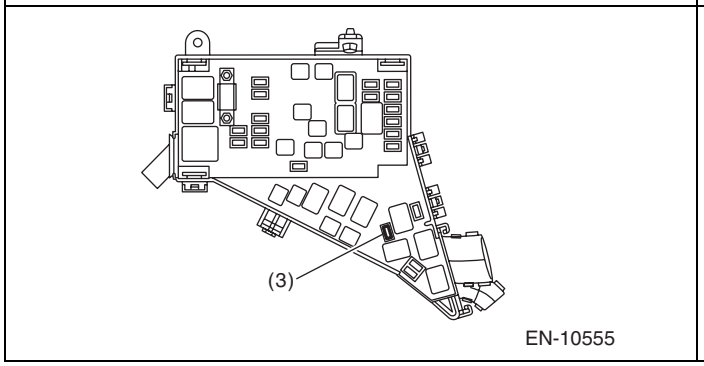
1. CONTROL MODULE

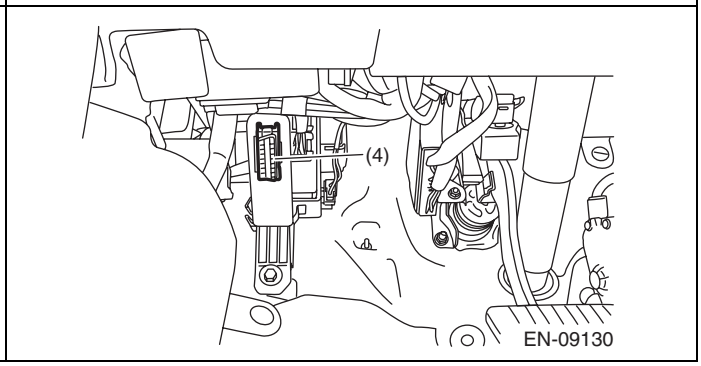


(1) Engine control module (ECM)
(2) Malfunction indicator light
(3) Delivery (test) mode fuse
(4) Data link connector

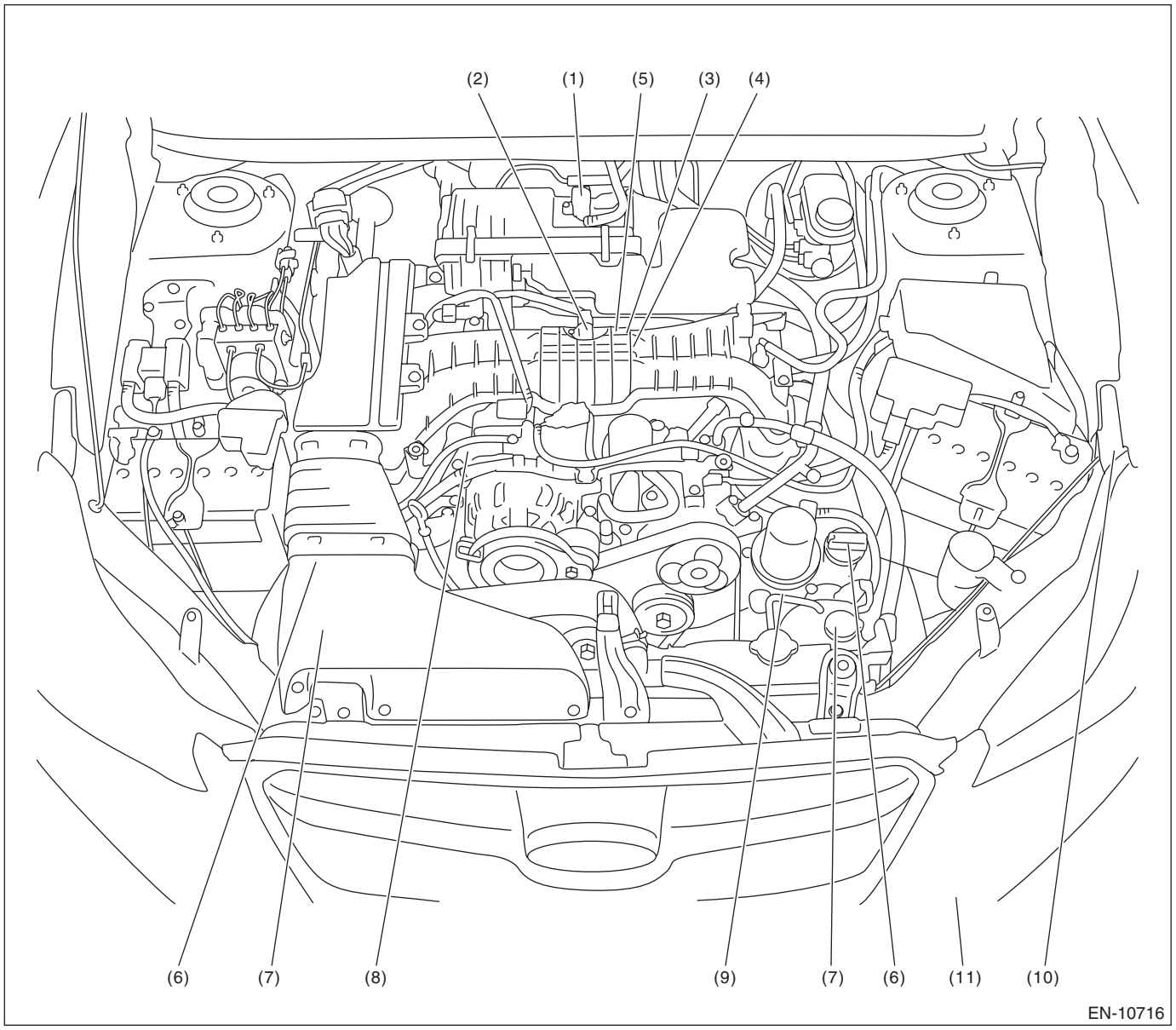




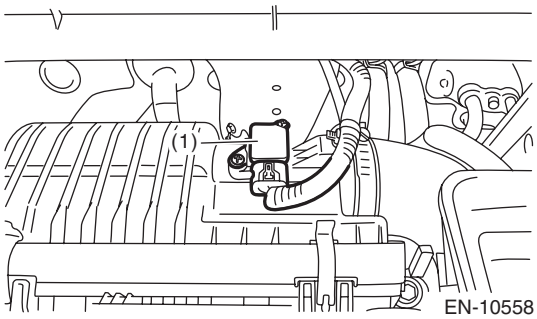




2. SENSOR



(1) Mass air flow and intake air temperature sensor
(2) Manifold absolute pressure sensor
(3) Electronic throttle control
(4) Knock sensor
(5) Crankshaft position sensor
(6) Intake camshaft position sensor
(7) Exhaust camshaft position sensor
(8) Engine coolant temperature sensor
(9) Engine oil temperature sensor
(10) Battery temperature sensor
(11) Ambient sensor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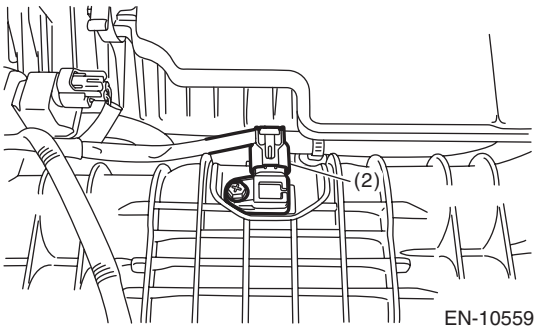
EN-10558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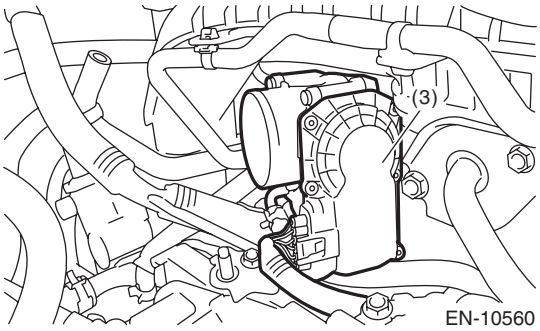
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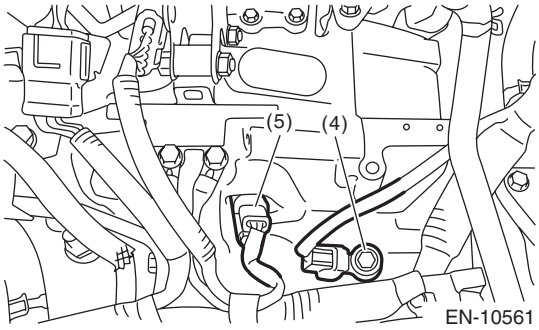
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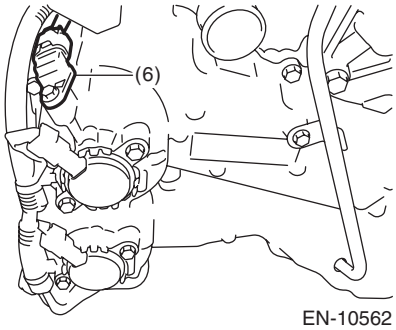
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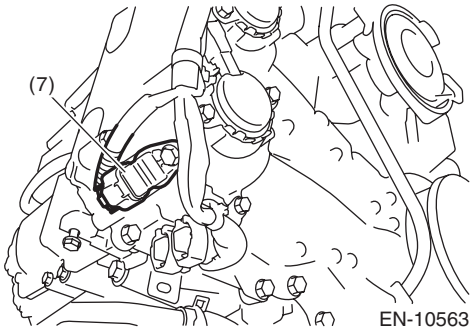
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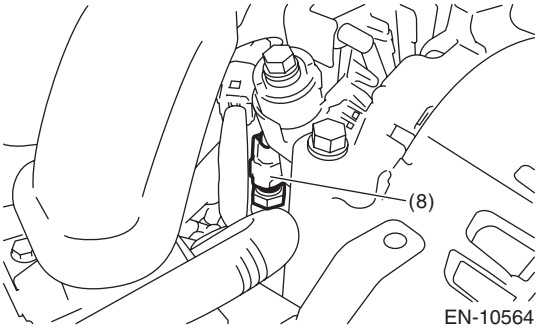
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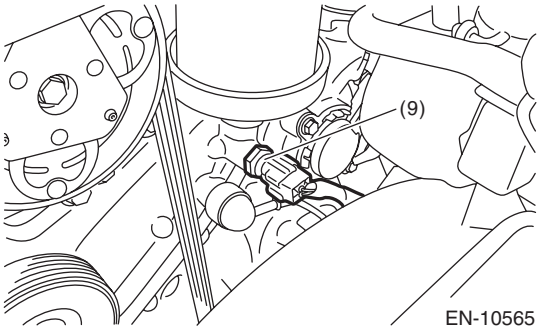
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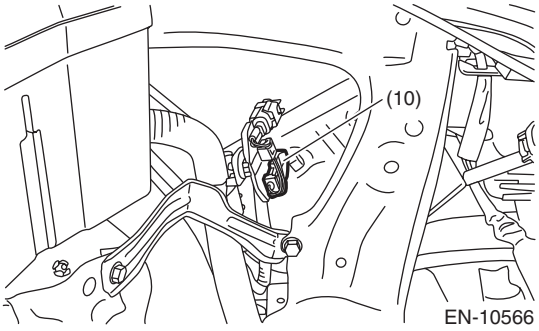
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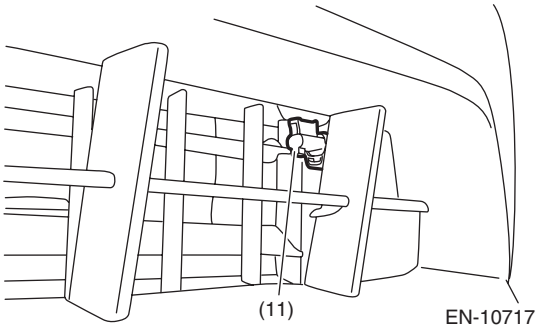
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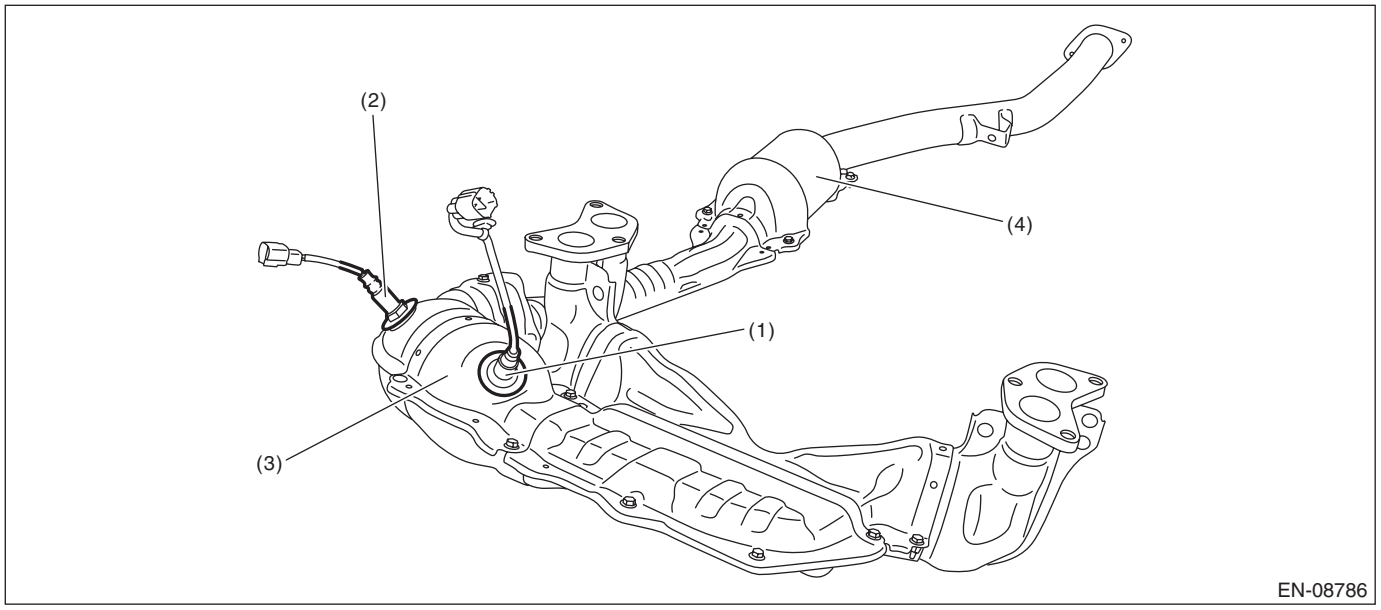
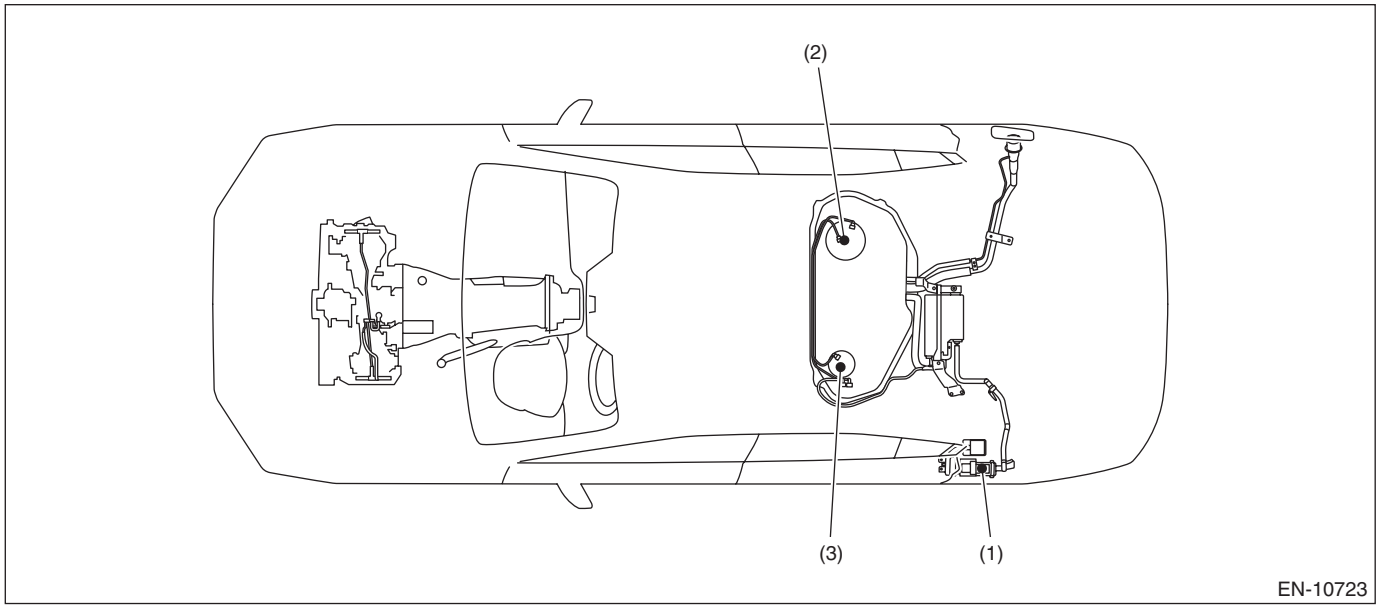
EN-10717

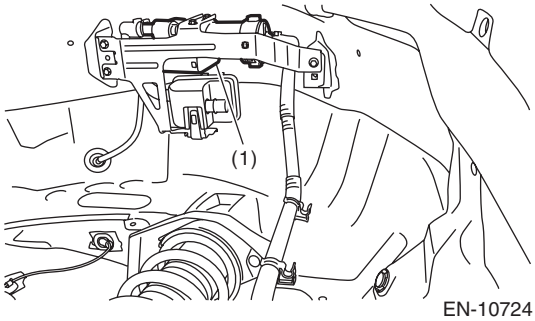
Electrical Component Location



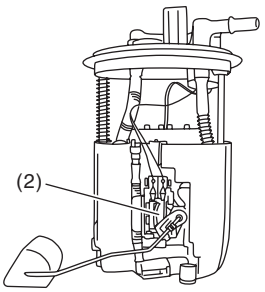
(1) Front oxygen (A/F) sensor
(2) Rear oxygen sensor
(3) Front catalytic converter
(4) Rear catalytic converter



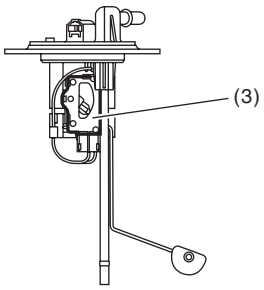
(1) Leak check valve ASSY (with built-in pressure sensor)
(2) Fuel level sensor
(3) Fuel sub level sensor



EN-10724

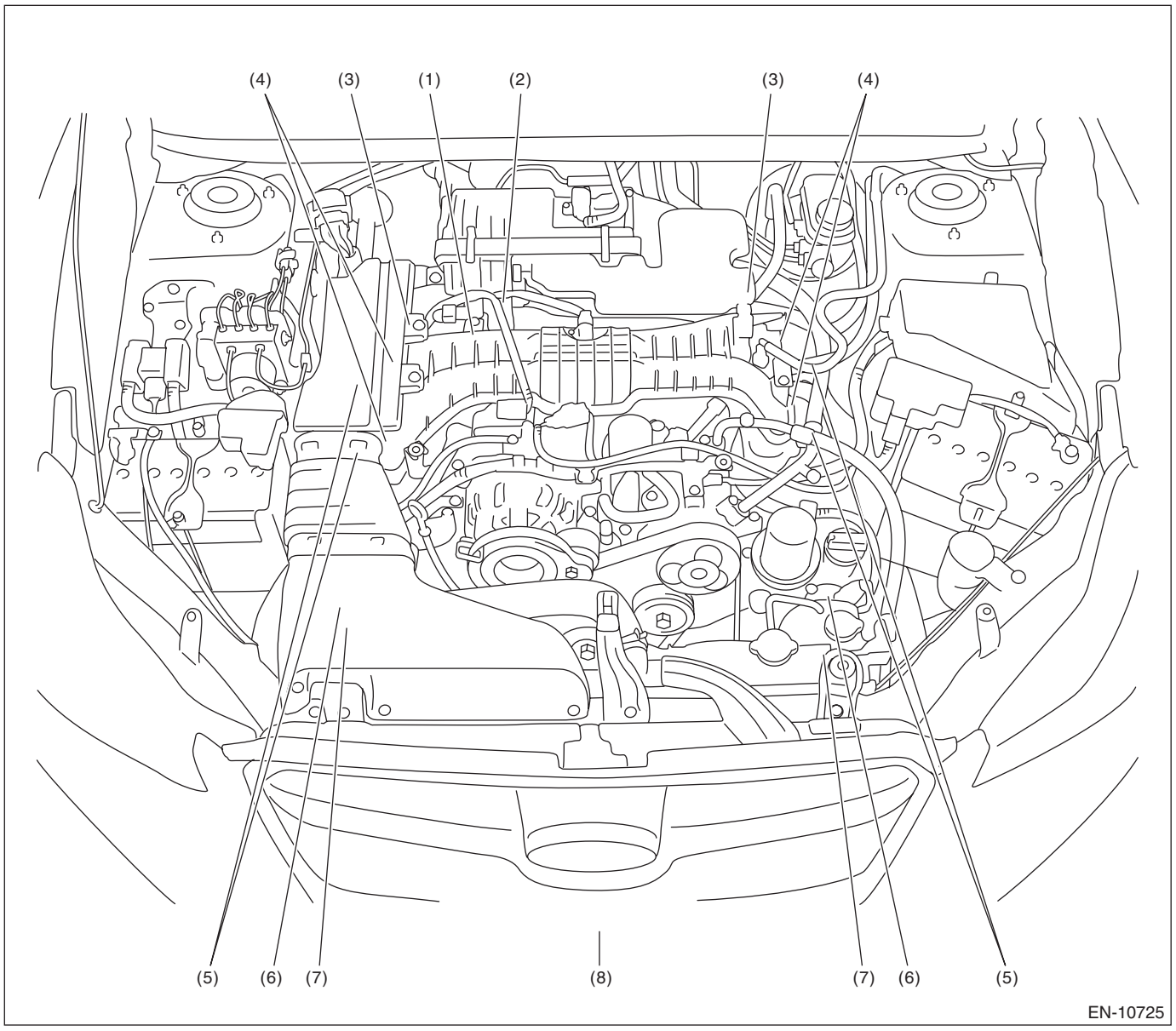


EN-10473

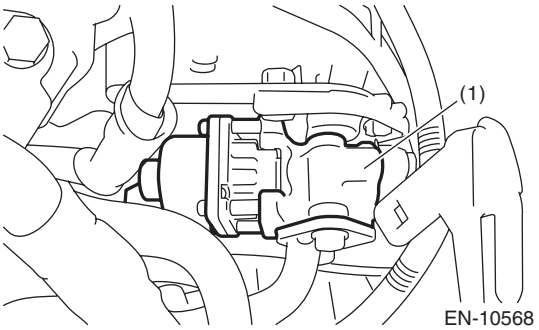


EN-08790

3. SOLENOID VALVE, ACTUATOR, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS



(1) EGR control valve
(2) Purge control solenoid valve
(3) Tumble generator valve actuator
(4) Fuel injector
(5) Ignition coil
(6) Intake oil control solenoid
(7) Exhaust oil control solenoid
(8) Active grille shutter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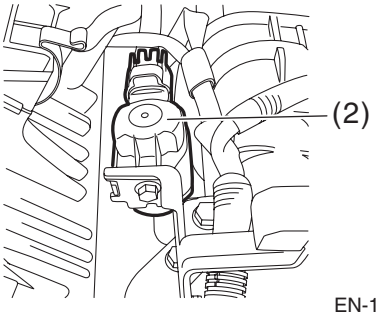
EN-10568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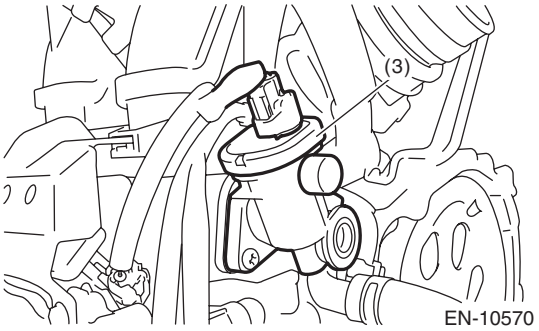
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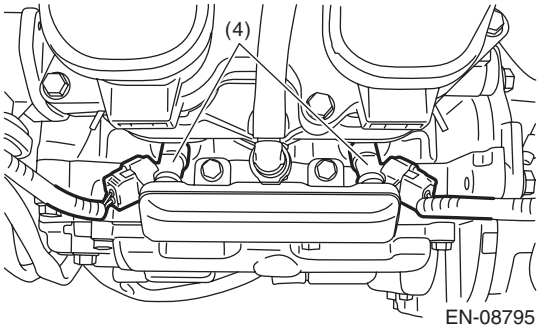
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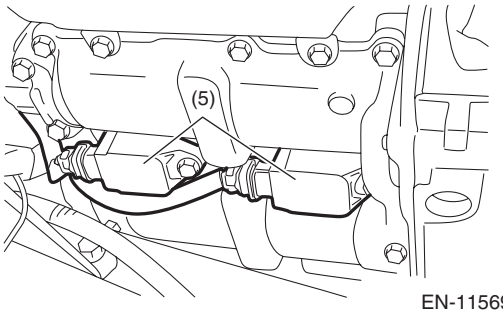
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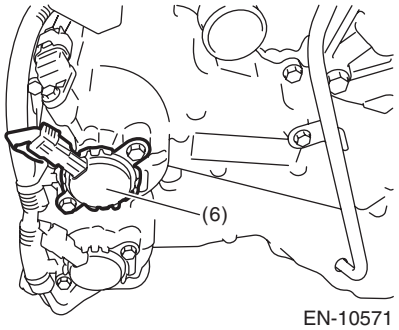
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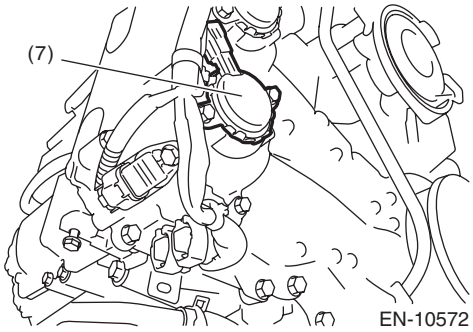
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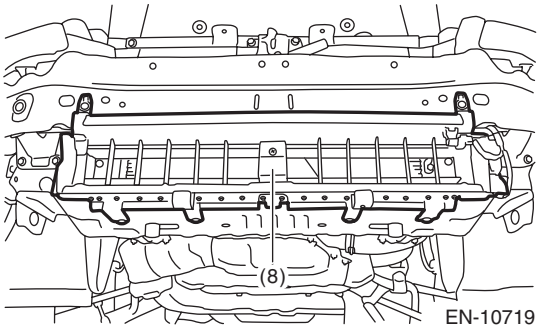
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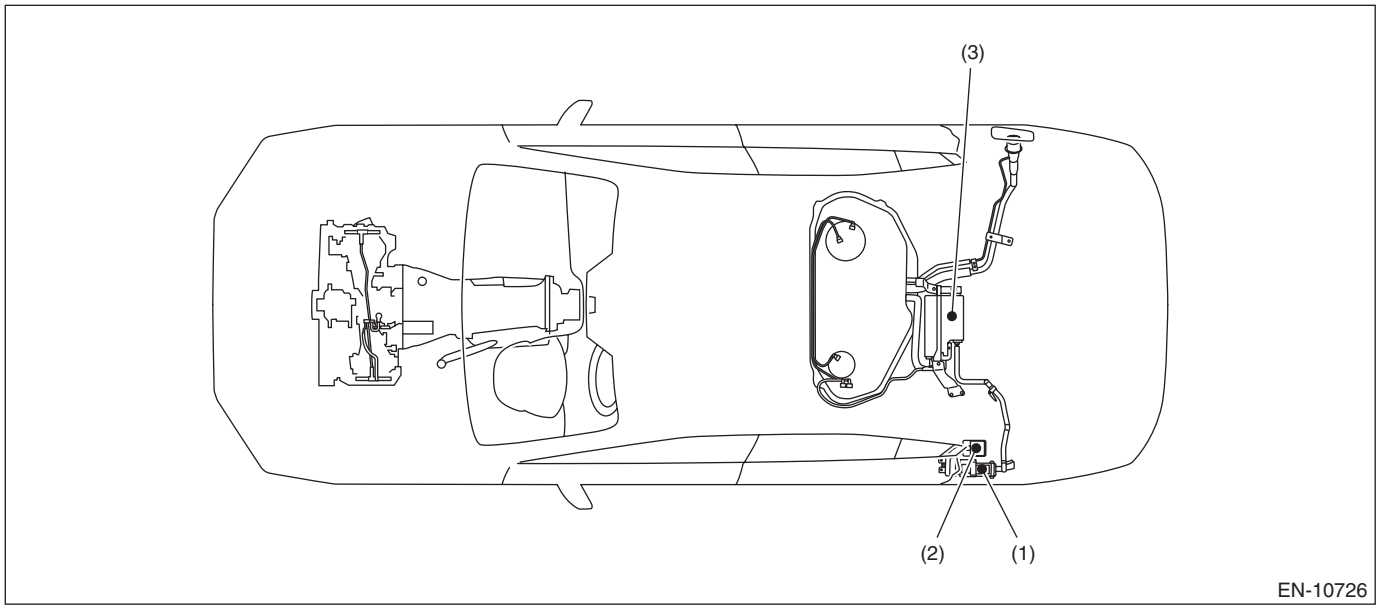
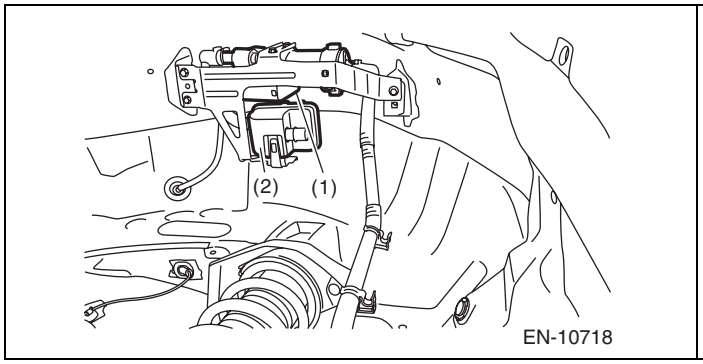
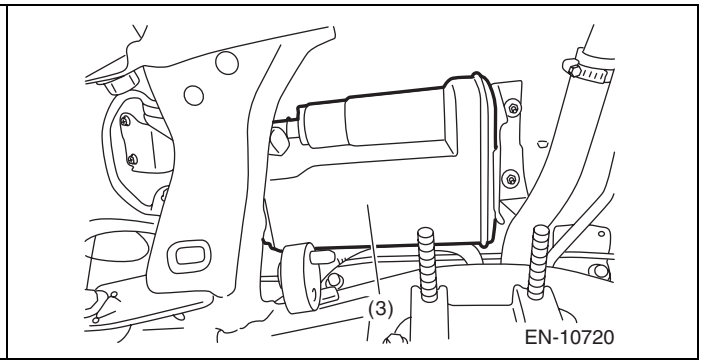
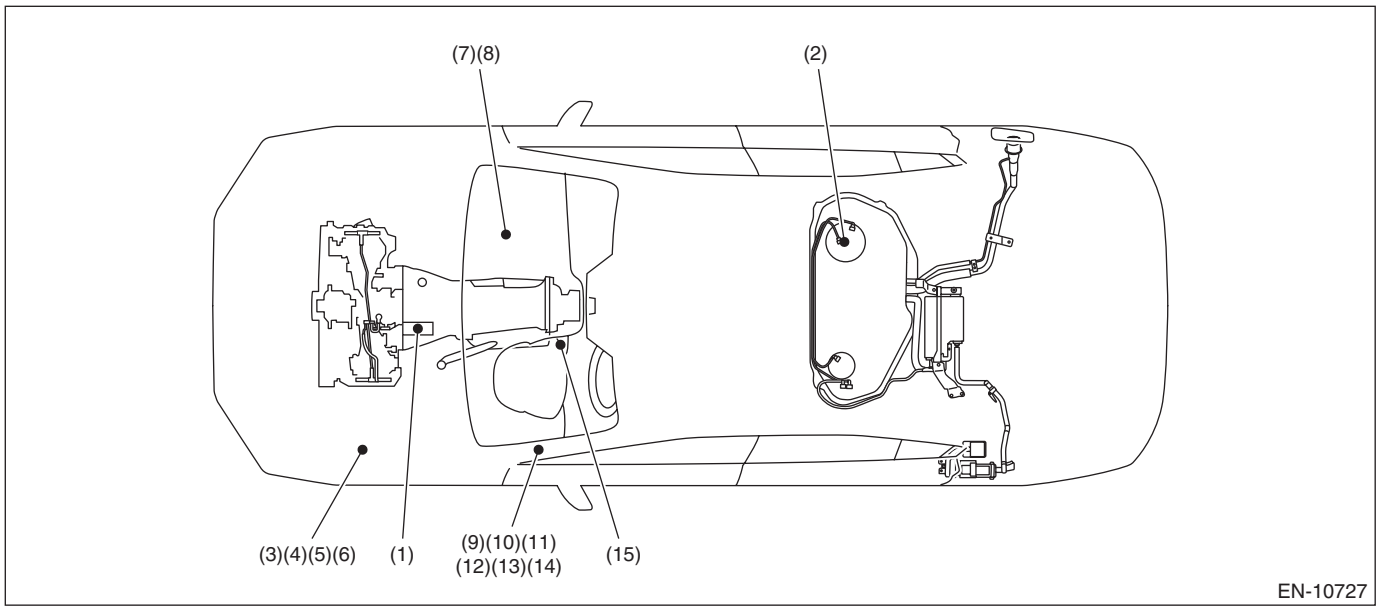


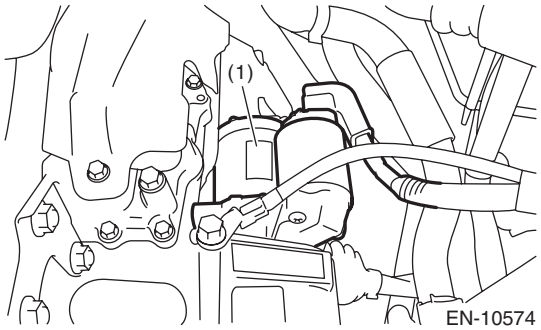
(1) Leak check valve ASSY (2) Drain filter (3) Canister

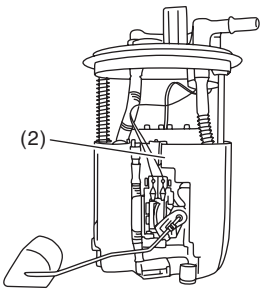


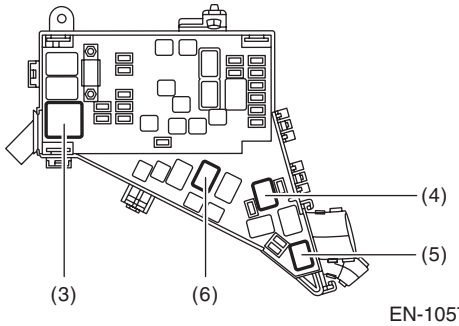


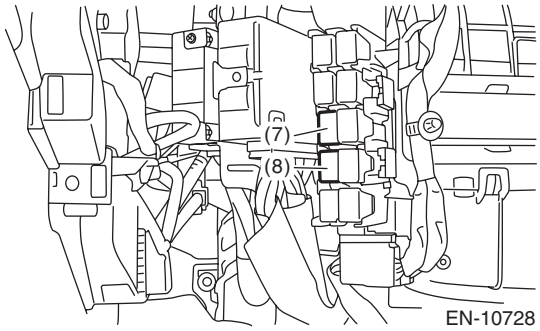


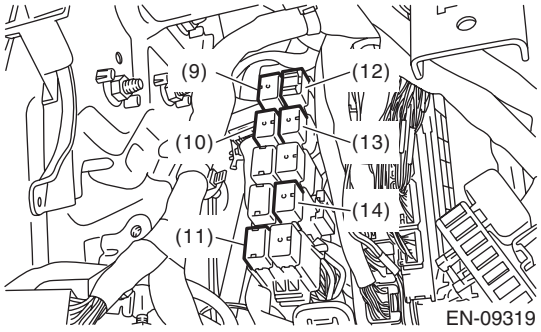
(1)	Starter	(6)	Fuel pump relay	(11)	Starter relay 1
(2)	Fuel pump	(7)	Main relay	(12)	Starter cut relay (model with push button start)
(3)	Radiator main fan relay 1	(8)	IG relay	(13)	IG relay 1 (push button start) (model with push button start)
(4)	Radiator main fan relay 2	(9)	A/F, oxygen sensor relay	(14)	Starter relay (push button start) (model with push button start)
(5)	Radiator sub fan relay	(10)	Electronic throttle control relay	(15)	Push button ignition switch (model with push button start)

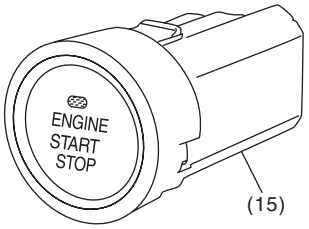




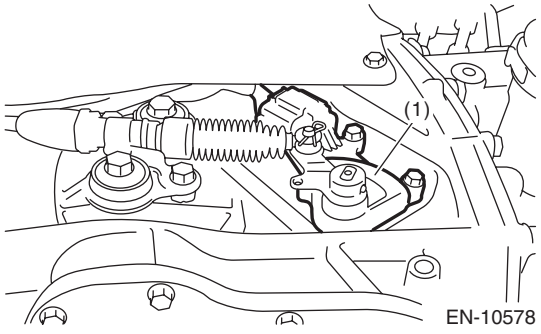








4. TRANSMISSION

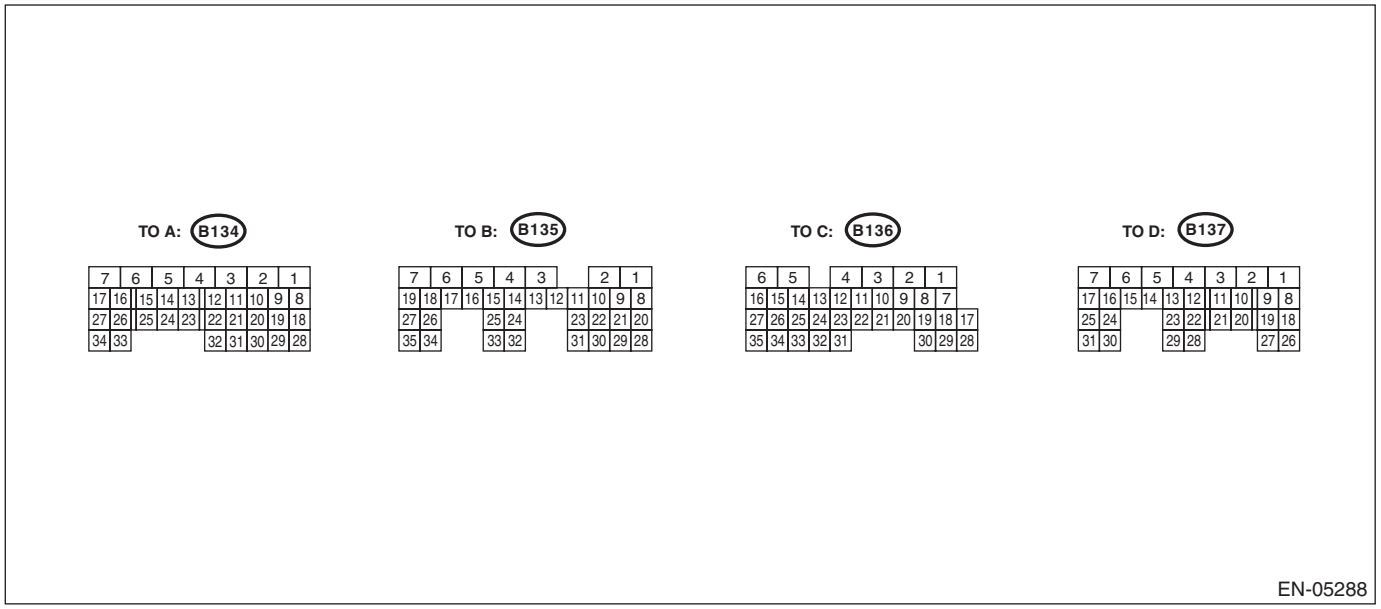


(1) Inhibitor switch

5. Control Module I/O Signal

A: ELECTRICAL SPECIFICATION

1. ENGINE CONTROL MODULE (ECM)



Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Crankshaft position sensor	Signal (+)	B136	16	5	0 or 5	Waveform
	Signal (–)	B136	27	5	0	—
Front oxygen (A/F) sensor	Signal (+)	B136	19	2.8 — 3.2	2.8 — 3.2	—
	Signal (–)	B136	18	2.4 — 2.7	2.4 — 2.7	—
	Shield	B136	30	0	0	—
Rear oxygen sensor	Signal	B136	21	0	0 — 0.9	—
	Shield	B136	30	0	0	—
Front oxygen (A/F) sensor heater signal		B136	5	Battery voltage	0 or battery voltage	Waveform
Rear oxygen sensor heater signal		B134	6	Battery voltage	0 or battery voltage	Waveform
Engine coolant temperature sensor	Signal	B134	30	1.0 — 1.4	1.0 — 1.6	—
Air flow sensor	Signal	B137	22	—	0.3 — 4.5	—
	Shield	B137	28	0	0	—
	Ground	B137	29	0	0	—
Intake air temperature sensor signal		B137	12	0.3 — 4.6	0.3 — 4.6	—
Engine oil temperature sensor signal		B134	20	1.0 — 1.4	1.0 — 1.6	—
Starter switch		B137	17	Waveform	Waveform	Waveform
Accessory cut request		B135	32	Waveform	Waveform	Cranking: waveform
Starter switch 2		B137	14	Waveform	Waveform	Cranking: waveform
Starter cut relay		B135	34	Waveform	Waveform	Cranking: waveform
Ignition switch		B137	27	Battery voltage	Battery voltage	—

Control Module I/O Signal

Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Neutral position switch		B137	16	ON: 0 OFF: Battery voltage	ON: 0 OFF: Battery voltage	—
Delivery mode switch		B137	13	Battery voltage	Battery voltage	When fuse is installed: 0
Knock sensor	Signal	B136	28	2.5	2.5	—
	Shield	B136	29	0	0	—
Back-up power supply		B137	2	Battery voltage	Battery voltage	—
Control module power supply		B136	6	Battery voltage	Battery voltage	—
		B137	1	Battery voltage	Battery voltage	—
Sensor power supply		B134	19	5	5	—
		B135	22	5	5	—
Ignition control	#1	B134	21	0	0 or 5	Waveform
	#2	B134	10	0	0 or 5	Waveform
	#3	B134	31	0	0 or 5	Waveform
	#4	B134	8	0	0 or 5	Waveform
Fuel injector	#1	B134	12	Battery voltage	0 or battery voltage	Waveform
	#2	B134	22	Battery voltage	0 or battery voltage	Waveform
	#3	B134	32	Battery voltage	0 or battery voltage	Waveform
	#4	B134	13	Battery voltage	0 or battery voltage	Waveform
Fuel pump relay control		B135	19	Battery voltage	ON: 0.5 or less OFF: Battery voltage	—
A/C relay control		B135	35	ON: 0.5 or less OFF: Battery voltage	ON: 0.5 or less OFF: Battery voltage	—
Pressure switch		B137	8	ON: 0 OFF: Battery voltage	ON: 0 OFF: Battery voltage	—
Main fan relay control		B135	12	ON: 0.5 or less OFF: Battery voltage	ON: 0.5 or less OFF: Battery voltage	—
Sub fan relay control		B135	11	ON: 0.5 or less OFF: Battery voltage	ON: 0.5 or less OFF: Battery voltage	—
Engine speed output		B135	15	—	0 or battery voltage	Waveform
Purge control solenoid valve		B134	11	Battery voltage	Battery voltage	In operation: Waveform
EGR control valve	Signal 1	B136	11	Battery voltage	0 or battery voltage	—
	Signal 2	B136	13	Battery voltage	0 or battery voltage	—
	Signal 3	B136	31	Battery voltage	0 or battery voltage	—
	Signal 4	B136	32	Battery voltage	0 or battery voltage	—
Manifold absolute pressure sensor signal		B136	20	3.4 — 3.8	1.0 — 1.6	—
Electronic throttle control	Main	B134	18	Approx. 0.7	Approx. 0.6 — 0.7	Fully closed: Approx. 0.6 Fully open: Approx. 4.0
	Sub	B134	28	Approx. 1.6	Approx. 1.5 — 1.6	Fully closed: Approx. 1.5 Fully open: Approx. 4.2
Electronic throttle control motor (+)		B134	2	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor (–)		B134	1	Duty waveform	Duty waveform	Drive frequency: 500 Hz

Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Electronic throttle control motor power supply		B135	7	Battery voltage	Battery voltage	—
Electronic throttle control motor relay		B135	17	0	0	—
Intake oil control solenoid (LH)		B134	16	Battery voltage	0 or battery voltage	Waveform
Intake oil control solenoid (RH)		B134	17	Battery voltage	0 or battery voltage	Waveform
Exhaust oil control solenoid (LH)		B134	5	Battery voltage	0 or battery voltage	Waveform
Exhaust oil control solenoid (RH)		B134	7	Battery voltage	0 or battery voltage	Waveform
Intake camshaft position sensor (LH)		B136	15	5	0 or 5	Waveform
Intake camshaft position sensor (RH)		B136	26	5	0 or 5	Waveform
Exhaust camshaft position sensor (LH)		B136	25	5	0 or 5	Waveform
Exhaust camshaft position sensor (RH)		B136	14	5	0 or 5	Waveform
Camshaft position sensor ground		B136	34	0	0	—
Accelerator pedal position sensor	Main sensor signal	B135	23	Fully closed: 0.4 — 1.0 Fully opened: 2.4 — 3.7	Fully closed: 0.4 — 1.0 Fully opened: 2.4 — 3.7	—
	Main power supply	B135	21	5	5	—
	Ground (main sensor)	B135	29	0	0	—
	Sub signal sensor	B135	31	Fully closed: 0.3 — 1.1 Fully opened: 2.3 — 3.8	Fully closed: 0.3 — 1.1 Fully opened: 2.3 — 3.8	—
Starter relay		B135	26	Waveform	Waveform	Waveform
Brake switch 1 (brake switch)		B137	7	When brake pedal is depressed: 0 When brake pedal is released: Battery voltage	When brake pedal is depressed: 0 When brake pedal is released: Battery voltage	—
Brake switch 2 (stop light switch)		B137	3	When brake pedal is depressed: Battery voltage When brake pedal is released: 0	When brake pedal is depressed: Battery voltage When brake pedal is released: 0	—
Cruise control command switch		B137	30	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	—
Cruise control main switch		B137	23	ON: 0 OFF: 5	ON: 0 OFF: 5	—

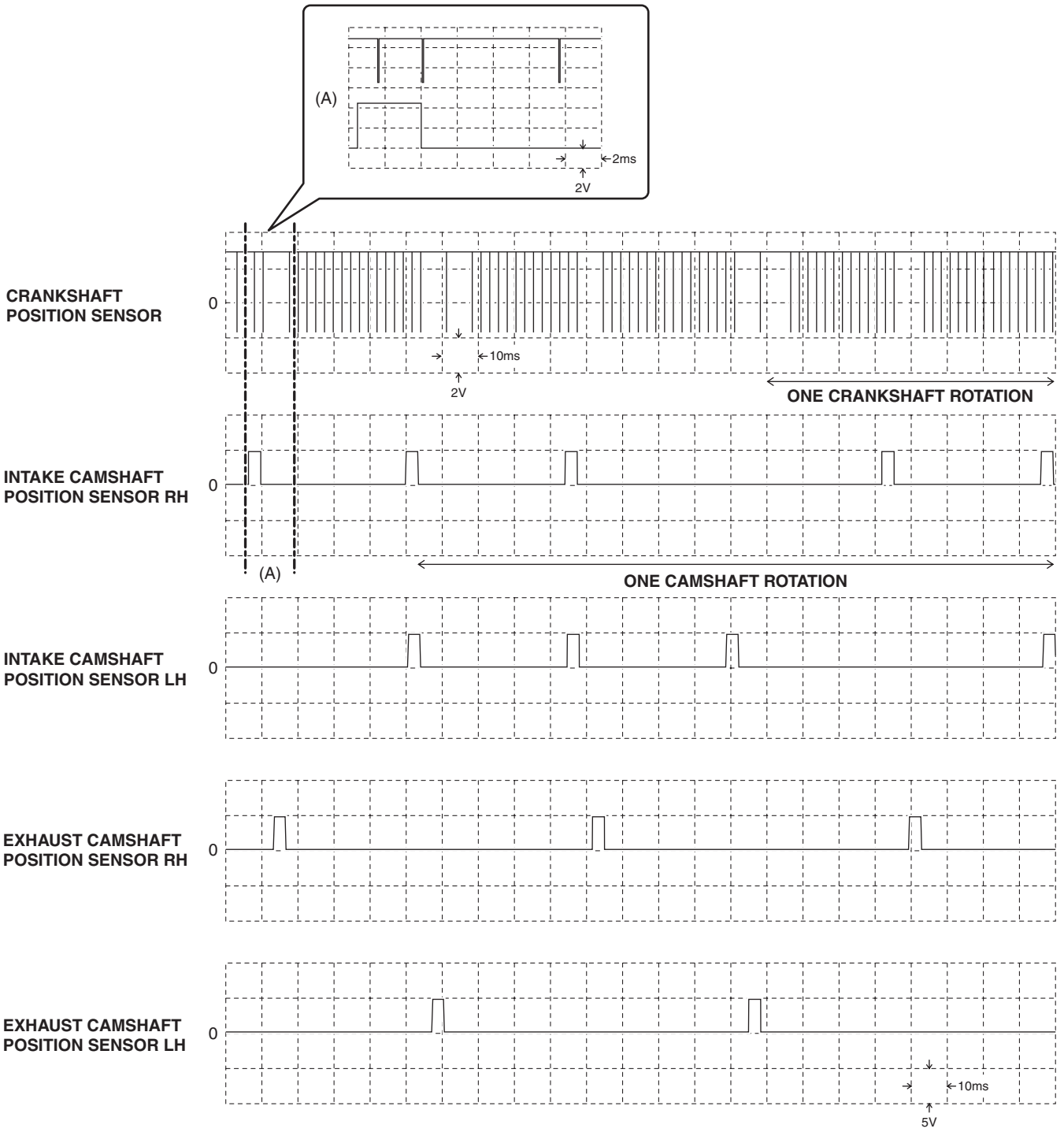
Control Module I/O Signal

Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
CAN communication (MAIN-CAN)	(Hi)	B137	19	—	—	—
	(Lo)	B137	18	—	—	—
CAN communication (PU-CAN)	(Hi)	B137	10	—	—	—
	(Lo)	B137	21	—	—	—
Self-shutoff control		B135	13	0	0	—
Battery temperature sensor		B137	24	1.1 — 2.4	1.1 — 2.4	When battery temperature is 20 — 50°C (68 — 122°F)
Oil level switch		B136	24	0	0	Oil level LOW: Battery voltage
Tumble generator valve opening angle switch signal (LH)		B136	9	0	Fully closed: 0.5 or less Fully opened: 4.5 or more	While operating: Waveform
Tumble generator valve actuator (LH open)		B134	23	0	0	While operating: Waveform
Tumble generator valve actuator (LH closed)		B134	24	0	0	While operating: Waveform
Tumble generator valve opening angle switch signal (RH)		B136	23	0	Fully closed: 0.5 or less Fully opened: 4.5 or more	While operating: Waveform
Tumble generator valve actuator (RH open)		B134	25	0	0	While operating: Waveform
Tumble generator valve actuator (RH closed)		B134	14	0	0	While operating: Waveform
Immobilizer communication		B135	25	—	—	—
ELCM	Switching valve	B135	1	Battery voltage	Battery voltage	Operating: 0
	Pressure sensor	B135	20	1 — 4	1 — 4	—
	Vacuum pump	B135	8	Battery voltage	Battery voltage	Operating: 0
Ground	Sensor	B134	29	0	0	—
		B135	30	0	0	—
	Engine 1	B134	4	0	0	—
	Engine 2	B134	3	0	0	—
	Engine 3	B136	1	0	0	—
	Engine 4	B136	2	0	0	—
	Engine 5	B136	3	0	0	—
	Body	B137	4	0	0	—

NOTE:
- Measurement should be performed after warming up the engine.
- Place the select lever in “P” range or “N” range.
- Turn the A/C to OFF.
- Turn all the accessory switches to OFF.
- Waveforms vary depending on a measurement environment and vehicle condition.

Input/output name:

- Crankshaft position sensor
- Intake camshaft position sensor RH
- Intake camshaft position sensor LH
- Exhaust camshaft position sensor RH
- Exhaust camshaft position sensor LH
- At idling



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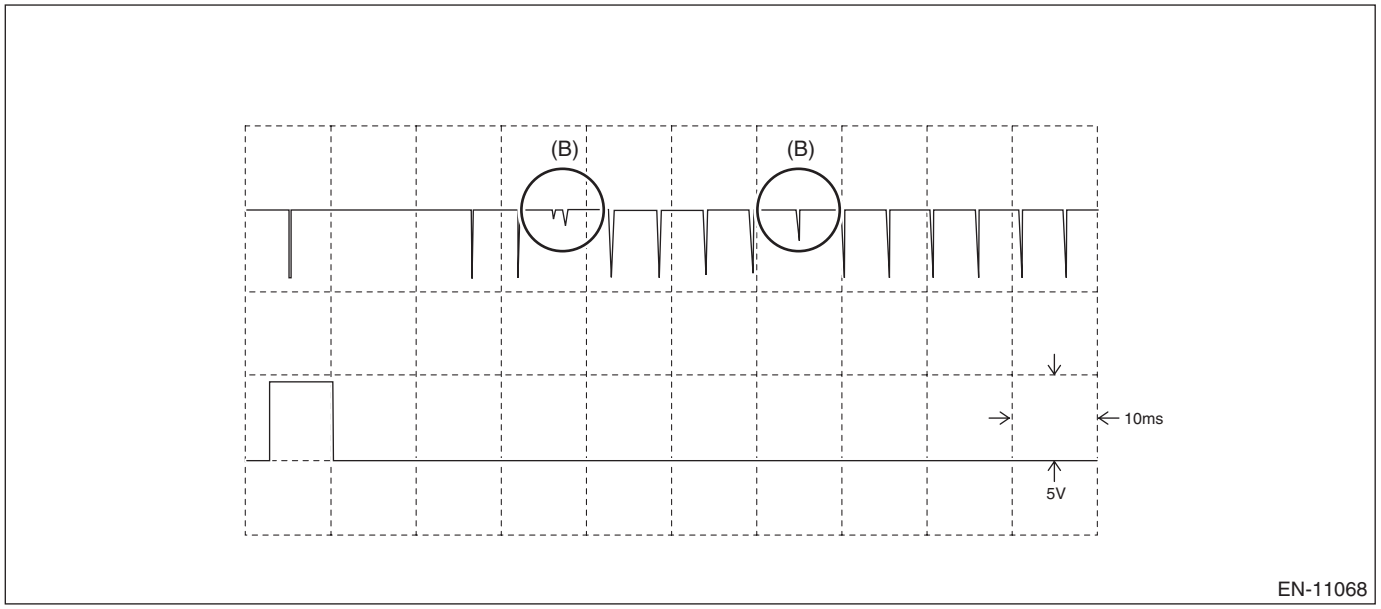
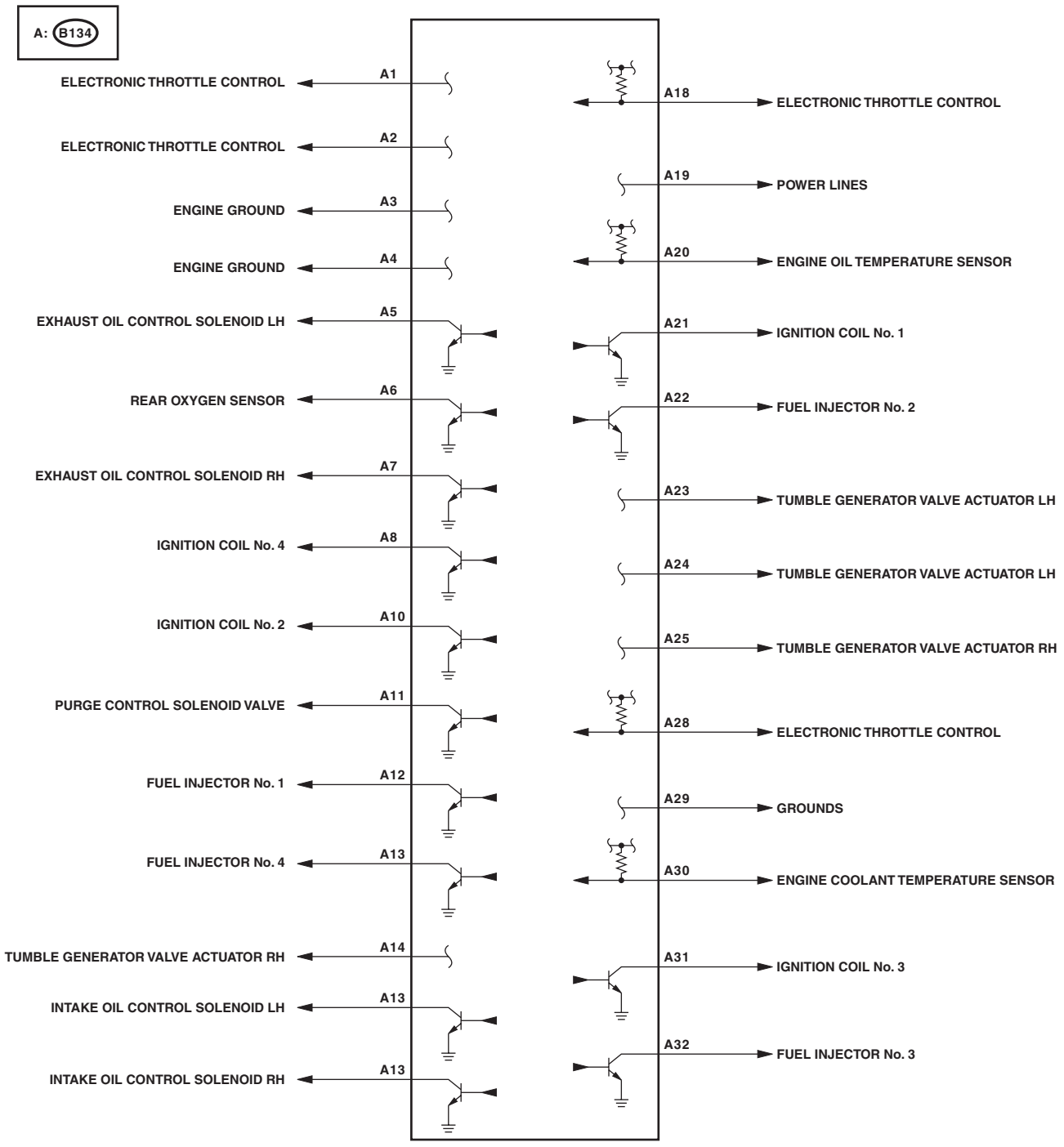
(A) Magnified waveform of crankshaft position sensor and camshaft position sensor

NOTE:
- For measuring the waveforms of the crankshaft position sensor, use of oscilloscope function of DST-i or an ordinary oscilloscope is recommended.
- If the oscilloscope function of the Subaru Select Monitor is used, the waveform of the crankshaft position sensor may be shown as in diagram (B).

This is not a malfunction of the Subaru Select Monitor or crankshaft position sensor, because the unit of output from the crankshaft position sensor is smaller than the minimal measurement unit of the Subaru Select Monitor.




A: B134
ELECTRONIC THROTTLE CONTROL
A1
ELECTRONIC THROTTLE CONTROL
A2
ENGINE GROUND
A3
ENGINE GROUND
A4
EXHAUST OIL CONTROL SOLENOID LH
A5
REAR OXYGEN SENSOR
A6
EXHAUST OIL CONTROL SOLENOID RH
A7
IGNITION COIL No. 4
A8
IGNITION COIL No. 2
A10
PURGE CONTROL SOLENOID VALVE
A11
FUEL INJECTOR No. 1
A12
FUEL INJECTOR No. 4
A13
TUMBLE GENERATOR VALVE ACTUATOR RH
A14
INTAKE OIL CONTROL SOLENOID LH
A13
INTAKE OIL CONTROL SOLENOID RH
A13
A18
ELECTRONIC THROTTLE CONTROL
A19
POWER LINES
A20
ENGINE OIL TEMPERATURE SENSOR
A21
IGNITION COIL No. 1
A22
FUEL INJECTOR No. 2
A23
TUMBLE GENERATOR VALVE ACTUATOR LH
A24
TUMBLE GENERATOR VALVE ACTUATOR LH
A25
TUMBLE GENERATOR VALVE ACTUATOR RH
A28
ELECTRONIC THROTTLE CONTROL
A29
GROUNDS
A30
ENGINE COOLANT TEMPERATURE SENSOR
A31
IGNITION COIL No. 3
A32
FUEL INJECTOR No. 3

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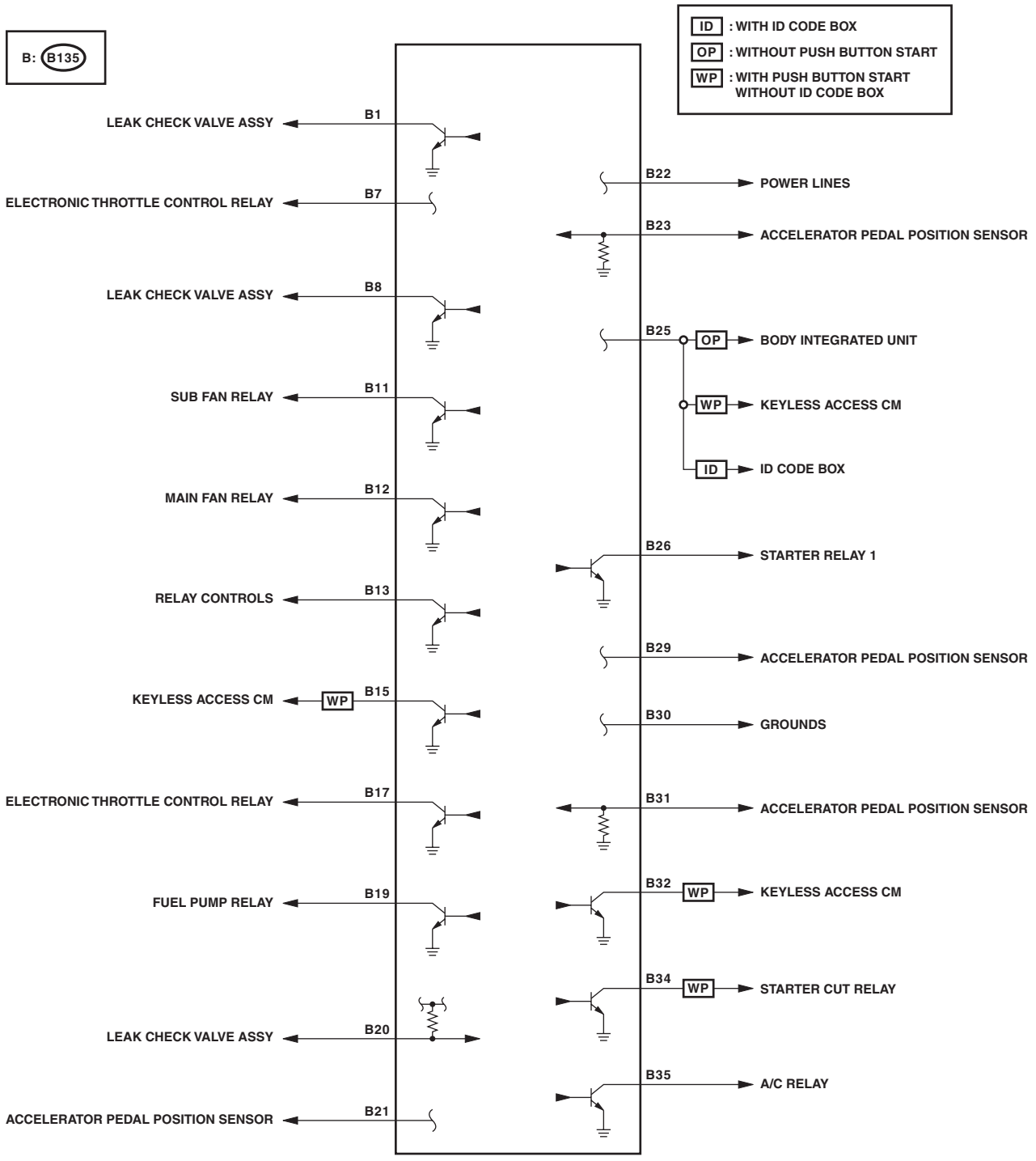
ID : WITH ID CODE BOX
OP : WITHOUT PUSH BUTTON START
WP : WITH PUSH BUTTON START WITHOUT ID CODE BOX
B: B135
LEAK CHECK VALVE ASSY
B1
ELECTRONIC THROTTLE CONTROL RELAY
B7
LEAK CHECK VALVE ASSY
B8
SUB FAN RELAY
B11
MAIN FAN RELAY
B12
RELAY CONTROLS
B13
KEYLESS ACCESS CM
WP
B15
ELECTRONIC THROTTLE CONTROL RELAY
B17
FUEL PUMP RELAY
B19
LEAK CHECK VALVE ASSY
B20
ACCELERATOR PEDAL POSITION SENSOR
B21
B22
POWER LINES
B23
ACCELERATOR PEDAL POSITION SENSOR
B25
OP
BODY INTEGRATED UNIT
WP
KEYLESS ACCESS CM
ID
ID CODE BOX
B26
STARTER RELAY 1
B29
ACCELERATOR PEDAL POSITION SENSOR
B30
GROUNDS
B31
ACCELERATOR PEDAL POSITION SENSOR
B32
WP
KEYLESS ACCESS CM
B34
WP
STARTER CUT RELAY
B35
A/C RELAY

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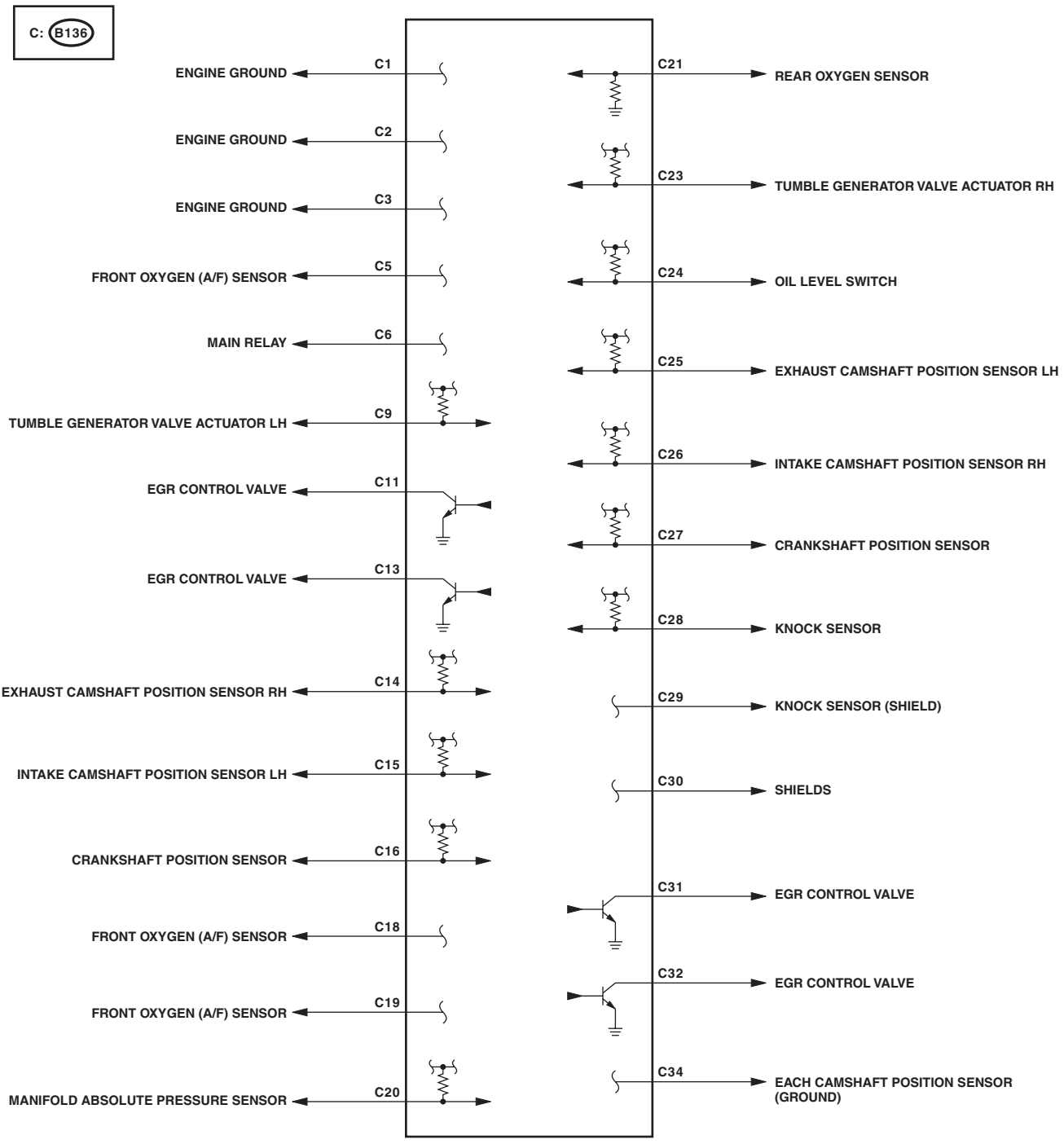
C: B136
ENGINE GROUND
C1
ENGINE GROUND
C2
ENGINE GROUND
C3
FRONT OXYGEN (A/F) SENSOR
C5
MAIN RELAY
C6
TUMBLE GENERATOR VALVE ACTUATOR LH
C9
EGR CONTROL VALVE
C11
EGR CONTROL VALVE
C13
EXHAUST CAMSHAFT POSITION SENSOR RH
C14
INTAKE CAMSHAFT POSITION SENSOR LH
C15
CRANKSHAFT POSITION SENSOR
C16
FRONT OXYGEN (A/F) SENSOR
C18
FRONT OXYGEN (A/F) SENSOR
C19
MANIFOLD ABSOLUTE PRESSURE SENSOR
C20
C21
REAR OXYGEN SENSOR
C23
TUMBLE GENERATOR VALVE ACTUATOR RH
C24
OIL LEVEL SWITCH
C25
EXHAUST CAMSHAFT POSITION SENSOR LH
C26
INTAKE CAMSHAFT POSITION SENSOR RH
C27
CRANKSHAFT POSITION SENSOR
C28
KNOCK SENSOR
C29
KNOCK SENSOR (SHIELD)
C30
SHIELDS
C31
EGR CONTROL VALVE
C32
EGR CONTROL VALVE
C34
EACH CAMSHAFT POSITION SENSOR (GROUND)

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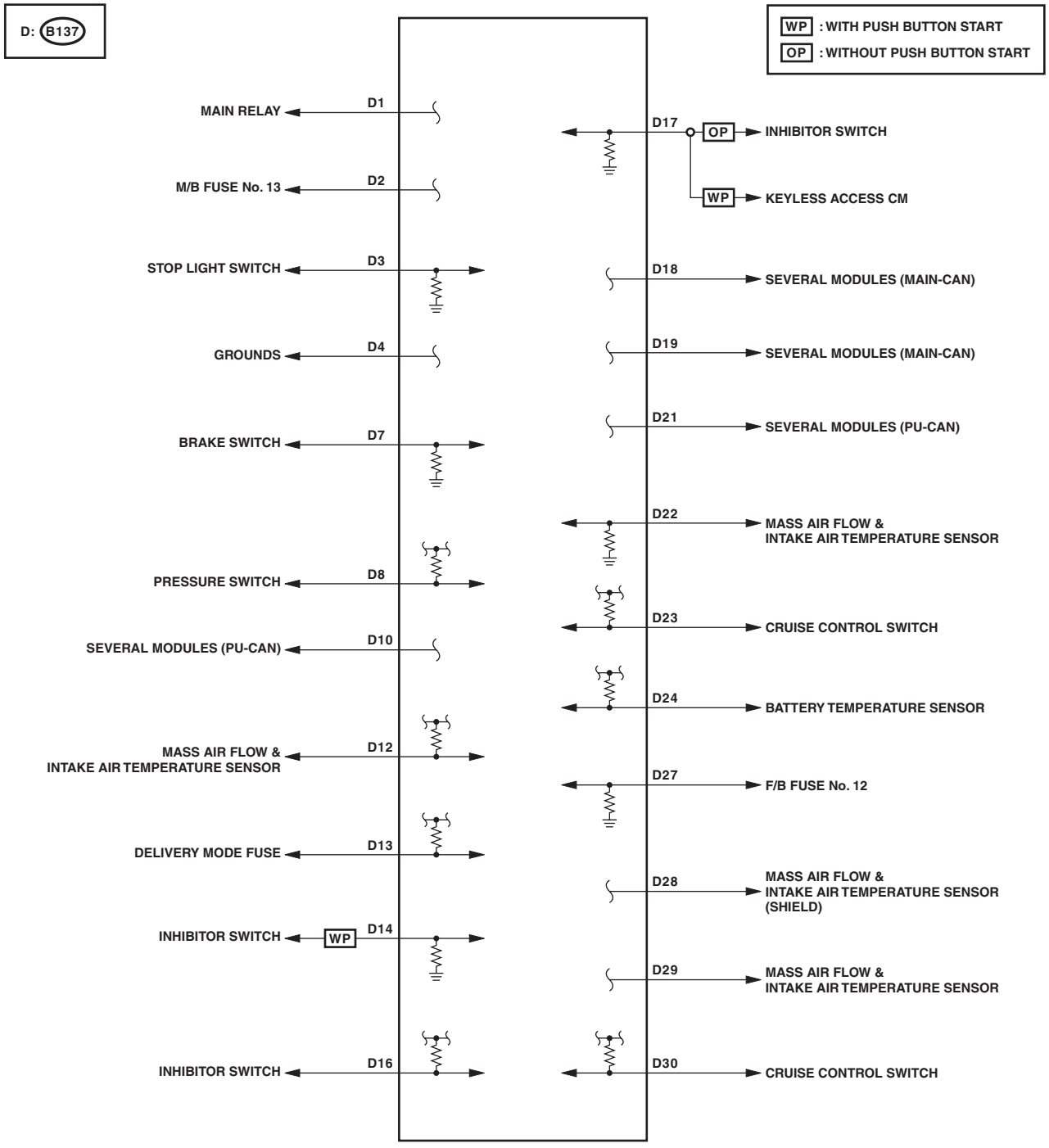

D: B137
WP : WITH PUSH BUTTON START
OP : WITHOUT PUSH BUTTON START
MAIN RELAY
D1
M/B FUSE No. 13
D2
STOP LIGHT SWITCH
D3
GROUNDS
D4
BRAKE SWITCH
D7
PRESSURE SWITCH
D8
SEVERAL MODULES (PU-CAN)
D10
MASS AIR FLOW &
INTAKE AIR TEMPERATURE SENSOR
D12
DELIVERY MODE FUSE
D13
INHIBITOR SWITCH
WP
D14
INHIBITOR SWITCH
D16
D17
OP
INHIBITOR SWITCH
WP
KEYLESS ACCESS CM
D18
SEVERAL MODULES (MAIN-CAN)
D19
SEVERAL MODULES (MAIN-CAN)
D21
SEVERAL MODULES (PU-CAN)
D22
MASS AIR FLOW &
INTAKE AIR TEMPERATURE SENSOR
D23
CRUISE CONTROL SWITCH
D24
BATTERY TEMPERATURE SENSOR
D27
F/B FUSE No. 12
D28
MASS AIR FLOW &
INTAKE AIR TEMPERATURE SENSOR
(SHIELD)
D29
MASS AIR FLOW &
INTAKE AIR TEMPERATURE SENSOR
D30
CRUISE CONTROL SWITCH

EN-10601

6. Engine Condition Data

A: ELECTRICAL SPECIFICATION

Contents	Specifications
Engine load	13.6 — 40.5 (%): Idling
	14.7 — 29.8 (%): 2,500 rpm racing

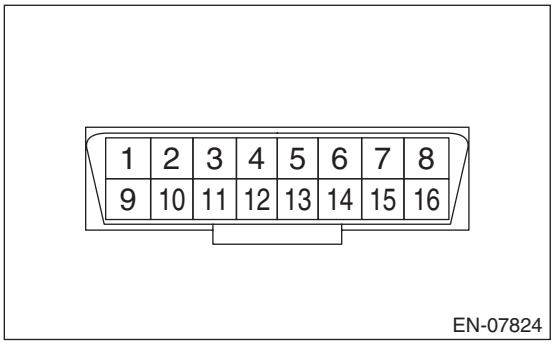
Measuring condition:
- After engine is warmed up.
- Place the select lever in “P” range or “N” range.
- Turn the A/C to OFF.
- Turn all the accessory switches to OFF.

7. Data Link Connector

A: NOTE

This connector is used for Subaru Select Monitor.

CAUTION:
Do not connect any scan tools other than Subaru Select Monitor or general scan tool. Otherwise the circuit may be damaged.



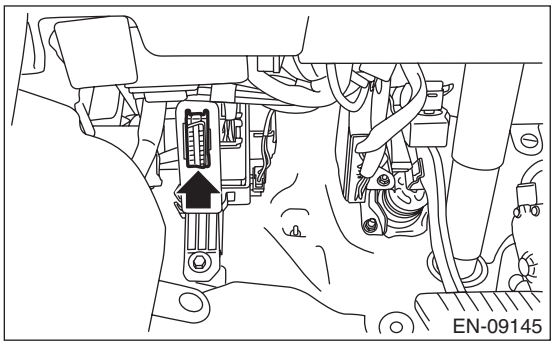
Terminal No.	Contents	Terminal No.	Contents
1	Not used	9	Not used
2	Not used	10	Not used
3	Not used	11	Not used
4	Ground	12	Not used
5	Ground	13	Not used
6	CAN communication (Hi)	14	CAN communication (Lo)
7	Not used	15	Not used
8	Not used	16	Power supply

8. General Scan Tool

A: OPERATION

1. HOW TO USE GENERAL SCAN TOOL

1) Prepare a scan tool (general scan tool) required by SAE J1978.
2) Connect the general scan tool to data link connector located in the lower portion of the instrument panel (on the driver's side).



3) Using the general scan tool, call up each data. General scan tool functions consist of:
   (1) MODE $01: Current powertrain diagnostic data
   (2) MODE $02: Powertrain freeze frame data
   (3) MODE $03: Emission-related powertrain DTC
   (4) MODE $04: Clear/Reset emission-related diagnostic information
   (5) MODE $06: Request on-board monitoring test results for intermittently monitored systems
   (6) MODE $07: Request on-board monitoring test results for continuously monitored systems
   (7) MODE $08: Request control for on-board system, test, and component
   (8) MODE $09: Request vehicle information
4) Read out the data according to repair procedures. (For detailed operation procedures, refer to the general scan tool operation manual.)

NOTE:
For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>

2. MODE $01: (CURRENT POWERTRAIN DIAGNOSTIC DATA)

Refer to data denoting the current operating condition of analog input/output, digital input/output or the powertrain system.
A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
$01	Number of emission-related powertrain DTC, and malfunction indicator light status and diagnosis support information	—
$03	Fuel system control status	—
$04	Calculated engine load value	%
$05	Engine coolant temperature	°C
$06	Short term fuel trim	%
$07	Long term fuel trim	%
$0B	Intake manifold absolute pressure	kPa
$0C	Engine speed	rpm
$0D	Vehicle speed	MPH
$0E	Ignition timing advance	°
$0F	Intake air temperature	°C
$10	Intake air amount	g/s
$11	Throttle valve opening angle	%
$13	Air fuel ratio sensor	—
$15	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor (Bank 1 Sensor 2)	V and %
$1C	Supporting OBD system	—
$1F	Elapsed time after starting the engine	sec
$21	Travel distance after the malfunction indicator light illuminates	miles
$24	A/F value and A/F sensor output voltage (Bank 1 Sensor 1)	— and V
$2C	Target EGR	%
$2D	EGR deviation	%
$2E	Evaporative purge	%
$2F	Fuel level	%
$30	Number of warm ups after DTC clear	time
$31	Travel distance after DTC clear	miles
$33	Barometric pressure	kPa
$34	A/F value and A/F sensor current (Bank 1 Sensor 1)	— and mA
$3C	Catalyst temperature #1	°C
$41	Diagnostic monitor of each drive cycle	—
$42	ECM power voltage	V
$43	Absolute load	%
$44	A/F target lambda	—
$45	Relative throttle opening angle	%
$46	Ambient temperature	°C
$47	Absolute throttle opening angle 2	%
$49	Absolute accelerator opening angle 1	%
$4A	Absolute accelerator opening angle 2	%
$4C	Target throttle opening angle	%
$4D	Engine operating time while malfunction indicator lit	min
$4E	Elapsed time after DTC clear	min
$53	ELCM pressure	—
$5A	Relative accelerator opening angle	%
$5C	Engine oil temperature	°C
$65	Neutral status	—

NOTE:
Refer to general scan tool manufacturer's operation manual to access current powertrain diagnostic data (MODE $01).

3. MODE $02 (POWERTRAIN FREEZE FRAME DATA)

Refer to data denoting the operating condition when trouble is detected by on-board diagnosis system.
A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
$02	DTC that caused freeze frame data to be stored	—
$03	Fuel system control status	—
$04	Calculated engine load value	%
$05	Engine coolant temperature	°C
$06	Short term fuel trim (Bank 1 Sensor 1)	%
$07	Long term fuel trim (Bank 1 Sensor 1)	%
$0B	Intake manifold absolute pressure	kPa
$0C	Engine speed	rpm
$0D	Vehicle speed	MPH
$0E	Ignition timing advance	°
$0F	Intake air temperature	°C
$10	Intake air amount	g/s
$11	Throttle valve opening angle	%
$13	Air fuel ratio sensor	—
$15	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor (Bank 1 Sensor 2)	V and %
$1C	Supporting OBD system	—
$1F	Elapsed time after starting the engine	sec
$2C	Target EGR	%
$2D	EGR deviation	%
$2E	Evaporative purge	%
$2F	Fuel level	%
$33	Barometric pressure	kPa
$42	ECM power voltage	V
$43	Absolute load	%
$44	A/F target lambda	—
$45	Relative throttle opening angle	%
$46	Ambient temperature	°C
$47	Absolute throttle opening angle 2	%
$49	Absolute accelerator opening angle 1	%
$4A	Absolute accelerator opening angle 2	%
$4C	Target throttle opening angle	%
$65	Neutral status	—

NOTE:
Refer to general scan tool manufacturer's instruction manual to access freeze frame data (MODE $02).

4. MODE $03 (EMISSION-RELATED POWERTRAIN DTC)

Refer to "List of Diagnostic Trouble Code (DTC)" for information about data denoting emission-related powertrain DTC. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>

5. MODE $04 (CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION)

Refer to the mode used to clear or reset emission-related diagnostic information.

NOTE:
Refer to general scan tool manufacturer's instruction manual to clear the emission-related diagnostic information (MODE $04).

6. MODE $06

Refer to diagnostic value of troubleshooting and data of test limit indicated on the support data bit sequence table. A list of the support data is shown in the following table.

NOTE:
Some items are not displayed according to the specifications.

OBDMID	TID	SID	Diagnostic item
$01	$84	$1E	A/F sensor range failure (Bank 1 Sensor 1)
	$85	$1E	
	$86	$20	A/F sensor response failure (Bank 1 Sensor 1)
	$91	$20	
	$92	$10	
	$A3	$20	
	$A4	$10	
	$AC	$10	
	$AD	$10	
	$AE	$10	
	$AF	$10	
	$CD	$20	
	$CF	$20	
	$DF	$10	
$02	$07	$0B	Oxygen sensor drop failure (Bank 1 Sensor 2)
	$08	$0B	
	$A5	$0B	
	$05	$10	Oxygen sensor response failure (Bank 1 Sensor 2)
	$06	$10	
	$BD	$10	
	$D1	$10	Oxygen sensor delay failure (Bank 1 Sensor 2)
	$D2	$01	
$21	$89	$20	Catalyst deterioration diagnosis (Bank 1)
$31	$8A	$FD	EGR system diagnosis
$35	$8B	$9D	VVT monitor (Bank 1)
	$8C	$9D	
	$8D	$9D	
	$8E	$9D	
	$D3	$9D	
	$D5	$9D	
	$D6	$9D	
$36	$8B	$9D	VVT monitor (Bank 2)
	$8C	$9D	
	$8D	$9D	
	$8E	$9D	
	$D3	$9D	
	$D5	$9D	
	$D6	$9D	

OBDMID	TID	SID	Diagnostic item
$3C	$96	$FE	Evaporative emission control system (0.02 inch leak)
	$C1	$FE	
	$C2	$FE	
	$C3	$FE	
	$C4	$FE	
	$C5	$FE	
	$C6	$35	
	$C7	$FE	
	$C8	$FE	
	$C9	$FE	
	$CA	$FE	
$3D	$98	$FE	Evaporative emission control system (purge flow)
	$E2	$FE	ELCM purge flow
$41	$9B	$14	A/F sensor heater characteristics failure (Bank 1 Sensor 1)
$42	$A2	$24	Oxygen sensor heater characteristics failure (Bank 1 Sensor 2)
$A1	$0B	$24	Misfire monitoring (all cylinders)
	$0C	$24	
$A2	$0B	$24	Misfire monitoring (#1 cylinder)
	$0C	$24	
$A3	$0B	$24	Misfire monitoring (#2 cylinder)
	$0C	$24	
$A4	$0B	$24	Misfire monitoring (#3 cylinder)
	$0C	$24	
$A5	$0B	$24	Misfire monitoring (#4 cylinder)
	$0C	$24	

7. MODE $07

Refer to the data of DTC (pending code) for troubleshooting result about emission in the first time.

8. MODE $08 (REQUEST CONTROL FOR ON-BOARD SYSTEM, TEST, AND COMPONENT)

Perform “Active Test” of the on-board system.

9. MODE $09

Refer to the data of the vehicle specification.

9. Subaru Select Monitor

A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

NOTE:
For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

2. DISPLAY CURRENT ENGINE DATA

NOTE:
- For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.
- A list of the support data is shown in the following table.
- *: For models without cruise control, the brake switch signal does not change.

Display	Contents	Note (at idling)	Remarks
Engine Speed	Calculated from crankshaft position sensor signal.	650 rpm	rpm
Mass Air Flow	Amount of intake air calculated from air flow sensor output value.	2.0 g/s	g/s or lb/m
Vehicle speed	Value calculated from vehicle speed sensor output value.	0 km/h	km/h or MPH
Throttle Opening Angle	Throttle valve opening angle (in percentage) calculated from throttle position sensor output value.	13%	%
Accel opening angle	Accelerator pedal opening angle (in percentage) calculated from accelerator pedal position sensor output value.	0.0%	%
A/F Sensor #1	Actual lambda value calculated from front A/F sensor output value. (Bank 1)	1.00	—
Ignition timing adv. #1	Ignition timing control value for No. 1 cylinder. Calculated from rotation speed, intake manifold pressure, intake air temperature, water temperature, and data from knock sensor etc.	7°	°
Coolant Temperature	Value calculated from engine coolant temperature sensor output value.	96°C	°C or °F
Fuel Injection #1 Pulse	Control value of fuel injection time by engine control module. (RH bank)	2.56 ms	ms
Short term fuel trim B1	Air fuel ratio correction control value for the RH bank front side.	0.0%	%
Long term fuel trim B1	Air fuel ratio learning control value for the RH bank front side.	0.0%	%
Learned Ignition Timing	Ignition timing learning value. Advance or retard angle amount when knocking occurs.	0.0 deg	deg
Mani. Absolute Pressure	Value after subtracting atmospheric pressure from intake manifold absolute pressure. [(Intake manifold absolute pressure) – (atmospheric pressure)]	29 kPa	kPa, mmHg, inHg or psig
Oxygen sensor #12	Rear oxygen sensor output voltage for the RH bank.	—	V
VVT Adv. Ang. Amount R	Intake AVCS advance angle amount. (RH bank)	0 deg	deg
VVT Adv. Ang. Amount L	Intake AVCS advance angle amount. (Bank 2)	0 deg	deg
Exh. VVT Retard Ang. R	AVCS actual retard angle amount for the RH bank on the exhaust side.	0 deg	deg
Exh. VVT Retard Ang. L	AVCS actual retard angle amount for the RH bank on the exhaust side.	0 deg	deg
VVT Initial Position Learning Value #1	AVCS initial position learning value for the RH bank on the intake side. Controls the angle against a standard angle. Deviation learning is performed based on this standard value.	60°CA	°CA

Display	Contents	Note (at idling)	Remarks
VVT Initial Position Learning Value #2	AVCS initial position learning value for the LH bank on the intake side. Controls the angle against a standard angle. Deviation learning is performed based on this standard value.	60°CA	°CA
VVT Ex Initial Position Learning Value #1	AVCS initial position learning value for the RH bank on the intake side. Controls the angle against a standard angle. Deviation learning is performed based on this standard value.	90°CA	°CA
VVT Ex Initial Position Learning Value #2	AVCS initial position learning value for the LH bank on the intake side. Controls the angle against a standard angle. Deviation learning is performed based on this standard value.	90°CA	°CA
ECU ACC	ECM input power supply voltage.	13.3 V	V
Target engine speed	TCM target engine speed.	650 rpm	rpm
Target Equivalence Ratio	Target air fuel ratio. (Lambda) It usually becomes 1.0 aiming at a theoretical air fuel ratio.	0.996	—
Oil Temperature	Value calculated from the VVL system engine oil temperature and the oil temperature sensor output.	96°C	°C or °F
Intake Air Temp.	Intake air temperature calculated from the intake air temperature sensor output value.	50°C	°C or °F
Ambient Temperature	Ambient temperature that ECM estimates by input values from the engine coolant temperature sensor or the intake air temperature sensor etc.	—	°C or °F
Ambient Temperature Sensor Signal	Data value of the ambient sensor input from the combination meter via CAN. Ambient temperature used for diagnosis.	—	°C or °F
Ambient Temperature for Control	Data value of the ambient sensor input from the combination meter via CAN. Ambient temperature used for control.	—	°C or °F
Calculated load value	Current rate of air amount. Value assuming that the air amount at the current engine speed with the throttle fully open is 100%.	19%	%
Absolute Load Value	Percentage of current intake air amount against the maximum air intake amount of the engine. For non-turbo engine, the value can be close to 95%, but will never be 100%. For turbo engine, this value may be close to 300% due to a boost pressure.	14%	%
Atmospheric pressure	Atmospheric pressure calculated from atmospheric pressure sensor output value.	—	kPa, mmHg, inHg or psig
Mani. Relative Pressure	Pressure value calculated from manifold pressure sensor output value. (Absolute value) (Air intake absolute pressure – Atmospheric pressure)	—	kPa, mmHg, inHg or psig
Target Throttle Opening Angle	Target throttle opening angle calculated by ECM.	16 deg	deg
Actual Throttle Opening Angle	Actual throttle opening angle. Calculated by ECM based on the throttle sensor input value.	16 deg	deg
Target Throttle Opening Angle	Control value of the target throttle opening angle calculated by ECM. Shows the target value of opening angle in percentage when 0% means fully closed and 100% means fully open.	0.0%	%

Display	Contents	Note (at idling)	Remarks
Relative Throttle Pos.	Current throttle opening angle in percentage against the throttle voltage (full range) that has reflected the full close point learning value. The value will be approx. 70% at full open.	1.2%	%
Throttle Motor Voltage	Power supply voltage of the throttle motor. ECM input value.	13.4 V	V
Main-Throttle Sensor	Voltage value of the main throttle position sensor. ECM input value.	0.63 V	V
Sub-Throttle Sensor	Voltage value of the sub throttle position sensor. ECM input value.	1.52 V	V
Throttle Motor Duty	Throttle motor control duty ratio. ECM output value.	–12.5%	%
Main-Accelerator Sensor	Voltage value of the main accelerator pedal position sensor. ECM input value.	0.68 V	V
Sub-Accelerator Sensor	Voltage value of the sub accelerator pedal position sensor. ECM input value.	0.68 V	V
Air Flow Sensor Voltage	Air flow sensor output value. Input value to ECM.	1.2 V	V
Fuel Level	Fuel level sensor output value. ECM input value. Total value of main and sub.	—	%
Fuel level resistance	Fuel level sensor resistance value. ECM input value.	—	Ω
Evap Purge	Evaporative purge rate displayed by the OBD.	0%	%
CPC Valve Duty Ratio	Purge control solenoid valve control duty ratio. ECM output value.	0%	%
Knocking Correction	Retard angle amount when knocking occurs. Partially learning value of ignition timing learning value.	0.0 deg	deg
Fuel system for Bank 1	Feedback status of air fuel ratio for the RH bank. Open: Feedback is stopped Closed: Feedback control is being performed	Cl_normal	—
A/F Sensor #1 Current	Front A/F sensor output current value. (Bank 1) ECM input value.	0.00 mA	mA
A/F Sensor #1 Resistance	Front A/F sensor resistance value calculated from the front A/F sensor output value. (Bank 1)	50 Ω	Ω
A/F Correction #3	Sub correction value of A/F feedback control.	0.00%	%
No. of EGR steps	Number of EGR valve steps. Number of stepping motor steps. ECM output value.	0 STEP	STEP
Commanded EGR	EGR setting value is calculated by ECM and the target value is displayed.	0%	%
EGR Error	Displays a difference (%) between the target EGR steps and the actual EGR steps. When the value is positive, it opens more than the target value. When the value is negative, it does not reach to the target value.	0%	%
TGV Position SW1	Shows an open/close status of the TGV opening angle SW for RH bank. Input value from the TGV opening angle SW for RH bank to the ECM.	Close	—
TGV Position SW2	Shows an open/close status of the TGV opening angle SW for RH bank. Input value from the TGV opening angle SW for LH bank to the ECM.	Close	—

Display	Contents	Note (at idling)	Remarks
TGV Output	Drive signal to TGV motor. Set to “ON” when the TGV is activated (when the duty output is other than 0%). ECM output value.	OFF	—
TGV Drive	Display of TGV drive status. Set to “Open” when the TGV is open. ECM control status.	Close	—
OCV Duty R	OCV control duty ratio. (Bank 1) ECM output value.	60%	%
OCV Duty L	OCV control duty ratio. (Bank 2) ECM output value.	63%	%
OCV Current R	OCV actual current value. (Bank 1) ECM input value.	703 mA	mA
OCV Current L	OCV actual current value. (Bank 2) ECM input value.	735 mA	mA
Exh. OCV Duty R	Exhaust side OCV control duty ratio on the RH bank. ECM output value.	49%	%
Exh. OCV Duty L	Exhaust side OCV control duty ratio on the LH bank. ECM output value.	49%	%
Exh. OCV Current R	Actual current value of the exhaust side OCV on the RH bank, and engine input value.	570 mA	mA
Exh. OCV Current L	Actual current value of the exhaust side OCV on the LH bank, and engine input value.	570 mA	mA
Roughness Monitor #1	#1 cylinder roughness monitor count value.	0	—
Roughness Monitor #2	#2 cylinder roughness monitor count value.	0	—
Roughness Monitor #3	#3 cylinder roughness monitor count value.	0	—
Roughness Monitor #4	#4 cylinder roughness monitor count value.	0	—
Active Grille Shutter Position	Displays the active grille shutter position. Counts the pulse and displays as 100% at full open and 0% at fully closed.	—	—
Active Grille Shutter Mechanical Break Status	Displays mechanical error status of the active grille shutter. During the calibration procedure, if a linkage of the active grille shutter is off, calibration is not performed. Judgment is done by the active grille shutter and the status is sent to ECM.	Normal	—
Active Grille Shutter Sensor Error Status	Judges a malfunction of the active grille shutter opening angle sensor. Judges the sensor malfunction on the pulse counter. Judgment is done by the active grille shutter and the status is sent to ECM.	Normal	—
Active Grille Shutter Voltage Error Status	Judges a malfunction of the power source voltage supplied to the active grille shutter. Judgment is done by the active grille shutter and the status is sent to ECM.	Normal	—
Active Grille Shutter Control Circuit Error Status	Judges a malfunction of the active grille shutter internal circuit (drive motor). Judgment is done by the active grille shutter and the status is sent to ECM.	Normal	—
Active Grille Shutter Stuck Error Status	Judges an abnormal stuck of the active grille shutter. Active grille shutter detects the status where the operation failed because of any foreign matter or ice clogging.	Normal	—
Active Grille Shutter Temperature Error Status	Detects internal temperature of the active grille shutter. Shows the status where the judgment is performed to check if the temperature is excessively high. Judgment is done by the active grille shutter and the status is sent to ECM.	Normal	—

Display	Contents	Note (at idling)	Remarks
Active Grille Shutter Communication Error Status	Communication is performed between the active grille shutter and ECM, and judges the abnormality of the communication status.	Normal	—
Active Grille Shutter Position Commanded Status	Shutter open/close command is sent from ECM to the active grille shutter, and the status of that command is displayed.	—	—
Active Grille Shutter Calibration in progress	Displays the calibration status of the active grille shutter. Active grille shutter performs the calibration when the ignition is ON. Set to ON when the calibration was performed.	OFF	—
Active Grille Shutter Calibration Commanded Status	Displays commands from ECM to the active grille shutter.	OFF	—
Active Grille Shutter Calibration Status	Shows the status where the calibration of the active grille shutter has completed or not completed. Always completed when there is no abnormality in the active grille shutter.	Complete	—
Active Grille Shutter Warning Status	Warning signal of the active grille shutter. When the active grille shutter has a malfunction, signal is sent to the combination meter to illuminate the warning light.	OFF	—
Active Grille Shutter Control Status 1	Shows the status such as operating factors (air conditioner, radiator fan etc.) or frozen judgment of the active grille shutter controlled by the ECM.	—	—
Ignition SW ON Count	Time stamp information. Number of times the ignition is ON since the vehicle was manufactured. The number of ignition ON is also recorded when a trouble code is recorded, so the comparison with that number will show you how many times the ignition has turned on since the diagnostic code was recorded.	—	times
Count	Time stamp information. Each unit individually counts the elapsed time since the ignition is turned ON. Master integrated unit and ECM synchronize with the master time. When synchronized: “Common” When not synchronized: “Originally” is displayed.	Common	—
Time Count	Time stamp information. Elapsed time after ignition ON. When a trouble code is recorded, the elapsed time after ignition ON is also recorded.	—	ms
Time Since Engine Start	Elapsed time after starting the engine. Displays the elapsed time after engine start based on the OBD regulations.	—	sec
Elapsed Time After Engine Run	Elapsed time after starting the engine. This value is used for control.	—	sec
Accumulation Time After Engine Run	Cumulative time after starting the engine. For models with Auto Start Stop, cumulative time after the first engine start. Time is not accumulated while the engine stops due to the Auto Start Stop system.	—	sec
Meter since DTC cleared	Travel distance after DTC clear.	—	km/mile
Time while MIL lighted	Engine operating time from when the malfunction indicator light illuminated till when it went off.	—	min
Time since DTC cleared	Elapsed time after DTC clear.	—	min

Display	Contents	Note (at idling)	Remarks
Number of warm-ups	Number of warm ups after DTC clear. Shows the number of cycle, considering that 1 cycle is the time from when starting and warming the engine till when stopping the engine.	—	times
Lighted MI lamp history	Travel distance after the warning light illuminated.	—	km/mile
Odometer	ECM calculates the total cumulative travel distance from the vehicle speed, separately from the odometer in the combination meter. Small difference from the odometer will be possible, but if there is a big difference, ECM or the combination meter may need to be replaced.	—	km
Catalyst Temperature #11	Estimated temperature of the front catalytic converter for RH bank.	—	°C or °F
AT drive status	Neutral condition. Information input from the inhibitor SW. (CVT model)	NEUT	—
Absolute Evap System Vapor Pressure	Measured value of the evaporative emission system pressure. Pressure sensor input value.	101 kPa	kPa
Neutral switch	Neutral switch signal. Signal when in neutral (MT) or in P or N range (AT). Value input to ECM.	Neutral	—
ETC Motor Relay	Drive signal to the electronic throttle motor relay. Set to ON when drive signal is output. ECM output value.	ON	—
Stop light SW	Stop light switch signal. Set to ON when the stop light illuminates. ECM input value.	OFF (when OFF)	—
Brake Switch*	Brake switch signal. Set to ON when the brake pedal is depressed. ECM input value.	OFF (when OFF)	—
Idle Switch Signal	Idle signal. Set to “Idle” while idling.	Idle	—
Ignition switch	Ignition switch signal. Set to ON when the ignition switch is ON.	ON	—
A/C Mid Pressure Switch	Air conditioner middle pressure SW signal. Set to “ON” when the switch is ON. ECM input value.	OFF (when OFF)	—
A/C Compressor Signal	A/C compressor drive signal. Set to “ON” when the drive signal is output. ECM output value.	OFF (when OFF)	—
Radiator Fan Relay #1	Radiator fan relay drive signal. Set to ON when the drive signal is output. ECM output value.	OFF (when OFF)	—
Radiator Fan Relay #2	Radiator fan relay drive signal. Set to ON when the drive signal is output. ECM output value.	OFF (when OFF)	—
A/C Switch	Air conditioner switch signal. Set to ON when the air conditioner switch of the heater control is ON. ECM input value.	OFF (when OFF)	—
Starter SW	Starter switch signal. Set to ON when the starter is ON. ECM input value.	OFF	—
Rear Defogger SW	Rear defogger switch input signal. Set to “ON” when the switch is ON. ECM input value.	OFF (when OFF)	—

Display	Contents	Note (at idling)	Remarks
Blower Fan SW	Blower fan switch input signal. Set to “ON” when the switch is ON. ECM input value.	OFF (when OFF)	—
Light Switch	Light switch input signal. Set to “ON” when the switch is ON. ECM input value.	OFF (when OFF)	—
Wiper Switch	Wiper switch input signal. Set to “ON” when the switch is ON. ECM input value.	OFF (when OFF)	—
Delivery Mode Connector	Delivery mode terminal fuse installation status.	OFF	—
Rear O2 Rich Signal	Rear oxygen sensor output value. Displays “Rich” when the air fuel ratio of rear oxygen sensor is rich, and displays “Lean” when lean.	—	—
Knocking Signal	Knock sensor output signal. Judges if a knocking occurs or not.	OFF	—
Crankshaft Position Sig.	Crankshaft position sensor output signal. Set to “ON” when the engine is running. ECM input signal.	ON	—
Camshaft Position Sig.	Camshaft position sensor output signal. Set to “ON” when the engine is running. ECM input signal.	ON	—
Ban of Torque Down	Torque down prohibition notification signal to the vehicle dynamics control (VDC) module. Set to “OFF” when the prohibition signal is output. ECM output value.	ON	—
Request Torque Down VDC	Torque down request signal transmitted from the vehicle dynamics control (VDC) module. Set to “ON” when the request signal is sent. ECM input signal.	OFF	—
Torque Permission Signal	Torque down permission notification signal to the transmission control module. (CVT model) Set to “ON” when the permission signal is output. ECM output value.	ON	—
SET/COAST SW	Cruise control system SET/COAST SW signal. Set to ON when the switch is operated. ECM input signal.	OFF (when OFF)	—
RESUME/ACCEL SW	Cruise control system RESUME/ACCEL SW signal. Set to ON when the switch is operated. ECM input signal.	OFF (when OFF)	—
Main switch	Cruise control system main switch signal. Set to ON when the switch is operated. ECM input signal.	OFF (when OFF)	—
Cruise Control Cancel Switch Signal	Cruise control cancel switch signal of the cruise control system. Set to ON when the switch is operated. ECM input signal.	OFF (when OFF)	—
Fuel Pump Relay	Fuel pump relay drive signal. Set to “ON” when the drive signal is output. ECM output value.	ON	—
All Cylinders Fuel cut	Status under the fuel injection amount control where the fuel injection is cut off in all cylinders.	OFF	—
Shift Pattern Demand for Low Water Temperature	Shift pattern request sent from ECM to the transmission CM. When the water temperature is low, shift pattern change to the low speed side is requested to raise the catalyst temperature faster.	OFF	—

Display	Contents	Note (at idling)	Remarks
Emphasized idle stop request	Request signal to prohibit Auto Start Stop cooperation control. Output signal from ECM to Auto Start Stop CM. Displayed only for models with Auto Start Stop.	ON	—
Oil level switch	Oil level switch signal. Set to “LOW level” when the amount of engine oil decreases. ECM input signal.	HIGH level	—
ELCM switching valve	ELCM switching valve drive signal. Set to “Close” when closing the switching valve. ECM output value.	Open	—
ELCM pump	ELCM pump drive signal. Set to “ON” when ELCM decompression pump is activated. ECM output value.	OFF	—
HPCM Current Control Mode	Shows current HPCM control mode for hybrid models.	—	—
Engine Control Status	Shows current engine control mode for hybrid models.	—	—
ISG Load Torque	Shows load torque of ISG equipped with hybrid models. Value calculated by ECM.	—	Nm
Primary Rev Speed	CVT primary pulley speed. Information received from HEV-CM.	—	rpm
12V Battery Relay Target Mode	Commanded status for the connection relay between the battery for starting engine and the battery for DCDC convert and for other load related to vehicle body. Information received from HEV-CM.	—	—
Start Control Check	Shows control mode when starting engine.	—	—
Input Clutch Open Request	Commanded status of drive request from HEV-CM to input clutch (which connects engine and primary axis).	—	—
ISG Cranking Status	Drive command status from HEV-CM to ISG.	OFF	—
Idle Stop Fuel Cut Request	Auto Start Stop fuel cut request status from HEV-CM to ECM.	No Request	—
Starter Relay Drive Permission Status	Starter relay operation permission status from HEV-CM to ECM.	—	—
Engine Torque Check 1	Engine torque information is transmitted from engine ECM to HPCM. And this is the engine torque related information.	—	Nm
Engine Torque Check 2	Engine torque information is transmitted from engine ECM to HPCM. And this is the engine torque related information.	—	Nm
Engine Torque Check 3	Engine torque information is transmitted from engine ECM to HPCM. And this is the engine torque related information.	—	Nm
Engine Torque Check 4	Engine torque information is transmitted from engine ECM to HPCM. And this is the engine torque related information.	—	Nm
Engine Torque Check 5	Engine torque information is transmitted from engine ECM to HPCM. And this is the engine torque related information.	—	Nm
Ignition Control Check 1	Detailed status of the engine ignition control information.	—	—
Ignition Control Check 2	Detailed status of the engine ignition control information.	—	—
MI(MIL)	Malfunction indicator light illumination status. When judged as abnormal, an illumination command signal is sent from ECM to the combination meter.	OFF	—
Number of Diag. Code:	The number of trouble codes recorded in the ECM.	0	—
(Oxygen sensor #11)	Installation status of the front oxygen sensor for RH bank.	Support	—

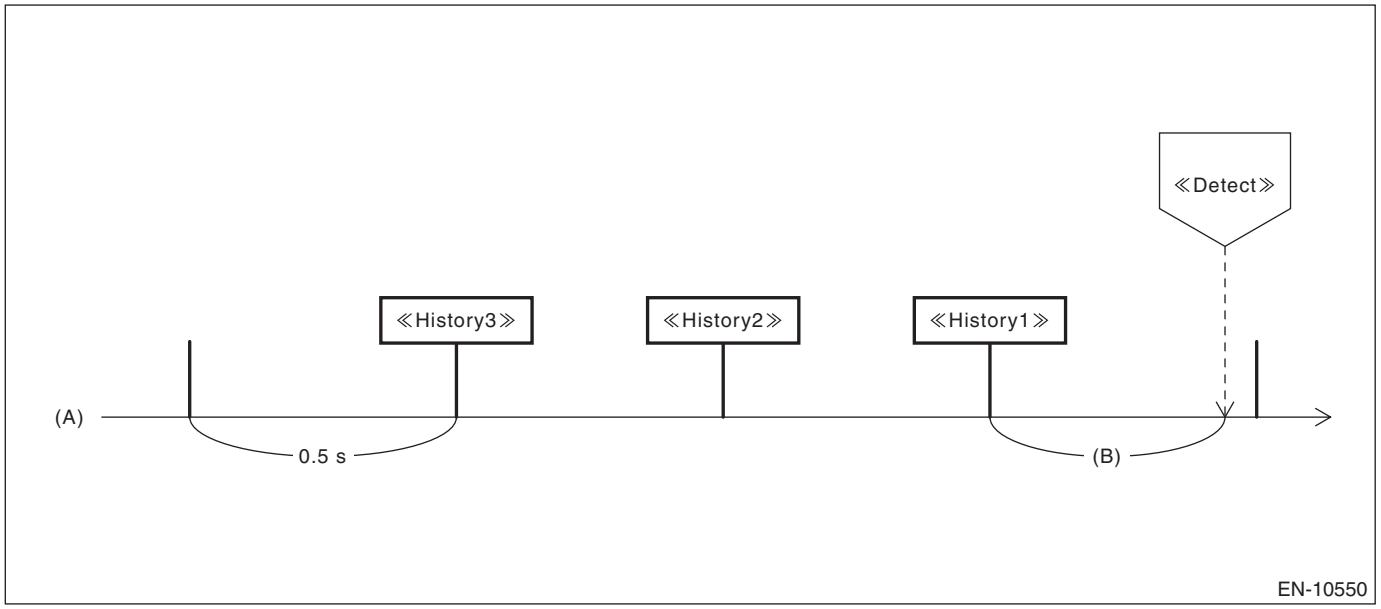
Display	Contents	Note (at idling)	Remarks
(Oxygen sensor #12)	Installation status of the rear oxygen sensor for RH bank.	Support	—
Short term fuel trim #12	Air fuel ratio correction control value for the RH bank rear side.	0.0%	%
A/F Sensor #11	Air fuel ratio calculated from the output value of RH bank front A/F sensor. (Lambda)	1.001	—
A/F Sensor #11	Output voltage of the RH bank front A/F sensor.	2.193 V	V
A/F Sensor #11	Air fuel ratio calculated from the output value of RH bank front A/F sensor. (Lambda)	1.001	—
A/F Sensor #11	Front A/F sensor output current on the RH side.	0.00	mA
Absolute Throttle Pos.#2	Shows the sub throttle sensor voltage value in % against the full-range 5 V throttle sensor output voltage.	30.2%	%
Accelerator Pedal Pos.#1	Shows the main accelerator sensor voltage value in % against the full-range 5 V.	13.3%	%
Accelerator Pedal Pos.#2	Shows the sub accelerator sensor voltage value in % against the full-range 5 V.	13.3%	%
Relative Accelerator Pos.	Shows the accelerator opening angle with a full close point learning value taken into consideration.	0%	%
Misfire monitoring(Supp)	Shows the support status of misfire diagnosis.	YES	—
Misfire monitoring(Rdy)	Status of the misfire diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	YES	—
Fuel system monitoring(Supp)	Shows the support status of fuel system diagnosis.	YES	—
Fuel system monitoring(Rdy)	Status of the fuel system diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	YES	—
Component monitoring(Supp)	Shows the support status of component diagnosis.	YES	—
Component monitoring(Rdy)	Status of the component diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	YES	—
Catalyst Diagnosis(Supp)	Shows the support status of catalyst diagnosis.	YES	—
Catalyst Diagnosis(Rdy)	Status of the catalyst diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	NO	—
Heated catalyst(Supp)	Shows the support status of heated catalyst diagnosis.	NO	—
Heated catalyst(Rdy)	Status of the heated catalyst diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	N/A	—
Evaporative purge system(Supp)	Shows the support status of evaporative purge system diagnosis.	NO	—
Evaporative purge system(Rdy)	Status of the evaporative purge system diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	N/A	—
Secondary air system(Supp)	Shows the support status of the secondary air system diagnosis.	NO	—
Secondary air system(Rdy)	Status of the secondary air system diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	N/A	—
A/C system refrigerant(Supp)	Shows the support status of A/C system refrigerant diagnosis.	NO	—
A/C system refrigerant(Rdy)	Status of the A/C system refrigerant diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	N/A	—

Display	Contents	Note (at idling)	Remarks
Oxygen sensor(Supp)	Shows the support status of oxygen sensor diagnosis.	YES	—
Oxygen sensor(Rdy)	Status of the oxygen sensor diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	NO	—
O2 Heater Diagnosis(Supp)	Shows the support status of oxygen sensor heater diagnosis.	YES	—
O2 Heater Diagnosis(Rdy)	Status of the oxygen sensor heater diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	YES	—
EGR system(Supp)	Shows the support status of EGR diagnosis.	YES	—
EGR system(Rdy)	Status of the EGR diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	NO	—
Misfire monitoring(Enable)	Shows whether or not the execution condition of misfire diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	YES	—
Misfire monitoring(Comp)	Shows whether or not the continuous misfire diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	YES	—
Fuel system monitoring(Enable)	Shows whether or not the execution condition of fuel system diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	YES	—
Fuel system monitoring(Comp)	Shows whether or not the fuel system diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	YES	—
Component monitoring(Enable)	Shows whether or not the execution condition of component diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	YES	—
Component monitoring(Comp)	Shows whether or not the component diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	NO	—
Catalyst Diagnosis(Enable)	Shows whether or not the execution condition of catalyst diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	YES	—
Catalyst Diagnosis(Comp)	Shows whether or not the catalyst diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	NO	—
Heated catalyst(Enable)	Shows whether or not the execution condition of heated catalyst diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	N/A	—
Heated catalyst(Comp)	Shows whether or not the heated catalyst diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	N/A	—

Display	Contents	Note (at idling)	Remarks
Evaporative purge system(Enable)	Shows whether or not the execution condition of evaporative purge system diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	N/A	—
Evaporative purge system(Comp)	Shows whether or not the evaporative purge system diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	N/A	—
Secondary air system(Enable)	Shows whether or not the execution condition of the secondary air system diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	N/A	—
Secondary air system(Comp)	Shows whether or not the secondary air system diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	N/A	—
A/C system refrigerant(Enable)	Shows whether or not the execution condition of A/C system refrigerant diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	N/A	—
A/C system refrigerant(Comp)	Shows whether or not the A/C system refrigerant diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	N/A	—
Oxygen sensor(Enable)	Shows whether or not the execution condition of oxygen sensor diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	YES	—
Oxygen sensor(Comp)	Shows whether or not the oxygen sensor diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	NO	—
O2 Heater Diagnosis(Enable)	Shows whether or not the execution condition of oxygen heater diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	YES	—
O2 Heater Diagnosis(Comp)	Shows whether or not the oxygen heater diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	YES	—
EGR system(Enable)	Shows whether or not the execution condition of EGR diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	YES	—
EGR system(Comp)	Shows whether or not the EGR diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	NO	—
OBD System	Shows the OBD regulation to be followed. This is the information recorded in the ECM, and it does not mean that the unit automatically judges the compliance to the OBD regulations.	OBD/OBD2	—

3. DISPLAY OF ENGINE FREEZE FRAME DATA

NOTE:
• ECM updates the freeze frame data every 0.5 seconds, and always keeps the last three records. Time-series freeze frame data includes the last three freeze frame data and the freeze frame data when the DTC is detected.
• In the time-series freeze frame data, the following freeze frame data are displayed: «Detect», «History1», «History2», and «History3».
• Time lag between the freeze frame data of «Detect» and the freeze frame data of «History1» changes within the range of 0 — 0.5 seconds. This is because the freeze frame data of «Detect» is recorded when the DTC is actually detected, while the freeze frame data of «History1» is updated every 0.5 seconds.



(A) 0.5 seconds timer
(B) Changes within the range of 0 — 0.5 seconds, depending on the timing of DTC detection.

- When more than one DTCs are recorded, the time-series freeze frame data is recorded only for the first-detected DTC, and for the next DTC, just the freeze frame data of «Detect» is recorded. And for the subsequent DTCs, no freeze frame data is recorded.
- When performing diagnosis, you can utilize the time-series freeze frame data to guess the vehicle status when the DTC was detected.
- For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.
- A list of the support data is shown in the following table.

Display	Contents	Unit of measure
Engine Speed	Calculated from crankshaft position sensor signal.	rpm
Mass Air Flow	Amount of intake air calculated from air flow sensor output value.	g/s or lb/m
Vehicle speed	Value calculated from vehicle speed sensor output value.	km/h or MPH
Throttle Opening Angle	Throttle valve opening angle (in percentage) calculated from throttle position sensor output value.	%
Ignition timing adv. #1	No. 1 cylinder ignition timing control value calculated from rotation speed, intake manifold pressure, intake air temperature, water temperature, and data from knock sensor etc.	°
Coolant Temperature	Value calculated from engine coolant temperature sensor output value.	°C or °F
Short term fuel trim B1	Main correction value of A/F feedback control. (Bank 1)	%
Long term fuel trim B1	Main learning value of A/F feedback control. (Bank 1)	%
Mani. Absolute Pressure	Value after subtracting atmospheric pressure from intake manifold absolute pressure [(intake manifold absolute pressure) – (atmospheric pressure)].	kPa, mmHg, inHg or psig
Oxygen sensor #12	Rear oxygen sensor voltage value on the front RH side.	V
ECU ACC	ECM input power supply voltage.	V
Target Equivalence Ratio	Target air fuel ratio. (Lambda) It usually becomes 1.0 aiming at a theoretical air fuel ratio.	—
Intake Air Temp.	Intake air temperature calculated from the intake air temperature sensor output value.	°C or °F
Ambient Temperature	Ambient temperature that ECM estimates by input values from the engine coolant temperature sensor or the intake air temperature sensor etc.	°C or °F
Ambient Temperature Sensor Signal	Data value of the ambient sensor input from the combination meter via CAN. Ambient temperature used for diagnosis.	°C or °F
Ambient Temperature for Control	Data value of the ambient sensor input from the combination meter via CAN. Ambient temperature used for control.	°C or °F
Calculated load value	Current rate of air amount assuming that the air amount at the current engine speed with the throttle fully open is 100%	%
Absolute Load Value	Shows a percentage of current intake air amount against the maximum air intake amount of the engine. For non-turbo engine, the value can be close to 95%, but will never be 100%. For turbo engine, this value may be close to 300% due to a boost pressure.	%
Atmospheric pressure	Atmospheric pressure calculated from atmospheric pressure sensor output value.	kPa, mmHg, inHg or psig
Actual Throttle Opening Angle	Actual throttle opening angle calculated by ECM based on the throttle sensor input value.	deg
Target Throttle Opening Angle	Control value of the target throttle opening angle calculated by ECM. Shows the target value of opening angle in percentage when 0% means fully closed and 100% means fully open.	%
Relative Throttle Pos.	Shoes the current throttle opening angle in percentage against the throttle voltage (full range) that has reflected the full close point learning value. The value will be approx. 70% at full open.	%
Fuel Level	Fuel level sensor output value. ECM input value. Total value of main and sub.	%

Display	Contents	Unit of measure
Evap Purge	Evaporative purge rate displayed by the OBD.	%
Fuel system for Bank 1	Displays the feedback status of air fuel ratio for the RH bank. Open: Feedback is stopped Closed: Feedback control is being performed	—
Commanded EGR	EGR setting value is calculated by ECM and the target value is displayed.	%
EGR Error	Displays a difference (%) between the target EGR steps and the actual EGR steps. When the value is negative, it does not reach to the target value. When the value is negative, it does not reach to the target value.	%
Active Grille Shutter Position	Counts the pulse of active grille shutter position, and displays as 100% at full open and 0% at fully closed.	—
Active Grille Shutter Mechanical Break Status	During the calibration procedure, if a linkage of the active grille shutter is off, calibration is not performed. Judgment is done by the active grille shutter and the status is sent to ECM.	—
Active Grille Shutter Sensor Error Status	Counts the pulse of active grille shutter opening angle position. Judges the sensor malfunction on the pulse counter. Judgment is done by the active grille shutter and the status is sent to ECM.	—
Active Grille Shutter Voltage Error Status	Judges whether the power source voltage supplied to the active grille shutter is abnormal. Judgment is done by the active grille shutter and the status is sent to ECM.	—
Active Grille Shutter Control Circuit Error Status	Shows the status where the judgment is performed to check if there is any abnormality in the internal circuit (drive motor) of the active grille shutter. Judgment is done by the active grille shutter and the status is sent to ECM.	—
Active Grille Shutter Stuck Error Status	Active grille shutter detects the status where the operation failed because of any foreign matter or ice clogging.	—
Active Grille Shutter Temperature Error Status	Detects internal temperature of the active grille shutter. Shows the status where the judgment is performed to check if the temperature is excessively high. Judgment is done by the active grille shutter and the status is sent to ECM.	—
Active Grille Shutter Communication Error Status	Communication is performed between the active grille shutter and ECM, and shows whether the communication status is abnormal.	—
Active Grille Shutter Position Commanded Status	Shutter open/close command is sent from ECM to the active grille shutter, and the status of that command is displayed.	—
Active Grille Shutter Calibration in progress	Active grille shutter performs the calibration when the ignition is ON, and displays the calibration status. Set to ON when the calibration was performed.	—
Active Grille Shutter Calibration Commanded Status	Status where the shutter open/close command is sent from ECM to the active grille shutter.	—
Active Grille Shutter Calibration Status	Shows the status where the calibration of the active grille shutter has completed or not completed, and is always completed when there is no abnormality in the active grille shutter.	—
Active Grille Shutter Warning Status	Shows warning signals of the active grille shutter. When the active grille shutter has a malfunction, signal is sent to the meter CM to illuminate the warning light.	—
Active Grille Shutter Control Status 1	Shows the status such as factors of the active grille operation (air conditioner, radiator fan etc.) or frozen judgment which is controlled by the ECM.	—
IGN Counter	Shows the number of times the ignition is turned ON since the vehicle was manufactured. The number of ignition ON is also recorded when a trouble code is recorded, so the comparison with that number will show you how many times the ignition has turned on since the diagnostic code was recorded.	times
Count	Shows the number of times the ignition is turned ON since the vehicle was manufactured. The number of ignition ON is also recorded when a trouble code is recorded, so the comparison with that number will show you how many times the ignition has turned on since the diagnostic code was recorded.	—

Display	Contents	Unit of measure
past time after IG on	Elapsed time after ignition ON. When a trouble code is recorded, the elapsed time after ignition ON is also recorded.	ms
Time Since Engine Start	Elapsed time after starting the engine. Displays the elapsed time after engine start based on the OBD regulations.	sec
AT drive status	Neutral condition. (CVT model) Information input from the inhibitor SW. (CVT model)	—
Engine Control Status	On hybrid system, engine torque information is transmitted from engine ECM to HPCM. And this is the engine torque related information.	—
Idle Stop Fuel Cut Request	On hybrid system, engine torque information is transmitted from engine ECM to hybrid powertrain control module. And this is the engine torque related information.	—
Engine Torque Check 1	On hybrid system, engine torque information is transmitted from engine ECM to hybrid powertrain control module. And this is the engine torque related information.	Nm
Engine Torque Check 2	On hybrid system, engine torque information is transmitted from engine ECM to hybrid powertrain control module. And this is the engine torque related information.	Nm
Engine Torque Check 3	On hybrid system, engine torque information is transmitted from engine ECM to hybrid powertrain control module. And this is the engine torque related information.	Nm
(Oxygen sensor #11)	Installation status of the front oxygen sensor for RH bank.	—
(Oxygen sensor #12)	Installation status of the rear oxygen sensor for RH bank.	—
Short term fuel trim #12	Air fuel ratio correction control value on the RH side rear.	%
Absolute Throttle Pos.#2	Shows the sub throttle sensor voltage value in % against the full-range 5V throttle sensor output voltage.	%
Accelerator Pedal Pos.#1	Absolute means to show the main accelerator sensor voltage value in % against the full-range 5V.	%
Accelerator Pedal Pos.#2	Absolute means to show the sub accelerator sensor voltage value in % against the full-range 5V.	%
OBD System	Shows the OBD regulation to be followed. This information is recorded in the ECU, and it does not mean that the unit automatically judges the compliance to the OBD regulations.	—

4. V.I.N REGISTRATION

1) On «Main Menu» display, select {Each System Check}.
2) On «System Selection Menu» display, select {Engine Control System}.
3) Click the [OK] button after the information of engine type has been displayed.
4) On «Engine Diagnosis» display, select {Work Support}.
5) On «Work Support» display, select {Entry VIN}.
6) Perform the procedures shown on the display screen.

10.Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. SUBARU SELECT MONITOR

NOTE:
• For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.
• For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>

2. GENERAL SCAN TOOL

Refer to data denoting emission-related powertrain DTC.
For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>

NOTE:
Refer to general scan tool manufacturer’s instruction manual to access powertrain DTC (MODE $03).

11.Inspection Mode

A: PROCEDURE

Perform the diagnosis shown in the following DTC table.
When performing the diagnosis not listed in “List of Diagnostic Trouble Code (DTC)”, refer to the item on the drive cycle. <Ref. to EN(H4DO HEV)(diag)-55, Drive Cycle.>

DTC	Item	Condition
B1570	Antenna	—
B1571	Reference Code Incompatibility	—
B1572	IMM Circuit Failure (Except Antenna Circuit)	—
B1574	Key Communication Failure	—
B1575	Incorrect Immobilizer Key	—
B1576	EGI Control Module EEPROM	—
B1577	IMM Control Module EEPROM	—
B1578	Meter Failure	—
P0010	"A" Camshaft Position Actuator Circuit/Open (Bank 1)	—
P0013	B Camshaft Position Actuator Circuit/Open (Bank 1)	—
P0020	"A" Camshaft Position Actuator Circuit/Open (Bank 2)	—
P0023	B Camshaft Position Actuator Circuit/Open (Bank 2)	—
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	—
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	—
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	—
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	—
P0072	Ambient Temperature Sensor Circuit "A" Low	—
P0073	Ambient Temperature Sensor Circuit "A" High	—
P0102	Mass or Volume Air Flow Circuit Low Input	—
P0103	Mass or Volume Air Flow Circuit High Input	—
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	—
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	—
P0112	Intake Air Temperature Sensor 1 Circuit Low	—
P0113	Intake Air Temperature Sensor 1 Circuit High	—
P0117	Engine Coolant Temperature Circuit Low	—
P0118	Engine Coolant Temperature Circuit High	—
P0122	Throttle/Pedal Position Sensor/Switch “A” Circuit Low	—
P0123	Throttle/Pedal Position Sensor/Switch “A” Circuit High	—
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	—
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	—
P0197	Engine Oil Temperature Sensor Low	—
P0198	Engine Oil Temperature Sensor High	—
P0201	Injector #1	—
P0202	Injector #2	—
P0203	Injector #3	—
P0204	Injector #4	—
P0222	Throttle/Pedal Position Sensor/Switch “B” Circuit Low	—
P0223	Throttle/Pedal Position Sensor/Switch “B” Circuit High	—
P0327	Knock Sensor 1 Circuit Low (Bank 1 or Single Sensor)	—
P0328	Knock Sensor 1 Circuit High (Bank 1 or Single Sensor)	—
P0335	Crankshaft Position Sensor “A” Circuit	—
P0336	Crankshaft Position Sensor “A” Circuit Range/Performance	—
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	—

DTC	Item	Condition
P0341	Camshaft Position Sensor "A" Circuit Range/Performance (Bank 1 or Single Sensor)	—
P0345	Camshaft Position Sensor “A” Circuit (Bank 2)	—
P0346	Camshaft Position Sensor "A" Circuit Range/Performance (Bank 2)	—
P0351	Ignition Coil A Primary/Secondary Circuit	—
P0352	Ignition Coil B Primary/Secondary Circuit	—
P0353	Ignition Coil C Primary/Secondary Circuit	—
P0354	Ignition Coil D Primary/Secondary Circuit	—
P0365	Camshaft Position Sensor “B” Circuit (Bank 1)	—
P0366	Camshaft Position Sensor B Circuit Range/Performance (Bank 1)	—
P0390	Camshaft Position Sensor “B” Circuit (Bank 2)	—
P0391	Camshaft Position Sensor B Circuit Range/Performance (Bank 2)	—
P0452	Evaporative Emission System Pressure Sensor/Switch Low	—
P0453	Evaporative Emission System Pressure Sensor/Switch High	—
P0458	Evaporative Emission System Purge Control Valve Circuit Low	—
P0462	Fuel Level Sensor “A” Circuit Low	—
P0463	Fuel Level Sensor “A” Circuit High	—
P0512	Starter Request Circuit	—
P0560	System Voltage	—
P0604	Internal Control Module Random Access Memory (RAM) Error	—
P0605	Internal Control Module Read Only Memory (ROM) Error	—
P0606	Control Module Processor	—
P060A	Internal Control Module Monitoring Processor Performance	—
P060B	Internal Control Module A/D Processing Performance	—
P0616	Starter Relay Circuit Low	—
P0617	Starter Relay Circuit High	—
P062F	Internal Control Module EEPROM Error	—
P0685	ECM/PCM Power Relay Control Circuit/Open	—
P081A	Starter Disable Circuit Low	—
P0A7B	Battery Energy Control Module Request MIL Illumination	—
P0AC4	Hybrid Powertrain Control Module Request MIL Illumination	—
P0CA1	Drive Motor Control Module Request MIL Illumination	—
P1160	Return Spring Failure	—
P2006	Intake Manifold Runner Control Stuck Closed (Bank 1)	—
P2007	Intake Manifold Runner Control Stuck Closed (Bank 2)	—
P2009	Intake Manifold Runner Control Circuit Low (Bank 1)	—
P2012	Intake Manifold Runner Control Circuit Low (Bank 2)	—
P2101	Throttle Actuator Control Motor Circuit Range/Performance	—
P2102	Throttle Actuator Control Motor Circuit Low	—
P2103	Throttle Actuator Control Motor Circuit High	—
P2109	Throttle/Pedal Position Sensor “A” Minimum Stop Performance	—
P2119	Throttle Actuator Control Throttle Body Range/Performance	—
P2122	Throttle/Pedal Position Sensor/Switch “D” Circuit Low Input	—
P2123	Throttle/Pedal Position Sensor/Switch “D” Circuit High Input	—
P2127	Throttle/Pedal Position Sensor/Switch “E” Circuit Low Input	—
P2128	Throttle/Pedal Position Sensor/Switch “E” Circuit High Input	—
P2135	Throttle/Pedal Position Sensor/Switch “A”/“B” Voltage Correlation	—
P2138	Throttle/Pedal Position Sensor/Switch “D”/“E” Voltage Correlation	—

DTC	Item	Condition
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	«Coolant Temp.»: 5 — 45°C (41 — 113°F) «Intake Air Temp.»: 5 — 50°C (41 — 122°F)
P2419	Evaporative Emission System Switching Valve Control Circuit Low	
P2530	Ignition Switch Run Position Circuit	—
U0073	Control Module Communication Bus Off	—
U0075	Control Module Communication Bus "PU-CAN" Off	—
U0101	Lost Communication With TCM	—
U0122	Lost Communication With Vehicle Dynamics Control Module	—
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	—
U0284	Lost Communication With Active Grille Shutter Module "A"	—
U0293	Lost Communication With Hybrid Powertrain Control Module	—
U0402	Invalid Data Received From TCM	—
U0416	Invalid Data Received From Vehicle Dynamics Control Module	—
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	—
U0594	Invalid Data Received From Hybrid Powertrain Control Module	—
U1101	Lost Communication With TCM PU-CAN	—
U1293	Lost Communication With Hybrid Powertrain Control Module PU-CAN	—
U1402	Invalid Data Received From TCM PU-CAN	—
U1594	Invalid Data Received From Hybrid Powertrain Control Module PU-CAN	—

1) Check that the 12 volt auxiliary battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2) Perform the Clear Memory Mode. <Ref. to EN(H4DO HEV)(diag)-66, Clear Memory Mode.>
3) Read the diagnostic trouble code (DTC) and check that no DTC is displayed. <Ref. to EN(H4DO HEV)(diag)-51, Read Diagnostic Trouble Code (DTC).>

NOTE:
If the DTC is displayed on the screen, the trouble is still present. Perform the diagnosis using “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-102, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> After solving the DTC, repeat from step 2).
4) Start the engine, and run the engine at idle for 10 seconds or more.
5) Read the readiness code using Subaru Select Monitor and check that the concerned DTC is not displayed. For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

NOTE:
If the concerned DTC is displayed, the self-diagnosis of the DTC is not complete. Repeat from step 4).
6) Read the diagnostic trouble code (DTC) and check the DTC. <Ref. to EN(H4DO HEV)(diag)-51, Read Diagnostic Trouble Code (DTC).>

NOTE:
If the DTC is displayed on the screen, the trouble is still present. Perform the diagnosis using “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-102, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> After solving the DTC, repeat from step 2).

12.Drive Cycle

A: PROCEDURE

It is necessary to perform the drive cycle listed below if DTC is not found in the Inspection Mode. It is possible to complete diagnosis of the DTC by performing the indicated drive cycle. After the repair for the DTC, perform a necessary drive cycle and make sure the function recovers and the DTC is recorded.

1. PREPARATION FOR DRIVE CYCLE

1) Check that the 12 volt auxiliary battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2) After performing the diagnostics and Clear Memory Mode, check that no DTC remains. <Ref. to EN(H4DO HEV)(diag)-66, Clear Memory Mode.>

NOTE:
Perform the drive cycle after warming up the engine except when the engine coolant temperature at engine start is specified.

2. DRIVE CYCLE A

DTC	Item	Condition
P0128	Coolant Thermostat (Engine Coolant Temperature Below Thermostat Regulating Temperature)	—
P0141	O2 Sensor Heater Circuit (Bank1 Sensor2)	—
P014C	O2 Sensor Slow Response - Rich to Lean (Bank 1 Sensor 1)	—
P014D	O2 Sensor Slow Response - Lean to Rich (Bank 1 Sensor 1)	—
P015A	O2 Sensor Delayed Response - Rich to Lean (Bank 1 Sensor 1)	—
P015B	O2 Sensor Delayed Response - Lean to Rich (Bank 1 Sensor 1)	—
P0171	System Too Lean (Bank 1)	Complete diagnosis with drive cycle B or C as well.
P0172	System Too Rich (Bank 1)	Complete diagnosis with drive cycle B or C as well.
P0300	Random/Multiple Cylinder Misfire Detected	Complete diagnosis with drive cycle B or C as well.
P0301	Cylinder 1 Misfire Detected	Complete diagnosis with drive cycle B or C as well.
P0302	Cylinder 2 Misfire Detected	Complete diagnosis with drive cycle B or C as well.
P0303	Cylinder 3 Misfire Detected	Complete diagnosis with drive cycle B or C as well.
P0304	Cylinder 4 Misfire Detected	Complete diagnosis with drive cycle B or C as well.
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	—
P0459	Evaporative Emission System Purge Control Valve Circuit High	—
P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	Complete diagnosis with drive cycle B or C as well.
P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)	Complete diagnosis with drive cycle B or C as well.
P2195	O2 Sensor Signal Biased/Stuck Lean (Bank 1 Sensor 1)	—
P2196	O2 Sensor Signal Biased/Stuck Rich (Bank 1 Sensor 1)	—

Diagnostic procedure:
1) Drive for 20 minutes or more at a constant speed of 80 km/h (50 MPH) or more.
2) Stop the vehicle and idle for one minute.
3) Read the temporary code using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-51, OPERATION, Read Diagnostic Trouble Code (DTC).>

3. DRIVE CYCLE B

DTC	Item	Condition
P0010	"A" Camshaft Position Actuator Circuit/Open (Bank 1)	—
P0020	"A" Camshaft Position Actuator Circuit/Open (Bank 2)	—
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	«Coolant Temp.» at engine start: Less than –15°C (5°F)
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	—
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	—
P0171	System Too Lean (Bank 1)	Complete diagnosis with drive cycle A or C as well.
P0172	System Too Rich (Bank 1)	Complete diagnosis with drive cycle A or C as well.
P0201	Injector #1	—
P0202	Injector #2	—
P0203	Injector #3	—
P0204	Injector #4	—
P0300	Random/Multiple Cylinder Misfire Detected	Complete diagnosis with drive cycle A or C as well.
P0301	Cylinder 1 Misfire Detected	Complete diagnosis with drive cycle A or C as well.
P0302	Cylinder 2 Misfire Detected	Complete diagnosis with drive cycle A or C as well.
P0303	Cylinder 3 Misfire Detected	Complete diagnosis with drive cycle A or C as well.
P0304	Cylinder 4 Misfire Detected	Complete diagnosis with drive cycle A or C as well.
P0351	Ignition Coil A Primary/Secondary Circuit	—
P0352	Ignition Coil B Primary/Secondary Circuit	—
P0353	Ignition Coil C Primary/Secondary Circuit	—
P0354	Ignition Coil D Primary/Secondary Circuit	—
P0500	Vehicle Speed Sensor “A”	—
P0506	Idle Air Control System RPM Lower Than Expected	—
P0507	Idle Air Control System RPM Higher Than Expected	—
P059A	Active Grille Shutter "A" Position Sensor Circuit	«Ambient Temperature»: 3 — 33°C (37.4 — 91.4°F)
P059F	Active Grille Shutter "A" Performance	
P05A0	Active Grille Shutter "A" Stuck	
P05A1	Active Grille Shutter "A" Range Over	
P05A2	Active Grille Shutter "A" Control Circuit	
P05A6	Active Grille Shutter "A" Supply Voltage Circuit/Open	
P05C0	Active Grille Shutter "A" Over Temperature	
P0700	Transmission Control System (MIL Request)	—
P2006	Intake Manifold Runner Control Stuck Closed (Bank 1)	—
P2007	Intake Manifold Runner Control Stuck Closed (Bank 2)	—
P2009	Intake Manifold Runner Control Circuit Low (Bank 1)	—
P2012	Intake Manifold Runner Control Circuit Low (Bank 2)	—
P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	Complete diagnosis with drive cycle A or C as well.
P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)	Complete diagnosis with drive cycle A or C as well.
P2135	Throttle/Pedal Position Sensor/Switch “A”/“B” Voltage Correlation	—
P2138	Throttle/Pedal Position Sensor/Switch “D”/“E” Voltage Correlation	—

DTC	Item	Condition
P219A	Bank 1 Air-Fuel Ratio Imbalance	Complete diagnosis with drive cycle C as well.
P2270	O2 Sensor Signal Biased/Stuck Lean (Bank 1 Sensor 2)	Complete diagnosis with drive cycle C as well.
P2271	O2 Sensor Signal Biased/Stuck Rich (Bank 1 Sensor 2)	Complete diagnosis with drive cycle C as well.

Diagnostic procedure:

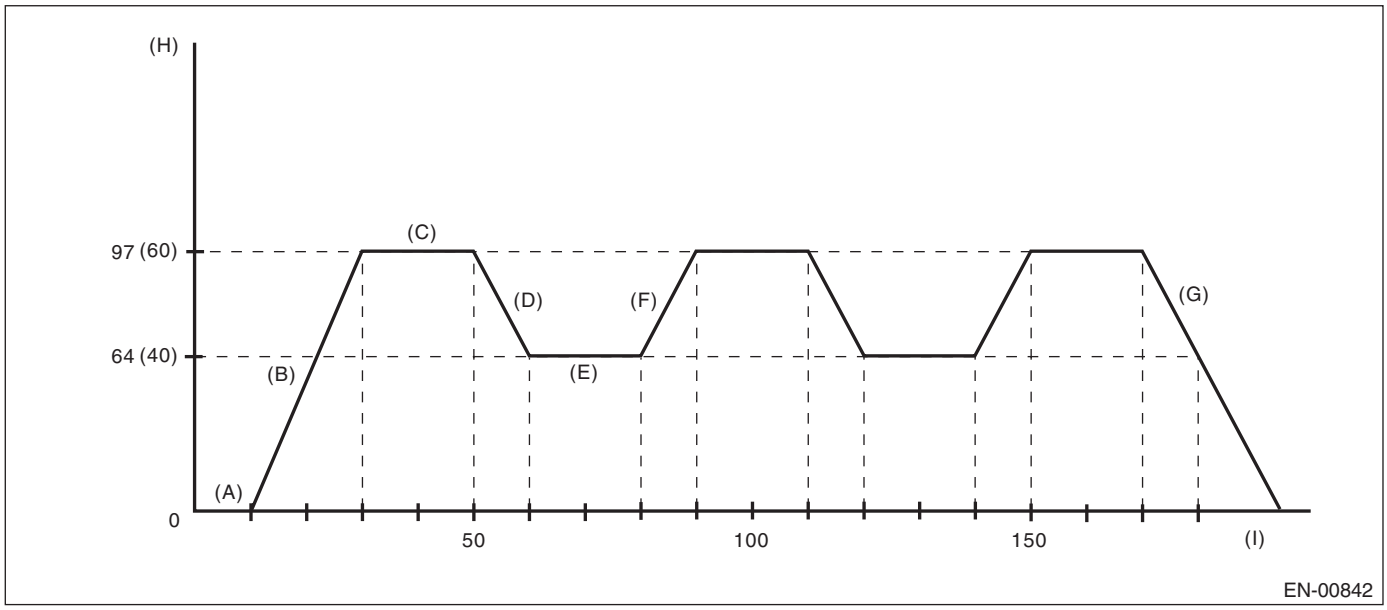
1) Drive at 10 km/h (6 MPH) or more.
2) Stop the vehicle and idle for ten minutes.
3) Read the temporary code using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-51, OPERATION, Read Diagnostic Trouble Code (DTC).>

4. DRIVE CYCLE C

DTC	Item	Condition
P000A	A Camshaft Position Slow Response (Bank 1)	—
P000B	B Camshaft Position Slow Response (Bank 1)	—
P000C	A Camshaft Position Slow Response (Bank 2)	—
P000D	B Camshaft Position Slow Response (Bank 2)	—
P0011	Intake Camshaft Position - Timing Over-Advanced or System Performance (Bank 1)	—
P0014	Exhaust AVCS System 1 (Range/Performance)	—
P0021	Intake Camshaft Position - Timing Over-Advanced or System Performance (Bank 2)	—
P0024	Exhaust AVCS System 2 (Range/Performance)	—
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	—
P0068	MAP/MAF - Throttle Position Correlation	—
P0101	Mass or Volume Air Flow Circuit Range/Performance	—
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	—
P013A	O2 Sensor Slow Response - Rich to Lean (Bank 1 Sensor 2)	—
P013B	O2 Sensor Slow Response - Lean to Rich (Bank 1 Sensor 2)	—
P013E	O2 Sensor Delayed Response - Rich to Lean (Bank 1 Sensor 2)	—
P013F	O2 Sensor Delayed Response - Lean to Rich (Bank 1 Sensor 2)	—
P0171	System Too Lean (Bank 1)	Complete diagnosis with drive cycle A or B as well.
P0172	System Too Rich (Bank 1)	Complete diagnosis with drive cycle A or B as well.
P0300	Random/Multiple Cylinder Misfire Detected	Complete diagnosis with drive cycle A or B as well.
P0301	Cylinder 1 Misfire Detected	Complete diagnosis with drive cycle A or B as well.
P0302	Cylinder 2 Misfire Detected	Complete diagnosis with drive cycle A or B as well.
P0303	Cylinder 3 Misfire Detected	Complete diagnosis with drive cycle A or B as well.
P0304	Cylinder 4 Misfire Detected	Complete diagnosis with drive cycle A or B as well.
P0400	Exhaust Gas Recirculation Flow	—
P0441	Evaporative Emission Cont. Sys. Incorrect Purge Flow	—
P0851	Park/Neutral Switch Input Circuit Low	—
P0852	Park/Neutral Switch Input Circuit High	—
P1449	Evaporative Emission Cont. Sys. Air Filter Clog	—
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	—
P1493	EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input)	—
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	—
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	—
P1496	EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	—
P1497	EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input)	—
P1498	EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	—
P1499	EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input)	—
P2004	Intake Manifold Runner Control Stuck Open (Bank 1)	—
P2005	Intake Manifold Runner Control Stuck Open (Bank 2)	—
P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	Complete diagnosis with drive cycle A or B as well.

DTC	Item	Condition
P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)	Complete diagnosis with drive cycle A or B as well.
P219A	Bank 1 Air-Fuel Ratio Imbalance	Complete diagnosis with drive cycle B as well.
P2270	O2 Sensor Signal Biased/Stuck Lean (Bank 1 Sensor 2)	Complete diagnosis with drive cycle B as well.
P2271	O2 Sensor Signal Biased/Stuck Rich (Bank 1 Sensor 2)	Complete diagnosis with drive cycle B as well.

Diagnostic procedure:
1) Drive according to the drive pattern described below.



(A)	Shift the select lever to “P” range, and let the engine idle for 10 seconds or more.	(D)	Decelerate with fully closed throttle to 64 km/h (40 MPH) or less.	(G)	Stop vehicle with the throttle fully closed.
(B)	Accelerate to 97 km/h (60 MPH) or more within 20 seconds.	(E)	Drive for 20 seconds or more at 64 km/h (40 MPH) or less.	(H)	Vehicle speed km/h (MPH)
(C)	Drive for 20 seconds or more at 97 km/h (60 MPH) or more.	(F)	Accelerate to 97 km/h (60 MPH) or more within 10 seconds.	(I)	Sec.

2) Read the temporary code using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-51, OPERATION, Read Diagnostic Trouble Code (DTC).>

5. DRIVE CYCLE E

DTC	Item	Condition
P0461	Fuel Level Sensor “A” Circuit Range/Performance	—

Diagnostic procedure:
1) Make sure that the battery voltage is 10.9 V or more.
2) Perform the Clear Memory Mode. <Ref. to EN(H4DO HEV)(diag)-66, Clear Memory Mode.>
3) Drive for approximately 30 L (7.9 US gal, 6.6 Imp gal) of fuel.

NOTE:
- It is acceptable to drive the vehicle intermittently.
- Do not disconnect the battery terminals while diagnosing. (Data will be cleared by disconnecting the battery terminals.)

4) Read the temporary code using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-51, OPERATION, Read Diagnostic Trouble Code (DTC).>

6. DRIVE CYCLE F

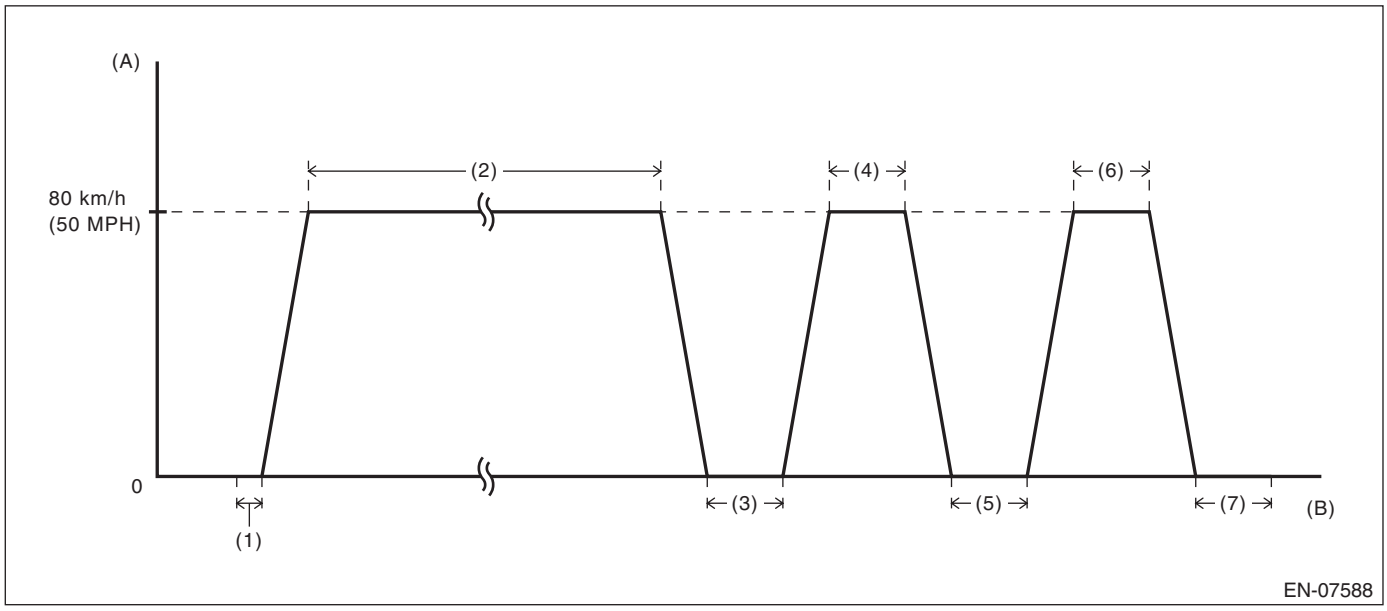
DTC	Item	Condition
P0111	Intake Air Temperature Sensor Range/Performance Problem	• 6 hours have elapsed since ignition switch is OFF under a completely warmed up condition. • For models with block heater, at least 6 hours must have elapsed without operating the block heater.
P0196	Engine Oil Temperature Sensor Circuit Range/Performance	

Diagnostic procedure:
1) With the ignition switch ON (engine stopped), read the values in «Coolant Temp.» and «Intake Air Temp.». <Ref. to EN(H4DO HEV)(diag)-36, DISPLAY CURRENT ENGINE DATA, OPERATION, Subaru Select Monitor.>
2) If the values from step 1) satisfy the following conditions, idle the engine for two minute or more.

Condition:
|Engine coolant temperature — Intake air temperature| ≤ 5°C (9°F)

NOTE:
- If the conditions are not satisfied, turn the ignition switch to OFF and wait until the parameters are satisfied.
- Hold the select lever in “P” range or “N” range at idling.

3) Drive according to the drive pattern described below.



(A) Vehicle speed
(B) Elapsed time
(1) Idle the engine for 2 minutes or more.
(2) Drive for 15 minutes or more in total at a speed of 80 km/h (50 MPH) or more.
(3) Stop the vehicle and idle for 30 seconds or more.
(4) Drive for 30 seconds or more at a constant speed of 80 km/h (50 MPH) or more.
(5) Stop the vehicle and idle for 30 seconds or more.
(6) Drive for 30 seconds or more at a constant speed of 80 km/h (50 MPH) or more.
(7) Stop the vehicle and idle for 30 seconds.

NOTE:
• While performing (2), depending on the traffic condition, it is possible to decrease the vehicle speed to less than 80 km/h (50 MPH), or to stop the vehicle. Drive the vehicle until the total time of driving with speed of 80 km/h (50 MPH) or more becomes 15 minutes or more.
• There is no given transition time between idling and cruising.
• Driving at constant speed only on a downhill causes smaller engine load and may result in failure to obtain a right diagnostic result.
• If the ignition switch is turned off while performing the drive cycle F, perform it again after condition in the table is met.
4) Read the temporary code using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-51, OPERATION, Read Diagnostic Trouble Code (DTC).>

7. DRIVE CYCLE H

DTC	Item	Condition
P0071	Ambient Temperature Sensor Circuit "A" Range/Performance	• 6 hours have elapsed since ignition switch is OFF under a completely warmed up condition. • For vehicle with block heater, wait for 6 hours without operating the block heater.
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance	• 6 hours have elapsed since ignition switch is OFF under a completely warmed up condition. • For vehicle with block heater, wait for 6 hours without operating the block heater.
P0451	Evaporative Emission System Pressure Sensor/Switch Range/Performance	60 seconds have elapsed since ignition switch is OFF.
P050A	Cold Start Idle Air Control System Performance	—
P050B	Cold Start Ignition Timing Performance	—

Diagnostic procedure:
1) With the ignition switch ON (engine stopped), read the values in «Coolant Temp.» and «Intake Air Temp.». <Ref. to EN(H4DO HEV)(diag)-36, DISPLAY CURRENT ENGINE DATA, OPERATION, Subaru Select Monitor.>
2) If the values from step 1) satisfy the following conditions, idle the engine for two minute or more.

Condition:
|Engine coolant temperature — Intake air temperature| ≤ 5°C (9°F)

NOTE:
• If the conditions are not satisfied, turn the ignition switch to OFF and wait until the parameters are satisfied.
• Hold the select lever in “P” range or “N” range at idling.
3) Read the temporary code using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-51, OPERATION, Read Diagnostic Trouble Code (DTC).>

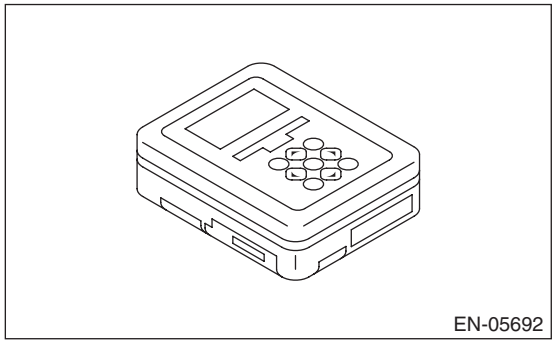
8. DRIVE CYCLE I

DTC	Item	Condition
P0455	Evaporative Emission System Leak Detected (Large Leak)	«Coolant Temp.»: 5 — 45°C (41 — 113°F) «Intake Air Temp.»: 5 — 50°C (41 — 122°F)
P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)	
P1451	Evaporative Emission Cont. Sys.	
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	
P2404	Evaporative Emission System Leak Detection Pump Sense Circuit Range/Performance	
P2420	Evaporative Emission System Switching Valve Control Circuit High	

CAUTION:
Be careful of the state of the battery when performing the drive cycle I consecutively. Performing the drive cycle I consecutively without the engine running may cause a low battery voltage and battery discharge.

NOTE:
- If it is necessary to perform drive cycle I consecutively, drive the vehicle under the following conditions to release accumulated evaporating gas. Performing the drive cycle I consecutively without starting the engine causes a large amount of evaporating gas to accumulate in the canister, which hinders an accurate diagnosis.
  - After engine is warmed up.
  - Drive for 10 minutes or more at a speed of 48 km/h (30 MPH) or more (duration of drive can be an accumulation)
- To obtain an accurate diagnostic result, perform the procedures according to the following points.
  - Do not refuel gas immediately before performing drive cycle I. There will be a large amount of evaporating gas immediately after refuel, which may cause a less accurate diagnostic performance.
  - Do not shake the vehicle while performing drive cycle I. Shaking the vehicle causes evaporating gas to increase inside the fuel tank, which may cause a less accurate diagnostic performance.
  - Do not perform any service operation including installation or removal of parts or connectors while performing drive cycle I. Performing service operation could affect on the functions of related parts, which may cause a less accurate diagnostic performance.
- Perform MODE $08 when using a general scan tool.

Diagnostic procedure:
1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4DO HEV)(diag)-8, PREPARATION TOOL, General Description.>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2) Prepare PC with Subaru Select Monitor installed.

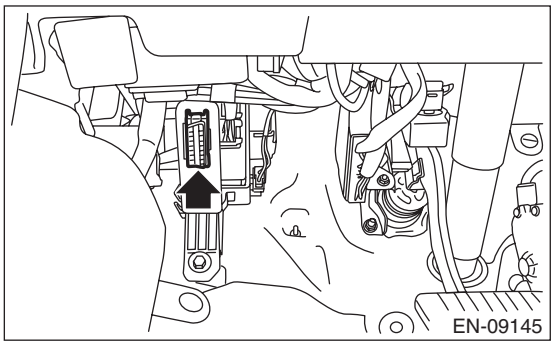
3) Connect the USB cable to SDI (Subaru Diagnosis Interface) and USB port on the personal computer (dedicated port for the Subaru Select Monitor).

NOTE:
The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.

4) Connect the diagnosis cable to SDI.

5) Connect SDI to data link connector located in the lower portion of the instrument panel (on the driver's side).

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor and general scan tool.



6) Start the PC.

7) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor".

8) On «Main Menu» display, select {Each System Check}.

9) On «System Selection Menu» display, select {Engine Control System}.

10) Click the [OK] button after the information of engine type has been displayed.

11) On «Engine Diagnosis» display, select {OBD System}.

12) On «OBD Menu» display, select {Evaporative System Leak Test}.

13) On «Evaporative System Leak Test» display, select {Evaporative System Leak Test}.

14) On «Evaporative System Leak Test is running. Press Cancel to exit this function.» display, click the [OK] button to perform evaporative system leak test.

15) When «Conditions have been enabled to control this function. Turn the ignition switch off to terminate the test.» display appears, wait for 30 minutes without clicking the [OK] button.

CAUTION:
Do not leave the vehicle for an extended period of time after the test is complete. This may cause early deterioration of the battery or discharged battery.

NOTE:
- Clicking the [OK] button bring the «Evaporative System Leak Test» display back, although the test is continuing.
- The Subaru Select Monitor screen does not change after the evaporative system leak test is complete or when the test is aborted by turning off the ignition switch.
- If «Test conditions are not correct» display appears, use Subaru Select Monitor to check that the values in «Coolant Temp.» and «Intake Air Temp.» are within the specified range. If the conditions are satisfied, make the necessary preparation for the drive cycle again. <Ref. to EN(H4DO HEV)(diag)-55, PREPARATION FOR DRIVE CYCLE, PROCEDURE, Drive Cycle.>

16) After 30 minutes passed from the start of step 14), click the [OK] button to return to the «Evaporative System Leak Test» display.

17) Click buttons until the «OBD Menu» display appears, then select {Result of on-board monitor test}.

18) In the {Result of on-board monitor test}, check TID $C1 — $CA of MID $3C.

NOTE:
Perform MODE $06 and check when using a general scan tool.

Result of on-board monitor test

Display	Details	Remarks
$0000 is stored in all Val.	During the evaporative system leak test, the test conditions were not met and the test was canceled.	Once the test conditions are met, perform the test again.
All Val. are stored with values and OK is set to all the results.	Evaporative system leak test is completed correctly.	While the ignition switch is ON, read the pending code using the Subaru Select Monitor.
Some results were no good.	The evaporative system leak test completed successfully but the results were faulty.	While the ignition switch is ON, read the pending code using the Subaru Select Monitor.

19) When the evaporative system leak test is completed correctly, read the pending code with the ignition switch turned to ON position. If the DTC is recorded, check the appropriate DTC. <Ref. to EN(H4DO HEV)(diag)-51, OPERATION, Read Diagnostic Trouble Code (DTC).>

NOTE:
- Perform MODE $07 when using a general scan tool.
- The pending code will be cleared by turning ignition switch to OFF.

9. DRIVE CYCLE J

DTC	Item	Condition
P2610	ECM/PCM Internal Engine Off Timer Performance	—

Diagnostic procedure:
1) Idle the engine for 15 minutes or more.
2) Turn the ignition switch to OFF.
3) After 10 hours passed from the start of step 2), read the temporary code using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-51, OPERATION, Read Diagnostic Trouble Code (DTC).>

10.DRIVE CYCLE N

DTC	Item	Condition
P0016	Crankshaft Position - Camshaft Position Correlation (Bank1)	«Coolant Temp.»: 80°C (176°F) or more
P0017	Crank and Cam Timing B System Failure (Bank 1)	
P0018	Crankshaft Position - Camshaft Position Correlation (Bank2)	
P0019	Crank and Cam Timing B System Failure (Bank 2)	

WARNING:
When performing drive cycle N on the road, pay great attention to traffic conditions and place top priority on safety drive.
1) Using Subaru Select Monitor or general scan tool, confirm the data in the condition field of the table.

NOTE:
- Subaru Select Monitor

For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, DISPLAY CURRENT ENGINE DATA, OPERATION, Subaru Select Monitor.>
- General scan tool

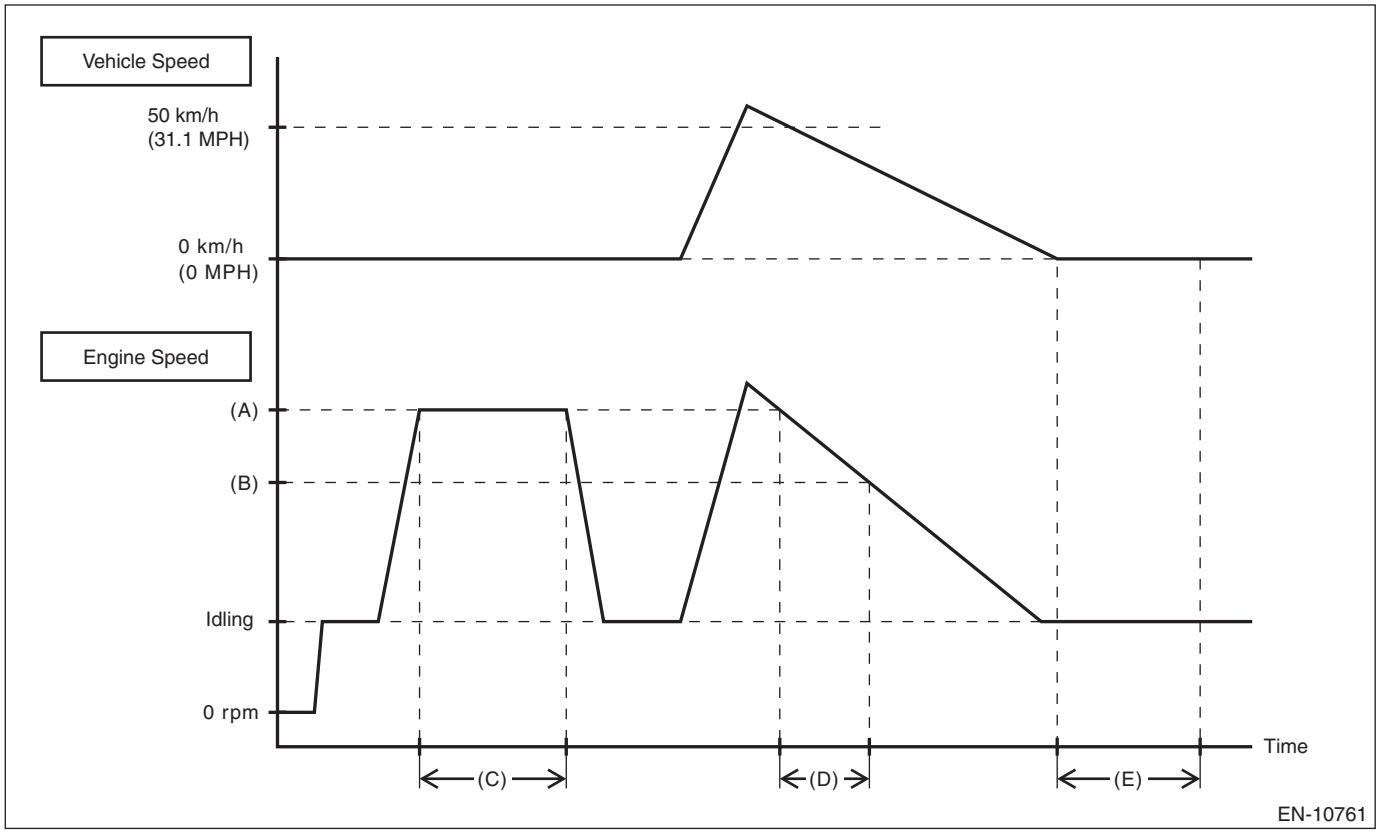
For detailed operation procedures, refer to the general scan tool operation manual.

2) Race up the engine at approx. 2500 rpm of engine speed for 40 seconds or more from a status where the conditions in the table are established.
3) Start the vehicle and accelerate up to 50 km/h (31.1 MPH) or more.
4) When the speed reaches 50 km/h (31.1 MPH) or more, release the accelerator pedal and brake pedal and decelerate without shifting operation. At this time, select an appropriate gear in advance so that the engine speed keeps between 2500 rpm and 1900 rpm for 5 seconds or more.

NOTE:
• As long as the engine speed keeps between 2500 rpm and 1900 rpm for 5 seconds or more, it does not matter how much speed the vehicle runs.
Example) On downhill, this could be performed at low vehicle speed and in lower gear.
• To keep continuous time longer, turn electrical load (A/C, etc.) to OFF or drive on downhill because the engine speed decreases more slowly.
5) Stop the vehicle at a safe place and let it idle for 5 minutes or more.

NOTE:
There is no special rule for driving operation until the vehicle is stopped at a safe place.
6) Read temporary DTC codes using Subaru Select Monitor or general scan tool at idling.

NOTE:
• Refer to “Read Diagnostic Trouble Code (DTC)” for detailed operation procedure. <Ref. to EN(H4DO HEV)(diag)-51, Read Diagnostic Trouble Code (DTC).>
• In step 6), if no DTC is shown on the screen of Subaru Select Monitor or general scan tool, the trouble has been solved.



(A) 2500 rpm
(B) 1900 rpm
(C) 40 seconds or more
(D) 5 seconds or more
(E) 5 minutes or more

13.Clear Memory Mode

A: OPERATION

1. SUBARU SELECT MONITOR

NOTE:
• Initial diagnosis of electronic throttle control is performed after memory clearance. Wait for 10 seconds or more after turning the ignition switch to ON, and then start the engine.
• For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

2. GENERAL SCAN TOOL

For clear memory procedures using the general scan tool, refer to “General Scan Tool Instruction Manual”.

NOTE:
Initial diagnosis of electronic throttle control is performed after memory clearance. Wait for 10 seconds or more after turning the ignition switch to ON, and then start the engine.

14.System Operation Check Mode

A: OPERATION

CAUTION:
After executing the system operation check mode, execute the Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>.

NOTE:
- *: When the ECM, HPCM or the active grille shutter has been replaced, be sure to perform this.
- For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

Item		SSM display		Execution condition
Activating the actuator ON/OFF	Activating the fuel pump ON/OFF	Fuel Pump	ON ←→ OFF	Ignition switch is ON (engine OFF)
	Activating the purge control solenoid valve ON/OFF	CPC Solenoid Valve	ON ←→ OFF	
	Activating the radiator fan relay ON/OFF	Radiator Fan Relay	ON ←→ OFF	
	Activating the A/C relay ON/OFF	A/C Relay	ON ←→ OFF	
	Activating the ELCM switching valve ON/OFF	ELCM switching valve	ON ←→ OFF	
	Activating the ELCM vacuum pump ON/OFF	ELCM pump	ON ←→ OFF	
Fuel pump control	Fuel pump OFF operation	OFF drive	OFF	At idling
Fixing the timing of idle ignition		Fixed Idle Ignition Timing	16.0°	At idling
Idle speed control		Idle Speed Control	500 — 2000 rpm	At idling
Injector control	Stopping fuel injection (Cylinder selection)	Injection Stop Mode	Injector 1 Injector 2 Injector 3 Injector 4	At idling
	Fuel injection amount control (All cylinders)	Injection Quantity Control	0 — 20%	At idling
EGR control valve control		EGR Valve Control	0 — 255 STEP	At idling
Active grille shutter control*		Active Grille Shutter Control	Open Close	• Ignition switch is ON (engine OFF) • Elapsed time after starting the engine exceeds 20 seconds (When the ECM is replaced)

15.Malfunction Indicator Light

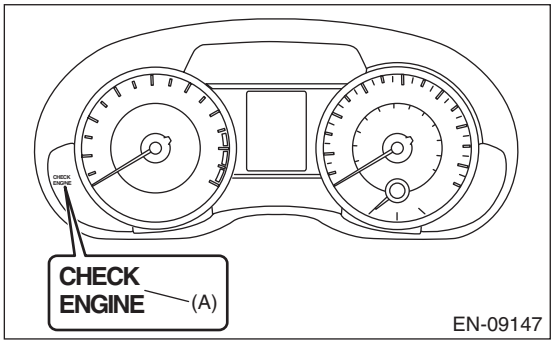
A: PROCEDURE

1. Activation of malfunction indicator light. <Ref. to EN(H4DO HEV)(diag)-68, ACTIVATION OF MALFUNCTION INDICATOR LIGHT, Malfunction Indicator Light.>
↓
2. Malfunction indicator light does not come on. <Ref. to EN(H4DO HEV)(diag)-69, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
↓
3. Malfunction indicator light does not go off <Ref. to EN(H4DO HEV)(diag)-69, MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF, Malfunction Indicator Light.>

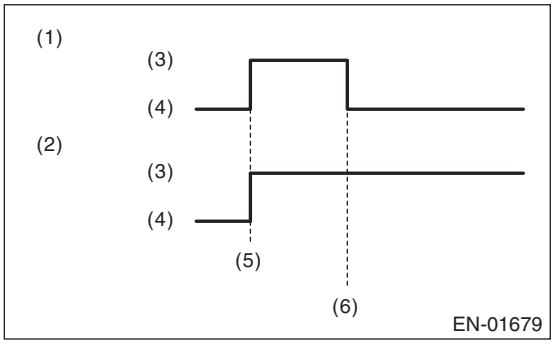
B: ACTIVATION OF MALFUNCTION INDICATOR LIGHT

1) When the ignition switch is turned to ON (engine OFF), the malfunction indicator light (A) in the combination meter illuminates.

NOTE:
If the malfunction indicator light does not illuminate, perform diagnostics of the malfunction indicator light circuit or the combination meter circuit. <Ref. to EN(H4DO HEV)(diag)-69, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>

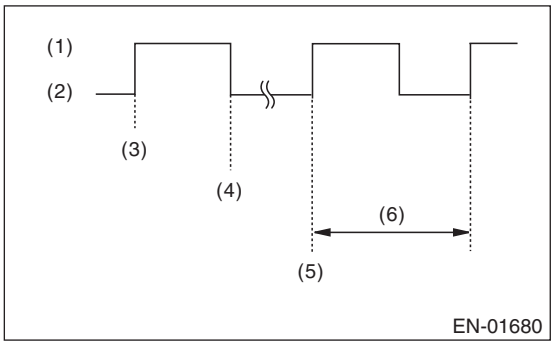


2) After starting the engine, the malfunction indicator light goes out. If it does not go off, any of the engine and emission control system has malfunction.



(1) No faulty
(2) Trouble occurs
(3) ON
(4) OFF
(5) Ignition switch ON
(6) Engine start

3) If the diagnostic system detects a misfire which could damage the catalyst, the malfunction indicator light will blink at a cycle of 1 Hz.



(1) ON
(2) OFF
(3) Ignition switch ON
(4) Engine start
(5) Misfire start
(6) 1 second

C: MALFUNCTION INDICATOR LIGHT DOES NOT COME ON

TROUBLE SYMPTOM:
When the ignition switch is turned to ON (engine OFF), malfunction indicator light does not illuminate.

NOTE:
Refer to IDI section for diagnostic procedure. <Ref. to IDI(diag)-2, Basic Diagnostic Procedure.>

D: MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF

TROUBLE SYMPTOM:
Although malfunction indicator light comes on when the engine runs, DTC is not shown on the Subaru Select Monitor display.

Step	Check	Yes	No
1 **CHECK DTC.**	Is DTC of engine or LAN system displayed? <Ref. to EN(H4DO HEV)(diag)-51, OPERATION, Read Diagnostic Trouble Code (DTC).>	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).> <Ref. to LAN(HEV)(diag)-87, List of Diagnostic Trouble Code (DTC).>	Check the combination meter system. <Ref. to IDI(diag)-2, Basic Diagnostic Procedure.>

16.Diagnostics for Engine Starting Failure

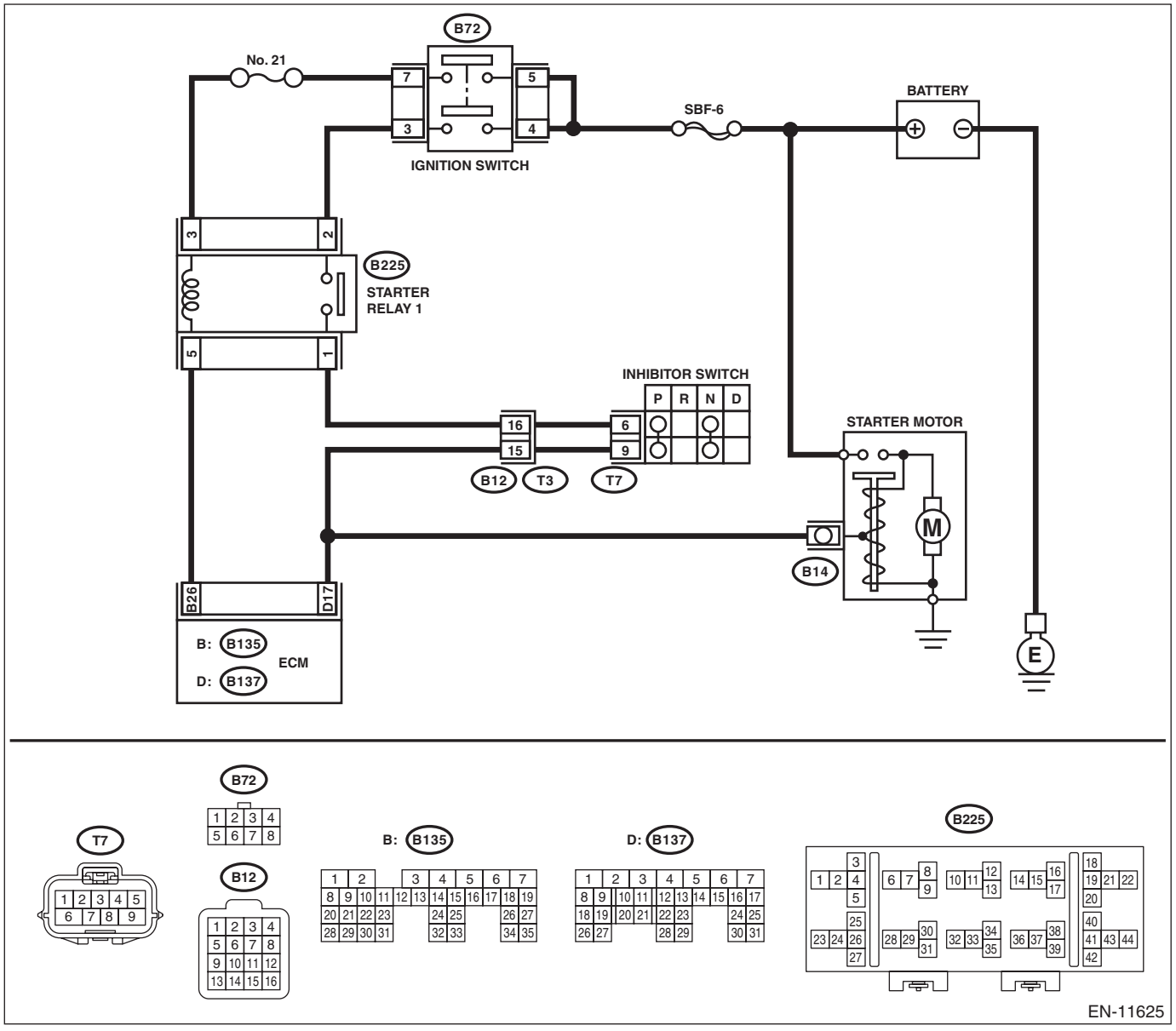
A: PROCEDURE

1. Check of the fuel amount
↓
2. Inspection of starter motor circuit <Ref. to EN(H4DO HEV)(diag)-71, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ECM power supply and ground line <Ref. to EN(H4DO HEV)(diag)-82, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>
↓
4. Inspection of ignition control system <Ref. to EN(H4DO HEV)(diag)-85, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel pump circuit <Ref. to EN(H4DO HEV)(diag)-87, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
6. Inspection of fuel injector circuit <Ref. to EN(H4DO HEV)(diag)-90, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

B: STARTER MOTOR CIRCUIT

1. MODEL WITHOUT PUSH BUTTON START

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, Inspection Mode.>.
WIRING DIAGRAM:
Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



Step		Check	Yes	No
1	**CHECK FOR MALFUNCTION OCCURRENCE.**	Has the start failure occurred during Auto Start Stop or during EV traveling?	Inspection using “Basic Diagnostic Procedure” of hybrid system. <Ref. to HEV(diag)-2, Basic Diagnostic Procedure.>	Go to step **2**.

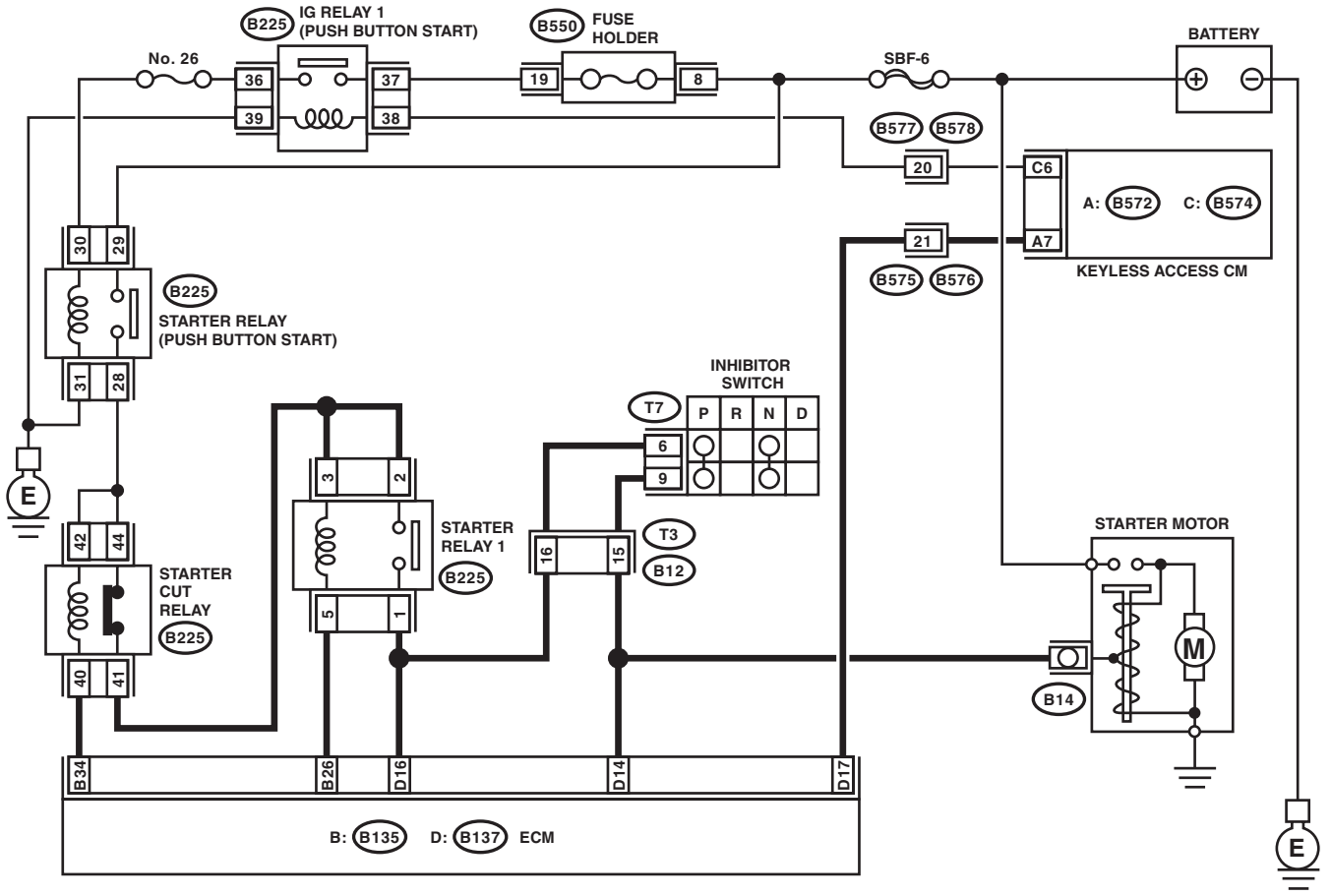
	Step	Check	Yes	No
2	**CHECK DTC.**	Is DTC displayed? <Ref. to EN(H4DO HEV)(diag)-51, OPERATION, Read Diagnostic Trouble Code (DTC).>	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **3**.
3	**CHECK CURRENT DATA.** 1) Turn the ignition switch to ON. 2) Read the value of «Starter Relay Drive Permission Status» using the Subaru Select Monitor. NOTE: For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	Is «OK» displayed?	Go to step **4**.	Inspection using "Basic Diagnostic Procedure" of hybrid system. <Ref. to HEV(diag)-2, Basic Diagnostic Procedure.>
4	**CHECK NEUTRAL POSITION SWITCH SIGNAL.** 1) Read the value of «Neutral Position Switch» using the Subaru Select Monitor. NOTE: For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> 2) Turn the ignition to ON. 3) Place the select lever in "P" range or "N" range.	Is «Neutral» displayed?	Go to step **5**.	Go to step **9**.
5	**CHECK 12 VOLT AUXILIARY BATTERY.** Check the battery. <Ref. to SC(H4DO(HEV))-39, Battery.>	Is the battery OK?	Go to step **6**.	Charge or replace the battery. <Ref. to SC(H4DO(HEV))-39, Battery.>
6	**CHECK OPERATION OF STARTER MOTOR.**	Does the starter motor operate?	Check ignition control system. <Ref. to EN(H4DO HEV)(diag)-85, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to step **7**.
7	**CHECK INPUT SIGNAL FOR STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter motor. 3) Turn the ignition switch to START. 4) Measure the voltage between the starter motor connector and the engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (–):*** NOTE: Place the select lever in "P" range or "N" range.	Is the voltage 10 V or more?	Check the starter motor. <Ref. to SC(H4DO(HEV))-10, Starter.>	Go to step **8**.

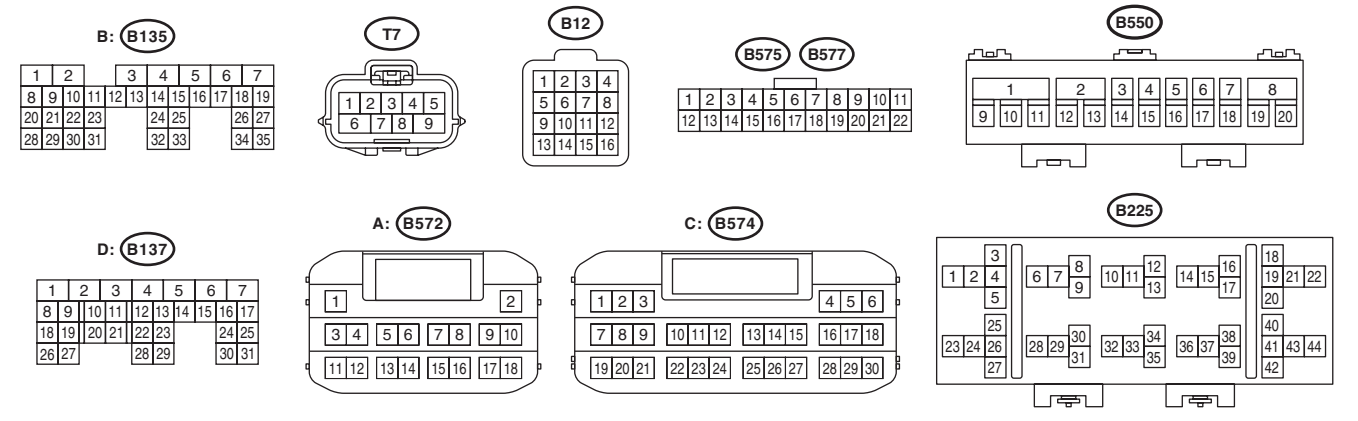
	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN 12 VOLT AUXILIARY BATTERY AND STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between starter motor terminal B and engine ground. ***Terminals*** ***Terminal B (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **9**.	Repair the power supply circuit.
9	**CHECK HARNESS BETWEEN 12 VOLT AUXILIARY BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition switch. 3) Measure the power supply voltage between ignition switch connector and chassis ground. ***Connector & terminal*** ***(B72) No. 4 (+) — Chassis ground (–):*** ***(B72) No. 5 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **10**.	Repair the power supply circuit.
10	**CHECK IGNITION SWITCH.** Measure the resistance between ignition switch terminals after turning the ignition switch to START position. ***Terminals*** ***No. 3 — No. 4:*** ***No. 5 — No. 7:***	Is the resistance less than 1 Ω?	Go to step **11**.	Replace the ignition switch. <Ref. to SL-70, REPLACEMENT, Ignition Key Lock.>
11	**CHECK INPUT VOLTAGE OF STARTER RELAY 1.** 1) Turn the ignition switch to OFF. 2) Remove the starter relay 1. 3) Connect the connector to ignition switch. 4) Measure the voltage between starter relay 1 connector and chassis ground after turning the ignition switch to START position. ***Connector & terminal*** ***(B225) No. 2 (+) — Chassis ground (–):*** ***(B225) No. 3 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **12**.	Check the following item and repair if necessary. • Blown out of fuse • Open or short circuit to ground in harness between starter relay 1 and ignition switch connector
12	**CHECK HARNESS BETWEEN ECM AND STARTER RELAY 1 CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and starter relay 1 connector. ***Connector & terminal*** ***(B135) No. 26 — (B225) No. 5:***	Is the resistance less than 1 Ω?	Go to step **13**.	Repair the open circuit of harness between ECM connector and starter relay 1 connector.
13	**CHECK STARTER RELAY 1.** 1) Connect the battery to starter relay 1 terminals No. 3 and No. 5. 2) Measure the resistance between starter relay 1 terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **14**.	Replace the starter relay 1. <Ref. to EN(H4DO HEV)(diag)-9, Electrical Component Location.>

	Step	Check	Yes	No
14	**CHECK HARNESS BETWEEN STARTER RELAY 1 AND INHIBITOR SWITCH CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from inhibitor switch. 3) Measure the resistance of harness between starter relay 1 connector and inhibitor switch connector. ***Connector & terminal*** ***(B225) No. 1 — (T7) No. 6:***	Is the resistance less than 1 Ω?	Go to step **15**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between starter relay 1 connector and inhibitor switch connector • Poor contact of coupling connector
15	**CHECK HARNESS BETWEEN INHIBITOR SWITCH AND STARTER MOTOR.** Measure the resistance of harness between the inhibitor switch connector and starter motor. ***Connector & terminal*** ***(T7) No. 9 — (B14) No. 1:***	Is the resistance less than 1 Ω?	Go to step **16**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between inhibitor switch connector and starter motor • Poor contact of coupling connector
16	**CHECK INHIBITOR SWITCH.** 1) Place the select lever in “P” range and “N” range. 2) Measure the resistance between inhibitor switch terminals. ***Terminals*** ***No. 6 — No. 9:***	Is the resistance less than 1 Ω?	Check the engine control module (ECM) power supply and ground line. <Ref. to EN(H4DO HEV)(diag)-82, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>	Replace the inhibitor switch. <Ref. to CVT(TH58A)-97, Inhibitor Switch.>

2. MODEL WITH PUSH BUTTON START

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, Inspection Mode.>.
WIRING DIAGRAM:
Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>





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Diagnostics for Engine Starting Failure

	Step	Check	Yes	No
1	**CHECK FOR MALFUNCTION OCCURRENCE.**	Has the start failure occurred during Auto Start Stop or during EV traveling?	Inspection using “Basic Diagnostic Procedure” of hybrid system. <Ref. to HEV(diag)-2, Basic Diagnostic Procedure.>	Go to step **2**.
2	**CHECK DTC.**	Is DTC displayed? <Ref. to EN(H4DO HEV)(diag)-51, OPERATION, Read Diagnostic Trouble Code (DTC).>	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **3**.
3	**CHECK CURRENT DATA.** 1) Turn the ignition to ON. 2) Read the value of «Starter Relay Drive Permission Status» using the Subaru Select Monitor. NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	Is «OK» displayed?	Go to step **4**.	Inspection using “Basic Diagnostic Procedure” of hybrid system. <Ref. to HEV(diag)-2, Basic Diagnostic Procedure.>
4	**CHECK NEUTRAL POSITION SWITCH SIGNAL.** 1) Read the value of «Neutral Position Switch» using the Subaru Select Monitor. NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> 2) Turn the ignition to ON. 3) Place the select lever in “P” range or “N” range.	Is «Neutral» displayed?	Go to step **5**.	Go to step **10**.
5	**CHECK 12 VOLT AUXILIARY BATTERY.** Check the battery. <Ref. to SC(H4DO(HEV))-39, Battery.>	Is the battery OK?	Go to step **6**.	Charge or replace the battery. <Ref. to SC(H4DO(HEV))-39, Battery.>
6	**CHECK OPERATION OF STARTER MOTOR.**	Does the starter motor operate?	Check ignition control system. <Ref. to EN(H4DO HEV)(diag)-85, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to step **7**.

	Step	Check	Yes	No
7	**CHECK PUSH BUTTON IGNITION SWITCH.** Press the push button ignition switch twice with the ignition OFF (ACC OFF). NOTE: Release the brake pedal.	Does the ignition turn to ON?	Go to step **8**.	Check the push button start system. <Ref. to KPS(diag)-109, POWER SUPPLY SWITCHING SYSTEM, INSPECTION, General Diagnostic Table.>
8	**CHECK PUSH BUTTON IGNITION SWITCH.** 1) Depress the brake pedal. NOTE: Shift the select lever to “P” range. 2) Check the push button ignition switch indicator.	Does the indicator turn to green?	Go to step **9**.	Check the push button start system. <Ref. to KPS(diag)-142, ENGINE DOES NOT START, INSPECTION, Diagnostics with Phenomenon.>
9	**CHECK START SWITCH SIGNAL.** 1) Read the waveform of «Starter SW» using the Subaru Select Monitor. NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> 2) Press the push button ignition switch once with the brake pedal depressed.	Does waveform of the «Starter SW» occur?	Go to step **13**.	Go to step **10**.
10	**CHECK HARNESS BETWEEN ECM AND KEYLESS ACCESS CM.** 1) Turn the ignition to OFF. 2) Disconnect the connectors from ECM and keyless access CM. 3) Measure the resistance of harness between ECM connector and keyless access CM. ***Connector & terminal*** ***(B137) No. 17 — (B572) No. 7:***	Is the resistance less than 1 Ω?	Go to step **11**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and keyless access CM connector • Poor contact of coupling connector
11	**CHECK HARNESS BETWEEN ECM AND KEYLESS ACCESS CM.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 17 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **12**.	Repair the short circuit to ground in harness between ECM connector and keyless access CM connector.
12	**CHECK START SWITCH SIGNAL.** 1) Connect the connector to ECM and keyless access CM. 2) Read the waveform of start switch signal using an oscilloscope. 3) Press the push button ignition switch once with the brake pedal depressed. ***Connector & terminal*** ***(B137) No. 17 (+) — Chassis ground (–):***	Does waveform of the start switch signal occur?	Repair the poor contact of ECM connector.	Repair the poor contact of keyless access CM connector.

	Step	Check	Yes	No
13	**CHECK INPUT SIGNAL FOR STARTER MOTOR.** 1) Turn the ignition to OFF. 2) Disconnect the connector from starter motor. 3) Place the select lever in “P” range or “N” range. 4) Press the push button ignition switch once with the brake pedal depressed. 5) Measure the voltage between the starter motor connector and the engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Check the starter motor. <Ref. to SC(H4DO(HEV))-10, Starter.>	Go to step **14**.
14	**CHECK HARNESS BETWEEN 12 VOLT AUXILIARY BATTERY AND STARTER MOTOR.** 1) Turn the ignition to OFF. 2) Measure the voltage between starter motor terminal B and engine ground. ***Terminals*** ***Terminal B (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **15**.	Repair the power supply circuit.
15	**CHECK IG RELAY 1 (PUSH BUTTON START) POWER SUPPLY.** 1) Remove the IG relay 1 (push button start). 2) Turn the ignition to ON. 3) Measure the voltage between the IG relay 1 (push button start) connector and chassis ground. ***Connector & terminal*** ***(B225) No. 37 (+) — Chassis ground (–):*** ***(B225) No. 38 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **16**.	Check the following item and repair or replace if necessary. • Blown out of fuse • Open circuit or short circuit to ground in harness between IG relay 1 (push button start) connector and keyless access CM connector • Open circuit or short circuit to ground in harness between IG relay 1 (push button start) connector and 12 volt auxiliary battery • Poor contact of coupling connector
16	**CHECK HARNESS BETWEEN IG RELAY 1 (PUSH BUTTON START) CONNECTOR AND CHASSIS GROUND.** 1) Turn the ignition to OFF. 2) Measure the resistance of harness between the IG relay 1 (push button start) connector and chassis ground. ***Connector & terminal*** ***(B225) No. 39 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **17**.	Repair the open circuit in harness between the IG relay 1 (push button start) connector and chassis ground.
17	**CHECK IG RELAY 1 (PUSH BUTTON START).** 1) Connect the battery to IG relay 1 (push button start) terminals No. 38 and No. 39. 2) Measure the resistance between IG relay 1 (push button start) terminals. ***Terminals*** ***No. 36 — No. 37:***	Is the resistance less than 1 Ω?	Go to step **18**.	Replace the IG relay 1 (push button start). <Ref. to SL-119, IG Relay1 (Push Button Start).>

	Step	Check	Yes	No
18	**CHECK STARTER RELAY (PUSH BUTTON START) POWER SUPPLY.** 1) Install the IG relay 1 (push button start). 2) Remove the starter relay (push button start). 3) Turn the ignition to ON. 4) Measure the voltage between starter relay (push button start) connector and chassis ground. ***Connector & terminal*** ***(B225) No. 29 (+) — Chassis ground (–):*** ***(B225) No. 30 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **19**.	Check the following item and repair or replace if necessary. • Blown out of fuse (F/B No. 26) • Open circuit or short circuit to ground in harness between starter relay (push button start) connector and IG relay 1 (push button start) connector • Open circuit or short circuit to ground in harness between starter relay (push button start) connector and 12 volt auxiliary battery
19	**CHECK HARNESS BETWEEN STARTER RELAY (PUSH BUTTON START) CONNECTOR AND CHASSIS GROUND.** 1) Turn the ignition to OFF. 2) Measure the resistance of harness between starter relay (push button start) connector and chassis ground. ***Connector & terminal*** ***(B225) No. 31 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **20**.	Repair the open circuit in harness between starter relay (push button start) connector and chassis ground.
20	**CHECK STARTER RELAY (PUSH BUTTON START).** 1) Connect the battery to starter relay (push button start) terminals No. 30 and No. 31. 2) Measure the resistance between starter relay (push button start) terminals. ***Terminals*** ***No. 28 — No. 29:***	Is the resistance less than 1 Ω?	Go to step **21**.	Replace the starter relay (push button start). <Ref. to SL-117, Starter Relay (Push Button Start).>
21	**CHECK HARNESS BETWEEN STARTER RELAY (PUSH BUTTON START) CONNECTOR AND STARTER CUT RELAY CONNECTOR.** 1) Remove the starter cut relay. 2) Measure the resistance of harness between starter relay (push button start) connector and starter cut relay connector. ***Connector & terminal*** ***(B225) No. 28 — (B225) No. 42:*** ***(B225) No. 28 — (B225) No. 44:***	Is the resistance less than 1 Ω?	Go to step **22**.	Repair the open circuit in harness between starter relay (push button start) connector and starter cut relay connector.
22	**CHECK HARNESS BETWEEN ECM AND STARTER CUT RELAY CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance between starter cut relay connector and chassis ground. ***Connector & terminal*** ***(B225) No. 40 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **23**.	Repair the short circuit to ground in harness between ECM connector and starter cut relay connector.

	Step	Check	Yes	No
23	**CHECK STARTER CUT RELAY.** Measure the resistance between starter cut relay terminals. ***Terminals*** ***No. 41 — No. 44:***	Is the resistance less than 1 Ω?	Go to step **24**.	Replace the starter cut relay. <Ref. to SL-124, Starter Cut Relay.>
24	**CHECK HARNESS BETWEEN STARTER CUT RELAY CONNECTOR AND STARTER RELAY 1 CONNECTOR.** 1) Remove the starter relay 1. 2) Measure the resistance of harness between starter cut relay connector and starter relay 1 connector. ***Connector & terminal*** ***(B225) No. 41 — (B225) No. 2:*** ***(B225) No. 41 — (B225) No. 3:***	Is the resistance less than 1 Ω?	Go to step **25**.	Repair the open circuit of harness between starter cut relay connector and starter relay 1 connector.
25	**CHECK HARNESS BETWEEN ECM AND STARTER RELAY 1 CONNECTOR.** Measure the resistance of harness between ECM connector and starter relay 1 connector. ***Connector & terminal*** ***(B135) No. 26 — (B225) No. 5:***	Is the resistance less than 1 Ω?	Go to step **26**.	Repair the open circuit of harness between ECM connector and starter relay 1 connector.
26	**CHECK STARTER RELAY 1.** 1) Connect the battery to starter relay 1 terminals No. 3 and No. 5. 2) Measure the resistance between starter relay 1 terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **27**.	Replace the starter relay 1. <Ref. to EN(H4DO HEV)(diag)-9, LOCATION, Electrical Component Location.>
27	**CHECK HARNESS BETWEEN STARTER RELAY 1 CONNECTOR AND INHIBITOR SWITCH CONNECTOR.** 1) Disconnect the connector from inhibitor switch. 2) Measure the resistance of harness between starter relay 1 connector and inhibitor switch connector. ***Connector & terminal*** ***(B225) No. 1 — (T7) No. 6:***	Is the resistance less than 1 Ω?	Go to step **28**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between starter relay 1 connector and inhibitor switch connector • Poor contact of coupling connector
28	**CHECK INHIBITOR SWITCH.** 1) Place the select lever in “P” range and “N” range. 2) Measure the resistance between inhibitor switch terminals. ***Terminals*** ***No. 6 — No. 9:***	Is the resistance less than 1 Ω?	Go to step **29**.	Replace the inhibitor switch. <Ref. to CVT(TH58A)-97, Inhibitor Switch.>
29	**CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM connector and inhibitor switch connector. ***Connector & terminal*** ***(B137) No. 16 — (T7) No. 6:***	Is the resistance less than 1 Ω?	Go to step **30**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and inhibitor switch connector • Poor contact of coupling connector

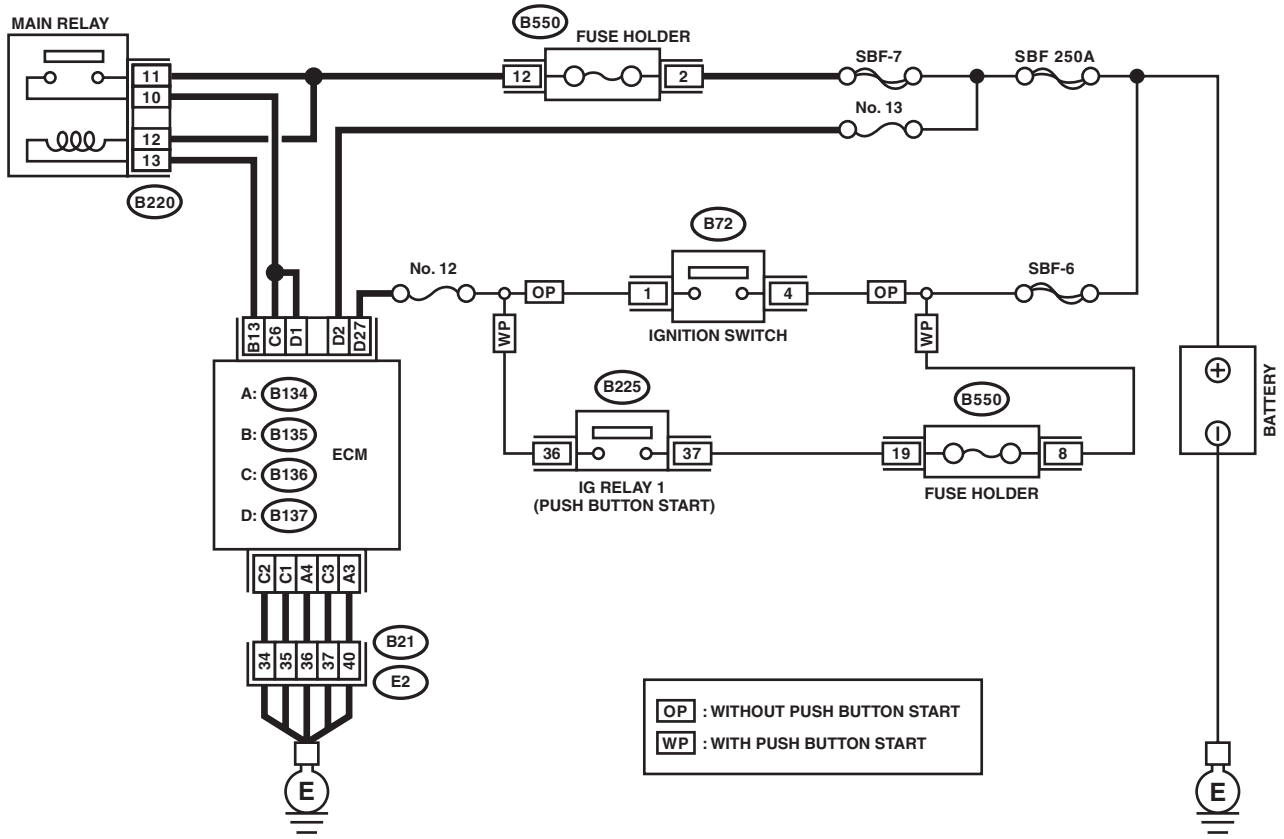
	Step	Check	Yes	No
30	**CHECK HARNESS BETWEEN INHIBITOR SWITCH AND STARTER MOTOR.** Measure the resistance of harness between the inhibitor switch connector and starter motor. ***Connector & terminal*** ***(T7) No. 9 — (B14) No. 1:***	Is the resistance less than 1 Ω?	Check the engine control module (ECM) power supply and ground line. <Ref. to EN(H4DO HEV)(diag)-82, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between inhibitor switch connector and starter motor connector • Poor contact of coupling connector

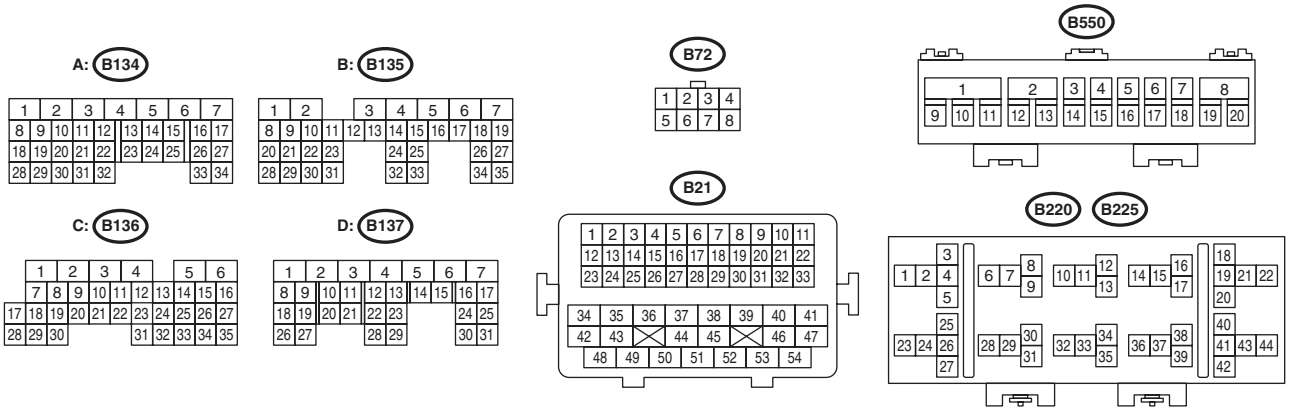
C: CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM)

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>





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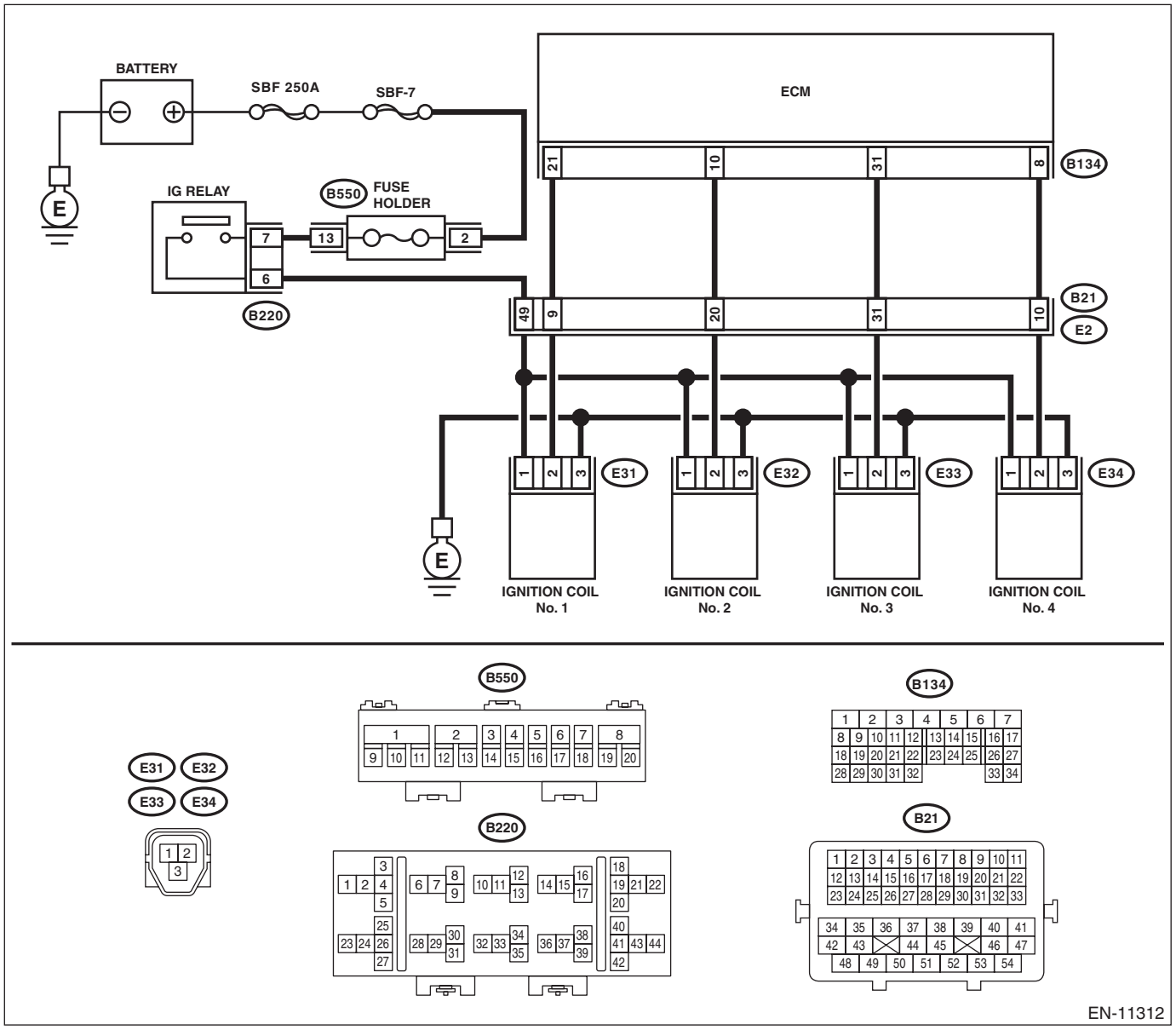
	Step	Check	Yes	No
1	**CHECK MAIN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main relay. 3) Connect the battery to main relay terminals No. 12 and No. 13. 4) Measure the resistance between main relay terminals. ***Terminals*** ***No. 10 — No. 11:***	Is the resistance less than 1 Ω?	Go to step **2**.	Replace the main relay. <Ref. to FU(H4DO(HEV))-88, Main Relay.>
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 3 — Chassis ground:*** ***(B134) No. 4 — Chassis ground:*** ***(B136) No. 1 — Chassis ground:*** ***(B136) No. 2 — Chassis ground:*** ***(B136) No. 3 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and engine ground terminal • Poor contact of coupling connector
3	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 2 (+) — Chassis ground (–):*** ***(B137) No. 27 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **4**.	Repair the open or ground short circuit of harness of power supply circuit.
4	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B220) No. 11 (+) — Chassis ground (–):*** ***(B220) No. 12 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **5**.	Repair the open or ground short circuit of harness of power supply circuit.
5	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to OFF. 2) Install the main relay. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 13 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **6**.	Repair the open circuit of harness between ECM connector and main relay connector.
6	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to ECM. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 6 (+) — Chassis ground (–):*** ***(B137) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Check ignition control system. <Ref. to EN(H4DO HEV)(diag)-85, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and main relay connector • Poor contact of main relay connector • Poor contact of ECM connector

D: IGNITION CONTROL SYSTEM

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, Inspection Mode.>.
WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



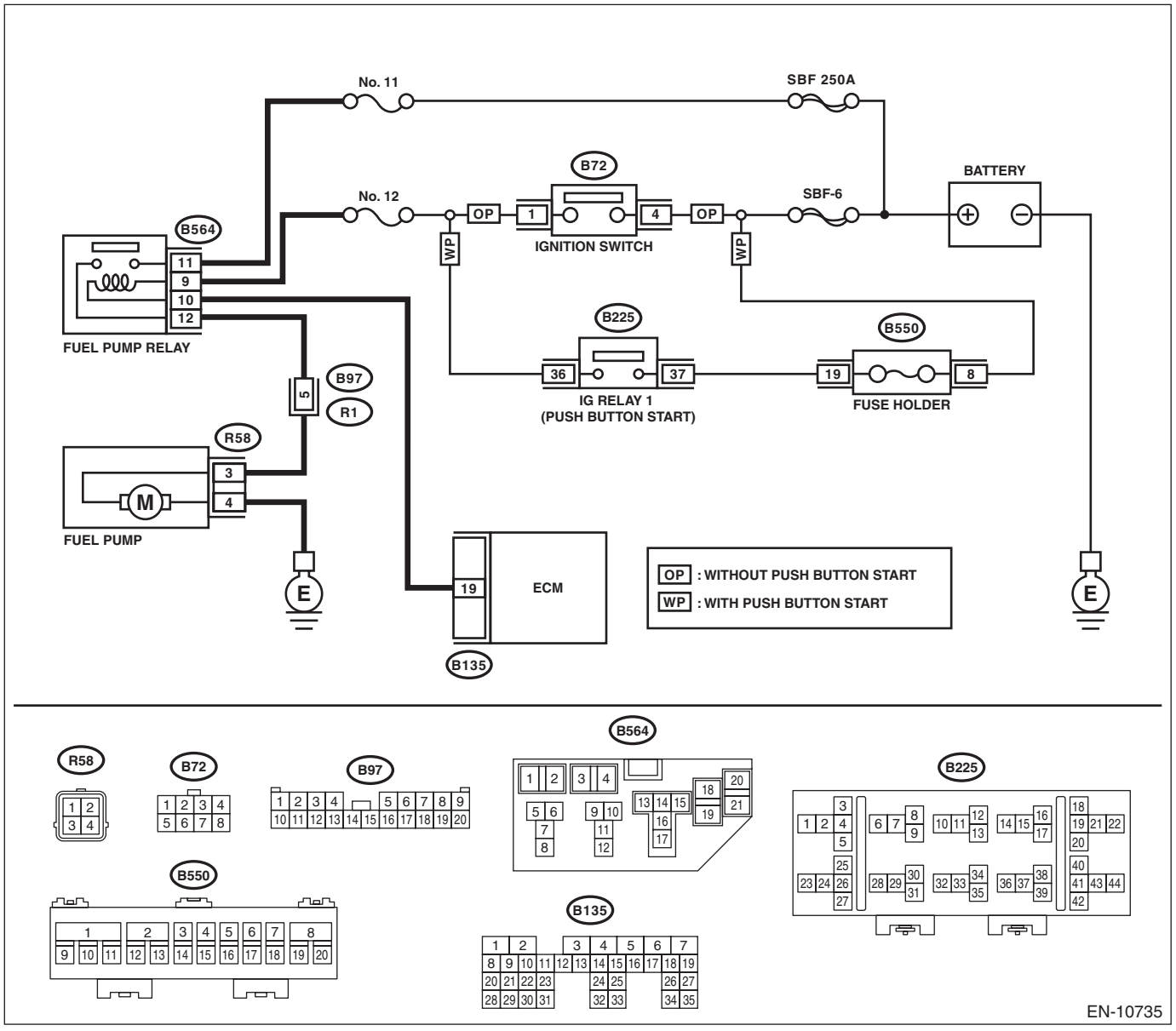
Step		Check	Yes	No
1	**CHECK SPARK PLUG CONDITION.** 1) Remove the spark plug. <Ref. to IG(H4DO(w/o HEV))-4, REMOVAL, Spark Plug.> 2) Check the spark plug condition. <Ref. to IG(H4DO(w/o HEV))-7, INSPECTION, Spark Plug.>	Is the spark plug condition normal?	Go to step **2**.	Replace the spark plug. <Ref. to IG(H4DO(w/o HEV))-4, Spark Plug.>

	Step	Check	Yes	No
2	**CHECK IGNITION SYSTEM FOR SPARKS.** 1) Connect the spark plug to ignition coil. 2) Release the fuel pressure. <Ref. to FU(H4DO(HEV))-98, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.> 3) Contact the spark plug thread portion to engine. 4) While opening the throttle valve fully, crank the engine to check that spark occurs at each cylinder.	Does spark occur at each cylinder?	Check fuel pump system. <Ref. to EN(H4DO HEV)(diag)-87, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **3**.
3	**CHECK IGNITION COIL POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition coil. 3) Turn the ignition switch to ON. 4) Measure the voltage between ignition coil connector and engine ground. ***Connector & terminal*** ***(E31) No. 1 (+) — Engine ground (–):*** ***(E32) No. 1 (+) — Engine ground (–):*** ***(E33) No. 1 (+) — Engine ground (–):*** ***(E34) No. 1 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit or short circuit to ground in harness of power supply circuit • Poor contact of coupling connector • Blown out of fuse
4	**CHECK HARNESS OF IGNITION COIL GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between ignition coil connector and engine ground. ***Connector & terminal*** ***(E31) No. 3 — Engine ground:*** ***(E32) No. 3 — Engine ground:*** ***(E33) No. 3 — Engine ground:*** ***(E34) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5**.	Repair the open circuit in harness between ignition coil connector and engine grounding terminal.
5	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM connector and ignition coil connector. ***Connector & terminal*** ***(B134) No. 21 — (E31) No. 2:*** ***(B134) No. 10 — (E32) No. 2:*** ***(B134) No. 31 — (E33) No. 2:*** ***(B134) No. 8 — (E34) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and the ignition coil connector • Poor contact of coupling connector
6	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR.** Measure the resistance of harness between ECM connector and engine ground. ***Connector & terminal:*** ***(B134) No. 21 — Engine ground:*** ***(B134) No. 10 — Engine ground:*** ***(B134) No. 31 — Engine ground:*** ***(B134) No. 8 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **7**.	Repair the ground short circuit of harness between ECM connector and ignition coil connector.
7	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Replace the ignition coil. <Ref. to IG(H4DO(w/o HEV))-12, Ignition Coil.>

E: FUEL PUMP CIRCUIT

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.
WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



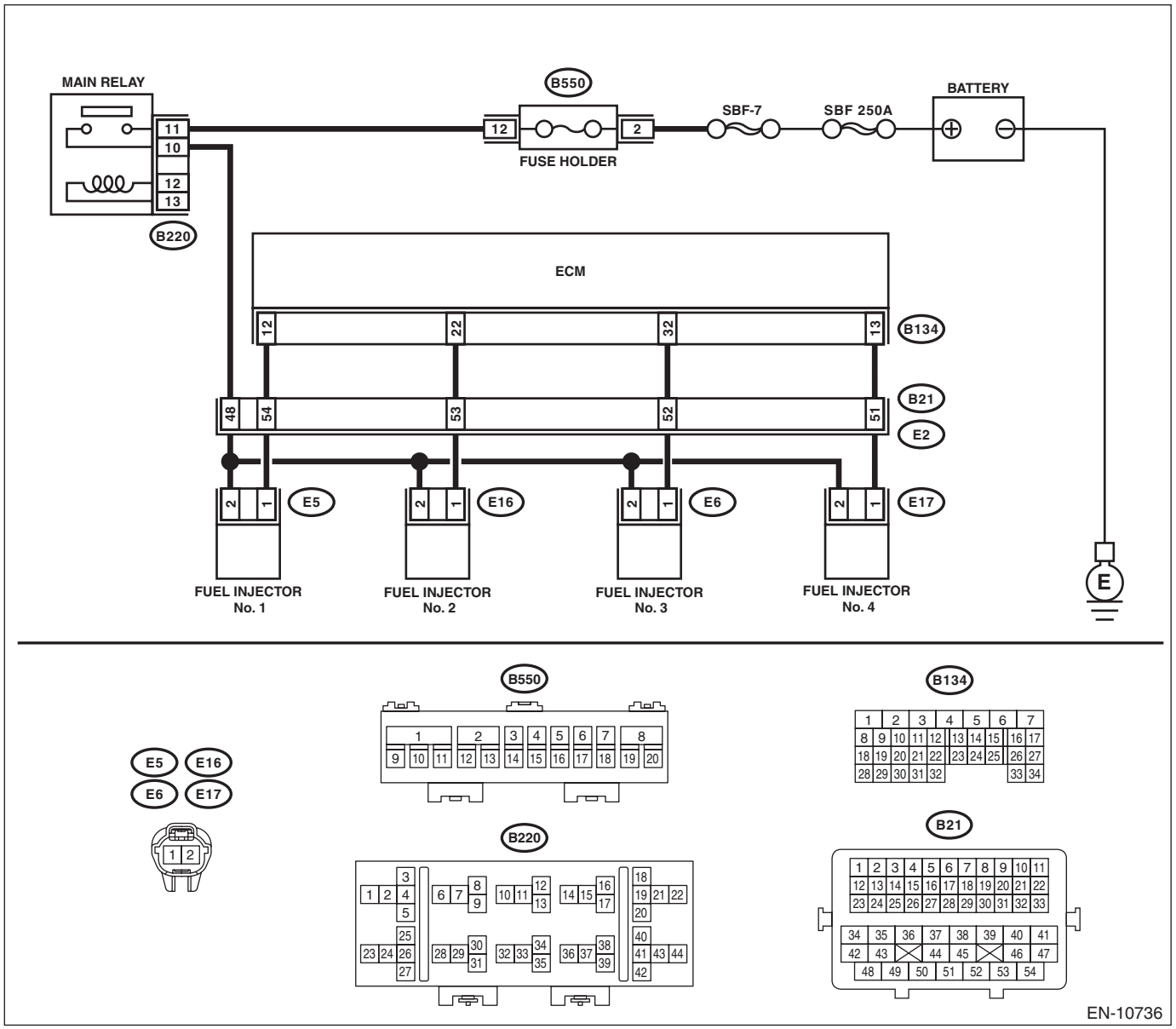
	Step	Check	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** Check if the fuel pump operates for two seconds when turning the ignition switch to ON. NOTE: Fuel pump operation can be executed using the Subaru Select Monitor. For detailed procedures, refer to "System Operation Check Mode". <Ref. to EN(H4DO HEV)(diag)-67, System Operation Check Mode.>	Does the fuel pump emit operating sound?	Check the fuel injector circuit. <Ref. to EN(H4DO HEV)(diag)-90, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **2**.
2	**CHECK GROUND CIRCUIT OF FUEL PUMP.** 1) Turn the ignition switch to OFF. 2) Remove the fuel pump access hole lid. 3) Disconnect the connector from fuel pump. 4) Measure the resistance of harness between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 4 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3**.	Repair the open circuit in harness between fuel pump connector and chassis ground terminal.
3	**CHECK POWER SUPPLY TO FUEL PUMP.** 1) Turn the ignition switch to ON. 2) Measure the voltage of power supply circuit between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 3 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Replace the fuel pump. <Ref. to FU(H4DO(HEV))-122, Fuel Pump.>	Go to step **4**.
4	**CHECK HARNESS BETWEEN FUEL PUMP CONNECTOR AND FUEL PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the fuel pump relay. 3) Measure the resistance of harness between fuel pump connector and fuel pump relay connector. ***Connector & terminal*** ***(R58) No. 3 — (B564) No. 12:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between fuel pump connector and fuel pump relay connector • Poor contact of coupling connector
5	**CHECK HARNESS BETWEEN FUEL PUMP CONNECTOR AND FUEL PUMP RELAY CONNECTOR.** Measure the resistance between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 3 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Repair the short circuit to ground in harness between fuel pump connector and fuel pump relay connector.
6	**CHECK FUEL PUMP RELAY.** 1) Connect the battery to fuel pump relay terminals No. 9 and No. 10. 2) Measure the resistance between fuel pump relay terminals. ***Terminals*** ***No. 11 — No. 12:***	Is the resistance less than 1 Ω?	Go to step **7**.	Replace the fuel pump relay. <Ref. to FU(H4DO(HEV))-96, Fuel Pump Relay.>
7	**CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM connector and fuel pump relay connector. ***Connector & terminal*** ***(B135) No. 19 — (B564) No. 10:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair the open circuit of harness between ECM connector and fuel pump relay connector.

	Step	Check	Yes	No
8	**CHECK POWER SUPPLY OF FUEL PUMP RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel pump relay connector and chassis ground. ***Connector & terminal*** ***(B564) No. 9 (+) — Chassis ground (–):*** ***(B564) No. 11 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the poor contact of ECM connector.	Repair the open or ground short circuit of harness of power supply circuit.

F: FUEL INJECTOR CIRCUIT

CAUTION:
- **Check or repair only faulty parts.**
- **After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.**

WIRING DIAGRAM:
- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



Step		Check	Yes	No
1	**CHECK OPERATION OF EACH FUEL INJECTOR.** While cranking the engine, check each fuel injector emits operating sound. Use a sound scope or attach a screwdriver to the injector to listen to sounds for this check.	Does the fuel injector emit operating sound?	Check the fuel pressure. <Ref. to ME(H4DO(w/o HEV))-35, INSPECTION, Fuel Pressure.>	Go to step **2**.

	Step	Check	Yes	No
2	**CHECK POWER SUPPLY TO EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between fuel injector terminal and engine ground. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between main relay connector and fuel injector connector • Poor contact of main relay connector • Poor contact of coupling connector
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and fuel injector connector. ***Connector & terminal*** ***#1 (B134) No. 12 — (E5) No. 1:*** ***#2 (B134) No. 22 — (E16) No. 1:*** ***#3 (B134) No. 32 — (E6) No. 1:*** ***#4 (B134) No. 13 — (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and fuel injector connector • Poor contact of coupling connector
4	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***#1 (B134) No. 12 — Chassis ground:*** ***#2 (B134) No. 22 — Chassis ground:*** ***#3 (B134) No. 32 — Chassis ground:*** ***#4 (B134) No. 13 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit to ground in harness between ECM connector and fuel injector connector.
5	**CHECK EACH FUEL INJECTOR.** Measure the resistance between each fuel injector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **6**.	Replace the faulty fuel injector. <Ref. to FU(H4DO(HEV))-69, Fuel Injector.>
6	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Inspection using “General Diagnostic Table” <Ref. to EN(H4DO HEV)(diag)-398, INSPECTION, General Diagnostic Table.>

17.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Note
B1570	Antenna	<Ref. to IM(diag)-16, DTC B1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B1571	Reference Code Incompatibility	<Ref. to IM(diag)-18, DTC B1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> <Ref. to KPS(diag)-102, DTC B1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B1572	IMM Circuit Failure (Except Antenna Circuit)	<Ref. to IM(diag)-19, DTC B1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).> <Ref. to KPS(diag)-103, DTC B1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B1574	Key Communication Failure	<Ref. to IM(diag)-22, DTC B1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B1575	Incorrect Immobilizer Key	<Ref. to IM(diag)-22, DTC B1575 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B1576	EGI Control Module EEPROM	<Ref. to IM(diag)-23, DTC B1576 EGI CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> <Ref. to KPS(diag)-107, DTC B1576 EGI CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B1577	IMM Control Module EEPROM	<Ref. to IM(diag)-23, DTC B1577 IMM CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> <Ref. to KPS(diag)-107, DTC B1577 IMM CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B1578	Meter Failure	<Ref. to IM(diag)-24, DTC B1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P000A	A Camshaft Position Slow Response (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-102, DTC P000A A CAMSHAFT POSITION SLOW RESPONSE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P000B	B Camshaft Position Slow Response (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-102, DTC P000B B CAMSHAFT POSITION SLOW RESPONSE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P000C	A Camshaft Position Slow Response (Bank 2)	<Ref. to EN(H4DO HEV)(diag)-102, DTC P000C A CAMSHAFT POSITION SLOW RESPONSE (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P000D	B Camshaft Position Slow Response (Bank 2)	<Ref. to EN(H4DO HEV)(diag)-102, DTC P000D B CAMSHAFT POSITION SLOW RESPONSE (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0010	"A" Camshaft Position Actuator Circuit/Open (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-103, DTC P0010 "A" CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0011	Intake Camshaft Position - Timing Over-Advanced or System Performance (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-105, DTC P0011 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0013	B Camshaft Position Actuator Circuit/Open (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-106, DTC P0013 B CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0014	Exhaust AVCS System 1 (Range/ Performance)	<Ref. to EN(H4DO HEV)(diag)-109, DTC P0014 EXHAUST AVCS SYSTEM 1 (RANGE/PERFORMANCE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0016	Crankshaft Position - Camshaft Position Correlation (Bank1)	<Ref. to EN(H4DO HEV)(diag)-110, DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Note
P0017	Crank and Cam Timing B System Failure (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-112, DTC P0017 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0018	Crankshaft Position - Camshaft Position Correlation (Bank2)	<Ref. to EN(H4DO HEV)(diag)-114, DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0019	Crank and Cam Timing B System Failure (Bank 2)	<Ref. to EN(H4DO HEV)(diag)-116, DTC P0019 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0020	"A" Camshaft Position Actuator Circuit/Open (Bank 2)	<Ref. to EN(H4DO HEV)(diag)-118, DTC P0020 "A" CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0021	Intake Camshaft Position - Timing Over-Advanced or System Performance (Bank 2)	<Ref. to EN(H4DO HEV)(diag)-120, DTC P0021 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0023	B Camshaft Position Actuator Circuit/Open (Bank 2)	<Ref. to EN(H4DO HEV)(diag)-121, DTC P0023 B CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0024	Exhaust AVCS System 2 (Range/Performance)	<Ref. to EN(H4DO HEV)(diag)-124, DTC P0024 EXHAUST AVCS SYSTEM 2 (RANGE/PERFORMANCE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to EN(H4DO HEV)(diag)-125, DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	<Ref. to EN(H4DO HEV)(diag)-127, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	<Ref. to EN(H4DO HEV)(diag)-129, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	<Ref. to EN(H4DO HEV)(diag)-131, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	<Ref. to EN(H4DO HEV)(diag)-133, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0068	MAP/MAF - Throttle Position Correlation	<Ref. to EN(H4DO HEV)(diag)-135, DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0071	Ambient Temperature Sensor Circuit "A" Range/Performance	<Ref. to EN(H4DO HEV)(diag)-136, DTC P0071 AMBIENT TEMPERATURE SENSOR CIRCUIT "A" RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0072	Ambient Temperature Sensor Circuit "A" Low	<Ref. to EN(H4DO HEV)(diag)-138, DTC P0072 AMBIENT TEMPERATURE SENSOR CIRCUIT "A" LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0073	Ambient Temperature Sensor Circuit "A" High	<Ref. to EN(H4DO HEV)(diag)-138, DTC P0073 AMBIENT TEMPERATURE SENSOR CIRCUIT "A" HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0101	Mass or Volume Air Flow Circuit Range/Performance	<Ref. to EN(H4DO HEV)(diag)-139, DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0102	Mass or Volume Air Flow Circuit Low Input	<Ref. to EN(H4DO HEV)(diag)-140, DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0103	Mass or Volume Air Flow Circuit High Input	<Ref. to EN(H4DO HEV)(diag)-142, DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Note
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	<Ref. to EN(H4DO HEV)(diag)-144, DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	<Ref. to EN(H4DO HEV)(diag)-146, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0111	Intake Air Temperature Sensor Range/Performance Problem	<Ref. to EN(H4DO HEV)(diag)-148, DTC P0111 INTAKE AIR TEMPERATURE SENSOR RANGE/PERFORMANCE PROBLEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0112	Intake Air Temperature Sensor 1 Circuit Low	<Ref. to EN(H4DO HEV)(diag)-150, DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0113	Intake Air Temperature Sensor 1 Circuit High	<Ref. to EN(H4DO HEV)(diag)-152, DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance	<Ref. to EN(H4DO HEV)(diag)-154, DTC P0116 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0117	Engine Coolant Temperature Circuit Low	<Ref. to EN(H4DO HEV)(diag)-157, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0118	Engine Coolant Temperature Circuit High	<Ref. to EN(H4DO HEV)(diag)-159, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0122	Throttle/Pedal Position Sensor/Switch “A” Circuit Low	<Ref. to EN(H4DO HEV)(diag)-161, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0123	Throttle/Pedal Position Sensor/Switch “A” Circuit High	<Ref. to EN(H4DO HEV)(diag)-164, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	<Ref. to EN(H4DO HEV)(diag)-167, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0128	Coolant Thermostat (Engine Coolant Temperature Below Thermostat Regulating Temperature)	<Ref. to EN(H4DO HEV)(diag)-168, DTC P0128 COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4DO HEV)(diag)-169, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4DO HEV)(diag)-171, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	<Ref. to EN(H4DO HEV)(diag)-173, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4DO HEV)(diag)-175, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4DO HEV)(diag)-177, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P013A	O2 Sensor Slow Response - Rich to Lean (Bank 1 Sensor 2)	<Ref. to EN(H4DO HEV)(diag)-179, DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P013B	O2 Sensor Slow Response - Lean to Rich (Bank 1 Sensor 2)	<Ref. to EN(H4DO HEV)(diag)-181, DTC P013B O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Note
P013E	O2 Sensor Delayed Response - Rich to Lean (Bank 1 Sensor 2)	<Ref. to EN(H4DO HEV)(diag)-181, DTC P013E O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P013F	O2 Sensor Delayed Response - Lean to Rich (Bank 1 Sensor 2)	<Ref. to EN(H4DO HEV)(diag)-181, DTC P013F O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0141	O2 Sensor Heater Circuit (Bank1 Sensor2)	<Ref. to EN(H4DO HEV)(diag)-181, DTC P0141 O2 SENSOR HEATER CIRCUIT (BANK1 SENSOR2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P014C	O2 Sensor Slow Response - Rich to Lean (Bank 1 Sensor 1)	<Ref. to EN(H4DO HEV)(diag)-182, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P014D	O2 Sensor Slow Response - Lean to Rich (Bank 1 Sensor 1)	<Ref. to EN(H4DO HEV)(diag)-182, DTC P014D O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P015A	O2 Sensor Delayed Response - Rich to Lean (Bank 1 Sensor 1)	<Ref. to EN(H4DO HEV)(diag)-182, DTC P015A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P015B	O2 Sensor Delayed Response - Lean to Rich (Bank 1 Sensor 1)	<Ref. to EN(H4DO HEV)(diag)-182, DTC P015B O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	System Too Lean (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-182, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0172	System Too Rich (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-183, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0196	Engine Oil Temperature Sensor Circuit Range/Performance	<Ref. to EN(H4DO HEV)(diag)-185, DTC P0196 ENGINE OIL TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0197	Engine Oil Temperature Sensor Low	<Ref. to EN(H4DO HEV)(diag)-188, DTC P0197 ENGINE OIL TEMPERATURE SENSOR LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0198	Engine Oil Temperature Sensor High	<Ref. to EN(H4DO HEV)(diag)-190, DTC P0198 ENGINE OIL TEMPERATURE SENSOR HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0201	Injector #1	<Ref. to EN(H4DO HEV)(diag)-192, DTC P0201 INJECTOR #1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0202	Injector #2	<Ref. to EN(H4DO HEV)(diag)-194, DTC P0202 INJECTOR #2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0203	Injector #3	<Ref. to EN(H4DO HEV)(diag)-194, DTC P0203 INJECTOR #3, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0204	Injector #4	<Ref. to EN(H4DO HEV)(diag)-194, DTC P0204 INJECTOR #4, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0222	Throttle/Pedal Position Sensor/ Switch “B” Circuit Low	<Ref. to EN(H4DO HEV)(diag)-195, DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0223	Throttle/Pedal Position Sensor/ Switch “B” Circuit High	<Ref. to EN(H4DO HEV)(diag)-198, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0300	Random/Multiple Cylinder Misfire Detected	<Ref. to EN(H4DO HEV)(diag)-201, DTC P0300 RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 Misfire Detected	<Ref. to EN(H4DO HEV)(diag)-205, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 Misfire Detected	<Ref. to EN(H4DO HEV)(diag)-205, DTC P0302 CYLINDER 2 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 Misfire Detected	<Ref. to EN(H4DO HEV)(diag)-205, DTC P0303 CYLINDER 3 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Note
P0304	Cylinder 4 Misfire Detected	<Ref. to EN(H4DO HEV)(diag)-206, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0327	Knock Sensor 1 Circuit Low (Bank 1 or Single Sensor)	<Ref. to EN(H4DO HEV)(diag)-211, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0328	Knock Sensor 1 Circuit High (Bank 1 or Single Sensor)	<Ref. to EN(H4DO HEV)(diag)-213, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0335	Crankshaft Position Sensor “A” Circuit	<Ref. to EN(H4DO HEV)(diag)-215, DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0336	Crankshaft Position Sensor “A” Circuit Range/Performance	<Ref. to EN(H4DO HEV)(diag)-218, DTC P0336 CRANKSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	<Ref. to EN(H4DO HEV)(diag)-219, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0341	Camshaft Position Sensor "A" Circuit Range/Performance (Bank 1 or Single Sensor)	<Ref. to EN(H4DO HEV)(diag)-221, DTC P0341 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0345	Camshaft Position Sensor “A” Circuit (Bank 2)	<Ref. to EN(H4DO HEV)(diag)-222, DTC P0345 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0346	Camshaft Position Sensor "A" Circuit Range/Performance (Bank 2)	<Ref. to EN(H4DO HEV)(diag)-224, DTC P0346 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0351	Ignition Coil A Primary/Secondary Circuit	<Ref. to EN(H4DO HEV)(diag)-225, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0352	Ignition Coil B Primary/Secondary Circuit	<Ref. to EN(H4DO HEV)(diag)-227, DTC P0352 IGNITION COIL B PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0353	Ignition Coil C Primary/Secondary Circuit	<Ref. to EN(H4DO HEV)(diag)-227, DTC P0353 IGNITION COIL C PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0354	Ignition Coil D Primary/Secondary Circuit	<Ref. to EN(H4DO HEV)(diag)-227, DTC P0354 IGNITION COIL D PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0365	Camshaft Position Sensor “B” Circuit (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-228, DTC P0365 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0366	Camshaft Position Sensor B Circuit Range/Performance (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-230, DTC P0366 CAMSHAFT POSITION SENSOR B CIRCUIT RANGE/PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0390	Camshaft Position Sensor “B” Circuit (Bank 2)	<Ref. to EN(H4DO HEV)(diag)-231, DTC P0390 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0391	Camshaft Position Sensor B Circuit Range/Performance (Bank 2)	<Ref. to EN(H4DO HEV)(diag)-233, DTC P0391 CAMSHAFT POSITION SENSOR B CIRCUIT RANGE/PERFORMANCE (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0400	Exhaust Gas Recirculation Flow	<Ref. to EN(H4DO HEV)(diag)-234, DTC P0400 EXHAUST GAS RECIRCULATION FLOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-235, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Note
P0441	Evaporative Emission Cont. Sys. Incorrect Purge Flow	<Ref. to EN(H4DO HEV)(diag)-240, DTC P0441 EVAPORATIVE EMISSION CONT. SYS. INCORRECT PURGE FLOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0451	Evaporative Emission System Pressure Sensor/Switch Range/Performance	<Ref. to EN(H4DO HEV)(diag)-241, DTC P0451 EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0452	Evaporative Emission System Pressure Sensor/Switch Low	<Ref. to EN(H4DO HEV)(diag)-242, DTC P0452 EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0453	Evaporative Emission System Pressure Sensor/Switch High	<Ref. to EN(H4DO HEV)(diag)-244, DTC P0453 EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0455	Evaporative Emission System Leak Detected (Large Leak)	<Ref. to EN(H4DO HEV)(diag)-246, DTC P0455 EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (LARGE LEAK), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)	<Ref. to EN(H4DO HEV)(diag)-247, DTC P0456 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0458	Evaporative Emission System Purge Control Valve Circuit Low	<Ref. to EN(H4DO HEV)(diag)-248, DTC P0458 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0459	Evaporative Emission System Purge Control Valve Circuit High	<Ref. to EN(H4DO HEV)(diag)-251, DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0461	Fuel Level Sensor “A” Circuit Range/Performance	<Ref. to EN(H4DO HEV)(diag)-253, DTC P0461 FUEL LEVEL SENSOR “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0462	Fuel Level Sensor “A” Circuit Low	<Ref. to EN(H4DO HEV)(diag)-253, DTC P0462 FUEL LEVEL SENSOR “A” CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0463	Fuel Level Sensor “A” Circuit High	<Ref. to EN(H4DO HEV)(diag)-254, DTC P0463 FUEL LEVEL SENSOR “A” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0500	Vehicle Speed Sensor “A”	<Ref. to EN(H4DO HEV)(diag)-254, DTC P0500 VEHICLE SPEED SENSOR “A”, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0506	Idle Air Control System RPM Lower Than Expected	<Ref. to EN(H4DO HEV)(diag)-255, DTC P0506 IDLE AIR CONTROL SYSTEM RPM LOWER THAN EXPECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0507	Idle Air Control System RPM Higher Than Expected	<Ref. to EN(H4DO HEV)(diag)-256, DTC P0507 IDLE AIR CONTROL SYSTEM RPM HIGHER THAN EXPECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P050A	Cold Start Idle Air Control System Performance	<Ref. to EN(H4DO HEV)(diag)-257, DTC P050A COLD START IDLE AIR CONTROL SYSTEM PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P050B	Cold Start Ignition Timing Performance	<Ref. to EN(H4DO HEV)(diag)-265, DTC P050B COLD START IGNITION TIMING PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter Request Circuit	<Ref. to EN(H4DO HEV)(diag)-266, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0560	System Voltage	<Ref. to EN(H4DO HEV)(diag)-269, DTC P0560 SYSTEM VOLTAGE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P059A	Active Grille Shutter "A" Position Sensor Circuit	<Ref. to EN(H4DO HEV)(diag)-272, DTC P059A ACTIVE GRILLE SHUTTER "A" POSITION SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P059F	Active Grille Shutter "A" Performance	<Ref. to EN(H4DO HEV)(diag)-273, DTC P059F ACTIVE GRILLE SHUTTER "A" PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P05A0	Active Grille Shutter "A" Stuck	<Ref. to EN(H4DO HEV)(diag)-275, DTC P05A0 ACTIVE GRILLE SHUTTER "A" STUCK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Note
P05A1	Active Grille Shutter "A" Range Over	<Ref. to EN(H4DO HEV)(diag)-276, DTC P05A1 ACTIVE GRILLE SHUTTER "A" RANGE OVER, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P05A2	Active Grille Shutter "A" Control Circuit	<Ref. to EN(H4DO HEV)(diag)-277, DTC P05A2 ACTIVE GRILLE SHUTTER "A" CONTROL CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P05A6	Active Grille Shutter "A" Supply Voltage Circuit/Open	<Ref. to EN(H4DO HEV)(diag)-278, DTC P05A6 ACTIVE GRILLE SHUTTER "A" SUPPLY VOLTAGE CIRCUIT/OPEN, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P05C0	Active Grille Shutter "A" Over Temperature	<Ref. to EN(H4DO HEV)(diag)-280, DTC P05C0 ACTIVE GRILLE SHUTTER "A" OVER TEMPERATURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal Control Module Random Access Memory (RAM) Error	<Ref. to EN(H4DO HEV)(diag)-281, DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0605	Internal Control Module Read Only Memory (ROM) Error	<Ref. to EN(H4DO HEV)(diag)-281, DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0606	Control Module Processor	<Ref. to EN(H4DO HEV)(diag)-282, DTC P0606 CONTROL MODULE PROCESSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P060A	Internal Control Module Monitoring Processor Performance	<Ref. to EN(H4DO HEV)(diag)-283, DTC P060A INTERNAL CONTROL MODULE MONITORING PROCESSOR PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P060B	Internal Control Module A/D Processing Performance	<Ref. to EN(H4DO HEV)(diag)-283, DTC P060B INTERNAL CONTROL MODULE A/D PROCESSING PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0616	Starter Relay Circuit Low	<Ref. to EN(H4DO HEV)(diag)-284, DTC P0616 STARTER RELAY CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0617	Starter Relay Circuit High	<Ref. to EN(H4DO HEV)(diag)-289, DTC P0617 STARTER RELAY CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P062F	Internal Control Module EEPROM Error	<Ref. to EN(H4DO HEV)(diag)-294, DTC P062F INTERNAL CONTROL MODULE EEPROM ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0685	ECM/PCM Power Relay Control Circuit/Open	<Ref. to EN(H4DO HEV)(diag)-295, DTC P0685 ECM/PCM POWER RELAY CONTROL CIRCUIT/OPEN, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0700	Transmission Control System (MIL Request)	<Ref. to EN(H4DO HEV)(diag)-297, DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P081A	Starter Disable Circuit Low	<Ref. to EN(H4DO HEV)(diag)-298, DTC P081A STARTER DISABLE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0851	Park/Neutral Switch Input Circuit Low (AT Model)	<Ref. to EN(H4DO HEV)(diag)-301, DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW (AT MODEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0852	Park/Neutral Switch Input Circuit High (AT Model)	<Ref. to EN(H4DO HEV)(diag)-303, DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH (AT MODEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0A7B	Battery Energy Control Module Request MIL Illumination	<Ref. to EN(H4DO HEV)(diag)-305, DTC P0A7B BATTERY ENERGY CONTROL MODULE REQUEST MIL ILLUMINATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0AC4	Hybrid Powertrain Control Module Request MIL Illumination	<Ref. to EN(H4DO HEV)(diag)-305, DTC P0AC4 HYBRID POWERTRAIN CONTROL MODULE REQUEST MIL ILLUMINATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0CA1	Drive Motor Control Module Request MIL Illumination	<Ref. to EN(H4DO HEV)(diag)-305, DTC P0CA1 DRIVE MOTOR CONTROL MODULE REQUEST MIL ILLUMINATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Note
P1160	Return Spring Failure	<Ref. to EN(H4DO HEV)(diag)-305, DTC P1160 RETURN SPRING FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1449	Evaporative Emission Cont. Sys. Air Filter Clog	<Ref. to EN(H4DO HEV)(diag)-306, DTC P1449 EVAPORATIVE EMISSION CONT. SYS. AIR FILTER CLOG, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1451	Evaporative Emission Cont. Sys.	<Ref. to EN(H4DO HEV)(diag)-307, DTC P1451 EVAPORATIVE EMISSION CONT. SYS., Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	<Ref. to EN(H4DO HEV)(diag)-308, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1493	EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input)	<Ref. to EN(H4DO HEV)(diag)-308, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	<Ref. to EN(H4DO HEV)(diag)-308, DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	<Ref. to EN(H4DO HEV)(diag)-308, DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1496	EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	<Ref. to EN(H4DO HEV)(diag)-308, DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1497	EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input)	<Ref. to EN(H4DO HEV)(diag)-308, DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1498	EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	<Ref. to EN(H4DO HEV)(diag)-309, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1499	EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input)	<Ref. to EN(H4DO HEV)(diag)-312, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2004	Intake Manifold Runner Control Stuck Open (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-315, DTC P2004 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2005	Intake Manifold Runner Control Stuck Open (Bank 2)	<Ref. to EN(H4DO HEV)(diag)-316, DTC P2005 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2006	Intake Manifold Runner Control Stuck Closed (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-317, DTC P2006 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2007	Intake Manifold Runner Control Stuck Closed (Bank 2)	<Ref. to EN(H4DO HEV)(diag)-318, DTC P2007 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2009	Intake Manifold Runner Control Circuit Low (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-319, DTC P2009 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2012	Intake Manifold Runner Control Circuit Low (Bank 2)	<Ref. to EN(H4DO HEV)(diag)-321, DTC P2012 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-323, DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)	<Ref. to EN(H4DO HEV)(diag)-329, DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

DTC	Item	Note
P2101	Throttle Actuator Control Motor Circuit Range/Performance	<Ref. to EN(H4DO HEV)(diag)-335, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2102	Throttle Actuator Control Motor Circuit Low	<Ref. to EN(H4DO HEV)(diag)-341, DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2103	Throttle Actuator Control Motor Circuit High	<Ref. to EN(H4DO HEV)(diag)-343, DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2109	Throttle/Pedal Position Sensor “A” Minimum Stop Performance	<Ref. to EN(H4DO HEV)(diag)-344, DTC P2109 THROTTLE/PEDAL POSITION SENSOR “A” MINIMUM STOP PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2119	Throttle Actuator Control Throttle Body Range/Performance	<Ref. to EN(H4DO HEV)(diag)-344, DTC P2119 THROTTLE ACTUATOR CONTROL THROTTLE BODY RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2122	Throttle/Pedal Position Sensor/ Switch “D” Circuit Low Input	<Ref. to EN(H4DO HEV)(diag)-345, DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2123	Throttle/Pedal Position Sensor/ Switch “D” Circuit High Input	<Ref. to EN(H4DO HEV)(diag)-347, DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2127	Throttle/Pedal Position Sensor/ Switch “E” Circuit Low Input	<Ref. to EN(H4DO HEV)(diag)-349, DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2128	Throttle/Pedal Position Sensor/ Switch “E” Circuit High Input	<Ref. to EN(H4DO HEV)(diag)-351, DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2135	Throttle/Pedal Position Sensor/ Switch “A”/“B” Voltage Correlation	<Ref. to EN(H4DO HEV)(diag)-353, DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A”/“B” VOLTAGE CORRELATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2138	Throttle/Pedal Position Sensor/ Switch “D”/“E” Voltage Correlation	<Ref. to EN(H4DO HEV)(diag)-356, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D”/“E” VOLTAGE CORRELATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2195	O2 Sensor Signal Biased/Stuck Lean (Bank 1 Sensor 1)	<Ref. to EN(H4DO HEV)(diag)-358, DTC P2195 O2 SENSOR SIGNAL BIASED/ STUCK LEAN (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2196	O2 Sensor Signal Biased/Stuck Rich (Bank 1 Sensor 1)	<Ref. to EN(H4DO HEV)(diag)-360, DTC P2196 O2 SENSOR SIGNAL BIASED/ STUCK RICH (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P219A	Bank 1 Air-Fuel Ratio Imbalance	<Ref. to EN(H4DO HEV)(diag)-362, DTC P219A BANK 1 AIR-FUEL RATIO IMBALANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2270	O2 Sensor Signal Biased/Stuck Lean (Bank 1 Sensor 2)	<Ref. to EN(H4DO HEV)(diag)-372, DTC P2270 O2 SENSOR SIGNAL BIASED/ STUCK LEAN (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2271	O2 Sensor Signal Biased/Stuck Rich (Bank 1 Sensor 2)	<Ref. to EN(H4DO HEV)(diag)-374, DTC P2271 O2 SENSOR SIGNAL BIASED/ STUCK RICH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	<Ref. to EN(H4DO HEV)(diag)-376, DTC P2401 EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	<Ref. to EN(H4DO HEV)(diag)-379, DTC P2402 EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2404	Evaporative Emission System Leak Detection Pump Sense Circuit Range/Performance	<Ref. to EN(H4DO HEV)(diag)-381, DTC P2404 EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP SENSE CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Note
P2419	Evaporative Emission System Switching Valve Control Circuit Low	<Ref. to EN(H4DO HEV)(diag)-385, DTC P2419 EVAPORATIVE EMISSION SYSTEM SWITCHING VALVE CONTROL CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2420	Evaporative Emission System Switching Valve Control Circuit High	<Ref. to EN(H4DO HEV)(diag)-388, DTC P2420 EVAPORATIVE EMISSION SYSTEM SWITCHING VALVE CONTROL CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2530	Ignition Switch Run Position Circuit	<Ref. to EN(H4DO HEV)(diag)-390, DTC P2530 IGNITION SWITCH RUN POSITION CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2610	ECM/PCM Internal Engine Off Timer Performance	<Ref. to EN(H4DO HEV)(diag)-393, DTC P2610 ECM/PCM INTERNAL ENGINE OFF TIMER PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0073	Control Module Communication Bus Off	<Ref. to EN(H4DO HEV)(diag)-393, DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0075	Control Module Communication Bus "PU-CAN" Off	<Ref. to EN(H4DO HEV)(diag)-393, DTC U0075 CONTROL MODULE COMMUNICATION BUS "PU-CAN" OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0101	Lost Communication With TCM	<Ref. to EN(H4DO HEV)(diag)-393, DTC U0101 LOST COMMUNICATION WITH TCM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0122	Lost Communication With Vehicle Dynamics Control Module	<Ref. to EN(H4DO HEV)(diag)-393, DTC U0122 LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	<Ref. to EN(H4DO HEV)(diag)-393, DTC U0155 LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER (IPC) CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0284	Lost Communication With Active Grille Shutter Module "A"	<Ref. to EN(H4DO HEV)(diag)-394, DTC U0284 LOST COMMUNICATION WITH ACTIVE GRILLE SHUTTER MODULE "A", Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0293	Lost Communication With Hybrid Powertrain Control Module	<Ref. to EN(H4DO HEV)(diag)-397, DTC U0293 LOST COMMUNICATION WITH HYBRID POWERTRAIN CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0402	Invalid Data Received From TCM	<Ref. to EN(H4DO HEV)(diag)-397, DTC U0402 INVALID DATA RECEIVED FROM TCM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0416	Invalid Data Received From Vehicle Dynamics Control Module	<Ref. to EN(H4DO HEV)(diag)-397, DTC U0416 INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	<Ref. to EN(H4DO HEV)(diag)-397, DTC U0423 INVALID DATA RECEIVED FROM INSTRUMENT PANEL CLUSTER CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0594	Invalid Data Received From Hybrid Powertrain Control Module	<Ref. to EN(H4DO HEV)(diag)-397, DTC U0594 INVALID DATA RECEIVED FROM HYBRID POWERTRAIN CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1101	Lost Communication With TCM PU-CAN	<Ref. to EN(H4DO HEV)(diag)-397, DTC U1101 LOST COMMUNICATION WITH TCM PU-CAN, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1293	Lost Communication With Hybrid Powertrain Control Module PU-CAN	<Ref. to EN(H4DO HEV)(diag)-397, DTC U1293 LOST COMMUNICATION WITH HYBRID POWERTRAIN CONTROL MODULE PU-CAN, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1402	Invalid Data Received From TCM PU-CAN	<Ref. to EN(H4DO HEV)(diag)-397, DTC U1402 INVALID DATA RECEIVED FROM TCM PU-CAN, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1594	Invalid Data Received From Hybrid Powertrain Control Module PU-CAN	<Ref. to EN(H4DO HEV)(diag)-397, DTC U1594 INVALID DATA RECEIVED FROM HYBRID POWERTRAIN CONTROL MODULE PU-CAN, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

18.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P000A A CAMSHAFT POSITION SLOW RESPONSE (BANK 1)

NOTE:
For the diagnostic procedure, refer to DTC P0011. <Ref. to EN(H4DO HEV)(diag)-105, DTC P0011 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

B: DTC P000B B CAMSHAFT POSITION SLOW RESPONSE (BANK 1)

NOTE:
For the diagnostic procedure, refer to DTC P0014. <Ref. to EN(H4DO HEV)(diag)-109, DTC P0014 EXHAUST AVCS SYSTEM 1 (RANGE/PERFORMANCE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

C: DTC P000C A CAMSHAFT POSITION SLOW RESPONSE (BANK 2)

NOTE:
For the diagnostic procedure, refer to DTC P0021. <Ref. to EN(H4DO HEV)(diag)-120, DTC P0021 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

D: DTC P000D B CAMSHAFT POSITION SLOW RESPONSE (BANK 2)

NOTE:
For the diagnostic procedure, refer to DTC P0024. <Ref. to EN(H4DO HEV)(diag)-124, DTC P0024 EXHAUST AVCS SYSTEM 2 (RANGE/PERFORMANCE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

E: DTC P0010 "A" CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-15, DTC P0010 "A" CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

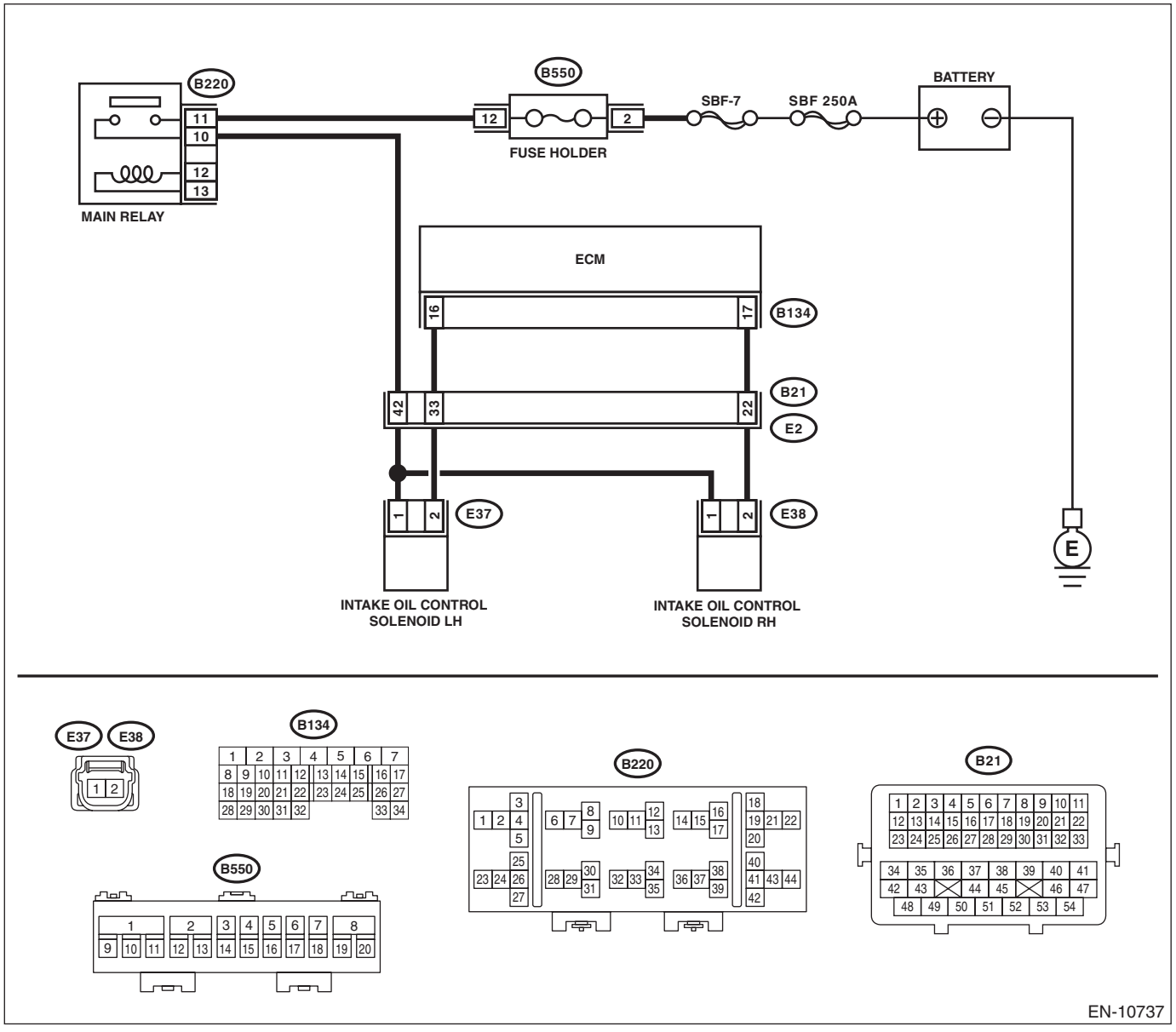
Improper idling

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 17 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Go to step **3**.
2	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
3	**CHECK POWER SUPPLY TO THE INTAKE OIL CONTROL SOLENOID RH.** Measure the voltage between intake oil control solenoid RH connector and engine ground. ***Connector & terminal*** ***(E38) No. 1 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **4**.	Repair the power supply circuit.
4	**CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID RH CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the ECM and intake oil control solenoid RH. 3) Measure the resistance between intake oil control solenoid RH connector and engine ground. ***Connector & terminal*** ***(E38) No. 2 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit to ground in harness between ECM connector and intake oil control solenoid RH connector.
5	**CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID RH CONNECTOR.** Measure the resistance of harness between ECM connector and intake oil control solenoid RH. ***Connector & terminal*** ***(B134) No. 17 — (E38) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and intake oil control solenoid RH connector • Poor contact of coupling connector
6	**CHECK INTAKE OIL CONTROL SOLENOID RH.** Measure the resistance between intake oil control solenoid RH terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact of intake oil control solenoid RH connector.	Replace the intake oil control solenoid RH. <Ref. to FU(H4DO(HEV))-56, Oil Control Solenoid.>

F: DTC P0011 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-16, DTC P0011 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine and let it idle. 2) Read the value of «VVT Adv. Ang. Amount R» using the Subaru Select Monitor. NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	Is the value of «VVT Adv. Ang. Amount R» approx. 0 deg?	Go to step **2**.	Check the following item and repair or replace if necessary. • Intake cam sprocket (clog or dirt of oil routing, setting of spring) • Intake camshaft (dirt, damage of camshaft)
2	**CHECK CURRENT DATA.** 1) Drive with acceleration and deceleration at 80 km/h (50 MPH) or less. NOTE: Drive to an extent that the duty output of oil flow control solenoid valve increases. 2) Read the values of «OCV Duty R» and «VVT Adv. Ang. Amount R» using the Subaru Select Monitor. NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	When the value of «OCV Duty R» increases more than 10%, is the value of «VVT Adv. Ang. Amount R» approx. 0 deg?	Check the following item and repair or replace if necessary. • Intake cam sprocket (clog or dirt of oil routing, setting of spring) • Intake camshaft (dirt, damage of camshaft)	Perform the following procedures, and clean the oil routing. Replace the engine oil and idle the engine for 5 minutes, and then replace the oil filter and engine oil. <Ref. to LU(H4DO(w/o HEV))-13, REPLACEMENT, Engine Oil.> <Ref. to LU(H4DO(w/o HEV))-29, Engine Oil Filter.>

G: DTC P0013 B CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-17, DTC P0013 B CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

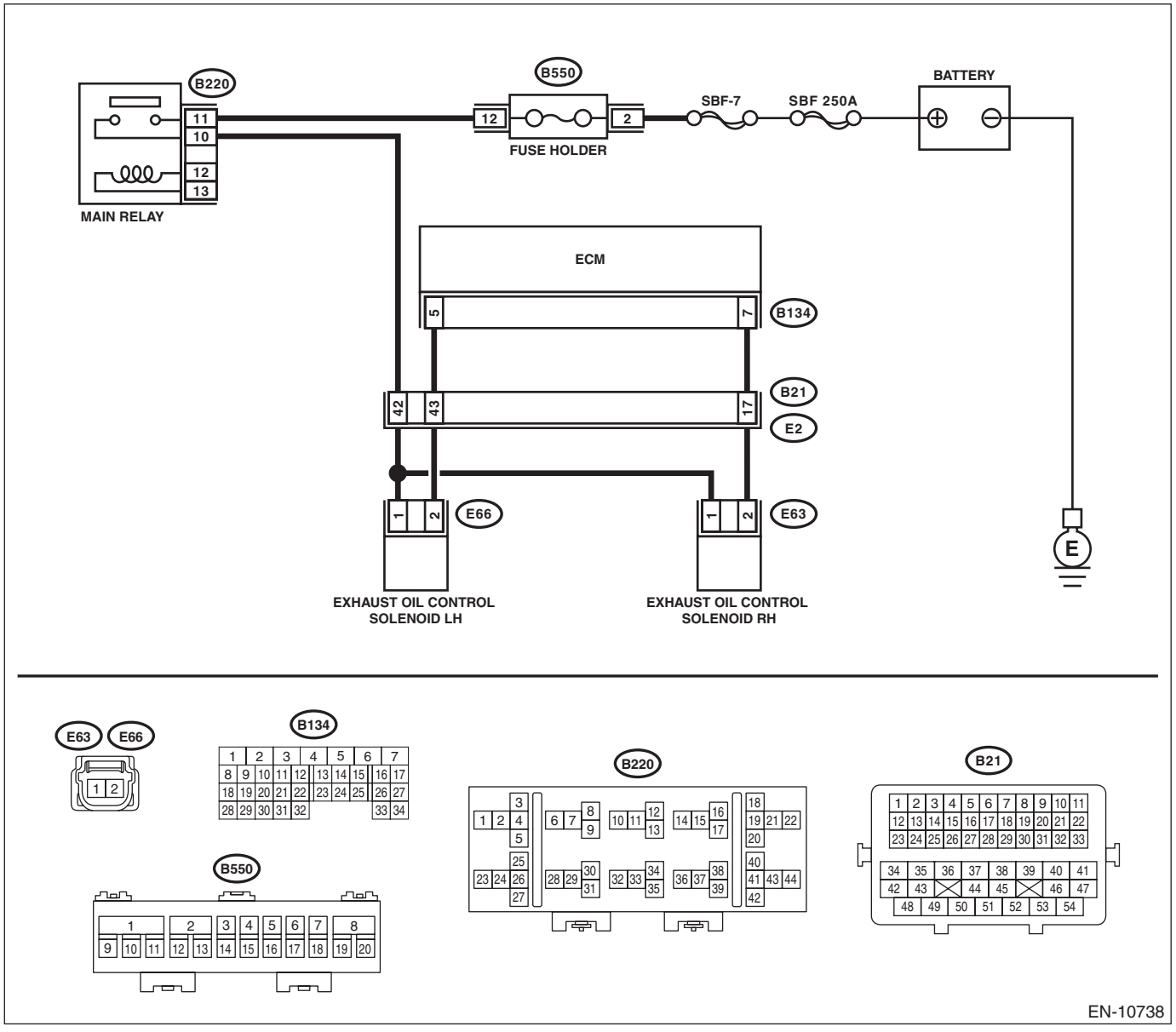
Improper idling

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 7 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Go to step **3**.
2	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
3	**CHECK POWER SUPPLY TO THE EXHAUST OIL CONTROL SOLENOID RH.** Measure the voltage between exhaust oil control solenoid RH connector and engine ground. ***Connector & terminal*** ***(E63) No. 1 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **4**.	Repair the power supply circuit.
4	**CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and exhaust oil control solenoid RH. 3) Measure the resistance between exhaust oil control solenoid RH connector and engine ground. ***Connector & terminal*** ***(E63) No. 2 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit to ground in harness between ECM connector and exhaust oil control solenoid RH connector.
5	**CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH CONNECTOR.** Measure the resistance of harness between ECM connector and exhaust oil control solenoid RH. ***Connector & terminal*** ***(B134) No. 7 — (E63) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and exhaust oil control solenoid RH connector • Poor contact of coupling connector

Step		Check	Yes	No
6	**CHECK EXHAUST OIL CONTROL SOLENOID RH.** Measure the resistance between exhaust oil control solenoid RH terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact of exhaust oil control solenoid RH connector.	Replace the exhaust oil control solenoid RH. <Ref. to FU(H4DO(HEV))-56, Oil Control Solenoid.>

H: DTC P0014 EXHAUST AVCS SYSTEM 1 (RANGE/PERFORMANCE)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-18, DTC P0014 EXHAUST AVCS SYSTEM 1 (RANGE/PERFORMANCE), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine and let it idle. 2) Read the value of «Exh. VVT Retard Ang. R» using the Subaru Select Monitor. NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	Is the value of «Exh. VVT Retard Ang. R» approx. 0 deg?	Go to step **2**.	Check the following item and repair or replace if necessary. • Exhaust cam sprocket (clog or dirt of oil routing, setting of spring) • Exhaust camshaft (dirt, damage of camshaft)
2	**CHECK CURRENT DATA.** 1) Drive with acceleration and deceleration at 80 km/h (50 MPH) or less. NOTE: Drive to an extent that the duty output of oil flow control solenoid valve increases. 2) Read the values of «Exh. OCV Duty R» and «Exh. VVT Retard Ang. R» using the Subaru Select Monitor. NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	When the value of «Exh. OCV Duty R» increases more than 10%, is the value of «Exh. VVT Retard Ang. R» approx. 0 deg?	Check the following item and repair or replace if necessary. • Exhaust cam sprocket (clog or dirt of oil routing, setting of spring) • Exhaust camshaft (dirt, damage of camshaft)	Perform the following procedures, and clean the oil routing. Replace the engine oil and idle the engine for 5 minutes, and then replace the oil filter and engine oil. <Ref. to LU(H4DO(w/o HEV))-13, REPLACEMENT, Engine Oil.> <Ref. to LU(H4DO(w/o HEV))-29, Engine Oil Filter.>

I: DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK1)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-19, DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Are DTCs other than P0016, P0017, P0018 or P0019 displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK INTAKE OIL CONTROL SOLENOID RH.** Check the intake oil control solenoid RH. <Ref. to FU(H4DO(HEV))-58, INSPECTION, Oil Control Solenoid.>	Is intake oil control solenoid RH normal?	Go to step **3**.	Replace the intake oil control solenoid RH. <Ref. to FU(H4DO(HEV))-56, Oil Control Solenoid.>
3	**CHECK INSTALLATION CONDITION OF TIMING CHAIN.** Using ST and by turning the crankshaft, align the alignment marks of crank sprocket, intake cam sprocket and exhaust cam sprocket. <Ref. to ME(H4DO(w/o HEV))-169, Timing Chain Assembly.> ST 18252AA000 CRANKSHAFT SOCKET	Is timing chain installed to the appropriate position?	Go to step **4**.	Correct the installation condition of timing chain. <Ref. to ME(H4DO(w/o HEV))-169, Timing Chain Assembly.>
4	**CHECK CAM CARRIER FILTER.** Check the filter installed to cam carrier. <Ref. to ME(H4DO(w/o HEV))-257, INSPECTION, Cam Carrier.>	Is filter of cam carrier normal?	Replace the intake cam sprocket RH. <Ref. to ME(H4DO(w/o HEV))-191, Cam Sprocket.> After the operation is complete, go to the next step. Go to step **5**.	Replace the filter of cam carrier. <Ref. to ME(H4DO(w/o HEV))-220, Cam Carrier.>

	Step	Check	Yes	No
5	**CHECK CURRENT DATA.** 1) Clear the memory using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.> 2) Start the engine and warm up completely. 3) Using Subaru Select Monitor, read the value of «VVT Initial Position Learning Value #1» and «VVT Adv. Ang. Amount R» when idling condition is stable for 30 seconds or more. NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> 4) Calculate the read value according to the following formula. At this time, ignore the unit. |«VVT Initial Position Learning Value #1» – (60 + «VVT Adv. Ang. Amount R»)|	Is the calculation result less than 10?	Go to step **6**.	Replace the ECM. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>
6	**CHECK DTC.** 1) Clear the memory using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.> 2) Perform drive cycle N. <Ref. to EN(H4DO HEV)(diag)-64, DRIVE CYCLE N, PROCEDURE, Drive Cycle.>	Is the same DTC as current diagnosis displayed?	Replace the ECM. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>	End.

J: DTC P0017 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 1)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-20, DTC P0017 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Are DTCs other than P0016, P0017, P0018 or P0019 displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK EXHAUST OIL CONTROL SOLENOID RH.** Check the exhaust oil control solenoid RH. <Ref. to FU(H4DO(HEV))-58, INSPECTION, Oil Control Solenoid.>	Is exhaust oil control solenoid RH normal?	Go to step **3**.	Replace the exhaust oil control solenoid RH. <Ref. to FU(H4DO(HEV))-56, Oil Control Solenoid.>
3	**CHECK INSTALLATION CONDITION OF TIMING CHAIN.** Using ST and by turning the crankshaft, align the alignment marks of crank sprocket, intake cam sprocket and exhaust cam sprocket. <Ref. to ME(H4DO(w/o HEV))-169, Timing Chain Assembly.> ST 18252AA000 CRANKSHAFT SOCKET	Is timing chain installed to the appropriate position?	Go to step **4**.	Correct the installation condition of timing chain. <Ref. to ME(H4DO(w/o HEV))-169, Timing Chain Assembly.>
4	**CHECK CAM CARRIER FILTER.** Check the filter installed to cam carrier. <Ref. to ME(H4DO(w/o HEV))-257, INSPECTION, Cam Carrier.>	Is filter of cam carrier normal?	Replace the exhaust cam sprocket RH. <Ref. to ME(H4DO(w/o HEV))-191, Cam Sprocket.> After the operation is complete, go to the next step. Go to step **5**.	Replace the filter of cam carrier. <Ref. to ME(H4DO(w/o HEV))-220, Cam Carrier.>

	Step	Check	Yes	No
5	**CHECK CURRENT DATA.** 1) Clear the memory using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.> 2) Start the engine and warm up completely. 3) Using Subaru Select Monitor, read the value of «VVT Ex Initial Position Learning Value #1» and «Exh. VVT Retard Ang. R» when idling condition is stable for 30 seconds or more. NOTE: For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> 4) Calculate the read value according to the following formula. At this time, ignore the unit. |«VVT Ex Initial Position Learning Value #1» – (90 – «Exh. VVT Retard Ang. R»)|	Is the calculation result less than 10?	Go to step **6**.	Replace the ECM. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>
6	**CHECK DTC.** 1) Clear the memory using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.> 2) Perform drive cycle N. <Ref. to EN(H4DO HEV)(diag)-64, DRIVE CYCLE N, PROCEDURE, Drive Cycle.>	Is the same DTC as current diagnosis displayed?	Replace the ECM. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>	End.

K: DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK2)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-21, DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Are DTCs other than P0016, P0017, P0018 or P0019 displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK INTAKE OIL CONTROL SOLENOID LH.** Check the intake oil control solenoid LH. <Ref. to FU(H4DO(HEV))-58, INSPECTION, Oil Control Solenoid.>	Is intake oil control solenoid LH normal?	Go to step **3**.	Replace the intake oil control solenoid LH. <Ref. to FU(H4DO(HEV))-56, Oil Control Solenoid.>
3	**CHECK INSTALLATION CONDITION OF TIMING CHAIN.** Using ST and by turning the crankshaft, align the alignment marks of crank sprocket, intake cam sprocket and exhaust cam sprocket. <Ref. to ME(H4DO(w/o HEV))-169, Timing Chain Assembly.> ST 18252AA000 CRANKSHAFT SOCKET	Is timing chain installed to the appropriate position?	Go to step **4**.	Correct the installation condition of timing chain. <Ref. to ME(H4DO(w/o HEV))-169, Timing Chain Assembly.>
4	**CHECK CAM CARRIER FILTER.** Check the filter installed to cam carrier. <Ref. to ME(H4DO(w/o HEV))-257, INSPECTION, Cam Carrier.>	Is filter of cam carrier normal?	Replace the intake cam sprocket LH. <Ref. to ME(H4DO(w/o HEV))-191, Cam Sprocket.> After the operation is complete, go to the next step. Go to step **5**.	Replace the filter of cam carrier. <Ref. to ME(H4DO(w/o HEV))-220, Cam Carrier.>

	Step	Check	Yes	No
5	**CHECK CURRENT DATA.** 1) Clear the memory using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.> 2) Start the engine and warm up completely. 3) Using Subaru Select Monitor, read the value of «VVT Initial Position Learning Value #2» and «VVT Adv. Ang. Amount L» when idling condition is stable for 30 seconds or more. NOTE: For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> 4) Calculate the read value according to the following formula. At this time, ignore the unit. |«VVT Initial Position Learning Value #2» – (60 + «VVT Adv. Ang. Amount L»)|	Is the calculation result less than 10?	Go to step **6**.	Replace the ECM. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>
6	**CHECK DTC.** 1) Clear the memory using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.> 2) Perform drive cycle N. <Ref. to EN(H4DO HEV)(diag)-64, DRIVE CYCLE N, PROCEDURE, Drive Cycle.>	Is the same DTC as current diagnosis displayed?	Replace the ECM. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>	End.

L: DTC P0019 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 2)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-21, DTC P0019 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Are DTCs other than P0016, P0017, P0018 or P0019 displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK EXHAUST OIL CONTROL SOLENOID LH.** Check the exhaust oil control solenoid LH. <Ref. to FU(H4DO(HEV))-58, INSPECTION, Oil Control Solenoid.>	Is exhaust oil control solenoid LH normal?	Go to step **3**.	Replace the exhaust oil control solenoid LH. <Ref. to FU(H4DO(HEV))-56, Oil Control Solenoid.>
3	**CHECK INSTALLATION CONDITION OF TIMING CHAIN.** Using ST and by turning the crankshaft, align the alignment marks of crank sprocket, intake cam sprocket and exhaust cam sprocket. <Ref. to ME(H4DO(w/o HEV))-169, Timing Chain Assembly.> ST 18252AA000 CRANKSHAFT SOCKET	Is timing chain installed to the appropriate position?	Go to step **4**.	Correct the installation condition of timing chain. <Ref. to ME(H4DO(w/o HEV))-169, Timing Chain Assembly.>
4	**CHECK CAM CARRIER FILTER.** Check the filter installed to cam carrier. <Ref. to ME(H4DO(w/o HEV))-257, INSPECTION, Cam Carrier.>	Is filter of cam carrier normal?	Replace the exhaust cam sprocket LH. <Ref. to ME(H4DO(w/o HEV))-191, Cam Sprocket.> After the operation is complete, go to the next step. Go to step **5**.	Replace the filter of cam carrier. <Ref. to ME(H4DO(w/o HEV))-220, Cam Carrier.>

	Step	Check	Yes	No
5	**CHECK CURRENT DATA.** 1) Clear the memory using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.> 2) Start the engine and warm up completely. 3) Using Subaru Select Monitor, read the value of «VVT Ex Initial Position Learning Value #2» and «Exh. VVT Retard Ang. L» when idling condition is stable for 30 seconds or more. NOTE: For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> 4) Calculate the read value according to the following formula. At this time, ignore the unit. |«VVT Ex Initial Position Learning Value #2» – (90 – «Exh. VVT Retard Ang. L»)|	Is the calculation result less than 10?	Go to step **6**.	Replace the ECM. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>
6	**CHECK DTC.** 1) Clear the memory using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.> 2) Perform drive cycle N. <Ref. to EN(H4DO HEV)(diag)-64, DRIVE CYCLE N, PROCEDURE, Drive Cycle.>	Is the same DTC as current diagnosis displayed?	Replace the ECM. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>	End.

M: DTC P0020 "A" CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 2)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-21, DTC P0020 "A" CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

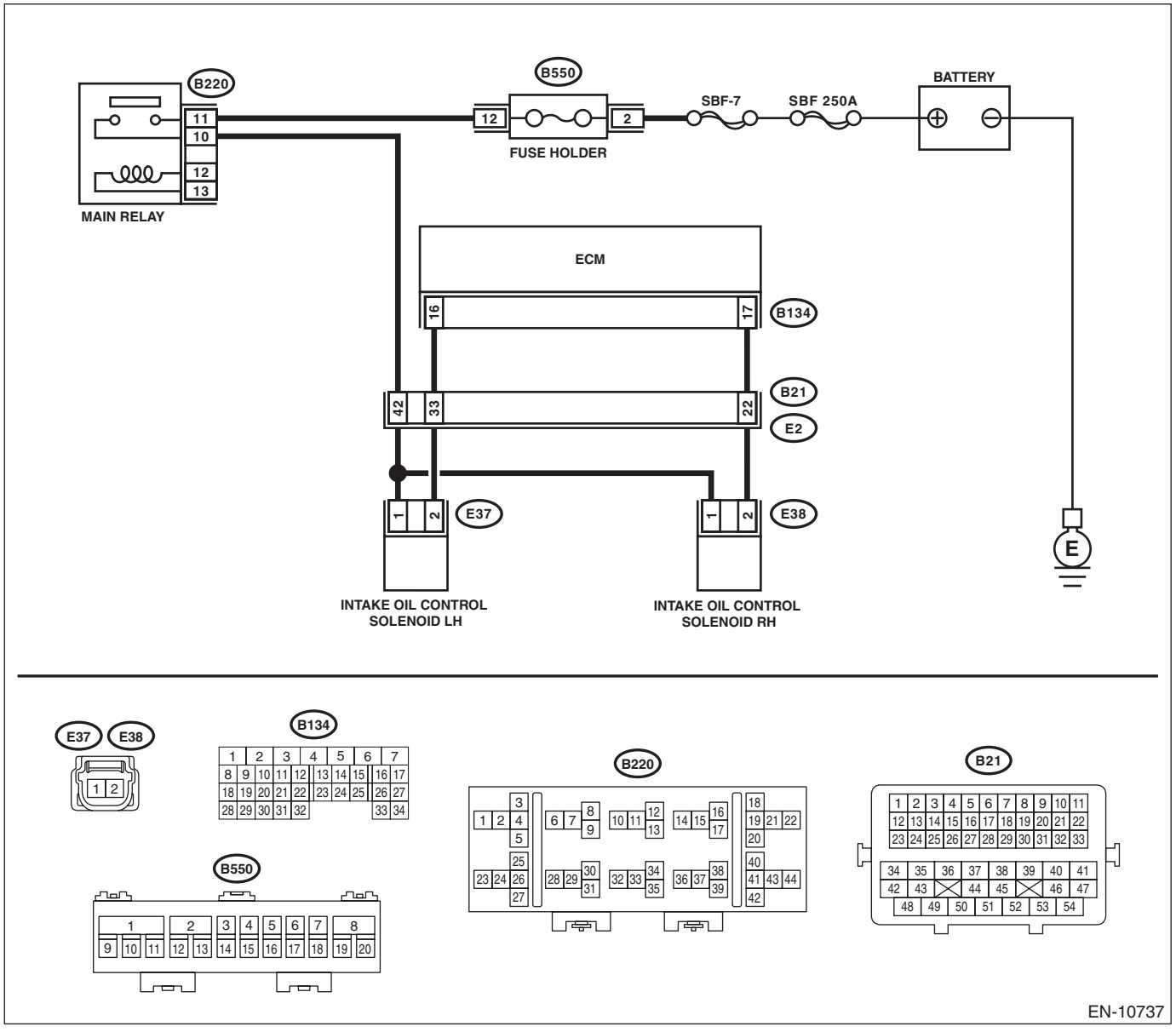
Improper idling

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 16 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Go to step **3**.
2	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
3	**CHECK POWER SUPPLY TO THE INTAKE OIL CONTROL SOLENOID LH.** Measure the voltage between intake oil control solenoid LH connector and engine ground. ***Connector & terminal*** ***(E37) No. 1 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **4**.	Repair the power supply circuit.
4	**CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID LH CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and intake oil control solenoid LH. 3) Measure the resistance between intake oil control solenoid LH connector and engine ground. ***Connector & terminal*** ***(E37) No. 2 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit to ground in harness between ECM connector and intake oil control solenoid LH connector.
5	**CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID LH CONNECTOR.** Measure the resistance of harness between ECM connector and intake oil control solenoid LH. ***Connector & terminal*** ***(B134) No. 16 — (E37) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and intake oil control solenoid LH connector • Poor contact of coupling connector
6	**CHECK INTAKE OIL CONTROL SOLENOID LH.** Measure the resistance between intake oil control solenoid LH terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact of intake oil control solenoid LH connector.	Replace the intake oil control solenoid LH. <Ref. to FU(H4DO(HEV))-56, Oil Control Solenoid.>

N: DTC P0021 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 2)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-21, DTC P0021 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine and let it idle. 2) Read the value of «VVT Adv. Ang. Amount L» using the Subaru Select Monitor. NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	Is the value of «VVT Adv. Ang. Amount L» approx. 0 deg?	Go to step **2**.	Check the following item and repair or replace if necessary. • Intake cam sprocket (clog or dirt of oil routing, setting of spring) • Intake camshaft (dirt, damage of camshaft)
2	**CHECK CURRENT DATA.** 1) Drive with acceleration and deceleration at 80 km/h (50 MPH) or less. NOTE: Drive to an extent that the duty output of oil flow control solenoid valve increases. 2) Read the values of «OCV Duty L» and «VVT Adv. Ang. Amount L» using the Subaru Select Monitor. NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	When the value of «OCV Duty L» increases more than 10%, is the value of «VVT Adv. Ang. Amount L» approx. 0 deg?	Check the following item and repair or replace if necessary. • Intake cam sprocket (clog or dirt of oil routing, setting of spring) • Intake camshaft (dirt, damage of camshaft)	Perform the following procedures, and clean the oil routing. Replace the engine oil and idle the engine for 5 minutes, and then replace the oil filter and engine oil. <Ref. to LU(H4DO(w/o HEV))-13, REPLACEMENT, Engine Oil.> <Ref. to LU(H4DO(w/o HEV))-29, Engine Oil Filter.>

O: DTC P0023 B CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 2)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-21, DTC P0023 B CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

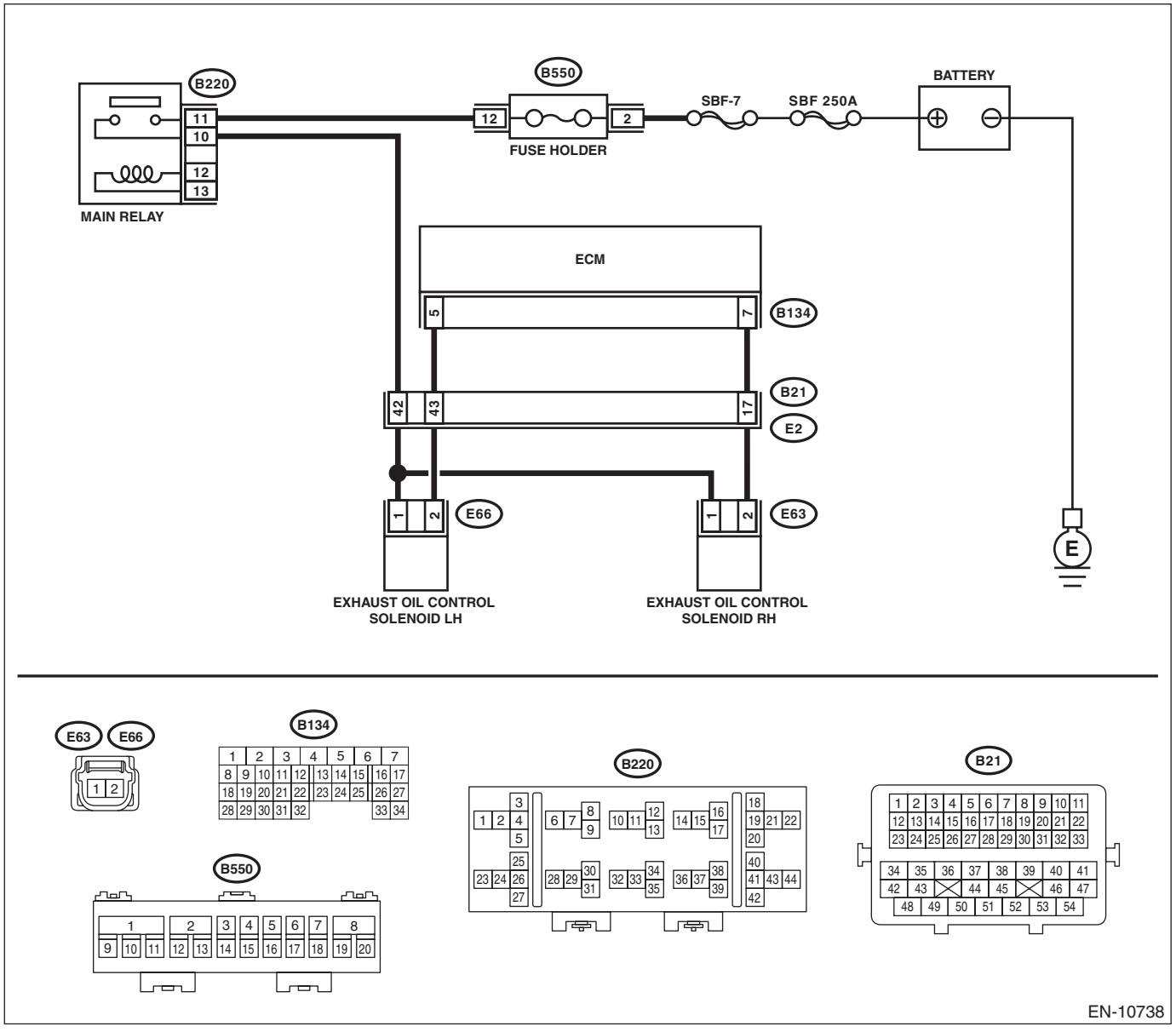
Improper idling

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 5 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Go to step **3**.
2	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
3	**CHECK POWER SUPPLY TO THE EXHAUST OIL CONTROL SOLENOID LH.** Measure the voltage between exhaust oil control solenoid LH connector and engine ground. ***Connector & terminal*** ***(E66) No. 1 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **4**.	Repair the power supply circuit.
4	**CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and exhaust oil control solenoid LH. 3) Measure the resistance between exhaust oil control solenoid LH connector and engine ground. ***Connector & terminal*** ***(E66) No. 2 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit to ground in harness between ECM connector and exhaust oil control solenoid LH connector.
5	**CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR.** Measure the resistance of harness between ECM connector and exhaust oil control solenoid LH. ***Connector & terminal*** ***(B134) No. 5 — (E66) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and exhaust oil control solenoid LH connector • Poor contact of coupling connector

	Step	Check	Yes	No
6	**CHECK EXHAUST OIL CONTROL SOLENOID LH.** Measure the resistance between exhaust oil control solenoid LH terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact of exhaust oil control solenoid LH connector.	Replace the exhaust oil control solenoid LH. <Ref. to FU(H4DO(HEV))-56, Oil Control Solenoid.>

P: DTC P0024 EXHAUST AVCS SYSTEM 2 (RANGE/PERFORMANCE)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-21, DTC P0024 EXHAUST AVCS SYSTEM 2 (RANGE/PERFORMANCE), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine and let it idle. 2) Read the value of «Exh. VVT Retard Ang. L» using the Subaru Select Monitor. NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	Is the value of «Exh. VVT Retard Ang. L» approx. 0 deg?	Go to step **2**.	Check the following item and repair or replace if necessary. • Exhaust cam sprocket (clog or dirt of oil routing, setting of spring) • Exhaust camshaft (dirt, damage of camshaft)
2	**CHECK CURRENT DATA.** 1) Drive with acceleration and deceleration at 80 km/h (50 MPH) or less. NOTE: Drive to an extent that the duty output of oil flow control solenoid valve increases. 2) Read the values of «Exh. OCV Duty L» and «Exh. VVT Retard Ang. L» using the Subaru Select Monitor. NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	When the value of «Exh. OCV Duty L» increases more than 10%, is the value of «Exh. VVT Retard Ang. L» approx. 0 deg?	Check the following item and repair or replace if necessary. • Exhaust cam sprocket (clog or dirt of oil routing, setting of spring) • Exhaust camshaft (dirt, damage of camshaft)	Perform the following procedures, and clean the oil routing. Replace the engine oil and idle the engine for 5 minutes, and then replace the oil filter and engine oil. <Ref. to LU(H4DO(w/o HEV))-13, REPLACEMENT, Engine Oil.> <Ref. to LU(H4DO(w/o HEV))-29, Engine Oil Filter.>

Q: DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

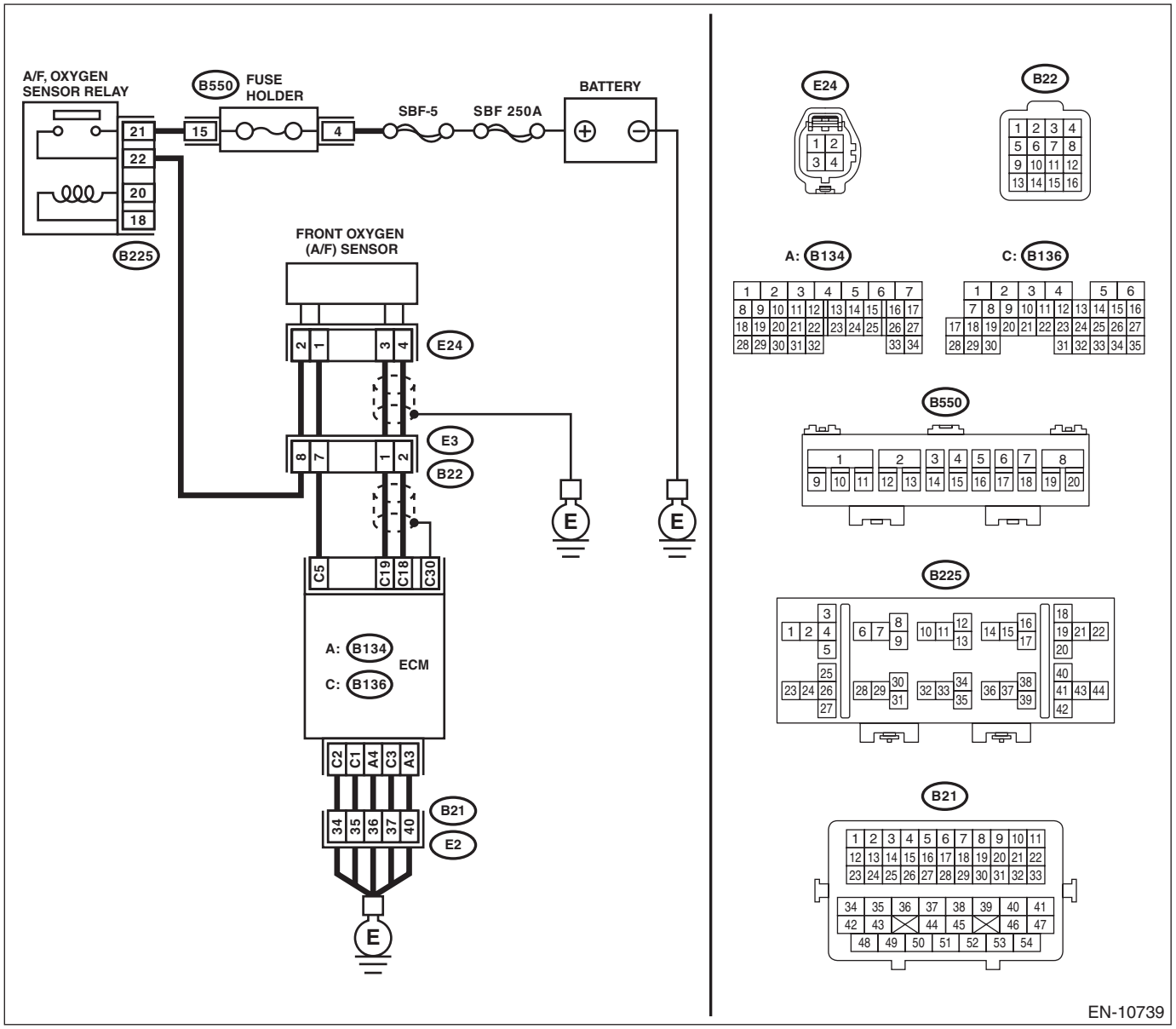
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-22, DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Start and warm up the engine. 2) Turn the ignition switch to OFF. 3) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 4) Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B136) No. 5 — (E24) No. 1:*** ***(B136) No. 19 — (E24) No. 3:*** ***(B136) No. 18 — (E24) No. 4:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and front oxygen (A/F) sensor connector • Poor contact of coupling connector
2	**CHECK FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between front oxygen (A/F) sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1.8 — 2.2 Ω?	Go to step **3**.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DO(HEV))-78, Front Oxygen (A/F) Sensor.>
3	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM and front oxygen (A/F) sensor connector.	Is there poor contact of ECM or front oxygen (A/F) sensor connector?	Repair the poor contact of ECM or front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DO(HEV))-78, Front Oxygen (A/F) Sensor.>

R: DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

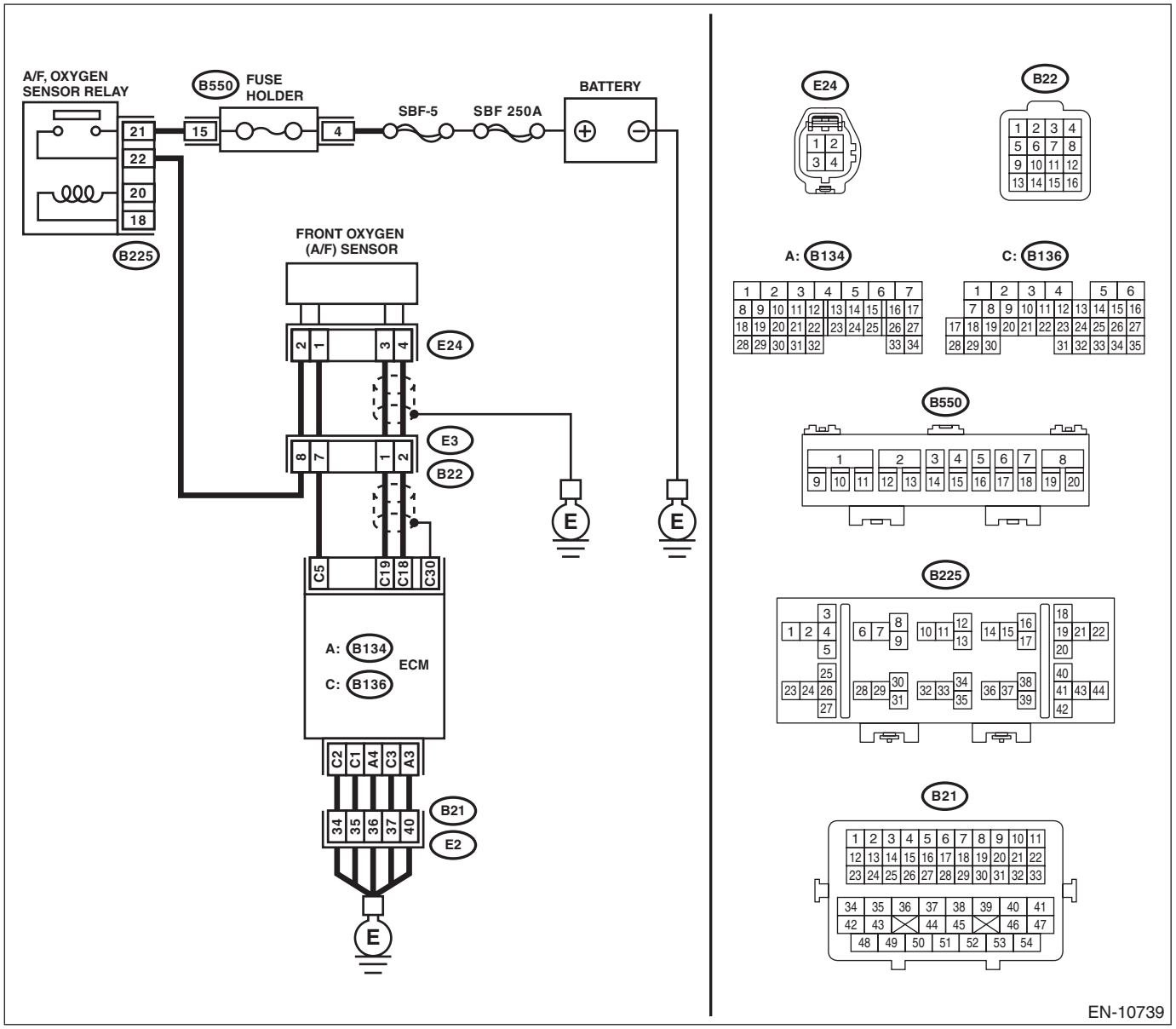
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-23, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from front oxygen (A/F) sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between front oxygen (A/F) sensor connector and engine ground. ***Connector & terminal*** ***(E24) No. 2 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Repair the power supply line. NOTE: In this case, repair the following item: • Open circuit in harness between A/F, oxygen sensor relay connector and front oxygen (A/F) sensor connector • Poor contact of A/F, oxygen sensor relay connector • Poor contact of coupling connector • Malfunction of A/F, oxygen sensor relay
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B136) No. 5 — (E24) No. 1:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and front oxygen (A/F) sensor connector • Poor contact of coupling connector
3	**CHECK GROUND CIRCUIT FOR ECM.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 3 — Chassis ground:*** ***(B134) No. 4 — Chassis ground:*** ***(B136) No. 1 — Chassis ground:*** ***(B136) No. 2 — Chassis ground:*** ***(B136) No. 3 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and engine ground • Poor contact of coupling connector
4	**CHECK FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between front oxygen (A/F) sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1.8 — 2.2 Ω?	Repair the poor contact of ECM connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DO(HEV))-78, Front Oxygen (A/F) Sensor.>

S: DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

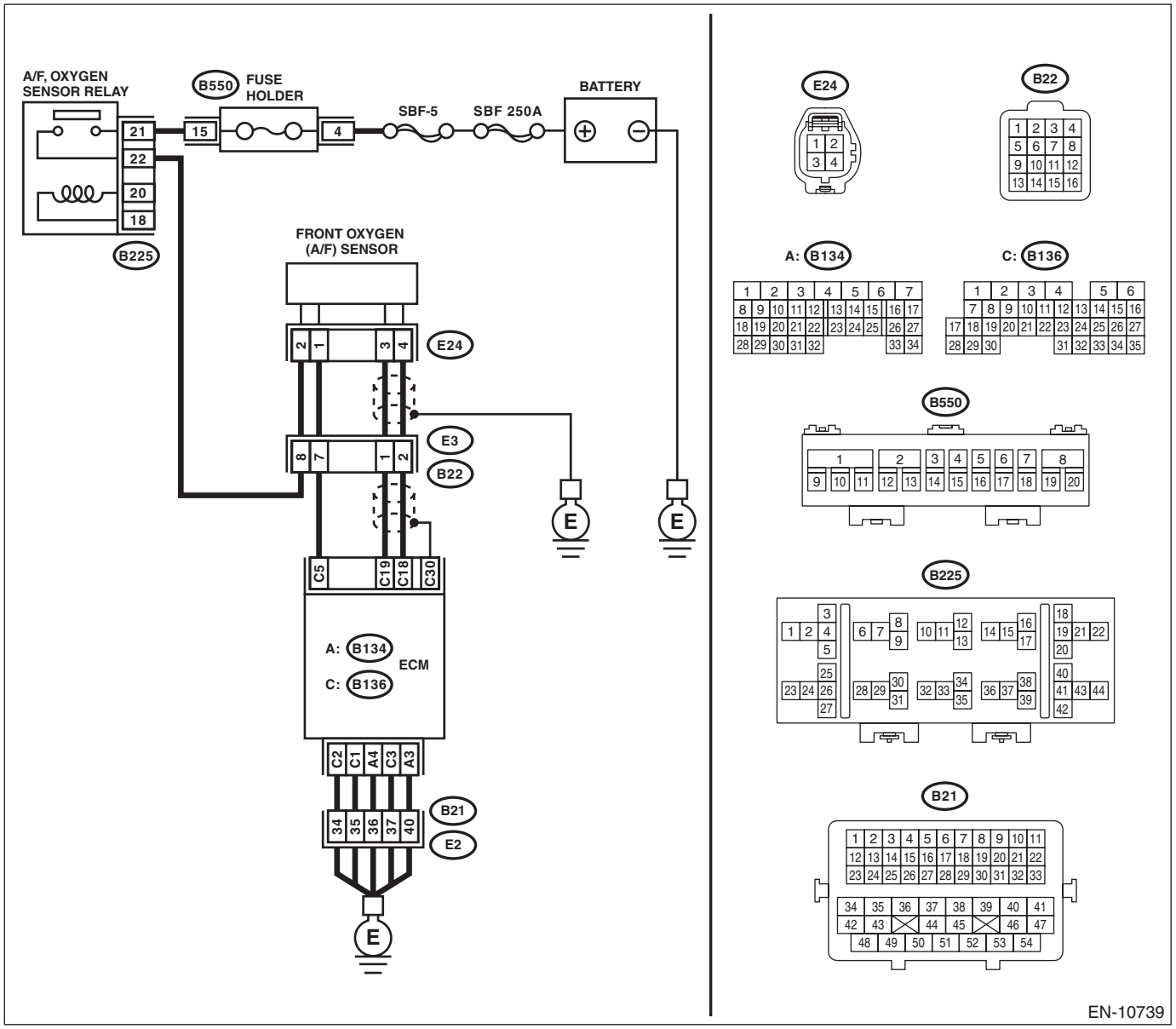
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-24, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 5 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector.	Go to step **2**.
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 3 — Chassis ground:*** ***(B134) No. 4 — Chassis ground:*** ***(B136) No. 1 — Chassis ground:*** ***(B136) No. 2 — Chassis ground:*** ***(B136) No. 3 — Chassis ground:***	Is the resistance less than 5 Ω?	Repair the poor contact of ECM connector.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and engine ground • Poor contact of coupling connector

T: DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2)

DTC DETECTING CONDITION:

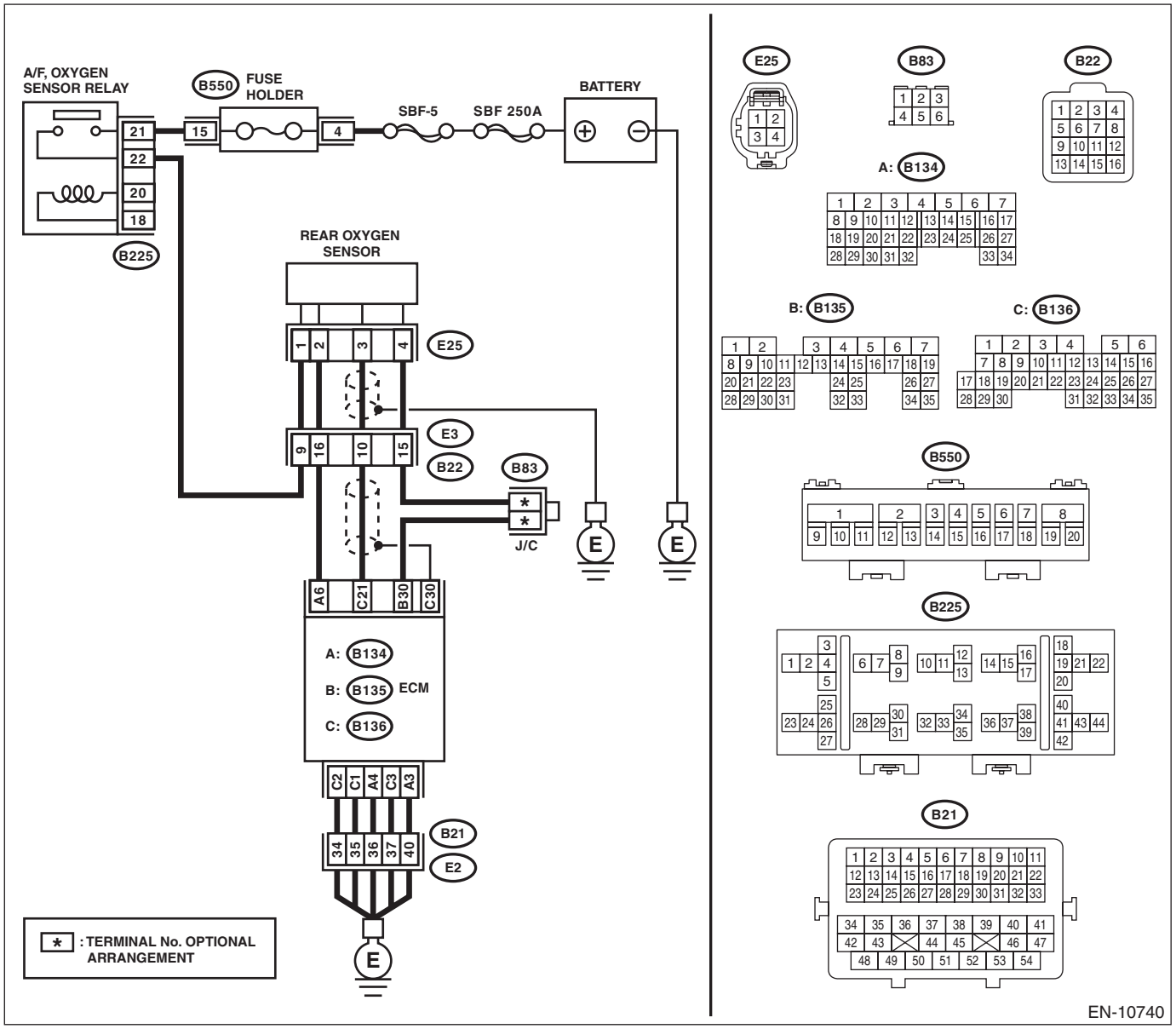
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-25, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor connector and engine ground. ***Connector & terminal*** ***(E25) No. 1 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Repair the power supply line. Or replace the main relay. NOTE: In this case, repair the following item: • Open circuit in harness between A/F, oxygen sensor relay connector and rear oxygen sensor connector • Poor contact of A/F, oxygen sensor relay connector • Poor contact of coupling connector • Malfunction of A/F, oxygen sensor relay
2	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and oxygen sensor connector. ***Connector & terminal*** ***(B134) No. 6 — (E25) No. 2:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and rear oxygen sensor connector • Poor contact of coupling connector
3	**CHECK GROUND CIRCUIT FOR ECM.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 3 — Chassis ground:*** ***(B134) No. 4 — Chassis ground:*** ***(B136) No. 1 — Chassis ground:*** ***(B136) No. 2 — Chassis ground:*** ***(B136) No. 3 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and engine ground • Poor contact of coupling connector
4	**CHECK REAR OXYGEN SENSOR.** Measure the resistance between rear oxygen sensor terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance 5 — 6.4 Ω?	Repair the poor contact of ECM connector.	Replace the rear oxygen sensor. <Ref. to FU(H4DO(HEV))-82, Rear Oxygen Sensor.>

U: DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2)

DTC DETECTING CONDITION:

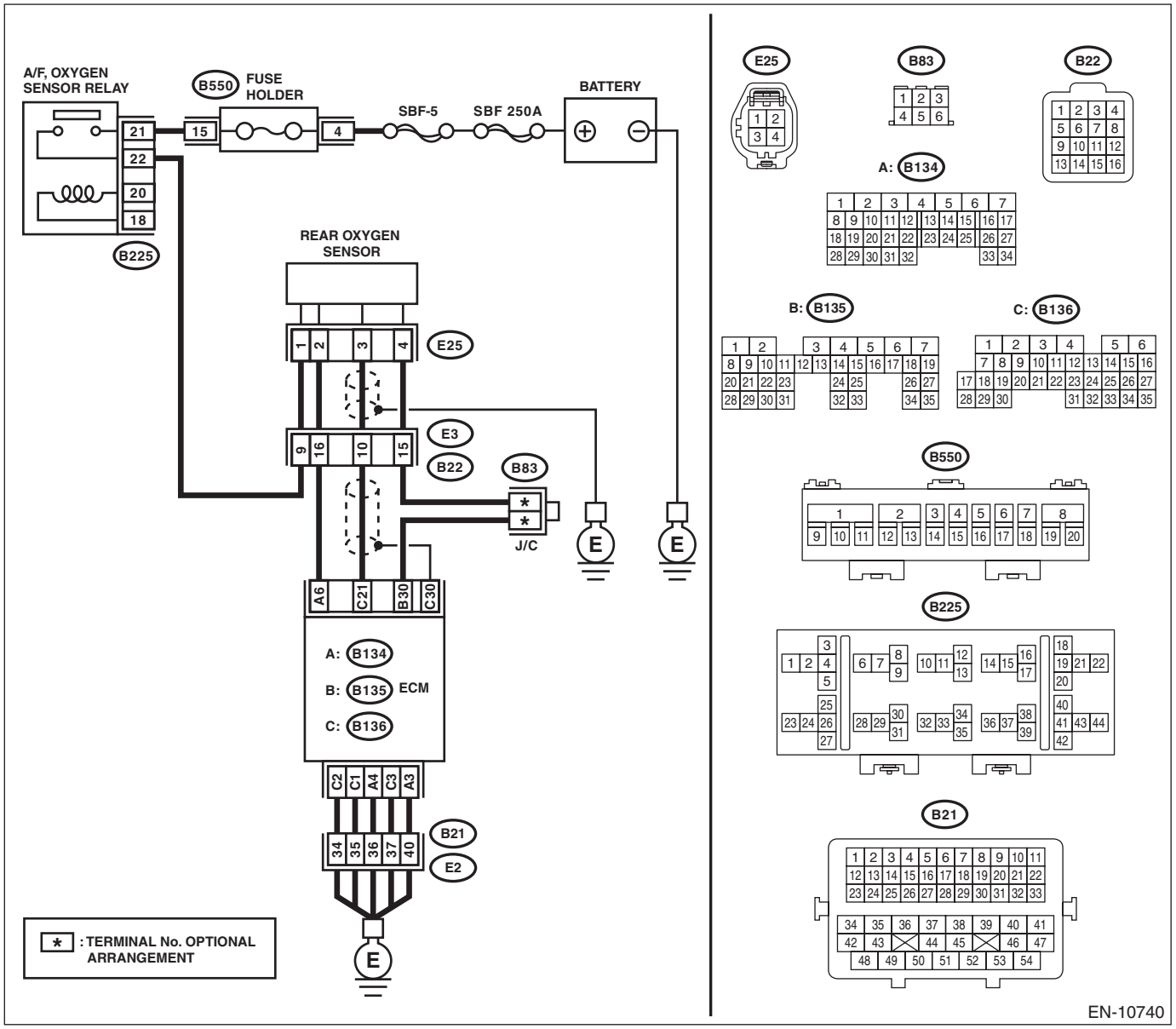
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-26, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 6 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power in the harness between ECM connector and rear oxygen sensor connector.	Go to step **2**.
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 3 — Chassis ground:*** ***(B134) No. 4 — Chassis ground:*** ***(B136) No. 1 — Chassis ground:*** ***(B136) No. 2 — Chassis ground:*** ***(B136) No. 3 — Chassis ground:***	Is the resistance less than 5 Ω?	Repair the poor contact of ECM connector.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and engine ground • Poor contact of coupling connector

V: DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-27, DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step **2**.
2	**CHECK MANIFOLD ABSOLUTE PRESSURE SENSOR.** 1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F). 2) Place the select lever in “P” range or “N” range. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Read the value of «Mani. Absolute Pressure» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the “General Scan Tool Instruction Manual”.	Is the value in «Mani. Absolute Pressure» 73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg) when the ignition is turned ON, and 20.0 — 46.7 kPa (150 — 350 mmHg, 5.91 — 13.78 inHg) during idling?	Go to step **3**.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4DO(HEV))-66, Manifold Absolute Pressure Sensor.>
3	**CHECK THROTTLE OPENING ANGLE.** Using the Subaru Select Monitor or a general scan tool, read the value in «Throttle Opening Angle». NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the “General Scan Tool Instruction Manual”.	Is the value in «Throttle Opening Angle» with the throttle fully closed less than 5%?	Go to step **4**.	Replace the electronic throttle control. <Ref. to FU(H4DO(HEV))-14, Throttle Body.>
4	**CHECK THROTTLE OPENING ANGLE.**	Is the value in «Throttle Opening Angle» with the throttle fully open 85% or more?	Replace the manifold absolute pressure sensor. <Ref. to FU(H4DO(HEV))-66, Manifold Absolute Pressure Sensor.>	Replace the electronic throttle control. <Ref. to FU(H4DO(HEV))-14, Throttle Body.>

W: DTC P0071 AMBIENT TEMPERATURE SENSOR CIRCUIT "A" RANGE/PERFORMANCE

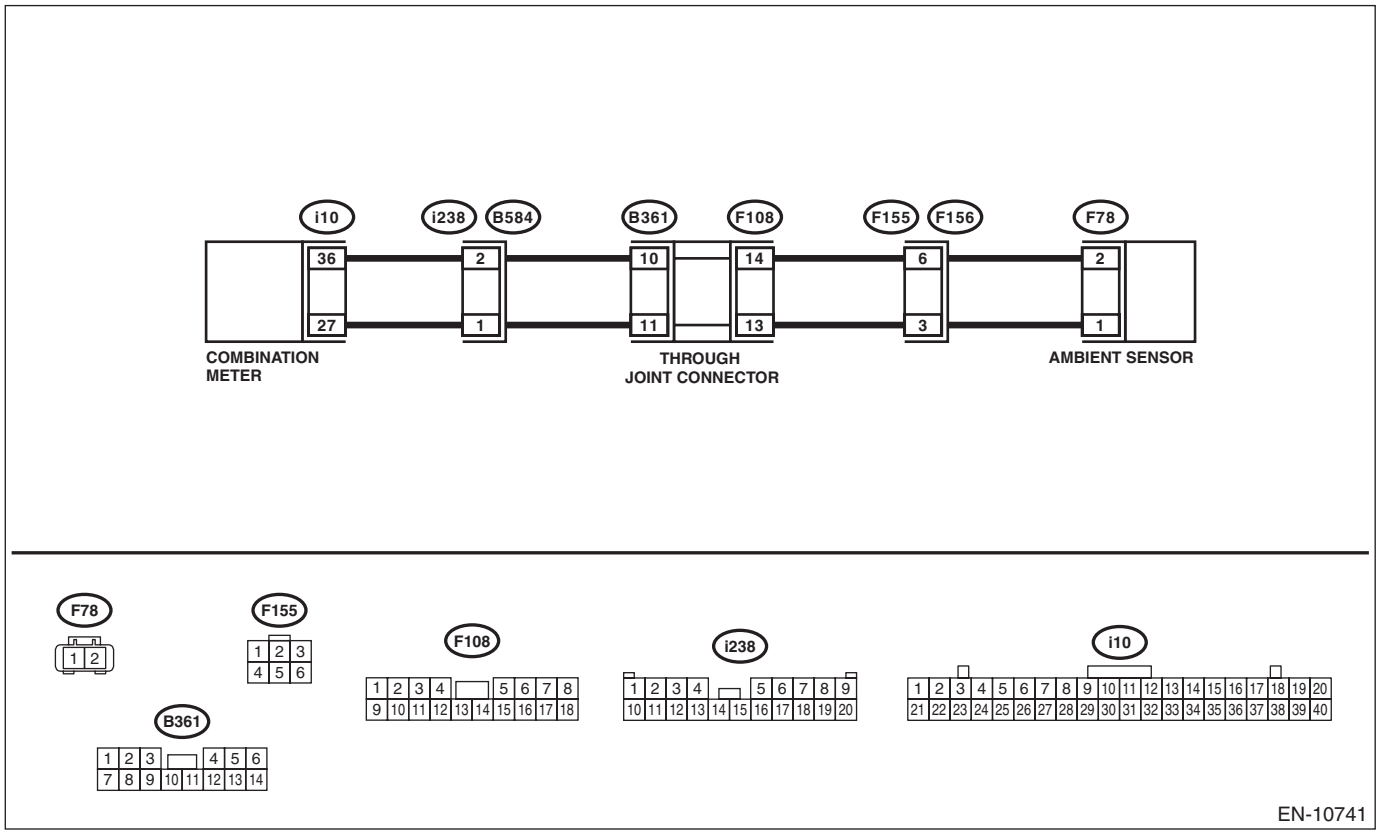
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-29, DTC P0071 AMBIENT TEMPERATURE SENSOR CIRCUIT "A" RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

Air conditioning system <Ref. to WI(HEV)-56, WIRING DIAGRAM, Air Conditioning System.>



Step	Check	Yes	No
1 **CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.

	Step	Check	Yes	No
2	**CHECK AMBIENT SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ambient sensor. 3) Measure the resistance between ambient sensor terminals while heating and cooling the ambient sensor using a hair drier. **CAUTION:** **Do not heat the part to the temperature where you cannot touch it with your bare hand in order to prevent burning yourself and protect the part.** ***Terminals*** ***No. 1 — No. 2:***	Is the resistance of ambient sensor different between during heating and during cooling?	Repair the poor contact of ECM connector.	Replace the ambient sensor. <Ref. to AC-77, Ambient Sensor.>

X: DTC P0072 AMBIENT TEMPERATURE SENSOR CIRCUIT "A" LOW

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-31, DTC P0072 AMBIENT TEMPERATURE SENSOR CIRCUIT "A" LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK DTC.** Check for DTC. <Ref. to EN(H4DO HEV)(diag)-51, Read Diagnostic Trouble Code (DTC).>	Is DTC P0072 or P0073 displayed in «Present fault»?	Go to step **2**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
2	**CHECK COMBINATION METER.** Check the combination meter system. <Ref. to IDI(diag)-2, Basic Diagnostic Procedure.>	Is combination meter system OK?	Replace the ambient sensor. <Ref. to AC-77, Ambient Sensor.>	Repair the combination meter system. <Ref. to IDI(diag)-2, Basic Diagnostic Procedure.>

Y: DTC P0073 AMBIENT TEMPERATURE SENSOR CIRCUIT "A" HIGH

NOTE:
For the diagnostic procedure, refer to DTC P0072. <Ref. to EN(H4DO HEV)(diag)-138, DTC P0072 AMBIENT TEMPERATURE SENSOR CIRCUIT "A" LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Z: DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-33, DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Improper idling
- Engine stalls.
- Poor driving performance

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

Step		Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>

AA:DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-35, DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

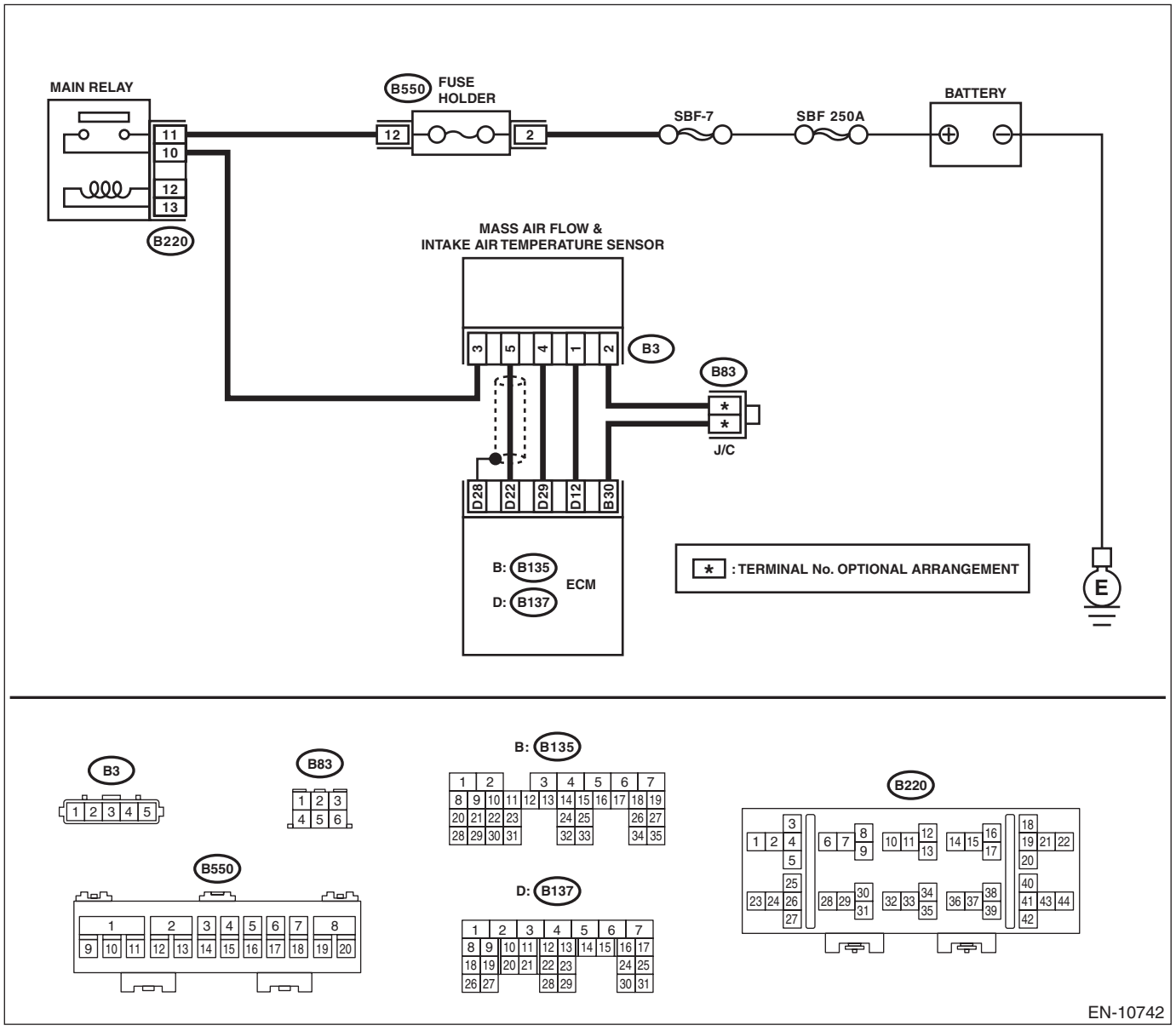
- Improper idling
- Engine stalls.
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the value of «Air Flow Sensor Voltage» using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	Is the value of «Air Flow Sensor Voltage» less than 0.2 V?	Go to step **2**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
2	**CHECK POWER SUPPLY OF MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the mass air flow and intake air temperature sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 3 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between main relay and mass air flow and intake air temperature sensor connector • Poor contact of main relay connector
3	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and the mass air flow and intake air temperature sensor connector. ***Connector & terminal*** ***(B137) No. 22 — (B3) No. 5:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between ECM connector and the mass air flow and intake air temperature sensor connector.
4	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 22 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the ground short circuit of harness between ECM connector and the mass air flow and intake air temperature sensor connector.
5	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM and mass air flow and intake air temperature sensor connector.	Is there poor contact of ECM or mass air flow and intake air temperature sensor connector?	Repair the poor contact of ECM or mass air flow and intake air temperature sensor connector.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>

AB:DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-36, DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

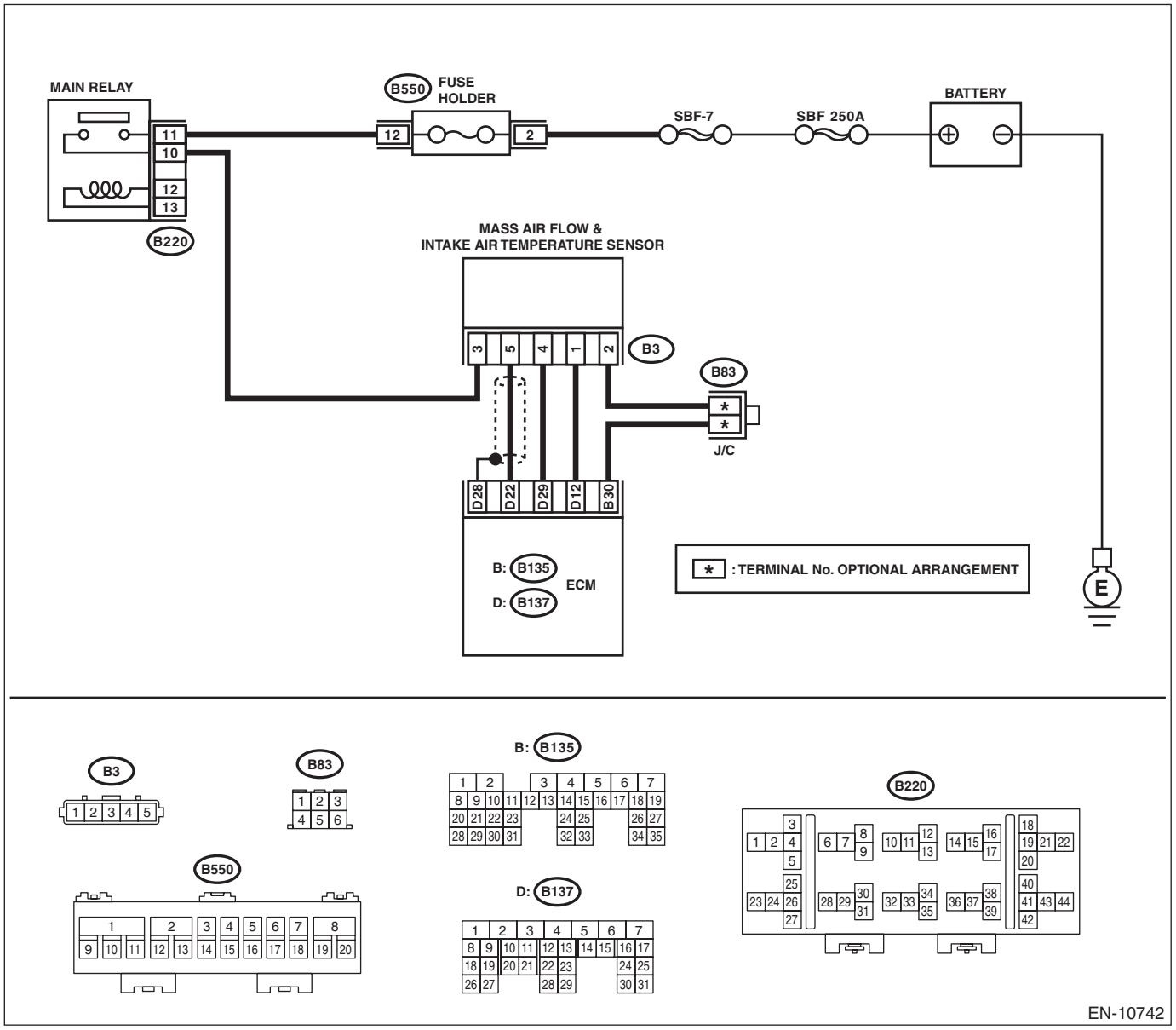
TROUBLE SYMPTOM:

- Improper idling
- Engine stalls.
- Poor driving performance

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the value of «Air Flow Sensor Voltage» using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	Is the value of «Air Flow Sensor Voltage» 5 V or more?	Go to step **2**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
2	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the mass air flow and intake air temperature sensor. 3) Start the engine. 4) Read the value of «Air Flow Sensor Voltage» using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	Is the value of «Air Flow Sensor Voltage» 5 V or more?	Repair the short circuit of harness to power supply between ECM connector and the mass air flow and intake air temperature sensor connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and the mass air flow and intake air temperature sensor connector • Poor contact of ECM connector
4	**CHECK FOR POOR CONTACT.** Check for poor contact of mass air flow and intake air temperature sensor connector.	Is there poor contact of mass air flow and intake air temperature sensor connector?	Repair the poor contact of mass air flow and intake air temperature sensor connector.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>

AC:DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

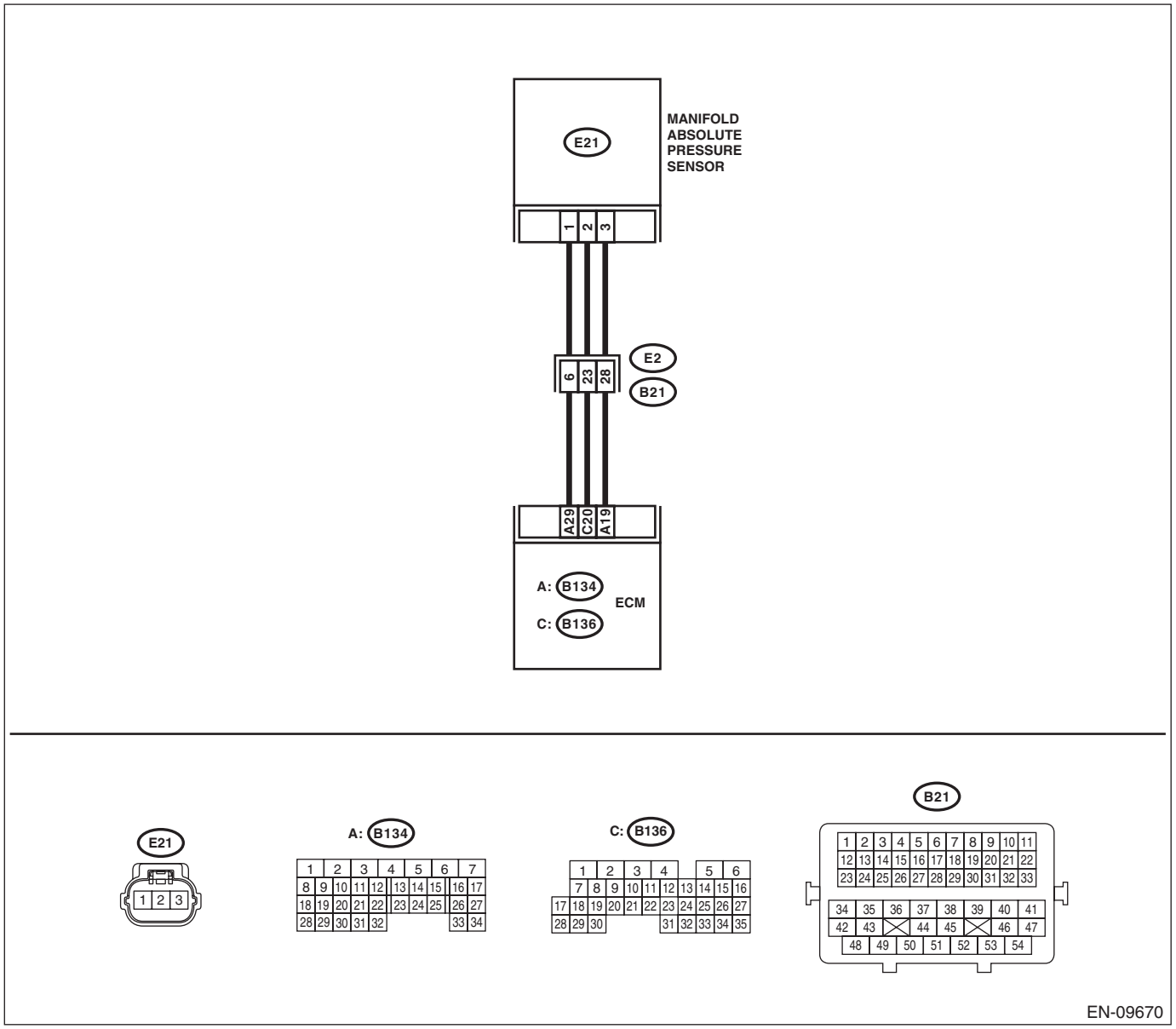
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-37, DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



EN-09670

	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the value of «Mani. Absolute Pressure» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the "General Scan Tool Instruction Manual".	Is the value of «Mani. Absolute Pressure» less than 13.3 kPa (100 mmHg, 3.94 inHg)?	Go to step **2**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
2	**CHECK POWER SUPPLY OF MANIFOLD ABSOLUTE PRESSURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (–):***	Is the voltage 4.5 V or more?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and manifold absolute pressure sensor connector • Poor contact of ECM connector • Poor contact of coupling connector
3	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 20 — (E21) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and manifold absolute pressure sensor connector • Poor contact of coupling connector
4	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 20 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair short circuit to ground in harness between ECM connector and manifold absolute pressure sensor connector.
5	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM and manifold absolute pressure sensor connector.	Is there poor contact of ECM or manifold absolute pressure sensor connector?	Repair the poor contact of ECM or manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4DO(HEV))-66, Manifold Absolute Pressure Sensor.>

AD:DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

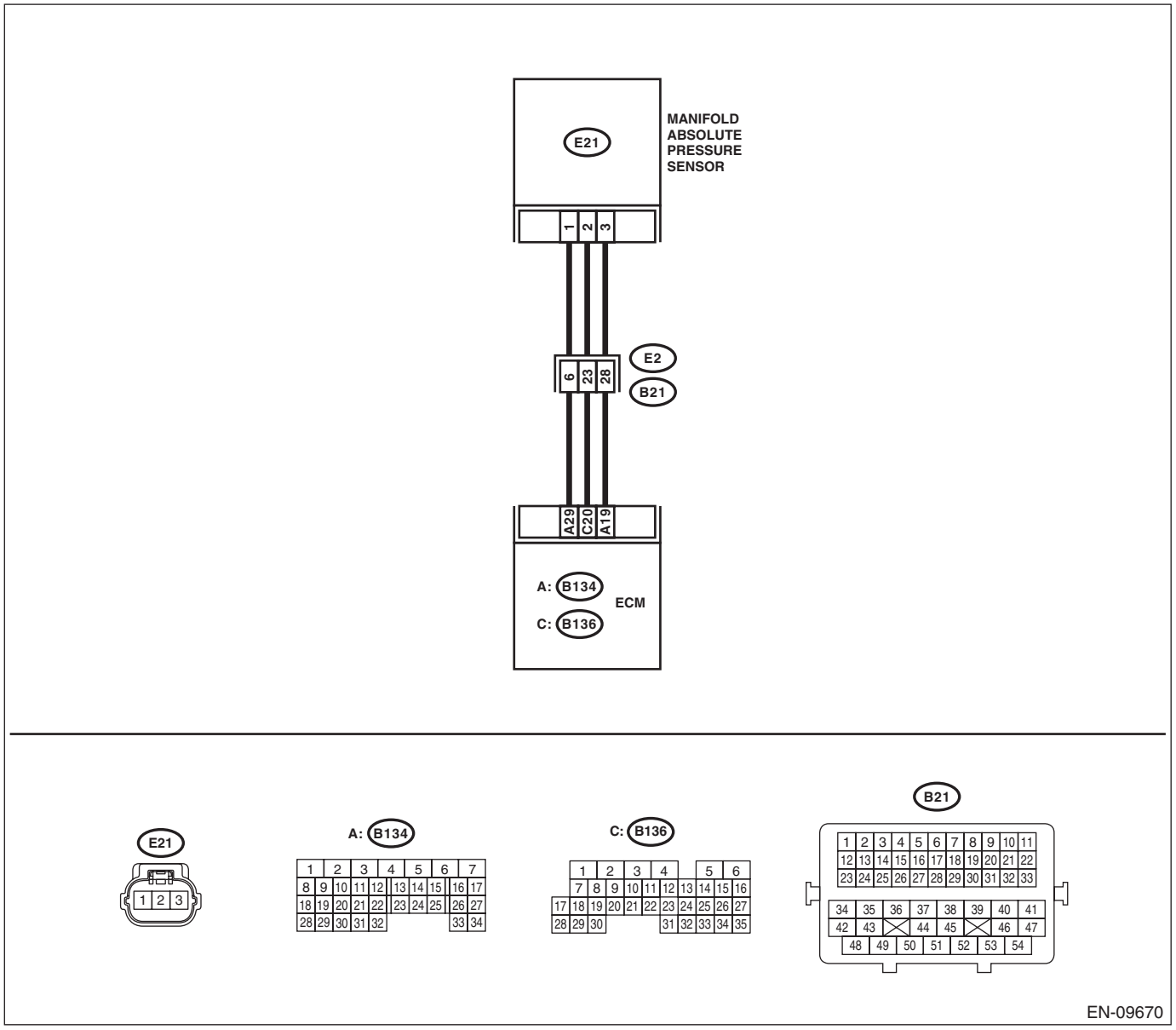
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-38, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the value of «Mani. Absolute Pressure» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the "General Scan Tool Instruction Manual".	Is the value of «Mani. Absolute Pressure» 119.5 kPa (896.5 mmHg, 35.29 inHg) or more?	Go to step **2**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
2	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from manifold absolute pressure sensor. 3) Start the engine. 4) Read the value of «Mani. Absolute Pressure» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the "General Scan Tool Instruction Manual".	Is the value of «Mani. Absolute Pressure» 119.5 kPa (896.5 mmHg, 35.29 inHg) or more?	Repair the short circuit to power in harness between ECM connector and manifold absolute pressure sensor connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and manifold absolute pressure sensor connector • Poor contact of ECM connector • Poor contact of coupling connector
4	**CHECK FOR POOR CONTACT.** Check for poor contact of manifold absolute pressure sensor connector.	Is there poor contact of manifold absolute pressure sensor connector?	Repair the poor contact of manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4DO(HEV))-66, Manifold Absolute Pressure Sensor.>

AE:DTC P0111 INTAKE AIR TEMPERATURE SENSOR RANGE/PERFORMANCE PROBLEM

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-39, DTC P0111 INTAKE AIR TEMPERATURE SENSOR RANGE/PERFORMANCE PROBLEM, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

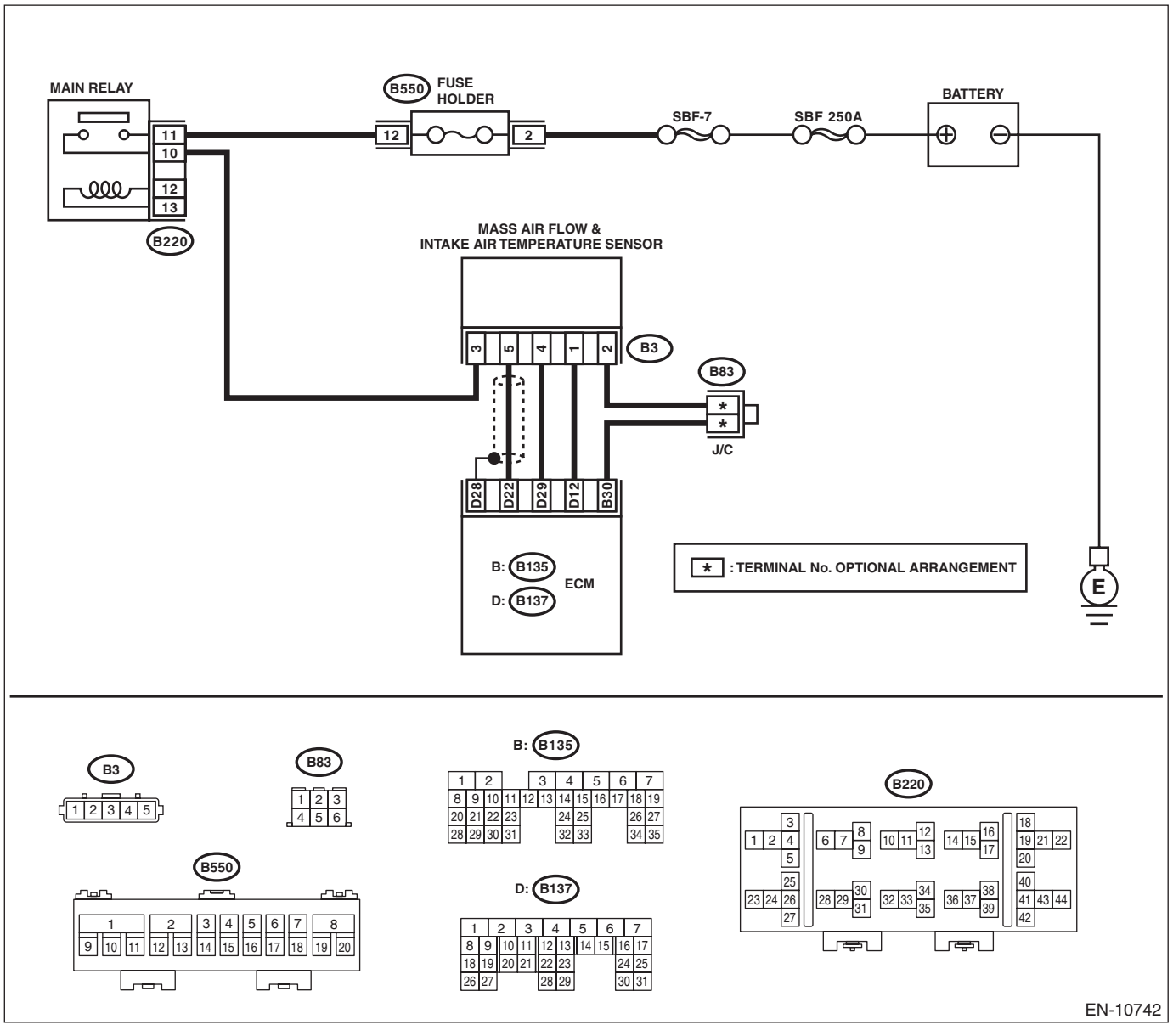
- Improper idling
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Disconnect the connectors from the mass air flow and intake air temperature sensor. 2) Measure the resistance between mass air flow and intake air temperature sensor terminals when the engine coolant is cold and after warmed up. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance of mass air flow and intake air temperature sensor different between when engine coolant is cold and after warmed up?	Repair the poor contact of ECM connector.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>

AF:DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-42, DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

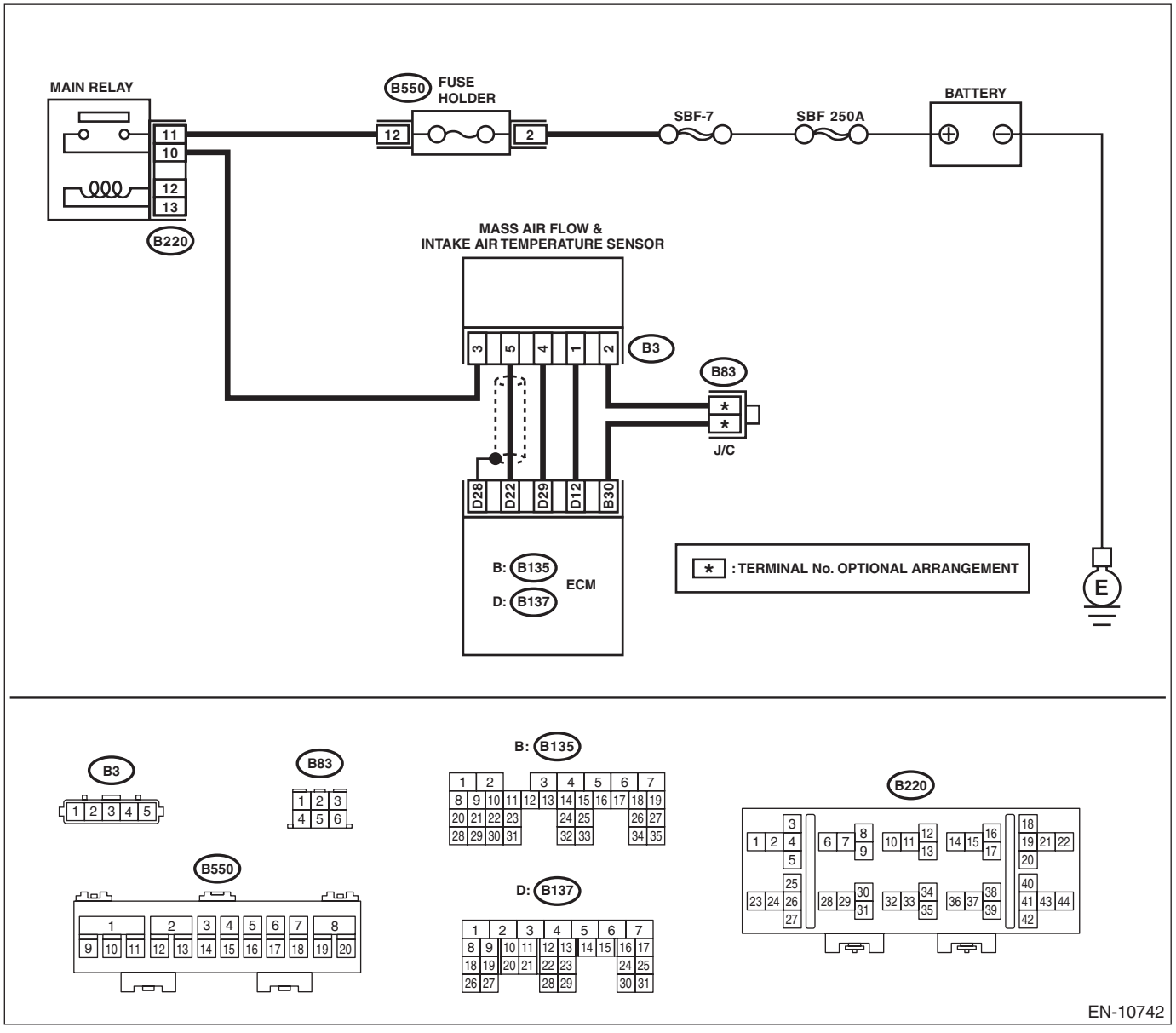
- Improper idling
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Intake Air Temp.» 120°C (248°F) or more?	Go to step **2**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
2	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and the mass air flow and intake air temperature sensor. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 12 — Chassis ground:***	Is the resistance 1 MΩ or more?	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the ground short circuit of harness between ECM connector and the mass air flow and intake air temperature sensor connector.

AG:DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-43, DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

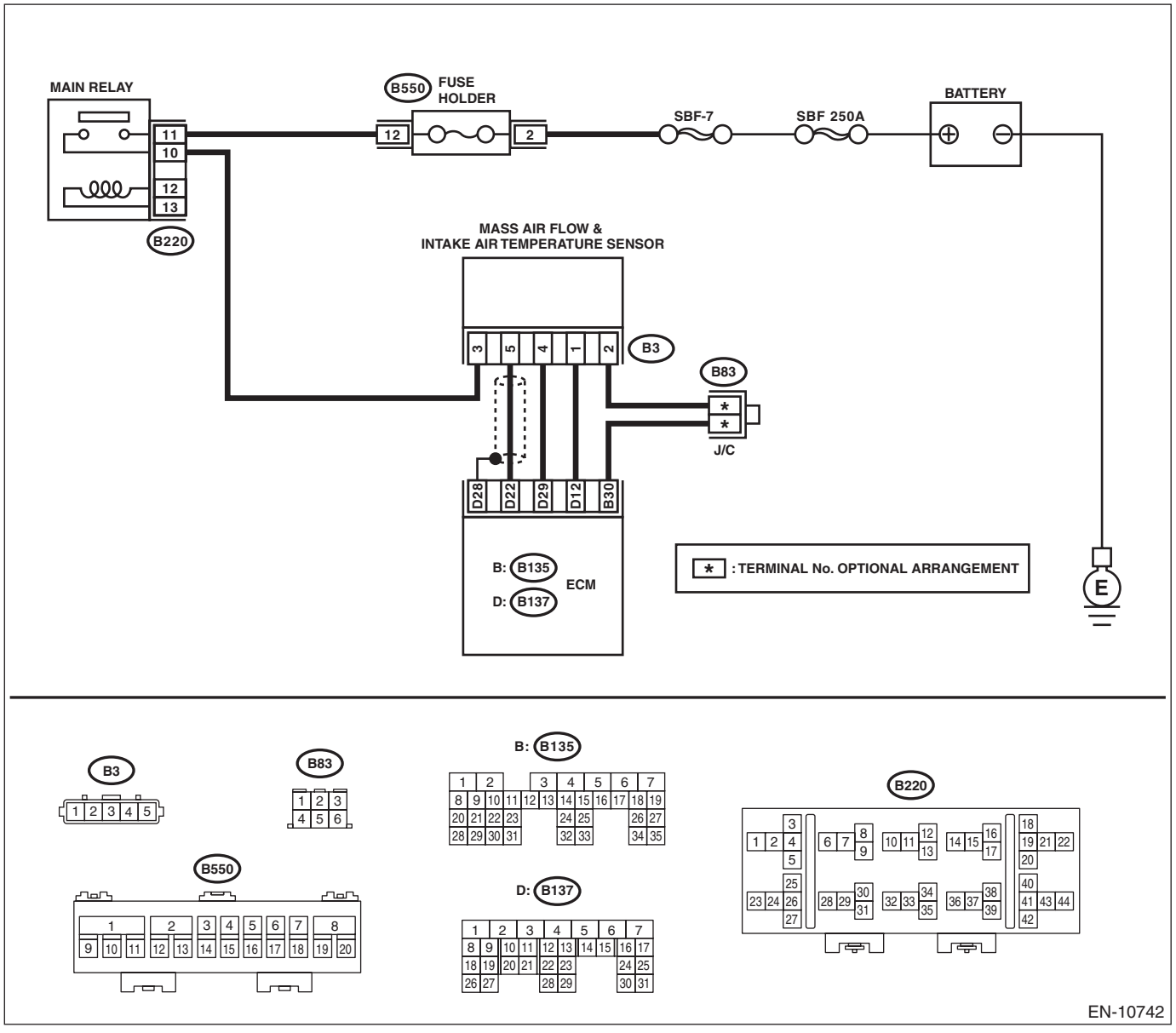
- Improper idling
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Intake Air Temp.» –40°C (–40°F) or less?	Go to step **2**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
2	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM and mass air flow and intake air temperature sensor connector.	Is there poor contact of ECM or mass air flow and intake air temperature sensor connector?	Repair the poor contact of ECM or mass air flow and intake air temperature sensor connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and the mass air flow and intake air temperature sensor. 3) Measure the resistance of harness between ECM connector and the mass air flow and intake air temperature sensor connector. ***Connector & terminal*** ***(B137) No. 12 — (B3) No. 1:*** ***(B135) No. 30 — (B3) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and the mass air flow and intake air temperature sensor connector • Poor contact of joint connector
4	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.** 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 12 (+) — Chassis ground (–):***	Is the voltage 5 V or more?	Repair the short circuit of harness to power supply between ECM connector and the mass air flow and intake air temperature sensor connector.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>

AH:DTC P0116 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-44, DTC P0116 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

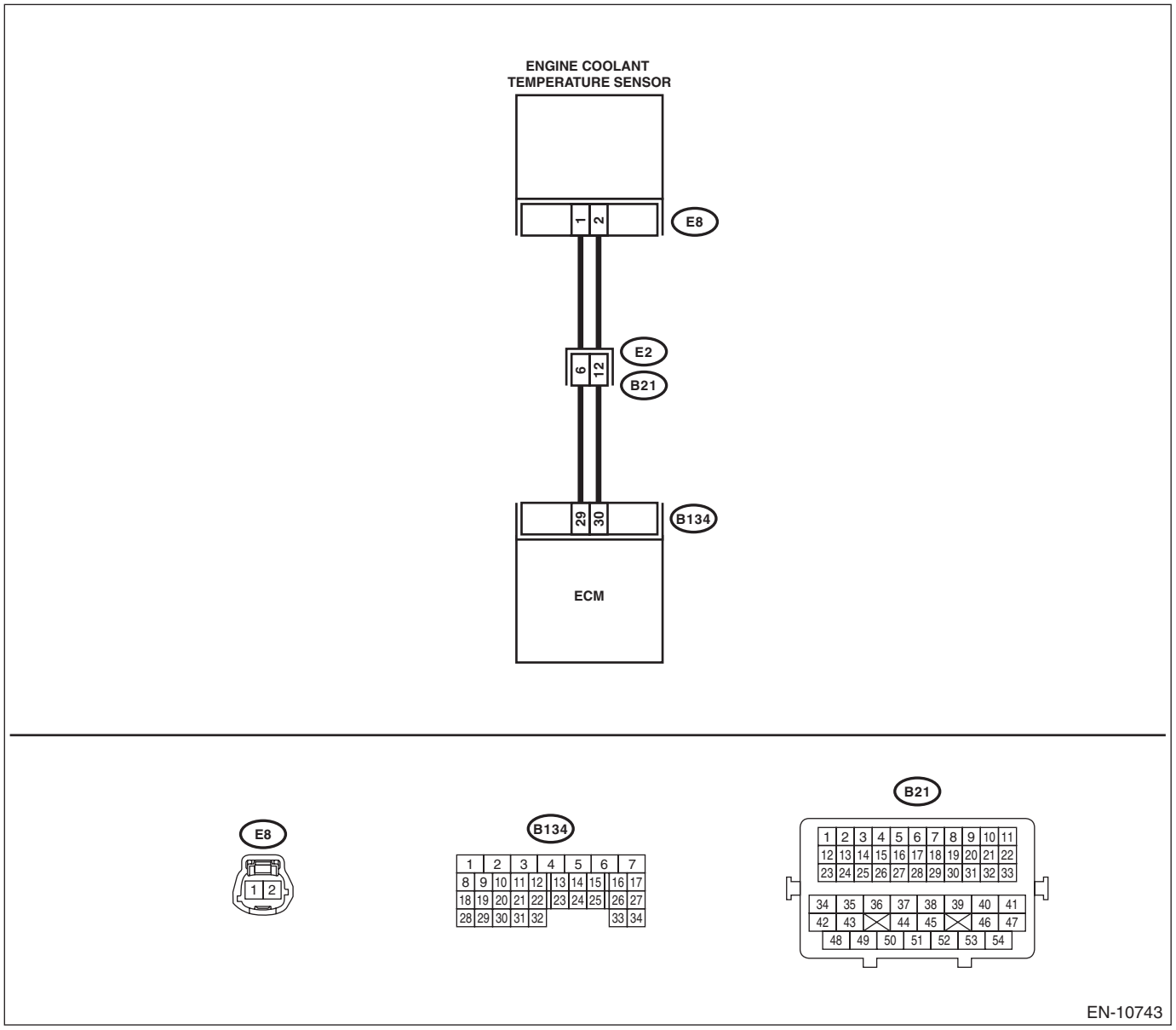
- Hard to start
- Improper idling
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



Step		Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.

	Step	Check	Yes	No
2	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Disconnect the connectors from the engine coolant temperature sensor. 2) Measure the resistance between engine coolant temperature sensor terminals when the engine coolant is cold and after warmed up. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance of engine coolant temperature sensor different between when engine coolant is cold and after warmed up?	Repair the poor contact of ECM connector.	Replace the engine coolant temperature sensor. <Ref. to FU(H4DO(HEV))-41, Engine Coolant Temperature Sensor.>

AI: DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-46, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

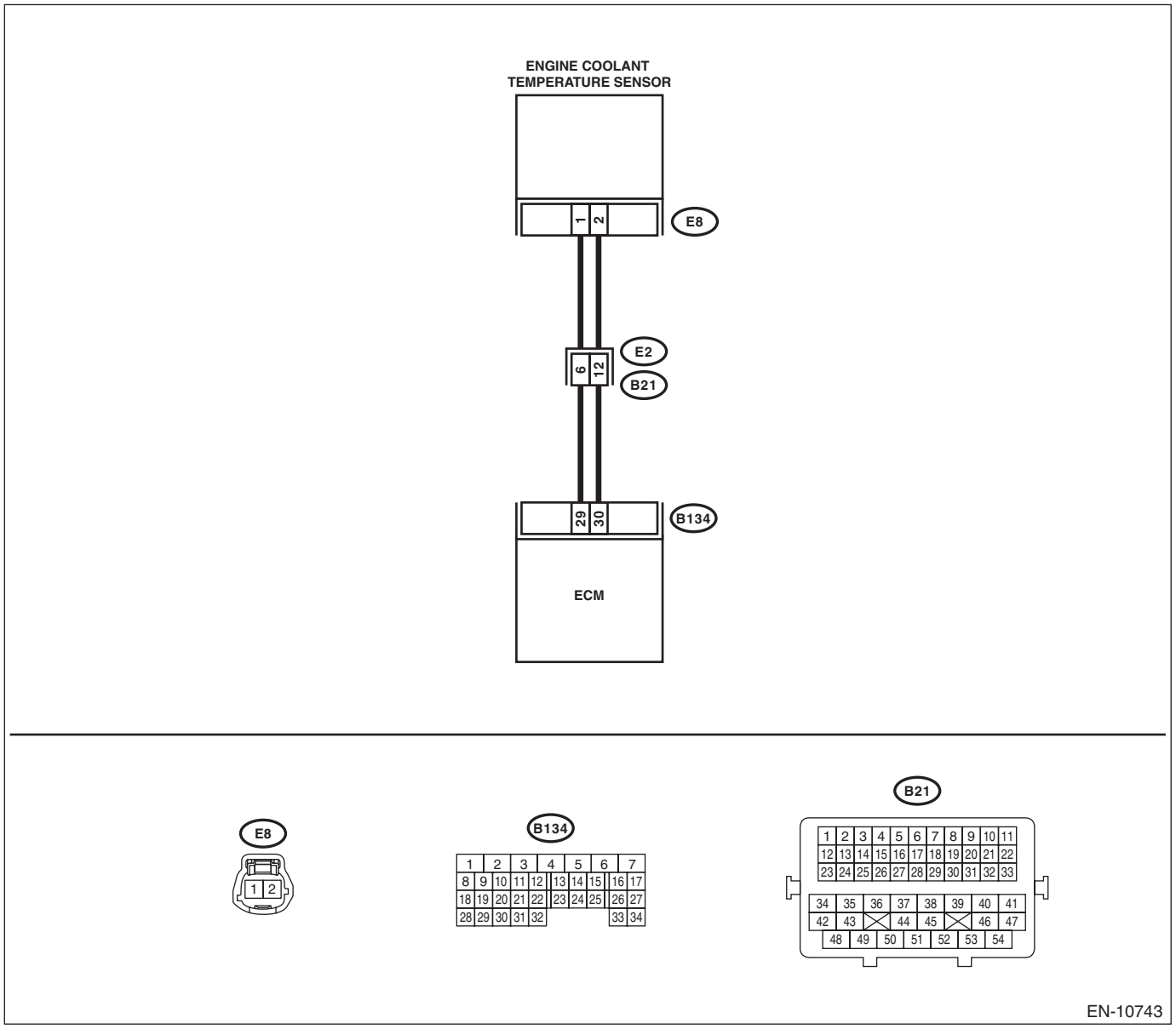
TROUBLE SYMPTOM:

- Hard to start
- Improper idling
- Poor driving performance

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Coolant Temp.» 120°C (248°F) or more?	Go to step **2**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
2	**CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and engine coolant temperature sensor. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 30 — Chassis ground:***	Is the resistance 1 MΩ or more?	Replace the engine coolant temperature sensor. <Ref. to FU(H4DO(HEV))-41, Engine Coolant Temperature Sensor.>	Repair the short circuit to ground in harness between ECM connector and engine coolant temperature sensor connector.

AJ:DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-47, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

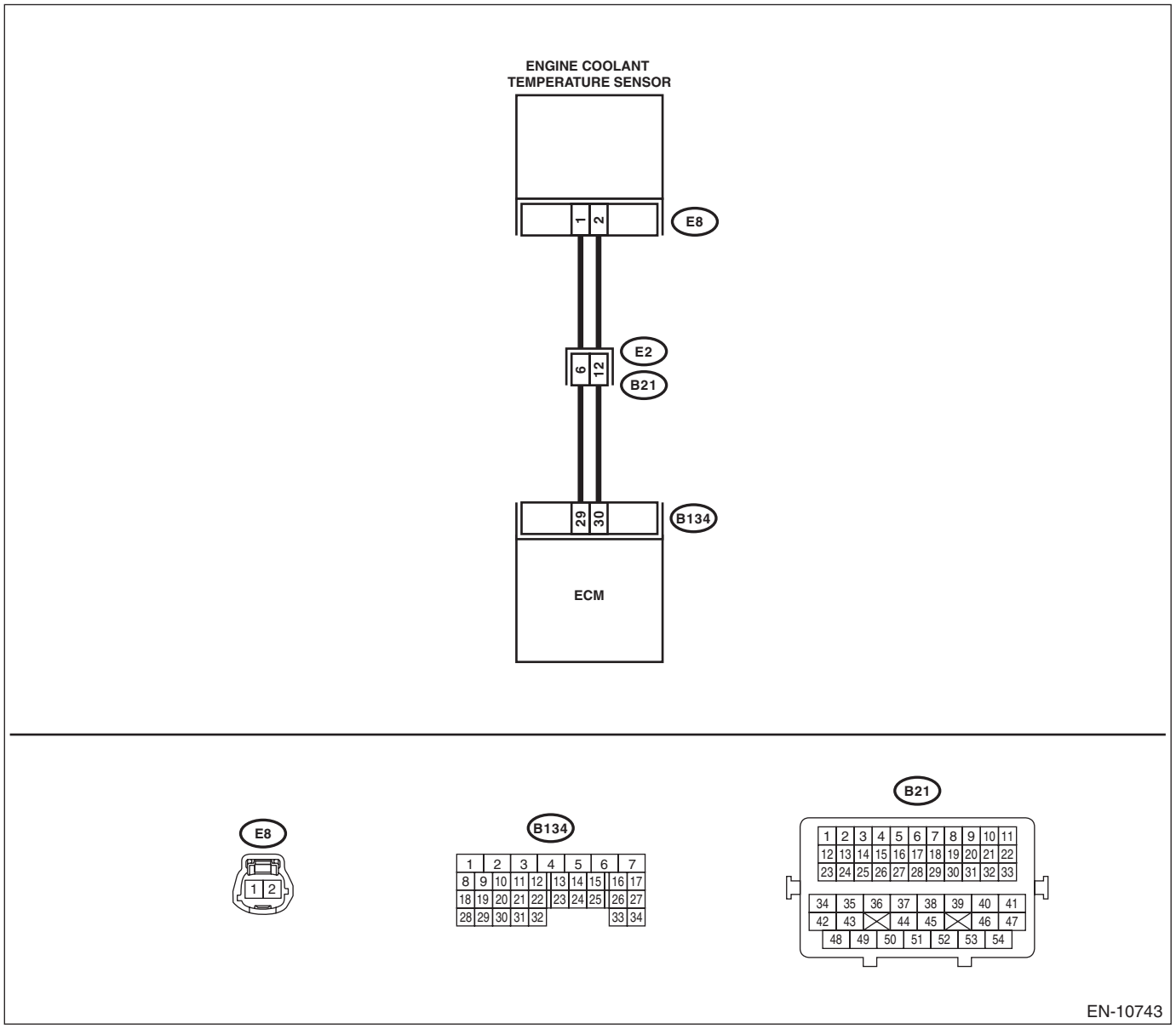
TROUBLE SYMPTOM:

- Hard to start
- Improper idling
- Poor driving performance

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Coolant Temp.» –40°C (–40°F) or less?	Go to step **2**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
2	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM and engine coolant temperature sensor connector.	Is there poor contact of ECM or engine coolant temperature sensor connector?	Repair the poor contact of ECM or engine coolant temperature sensor connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and engine coolant temperature sensor. 3) Measure the resistance of harness between ECM connector and engine coolant temperature sensor connector. ***Connector & terminal*** ***(B134) No. 29 — (E8) No. 1:*** ***(B134) No. 30 — (E8) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and engine coolant temperature sensor connector • Poor contact of coupling connector
4	**CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR.** 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 30 (+) — Chassis ground (–):***	Is the voltage 5 V or more?	Repair the short circuit of harness to power supply between ECM connector and engine coolant temperature sensor connector.	Replace the engine coolant temperature sensor. <Ref. to FU(H4DO(HEV))-41, Engine Coolant Temperature Sensor.>

AK:DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-48, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

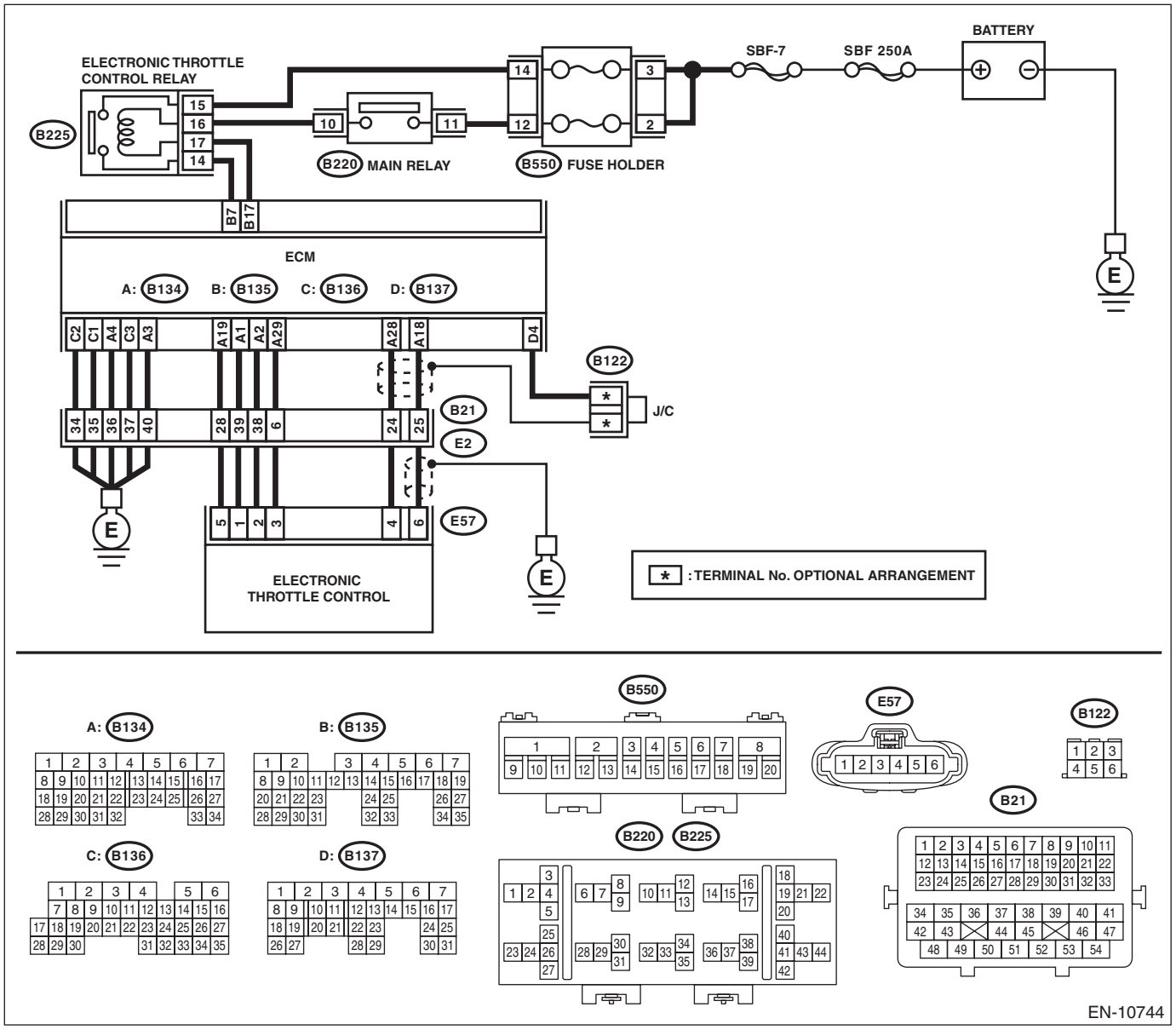
- Improper idling
- Engine stalls.
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



Step		Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 19 — Chassis ground:*** ***(B134) No. 18 — Chassis ground:*** ***(B134) No. 18 — (B137) No. 4:***	Is the resistance 1 MΩ or more?	Go to step **2**.	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

Step		Check	Yes	No
2	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:***	Is the resistance 1 MΩ or more?	Replace the electronic throttle control. <Ref. to FU(H4DO(HEV))-14, Throttle Body.>	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector. Replace the ECM if defective. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>

AL:DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-49, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

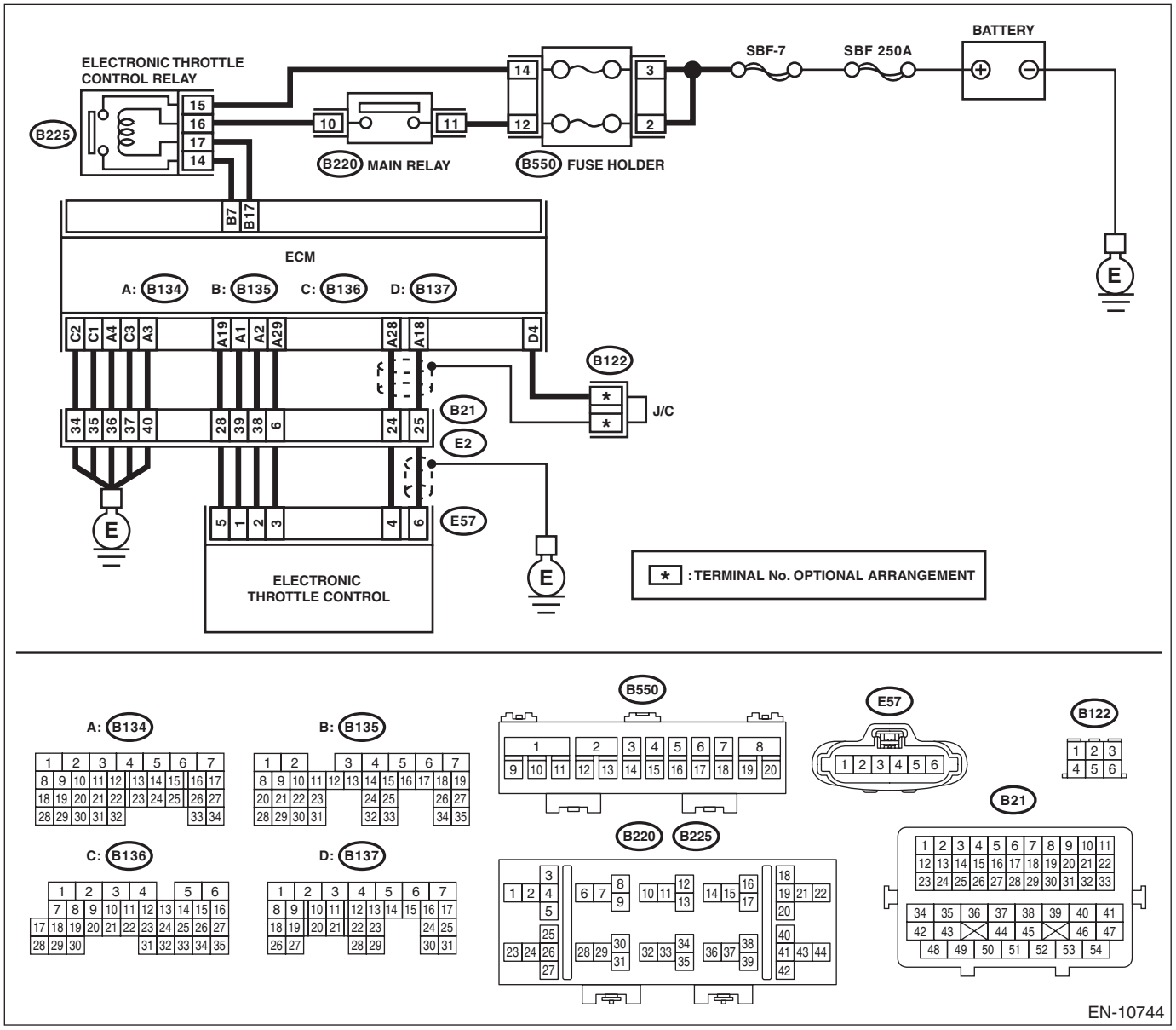
- Improper idling
- Engine stalls.
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



Step		Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance of harness between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 18 — (E57) No. 6:*** ***(B134) No. 29 — (E57) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and electronic throttle control connector • Poor contact of coupling connector

	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and engine ground • Poor contact of ECM connector • Poor contact of coupling connector
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B134) No. 19 — (B134) No. 18:***	Is the resistance 1 MΩ or more?	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. <Ref. to FU(H4DO(HEV))-14, Throttle Body.>	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.

AM:DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-50, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

Engine does not return to idle.

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK TIRE SIZE.**	Is the tire size as specified and the same size as three other wheels?	Go to step **2**.	Replace the tire.
2	**CHECK ENGINE COOLANT.** Check the following items: • Amount of engine coolant • Engine coolant freeze • Contamination of engine coolant	Is the engine coolant normal?	Go to step **3**.	Fill or replace the engine coolant. <Ref. to CO(H4DO(w/o HEV))-16, REPLACEMENT, Engine Coolant.>
3	**CHECK THERMOSTAT.**	Does the thermostat remain opened?	Replace the thermostat. <Ref. to CO(H4DO(w/o HEV))-64, Thermostat.>	Replace the engine coolant temperature sensor. <Ref. to FU(H4DO(HEV))-41, Engine Coolant Temperature Sensor.>

AN:DTC P0128 COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-51, DTC P0128 COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

Thermostat remains open.

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK ENGINE COOLANT.**	Is the engine coolant amount normal?	Go to step **3**.	Refill the engine coolant. <Ref. to CO(H4DO(w/o HEV))-16, Engine Coolant.>
3	**CHECK RADIATOR FAN.** 1) Start the engine. 2) Check the radiator fan operation.	Does the radiator fan continuously rotate for 3 minutes or more during idling?	Repair radiator fan circuit. <Ref. to CO(H4DO(w/o HEV))-89, Radiator Main Fan and Fan Motor.> and <Ref. to CO(H4DO(w/o HEV))-93, Radiator Sub Fan and Fan Motor.>	Replace the thermostat. <Ref. to CO(H4DO(w/o HEV))-64, Thermostat.>

AO:DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

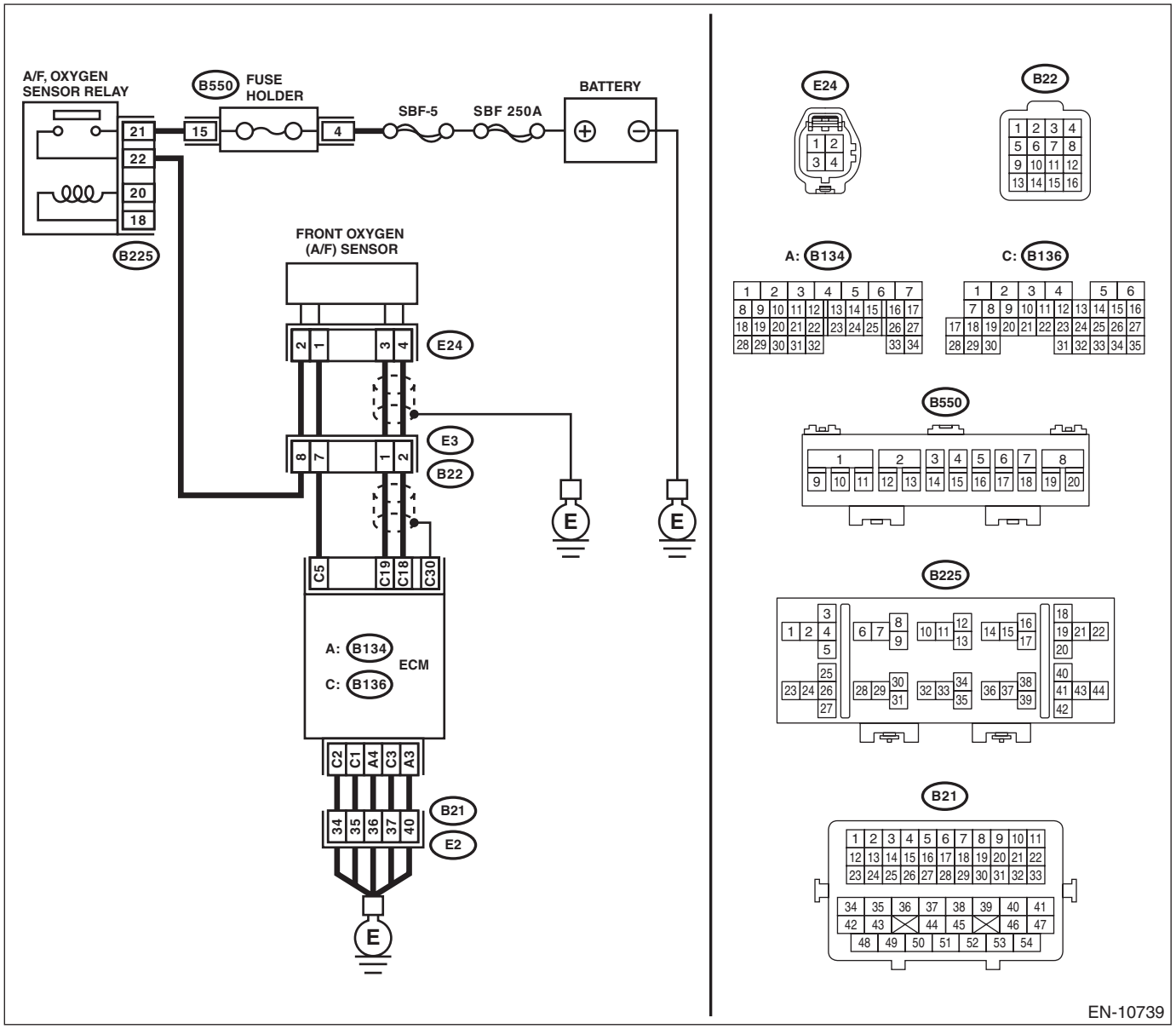
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-54, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.**	Has water entered the connector?	Completely remove any water inside.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 18 — Chassis ground:*** ***(B136) No. 19 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector.
3	**CHECK FOR POOR CONTACT.** Check for poor contact of the front oxygen (A/F) sensor connector.	Is there poor contact of front oxygen (A/F) sensor connector?	Repair the poor contact of front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DO(HEV))-78, Front Oxygen (A/F) Sensor.>

AP:DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

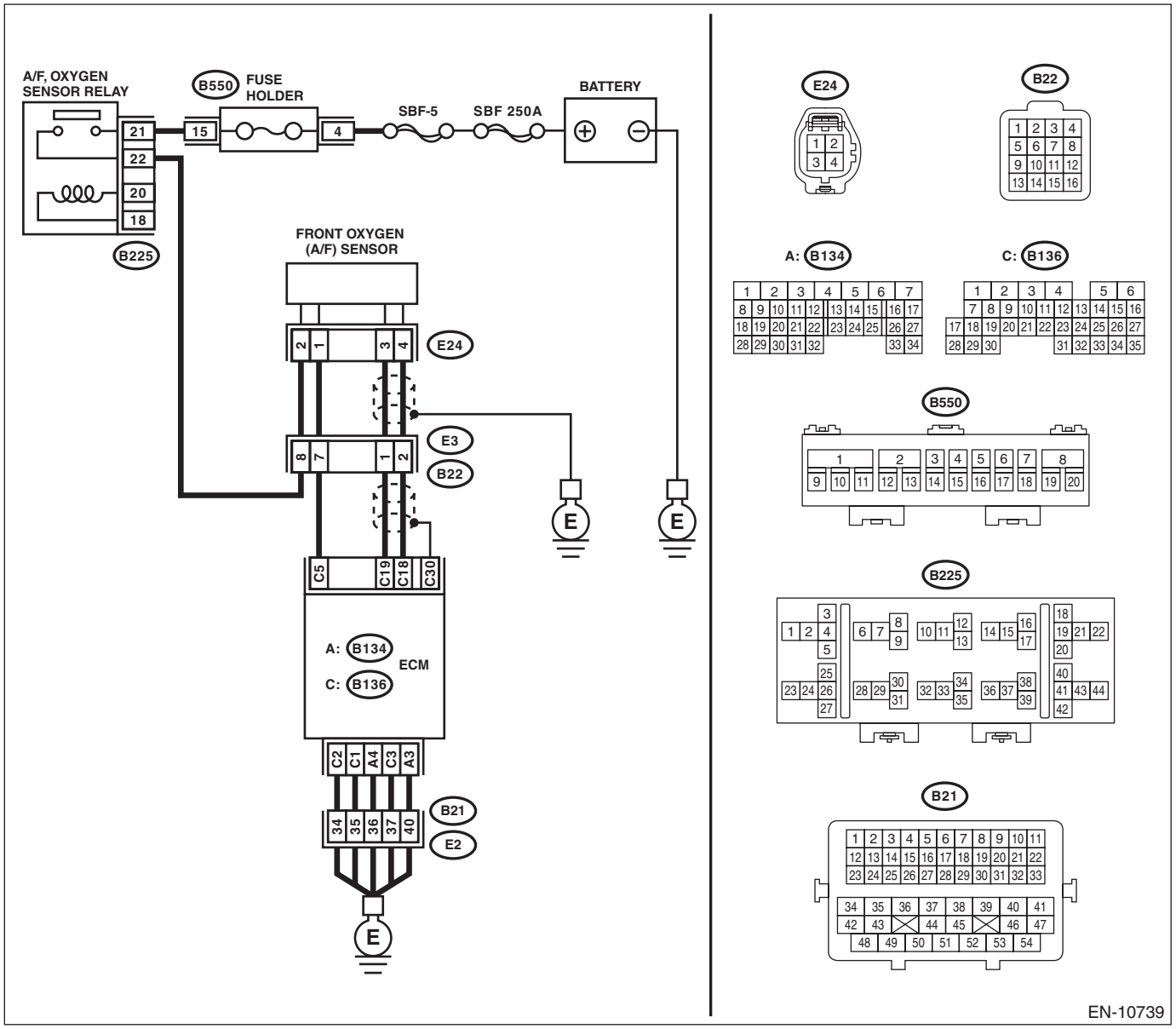
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-55, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.**	Has water entered the connector?	Completely remove any water inside.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from front oxygen (A/F) sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 18 (+) — Chassis ground (–):*** ***(B136) No. 19 (+) — Chassis ground (–):***	Is the voltage 8 V or more?	Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DO(HEV))-78, Front Oxygen (A/F) Sensor.>

AQ:DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

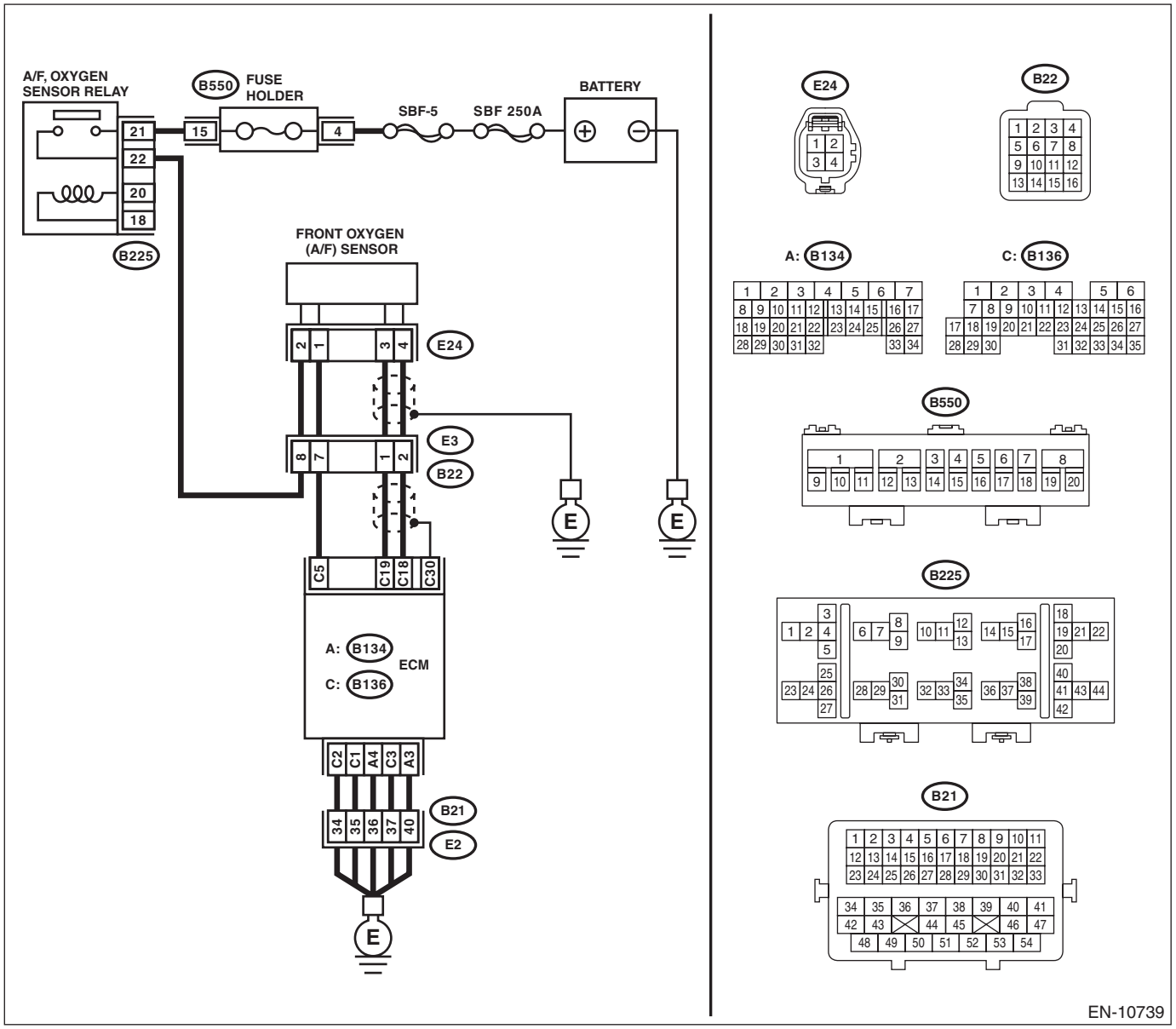
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-56, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 3) Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B136) No. 19 — (E24) No. 3:*** ***(B136) No. 18 — (E24) No. 4:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and front oxygen (A/F) sensor connector • Poor contact of coupling connector
2	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM and front oxygen (A/F) sensor connector.	Is there poor contact of ECM or front oxygen (A/F) sensor connector?	Repair the poor contact of ECM or front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DO(HEV))-78, Front Oxygen (A/F) Sensor.>

AR:DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)

DTC DETECTING CONDITION:

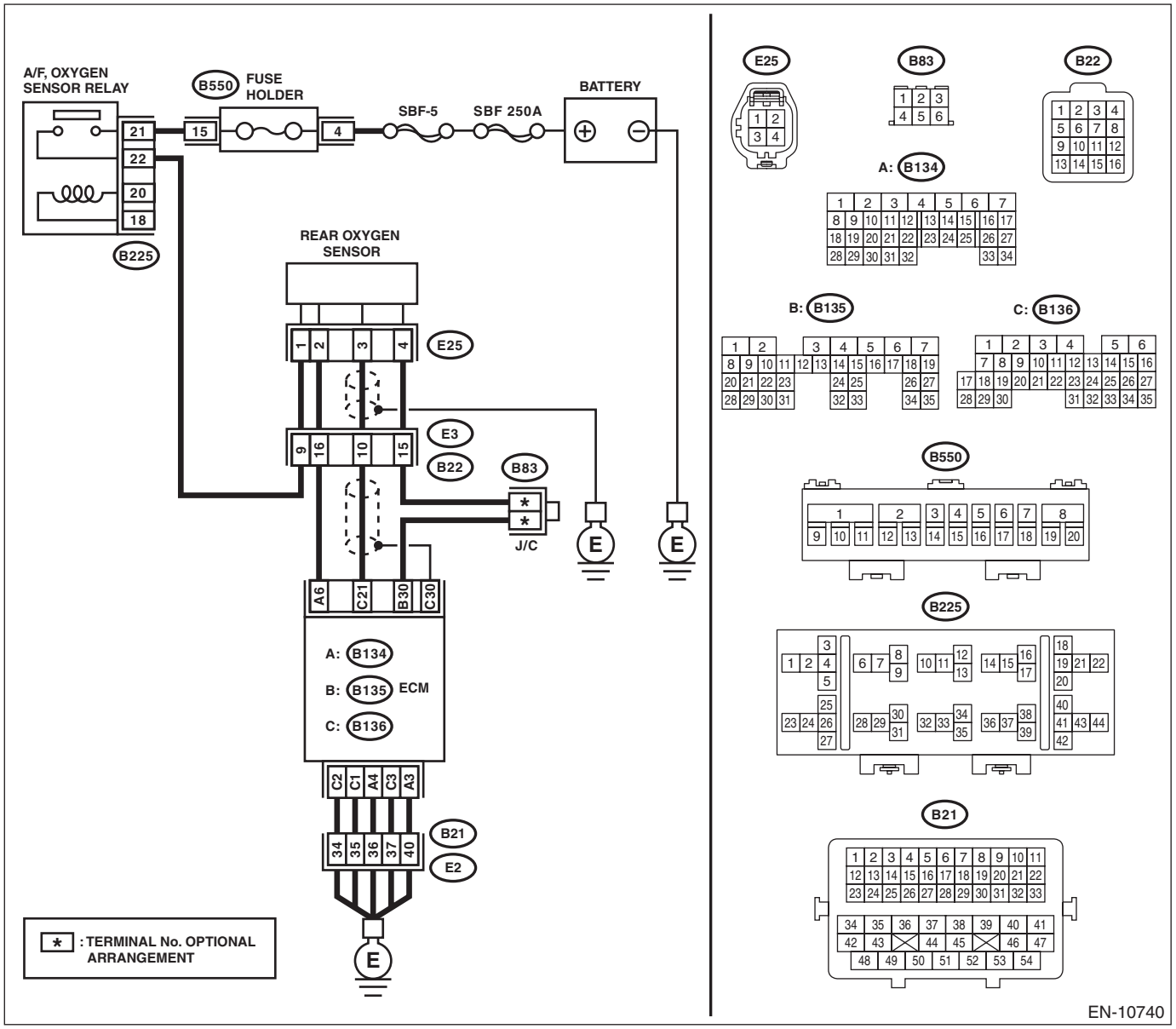
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-57, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum) 2) Read the value of «Oxygen sensor #12» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Oxygen sensor #12» 0.490 V or more?	Go to step **5**.	Go to step **2**.
2	**CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.**	Has water entered the connector?	Completely remove any water inside.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM connector and rear oxygen sensor connector. ***Connector & terminal*** ***(B136) No. 21 — (E25) No. 3:*** ***(B135) No. 30 — (E25) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and rear oxygen sensor connector • Poor contact of coupling connector
4	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between rear oxygen sensor connector and chassis ground. ***Connector & terminal*** ***(E25) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H4DO(HEV))-82, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and rear oxygen sensor connector • Poor contact of coupling connector • Poor contact of ECM connector
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Looseness and improper fitting of exhaust system parts • Damage (crack, hole etc.) of parts • Loose part and improper installation between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace faulty parts.	Replace the rear oxygen sensor. <Ref. to FU(H4DO(HEV))-82, Rear Oxygen Sensor.>

AS:DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)

DTC DETECTING CONDITION:

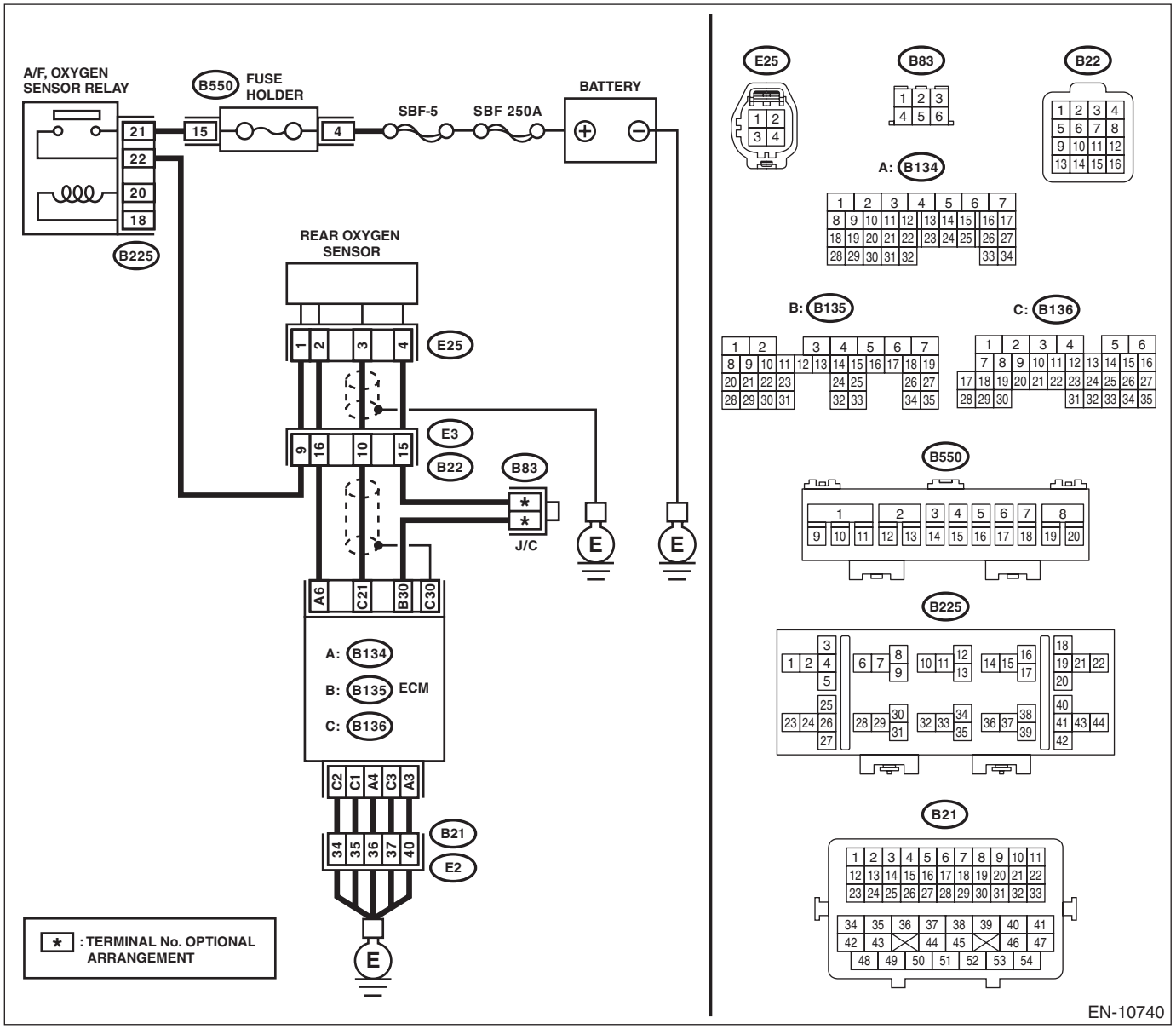
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-58, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm. 2) Read the value of «Oxygen sensor #12» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Oxygen sensor #12» 0.250 V or less?	Go to step **5**.	Go to step **2**.
2	**CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.**	Has water entered the connector?	Completely remove any water inside.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM connector and rear oxygen sensor connector. ***Connector & terminal*** ***(B136) No. 21 — (E25) No. 3:*** ***(B135) No. 30 — (E25) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and rear oxygen sensor connector • Poor contact of coupling connector
4	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between rear oxygen sensor connector and chassis ground. ***Connector & terminal*** ***(E25) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H4DO(HEV))-82, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and rear oxygen sensor connector • Poor contact of coupling connector • Poor contact of ECM connector
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Looseness and improper fitting of exhaust system parts • Damage (crack, hole etc.) of parts • Loose part and improper installation between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace faulty parts.	Replace the rear oxygen sensor. <Ref. to FU(H4DO(HEV))-82, Rear Oxygen Sensor.>

AT:DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2)

DTC DETECTING CONDITION:

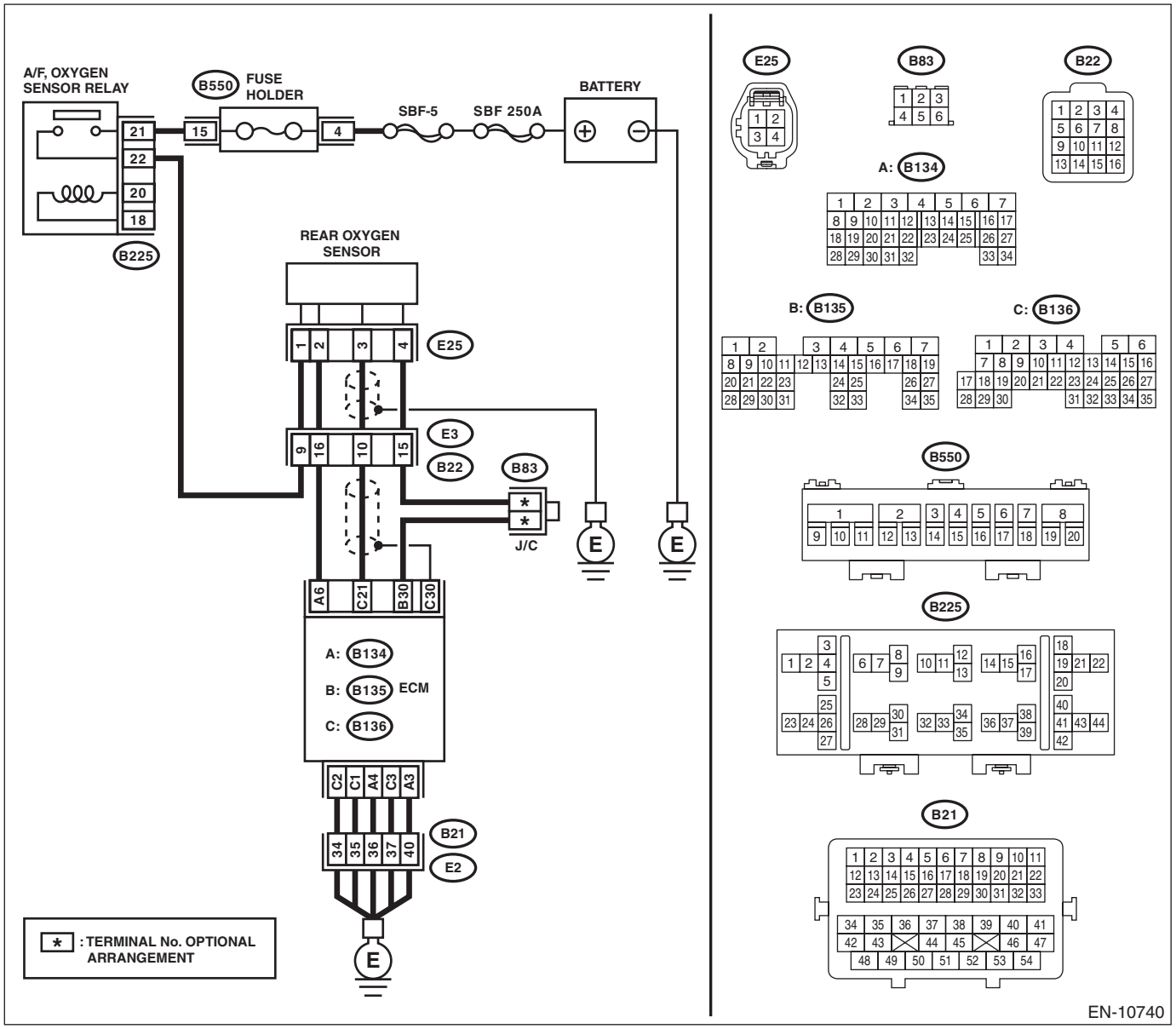
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-59, DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM connector and rear oxygen sensor connector. ***Connector & terminal*** ***(B136) No. 21 — (E25) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and rear oxygen sensor connector • Poor contact of coupling connector
2	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** Measure the resistance between rear oxygen sensor connector and chassis ground. ***Connector & terminal*** ***(E25) No. 3 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit to ground in harness between ECM connector and rear oxygen sensor connector.
3	**CHECK REAR OXYGEN SENSOR.** Measure the resistance between rear oxygen sensor terminals. ***Terminals*** ***No. 3 — No. 4***	Is the resistance less than 1 Ω?	Replace the rear oxygen sensor. <Ref. to FU(H4DO(HEV))-82, Rear Oxygen Sensor.>	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.

AU:DTC P013B O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2)

NOTE:
For the diagnostic procedure, refer to DTC P013A. <Ref. to EN(H4DO HEV)(diag)-179, DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AV:DTC P013E O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2)

NOTE:
For the diagnostic procedure, refer to DTC P013A. <Ref. to EN(H4DO HEV)(diag)-179, DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AW:DTC P013F O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2)

NOTE:
For the diagnostic procedure, refer to DTC P013A. <Ref. to EN(H4DO HEV)(diag)-179, DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AX:DTC P0141 O2 SENSOR HEATER CIRCUIT (BANK1 SENSOR2)

Refer to DTC P0037 for diagnostic procedure. <Ref. to EN(H4DO HEV)(diag)-131, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AY:DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-68, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK EXHAUST SYSTEM.** NOTE: Check the following items. • Loose installation of front portion of exhaust pipe onto cylinder heads • Loose connection between front exhaust pipe and front catalytic converter • Damage of exhaust pipe resulting in a hole	Is there any fault in exhaust system?	Repair the exhaust system.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DO(HEV))-78, Front Oxygen (A/F) Sensor.>

AZ:DTC P014D O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1)

NOTE:
For the diagnostic procedure, refer to DTC P014C. <Ref. to EN(H4DO HEV)(diag)-182, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BA:DTC P015A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1)

NOTE:
For the diagnostic procedure, refer to DTC P014C. <Ref. to EN(H4DO HEV)(diag)-182, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BB:DTC P015B O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1)

NOTE:
For the diagnostic procedure, refer to DTC P014C. <Ref. to EN(H4DO HEV)(diag)-182, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BC:DTC P0171 SYSTEM TOO LEAN (BANK 1)

Refer to DTC P0172 for diagnostic procedure. <Ref. to EN(H4DO HEV)(diag)-183, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BD:DTC P0172 SYSTEM TOO RICH (BANK 1)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-75, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Improper idling
- Engine stalls.
- Poor driving performance

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK EXHAUST SYSTEM.**	Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step **2**.
2	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step **3**.
3	**CHECK FUEL PRESSURE.** **WARNING:** **Place "NO OPEN FLAMES" signs near the working area.** **CAUTION:** **Be careful not to spill fuel.** Measure the fuel pressure. <Ref. to ME(H4DO(w/o HEV))-35, INSPECTION, Fuel Pressure.> **CAUTION:** **Release fuel pressure before removing the fuel pressure gauge.**	Is the measured value 340 — 400 kPa (3.5 — 4.1 kg/cm^2, 49 — 58 psi)?	Go to step **4**.	Check the fuel pump and fuel delivery line. <Ref. to FU(H4DO(HEV))-127, INSPECTION, Fuel Pump.> <Ref. to FU(H4DO(HEV))-157, INSPECTION, Fuel Delivery and Evaporation Lines.>
4	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm up completely. 2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Coolant Temp.» 75°C (167°F) or more?	Go to step **5**.	Replace the engine coolant temperature sensor. <Ref. to FU(H4DO(HEV))-41, Engine Coolant Temperature Sensor.>

	Step	Check	Yes	No
5	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F). 2) Place the select lever in “P” range or “N” range. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Mass Air Flow» 1.0 — 5.0 g/s (0.13 — 0.66 lb/m)?	Go to step **6**.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>
6	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F). 2) Place the select lever in “P” range or “N” range. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Open the front hood. 6) Measure the ambient temperature. 7) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Subtract ambient temperature from «Intake Air Temp.». Is the obtained value –10 — 50°C (–18 — 90°F)?	Repair the poor contact of ECM connector.	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>

BE:DTC P0196 ENGINE OIL TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-76, DTC P0196 ENGINE OIL TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

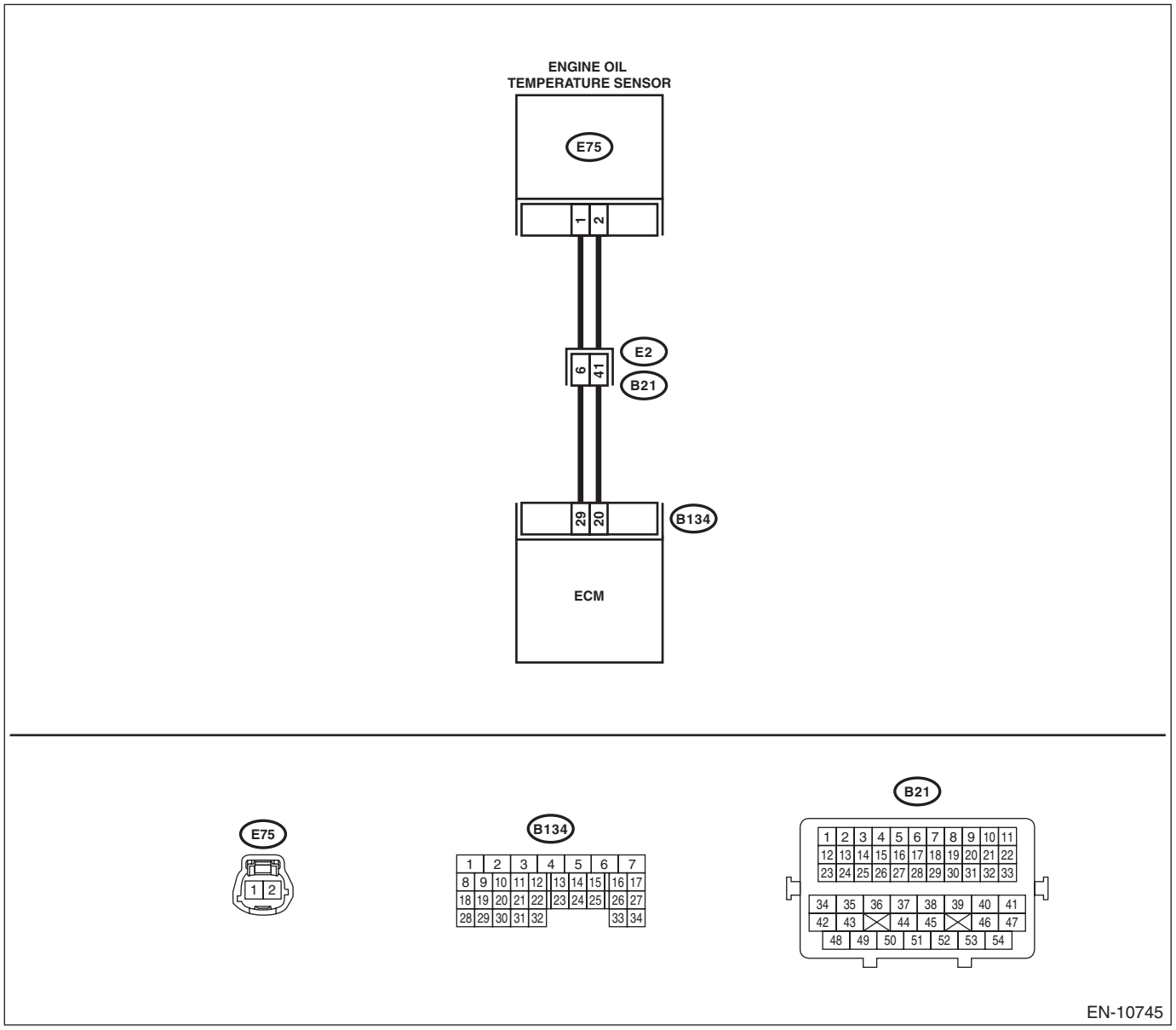
- Hard to start
- Improper idling
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



Step	Check	Yes	No
1 **CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.

	Step	Check	Yes	No
2	**CHECK ENGINE OIL TEMPERATURE SENSOR.** 1) Disconnect the connectors from the engine oil temperature sensor. 2) Measure the resistance between engine oil temperature sensor terminals when the engine coolant is cold and after warmed up. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance of engine oil temperature sensor different between when engine coolant is cold and after warmed up?	Repair the poor contact of ECM connector.	Replace the engine oil temperature sensor. <Ref. to FU(H4DO(HEV))-44, Engine Oil Temperature Sensor.>

BF:DTC P0197 ENGINE OIL TEMPERATURE SENSOR LOW

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-78, DTC P0197 ENGINE OIL TEMPERATURE SENSOR LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

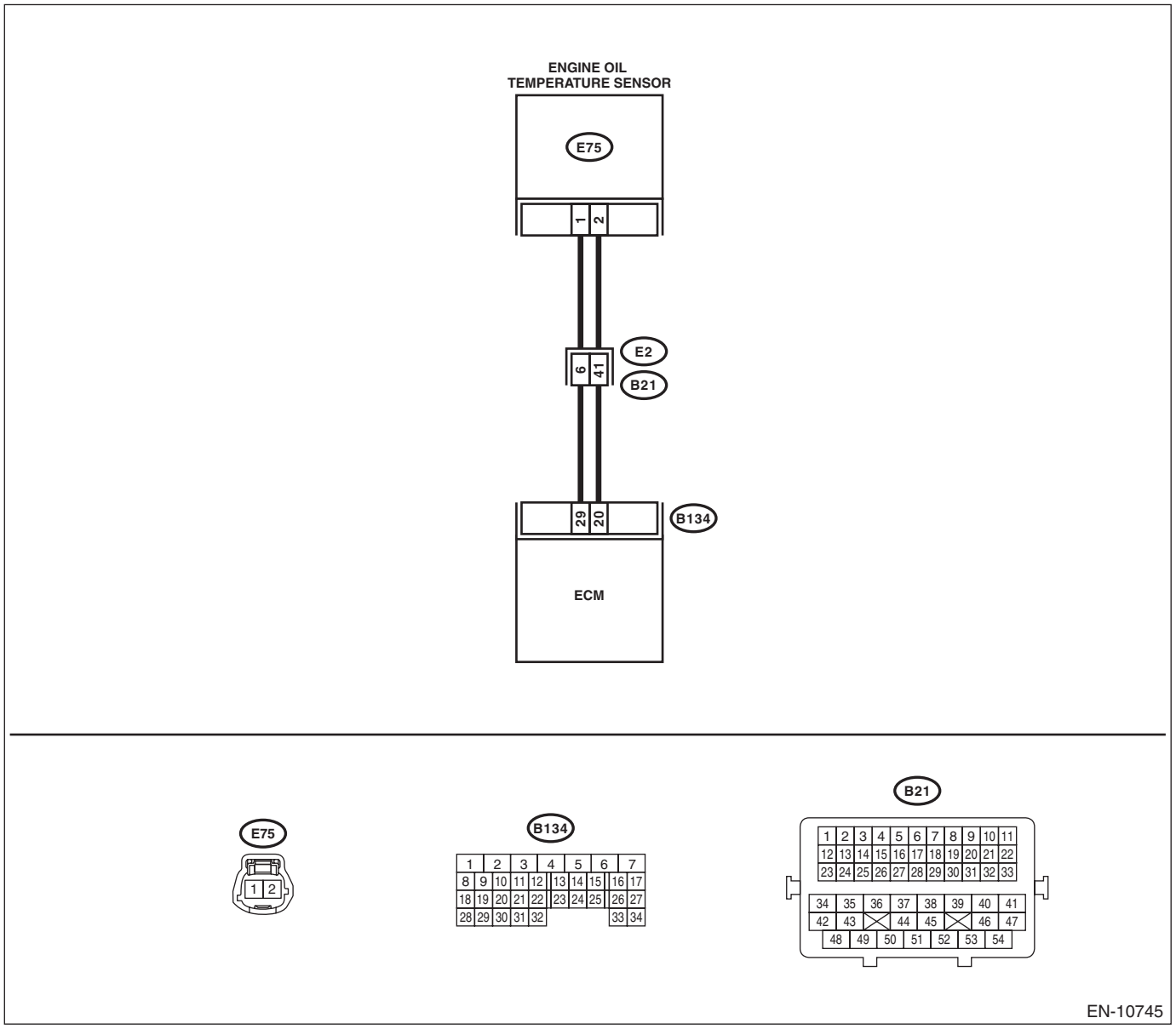
TROUBLE SYMPTOM:

- Hard to start
- Improper idling
- Poor driving performance

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the value of «Oil Temperature» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Oil Temperature» 150°C (302°F) or more?	Go to step **2**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
2	**CHECK HARNESS BETWEEN ECM AND ENGINE OIL TEMPERATURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the ECM and engine oil temperature sensor. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 20 — Chassis ground:***	Is the resistance 1 MΩ or more?	Replace the engine oil temperature sensor. <Ref. to FU(H4DO(HEV))-44, Engine Oil Temperature Sensor.>	Repair the short circuit to ground in the harness between the ECM connector and engine oil temperature sensor connector.

BG:DTC P0198 ENGINE OIL TEMPERATURE SENSOR HIGH

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-79, DTC P0198 ENGINE OIL TEMPERATURE SENSOR HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

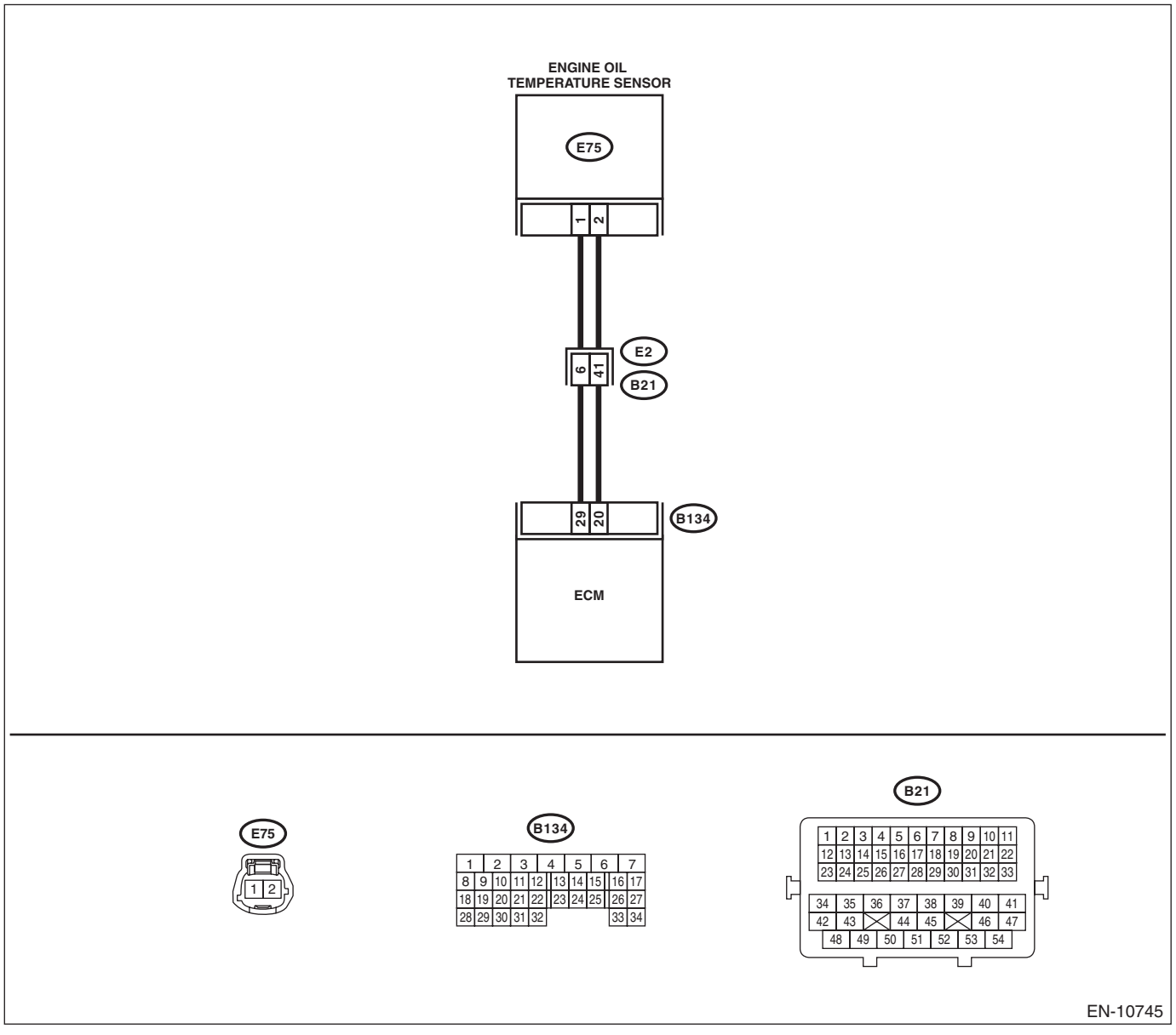
TROUBLE SYMPTOM:

- Hard to start
- Improper idling
- Poor driving performance

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the value of «Oil Temperature» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Oil Temperature» –40°C (–40°F) or less?	Go to step **2**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
2	**CHECK FOR POOR CONTACT.** Check for poor contact between the ECM and engine oil temperature sensor connectors.	Is there poor contact of the ECM or engine oil temperature sensor connectors?	Repair the poor contact of ECM or engine oil temperature sensor connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND ENGINE OIL TEMPERATURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the ECM and engine oil temperature sensor. 3) Measure the resistance of the harness between the ECM connector and engine oil temperature sensor connector. ***Connector & terminal*** ***(B134) No. 29 — (E75) No. 1:*** ***(B134) No. 20 — (E75) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and engine oil temperature sensor connector • Poor contact of coupling connector
4	**CHECK HARNESS BETWEEN ECM AND ENGINE OIL TEMPERATURE SENSOR CONNECTOR.** 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 20 (+) — Chassis ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power in harness between ECM connector and engine oil temperature sensor connector.	Replace the engine oil temperature sensor. <Ref. to FU(H4DO(HEV))-44, Engine Oil Temperature Sensor.>

BH:DTC P0201 INJECTOR #1

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-80, DTC P0201 INJECTOR #1, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

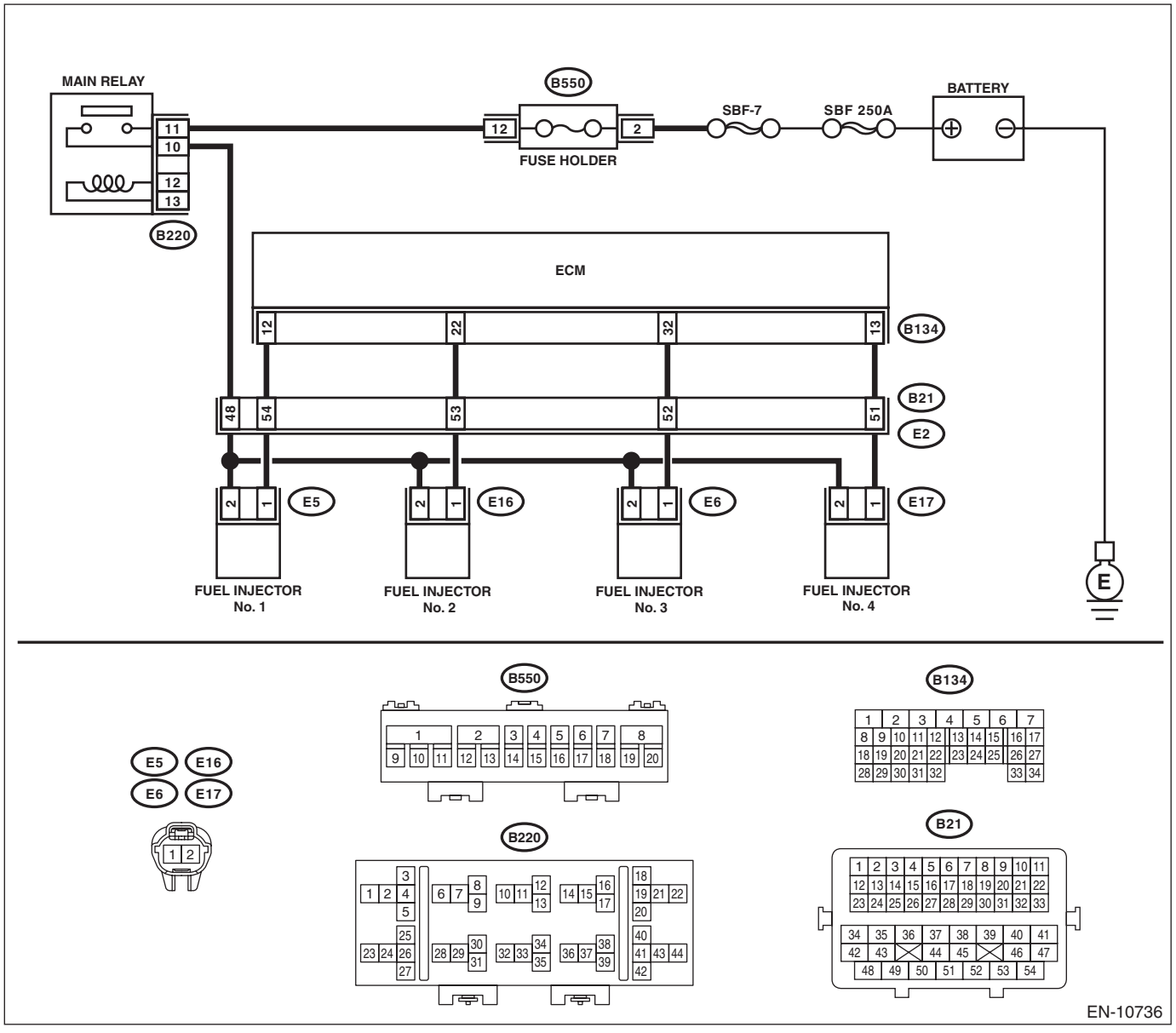
- Improper idling
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector. 3) Turn the ignition switch to ON. 4) Measure the voltage between fuel injector connector and the engine ground. ***Connector & terminal*** ***DTC P0201; (E5) No. 2 (+) — Engine ground (–):*** ***DTC P0202; (E16) No. 2 (+) — Engine ground (–):*** ***DTC P0203; (E6) No. 2 (+) — Engine ground (–):*** ***DTC P0204; (E17) No. 2 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between main relay and fuel injector connector • Poor contact of main relay connector • Poor contact of coupling connector
2	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between fuel injector connector and engine ground. ***Connector & terminal*** ***DTC P0201; (E5) No. 1 — Engine ground:*** ***DTC P0202; (E16) No. 1 — Engine ground:*** ***DTC P0203; (E6) No. 1 — Engine ground:*** ***DTC P0204; (E17) No. 1 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit to ground in harness between ECM connector and fuel injector connector.
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM connector and fuel injector connector. ***Connector & terminal*** ***DTC P0201; (B134) No. 12 — (E5) No. 1:*** ***DTC P0202; (B134) No. 22 — (E16) No. 1:*** ***DTC P0203; (B134) No. 32 — (E6) No. 1:*** ***DTC P0204; (B134) No. 13 — (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and fuel injector connector • Poor contact of coupling connector
4	**CHECK FUEL INJECTOR.** Measure the resistance between fuel injector terminals on the corresponding cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **5**.	Replace the fuel injector. <Ref. to FU(H4DO(HEV))-69, Fuel Injector.>
5	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Go to step **6**.

	Step	Check	Yes	No
6	**CHECK FUEL INJECTOR OPERATION.** 1) Connect all connectors. 2) Start the engine. 3) Check if the corresponding fuel injector emits operating sound. NOTE: Use a sound scope to check the operating sound.	Does the fuel injector emit operating sound?	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.	Repair the poor contact of fuel injector connector.

BI: DTC P0202 INJECTOR #2

NOTE:
For the diagnostic procedure, refer to DTC P0201. <Ref. to EN(H4DO HEV)(diag)-192, DTC P0201 INJECTOR #1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BJ:DTC P0203 INJECTOR #3

NOTE:
For the diagnostic procedure, refer to DTC P0201. <Ref. to EN(H4DO HEV)(diag)-192, DTC P0201 INJECTOR #1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BK:DTC P0204 INJECTOR #4

NOTE:
For the diagnostic procedure, refer to DTC P0201. <Ref. to EN(H4DO HEV)(diag)-192, DTC P0201 INJECTOR #1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BL:DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-81, DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

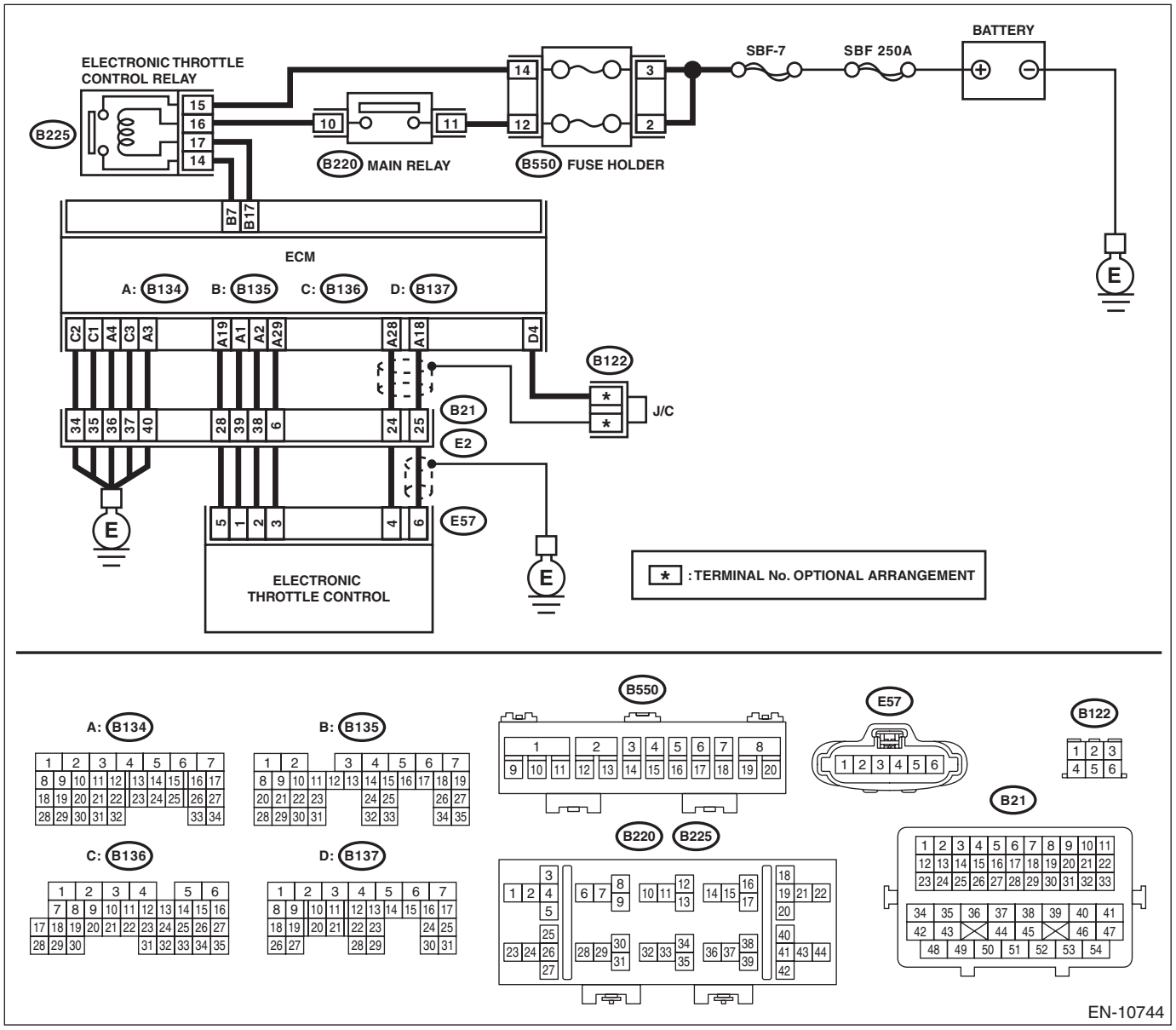
TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance
- Engine stalls.

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



Step		Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 19 — Chassis ground:*** ***(B134) No. 28 — Chassis ground:*** ***(B134) No. 28 — (B137) No. 4:***	Is the resistance 1 MΩ or more?	Go to step **2**.	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

	Step	Check	Yes	No
2	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 4 — Engine ground:***	Is the resistance 1 MΩ or more?	Replace the electronic throttle control. <Ref. to FU(H4DO(HEV))-14, Throttle Body.>	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector. Replace the ECM if defective. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>

BM:DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-82, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

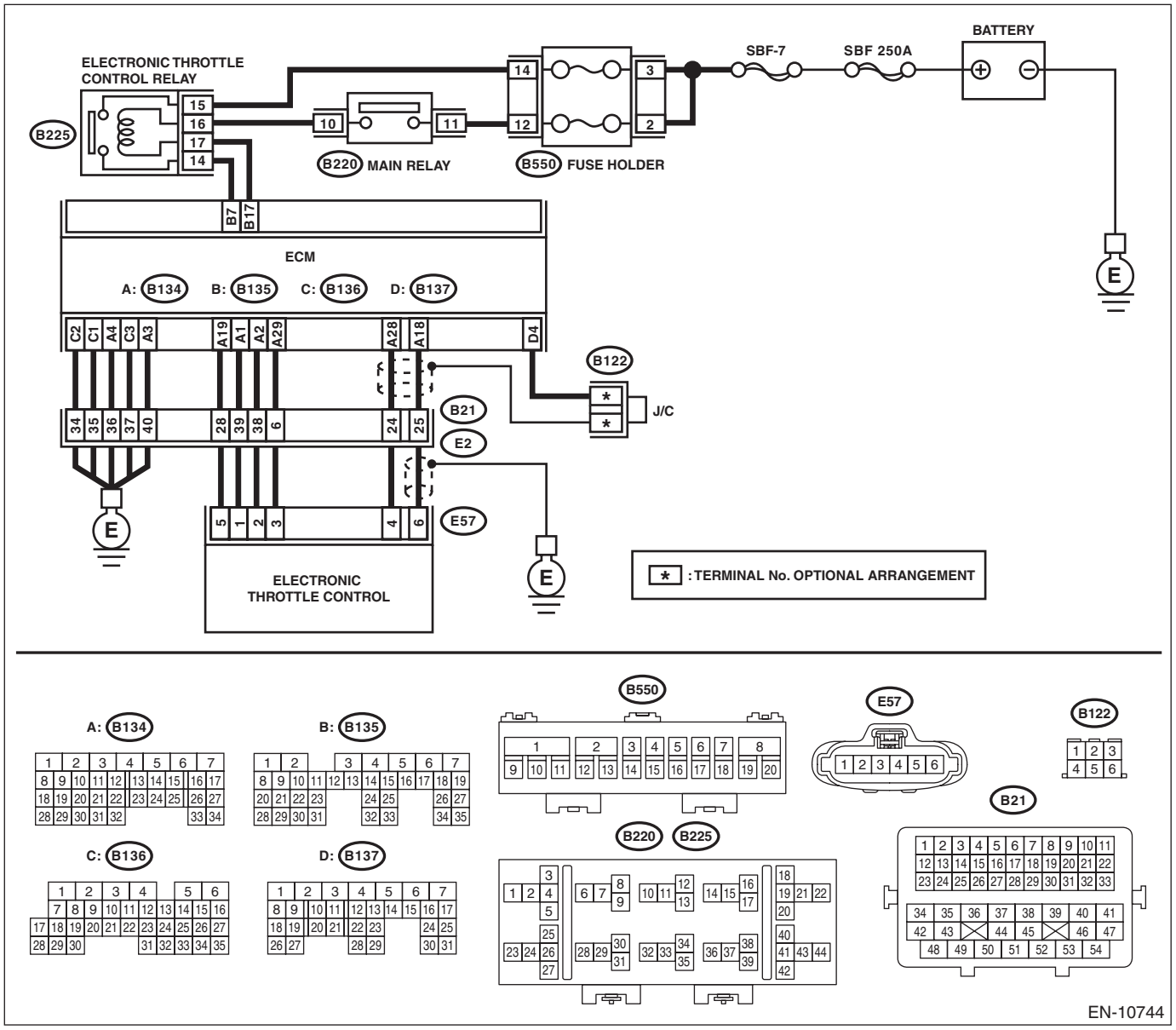
- Improper idling
- Poor driving performance
- Engine stalls.

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



Step		Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance of harness between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 28 — (E57) No. 4:*** ***(B134) No. 29 — (E57) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and electronic throttle control connector • Poor contact of coupling connector

	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and engine ground • Poor contact of ECM connector • Poor contact of coupling connector
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 4 (+) — Engine ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B134) No. 19 — (B134) No. 28:***	Is the resistance 1 MΩ or more?	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. <Ref. to FU(H4DO(HEV))-14, Throttle Body.>	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.

BN:DTC P0300 RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- Immediately at fault recognition (A misfire which could damage catalyst occurs.)
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-82, DTC P0300 RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

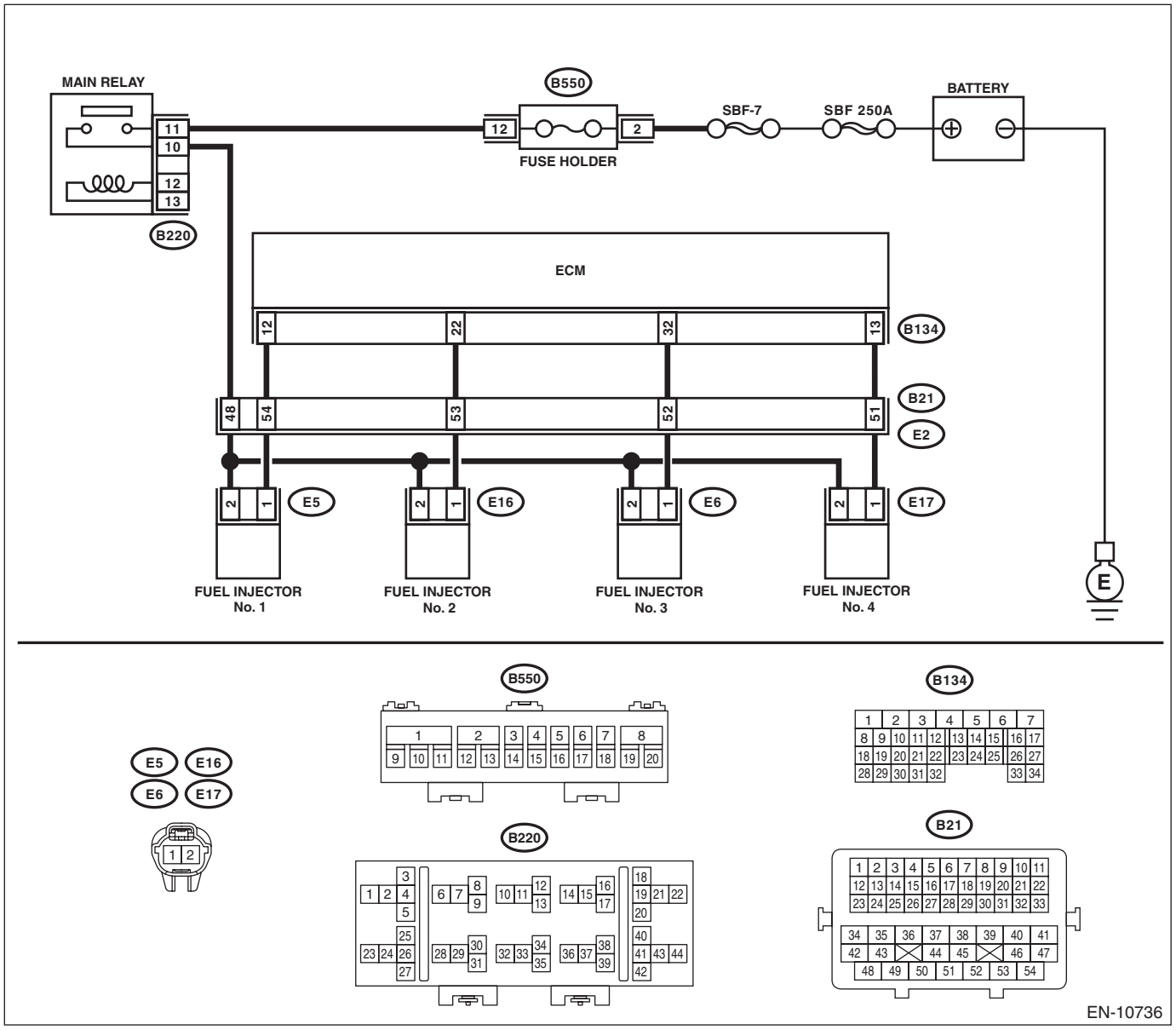
- Engine stalls.
- Improper idling
- Rough driving

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



Step		Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground on all cylinders. ***Connector & terminal*** ***#1 (B134) No. 12 (+) — Chassis ground (–):*** ***#2 (B134) No. 22 (+) — Chassis ground (–):*** ***#3 (B134) No. 32 (+) — Chassis ground (–):*** ***#4 (B134) No. 13 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **6**.	Go to step **2**.

	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from all fuel injectors. 3) Measure the resistance between all fuel injector connectors and engine ground. ***Connector & terminal*** ***#1 (E5) No. 1 — Engine ground:*** ***#2 (E16) No. 1 — Engine ground:*** ***#3 (E6) No. 1 — Engine ground:*** ***#4 (E17) No. 1 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit to ground in harness between ECM connector and fuel injector connector.
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector on all cylinders. ***Connector & terminal*** ***#1 (B134) No. 12 — (E5) No. 1:*** ***#2 (B134) No. 22 — (E16) No. 1:*** ***#3 (B134) No. 32 — (E6) No. 1:*** ***#4 (B134) No. 13 — (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and fuel injector connector • Poor contact of coupling connector
4	**CHECK FUEL INJECTOR.** Measure the resistance between all fuel injector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **5**.	Replace the faulty fuel injector. <Ref. to FU(H4DO(HEV))-69, Fuel Injector.>
5	**CHECK POWER SUPPLY LINE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between all fuel injector connectors and the engine ground. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Repair the poor contact of all connectors in fuel injector circuit.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between main relay connector and fuel injector connector • Poor contact of coupling connector • Poor contact of main relay connector
6	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from all fuel injectors. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground on all cylinders. ***Connector & terminal*** ***#1 (B134) No. 12 (+) — Chassis ground (–):*** ***#2 (B134) No. 22 (+) — Chassis ground (–):*** ***#3 (B134) No. 32 (+) — Chassis ground (–):*** ***#4 (B134) No. 13 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power in harness between ECM connector and fuel injector connectors.	Go to step **7**.

	Step	Check	Yes	No
7	**CHECK FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between all fuel injector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **8**.	Replace the faulty fuel injector. <Ref. to FU(H4DO(HEV))-69, Fuel Injector.>
8	**CHECK INSTALLATION CONDITION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.**	Is the camshaft position sensor or crankshaft position sensor loosely installed?	Tighten the camshaft position sensor or crankshaft position sensor. <Ref. to FU(H4DO(HEV))-53, INSTALLATION, Camshaft Position Sensor.> <Ref. to FU(H4DO(HEV))-48, INSTALLATION, Crankshaft Position Sensor.>	Go to step **9**.
9	**CHECK CRANKSHAFT POSITION SENSOR PLATE.**	Is the crankshaft position sensor plate rusted or does it have broken teeth?	Replace the crankshaft position sensor plate. <Ref. to ME(H4DO(w/o HEV))-304, Cylinder Block.>	Go to step **10**.
10	**CHECK INSTALLATION CONDITION OF TIMING CHAIN.** Turn the crankshaft using ST, and align the alignment mark on crank sprocket with alignment mark on cylinder block. ST 18252AA000 CRANKSHAFT SOCKET	Is the timing chain dislocated from its proper position?	Correct the installation condition of timing chain. <Ref. to ME(H4DO(w/o HEV))-169, Timing Chain Assembly.>	Go to step **11**.
11	**CHECK FUEL LEVEL.**	Is the fuel meter indication higher than the “Lower” level?	Go to step **12**.	Refill the fuel so that the fuel meter indication is higher than the “Lower” level, and proceed to the next step. Go to step **12**.
12	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Clear the memory using the Subaru Select Monitor. <Ref. to EN(H4DO HEV)(diag)-66, Clear Memory Mode.> 2) Start the engine, and drive the vehicle 10 minutes or more.	Does the malfunction indicator light illuminate or blink?	Go to step **14**.	Go to step **13**.

Step		Check	Yes	No
13	CHECK CAUSE OF MISFIRE.	Was the cause of misfire identified when the engine is running?	Finish diagnostics operation, if the engine has no abnormality.	Repair the poor contact of connector. NOTE: In this case, repair the following item: • Poor contact of ignition coil connector • Poor contact of fuel injector connector on faulty cylinders • Poor contact of ECM connector • Poor contact of coupling connector
14	CHECK AIR INTAKE SYSTEM.	Is there any fault in air intake system?	Repair the air intake system. NOTE: Check the following items. • Are there air leaks or air suction caused by loose or dislocated nuts and bolts? • Are there cracks or any disconnection of hoses?	Go to step **15**.
15	CHECK ALL CYLINDERS.	Is there a fault in any cylinder?	Repair or replace the faulty part of the faulty cylinder. NOTE: Check the following items. • Spark plug • Ignition coil • Fuel injector • Compression ratio • Skipping timing chain teeth	Go to DTC P0171. <Ref. to EN(H4DO HEV)(diag)-182, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BO:DTC P0301 CYLINDER 1 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4DO HEV)(diag)-206, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BP:DTC P0302 CYLINDER 2 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4DO HEV)(diag)-206, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BQ:DTC P0303 CYLINDER 3 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4DO HEV)(diag)-206, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BR:DTC P0304 CYLINDER 4 MISFIRE DETECTED

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- Immediately at fault recognition (A misfire which could damage catalyst occurs.)
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-89, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

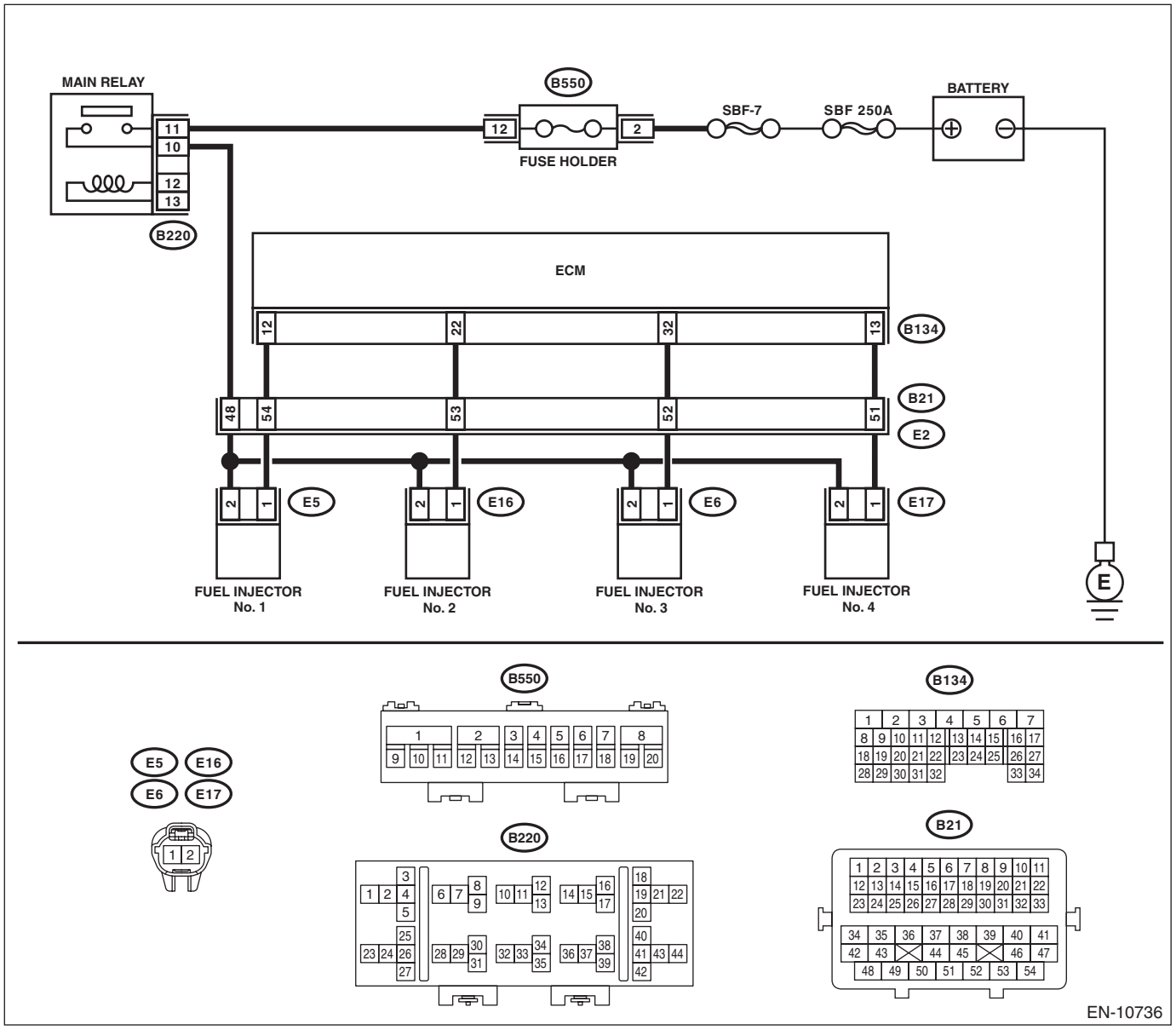
- Engine stalls.
- Improper idling
- Rough driving

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



Step		Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 12 (+) — Chassis ground (–):*** ***#2 (B134) No. 22 (+) — Chassis ground (–):*** ***#3 (B134) No. 32 (+) — Chassis ground (–):*** ***#4 (B134) No. 13 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **6**.	Go to step **2**.

	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Measure the resistance between fuel injector connector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 1 — Engine ground:*** ***#2 (E16) No. 1 — Engine ground:*** ***#3 (E6) No. 1 — Engine ground:*** ***#4 (E17) No. 1 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit to ground in harness between ECM connector and fuel injector connector.
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 12 — (E5) No. 1:*** ***#2 (B134) No. 22 — (E16) No. 1:*** ***#3 (B134) No. 32 — (E6) No. 1:*** ***#4 (B134) No. 13 — (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and fuel injector connector • Poor contact of coupling connector
4	**CHECK FUEL INJECTOR.** Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **5**.	Replace the faulty fuel injector. <Ref. to FU(H4DO(HEV))-69, Fuel Injector.>
5	**CHECK POWER SUPPLY LINE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel injector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Repair the poor contact of all connectors in fuel injector circuit.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between the main relay connector and fuel injector connector on faulty cylinders • Poor contact of coupling connector • Poor contact of main relay connector
6	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 12 (+) — Chassis ground (–):*** ***#2 (B134) No. 22 (+) — Chassis ground (–):*** ***#3 (B134) No. 32 (+) — Chassis ground (–):*** ***#4 (B134) No. 13 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power in harness between ECM connector and fuel injector connectors.	Go to step **7**.

	Step	Check	Yes	No
7	**CHECK FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **8**.	Replace the faulty fuel injector. <Ref. to FU(H4DO(HEV))-69, Fuel Injector.>
8	**CHECK INSTALLATION CONDITION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.**	Is the camshaft position sensor or crankshaft position sensor loosely installed?	Tighten the camshaft position sensor or crankshaft position sensor. <Ref. to FU(H4DO(HEV))-53, INSTALLATION, Camshaft Position Sensor.> <Ref. to FU(H4DO(HEV))-48, INSTALLATION, Crankshaft Position Sensor.>	Go to step **9**.
9	**CHECK CRANKSHAFT POSITION SENSOR PLATE.**	Is the crankshaft position sensor plate rusted or does it have broken teeth?	Replace the crankshaft position sensor plate. <Ref. to ME(H4DO(w/o HEV))-304, Cylinder Block.>	Go to step **10**.
10	**CHECK INSTALLATION CONDITION OF TIMING CHAIN.** Turn the crankshaft using ST, and align the alignment mark on crank sprocket with alignment mark on cylinder block. ST 18252AA000 CRANKSHAFT SOCKET	Is the timing chain dislocated from its proper position?	Correct the installation condition of timing chain. <Ref. to ME(H4DO(w/o HEV))-169, Timing Chain Assembly.>	Go to step **11**.
11	**CHECK FUEL LEVEL.**	Is the fuel meter indication higher than the “Lower” level?	Go to step **12**.	Refill the fuel so that the fuel meter indication is higher than the “Lower” level, and proceed to the next step. Go to step **12**.
12	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Clear the memory using the Subaru Select Monitor. <Ref. to EN(H4DO HEV)(diag)-66, Clear Memory Mode.> 2) Start the engine, and drive the vehicle 10 minutes or more.	Does the malfunction indicator light illuminate or blink?	Go to step **14**.	Go to step **13**.

Step		Check	Yes	No
13	CHECK CAUSE OF MISFIRE.	Was the cause of misfire identified when the engine is running?	Finish diagnostics operation, if the engine has no abnormality.	Repair the poor contact of connector. NOTE: In this case, repair the following item: • Poor contact of ignition coil connector • Poor contact of fuel injector connector on faulty cylinders • Poor contact of ECM connector • Poor contact of coupling connector
14	CHECK AIR INTAKE SYSTEM.	Is there any fault in air intake system?	Repair the air intake system. NOTE: Check the following items. • Are there air leaks or air suction caused by loose or dislocated nuts and bolts? • Are there cracks or any disconnection of hoses?	Go to step **15**.
15	CHECK CYLINDER.	Is there any fault in the cylinder?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Ignition coil • Fuel injector • Compression ratio • Skipping timing chain teeth	Go to DTC P0171. <Ref. to EN(H4DO HEV)(diag)-182, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BS:DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-90, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

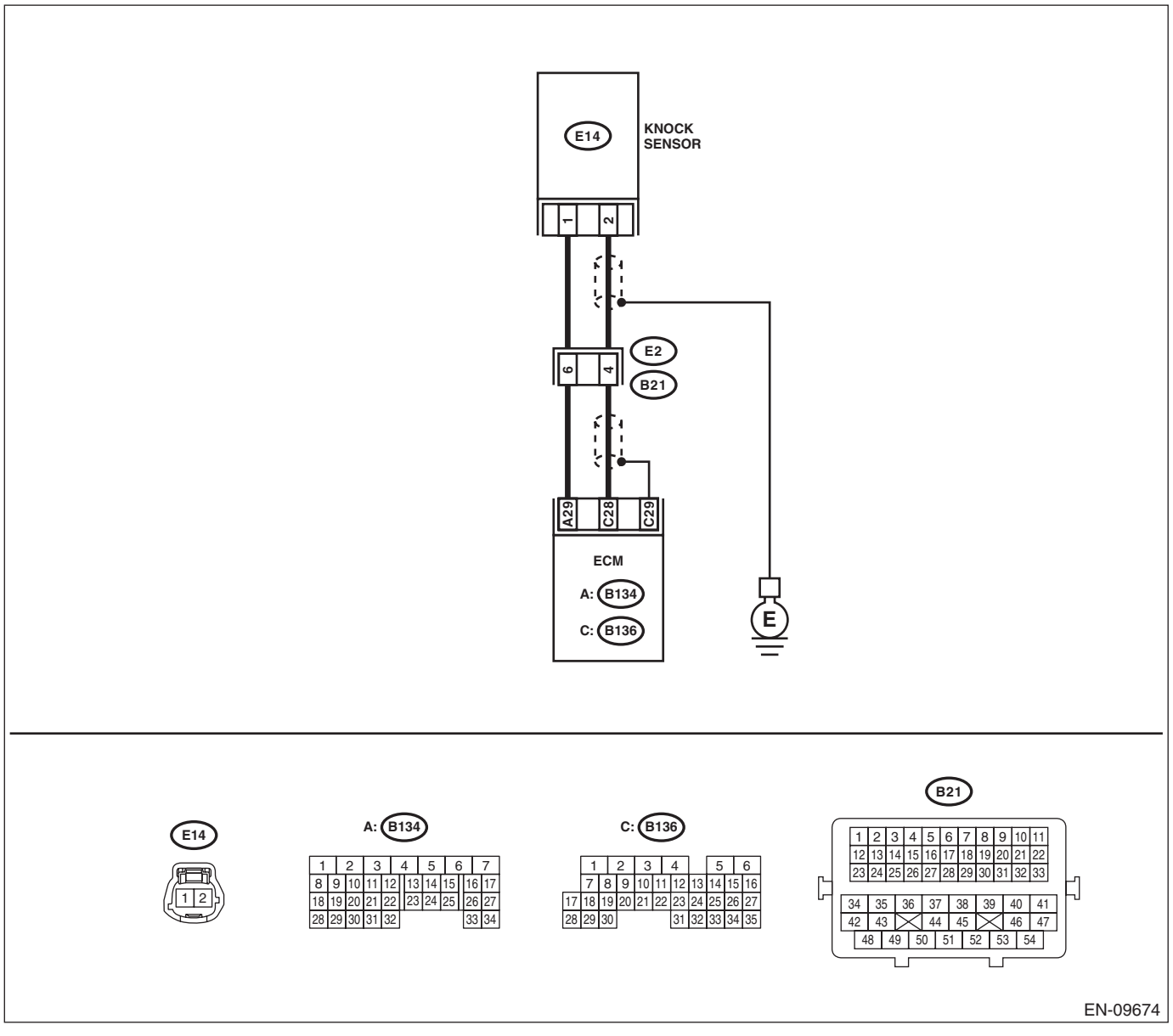
- Poor driving performance
- Knocking occurs

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 28 — (B134) No. 29:***	Is the resistance less than 500 kΩ?	Go to step **2**.	Go to step **3**.
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from the knock sensor. 2) Measure the resistance between knock sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 500 kΩ?	Replace the knock sensor. <Ref. to FU(H4DO(HEV))-59, Knock Sensor.>	Repair the short circuit to ground in harness between ECM connector and knock sensor connector. NOTE: The harness between both connectors are shielded. Remove the shield and repair the short circuit of harness.
3	**CHECK INPUT SIGNAL OF ECM.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 28 (+) — Chassis ground (–):***	Is the voltage 2 V or more?	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.	Repair the short circuit to ground in harness between ECM connector and knock sensor connector. NOTE: The harness between both connectors are shielded. Remove the shield and repair the short circuit of harness.

BT:DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-91, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

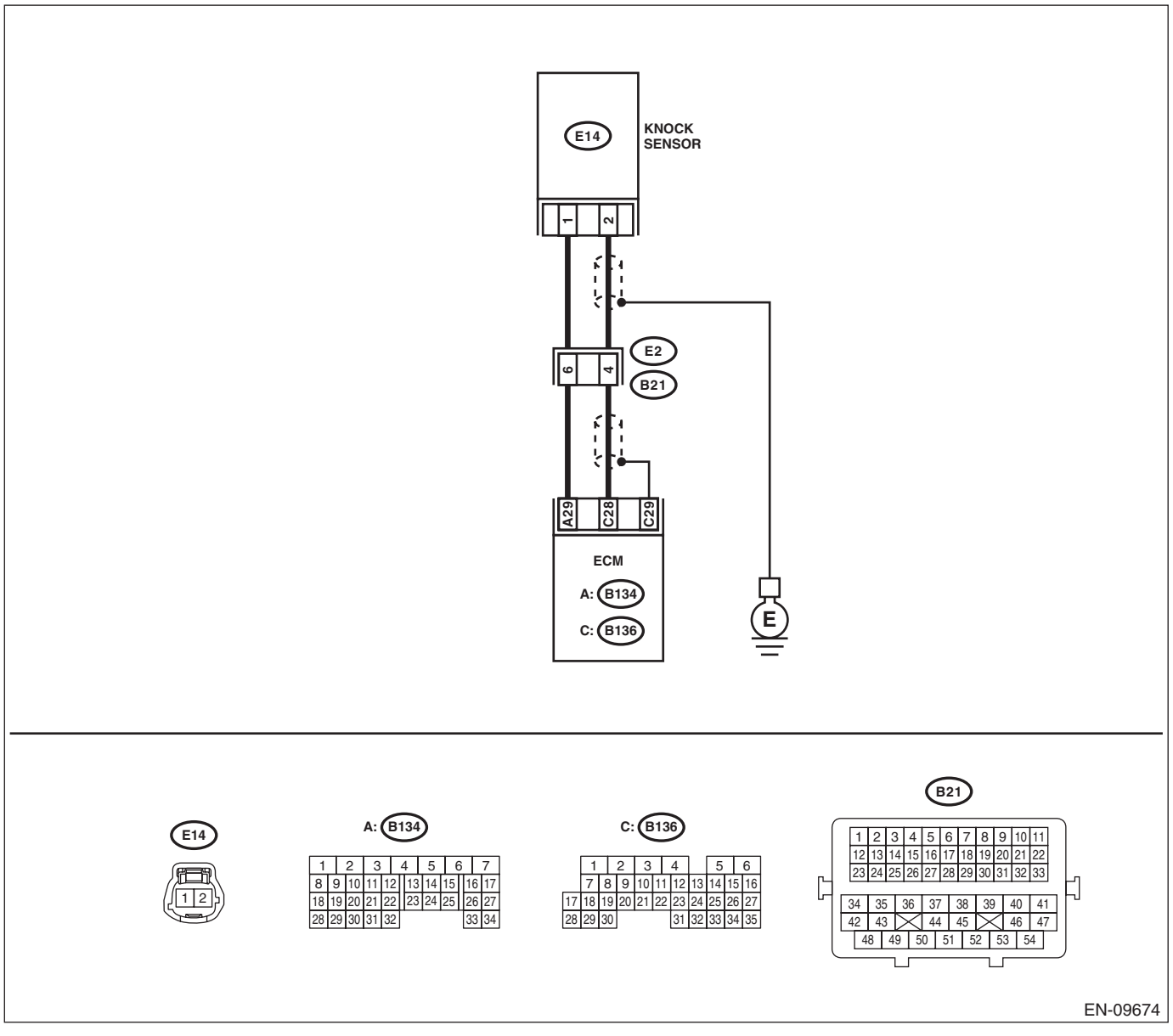
- Poor driving performance
- Knocking occurs

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 28 — (B134) No. 29:***	Is the resistance 600 kΩ or more?	Go to step **2**.	Repair the poor contact of ECM connector.
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from the knock sensor. 2) Measure the resistance between knock sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 600 kΩ or more?	Replace the knock sensor. <Ref. to FU(H4DO(HEV))-59, Knock Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and knock sensor connector • Poor contact of knock sensor connector • Poor contact of coupling connector

BU:DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-92, DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

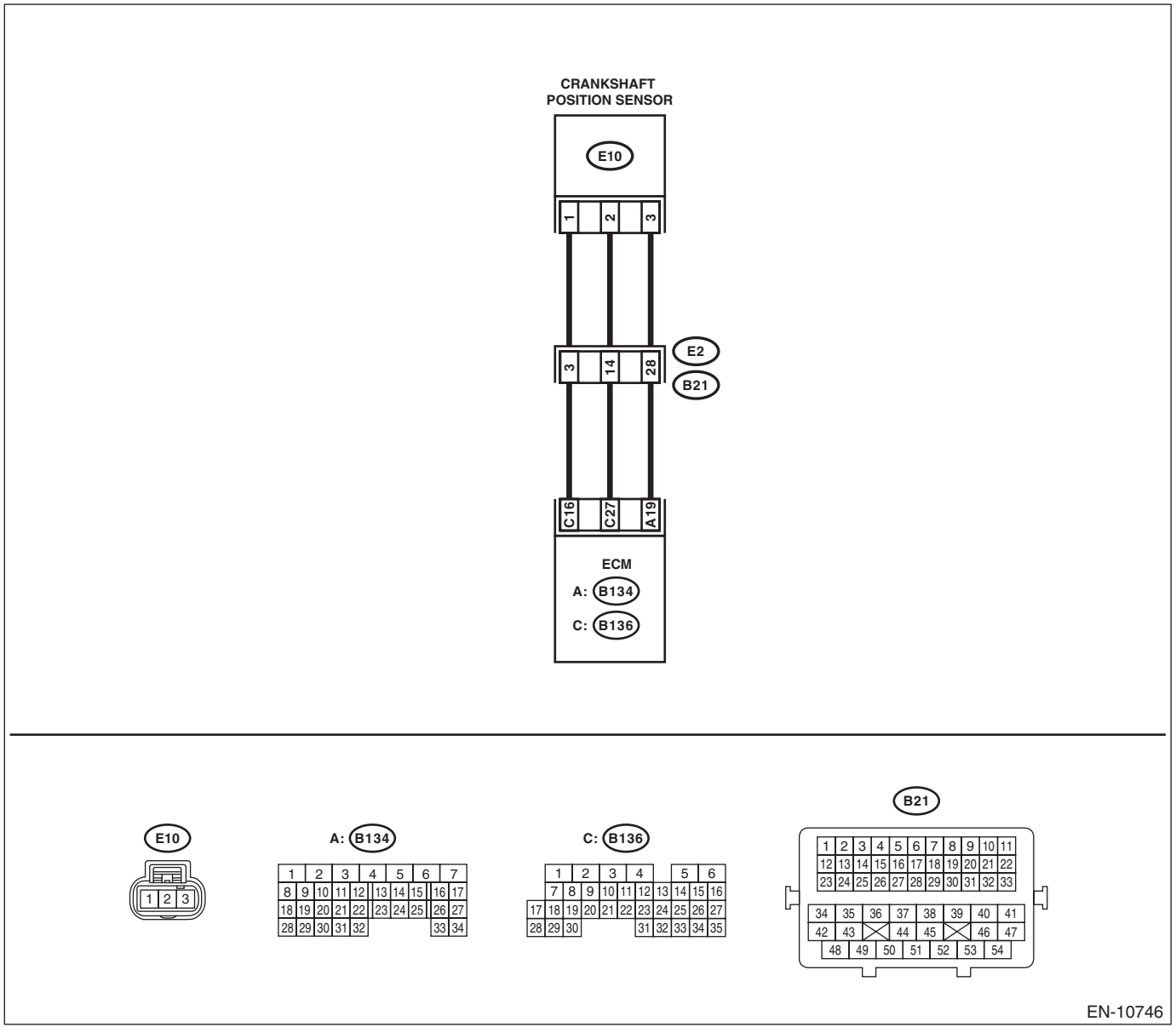
- Engine stalls.
- Failure of engine to start

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.**	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **2**.	Tighten the crankshaft position sensor installation bolt securely. <Ref. to FU(H4DO(HEV))-48, INSTALLATION, Crankshaft Position Sensor.>
2	**CHECK POWER SUPPLY OF CRANKSHAFT POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the crankshaft position sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 3 (+) — Engine ground (–):***	Is the voltage 4.5 V or more?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and crankshaft position sensor connector • Poor contact of ECM connector • Poor contact of coupling connector
3	**CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and crankshaft position sensor connector. ***Connector & terminal*** ***(B136) No. 16 — (E10) No. 1:*** ***(B136) No. 27 — (E10) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and crankshaft position sensor connector • Poor contact of coupling connector
4	**CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR.** Measure the resistance between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:*** ***(E10) No. 2 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair short circuit to ground in harness between ECM connector and crankshaft position sensor connector.
5	**CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR.** Measure the voltage between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 (+) — Engine ground (–):*** ***(E10) No. 2 (+) — Engine ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM connector and crankshaft position sensor connector.	Go to step **6**.

	Step	Check	Yes	No
6	**CHECK CRANKSHAFT POSITION SENSOR.** Check waveform of crankshaft position sensor. <Ref. to EN(H4DO HEV)(diag)-19, Control Module I/O Signal.>	Is there any abnormality in waveform?	Replace the crankshaft position sensor. <Ref. to FU(H4DO(HEV))-46, Crankshaft Position Sensor.>	Repair the following item. • Poor contact of ECM connector • Poor contact of crankshaft position sensor connector • Poor contact of coupling connector

BV:DTC P0336 CRANKSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-94, DTC P0336 CRANKSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.** Turn the ignition switch to OFF.	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **2**.	Tighten the crankshaft position sensor installation bolt securely. <Ref. to FU(H4DO(HEV))-48, INSTALLATION, Crankshaft Position Sensor.>
2	**CHECK CRANKSHAFT POSITION SENSOR PLATE.**	Is there crack or damage in the crankshaft position sensor plate teeth?	Replace the crankshaft position sensor plate. <Ref. to ME(H4DO(w/o HEV))-304, Cylinder Block.>	Go to step **3**.
3	**CHECK INSTALLATION CONDITION OF TIMING CHAIN.** Turn the crankshaft, and align alignment mark on crank sprocket with alignment mark on cylinder block. ST 18252AA000 CRANKSHAFT SOCKET	Is the timing chain dislocated from its proper position?	Correct the installation condition of timing chain. <Ref. to ME(H4DO(w/o HEV))-169, Timing Chain Assembly.>	Replace the crankshaft position sensor. <Ref. to FU(H4DO(HEV))-46, Crankshaft Position Sensor.>

BW:DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-96, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

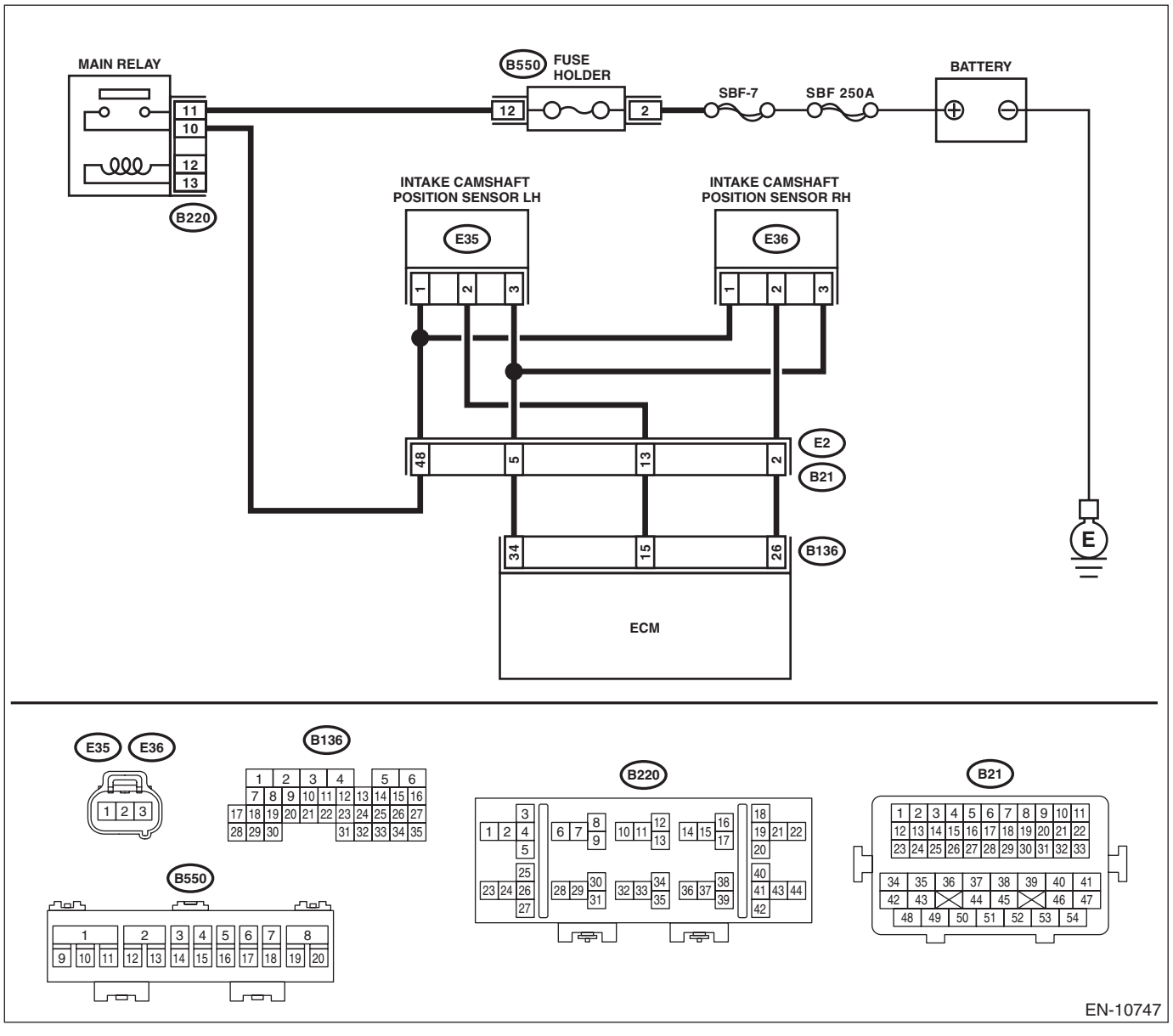
- Engine stalls.
- Failure of engine to start

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E36) No. 1 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit or short circuit to ground in harness between main relay connector and camshaft position sensor connector • Poor contact of coupling connector
2	**CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and camshaft position sensor connector. ***Connector & terminal*** ***(B136) No. 26 — (E36) No. 2:*** ***(B136) No. 34 — (E36) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and camshaft position sensor connector • Poor contact of coupling connector
3	**CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.** Measure the resistance between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E36) No. 2 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair short circuit to ground in harness between ECM connector and camshaft position sensor connector.
4	**CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.** Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E36) No. 2 (+) — Engine ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM connector and camshaft position sensor connector.	Go to step **5**.
5	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **6**.	Tighten the camshaft position sensor installation bolt securely. <Ref. to FU(H4DO(HEV))-53, INSTALLATION, Camshaft Position Sensor.>
6	**CHECK CAMSHAFT POSITION SENSOR.** Check the waveform of the camshaft position sensor. <Ref. to EN(H4DO HEV)(diag)-19, ENGINE CONTROL MODULE (ECM), ELECTRICAL SPECIFICATION, Control Module I/O Signal.>	Is there any abnormality in waveform?	Replace the camshaft position sensor. <Ref. to FU(H4DO(HEV))-52, Camshaft Position Sensor.>	Repair the following item. • Poor contact of ECM connector • Poor contact of camshaft position sensor connector • Poor contact of coupling connector

BX:DTC P0341 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR)

NOTE:
For the diagnostic procedure, refer to DTC P0340. <Ref. to EN(H4DO HEV)(diag)-219, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BY:DTC P0345 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 2)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-99, DTC P0345 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

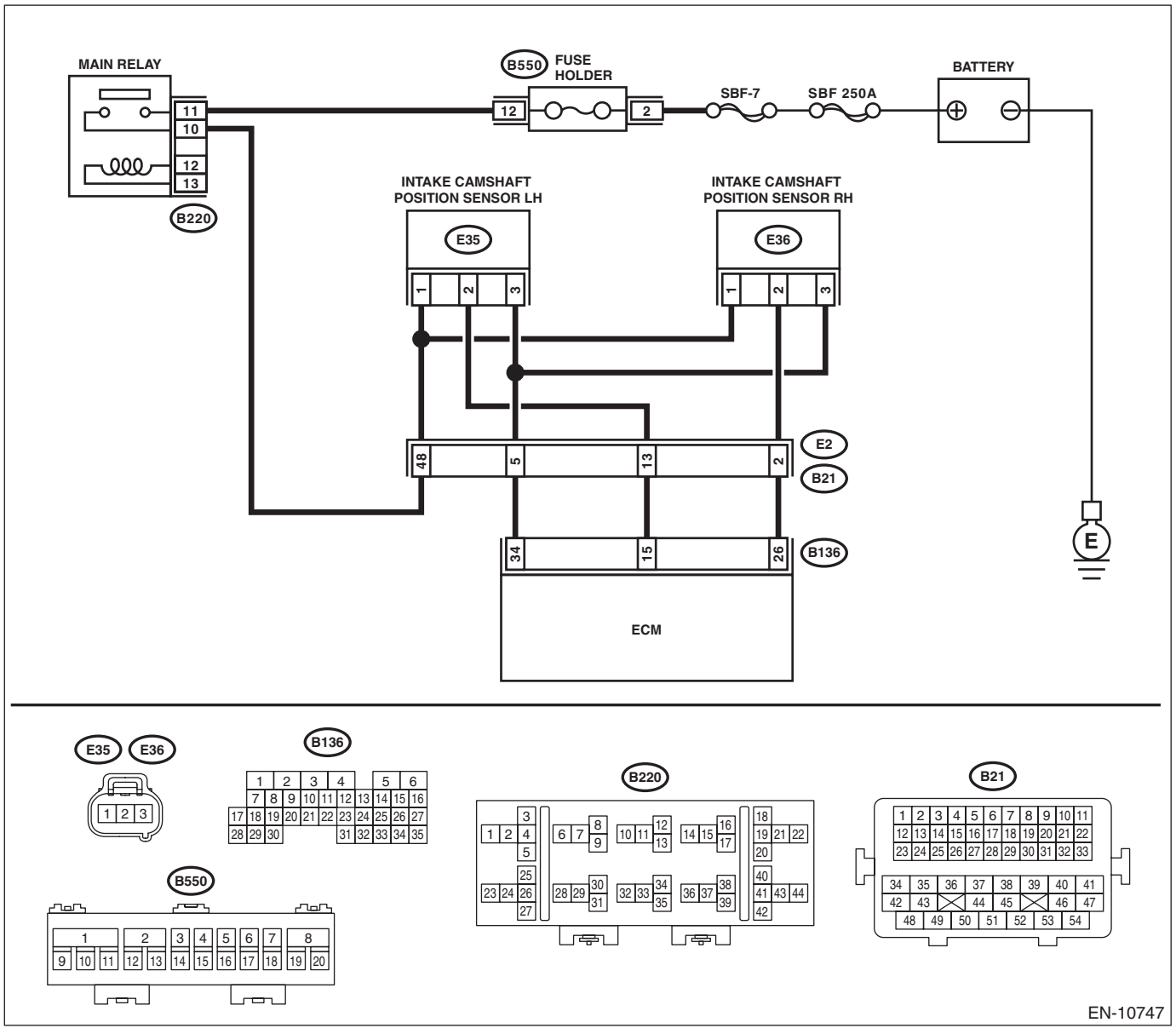
- Engine stalls.
- Failure of engine to start

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E35) No. 1 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit or short circuit to ground in harness between main relay connector and camshaft position sensor connector • Poor contact of coupling connector
2	**CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and camshaft position sensor connector. ***Connector & terminal*** ***(B136) No. 15 — (E35) No. 2:*** ***(B136) No. 34 — (E35) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and camshaft position sensor connector • Poor contact of coupling connector
3	**CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.** Measure the resistance between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E35) No. 2 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair short circuit to ground in harness between ECM connector and camshaft position sensor connector.
4	**CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.** Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E35) No. 2 (+) — Engine ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM connector and camshaft position sensor connector.	Go to step **5**.
5	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **6**.	Tighten the camshaft position sensor installation bolt securely. <Ref. to FU(H4DO(HEV))-53, INSTALLATION, Camshaft Position Sensor.>
6	**CHECK CAMSHAFT POSITION SENSOR.** Check the waveform of the camshaft position sensor. <Ref. to EN(H4DO HEV)(diag)-19, ENGINE CONTROL MODULE (ECM), ELECTRICAL SPECIFICATION, Control Module I/O Signal.>	Is there any abnormality in waveform?	Replace the camshaft position sensor. <Ref. to FU(H4DO(HEV))-52, Camshaft Position Sensor.>	Repair the following item. • Poor contact of ECM connector • Poor contact of camshaft position sensor connector • Poor contact of coupling connector

BZ:DTC P0346 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE (BANK 2)

NOTE:
For the diagnostic procedure, refer to DTC P0345. <Ref. to EN(H4DO HEV)(diag)-222, DTC P0345 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CA:DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-100, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

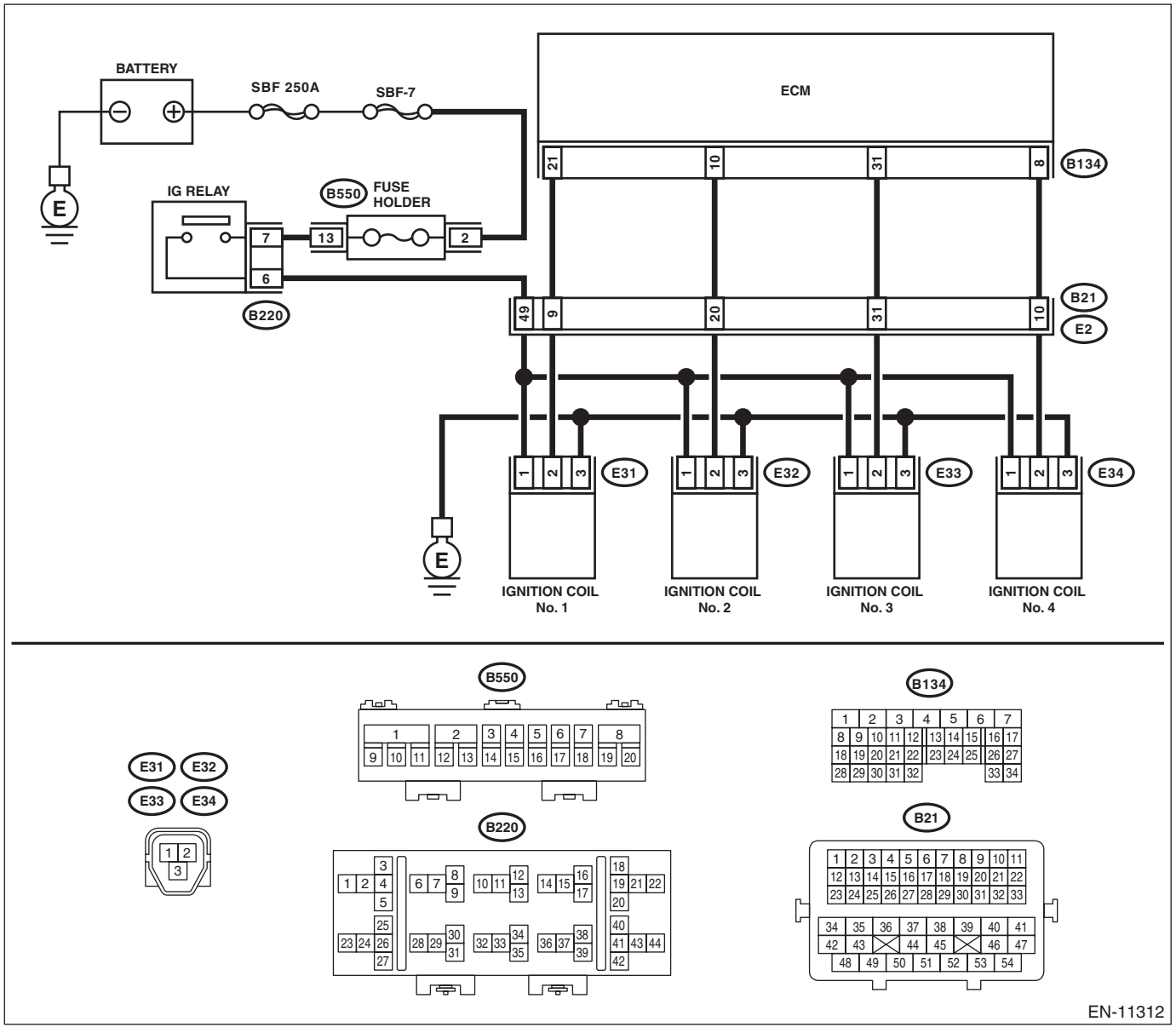
- Improper idling
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK IGNITION COIL POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition coil. 3) Turn the ignition switch to ON. 4) Measure the voltage between ignition coil connector and engine ground. ***Connector & terminal*** ***DTC P0351; (E31) No. 1 (+) — Engine ground (–):*** ***DTC P0352; (E32) No. 1 (+) — Engine ground (–):*** ***DTC P0353; (E33) No. 1 (+) — Engine ground (–):*** ***DTC P0354; (E34) No. 1 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit or short circuit to ground in harness of power supply circuit • Blown out of fuse • Poor contact of IG relay connector • Poor contact of coupling connector • Faulty IG relay
2	**CHECK HARNESS OF IGNITION COIL GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between ignition coil connector and engine ground. ***Connector & terminal*** ***DTC P0351; (E31) No. 3 — Engine ground:*** ***DTC P0352; (E32) No. 3 — Engine ground:*** ***DTC P0353; (E33) No. 3 — Engine ground:*** ***DTC P0354; (E34) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3**.	Repair the open circuit in harness between ignition coil connector and engine grounding terminal.
3	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ignition coil connector and engine ground. ***Connector & terminal*** ***DTC P0351; (E31) No. 2 — Engine ground:*** ***DTC P0352; (E32) No. 2 — Engine ground:*** ***DTC P0353; (E33) No. 2 — Engine ground:*** ***DTC P0354; (E34) No. 2 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the ground short circuit of harness between ECM connector and ignition coil connector.
4	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR.** Measure the resistance of harness between ECM connector and ignition coil connector. ***Connector & terminal*** ***DTC P0351; (B134) No. 21 — (E31) No. 2:*** ***DTC P0352; (B134) No. 10 — (E32) No. 2:*** ***DTC P0353; (B134) No. 31 — (E33) No. 2:*** ***DTC P0354; (B134) No. 8 — (E34) No. 2:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and the ignition coil connector • Poor contact of coupling connector
5	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Go to step **6**.
6	**CHECK SPARK PLUG CONDITION.** 1) Remove the spark plug of the corresponding cylinder. <Ref. to IG(H4DO(w/o HEV))-4, REMOVAL, Spark Plug.> 2) Check the spark plug condition. <Ref. to IG(H4DO(w/o HEV))-7, INSPECTION, Spark Plug.>	Is the spark plug condition normal?	Replace the ignition coil. <Ref. to IG(H4DO(w/o HEV))-12, Ignition Coil.>	Replace the spark plug. <Ref. to IG(H4DO(w/o HEV))-4, Spark Plug.>

CB:DTC P0352 IGNITION COIL B PRIMARY/SECONDARY CIRCUIT

NOTE:
For the diagnostic procedure, refer to DTC P0351. <Ref. to EN(H4DO HEV)(diag)-225, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CC:DTC P0353 IGNITION COIL C PRIMARY/SECONDARY CIRCUIT

NOTE:
For the diagnostic procedure, refer to DTC P0351. <Ref. to EN(H4DO HEV)(diag)-225, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CD:DTC P0354 IGNITION COIL D PRIMARY/SECONDARY CIRCUIT

NOTE:
For the diagnostic procedure, refer to DTC P0351. <Ref. to EN(H4DO HEV)(diag)-225, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CE:DTC P0365 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 1)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-101, DTC P0365 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

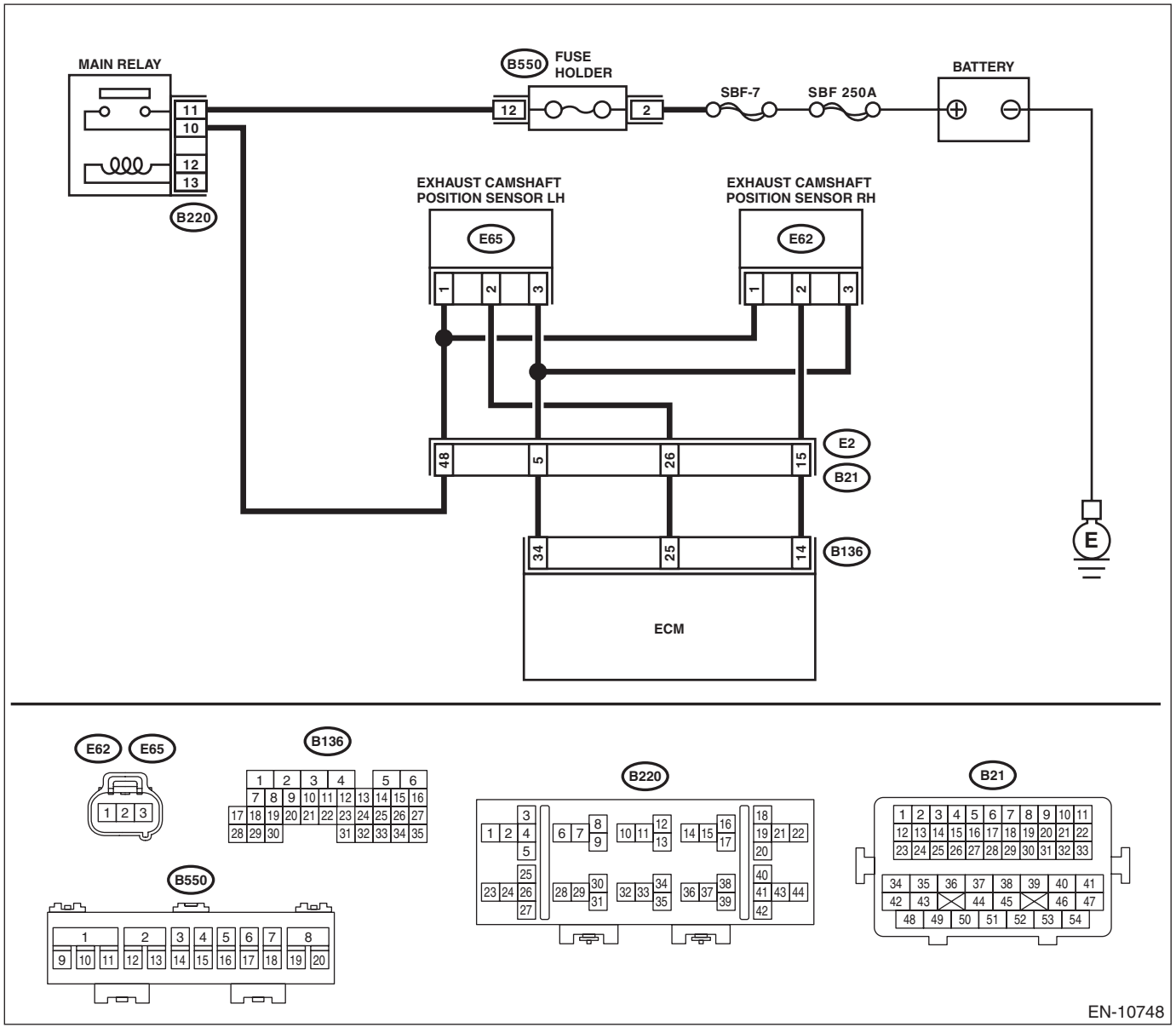
- Engine stalls.
- Failure of engine to start

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E62) No. 1 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit or short circuit to ground in harness between main relay connector and camshaft position sensor connector • Poor contact of coupling connector
2	**CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and camshaft position sensor connector. ***Connector & terminal*** ***(B136) No. 14 — (E62) No. 2:*** ***(B136) No. 34 — (E62) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and camshaft position sensor connector • Poor contact of coupling connector
3	**CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.** Measure the resistance between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E62) No. 2 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair short circuit to ground in harness between ECM connector and camshaft position sensor connector.
4	**CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.** Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E62) No. 2 (+) — Engine ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM connector and camshaft position sensor connector.	Go to step **5**.
5	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **6**.	Tighten the camshaft position sensor installation bolt securely. <Ref. to FU(H4DO(HEV))-53, INSTALLATION, Camshaft Position Sensor.>
6	**CHECK CAMSHAFT POSITION SENSOR.** Check the waveform of the camshaft position sensor. <Ref. to EN(H4DO HEV)(diag)-19, ENGINE CONTROL MODULE (ECM), ELECTRICAL SPECIFICATION, Control Module I/O Signal.>	Is there any abnormality in waveform?	Replace the camshaft position sensor. <Ref. to FU(H4DO(HEV))-52, Camshaft Position Sensor.>	Repair the following item. • Poor contact of ECM connector • Poor contact of camshaft position sensor connector • Poor contact of coupling connector

CF:DTC P0366 CAMSHAFT POSITION SENSOR B CIRCUIT RANGE/PERFORMANCE (BANK 1)

NOTE:
For the diagnostic procedure, refer to DTC P0365. <Ref. to EN(H4DO HEV)(diag)-228, DTC P0365 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CG:DTC P0390 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 2)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-103, DTC P0390 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

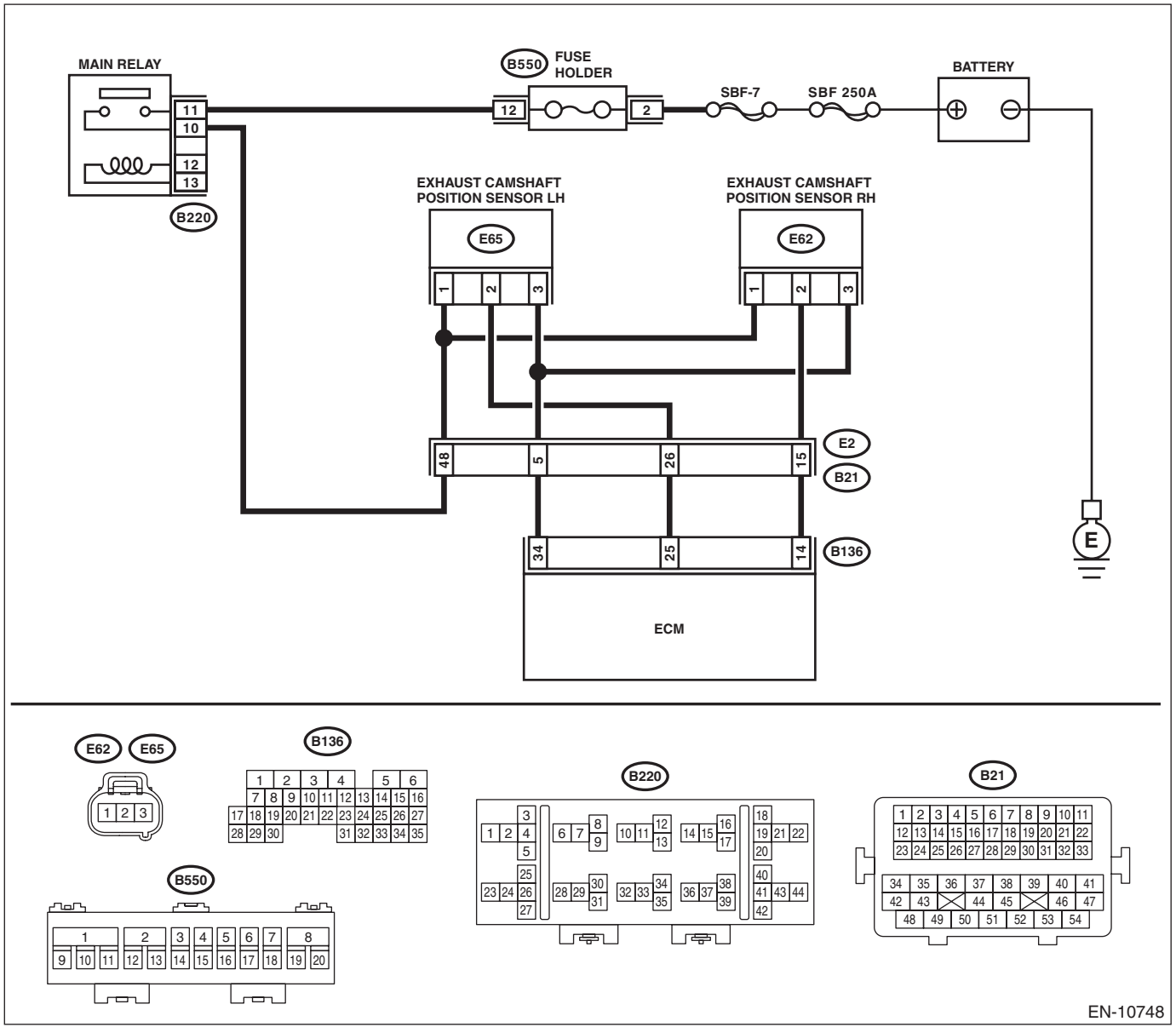
- Engine stalls.
- Failure of engine to start

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E65) No. 1 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit or short circuit to ground in harness between main relay connector and camshaft position sensor connector • Poor contact of coupling connector
2	**CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and camshaft position sensor connector. ***Connector & terminal*** ***(B136) No. 25 — (E65) No. 2:*** ***(B136) No. 34 — (E65) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and camshaft position sensor connector • Poor contact of coupling connector
3	**CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.** Measure the resistance between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E65) No. 2 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair short circuit to ground in harness between ECM connector and camshaft position sensor connector.
4	**CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.** Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E65) No. 2 (+) — Engine ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM connector and camshaft position sensor connector.	Go to step **5**.
5	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **6**.	Tighten the camshaft position sensor installation bolt securely. <Ref. to FU(H4DO(HEV))-53, INSTALLATION, Camshaft Position Sensor.>
6	**CHECK CAMSHAFT POSITION SENSOR.** Check the waveform of the camshaft position sensor. <Ref. to EN(H4DO HEV)(diag)-19, ENGINE CONTROL MODULE (ECM), ELECTRICAL SPECIFICATION, Control Module I/O Signal.>	Is there any abnormality in waveform?	Replace the camshaft position sensor. <Ref. to FU(H4DO(HEV))-52, Camshaft Position Sensor.>	Repair the following item. • Poor contact of ECM connector • Poor contact of camshaft position sensor connector • Poor contact of coupling connector

CH:DTC P0391 CAMSHAFT POSITION SENSOR B CIRCUIT RANGE/PERFORMANCE (BANK 2)

NOTE:
For the diagnostic procedure, refer to DTC P0390. <Ref. to EN(H4DO HEV)(diag)-231, DTC P0390 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CI: DTC P0400 EXHAUST GAS RECIRCULATION FLOW

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-104, DTC P0400 EXHAUST GAS RECIRCULATION FLOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Movement performance problem when engine is low speed
- Improper idling
- Movement performance problem

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the value of «Mani. Absolute Pressure» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Mani. Absolute Pressure» 53.3 kPa (400 mmHg, 15.75 inHg) or more?	Make sure that the EGR control valve, manifold absolute pressure sensor and throttle body are installed securely.	Go to step **2**.
2	**CHECK EGR CONTROL VALVE.** Remove the EGR control valve.	Are there any holes, clogged lines or foreign matters in the EGR system?	Repair the EGR system.	Replace EGR control valve. <Ref. to EC(H4DO(HEV))-26, EGR Control Valve.>

CJ:DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-106, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

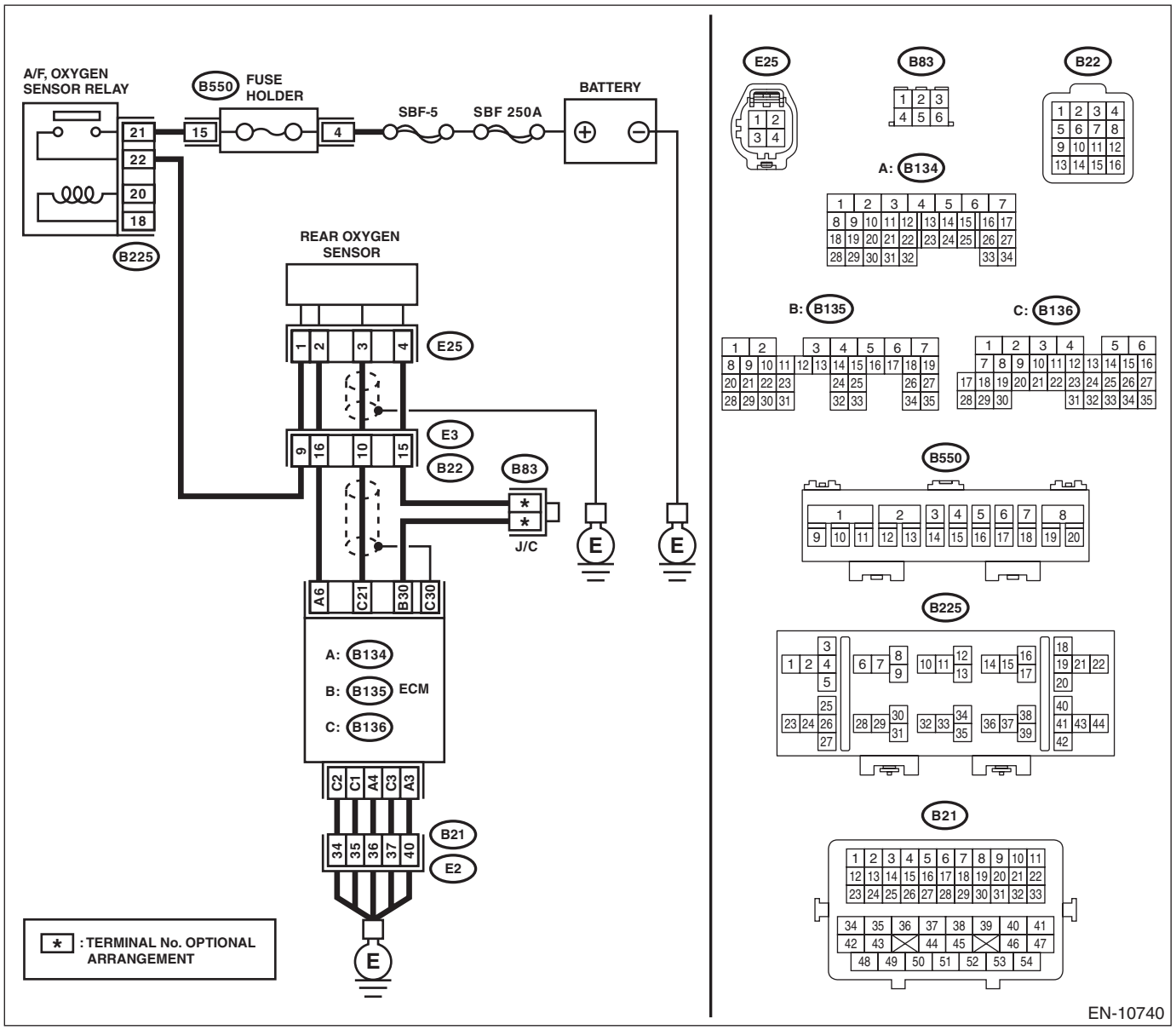
- Engine stalls.
- Idle mixture is out of specifications.

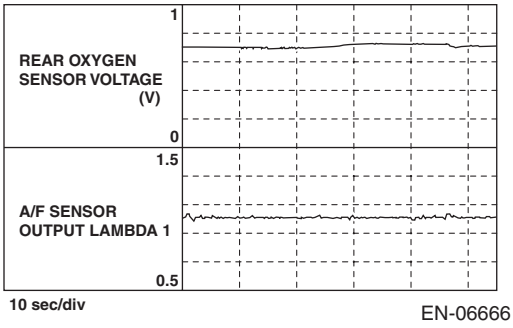
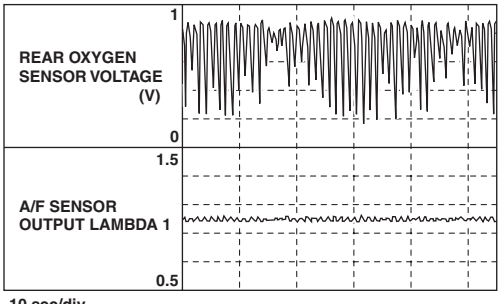
CAUTION:

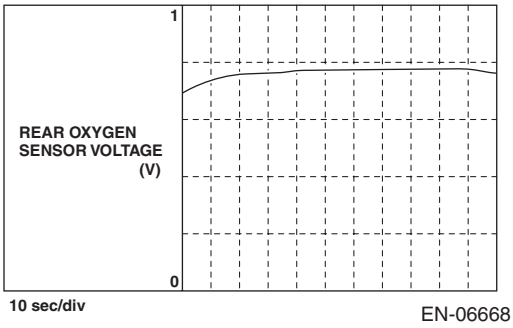
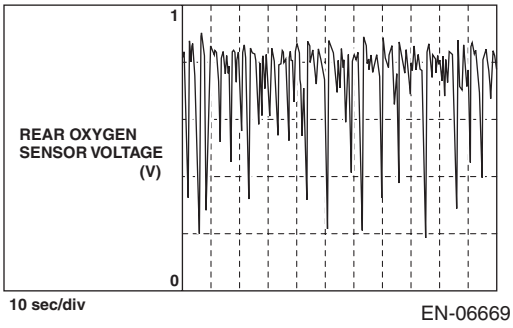
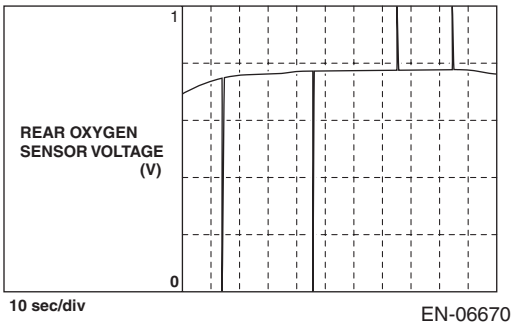
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK EXHAUST SYSTEM.** Check for gas leaks or air suction caused by loose or dislocated nuts and bolts, and open hole at exhaust pipes. NOTE: Check the following positions. • Between cylinder head and front exhaust pipe • Between front exhaust pipe and front catalytic converter • Between front catalytic converter and rear catalytic converter • Loose or improperly attached front oxygen (A/F) sensor or rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace the exhaust system. <Ref. to EX(H4DO(w/o HEV))-2, General Description.>	Go to step **2**.
2	**CHECK WAVEFORM DATA ON THE SUBARU SELECT MONITOR (WHILE DRIVING).** 1) Drive at a constant speed between 80 — 112 km/h (50 — 70 MPH). 2) After 5 minutes have elapsed in the condition of step 1), use the Subaru Select Monitor while still driving to read the waveform data. • At normal condition  EN-06666 • At abnormal condition (numerous inversion)  EN-06667	Is a normal waveform displayed?	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.	Go to step **3**.

	Step	Check	Yes	No
3	**CHECK WAVEFORM DATA ON THE SUBARU SELECT MONITOR (WHILE IDLING).** 1) Run the engine at idle. 2) In the condition of step 1), use the Subaru Select Monitor to read the waveform data. • At normal condition  EN-06668 • At abnormal condition 1 (numerous inversion)  EN-06669 • At abnormal condition 2 (noise input)  EN-06670	Is a normal waveform displayed?	Go to step **4**.	• The waveform is displayed at abnormal condition 1: Go to step **4**. • The waveform is displayed at abnormal condition 2: Go to step **5**.
4	**CHECK CATALYTIC CONVERTER.**	Is the catalytic converter damaged?	Replace the catalytic converter. <Ref. to EC(H4DO(HEV))-6, Front Catalytic Converter.>	Go to step **5**.
5	**CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.**	Has water entered the connector?	Completely remove any water inside.	Go to step **6**.

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM connector and rear oxygen sensor connector. ***Connector & terminal*** ***(B136) No. 21 — (E25) No. 3:*** ***(B135) No. 30 — (E25) No. 4:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair the harness and connector. NOTE: Repair the following locations. • Open circuit in harness between ECM connector and rear oxygen sensor connector • Poor contact of coupling connector
7	**CHECK REAR OXYGEN SENSOR SHIELD.** 1) Turn the ignition switch to OFF. 2) Expose the rear oxygen sensor connector body side harness sensor shield. 3) Measure the resistance between sensor shield and chassis ground.	Is the resistance less than 1 Ω?	Go to step **8**.	Repair the open circuit of rear oxygen sensor harness.
8	**CHECK ENGINE OIL AMOUNT AND EXHAUST GAS.** 1) Check the engine oil amount. <Ref. to LU(H4DO(w/o HEV))-12, INSPECTION, Engine Oil.> 2) Check exhaust gas during idling.	Does the engine oil amount drop or white smoke emit from the muffler?	Check the engine, and repair the defective part. <Ref. to ME(H4DO(w/o HEV))-421, INSPECTION, Engine Trouble in General.> After repairing the engine, replace the front catalytic converter. <Ref. to EX(H4DO(w/o HEV))-6, Front Exhaust Pipe.> After the catalytic converter is replaced, perform step 2 to check the normal waveform is displayed, and then exit the procedure.	Go to step **9**.
9	**CHECK IGNITION SYSTEM.** 1) Check the spark plug. <Ref. to IG(H4DO(w/o HEV))-7, INSPECTION, Spark Plug.> 2) Check the status of the ignition coil connector and the spark plug terminal.	Is there any fault in the ignition system?	After repairing the ignition system, replace the front catalytic converter. <Ref. to EX(H4DO(w/o HEV))-6, Front Exhaust Pipe.> After the catalytic converter is replaced, perform step 2 to check the normal waveform is displayed, and then exit the procedure.	Go to step **10**.

	Step	Check	Yes	No
10	**CHECK FUEL SYSTEM.** 1) Refer to and check the items in “Insufficient fuel supply to fuel injector (except for “a. Fuel pump does not operate.”)” and “Leakage or blow out of fuel”. <Ref. to FU(H4DO(HEV))-158, INSPECTION, Fuel System Trouble in General.> 2) Check throttle body. <Ref. to FU(H4DO(HEV))-17, INSPECTION, Throttle Body.> 3) Check intake manifold. <Ref. to FU(H4DO(HEV))-33, INSPECTION, Intake Manifold.>	Is there any fault in the fuel system?	After repairing the fuel system, replace the front catalytic converter. <Ref. to EX(H4DO(w/o HEV))-6, Front Exhaust Pipe.> After the catalytic converter is replaced, perform step 2 to check the normal waveform is displayed, and then exit the procedure.	Go to step **11**.
11	**CHECK DTC.**	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).> After checking the DTC, replace the front catalytic converter. <Ref. to EX(H4DO(w/o HEV))-6, Front Exhaust Pipe.> After the catalytic converter is replaced, perform step 2 to check the normal waveform is displayed, and then exit the procedure.	Replace the rear oxygen sensor. <Ref. to FU(H4DO(HEV))-82, Rear Oxygen Sensor.>

CK:DTC P0441 EVAPORATIVE EMISSION CONT. SYS. INCORRECT PURGE FLOW

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-108, DTC P0441 EVAPORATIVE EMISSION CONT. SYS. INCORRECT PURGE FLOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

Improper idling

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK PURGE CONTROL SOLENOID VALVE.** Operate the purge control solenoid valve using the Subaru Select Monitor. NOTE: For detailed procedures, refer to “System Operation Check Mode”. <Ref. to EN(H4DO HEV)(diag)-67, System Operation Check Mode.>	Does the purge control solenoid valve operate?	Go to step **3**.	Replace the purge control solenoid valve. <Ref. to EC(H4DO(HEV))-21, Purge Control Solenoid Valve.>
3	**CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.** Turn the ignition switch to OFF.	Are there holes, cracks, clogging, or disconnection, misconnection of hoses or pipes in evaporative emission control system?	Repair or replace the hoses or pipes.	Repair the poor contact of ECM connector.

CL:DTC P0451 EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/ SWITCH RANGE/PERFORMANCE

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-111, DTC P0451 EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK CURRENT DATA.** 1) Turn the ignition switch to ON (engine OFF). 2) Using the Subaru Select Monitor or general scan tool, read the value in «Absolute Evap Sys. Pressure» and «Mani. Absolute Pressure», and compare them with the actual atmospheric pressure. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual. • To read the actual atmospheric pressure, connect the Subaru Select Monitor or general scan tool to the other known good vehicle.	Is the difference with the actual atmospheric pressure 2.4 kPa (17.8 mmHg, 0.7 inHg) or more?	Replace the part that showed larger deviation from the actual atmospheric pressure than the other. • If deviations in value for «Absolute Evap Sys. Pressure» is larger: Replace the leak check valve assembly. <Ref. to EC(H4DO(HEV))-39, Leak Check Valve Assembly.> • If deviations in value for «Mani. Absolute Pressure» is larger: Replace the manifold absolute pressure sensor. <Ref. to FU(H4DO(HEV))-66, Manifold Absolute Pressure Sensor.>	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.

CM:DTC P0452 EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/ SWITCH LOW

DTC DETECTING CONDITION:

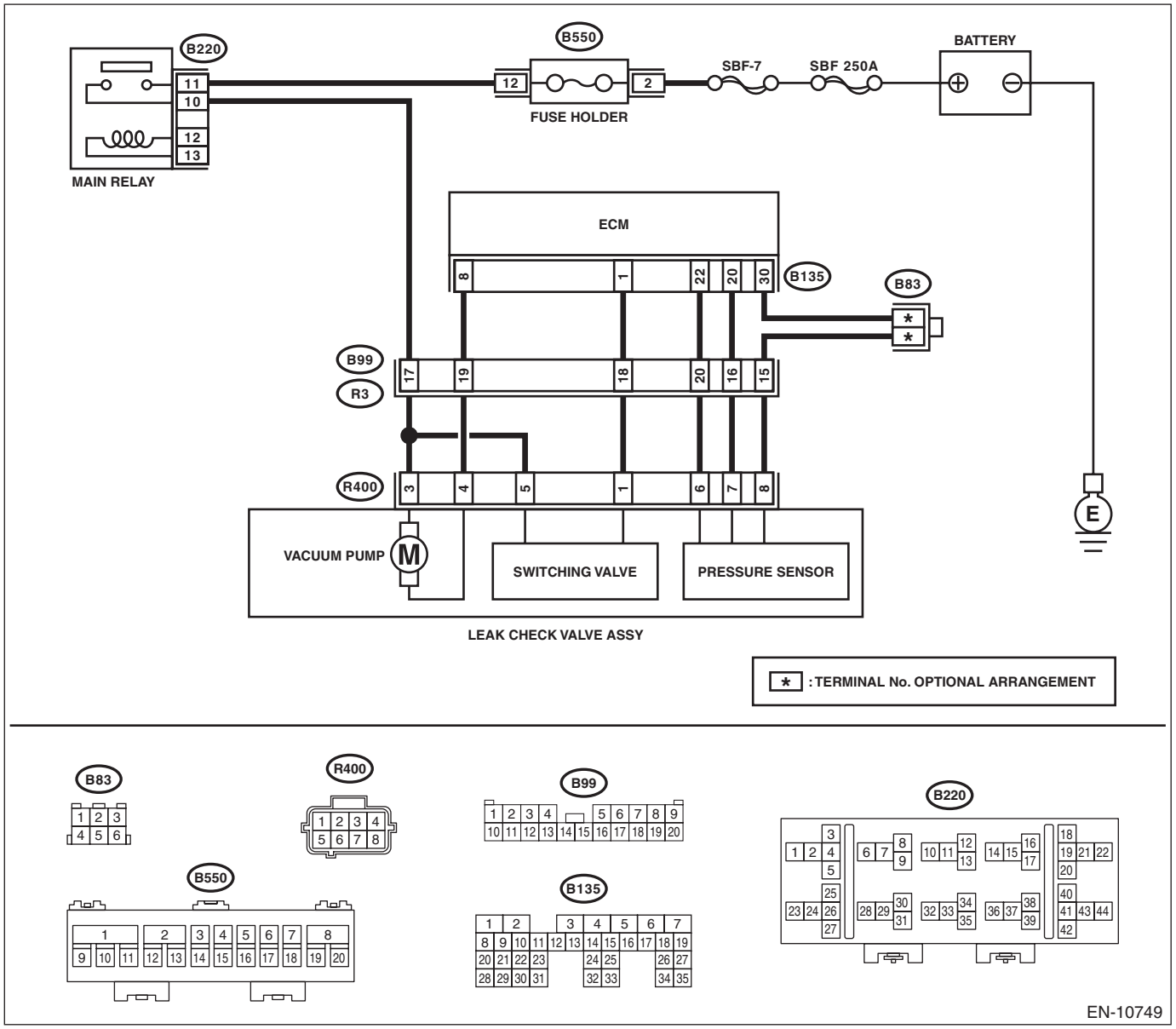
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-113, DTC P0452 EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Turn the ignition switch to ON. 2) Read the value of «Atmosphere Pressure» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value in «Atmosphere Pressure» 34 kPa (255 mmHg, 10 inHg) or less?	Go to step **2**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
2	**CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the leak check valve assembly. 3) Turn the ignition switch to ON. 4) Measure the voltage between the leak check valve assembly connector and chassis ground. ***Connector & terminal*** ***(R400) No. 6 (+) — Chassis ground (–):***	Is the voltage 4.5 V or more?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and the leak check valve assembly connector • Poor contact of ECM connector • Poor contact of coupling connector
3	**CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 20 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit to ground in harness between ECM connector and leak check valve assembly connector.
4	**CHECK FOR POOR CONTACT.** Check for poor contact of leak check valve assembly connector.	Is there poor contact in the leak check valve assembly connector?	Repair the poor contact in the leak check valve assembly connector.	Replace the leak check valve assembly. <Ref. to EC(H4DO(HEV))-39, Leak Check Valve Assembly.>

CN:DTC P0453 EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/ SWITCH HIGH

DTC DETECTING CONDITION:

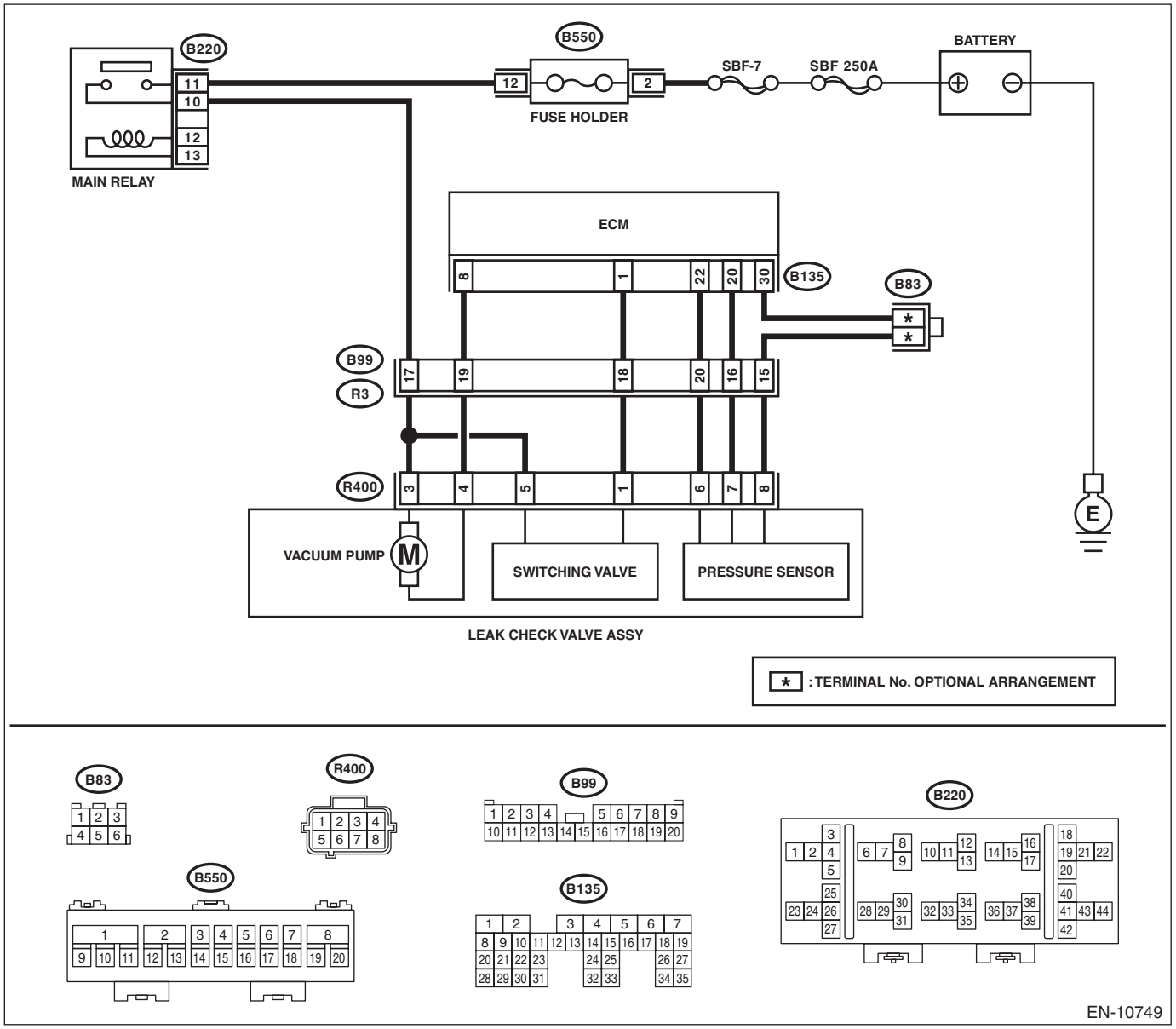
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-114, DTC P0453 EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Turn the ignition switch to ON. 2) Read the value of «Atmosphere Pressure» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value in «Atmosphere Pressure» 125 kPa (938 mmHg, 36.9 inHg) or more?	Go to step **2**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
2	**CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and the leak check valve assembly. 3) Measure the resistance of harness between ECM connector and the leak check valve assembly connector. ***Connector & terminal*** ***(B135) No. 20 — (R400) No. 7:*** ***(B135) No. 30 — (R400) No. 8:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and the leak check valve assembly connector • Poor contact of coupling connector • Poor contact of joint connector
3	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM and the leak check valve assembly connector.	Is there poor contact in ECM and the leak check valve assembly connector?	Repair the poor contact of ECM and the leak check valve assembly connector.	Go to step **4**.
4	**CHECK LEAK CHECK VALVE ASSEMBLY.** Check the pressure sensor of the leak check valve assembly. <Ref. to EC(H4DO(HEV))-49, CHECK PRESSURE SENSOR, INSPECTION, Leak Check Valve Assembly.>	Is the pressure sensor of the leak check valve assembly OK?	Repair the short circuit to power in harness between ECM connector and leak check valve assembly connector.	Replace the leak check valve assembly. <Ref. to EC(H4DO(HEV))-39, Leak Check Valve Assembly.>

CO:DTC P0455 EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (LARGE LEAK)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-115, DTC P0455 EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (LARGE LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Fuel odor
- There is a hole of more than 1.0 mm (0.04 in) dia. in evaporation system or fuel tank.
- Fuel filler cap loose or lost

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FUEL FILLER CAP.** 1) Turn the ignition switch to OFF. 2) Check the fuel filler cap. NOTE: The DTC is stored in memory if fuel filler cap is or was loose or if the cap chain has caught while tightening.	Is the fuel filler cap tightened securely?	Go to step **2**.	Tighten fuel filler cap securely.
2	**CHECK FUEL FILLER CAP.**	Is the fuel filler cap genuine?	Go to step **3**.	Replace with a genuine fuel filler cap.
3	**CHECK FUEL FILLER PIPE GASKET.**	Is there any damage to the seal between fuel filler cap and fuel filler pipe?	Repair or replace the fuel filler cap and fuel filler pipe. <Ref. to FU(H4DO(HEV))-118, Fuel Filler Pipe.>	Go to step **4**.
4	**CHECK PURGE CONTROL SOLENOID VALVE.** Check air-tightness of the purge control solenoid valve. <Ref. to EC(H4DO(HEV))-24, INSPECTION, Purge Control Solenoid Valve.>	Is the purge control solenoid valve OK?	Go to step **5**.	Replace the purge control solenoid valve. <Ref. to EC(H4DO(HEV))-21, Purge Control Solenoid Valve.>
5	**CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.**	Are there holes on the evaporation line?	Repair or replace the evaporation line. <Ref. to FU(H4DO(HEV))-149, Fuel Delivery and Evaporation Lines.>	Go to step **6**.
6	**CHECK CANISTER.**	Are there holes on the canister?	Replace the canister. <Ref. to EC(H4DO(HEV))-8, Canister.>	Go to step **7**.
7	**CHECK LEAK CHECK VALVE ASSEMBLY.**	Are there damage or holes on the leak check valve assembly?	Replace the leak check valve assembly. <Ref. to EC(H4DO(HEV))-39, Leak Check Valve Assembly.>	Go to step **8**.

	Step	Check	Yes	No
8	**CHECK FUEL TANK.** Remove the fuel tank. <Ref. to FU(H4DO(HEV))-105, Fuel Tank.>	Are there damage or holes on the fuel tank?	Repair or replace the fuel tank. <Ref. to FU(H4DO(HEV))-105, Fuel Tank.>	Go to step **9**.
9	**CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.**	Are there holes, cracks, clogging, or disconnection, misconnection of hoses or pipes in evaporative emission control system?	Repair or replace the hoses or pipes.	Repair the poor contact of ECM connector.

CP:DTC P0456 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK)

NOTE:
For the diagnostic procedure, refer to DTC P0455. <Ref. to EN(H4DO HEV)(diag)-246, DTC P0455 EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (LARGE LEAK), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CQ:DTC P0458 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT LOW

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-121, DTC P0458 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

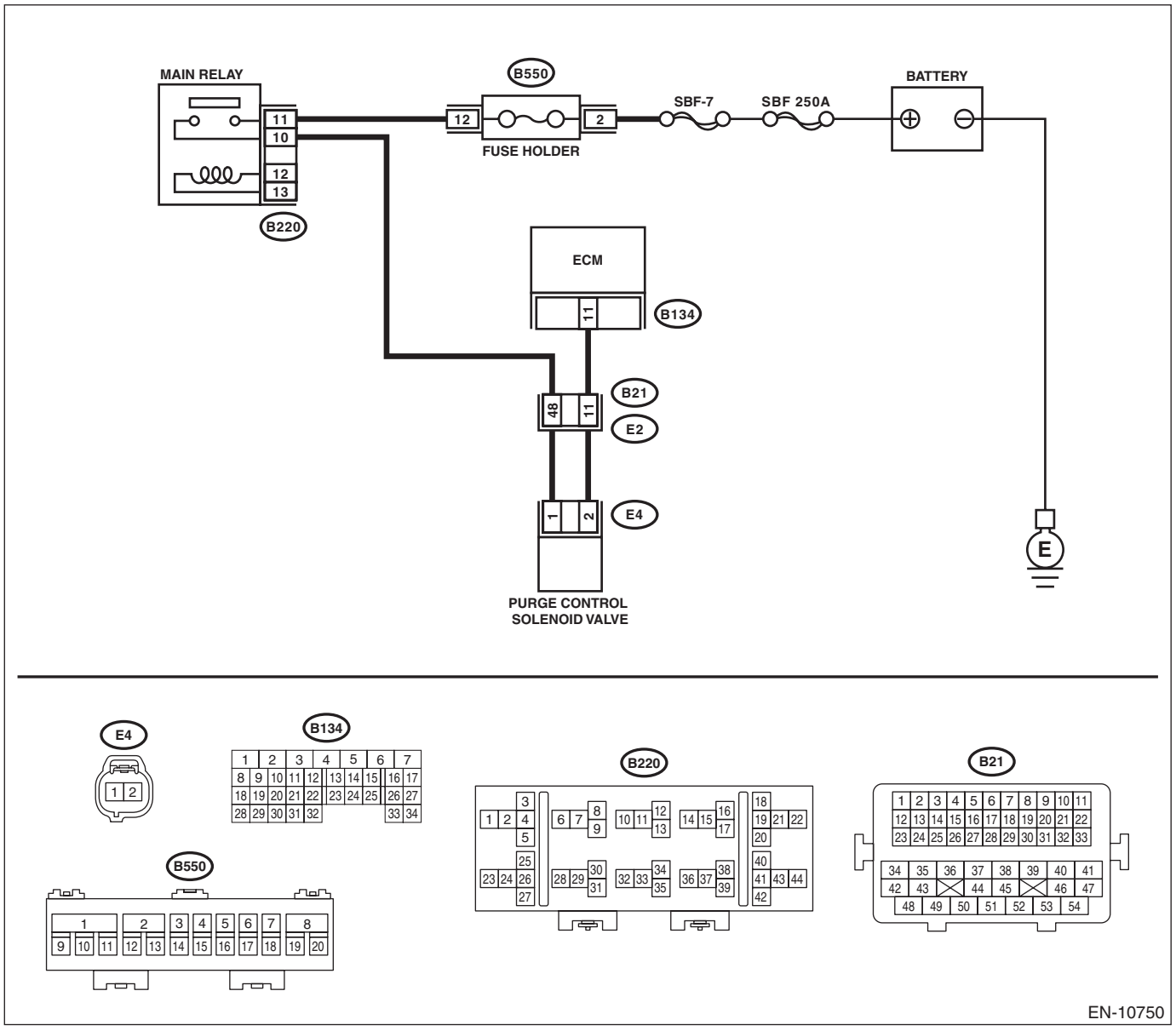
Improper idling

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 11 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Go to step **3**.
2	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
3	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** Measure the voltage between purge control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E4) No. 1 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **4**.	Repair the power supply circuit.
4	**CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and purge control solenoid valve. 3) Measure the resistance between the purge control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E4) No. 2 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit to ground in harness between ECM connector and purge control solenoid valve connector.
5	**CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR.** Measure the resistance of harness between ECM connector and purge control solenoid valve. ***Connector & terminal*** ***(B134) No. 11 — (E4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and purge control solenoid valve connector • Poor contact of coupling connector

Step		Check	Yes	No
6	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Remove the purge control solenoid valve. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 10 — 100 Ω?	Repair the poor contact of purge control solenoid valve connector.	Replace the purge control solenoid valve. <Ref. to EC(H4DO(HEV))-21, Purge Control Solenoid Valve.>

CR:DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-122, DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

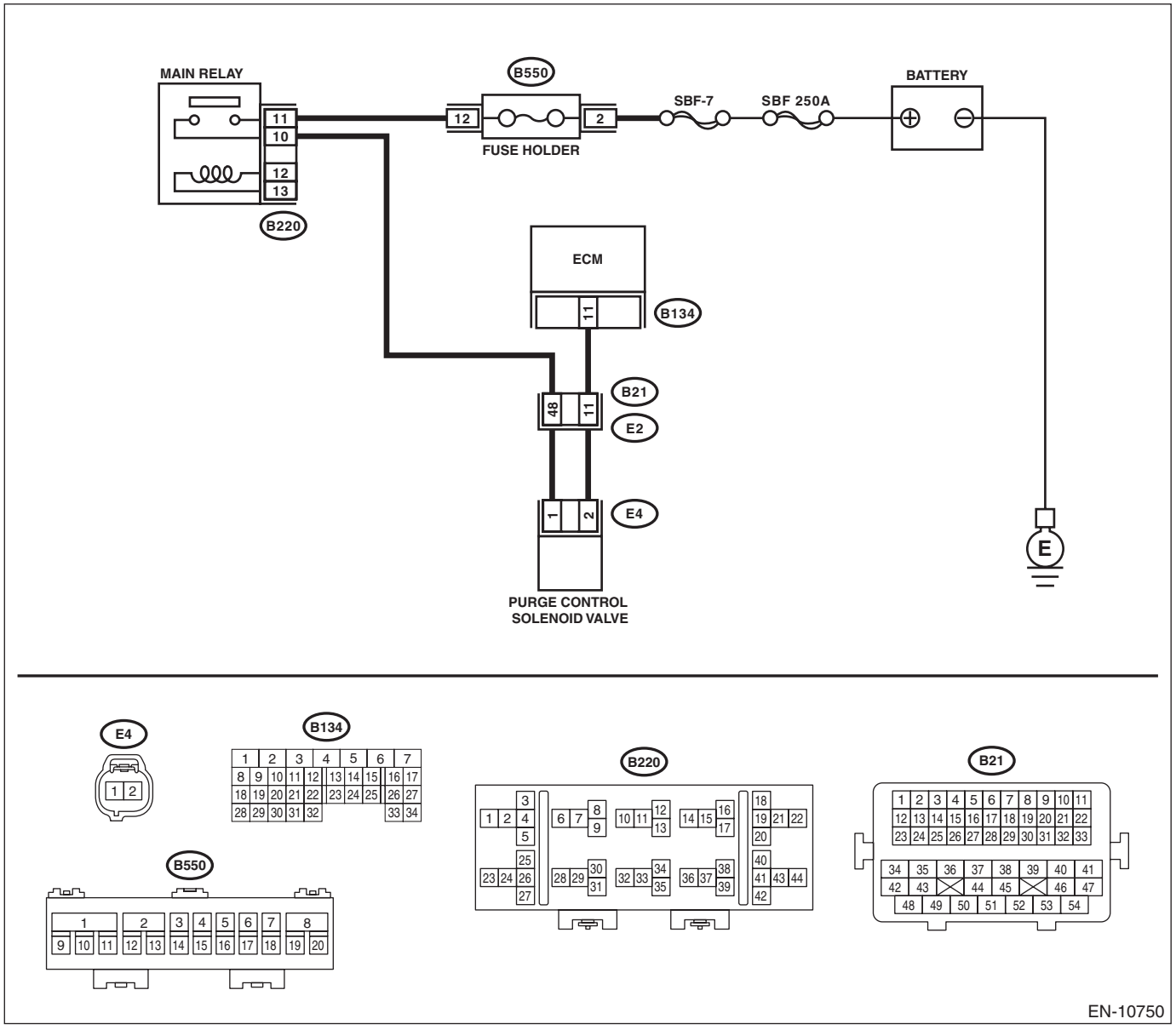
Improper idling

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and purge control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 11 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power in the harness between ECM connector and purge control solenoid valve connector.	Go to step **2**.
2	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the purge control solenoid valve. <Ref. to EC(H4DO(HEV))-21, Purge Control Solenoid Valve.>	Repair the poor contact of ECM connector.

CS:DTC P0461 FUEL LEVEL SENSOR “A” CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-123, DTC P0461 FUEL LEVEL SENSOR “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

Step		Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Replace the fuel level sensor and fuel sub level sensor. <Ref. to FU(H4DO(HEV))-128, Fuel Level Sensor.> <Ref. to FU(H4DO(HEV))-131, Fuel Sub Level Sensor.>

CT:DTC P0462 FUEL LEVEL SENSOR “A” CIRCUIT LOW

NOTE:
For the diagnostic procedure, refer to DTC P0463. <Ref. to EN(H4DO HEV)(diag)-254, DTC P0463 FUEL LEVEL SENSOR “A” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CU:DTC P0463 FUEL LEVEL SENSOR “A” CIRCUIT HIGH

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-125, DTC P0463 FUEL LEVEL SENSOR “A” CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

Step		Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is DTC P0462 or P0463 displayed on the Subaru Select Monitor?	Check the combination meter. <Ref. to IDI(diag)-2, Basic Diagnostic Procedure.>	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.

CV:DTC P0500 VEHICLE SPEED SENSOR “A”

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-126, DTC P0500 VEHICLE SPEED SENSOR “A”, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

Step		Check	Yes	No
1	**CHECK DTC OF VDC.** Check DTC of VDC.	Is DTC of VDC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-40, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact of ECM connector.

CW:DTC P0506 IDLE AIR CONTROL SYSTEM RPM LOWER THAN EXPECTED

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-127, DTC P0506 IDLE AIR CONTROL SYSTEM RPM LOWER THAN EXPECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Hard to start the engine.
- Engine does not start.
- Improper idling
- Engine stalls.

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK AIR CLEANER ELEMENT.** 1) Turn the ignition switch to OFF. 2) Check the air cleaner element.	Is there excessive clogging on air cleaner element?	Replace the air cleaner element. <Ref. to IN(H4DO(HEV))-4, Air Cleaner Element.>	Go to step **3**.
3	**CHECK ELECTRONIC THROTTLE CONTROL.** 1) Remove the electronic throttle control. <Ref. to FU(H4DO(HEV))-14, REMOVAL, Throttle Body.> 2) Check the electronic throttle control.	Are foreign matter found inside electronic throttle control?	Remove foreign matter from electronic throttle control.	Perform the diagnosis of DTC P2101. <Ref. to EN(H4DO HEV)(diag)-335, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CX:DTC P0507 IDLE AIR CONTROL SYSTEM RPM HIGHER THAN EXPECTED

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-128, DTC P0507 IDLE AIR CONTROL SYSTEM RPM HIGHER THAN EXPECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

Engine keeps running at higher speed than specified idle speed.

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK AIR INTAKE SYSTEM.** 1) Start and idle the engine. 2) Check the following items. • Loose installation of intake manifold and throttle body • Cracks of intake manifold gasket and throttle body gasket • Disconnection of vacuum hoses	Is there any fault in air intake system?	Repair air suction and leaks.	Go to step **3**.
3	**CHECK ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control. <Ref. to FU(H4DO(HEV))-14, REMOVAL, Throttle Body.> 3) Check the electronic throttle control.	Are foreign matter found inside electronic throttle control?	Remove foreign matter from electronic throttle control.	Perform the diagnosis of DTC P2101. <Ref. to EN(H4DO HEV)(diag)-335, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CY:DTC P050A COLD START IDLE AIR CONTROL SYSTEM PERFORMANCE

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-129, DTC P050A COLD START IDLE AIR CONTROL SYSTEM PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

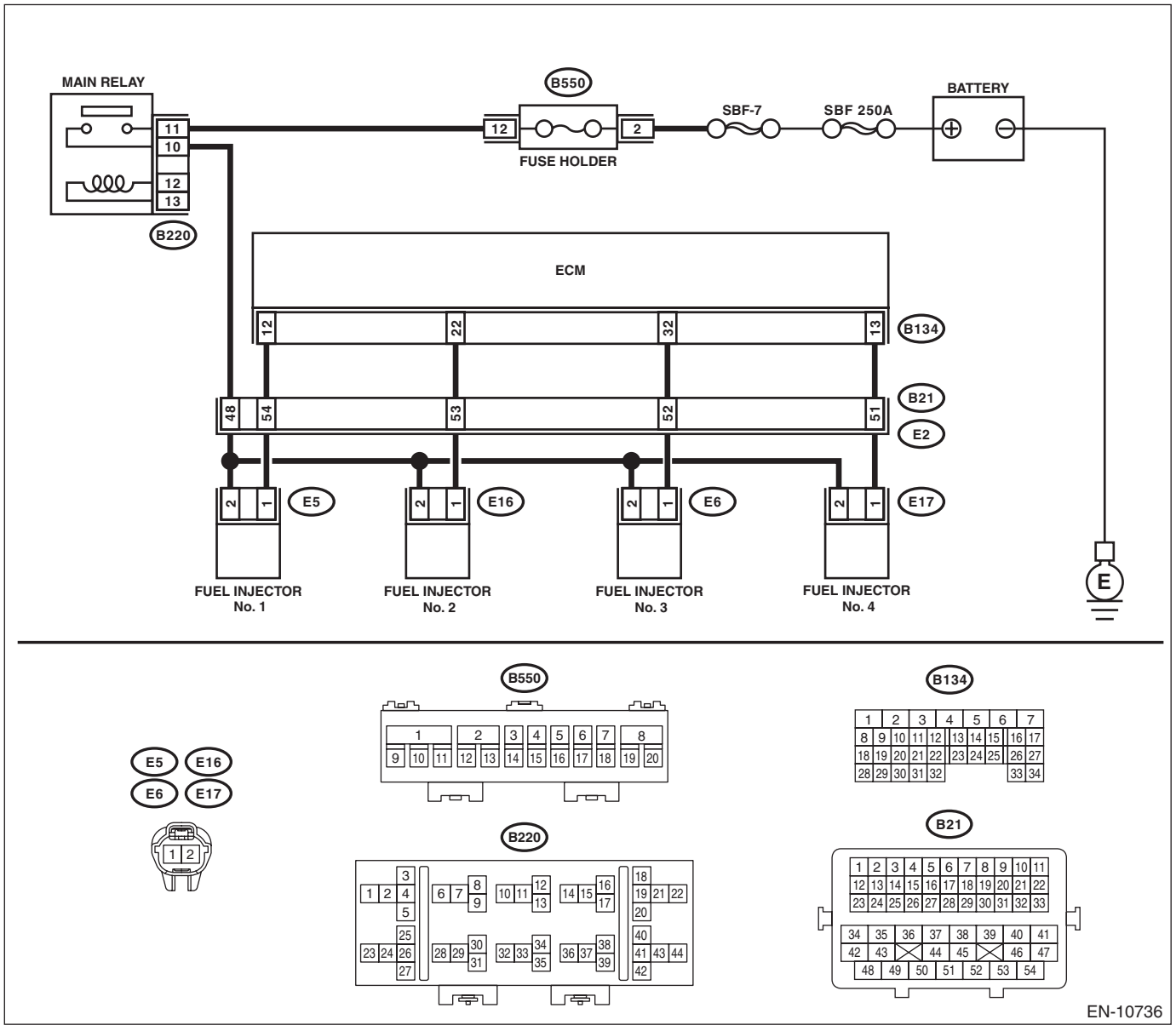
- Engine keeps running at higher speed than specified idle speed.
- Engine keeps running at a lower speed than the specified idle speed.
- Engine stalls.

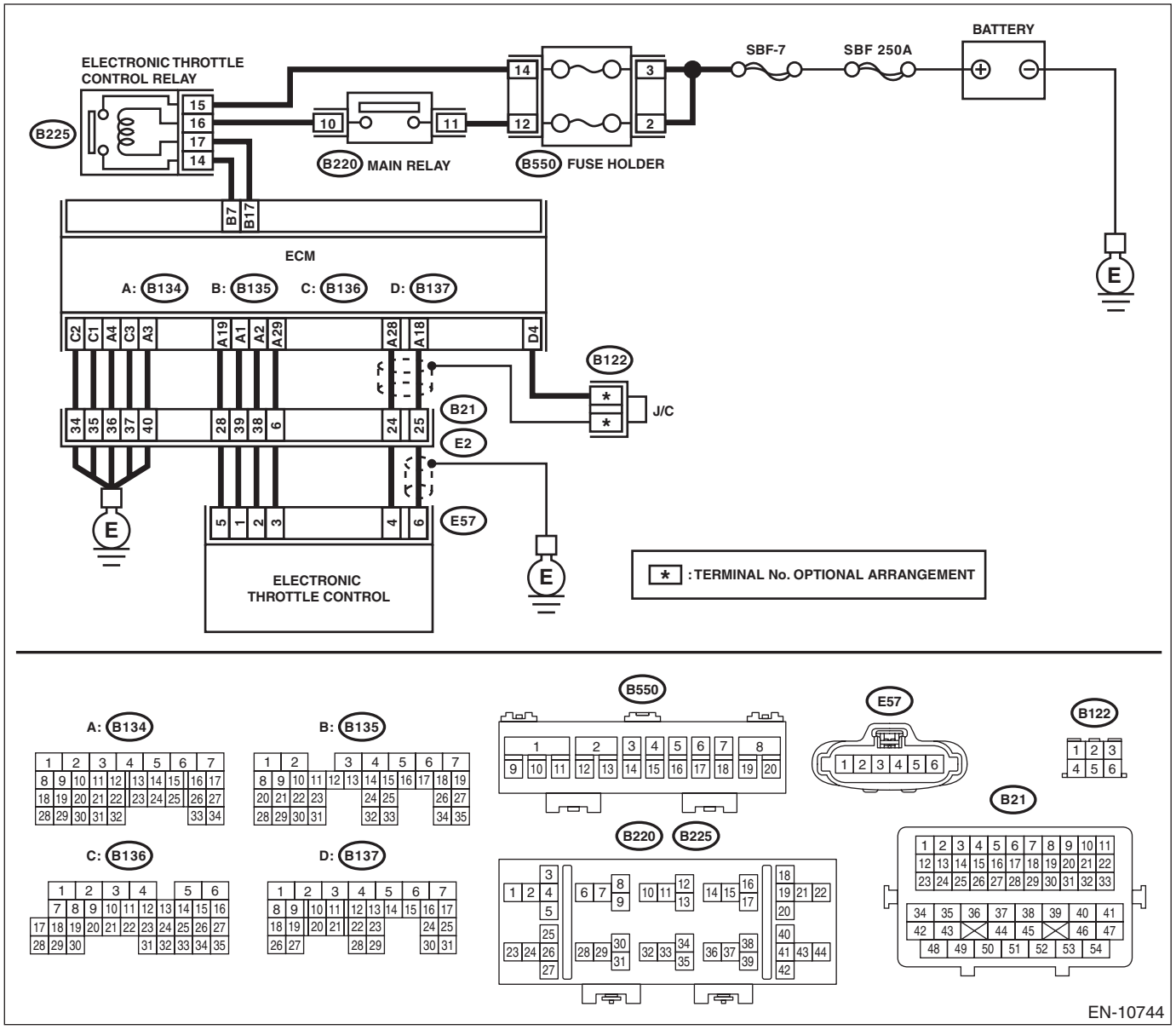
CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>





Step		Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK ENGINE OIL.**	Is there a proper amount of engine oil?	Go to step **3**.	Replace engine oil. <Ref. to LU(H4DO(w/o HEV))-13, REPLACEMENT, Engine Oil.>
3	**CHECK EXHAUST SYSTEM.**	Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step **4**.

	Step	Check	Yes	No
4	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step **5**.
5	**CHECK FUEL PRESSURE.** **WARNING:** **Place "NO OPEN FLAMES" signs near the working area.** **CAUTION:** **Be careful not to spill fuel.** Measure the fuel pressure. <Ref. to ME(H4DO(w/o HEV))-35, INSPECTION, Fuel Pressure.> **CAUTION:** **Release fuel pressure before removing the fuel pressure gauge.**	Is the measured value 340 — 400 kPa (3.5 — 4.1 kg/cm^2, 49 — 58 psi)?	Go to step **6**.	Check the fuel pump and fuel delivery line. <Ref. to FU(H4DO(HEV))-127, INSPECTION, Fuel Pump.> <Ref. to FU(H4DO(HEV))-157, INSPECTION, Fuel Delivery and Evaporation Lines.>
6	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm up completely. 2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Coolant Temp.» 75°C (167°F) or more?	Go to step **7**.	Replace the engine coolant temperature sensor. <Ref. to FU(H4DO(HEV))-41, Engine Coolant Temperature Sensor.>
7	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F). 2) Place the select lever in "P" range or "N" range. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Mass Air Flow» 2.0 — 5.0 g/s (0.26 — 0.66 lb/m)?	Go to step **8**.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>

	Step	Check	Yes	No
8	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F). 2) Place the select lever in "P" range or "N" range. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Open the front hood. 6) Measure the ambient temperature. 7) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Subtract ambient temperature from «Intake Air Temp.». Is the obtained value –10 — 50°C (–18 — 90°F)?	Go to step **9**.	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>
9	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 12 (+) — Chassis ground (–):*** ***#2 (B134) No. 22 (+) — Chassis ground (–):*** ***#3 (B134) No. 32 (+) — Chassis ground (–):*** ***#4 (B134) No. 13 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **14**.	Go to step **10**.
10	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Measure the resistance between fuel injector connector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 1 — Engine ground:*** ***#2 (E16) No. 1 — Engine ground:*** ***#3 (E6) No. 1 — Engine ground:*** ***#4 (E17) No. 1 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **11**.	Repair the short circuit to ground in harness between ECM connector and fuel injector connector.
11	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 12 — (E5) No. 1:*** ***#2 (B134) No. 22 — (E16) No. 1:*** ***#3 (B134) No. 32 — (E6) No. 1:*** ***#4 (B134) No. 13 — (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **12**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and fuel injector connector • Poor contact of coupling connector

	Step	Check	Yes	No
12	**CHECK FUEL INJECTOR.** Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **13**.	Replace the faulty fuel injector. <Ref. to FU(H4DO(HEV))-69, Fuel Injector.>
13	**CHECK POWER SUPPLY LINE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel injector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Repair the poor contact of all connectors in fuel injector circuit.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between the main relay connector and fuel injector connector on faulty cylinders • Poor contact of coupling connector • Poor contact of main relay connector
14	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 12 (+) — Chassis ground (–):*** ***#2 (B134) No. 22 (+) — Chassis ground (–):*** ***#3 (B134) No. 32 (+) — Chassis ground (–):*** ***#4 (B134) No. 13 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power in harness between ECM connector and fuel injector.	Go to step **15**.
15	**CHECK FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **16**.	Replace the faulty fuel injector. <Ref. to FU(H4DO(HEV))-69, Fuel Injector.>
16	**CHECK INSTALLATION CONDITION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.**	Is the camshaft position sensor or crankshaft position sensor loosely installed?	Tighten the camshaft position sensor or crankshaft position sensor. <Ref. to FU(H4DO(HEV))-53, INSTALLATION, Camshaft Position Sensor.> <Ref. to FU(H4DO(HEV))-48, INSTALLATION, Crankshaft Position Sensor.>	Go to step **17**.
17	**CHECK CRANKSHAFT POSITION SENSOR PLATE.**	Is the crankshaft position sensor plate rusted or does it have broken teeth?	Replace the crankshaft position sensor plate. <Ref. to ME(H4DO(w/o HEV))-304, Cylinder Block.>	Go to step **18**.

	Step	Check	Yes	No
18	**CHECK INSTALLATION CONDITION OF TIMING CHAIN.** Turn the crankshaft using ST, and align the alignment mark on crank sprocket with alignment mark on cylinder block. ST 18252AA000 CRANKSHAFT SOCKET	Is the timing chain dislocated from its proper position?	Correct the installation condition of timing chain. <Ref. to ME(H4DO(w/o HEV))-169, Timing Chain Assembly.>	Go to step **19**.
19	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Connect the battery to terminals No. 16 and No. 17 of electronic throttle control relay. 4) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 14 — No. 15:***	Is the resistance less than 1 Ω?	Go to step **20**.	Replace the electronic throttle control relay. <Ref. to FU(H4DO(HEV))-94, Electronic Throttle Control Relay.>
20	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B225) No. 15 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **21**.	Repair the open or ground short circuit of power supply circuit.
21	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.** 1) Disconnect the connector from ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B225) No. 17 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power in the harness between ECM connector and electronic throttle control relay connector.	Go to step **22**.
22	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B225) No. 14 — Chassis ground:*** ***(B225) No. 17 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **23**.	Repair the short circuit to ground in harness between ECM connector and electronic throttle control relay connector.
23	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.** Measure the resistance of harness between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B135) No. 17 — (B225) No. 17:*** ***(B135) No. 7 — (B225) No. 14:***	Is the resistance less than 1 Ω?	Go to step **24**.	Repair the open circuit in harness between ECM connector and electronic throttle control relay connector.

	Step	Check	Yes	No
24	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 19 — Chassis ground:*** ***(B134) No. 18 — Chassis ground:*** ***(B134) No. 18 — (B137) No. 4:*** ***(B134) No. 28 — Chassis ground:*** ***(B134) No. 28 — (B137) No. 4:***	Is the resistance 1 MΩ or more?	Go to step **25**.	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.
25	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:*** ***(E57) No. 4 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **26**.	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector. Replace the ECM if defective. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>
26	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 18 — (E57) No. 6:*** ***(B134) No. 28 — (E57) No. 4:*** ***(B134) No. 29 — (E57) No. 3:***	Is the resistance less than 1 Ω?	Go to step **27**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and electronic throttle control connector • Poor contact of coupling connector
27	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **28**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and engine ground • Poor contact of ECM connector • Poor contact of coupling connector

	Step	Check	Yes	No
28	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (–):*** ***(E57) No. 4 (+) — Engine ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.	Go to step **29**.
29	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B134) No. 19 — (B134) No. 18:*** ***(B134) No. 19 — (B134) No. 28:***	Is the resistance 1 MΩ or more?	Go to step **30**.	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.
30	**CHECK SENSOR OUTPUT.** 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Read the value of «Main-Throttle Sensor» using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	Is the value of «Main-Throttle Sensor» 0.81 — 0.87 V?	Go to step **31**.	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. <Ref. to FU(H4DO(HEV))-14, Throttle Body.>
31	**CHECK SENSOR OUTPUT.** Read the value of «Sub-Throttle Sensor» using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	Is the value of «Sub-Throttle Sensor» 1.64 — 1.70 V?	Go to step **32**.	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. <Ref. to FU(H4DO(HEV))-14, Throttle Body.>
32	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 2 — (E57) No. 2:*** ***(B134) No. 1 — (E57) No. 1:***	Is the resistance less than 1 Ω?	Go to step **33**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and electronic throttle control connector • Poor contact of coupling connector

	Step	Check	Yes	No
33	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 2 (+) — Engine ground (–):*** ***(E57) No. 1 (+) — Engine ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.	Go to step **34**.
34	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 2 — Engine ground:*** ***(E57) No. 1 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **35**.	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.
35	**CHECK HARNESS BETWEEN ELECTRONIC THROTTLE CONTROL CONNECTOR.** Measure the resistance between electronic throttle control connectors. ***Connector & terminal*** ***(E57) No. 2 — (E57) No. 1:***	Is the resistance 1 MΩ or more?	Go to step **36**.	Repair the short circuit in harness between ECM connector and electronic throttle control connector.
36	**CHECK ELECTRONIC THROTTLE CONTROL GROUND CIRCUIT.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 3 — Chassis ground:*** ***(B134) No. 4 — Chassis ground:*** ***(B136) No. 1 — Chassis ground:*** ***(B136) No. 2 — Chassis ground:*** ***(B136) No. 3 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **37**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and engine ground • Poor contact of coupling connector
37	**CHECK ELECTRONIC THROTTLE CONTROL.** Measure the resistance between electronic throttle control terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance 50 Ω or less?	Go to step **38**.	Replace the electronic throttle control. <Ref. to FU(H4DO(HEV))-14, Throttle Body.>
38	**CHECK ELECTRONIC THROTTLE CONTROL.** Move the throttle valve to the fully open and fully closed positions with fingers. Check that the valve returns to the specified position when releasing fingers.	Does the valve return to the specified position? Standard value: 3 mm (0.12 in) from fully closed position	Repair the poor contact of ECM connector.	Replace the electronic throttle control. <Ref. to FU(H4DO(HEV))-14, Throttle Body.>

CZ:DTC P050B COLD START IGNITION TIMING PERFORMANCE

NOTE:
For the diagnostic procedure, refer to DTC P050A. <Ref. to EN(H4DO HEV)(diag)-257, DTC P050A COLD START IDLE AIR CONTROL SYSTEM PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DA:DTC P0512 STARTER REQUEST CIRCUIT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-132, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

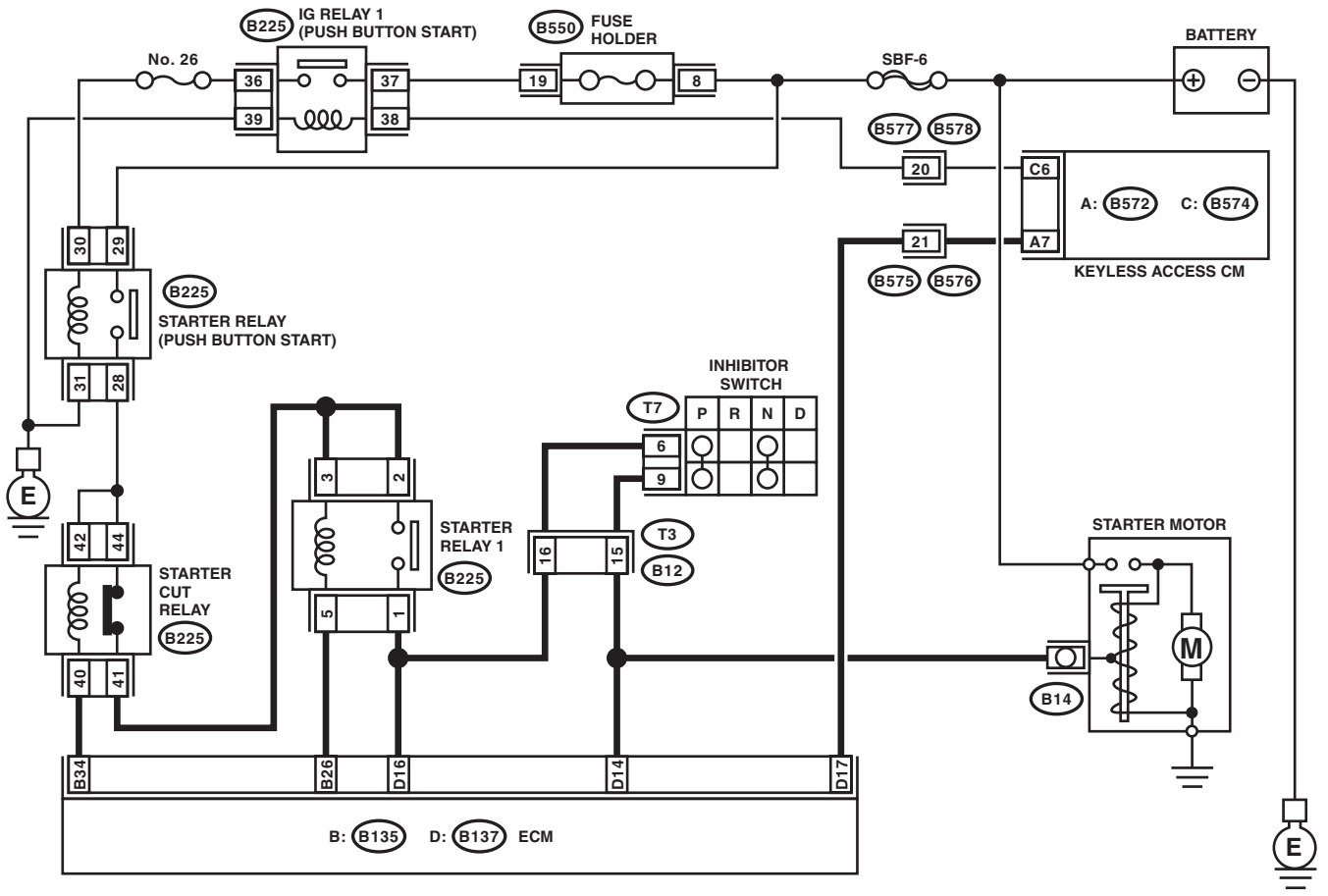
Failure of engine to start

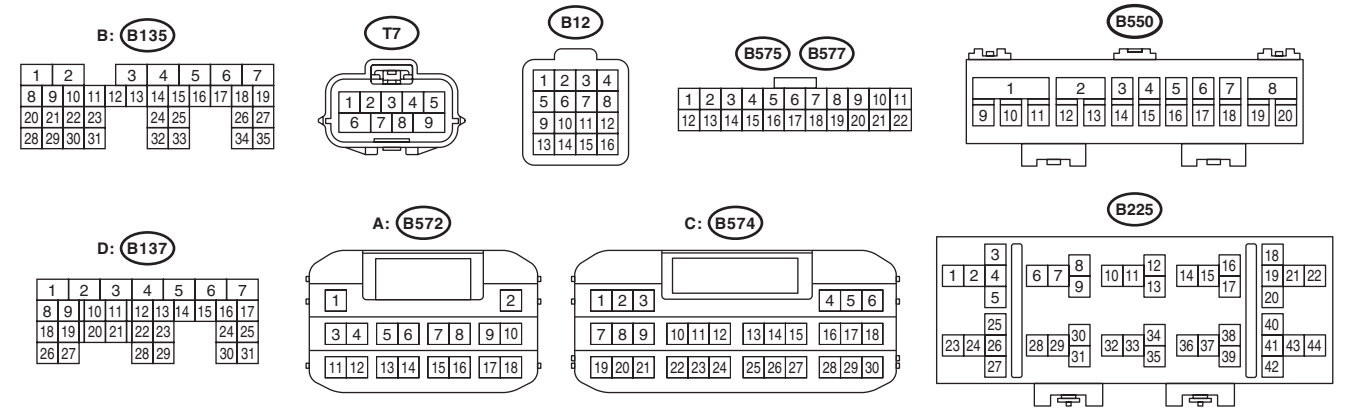
CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>





EN-10732

	Step	Check	Yes	No
1	**CHECK PUSH BUTTON IGNITION SWITCH.** Operate the push button ignition switch.	Does it operate smoothly without catch?	Go to step **2**.	Replace the push button ignition switch. <Ref. to SL-114, Push Button Ignition Switch.>
2	**CHECK DTC.** 1) Clear the memory using the Subaru Select Monitor. <Ref. to EN(H4DO HEV)(diag)-66, Clear Memory Mode.> 2) Start and idle the engine for three minutes or more.	Is the same DTC as current diagnosis output?	Go to step **3**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
3	**CHECK HARNESS BETWEEN ECM AND KEYLESS ACCESS CM.** 1) Turn the ignition to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition to ON. 4) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 17 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power supply in harness between ECM connector and keyless access CM connector.	Repair the poor contact of ECM connector.

DB:DTC P0560 SYSTEM VOLTAGE

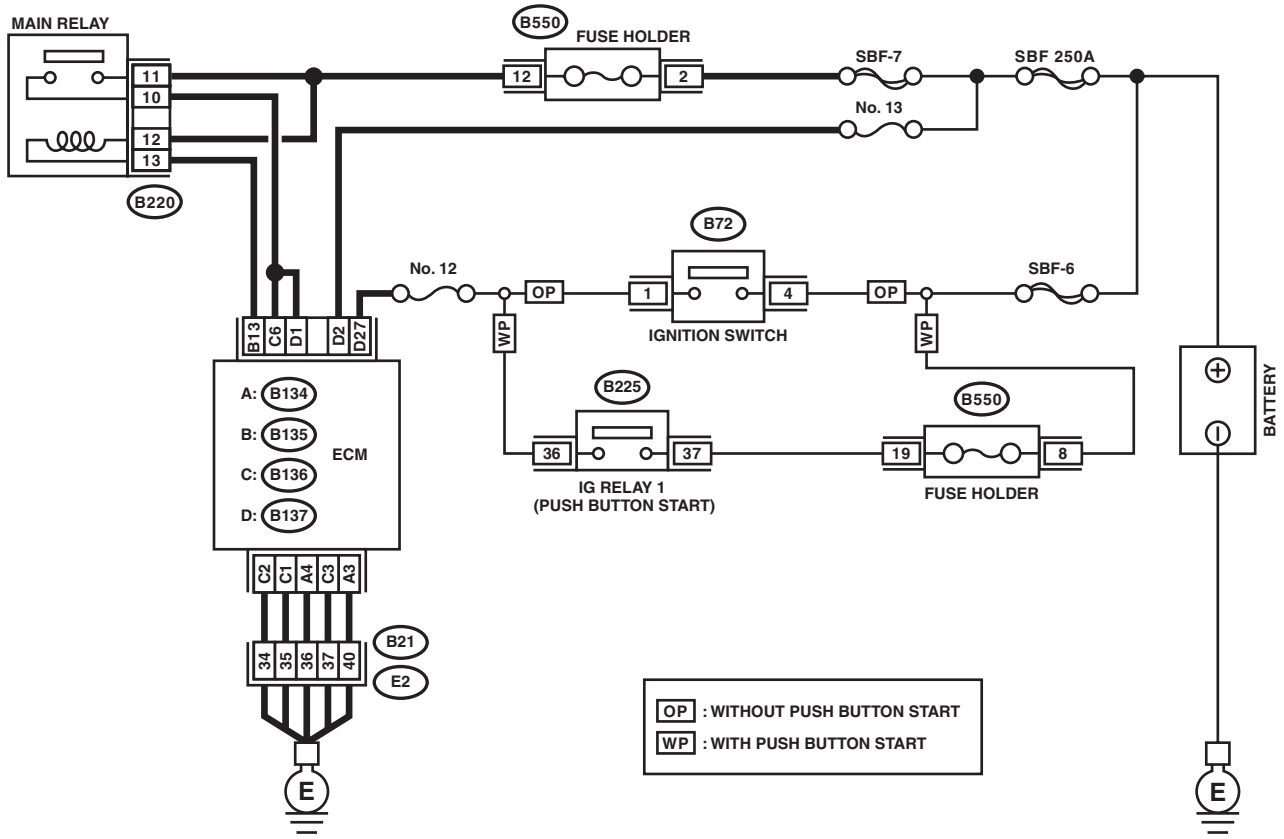
DTC DETECTING CONDITION:

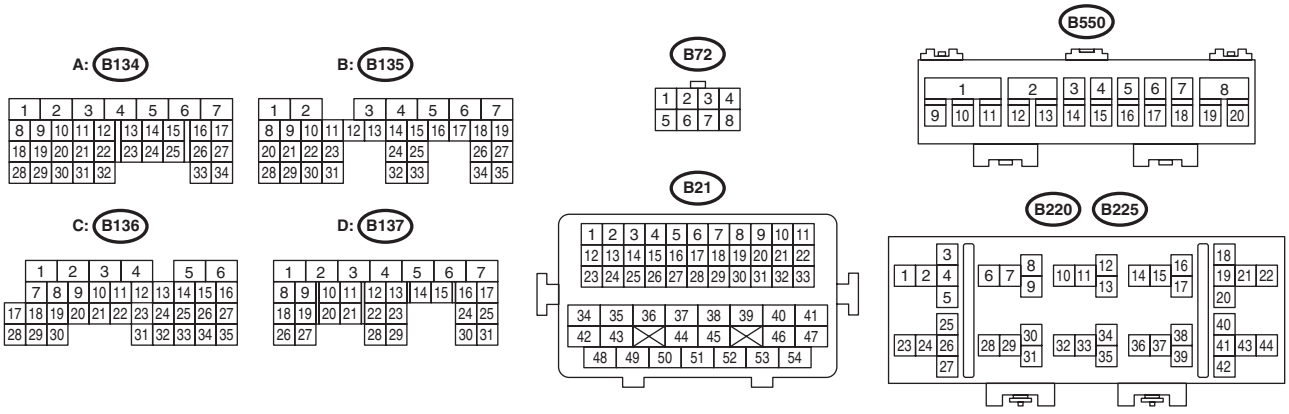
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-133, DTC P0560 SYSTEM VOLTAGE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>





EN-10733

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 2 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the poor contact of ECM connector.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 2 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit to ground in harness between ECM connector and 12 volt auxiliary battery terminal.
3	**CHECK FUSE NO. 13 (MAIN FUSE BOX).**	Is the fuse blown out?	Replace the fuse.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and 12 volt auxiliary battery • Poor contact of ECM connector • Poor contact of 12 volt auxiliary battery terminal

DC:DTC P059A ACTIVE GRILLE SHUTTER "A" POSITION SENSOR CIRCUIT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-134, DTC P059A ACTIVE GRILLE SHUTTER "A" POSITION SENSOR CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ACTIVE GRILLE SHUTTER.** 1) Turn the ignition switch to OFF and then wait for around 30 seconds. 2) Turn the ignition switch to ON. 3) Perform operation check for the active grille shutter using the Subaru Select Monitor. NOTE: For detailed procedures, refer to “System Operation Check Mode”. <Ref. to EN(H4DO HEV)(diag)-67, System Operation Check Mode.>	Are the closing and opening operations finished normally?	Even if DTC is detected, it has returned to a normal condition at this time. NOTE: In this case, the possible causes are the tentative adhering and biting of foreign matter to the active grille shutter or freezing.	Replace the active grille shutter. <Ref. to HEV-77, Active Grille Shutter.>

DD:DTC P059F ACTIVE GRILLE SHUTTER "A" PERFORMANCE

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-135, DTC P059F ACTIVE GRILLE SHUTTER "A" PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK DTC.** Check for DTC. <Ref. to EN(H4DO HEV)(diag)-51, Read Diagnostic Trouble Code (DTC).>	Is DTC P059F displayed in «Present fault»?	Go to step **2**.	Even if DTC is detected, it has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, the possible causes are the tentative adhering and biting of foreign matter to the active grille shutter or freezing.
2	**CHECK ACTIVE GRILLE SHUTTER.** Check the louver area of active grille shutter, louver link area and actuator part.	Is there any trouble such as foreign matter adhesion, biting or freezing?	Remove the foreign matter from active grille shutter and go to the next step. Go to step **3**.	Go to step **3**.
3	**CHECK ACTIVE GRILLE SHUTTER.** 1) Turn the ignition switch to ON (engine OFF). 2) Perform the active grille shutter operation check using Subaru Select Monitor to measure the time required for closing and opening operations. NOTE: For detailed procedures, refer to “System Operation Check Mode”. <Ref. to EN(H4DO HEV)(diag)-67, System Operation Check Mode.>	Is the time less than 15 seconds?	Even if DTC is detected, it has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.	Go to step **4**.
4	**CHECK CURRENT DATA.** Using the Subaru Select Monitor, read the value of «Active Grille Shutter Voltage Error Status». NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	Is «Normal» displayed?	Go to step **5**.	Check the power supply circuit. Replace the active grille shutter if the power supply circuit is normal. <Ref. to HEV-77, Active Grille Shutter.>

	Step	Check	Yes	No
5	**CHECK CURRENT DATA.** 1) Cool down the engine sufficiently after turning the ignition switch OFF. NOTE: Cool until you do not feel heat when touching the engine body. 2) Turn the ignition switch to ON. 3) Using the Subaru Select Monitor, read the value of «Active Grille Shutter Temperature Error Status». NOTE: For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	Is «Normal» displayed?	Even if DTC is detected, it has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.	Replace the active grille shutter. <Ref. to HEV-77, Active Grille Shutter.>

DE:DTC P05A0 ACTIVE GRILLE SHUTTER "A" STUCK

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-136, DTC P05A0 ACTIVE GRILLE SHUTTER "A" STUCK, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ACTIVE GRILLE SHUTTER.** Check the louver area of active grille shutter, louver link area and actuator part.	Is there any trouble such as foreign matter adhesion, biting or freezing?	Remove the foreign matter from active grille shutter.	Go to step **2**.
2	**CHECK ACTIVE GRILLE SHUTTER.** Check the louver area of active grille shutter, louver link area and actuator part.	Is each part of active grille shutter damaged?	Replace the active grille shutter. <Ref. to HEV-77, Active Grille Shutter.>	Go to step **3**.
3	**CHECK ACTIVE GRILLE SHUTTER.** 1) Turn the ignition switch to OFF and then wait for around 30 seconds. 2) Turn the ignition switch to ON. 3) Perform operation check for the active grille shutter using the Subaru Select Monitor. NOTE: For detailed procedures, refer to “System Operation Check Mode”. <Ref. to EN(H4DO HEV)(diag)-67, System Operation Check Mode.>	Are the closing and opening operations finished normally?	Even if DTC is detected, it has returned to a normal condition at this time. NOTE: In this case, the possible causes are the tentative adhering and biting of foreign matter to the active grille shutter or freezing.	Replace the active grille shutter. <Ref. to HEV-77, Active Grille Shutter.>

DF:DTC P05A1 ACTIVE GRILLE SHUTTER "A" RANGE OVER

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-137, DTC P05A1 ACTIVE GRILLE SHUTTER "A" RANGE OVER, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ACTIVE GRILLE SHUTTER.** Check the louver area of active grille shutter, louver link area and actuator part.	Is there any trouble such as foreign matter adhesion, biting or freezing?	Remove the foreign matter from active grille shutter.	Go to step **2**.
2	**CHECK ACTIVE GRILLE SHUTTER.** Check the louver area of active grille shutter, louver link area and actuator part.	Is each part of active grille shutter damaged?	Replace the active grille shutter. <Ref. to HEV-77, Active Grille Shutter.>	Go to step **3**.
3	**CHECK ACTIVE GRILLE SHUTTER.** 1) Turn the ignition switch to OFF and then wait for around 30 seconds. 2) Turn the ignition switch to ON. 3) Perform operation check for the active grille shutter using the Subaru Select Monitor. NOTE: For detailed procedures, refer to “System Operation Check Mode”. <Ref. to EN(H4DO HEV)(diag)-67, System Operation Check Mode.>	Are the closing and opening operations finished normally?	Even if DTC is detected, it has returned to a normal condition at this time. NOTE: In this case, the possible causes are the tentative adhering and biting of foreign matter to the active grille shutter or freezing.	Replace the active grille shutter. <Ref. to HEV-77, Active Grille Shutter.>

DG:DTC P05A2 ACTIVE GRILLE SHUTTER "A" CONTROL CIRCUIT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-138, DTC P05A2 ACTIVE GRILLE SHUTTER "A" CONTROL CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK DTC.** 1) Turn the ignition switch to OFF and then wait for around 30 seconds. 2) Turn the ignition switch to ON. 3) Check for DTC. <Ref. to EN(H4DO HEV)(diag)-51, Read Diagnostic Trouble Code (DTC).>	Is DTC P05A2 displayed in «Present fault» or «Past faults»?	Replace the active grille shutter. <Ref. to HEV-77, Active Grille Shutter.>	Perform the active grille shutter operation check using Subaru Select Monitor to confirm that closing and opening operations finish normally. NOTE: For detailed procedures, refer to “System Operation Check Mode”. <Ref. to EN(H4DO HEV)(diag)-67, System Operation Check Mode.>

DH:DTC P05A6 ACTIVE GRILLE SHUTTER "A" SUPPLY VOLTAGE CIRCUIT/ OPEN

DTC DETECTING CONDITION:

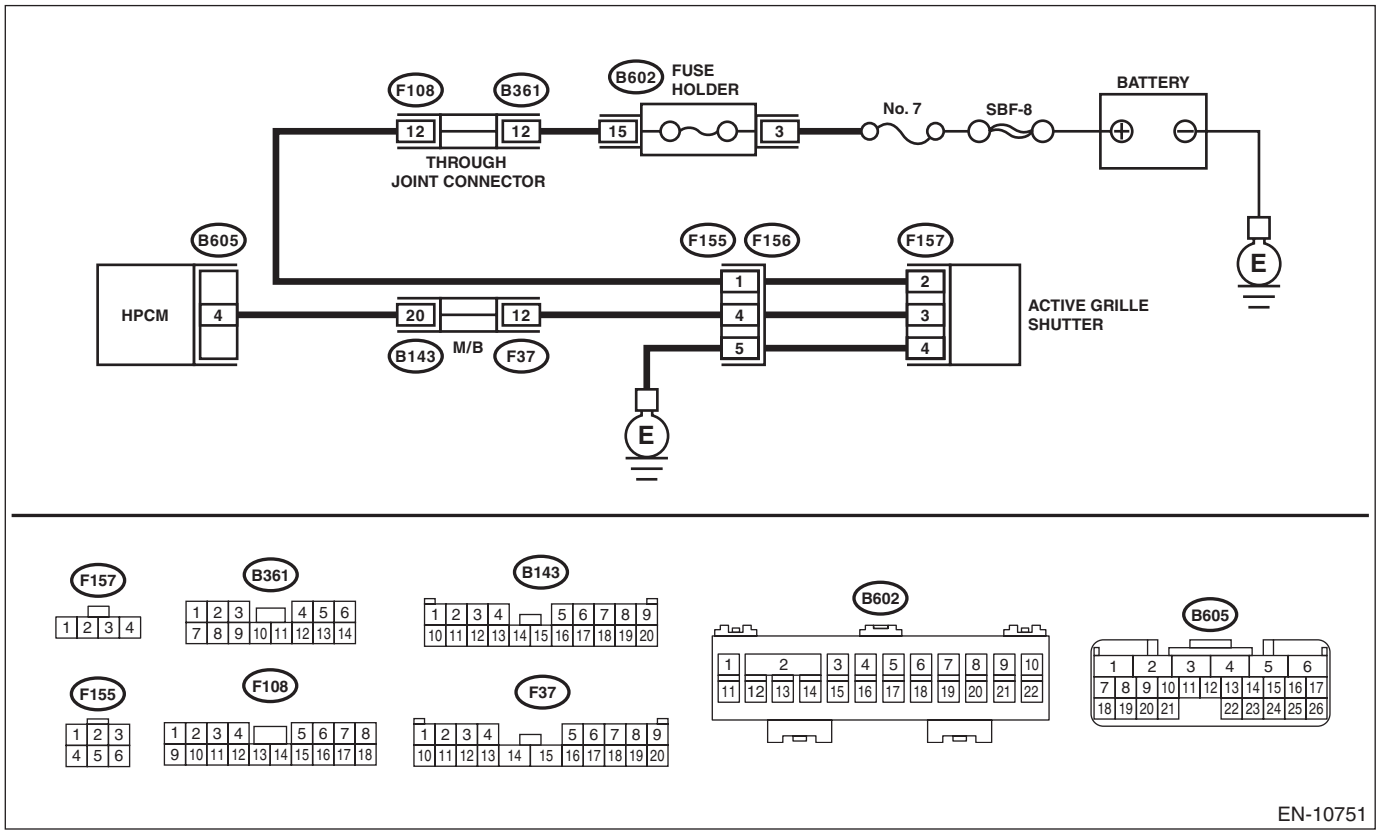
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-140, DTC P05A6 ACTIVE GRILLE SHUTTER "A" SUPPLY VOLTAGE CIRCUIT/OPEN, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

Active grille shutter <Ref. to WI(HEV)-50, Active Grille Shutter.>



	Step	Check	Yes	No
1	**CHECK DTC.** 1) Turn the ignition switch to OFF and then wait for around 30 seconds. 2) Turn the ignition switch to ON. 3) Check for DTC. <Ref. to EN(H4DO HEV)(diag)-51, Read Diagnostic Trouble Code (DTC).>	Is DTC P05A6 displayed in «Present fault»?	Go to step **2**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary battery voltage drop, temporary poor contact of connector or temporary open or short circuit of harness or may be the cause.
2	**CHECK 12 VOLT AUXILIARY BATTERY.** Check the battery. <Ref. to SC(H4DO(HEV))-39, Battery.>	Is the battery OK?	Go to step **3**.	Charge or replace the battery. <Ref. to SC(H4DO(HEV))-39, Battery.>
3	**CHECK ACTIVE GRILLE SHUTTER POWER SUPPLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the 12 volt auxiliary battery. <Ref. to NT-5, BATTERY, NOTE, Note.> 3) Disconnect the connector from the active grille shutter. 4) Measure the voltage between active grille shutter connector and chassis ground. ***Connector & terminal*** ***(F157) No. 2 (+) — Chassis ground (–):***	Is the voltage 9 V or more?	Replace the active grille shutter. <Ref. to HEV-77, Active Grille Shutter.>	Repair the power supply circuit.

DI: DTC P05C0 ACTIVE GRILLE SHUTTER "A" OVER TEMPERATURE

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-141, DTC P05C0 ACTIVE GRILLE SHUTTER "A" OVER TEMPERATURE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK DTC.** 1) Cool down the engine sufficiently after turning the ignition switch OFF. NOTE: Cool until you do not feel heat when touching the engine body. 2) Turn the ignition switch to ON. 3) Check for DTC. <Ref. to EN(H4DO HEV)(diag)-51, Read Diagnostic Trouble Code (DTC).>	Is DTC P05C0 displayed in «Present fault»?	Replace the active grille shutter. <Ref. to HEV-77, Active Grille Shutter.>	Even if DTC is detected, it has returned to a normal condition at this time. NOTE: In this case, temporary temperature rise in engine compartment may be the cause.

DJ:DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-142, DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Engine does not start.
- Engine stalls.

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

Step		Check	Yes	No
1	CHECK FOR ANY OTHER DTC ON DISPLAY.	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.

DK:DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR

NOTE:
For the diagnostic procedure, refer to DTC P0606. <Ref. to EN(H4DO HEV)(diag)-282, DTC P0606 CONTROL MODULE PROCESSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DL:DTC P0606 CONTROL MODULE PROCESSOR

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-144, DTC P0606 CONTROL MODULE PROCESSOR, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

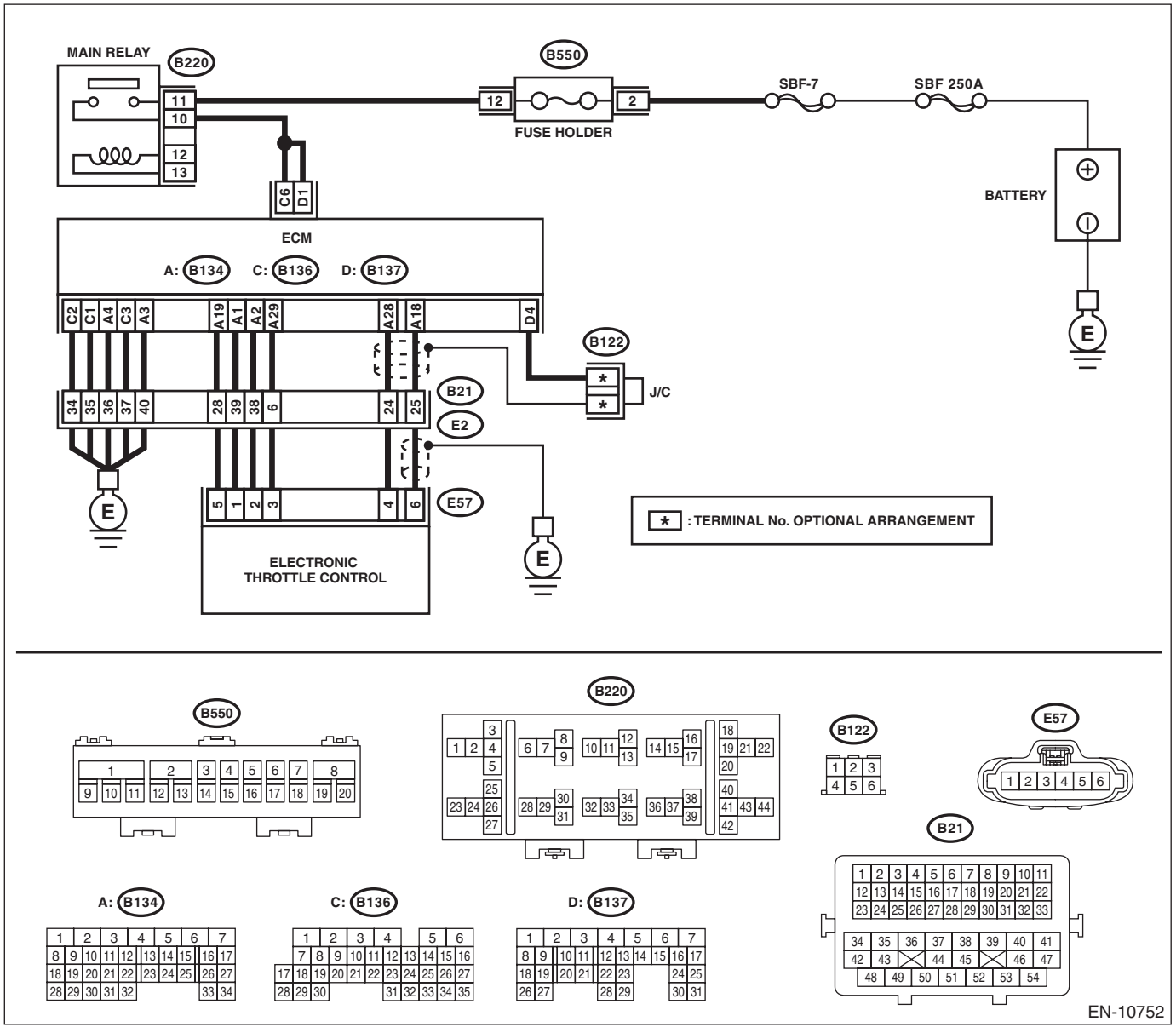
- Improper idling
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 6 (+) — Chassis ground (–):*** ***(B137) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **2**.	Repair the open or ground short circuit of power supply circuit.
2	**CHECK INPUT VOLTAGE OF ECM.** 1) Start the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 6 (+) — Chassis ground (–):*** ***(B137) No. 1 (+) — Chassis ground (–):***	Is the voltage 13 — 15 V?	Go to step **3**.	Repair the open or ground short circuit of power supply circuit.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance of harness between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 19 — (E57) No. 5:*** ***(B134) No. 29 — (E57) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and electronic throttle control connector • Poor contact of coupling connector
4	**CHECK ECM GROUND HARNESS.** 1) Connect all connectors. 2) Turn the ignition to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 3 (+) — Chassis ground (–):*** ***(B134) No. 4 (+) — Chassis ground (–):*** ***(B136) No. 1 (+) — Chassis ground (–):*** ***(B136) No. 2 (+) — Chassis ground (–):*** ***(B136) No. 3 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Check the connector for poor contact and check the harness. Replace the ECM if no fault is found. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in ground circuit • Loose engine ground terminal • Poor contact of coupling connector

DM:DTC P060A INTERNAL CONTROL MODULE MONITORING PROCESSOR PERFORMANCE

NOTE:
For the diagnostic procedure, refer to DTC P0606. <Ref. to EN(H4DO HEV)(diag)-282, DTC P0606 CONTROL MODULE PROCESSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DN:DTC P060B INTERNAL CONTROL MODULE A/D PROCESSING PERFORMANCE

NOTE:
For the diagnostic procedure, refer to DTC P0606. <Ref. to EN(H4DO HEV)(diag)-282, DTC P0606 CONTROL MODULE PROCESSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DO:DTC P0616 STARTER RELAY CIRCUIT LOW

1. MODEL WITHOUT PUSH BUTTON START

DTC DETECTING CONDITION:

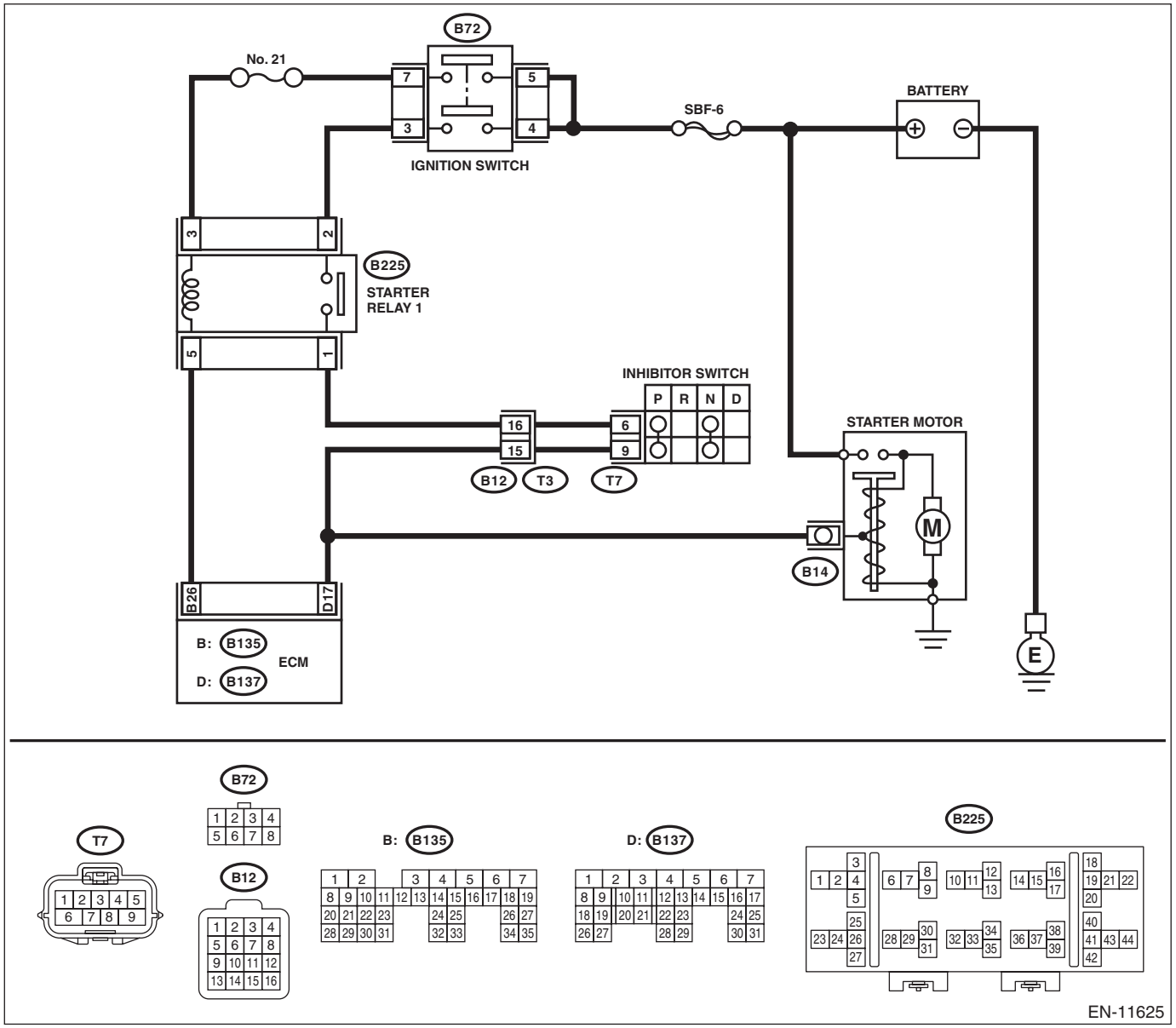
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-150, DTC P0616 STARTER RELAY CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND STARTER RELAY 1 CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the starter relay 1. 3) Disconnect the connectors from ECM and starter motor. 4) Measure the resistance of harness between ECM connector and starter relay 1 connector. ***Connector & terminal*** ***(B137) No. 17 — (B225) No. 1:*** NOTE: Place the select lever in "P" range or "N" range.	Is the resistance less than 1 Ω?	Go to step **3**.	NOTE: Check the following item and repair or replace if necessary. • Open circuit of harness between ECM connector and starter relay 1 connector • Poor contact of coupling connector
3	**CHECK HARNESS BETWEEN ECM AND STARTER RELAY 1 CONNECTOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 17 — Chassis ground:***	Is the resistance 1 MΩ or more?	Repair the poor contact of ECM connector.	Repair the short circuit to ground in harness between ECM connector and starter relay 1 connector.

2. MODEL WITH PUSH BUTTON START

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-150, DTC P0616 STARTER RELAY CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

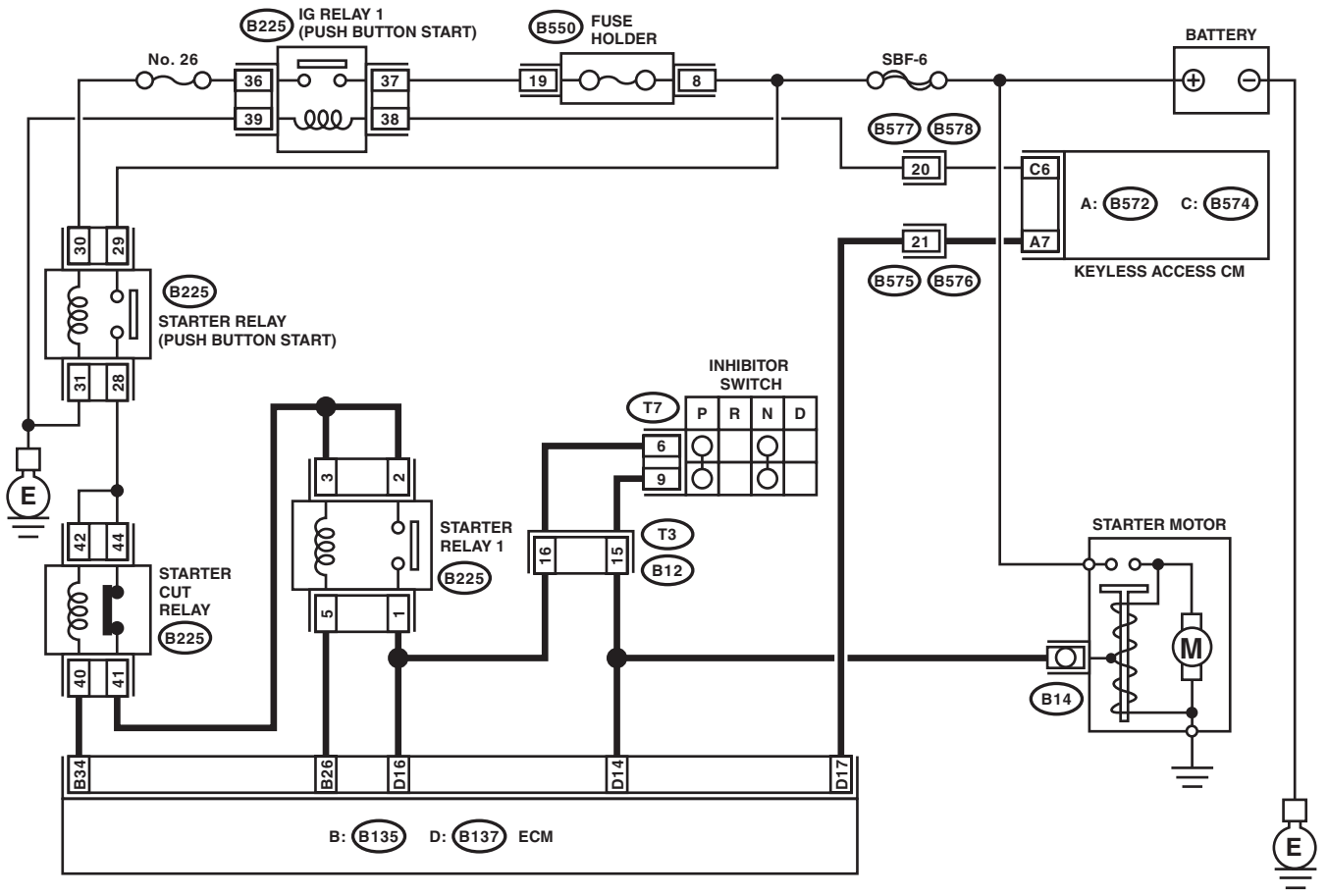
Failure of engine to start

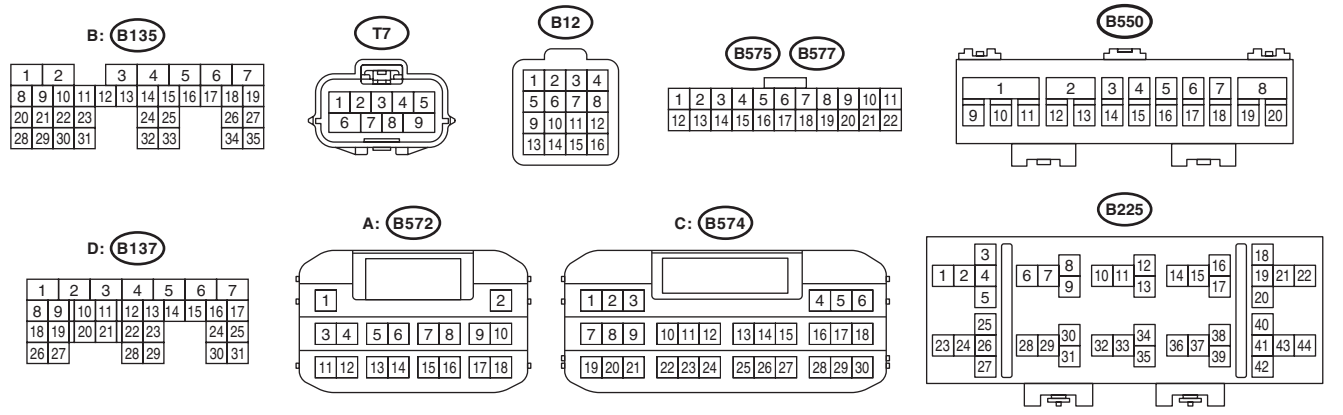
CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>





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	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND STARTER RELAY 1 CONNECTOR.** 1) Turn the ignition to OFF. 2) Disconnect the connector from ECM. 3) Remove the starter relay 1. 4) Measure the resistance of harness between ECM connector and starter relay 1 connector. NOTE: Place the select lever in “P” range or “N” range. ***Connector & terminal*** ***(B137) No. 14 — (B225) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and starter relay 1 connector • Poor contact of coupling connector
2	**CHECK HARNESS BETWEEN ECM AND STARTER RELAY 1 CONNECTOR.** 1) Disconnect the connector from starter motor. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 14 — Chassis ground:***	Is the resistance 1 MΩ or more?	Repair the poor contact of ECM connector.	Repair the short circuit to ground in harness between ECM connector and starter relay 1 connector.

DP:DTC P0617 STARTER RELAY CIRCUIT HIGH

1. MODEL WITHOUT PUSH BUTTON START

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-151, DTC P0617 STARTER RELAY CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

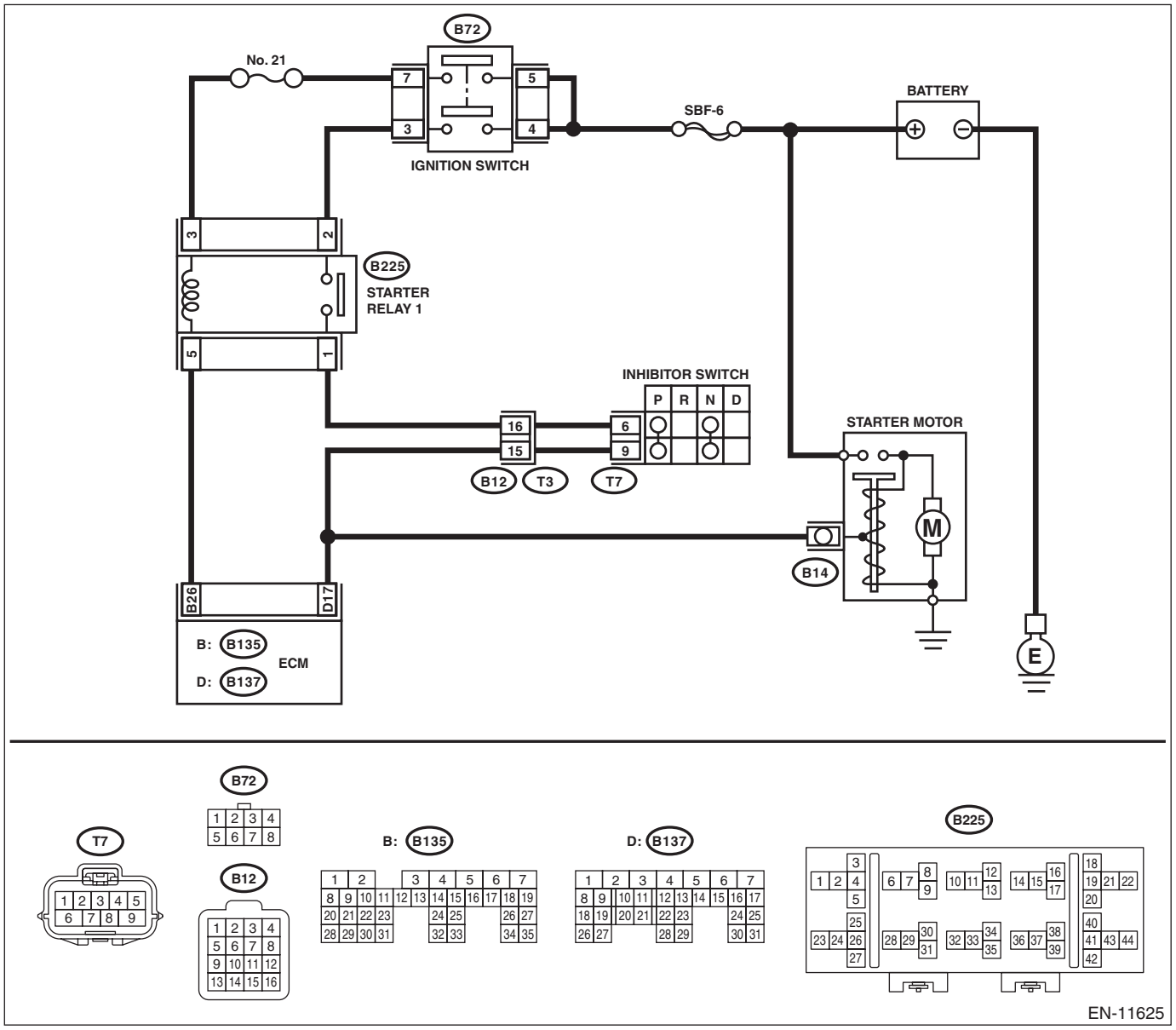
Failure of engine to start

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND STARTER RELAY 1 CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 17 (+) — Chassis ground (–):*** NOTE: Place the select lever in “P” range or “N” range.	Is the voltage 10 V or more?	Repair the short circuit to power in harness between ECM connector and starter relay 1 connector.	Repair the poor contact of ECM connector.

2. MODEL WITH PUSH BUTTON START

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-151, DTC P0617 STARTER RELAY CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

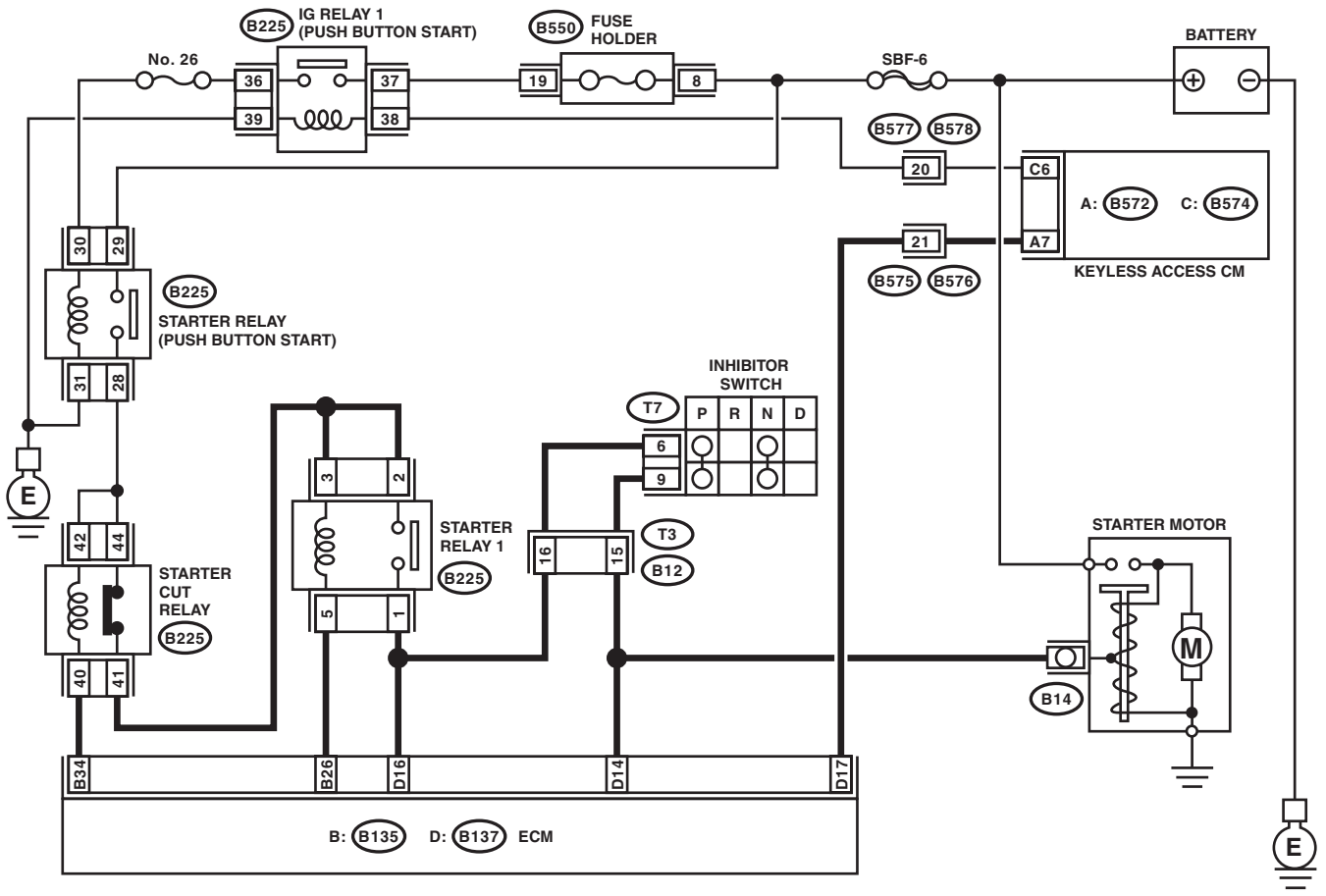
Failure of engine to start

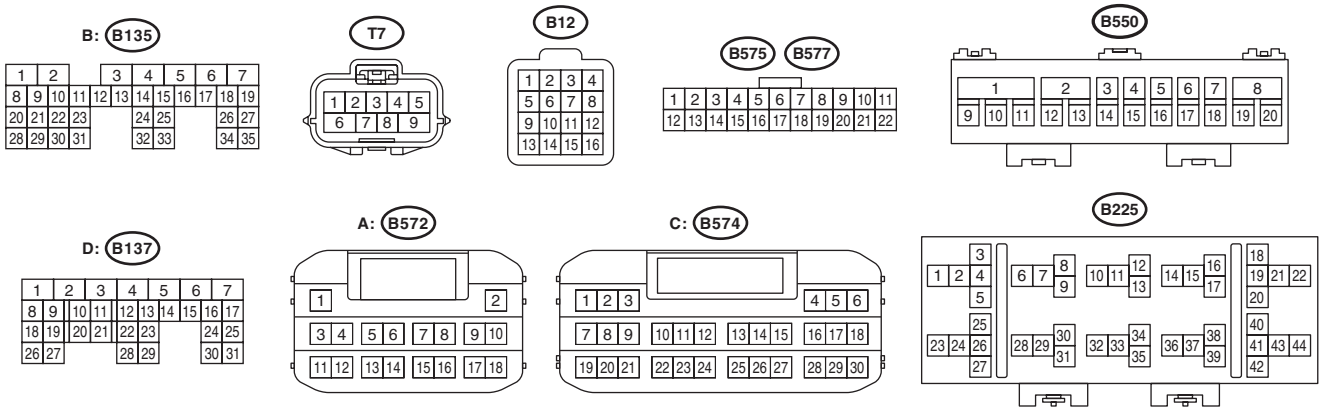
CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>





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	Step	Check	Yes	No
1	**CHECK STARTER MOTOR.** 1) Turn the ignition to ON. 2) Check the starter motor condition.	Is the starter motor rotating?	Go to step **2**.	Repair the short circuit to power supply. NOTE: In this case, repair the following harnesses: • Short circuit to power supply in harness between ECM connector and starter relay 1 connector • Short circuit to power supply in harness between ECM connector and starter motor • Short circuit to power supply in harness between starter relay 1 connector and starter motor
2	**CHECK HARNESS BETWEEN STARTER CUT RELAY CONNECTOR AND STARTER RELAY 1 CONNECTOR.** 1) Turn the ignition to OFF. 2) Disconnect the connector from starter motor. 3) Remove the starter cut relay and starter relay 1. 4) Turn the ignition to ON. 5) Measure the voltage between starter relay 1 connector and chassis ground. ***Connector & terminal*** ***(B225) No. 2 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power in harness between starter cut relay connector and starter relay 1 connector.	Go to step **3**.
3	**CHECK STARTER CUT RELAY.** 1) Connect the battery to starter cut relay terminals No. 40 and No. 42. 2) Measure the resistance between starter cut relay terminals. ***Terminals*** ***No. 41 — No. 44:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Replace the starter cut relay. <Ref. to SL-124, Starter Cut Relay.> Go to step **4**.
4	**CHECK HARNESS BETWEEN ECM AND STARTER RELAY 1 CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 26 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit to ground in harness between ECM connector and starter relay 1 connector.
5	**CHECK STARTER RELAY 1.** Measure the resistance between starter relay 1 terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Replace the starter relay 1. <Ref. to EN(H4DO HEV)(diag)-9, LOCATION, Electrical Component Location.>

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM, STARTER RELAY 1 CONNECTOR AND STARTER MOTOR.** 1) Disconnect the connector from ECM. 2) Turn the ignition to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 14 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power supply. NOTE: In this case, repair the following harnesses: • Short circuit to power supply in harness between ECM connector and starter relay 1 connector • Short circuit to power supply in harness between ECM connector and starter motor • Short circuit to power supply in harness between starter relay 1 connector and starter motor	Repair the poor contact of ECM connector.

DQ:DTC P062F INTERNAL CONTROL MODULE EEPROM ERROR

NOTE:
For the diagnostic procedure, refer to DTC P0606. <Ref. to EN(H4DO HEV)(diag)-282, DTC P0606 CONTROL MODULE PROCESSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DR:DTC P0685 ECM/PCM POWER RELAY CONTROL CIRCUIT/OPEN

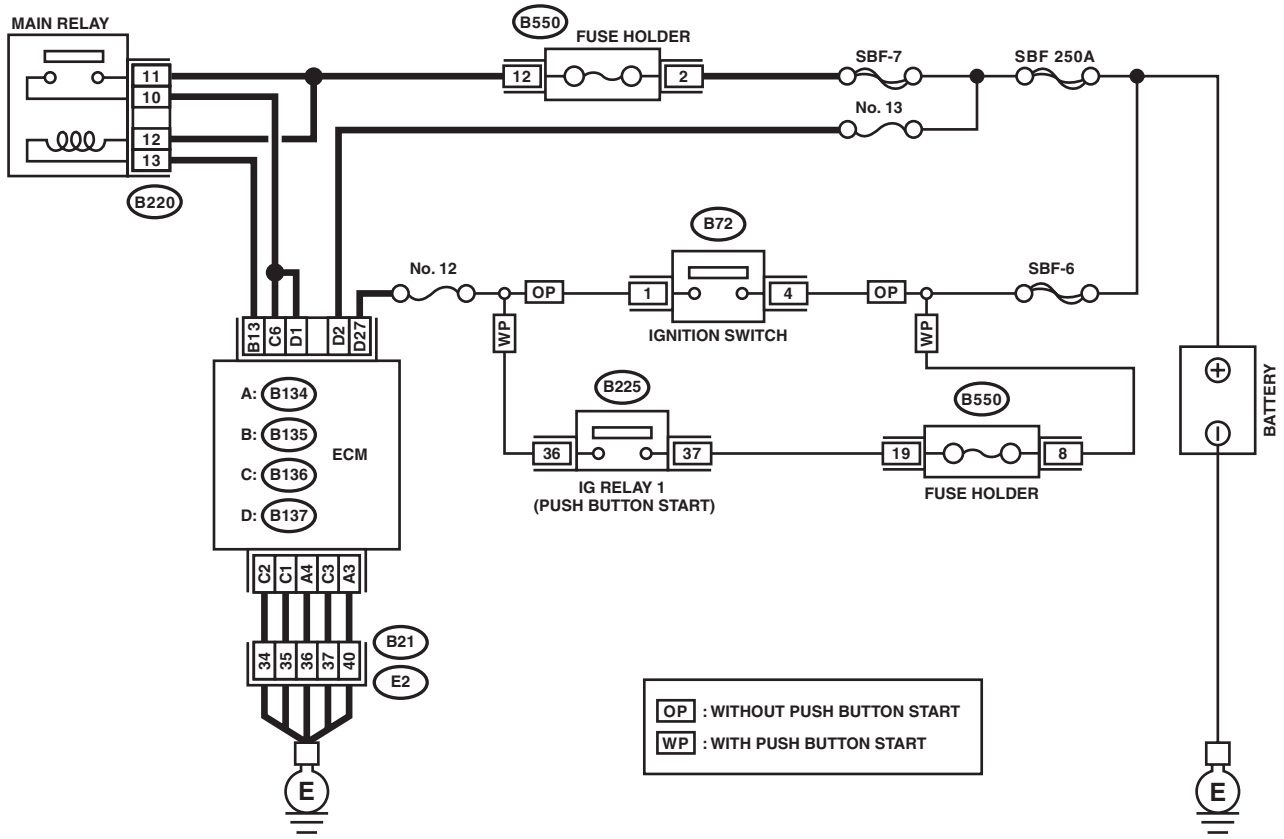
DTC DETECTING CONDITION:

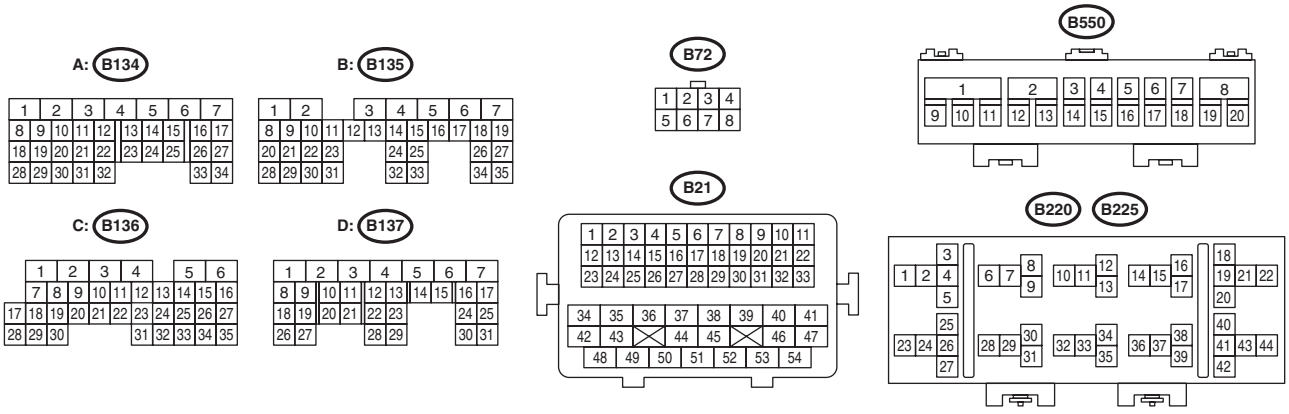
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-153, DTC P0685 ECM/PCM POWER RELAY CONTROL CIRCUIT/OPEN, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>





EN-10733

Step		Check	Yes	No
1	**CHECK ECM CONNECTOR.** Check the connecting condition of ECM connector.	Is the ECM connector correctly connected?	Go to step **2**.	Connect the ECM connector correctly.

	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN ECM AND MAIN RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM connector and engine ground. ***Connector & terminal*** ***(B136) No. 6 (+) — Engine ground (–):*** ***(B137) No. 1 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Repair the harness and connector. NOTE: In this case, repair the following item: • Short circuit to power supply in harness between ECM connector and main relay connector • Defective main relay	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND MAIN RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the main relay. 3) Disconnect the connector from ECM. 4) Measure the resistance between the ECM connector and engine ground. ***Connector & terminal*** ***(B135) No. 13 — Engine ground:***	Is the resistance 1 MΩ or more?	Repair the poor contact of ECM connector.	Repair the short circuit to ground in harness between ECM connector and main relay connector.

DS:DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

NOTE:
For the diagnostic procedure, refer to CVT section. <Ref. to CVT(w/o HEV)(diag)-2, Basic Diagnostic Procedure.>

DT:DTC P081A STARTER DISABLE CIRCUIT LOW

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-155, DTC P081A STARTER DISABLE CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

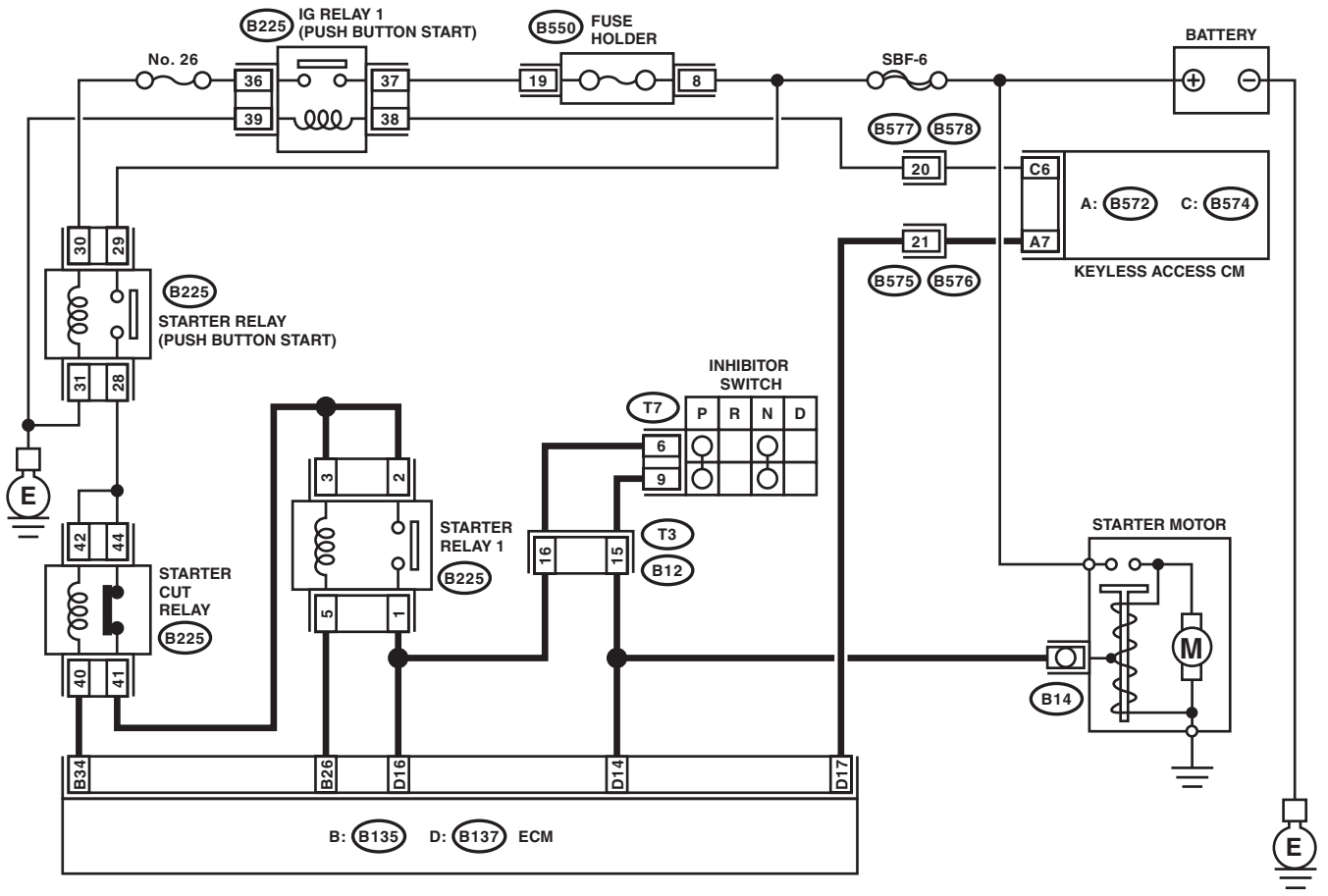
Failure of engine to start

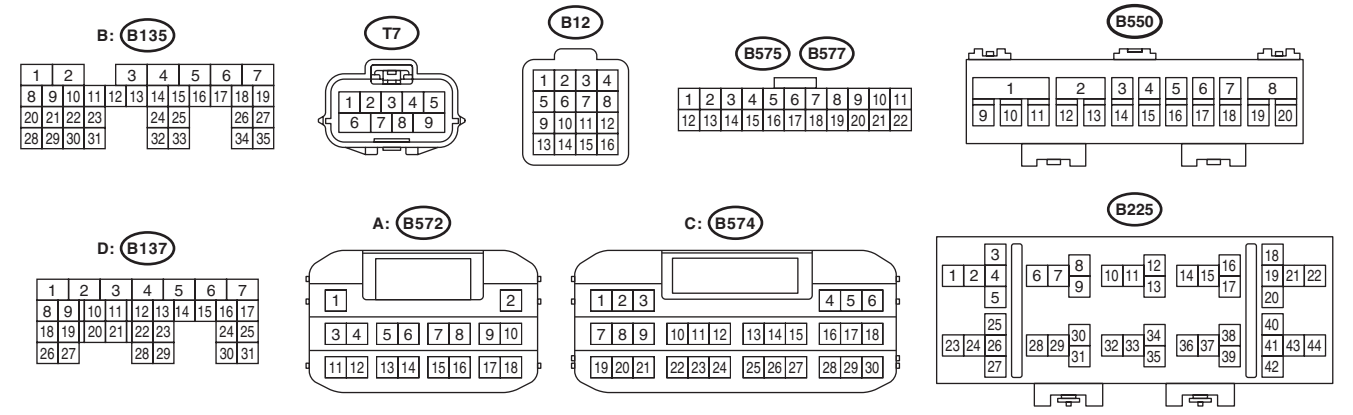
CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>





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	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN STARTER RELAY (PUSH BUTTON START) CONNECTOR AND STARTER CUT RELAY CONNECTOR.** 1) Turn the ignition to OFF. 2) Remove the starter relay (push button start) and starter cut relay. 3) Measure the resistance of harness between starter relay (push button start) connector and starter cut relay connector. ***Connector & terminal*** ***(B225) No. 28 — (B225) No. 42:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit in harness between starter relay (push button start) connector and starter cut relay connector.
2	**CHECK HARNESS BETWEEN ECM AND STARTER CUT RELAY CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM connector and starter cut relay connector. ***Connector & terminal*** ***(B135) No. 34 — (B225) No. 40:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between ECM connector and starter cut relay connector.
3	**CHECK STARTER CUT RELAY.** 1) Connect the battery to starter cut relay terminals No. 40 and No. 42. 2) Measure the resistance between starter cut relay terminals. ***Terminals*** ***No. 41 — No. 44:***	Is the resistance 1 MΩ or more?	Repair the poor contact of ECM connector.	Replace the starter cut relay. <Ref. to SL-124, Starter Cut Relay.>

DU:DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW (AT MODEL)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-156, DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW (AT MODEL), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

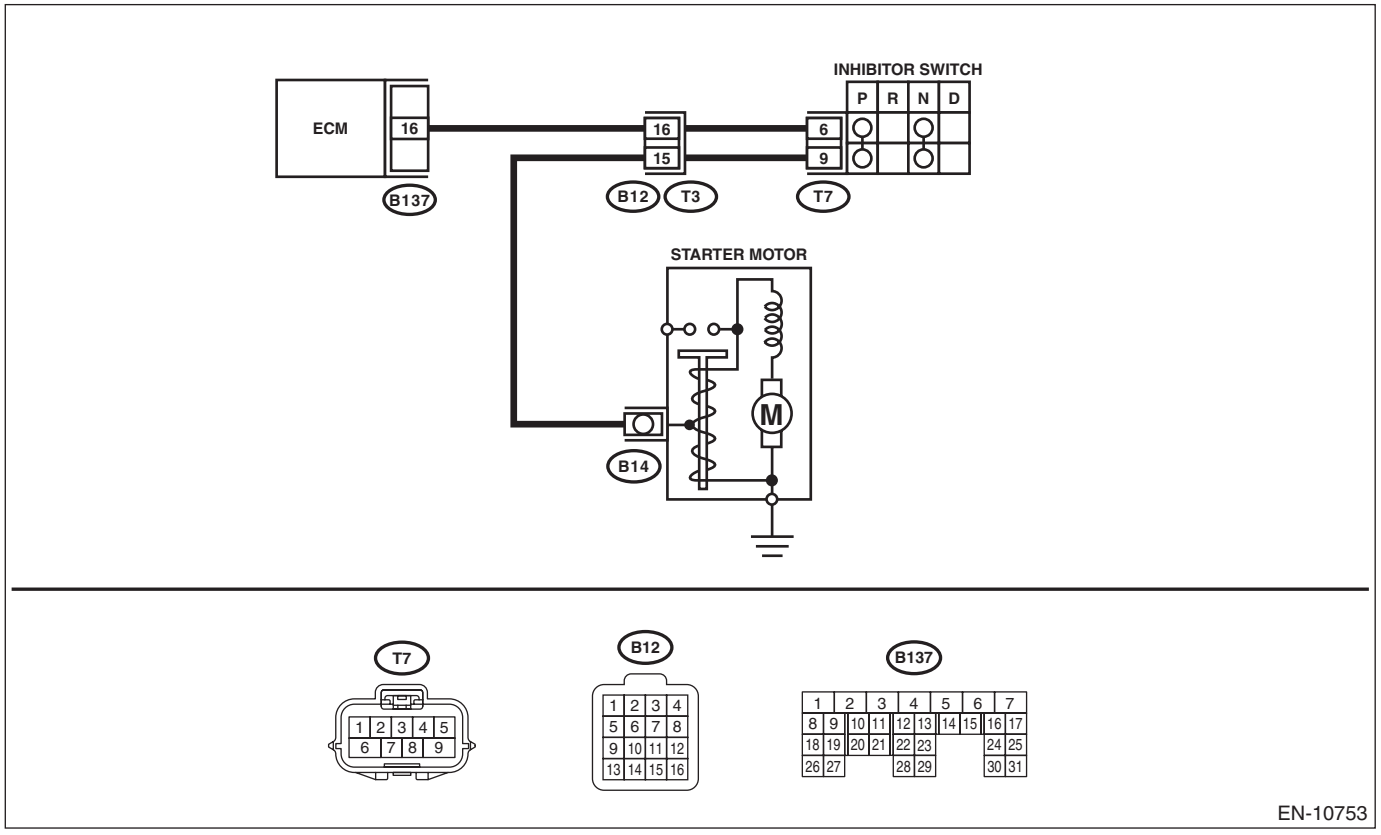
Improper idling

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



Step		Check	Yes	No
1	**CHECK SELECT CABLE.**	Is there any fault in select cable?	Repair or adjust the select cable. <Ref. to CS-51, Select Cable.>	Go to step **2**.
2	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Place the select lever in other than "P" range and "N" range. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 16 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the poor contact of ECM connector.	Go to step **3**.

	Step	Check	Yes	No
3	**CHECK HARNESS BETWEEN ECM AND TRANSMISSION HARNESS CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and transmission harness connector (T3). 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 16 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit to ground in harness between ECM connector and transmission harness connector.
4	**CHECK TRANSMISSION HARNESS CONNECTOR.** 1) Disconnect the connector from inhibitor switch. 2) Measure the resistance between transmission harness connector and engine ground. ***Connector & terminal*** ***(T3) No. 16 — Engine ground:***	Is the resistance 1 MΩ or more?	Replace the inhibitor switch. <Ref. to CVT(TH58A)-97, Inhibitor Switch.>	Repair short circuit to ground in harness between transmission harness connector and inhibitor switch connector.

DV:DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH (AT MODEL)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-157, DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH (AT MODEL), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

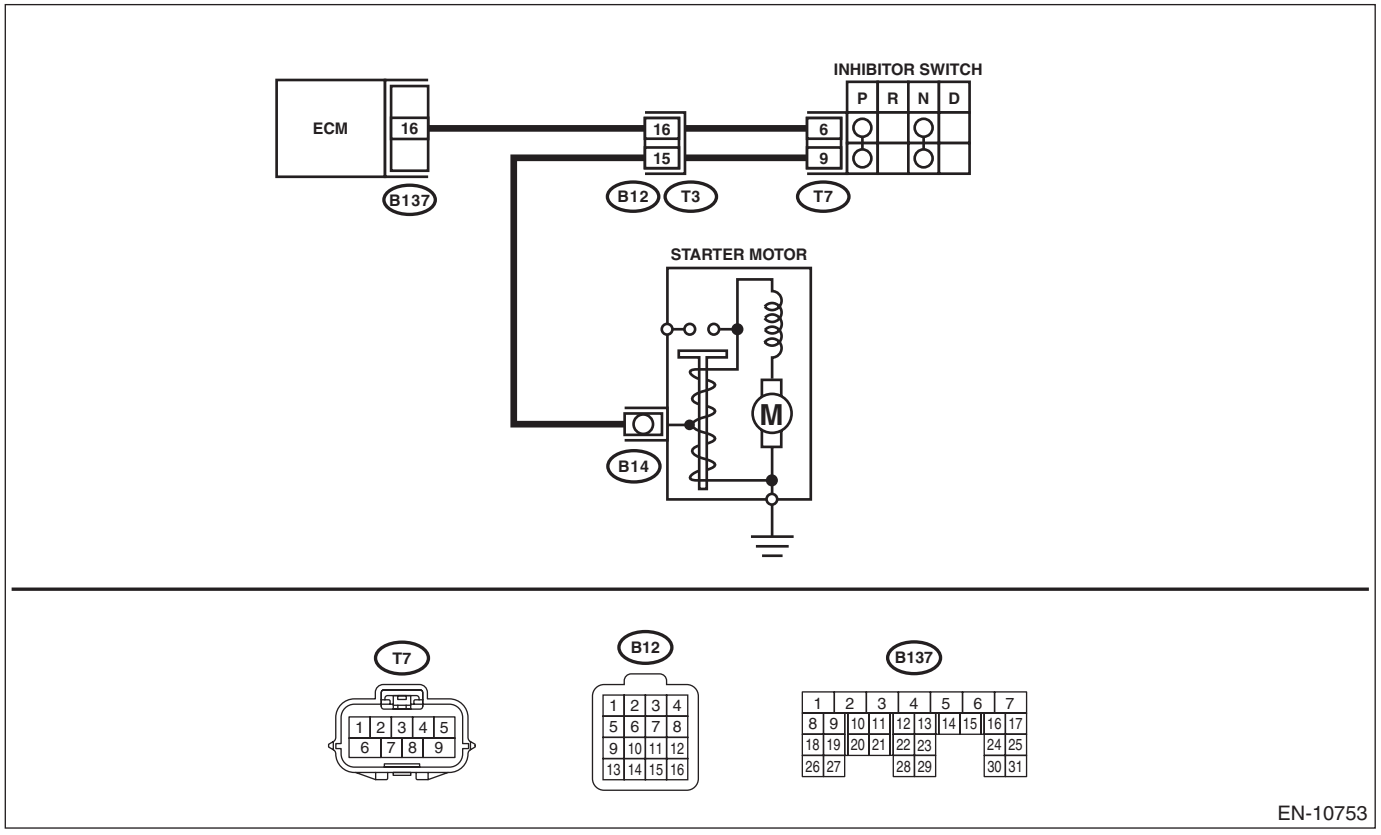
Improper idling

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK SELECT CABLE.**	Is there any fault in select cable?	Repair or adjust the select cable. <Ref. to CS-51, Select Cable.>	Go to step **2**.
2	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground with select lever at "P" range and "N" range. ***Connector & terminal*** ***(B137) No. 16 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Repair the poor contact of ECM connector.	Go to step **3**.

	Step	Check	Yes	No
3	**CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and inhibitor switch. 3) Measure the resistance of harness between ECM connector and inhibitor switch connector. ***Connector & terminal*** ***(B137) No. 16 — (T7) No. 6:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and inhibitor switch connector • Poor contact of coupling connector
4	**CHECK INHIBITOR SWITCH GROUND LINE.** Measure the resistance of harness between inhibitor switch connector and engine ground. ***Connector & terminal*** ***(T7) No. 9 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the inhibitor switch. <Ref. to CVT(TH58A)-97, Inhibitor Switch.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between inhibitor switch connector and starter motor ground line • Poor contact of coupling connector • Poor contact of starter motor connector • Poor contact of starter motor ground • Starter motor

DW:DTC P0A7B BATTERY ENERGY CONTROL MODULE REQUEST MIL ILLUMINATION

NOTE:
Refer to HEV section for diagnostic procedure. <Ref. to HEV(diag)-2, Basic Diagnostic Procedure.>

DX:DTC P0AC4 HYBRID POWERTRAIN CONTROL MODULE REQUEST MIL ILLUMINATION

NOTE:
Refer to HEV section for diagnostic procedure. <Ref. to HEV(diag)-2, Basic Diagnostic Procedure.>

DY:DTC P0CA1 DRIVE MOTOR CONTROL MODULE REQUEST MIL ILLUMINATION

NOTE:
Refer to HEV section for diagnostic procedure. <Ref. to HEV(diag)-2, Basic Diagnostic Procedure.>

DZ:DTC P1160 RETURN SPRING FAILURE

NOTE:
For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4DO HEV)(diag)-335, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

EA:DTC P1449 EVAPORATIVE EMISSION CONT. SYS. AIR FILTER CLOG

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-162, DTC P1449 EVAPORATIVE EMISSION CONT. SYS. AIR FILTER CLOG, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

Step		Check	Yes	No
1	CHECK FOR ANY OTHER DTC ON DISPLAY.	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	CHECK DRAIN FILTER AND DRAIN TUBE.	Is the drain filter or drain tube clogged?	Replace the drain filter. <Ref. to EC(H4DO(HEV))-38, Drain Filter.>	Replace the leak check valve assembly. <Ref. to EC(H4DO(HEV))-39, Leak Check Valve Assembly.>

EB:DTC P1451 EVAPORATIVE EMISSION CONT. SYS.

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-163, DTC P1451 EVAPORATIVE EMISSION CONT. SYS., Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK DRAIN TUBE BETWEEN CANISTER AND LEAK CHECK VALVE ASSEMBLY.**	Is the drain tube between canister and leak check valve assembly clogged?	Replace the drain tube between the canister and leak check valve assembly. <Ref. to EC(H4DO(HEV))-8, Canister.> <Ref. to EC(H4DO(HEV))-39, Leak Check Valve Assembly.>	Go to step **2**.
2	**CHECK HOSES BETWEEN CANISTER AND FUEL TANK.**	Are the hoses between the canister and fuel tank clogged?	Replace the hoses between the canister and fuel tank. <Ref. to EC(H4DO(HEV))-8, Canister.> <Ref. to FU(H4DO(HEV))-105, Fuel Tank.>	Replace the canister. <Ref. to EC(H4DO(HEV))-8, Canister.> After the operation is complete, go to the next step. Go to step **3**.
3	**CHECK EVAPORATIVE EMISSION CONTROL SYSTEM.** Perform drive cycle I. <Ref. to EN(H4DO HEV)(diag)-62, DRIVE CYCLE I, PROCEDURE, Drive Cycle.>	Is DTC P1451 displayed on the display?	Replace the leak check valve assembly. <Ref. to EC(H4DO(HEV))-39, Leak Check Valve Assembly.>	End.

EC:DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4DO HEV)(diag)-309, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

ED:DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4DO HEV)(diag)-312, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

EE:DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4DO HEV)(diag)-309, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

EF:DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4DO HEV)(diag)-312, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

EG:DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4DO HEV)(diag)-309, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

EH:DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4DO HEV)(diag)-312, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

EI: DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-166, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

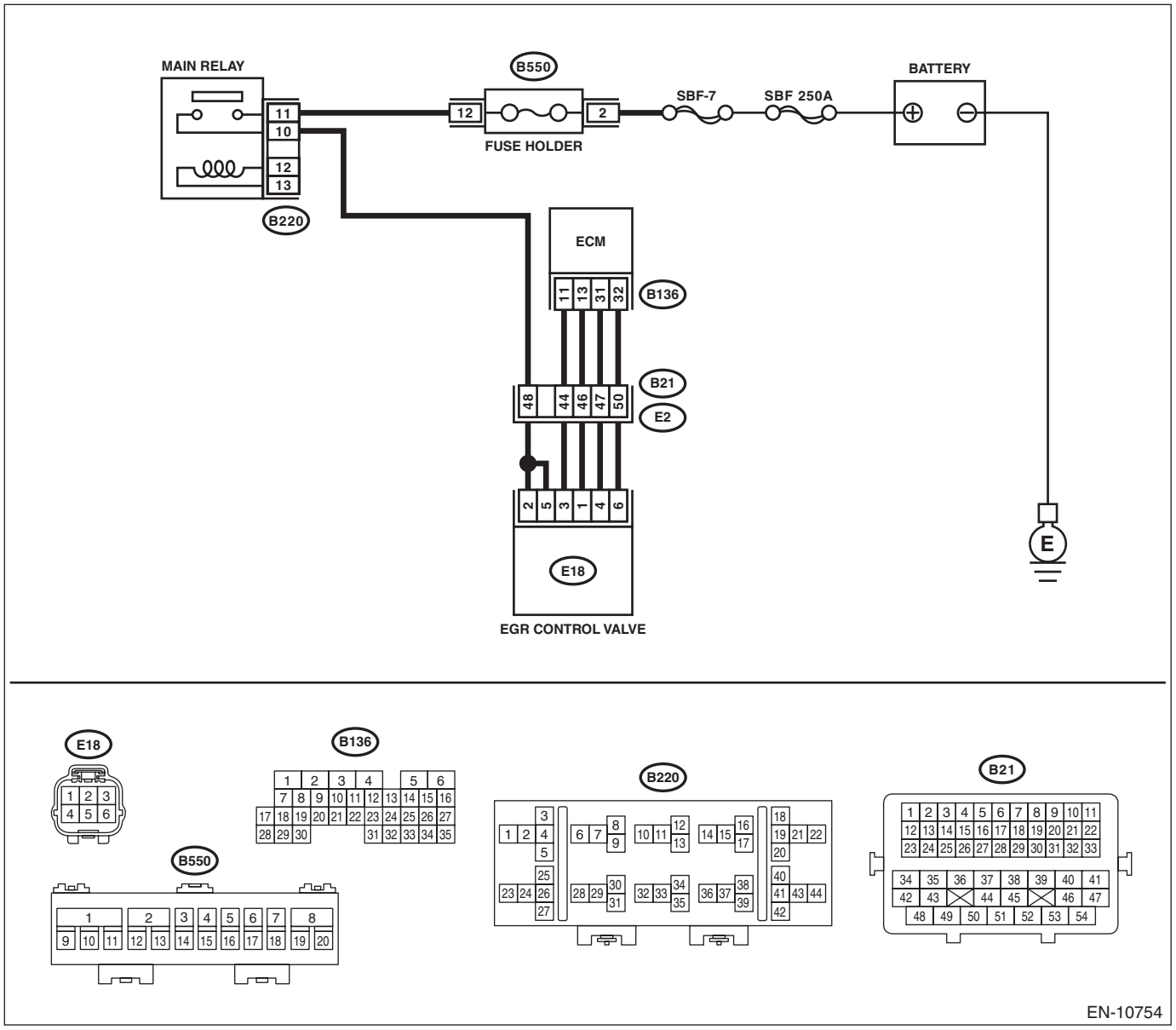
- Improper idling
- Poor driving performance
- Engine breathing

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



Step		Check	Yes	No
1	**CHECK POWER SUPPLY TO EGR CONTROL VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the EGR control valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between EGR control valve connector and engine ground. ***Connector & terminal*** ***(E18) No. 2 (+) — Engine ground (–):*** ***(E18) No. 5 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between EGR control valve and main relay connector • Poor contact of coupling connector

	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN ECM AND EGR CONTROL VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and EGR control valve connector. ***Connector & terminal*** ***DTC P1492; (B136) No. 11 — (E18) No. 3:*** ***DTC P1494; (B136) No. 13 — (E18) No. 1:*** ***DTC P1496; (B136) No. 31 — (E18) No. 4:*** ***DTC P1498; (B136) No. 32 — (E18) No. 6:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and EGR control valve connector • Poor contact of coupling connector
3	**CHECK HARNESS BETWEEN ECM AND EGR CONTROL VALVE CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1492; (B136) No. 11 — Chassis ground:*** ***DTC P1494; (B136) No. 13 — Chassis ground:*** ***DTC P1496; (B136) No. 31 — Chassis ground:*** ***DTC P1498; (B136) No. 32 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair ground short circuit of harness between ECM connector and EGR control valve connector.
4	**CHECK FOR POOR CONTACT.** Check for poor contact between ECM connector and EGR control valve connector.	Is there poor contact in ECM or EGR control valve connector?	Repair the poor contact of ECM or EGR control valve connector.	Replace EGR control valve. <Ref. to EC(H4DO(HEV))-26, EGR Control Valve.>

EJ: DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-166, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

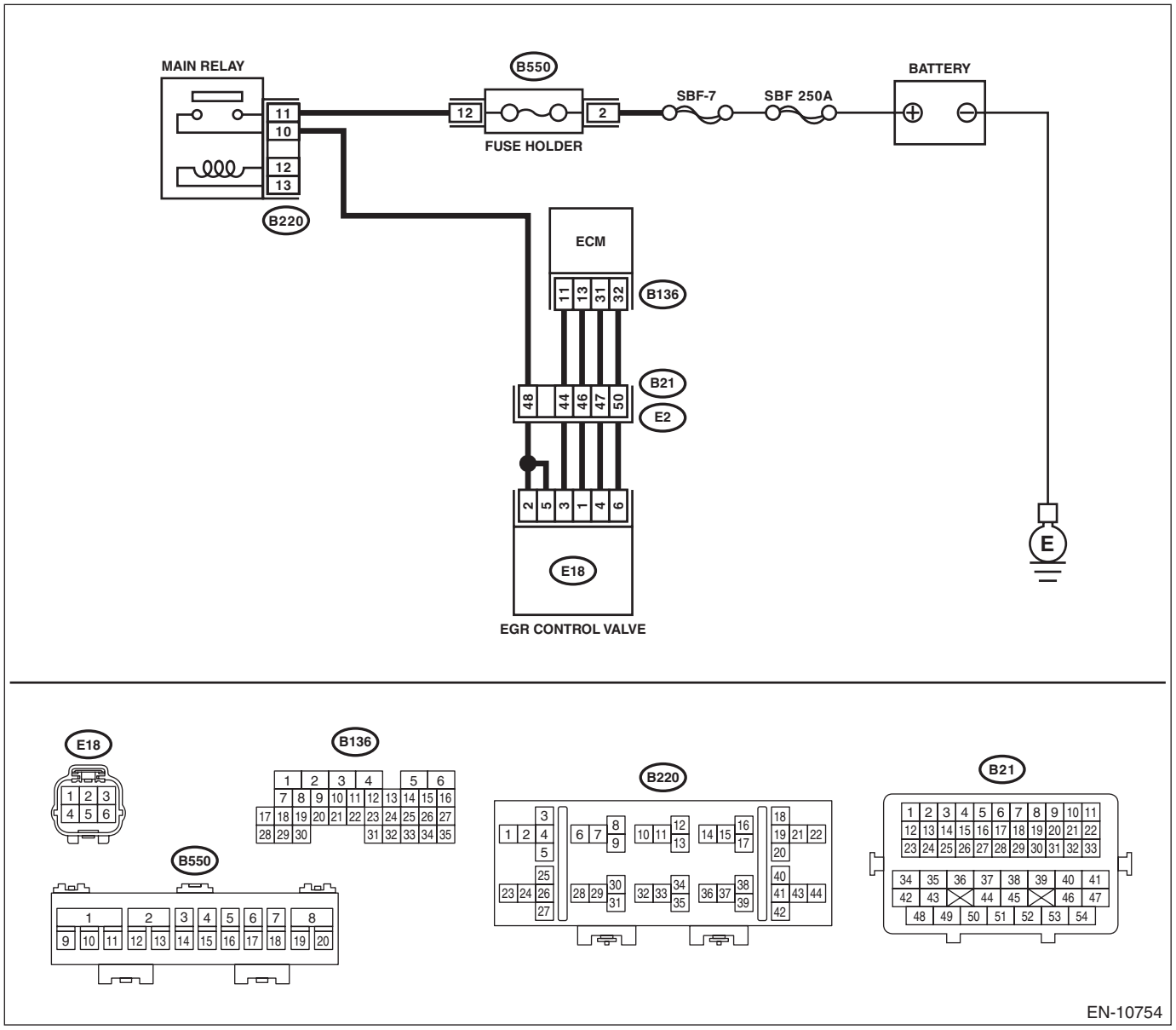
TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance
- Engine breathing

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND EGR CONTROL VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and EGR control valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1493; (B136) No. 11 (+) — Chassis ground (–):*** ***DTC P1495; (B136) No. 13 (+) — Chassis ground (–):*** ***DTC P1497; (B136) No. 31 (+) — Chassis ground (–):*** ***DTC P1499; (B136) No. 32 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power supply in the harness between the ECM connector and EGR control valve connector.	Go to step **2**.
2	**CHECK EGR CONTROL VALVE.** Measure the resistance between EGR control valve terminals. ***Terminals*** ***DTC P1493; No. 2 — No. 3:*** ***DTC P1495; No. 2 — No. 1:*** ***DTC P1497; No. 5 — No. 4:*** ***DTC P1499; No. 5 — No. 6:***	Is the resistance 20 Ω or more?	Repair the poor contact of ECM connector.	Replace EGR control valve. <Ref. to EC(H4DO(HEV))-26, EGR Control Valve.>

EK:DTC P2004 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 1)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-167, DTC P2004 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK TUMBLE GENERATOR VALVE RH.** 1) Remove the tumble generator valve assembly RH. 2) Check the tumble generator valve.	Is there any dirt or clogging with foreign objects in the tumble generator valve?	Clean the tumble generator valve.	Replace the tumble generator valve RH. <Ref. to FU(H4DO(HEV))-73, Tumble Generator Valve Assembly.>

EL:DTC P2005 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 2)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-168, DTC P2005 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK TUMBLE GENERATOR VALVE LH.** 1) Remove the tumble generator valve assembly LH. 2) Check the tumble generator valve.	Is there any dirt or clogging with foreign objects in the tumble generator valve?	Clean the tumble generator valve.	Replace the tumble generator valve LH. <Ref. to FU(H4DO(HEV))-73, Tumble Generator Valve Assembly.>

EM:DTC P2006 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 1)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-169, DTC P2006 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK TUMBLE GENERATOR VALVE RH.** 1) Remove the tumble generator valve assembly RH. 2) Check the tumble generator valve.	Is there any dirt or clogging with foreign objects in the tumble generator valve?	Clean the tumble generator valve.	Replace the tumble generator valve RH. <Ref. to FU(H4DO(HEV))-73, Tumble Generator Valve Assembly.>

EN:DTC P2007 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 2)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-170, DTC P2007 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK TUMBLE GENERATOR VALVE LH.** 1) Remove the tumble generator valve assembly LH. 2) Check the tumble generator valve.	Is there any dirt or clogging with foreign objects in the tumble generator valve?	Clean the tumble generator valve.	Replace the tumble generator valve LH. <Ref. to FU(H4DO(HEV))-73, Tumble Generator Valve Assembly.>

EO:DTC P2009 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 1)

DTC DETECTING CONDITION:

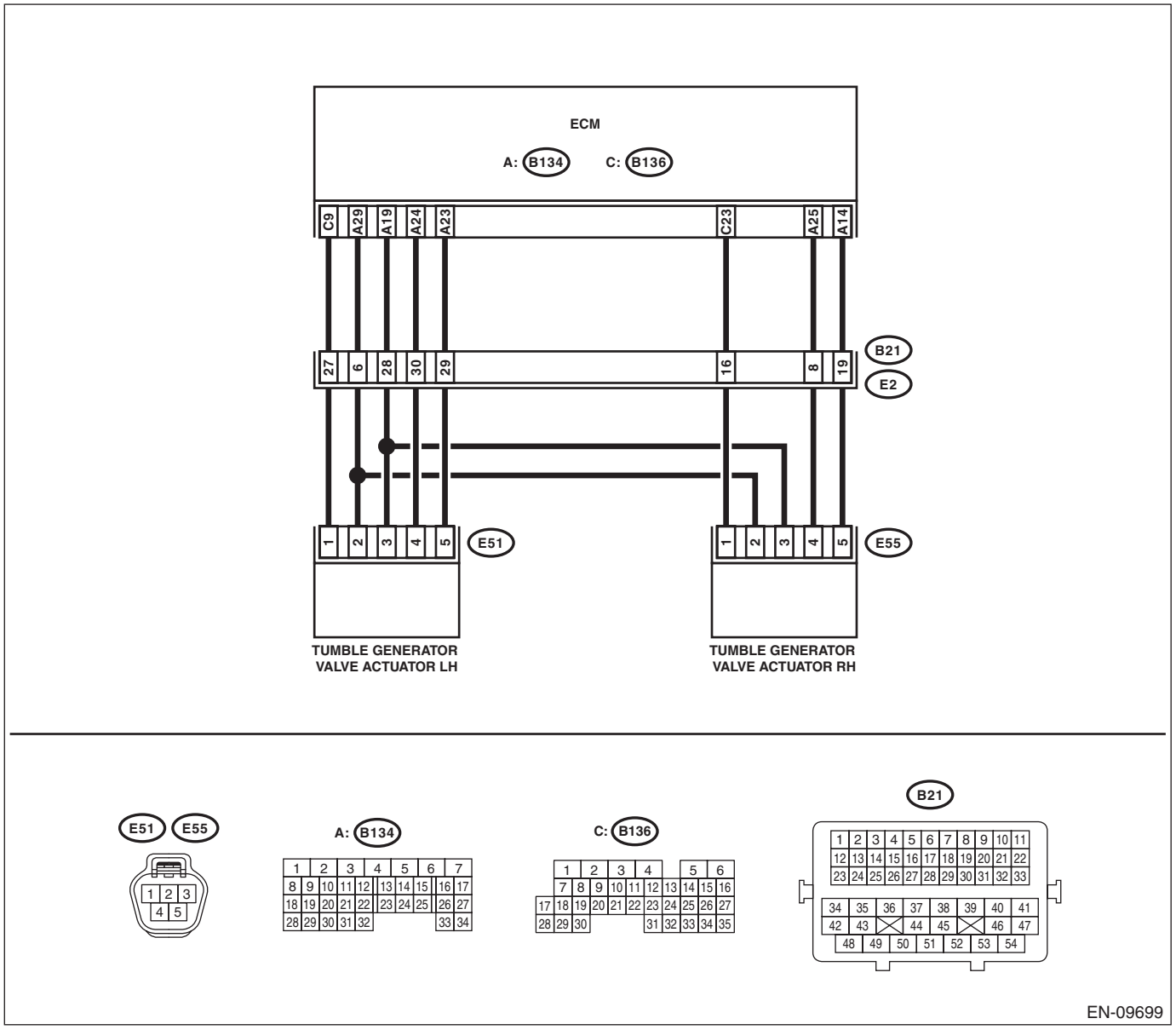
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-171, DTC P2009 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR RH CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 25 (+) — Chassis ground (–):*** ***(B134) No. 14 (+) — Chassis ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power in harness between ECM connector and tumble generator valve actuator RH connector.	Replace the tumble generator valve actuator RH. <Ref. to FU(H4DO(HEV))-76, Tumble Generator Valve Actuator.>

EP:DTC P2012 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 2)

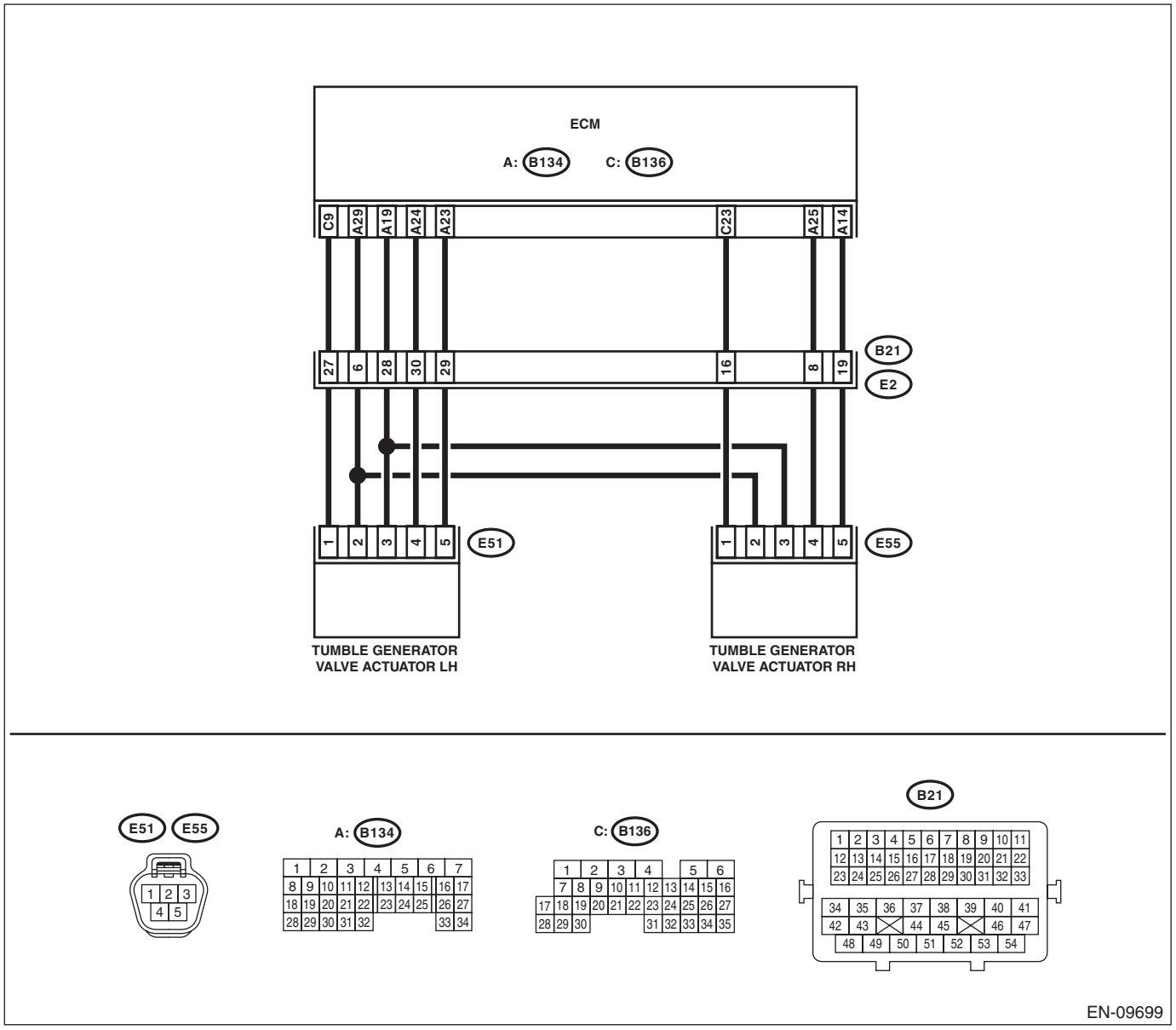
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-171, DTC P2012 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR LH CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 23 (+) — Chassis ground (–):*** ***(B134) No. 24 (+) — Chassis ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power in harness between ECM connector and tumble generator valve actuator LH connector.	Replace the tumble generator valve actuator LH. <Ref. to FU(H4DO(HEV))-76, Tumble Generator Valve Actuator.>

EQ:DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 1)

DTC DETECTING CONDITION:

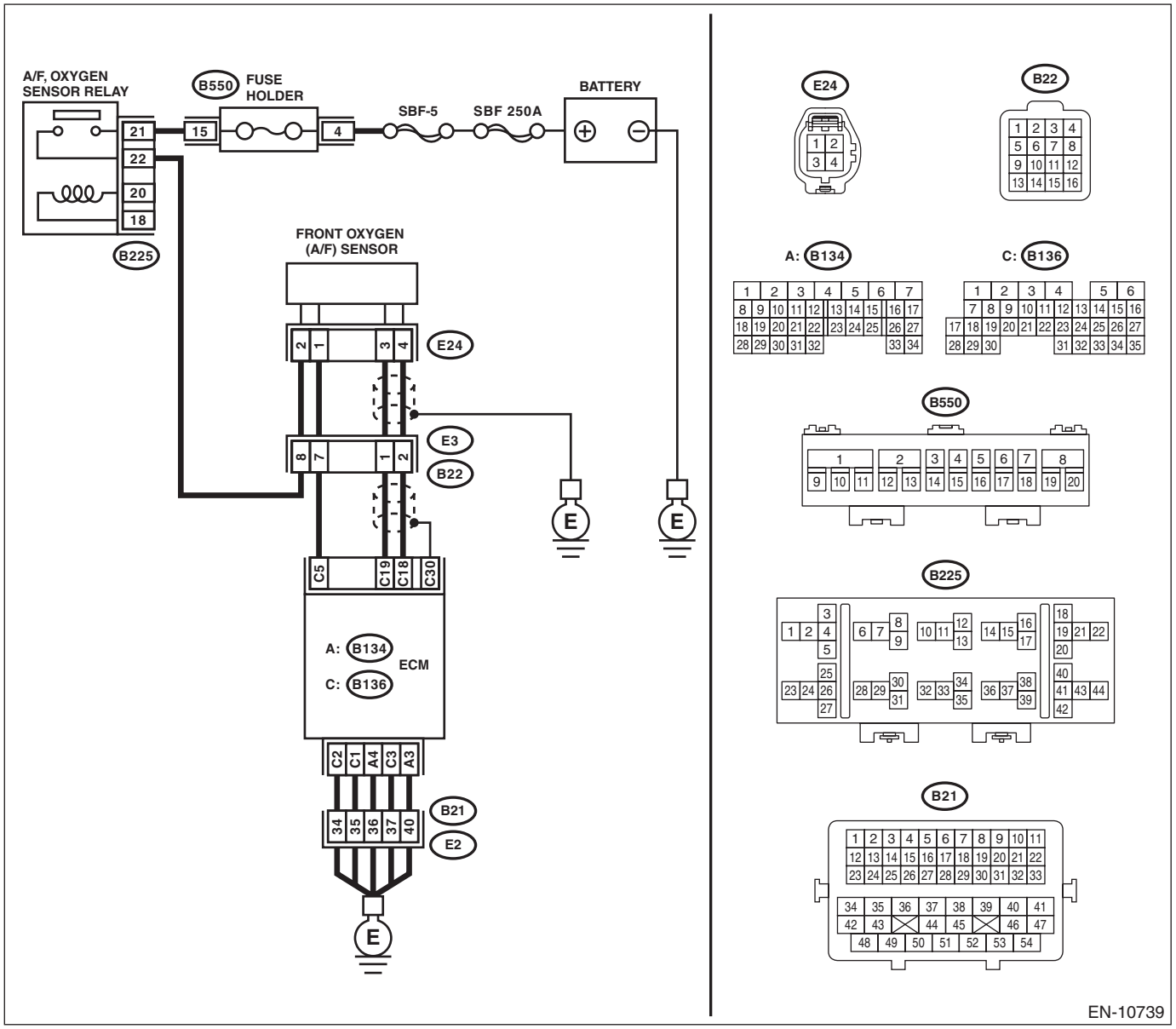
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-172, DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

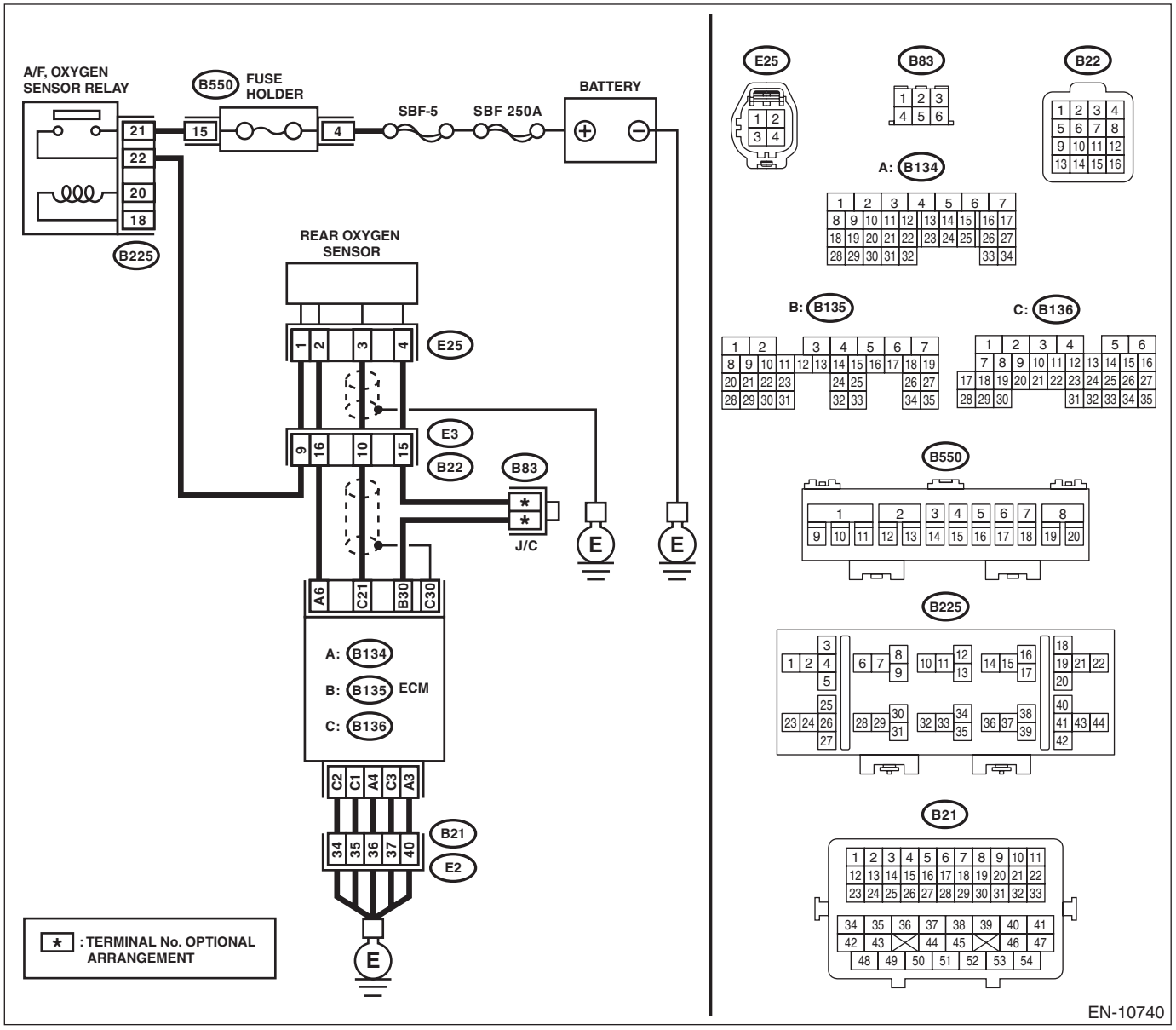
CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>





Step		Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.**	Has water entered the connector?	Completely remove any water inside.	Go to step **3**.

	Step	Check	Yes	No
3	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 3) Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B136) No. 19 — (E24) No. 3:*** ***(B136) No. 18 — (E24) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and front oxygen (A/F) sensor connector • Poor contact of coupling connector
4	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 19 — Chassis ground:*** ***(B136) No. 18 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector.
5	**CHECK OUTPUT SIGNAL FOR ECM.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. ***Connector & terminal*** ***(E24) No. 3 (+) — Chassis ground (–):***	Is the voltage 4.5 V or more?	Go to step **7**.	Go to step **6**.
6	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. ***Connector & terminal*** ***(E24) No. 4 (+) — Chassis ground (–):***	Is the voltage 4.95 V or more?	Go to step **7**.	Go to step **8**.
7	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. ***Connector & terminal*** ***(E24) No. 3 (+) — Chassis ground (–):*** ***(E24) No. 4 (+) — Chassis ground (–):***	Is the voltage 8 V or more?	Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>	Repair the poor contact of ECM connector.
8	**CHECK EXHAUST SYSTEM.**	Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step **9**.
9	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step **10**.

	Step	Check	Yes	No
10	**CHECK FUEL PRESSURE.** **WARNING:** **Place "NO OPEN FLAMES" signs near the working area.** **CAUTION:** **Be careful not to spill fuel.** 1) Connect the front oxygen (A/F) sensor connector. 2) Measure the fuel pressure. <Ref. to ME(H4DO(w/o HEV))-35, INSPECTION, Fuel Pressure.> **CAUTION:** **Release fuel pressure before removing the fuel pressure gauge.**	Is the measured value 340 — 400 kPa (3.5 — 4.1 kg/cm^2, 49 — 58 psi)?	Go to step **11**.	Check the fuel pump and fuel delivery line. <Ref. to FU(H4DO(HEV))-127, INSPECTION, Fuel Pump.> <Ref. to FU(H4DO(HEV))-157, INSPECTION, Fuel Delivery and Evaporation Lines.>
11	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm up completely. 2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Coolant Temp.» 75°C (167°F) or more?	Go to step **12**.	Replace the engine coolant temperature sensor. <Ref. to FU(H4DO(HEV))-41, Engine Coolant Temperature Sensor.>
12	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F). 2) Place the select lever in "P" range or "N" range. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Mass Air Flow» 2.0 — 5.0 g/s (0.26 — 0.66 lb/m)?	Go to step **13**.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>

	Step	Check	Yes	No
13	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F). 2) Place the select lever in “P” range or “N” range. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Open the front hood. 6) Measure the ambient temperature. 7) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Subtract ambient temperature from «Intake Air Temp.». Is the obtained value –10 — 50°C (–18 — 90°F)?	Go to step **14**.	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>
14	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum) 2) Read the value of «Oxygen sensor #12» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Oxygen sensor #12» 0.490 V or more?	Go to step **15**.	Go to step **16**.
15	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm. 2) Read the value of «Oxygen sensor #12» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Oxygen sensor #12» 0.250 V or less?	Go to step **17**.	Go to step **16**.
16	**CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.**	Has water entered the connector?	Completely remove any water inside.	Go to step **18**.

	Step	Check	Yes	No
17	**CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.** 1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), then keep the engine idling for 5 minutes or more. 2) Read the value of «Oxygen sensor #12» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Oxygen sensor #12» 0.250 V or less for 5 minutes or more?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DO(HEV))-78, Front Oxygen (A/F) Sensor.>	Go to step **18**.
18	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM connector and rear oxygen sensor connector. ***Connector & terminal*** ***(B136) No. 21 — (E25) No. 3:*** ***(B135) No. 30 — (E25) No. 4:***	Is the resistance less than 1 Ω?	Go to step **19**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and rear oxygen sensor connector • Poor contact of coupling connector
19	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between rear oxygen sensor connector and chassis ground. ***Connector & terminal*** ***(E25) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H4DO(HEV))-82, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and rear oxygen sensor connector • Poor contact of ECM connector • Poor contact of coupling connector

ER:DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 1)

DTC DETECTING CONDITION:

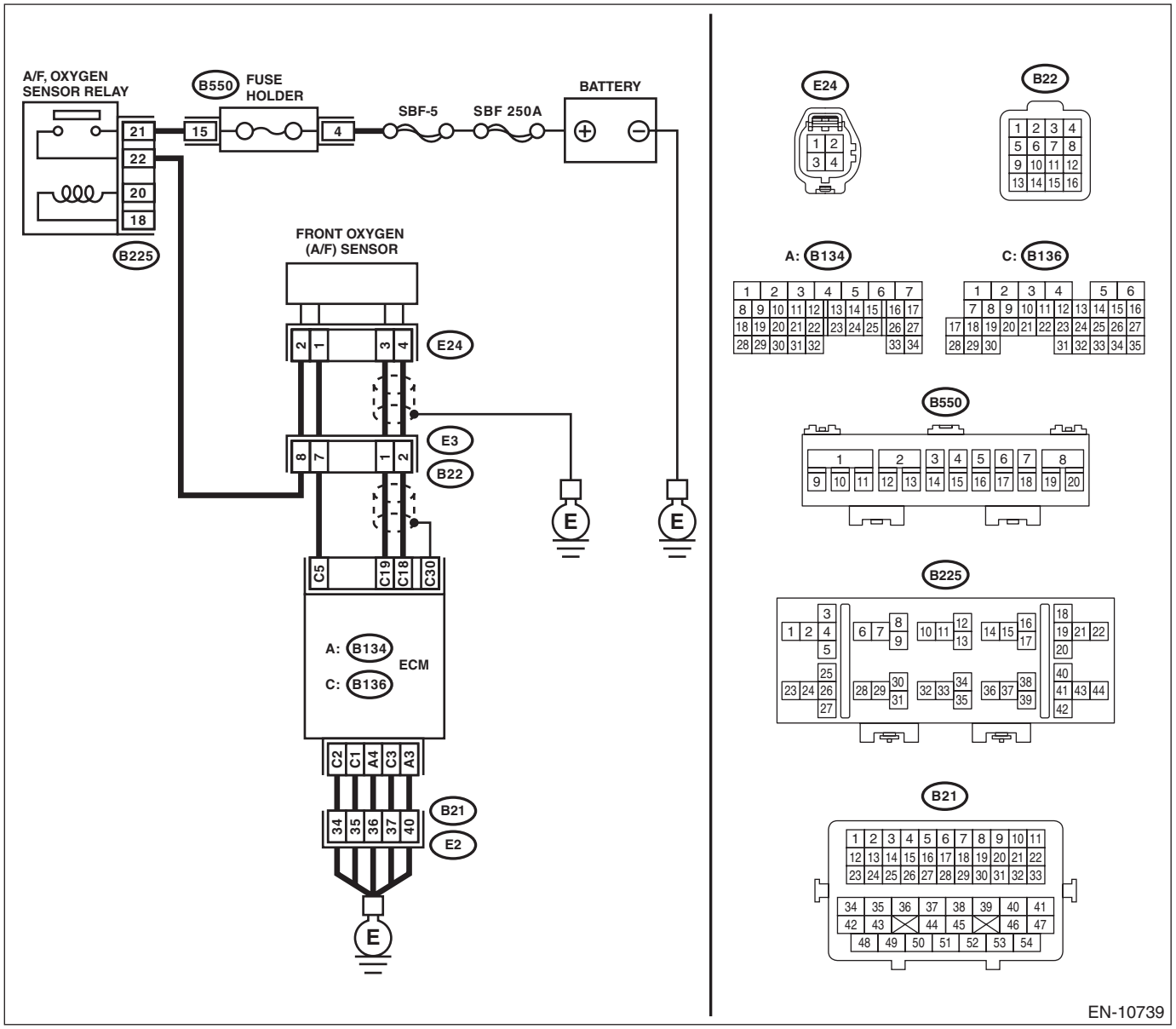
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-173, DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

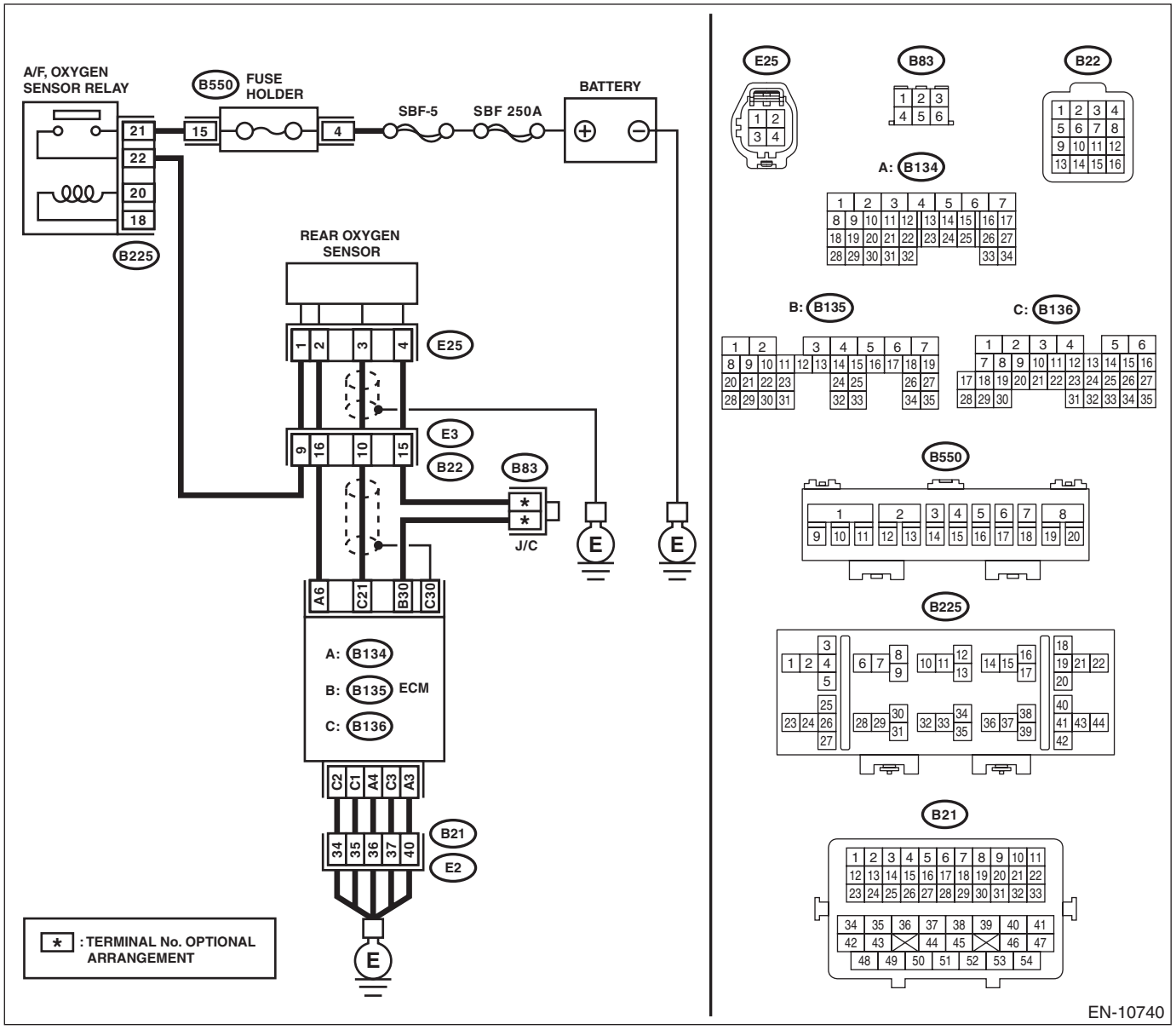
CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>





Step		Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.**	Has water entered the connector?	Completely remove any water inside.	Go to step **3**.

	Step	Check	Yes	No
3	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 3) Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B136) No. 19 — (E24) No. 3:*** ***(B136) No. 18 — (E24) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and front oxygen (A/F) sensor connector • Poor contact of coupling connector
4	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 19 — Chassis ground:*** ***(B136) No. 18 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector.
5	**CHECK OUTPUT SIGNAL FOR ECM.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. ***Connector & terminal*** ***(E24) No. 3 (+) — Chassis ground (–):***	Is the voltage 4.5 V or more?	Go to step **7**.	Go to step **6**.
6	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. ***Connector & terminal*** ***(E24) No. 4 (+) — Chassis ground (–):***	Is the voltage 4.95 V or more?	Go to step **7**.	Go to step **8**.
7	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. ***Connector & terminal*** ***(E24) No. 3 (+) — Chassis ground (–):*** ***(E24) No. 4 (+) — Chassis ground (–):***	Is the voltage 8 V or more?	Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>	Repair the poor contact of ECM connector.
8	**CHECK EXHAUST SYSTEM.**	Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step **9**.
9	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step **10**.

	Step	Check	Yes	No
10	**CHECK FUEL PRESSURE.** **WARNING:** **Place "NO OPEN FLAMES" signs near the working area.** **CAUTION:** **Be careful not to spill fuel.** 1) Connect the front oxygen (A/F) sensor connector. 2) Measure the fuel pressure. <Ref. to ME(H4DO(w/o HEV))-35, INSPECTION, Fuel Pressure.> **CAUTION:** **Release fuel pressure before removing the fuel pressure gauge.**	Is the measured value 340 — 400 kPa (3.5 — 4.1 kg/cm^2, 49 — 58 psi)?	Go to step **11**.	Check the fuel pump and fuel delivery line. <Ref. to FU(H4DO(HEV))-127, INSPECTION, Fuel Pump.> <Ref. to FU(H4DO(HEV))-157, INSPECTION, Fuel Delivery and Evaporation Lines.>
11	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm up completely. 2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Coolant Temp.» 75°C (167°F) or more?	Go to step **12**.	Replace the engine coolant temperature sensor. <Ref. to FU(H4DO(HEV))-41, Engine Coolant Temperature Sensor.>
12	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F). 2) Place the select lever in "P" range or "N" range. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Mass Air Flow» 2.0 — 5.0 g/s (0.26 — 0.66 lb/m)?	Go to step **13**.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>

	Step	Check	Yes	No
13	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F). 2) Place the select lever in “P” range or “N” range. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Open the front hood. 6) Measure the ambient temperature. 7) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Subtract ambient temperature from «Intake Air Temp.». Is the obtained value –10 — 50°C (–18 — 90°F)?	Go to step **14**.	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>
14	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum) 2) Read the value of «Oxygen sensor #12» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Oxygen sensor #12» 0.490 V or more?	Go to step **15**.	Go to step **16**.
15	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm. 2) Read the value of «Oxygen sensor #12» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “Current Data Display For Engine”. <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Oxygen sensor #12» 0.250 V or less?	Go to step **17**.	Go to step **16**.
16	**CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.**	Has water entered the connector?	Completely remove any water inside.	Go to step **18**.

	Step	Check	Yes	No
17	**CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.** 1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), then keep the engine idling for 5 minutes or more. 2) Read the value of «Oxygen sensor #12» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Oxygen sensor #12» 0.8 V or more for 5 minutes or more?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DO(HEV))-78, Front Oxygen (A/F) Sensor.>	Go to step **18**.
18	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM connector and rear oxygen sensor connector. ***Connector & terminal*** ***(B136) No. 21 — (E25) No. 3:*** ***(B135) No. 30 — (E25) No. 4:***	Is the resistance less than 1 Ω?	Go to step **19**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and rear oxygen sensor connector • Poor contact of coupling connector
19	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between rear oxygen sensor connector and chassis ground. ***Connector & terminal*** ***(E25) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H4DO(HEV))-82, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and rear oxygen sensor connector • Poor contact of ECM connector • Poor contact of coupling connector

ES:DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/ PERFORMANCE

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-174, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

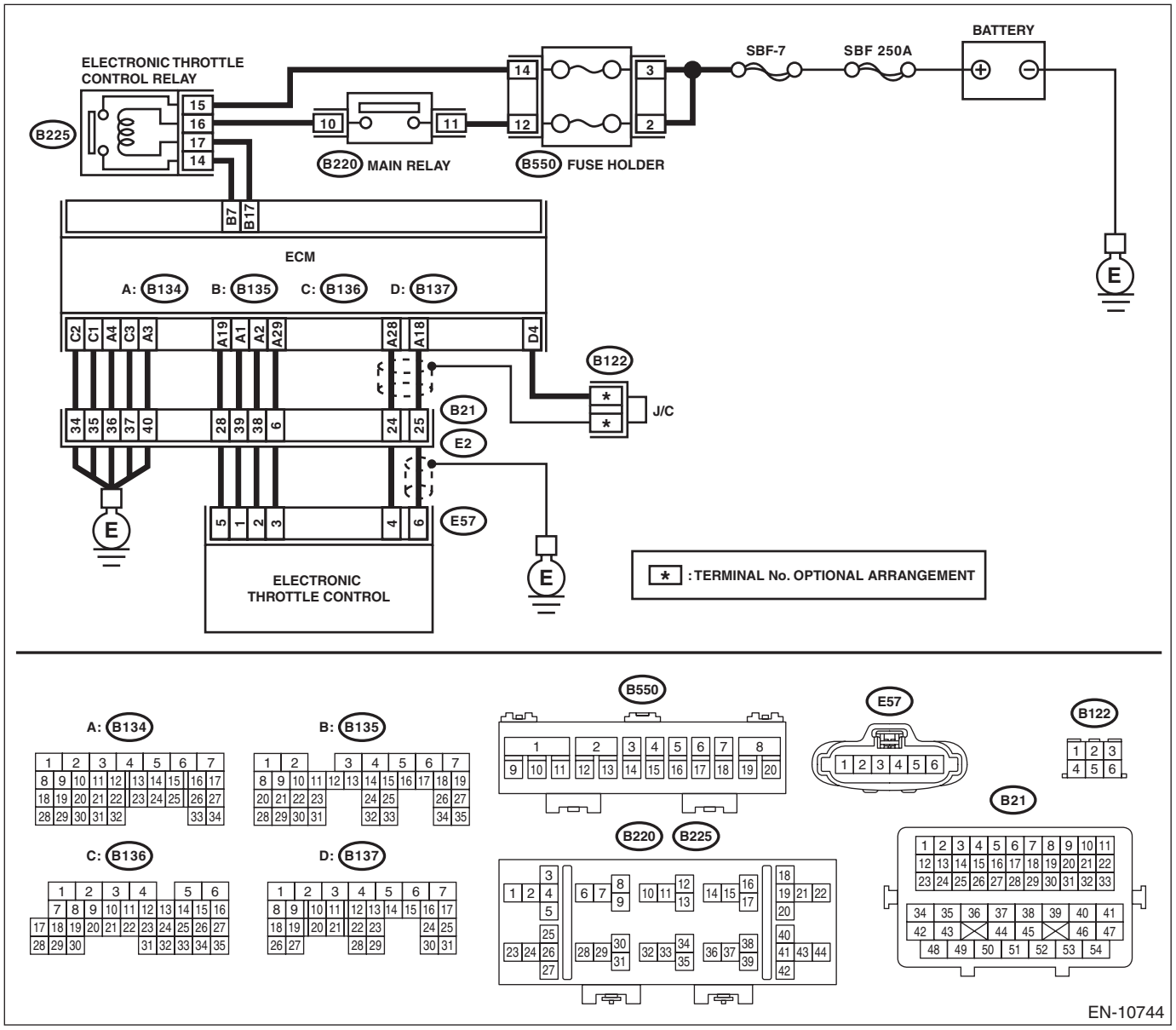
TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance
- Engine stalls.

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



Step		Check	Yes	No
1	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Connect the battery to terminals No. 16 and No. 17 of electronic throttle control relay. 4) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 14 — No. 15:***	Is the resistance less than 1 Ω?	Go to step **2**.	Replace the electronic throttle control relay. <Ref. to FU(H4DO(HEV))-94, Electronic Throttle Control Relay.>

	Step	Check	Yes	No
2	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B225) No. 15 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **3**.	Repair the open or ground short circuit of power supply circuit.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.** 1) Disconnect the connector from ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B225) No. 17 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power in the harness between ECM connector and electronic throttle control relay connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B225) No. 14 — Chassis ground:*** ***(B225) No. 17 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit to ground in harness between ECM connector and electronic throttle control relay connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B135) No. 7 — (B225) No. 14:*** ***(B135) No. 17 — (B225) No. 17:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit in harness between ECM connector and electronic throttle control relay connector.
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from electronic throttle control. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 19 — Chassis ground:*** ***(B134) No. 18 — Chassis ground:*** ***(B134) No. 18 — (B137) No. 4:*** ***(B134) No. 28 — Chassis ground:*** ***(B134) No. 28 — (B137) No. 4:***	Is the resistance 1 MΩ or more?	Go to step **7**.	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

Step		Check	Yes	No
7	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:*** ***(E57) No. 4 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **8**.	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector. Replace the ECM if defective. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>
8	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 18 — (E57) No. 6:*** ***(B134) No. 28 — (E57) No. 4:*** ***(B134) No. 29 — (E57) No. 3:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and electronic throttle control connector • Poor contact of coupling connector
9	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **10**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and engine ground • Poor contact of ECM connector • Poor contact of coupling connector
10	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (–):*** ***(E57) No. 4 (+) — Engine ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.	Go to step **11**.
11	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B134) No. 19 — (B134) No. 18:*** ***(B134) No. 19 — (B134) No. 28:***	Is the resistance 1 MΩ or more?	Go to step **12**.	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.

	Step	Check	Yes	No
12	**CHECK SENSOR OUTPUT.** 1) Connect all connectors. 2) Start the engine and warm up completely. 3) Stop the engine, and then turn the ignition switch to ON (engine OFF). 4) Read the value of «Main-Throttle Sensor» using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	Is the value of «Main-Throttle Sensor» 0.81 — 0.87 V?	Go to step **13**.	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. <Ref. to FU(H4DO(HEV))-14, Throttle Body.>
13	**CHECK SENSOR OUTPUT.** Read the value of «Sub-Throttle Sensor» using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.>	Is the value of «Sub-Throttle Sensor» 1.64 — 1.70 V?	Go to step **14**.	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. <Ref. to FU(H4DO(HEV))-14, Throttle Body.>
14	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 2 — (E57) No. 2:*** ***(B134) No. 1 — (E57) No. 1:***	Is the resistance less than 1 Ω?	Go to step **15**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and electronic throttle control connector • Poor contact of coupling connector
15	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 2 (+) — Engine ground (–):*** ***(E57) No. 1 (+) — Engine ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.	Go to step **16**.
16	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 2 — Engine ground:*** ***(E57) No. 1 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **17**.	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

	Step	Check	Yes	No
17	**CHECK ELECTRONIC THROTTLE CONTROL CONNECTOR HARNESS.** Measure the resistance between electronic throttle control connectors. ***Connector & terminal*** ***(E57) No. 2 — (E57) No. 1:***	Is the resistance 1 MΩ or more?	Go to step **18**.	Repair the short circuit in harness between ECM connector and electronic throttle control connector.
18	**CHECK ELECTRONIC THROTTLE CONTROL GROUND CIRCUIT.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 3 — Chassis ground:*** ***(B134) No. 4 — Chassis ground:*** ***(B136) No. 1 — Chassis ground:*** ***(B136) No. 2 — Chassis ground:*** ***(B136) No. 3 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **19**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and engine ground • Poor contact of coupling connector
19	**CHECK ELECTRONIC THROTTLE CONTROL.** Measure the resistance between electronic throttle control terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance 50 Ω or less?	Go to step **20**.	Replace the electronic throttle control. <Ref. to FU(H4DO(HEV))-14, Throttle Body.>
20	**CHECK ELECTRONIC THROTTLE CONTROL.** Move the throttle valve to the fully open and fully closed positions with fingers. Check that the valve returns to the specified position when releasing fingers.	Does the valve return to the specified position? Standard value: 3 mm (0.12 in) from fully closed position	Repair the poor contact of ECM connector.	Replace the electronic throttle control. <Ref. to FU(H4DO(HEV))-14, Throttle Body.>

ET:DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-175, DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

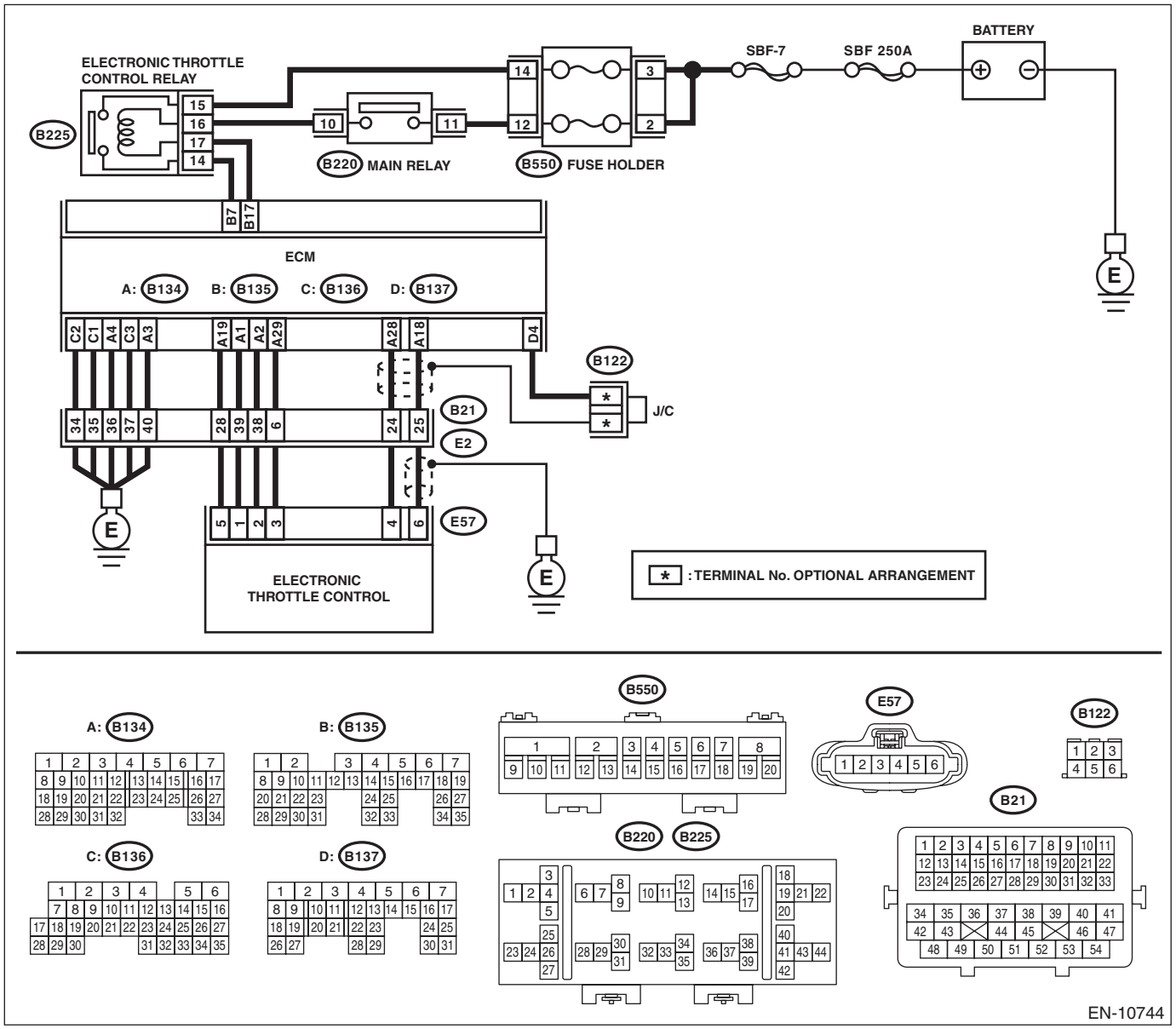
- Improper idling
- Poor driving performance
- Engine stalls.

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Connect the battery to terminals No. 16 and No. 17 of electronic throttle control relay. 4) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 14 — No. 15:***	Is the resistance less than 1 Ω?	Go to step **2**.	Replace the electronic throttle control relay. <Ref. to FU(H4DO(HEV))-94, Electronic Throttle Control Relay.>
2	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B225) No. 15 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **3**.	Repair the open or ground short circuit of power supply circuit.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.** 1) Disconnect the connector from ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B225) No. 17 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power in the harness between ECM connector and electronic throttle control relay connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B225) No. 14 — Chassis ground:*** ***(B225) No. 17 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit to ground in harness between ECM connector and electronic throttle control relay connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B135) No. 7 — (B225) No. 14:*** ***(B135) No. 17 — (B225) No. 17:***	Is the resistance less than 1 Ω?	Repair the poor contact of ECM connector.	Repair the open circuit in harness between ECM connector and electronic throttle control relay connector.

EU:DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH

DTC DETECTING CONDITION:

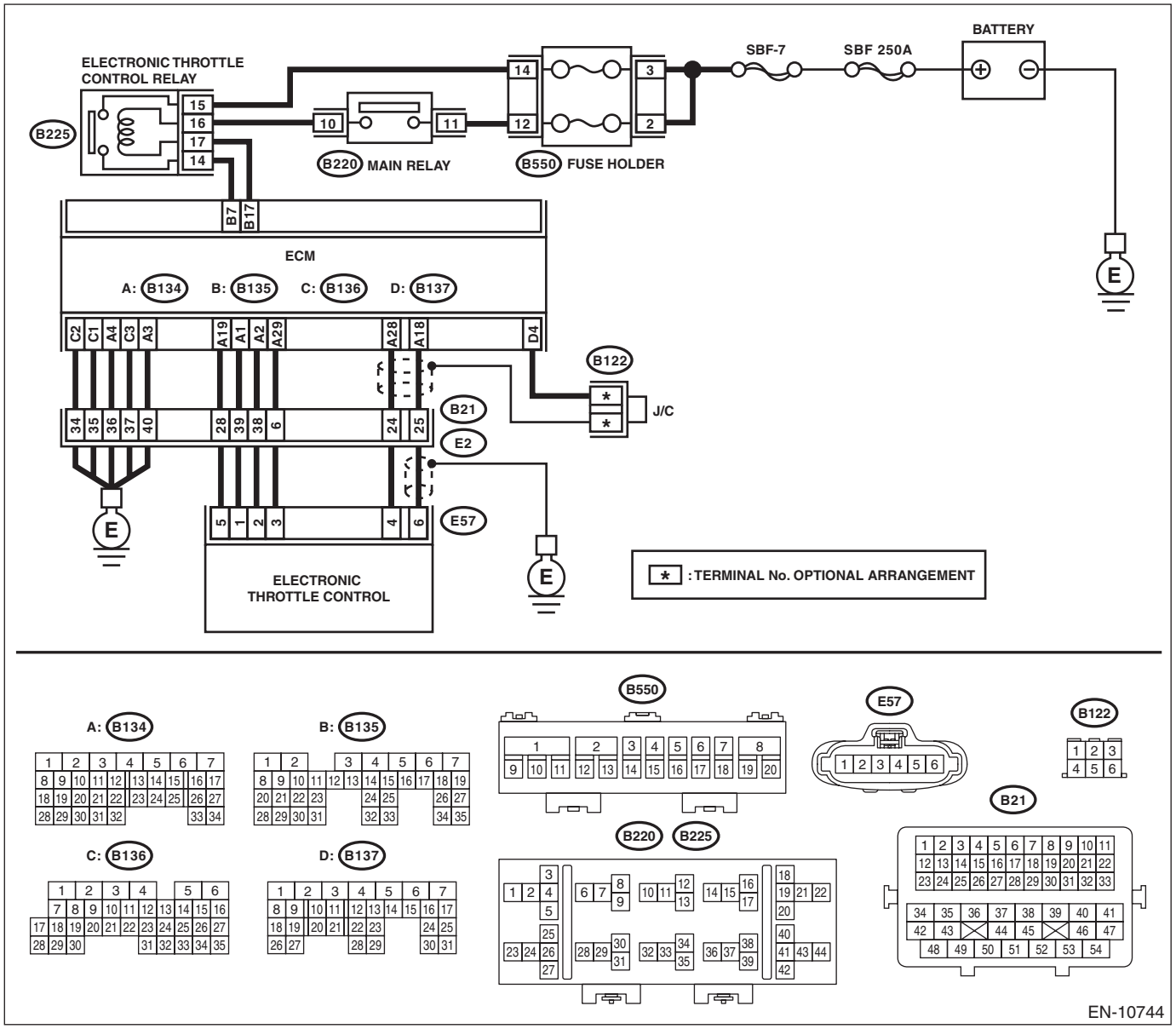
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-176, DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 14 — No. 15:***	Is the resistance 1 MΩ or more?	Go to step **2**.	Replace the electronic throttle control relay. <Ref. to FU(H4DO(HEV))-94, Electronic Throttle Control Relay.>
2	**CHECK SHORT CIRCUIT OF ELECTRONIC THROTTLE CONTROL RELAY POWER SUPPLY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B225) No. 14 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power in the harness between ECM connector and electronic throttle control relay connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 17 — Chassis ground:***	Is the resistance 1 MΩ or more?	Repair the poor contact of ECM connector.	Repair the short circuit to ground in harness between ECM connector and electronic throttle control relay connector.

EV:DTC P2109 THROTTLE/PEDAL POSITION SENSOR “A” MINIMUM STOP PERFORMANCE

NOTE:
For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4DO HEV)(diag)-335, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

EW:DTC P2119 THROTTLE ACTUATOR CONTROL THROTTLE BODY RANGE/PERFORMANCE

NOTE:
For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4DO HEV)(diag)-335, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

EX:DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-180, DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

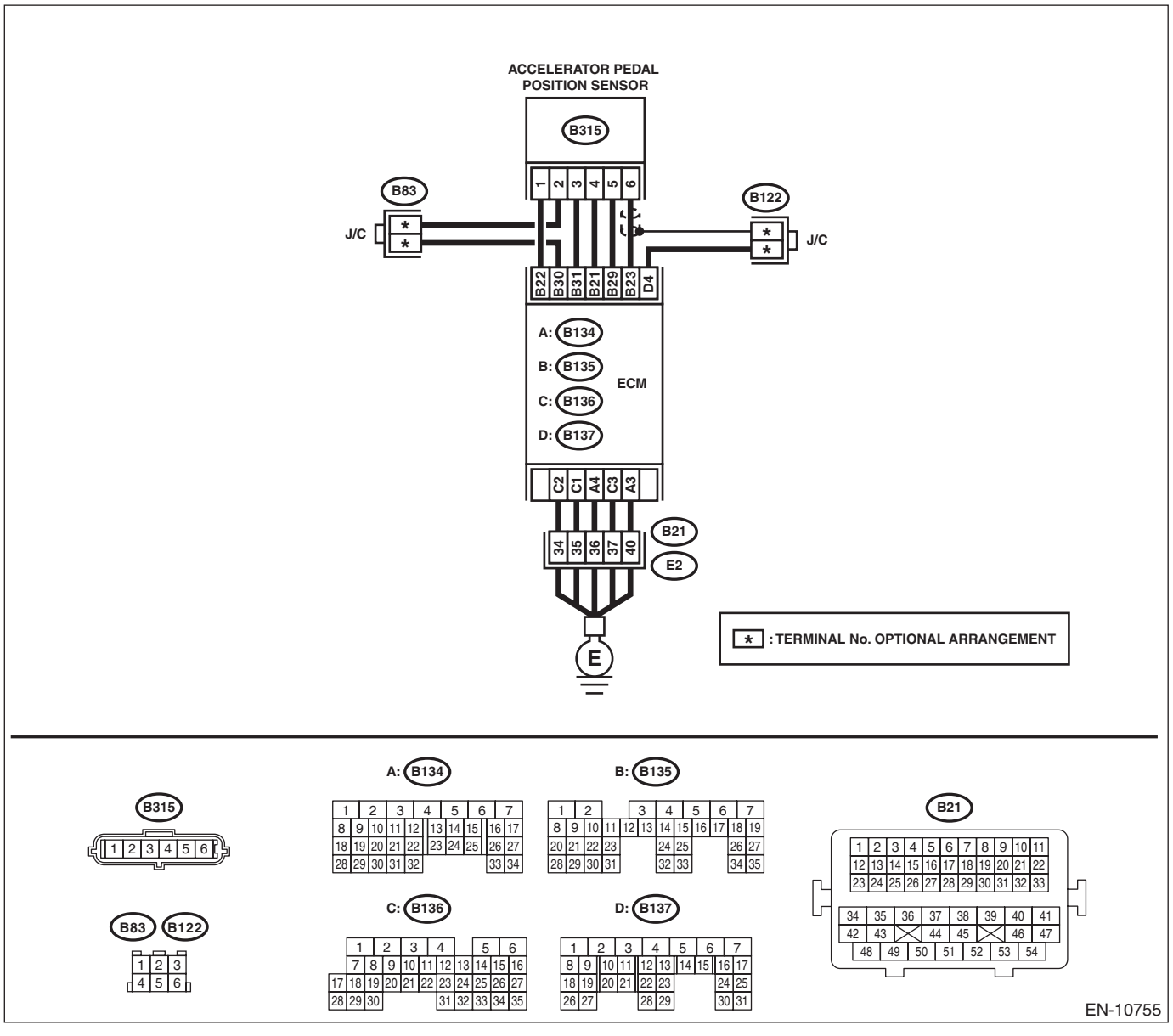
- Improper idling
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and accelerator pedal position sensor. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 21 — Chassis ground:*** ***(B135) No. 23 — Chassis ground:*** ***(B135) No. 23 — (B137) No. 4:***	Is the resistance 1 MΩ or more?	Go to step **2**.	Repair the short circuit to ground in harness between ECM connector and accelerator pedal position sensor connector.
2	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Connect the connector to ECM. 2) Measure the resistance between accelerator pedal position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 6 — Chassis ground:***	Is the resistance 1 MΩ or more?	Replace the accelerator pedal. <Ref. to SP(H4DO(w/o HEV))-4, Accelerator Pedal.>	Repair the short circuit to ground in harness between ECM connector and accelerator pedal position sensor connector. Replace the ECM if defective. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>

EY:DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-181, DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

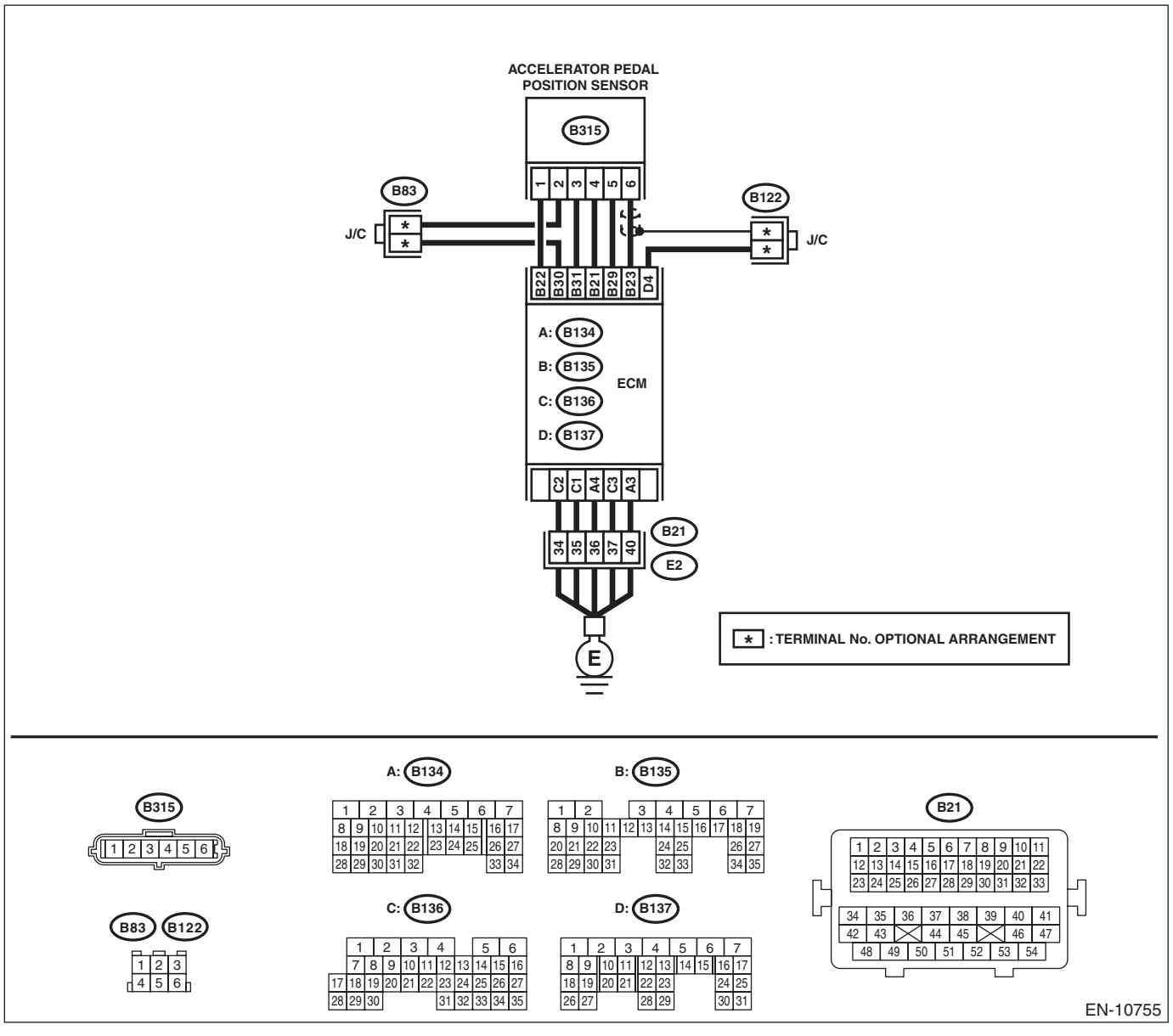
- Improper idling
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and accelerator pedal position sensor. 3) Measure the resistance of harness between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B135) No. 23 — (B315) No. 6:*** ***(B135) No. 29 — (B315) No. 5:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between ECM connector and accelerator pedal position sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.** 1) Connect the connector to ECM. 2) Measure the resistance between accelerator pedal position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 5 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and engine ground • Poor contact of ECM connector • Poor contact of coupling connector
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between accelerator pedal position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 6 (+) — Chassis ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power supply in harness between ECM connector and accelerator pedal position sensor connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B135) No. 21 — (B135) No. 23:***	Is the resistance 1 MΩ or more?	Repair the poor contact of accelerator pedal position sensor connector. Replace the accelerator pedal if defective. <Ref. to SP(H4DO(w/o HEV))-4, Accelerator Pedal.>	Repair the short circuit to power supply in harness between ECM connector and accelerator pedal position sensor connector.

EZ:DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-182, DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

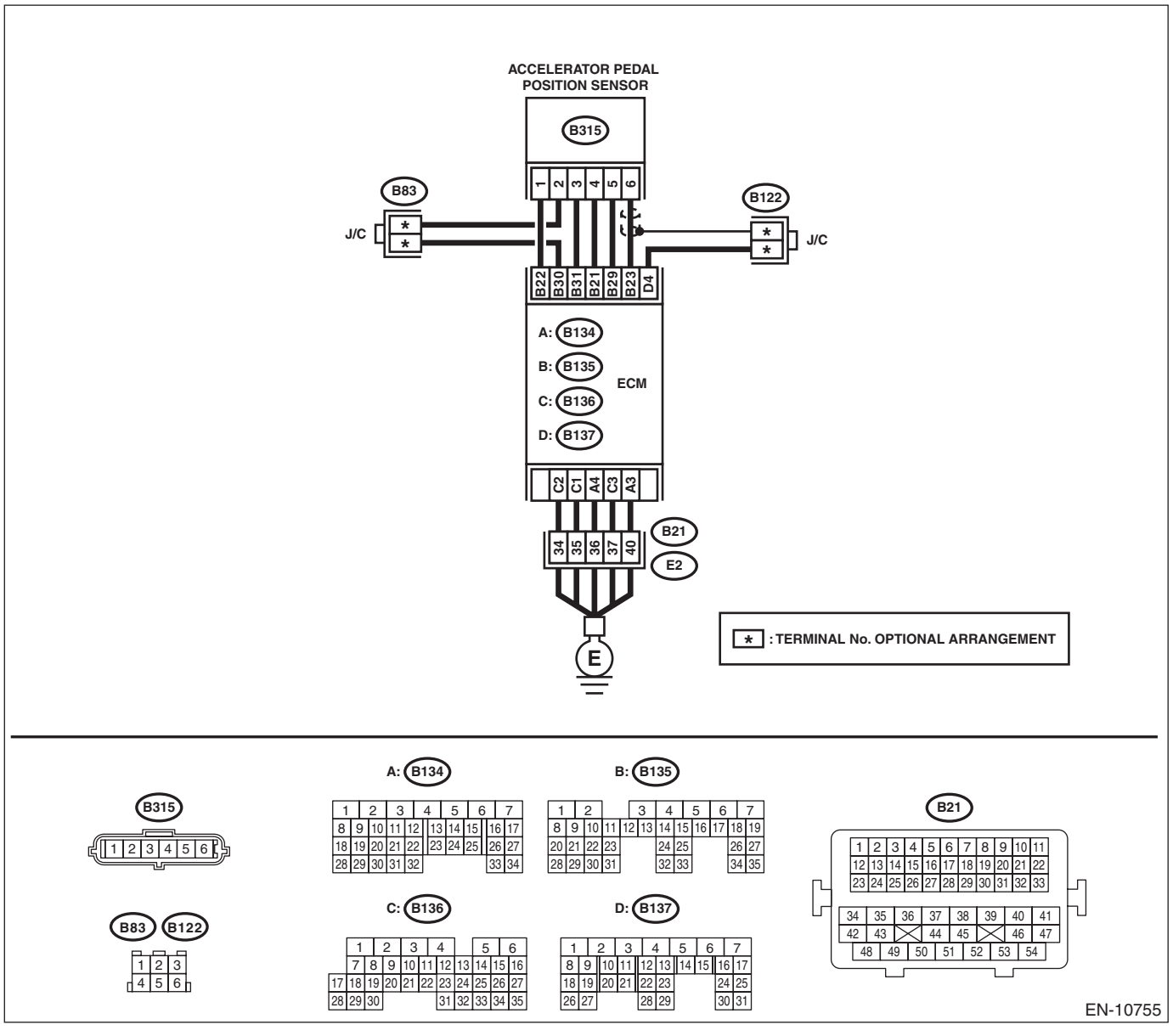
- Improper idling
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and accelerator pedal position sensor. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 22 — Chassis ground:*** ***(B135) No. 31 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **2**.	Repair the short circuit to ground in harness between ECM connector and accelerator pedal position sensor connector.
2	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Connect the connector to ECM. 2) Measure the resistance between accelerator pedal position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 3 — Chassis ground:***	Is the resistance 1 MΩ or more?	Replace the accelerator pedal. <Ref. to SP(H4DO(w/o HEV))-4, Accelerator Pedal.>	Repair the short circuit to ground in harness between ECM connector and accelerator pedal position sensor connector. Replace the ECM if defective. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>

FA:DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-183, DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

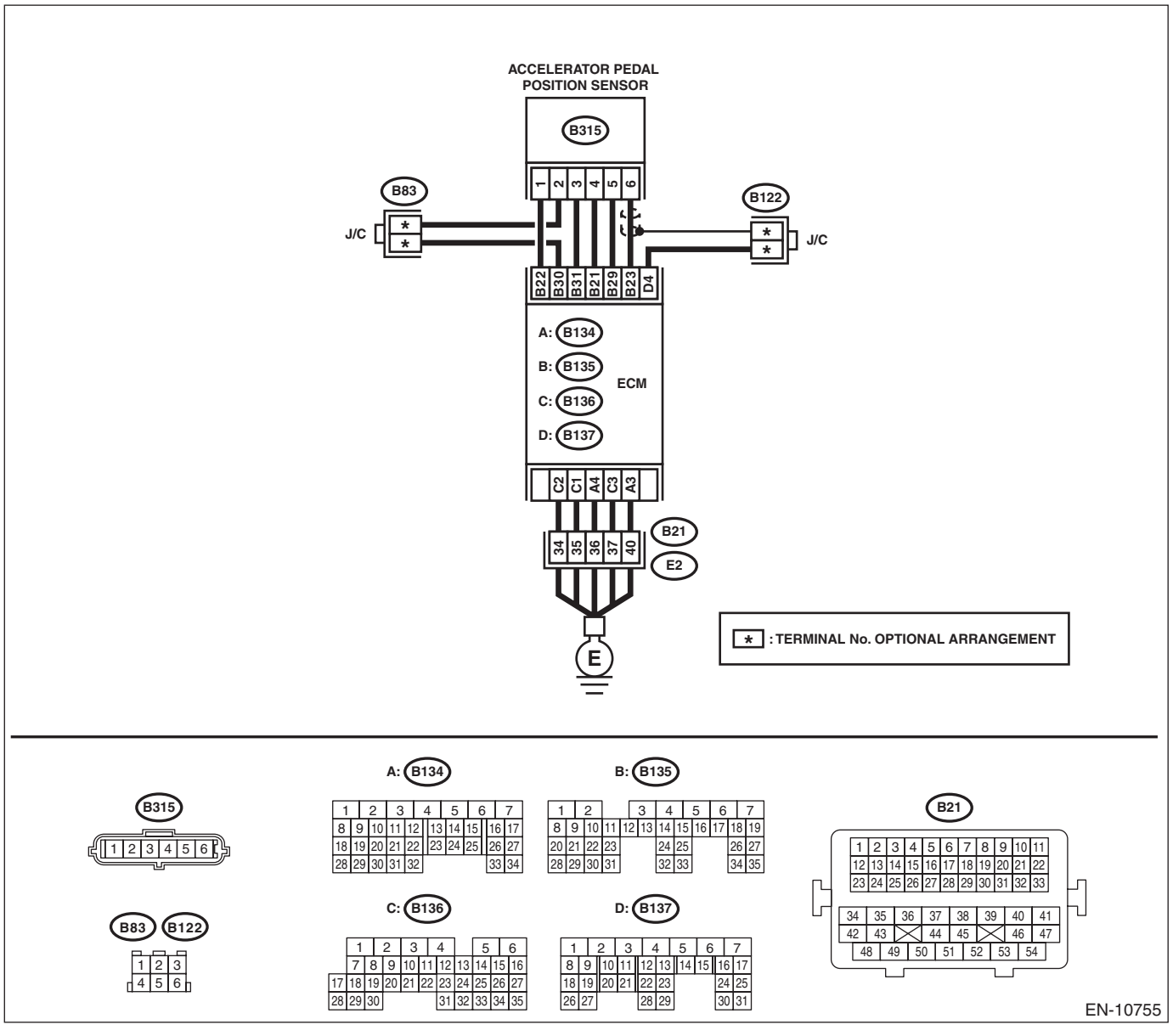
- Improper idling
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and accelerator pedal position sensor. 3) Measure the resistance of harness between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B135) No. 31 — (B315) No. 3:*** ***(B135) No. 30 — (B315) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and accelerator pedal position sensor connector • Poor contact of joint connector
2	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.** 1) Connect the connector to ECM. 2) Measure the resistance between accelerator pedal position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 2 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and engine ground • Poor contact of ECM connector • Poor contact of coupling connector
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between accelerator pedal position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 3 (+) — Chassis ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power supply in harness between ECM connector and accelerator pedal position sensor connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B135) No. 22 — (B135) No. 31:***	Is the resistance 1 MΩ or more?	Repair the poor contact of accelerator pedal position sensor connector. Replace the accelerator pedal if defective. <Ref. to SP(H4DO(w/o HEV))-4, Accelerator Pedal.>	Repair the short circuit to power supply in harness between ECM connector and accelerator pedal position sensor connector.

FB:DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRELATION

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-184, DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRELATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

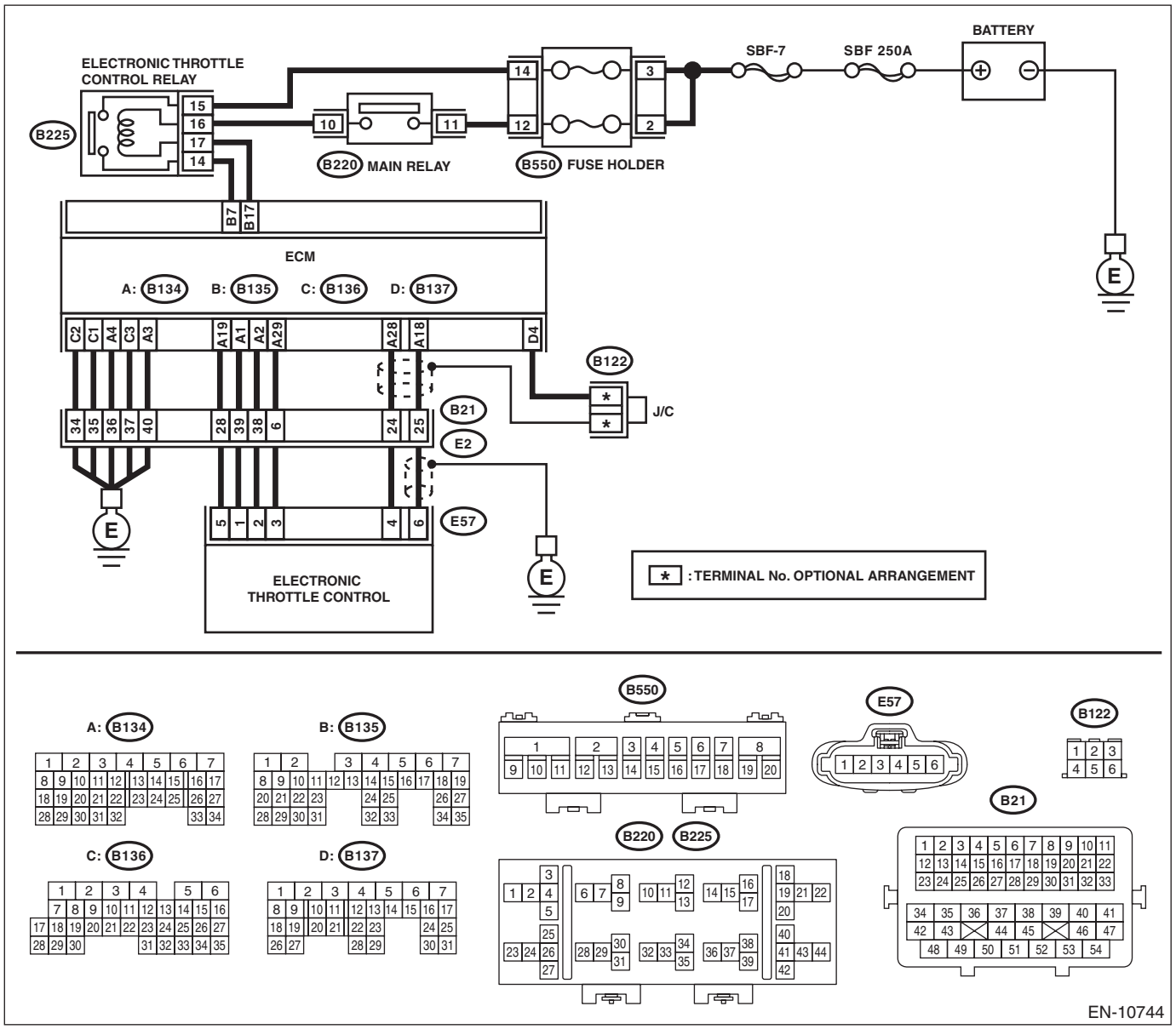
- Improper idling
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 19 — Chassis ground:*** ***(B134) No. 18 — Chassis ground:*** ***(B134) No. 18 — (B137) No. 4:*** ***(B134) No. 28 — Chassis ground:*** ***(B134) No. 28 — (B137) No. 4:***	Is the resistance 1 MΩ or more?	Go to step **2**.	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.
2	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:*** ***(E57) No. 4 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector. Replace the ECM if defective. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 18 — (E57) No. 6:*** ***(B134) No. 28 — (E57) No. 4:*** ***(B134) No. 29 — (E57) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and electronic throttle control connector • Poor contact of coupling connector
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and engine ground • Poor contact of ECM connector • Poor contact of coupling connector

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (–):*** ***(E57) No. 4 (+) — Engine ground (–):***	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.	Go to step **6**.
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B134) No. 19 — (B134) No. 18:*** ***(B134) No. 19 — (B134) No. 28:***	Is the resistance 1 MΩ or more?	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. <Ref. to FU(H4DO(HEV))-14, Throttle Body.>	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.

FC:DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D”/“E” VOLTAGE CORRELATION

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-186, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D”/“E” VOLTAGE CORRELATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

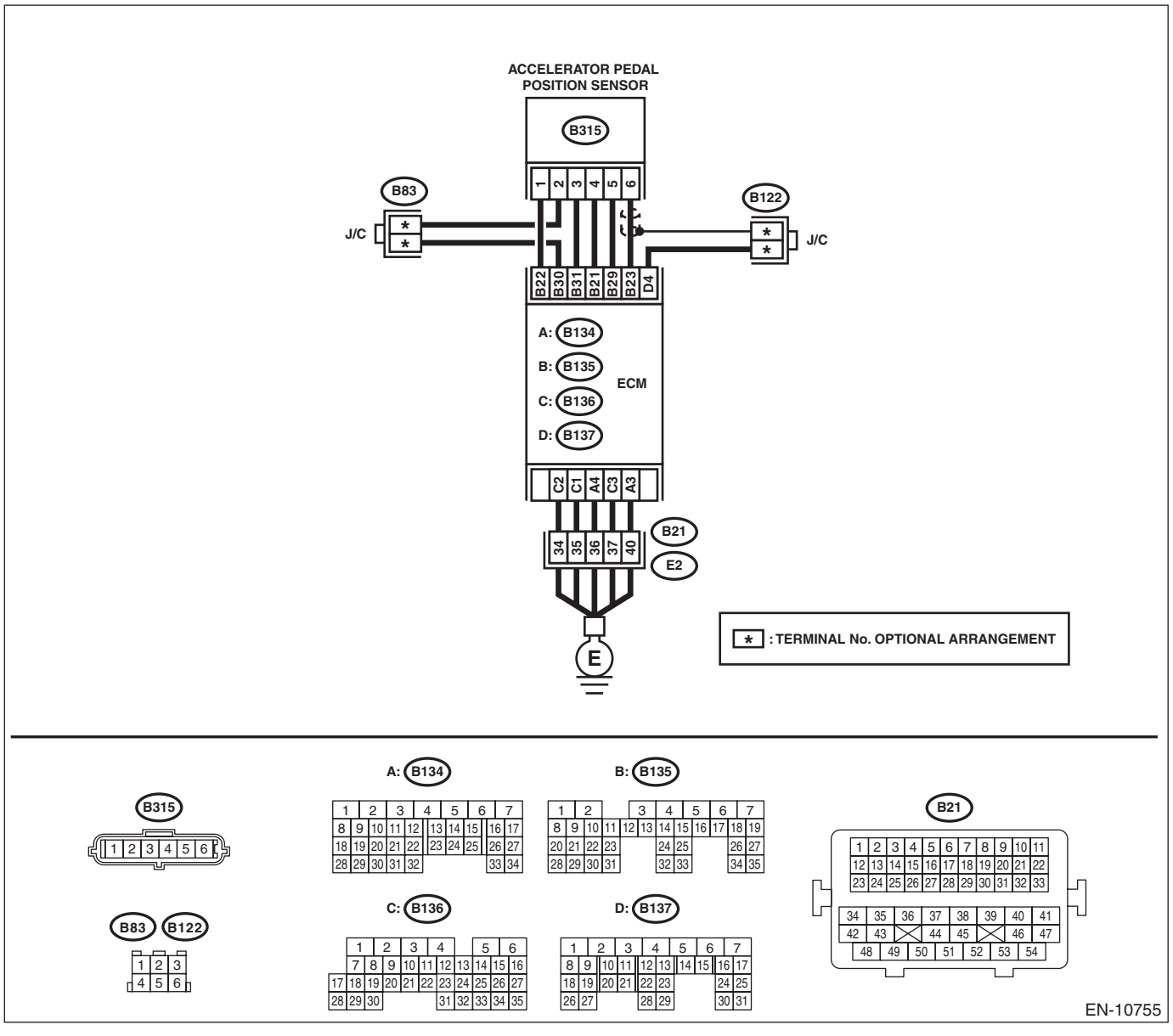
- Improper idling
- Poor driving performance

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***Main accelerator pedal position sensor signal*** ***(B135) No. 23 (+) — Chassis ground (–):*** ***Sub accelerator pedal position sensor signal*** ***(B135) No. 31 (+) — Chassis ground (–):***	Is the difference in measured values for the main accelerator pedal position sensor signal and the sub accelerator pedal position sensor signal 0 V?	Go to step **3**.	Go to step **2**.
2	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Measure the voltage between accelerator pedal position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 6 (+) — Chassis ground (–):*** ***(B315) No. 3 (+) — Chassis ground (–):***	Is the difference in measured values for the main accelerator pedal position sensor signal and the sub accelerator pedal position sensor signal 0 V?	Replace the accelerator pedal. <Ref. to SP(H4DO(w/o HEV))-4, Accelerator Pedal.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and accelerator pedal position sensor connector • Short circuit to ground in harness between ECM connector and accelerator pedal position sensor connector
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.** Measure the resistance of harness between accelerator pedal position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 5 — Chassis ground:*** ***(B315) No. 2 — Chassis ground:***	Is the resistance less than 5 Ω?	Repair the poor contact of ECM connector.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and accelerator pedal position sensor connector • Open circuit of harness between ECM connector and engine ground • Poor contact of ECM connector • Poor contact of joint connector

FD:DTC P2195 O2 SENSOR SIGNAL BIASED/STUCK LEAN (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

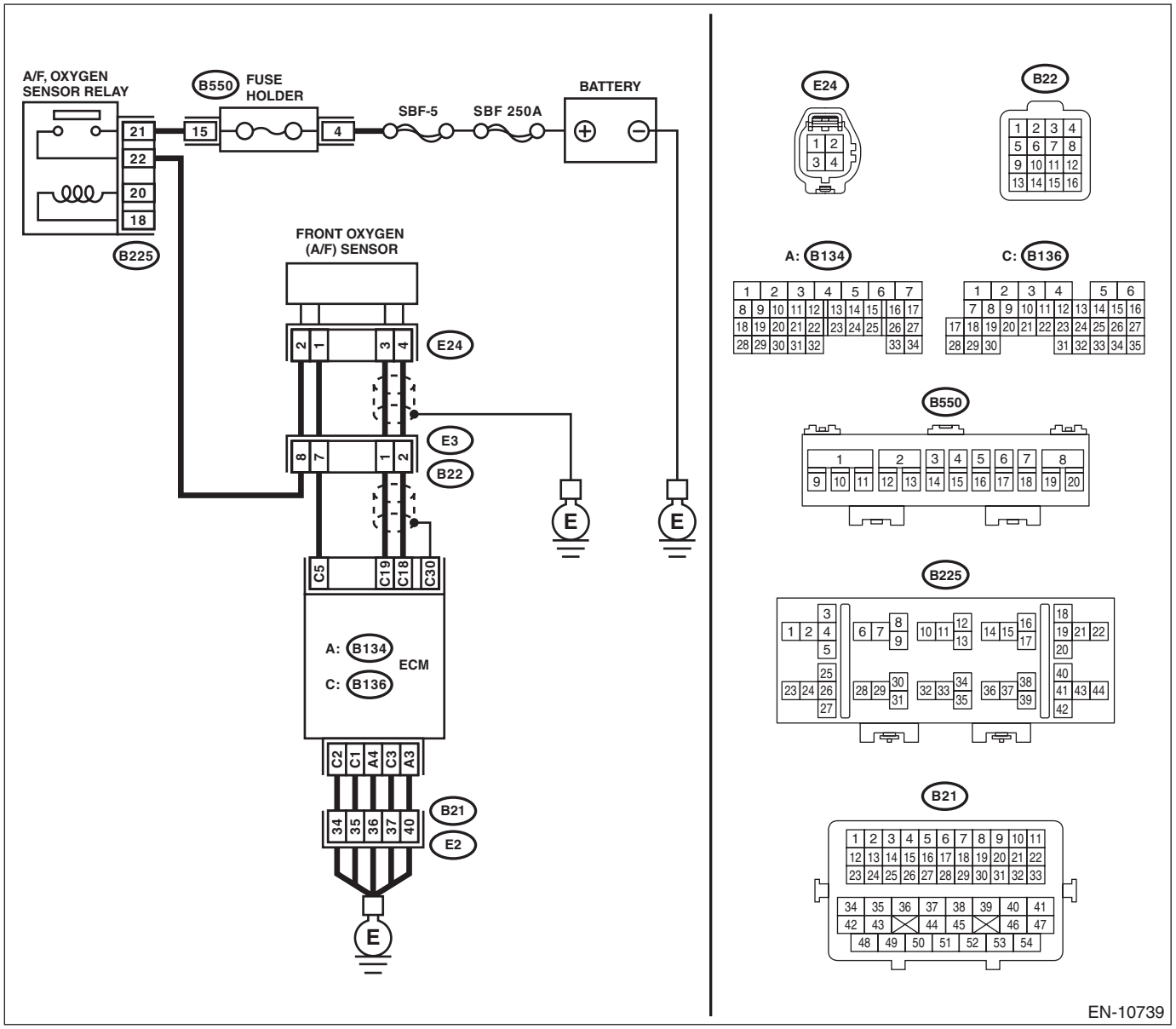
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-188, DTC P2195 O2 SENSOR SIGNAL BIASED/ STUCK LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.**	Has water entered the connector?	Completely remove any water inside.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 3) Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B136) No. 19 — (E24) No. 3:*** ***(B136) No. 18 — (E24) No. 4:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and front oxygen (A/F) sensor connector • Poor contact of coupling connector
3	**CHECK FOR POOR CONTACT.** Check for poor contact of the front oxygen (A/F) sensor connector.	Is there poor contact of front oxygen (A/F) sensor connector?	Repair the poor contact of front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DO(HEV))-78, Front Oxygen (A/F) Sensor.>

FE:DTC P2196 O2 SENSOR SIGNAL BIASED/STUCK RICH (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

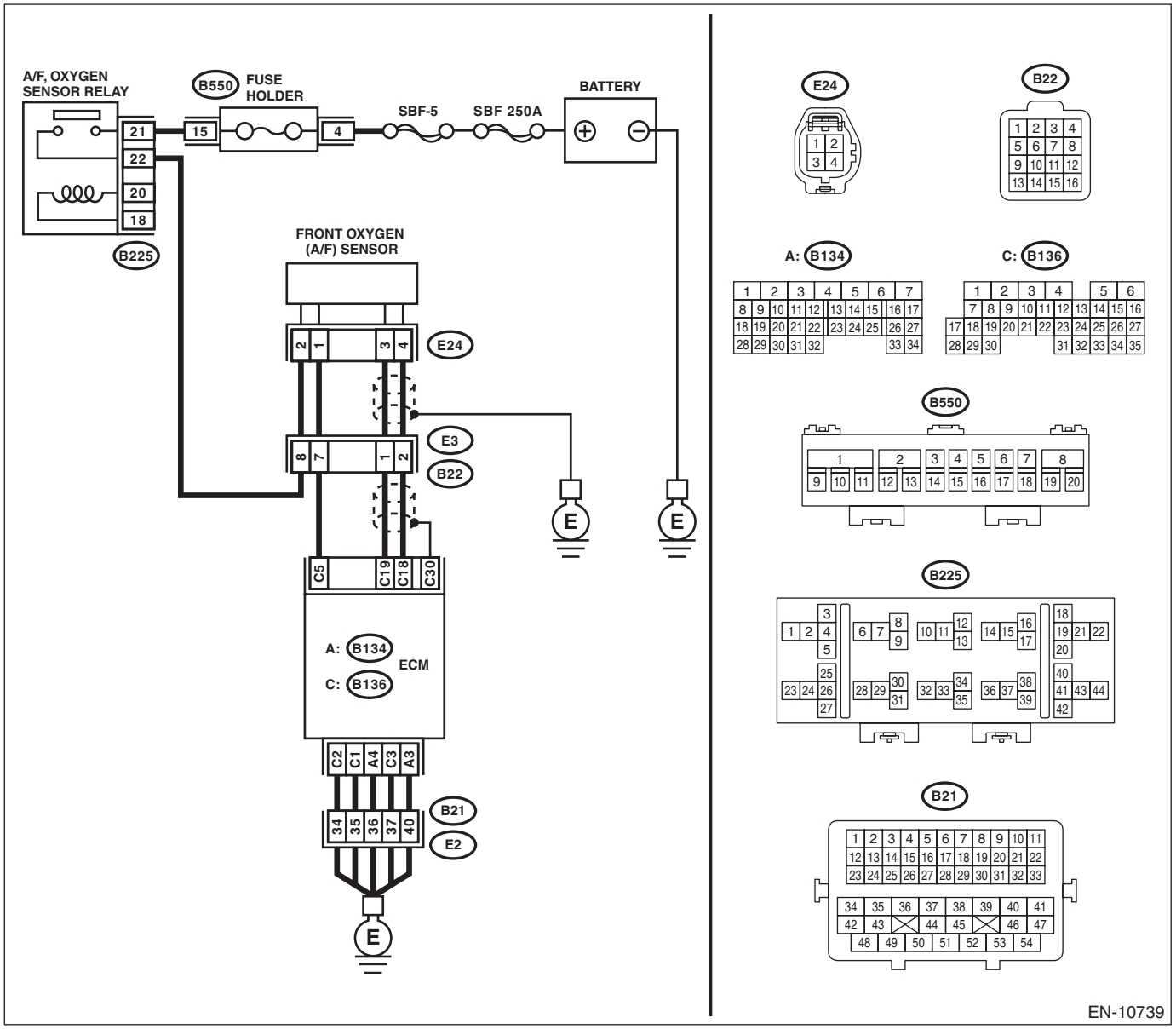
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-190, DTC P2196 O2 SENSOR SIGNAL BIASED/ STUCK RICH (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.**	Has water entered the connector?	Completely remove any water inside.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 19 — Chassis ground:*** ***(B136) No. 18 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector.
3	**CHECK OUTPUT SIGNAL FOR ECM.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 19 (+) — Chassis ground (–):***	Is the voltage 4.5 V or more?	Go to step **5**.	Go to step **4**.
4	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 18 (+) — Chassis ground (–):***	Is the voltage 4.95 V or more?	Go to step **5**.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DO(HEV))-78, Front Oxygen (A/F) Sensor.>
5	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 19 (+) — Chassis ground (–):*** ***(B136) No. 18 (+) — Chassis ground (–):***	Is the voltage 8 V or more?	Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>	Repair the poor contact of ECM connector.

FF: DTC P219A BANK 1 AIR-FUEL RATIO IMBALANCE

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-192, DTC P219A BANK 1 AIR-FUEL RATIO IMBALANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

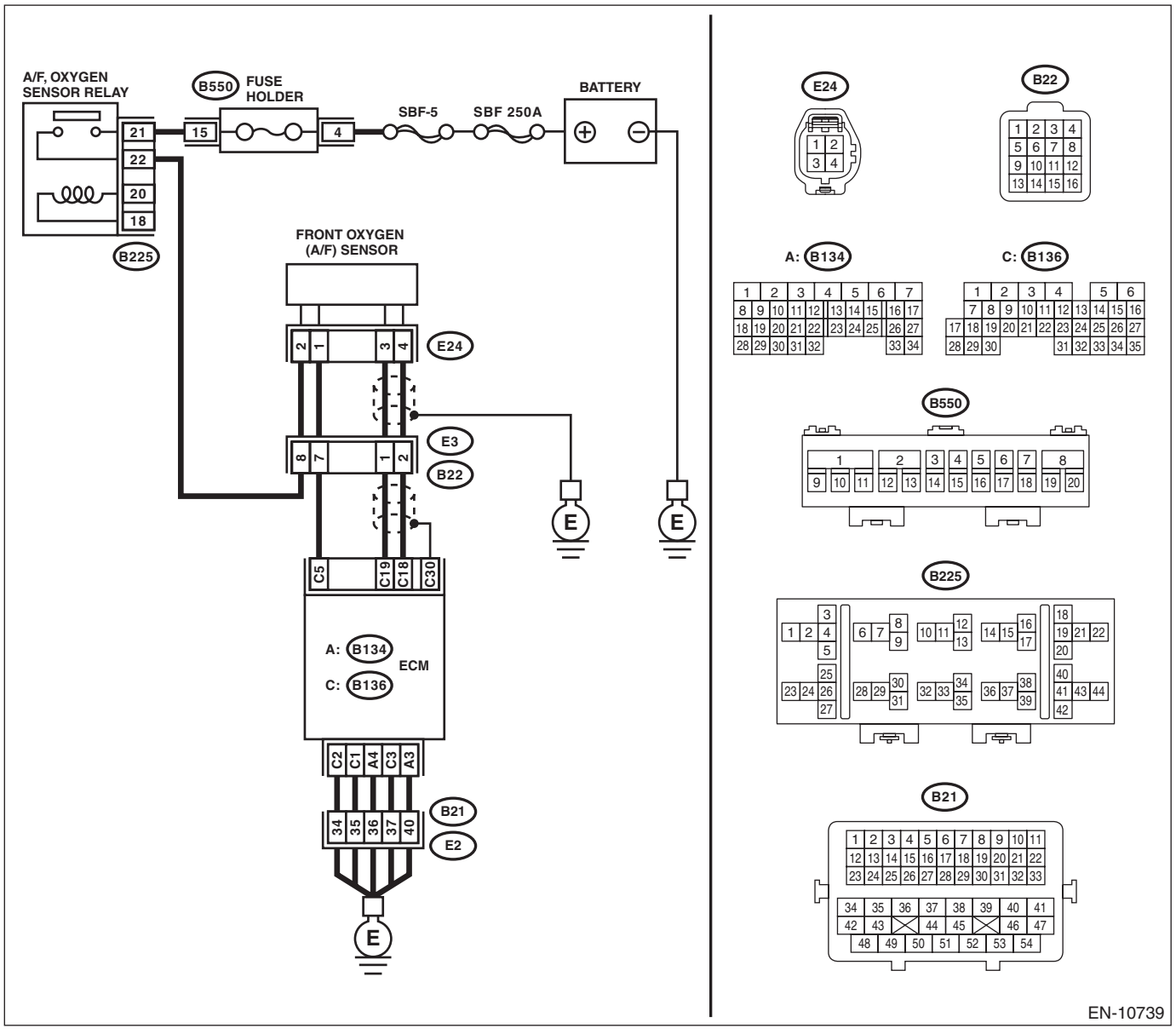
- Engine stalls.
- Improper idling

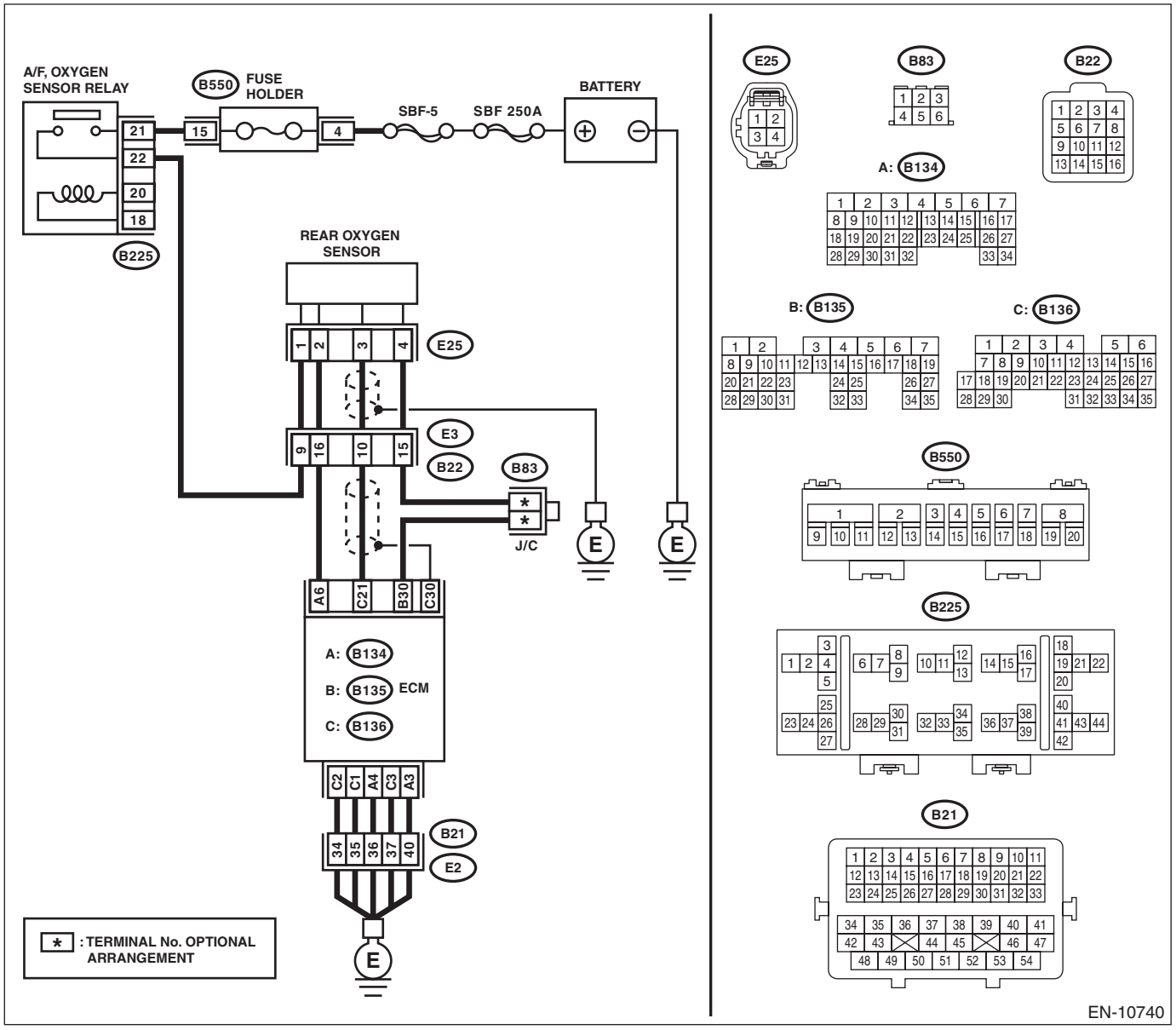
CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>




A/F, OXYGEN SENSOR RELAY
B550
FUSE HOLDER
BATTERY
SBF-5
SBF 250A
21
22
20
18
15
4
B225
REAR OXYGEN SENSOR
E25
E3
B22
B83
J/C
A6
C21
B30
C30
A: B134
B: B135
C: B136
ECM
C2
C1
A4
C3
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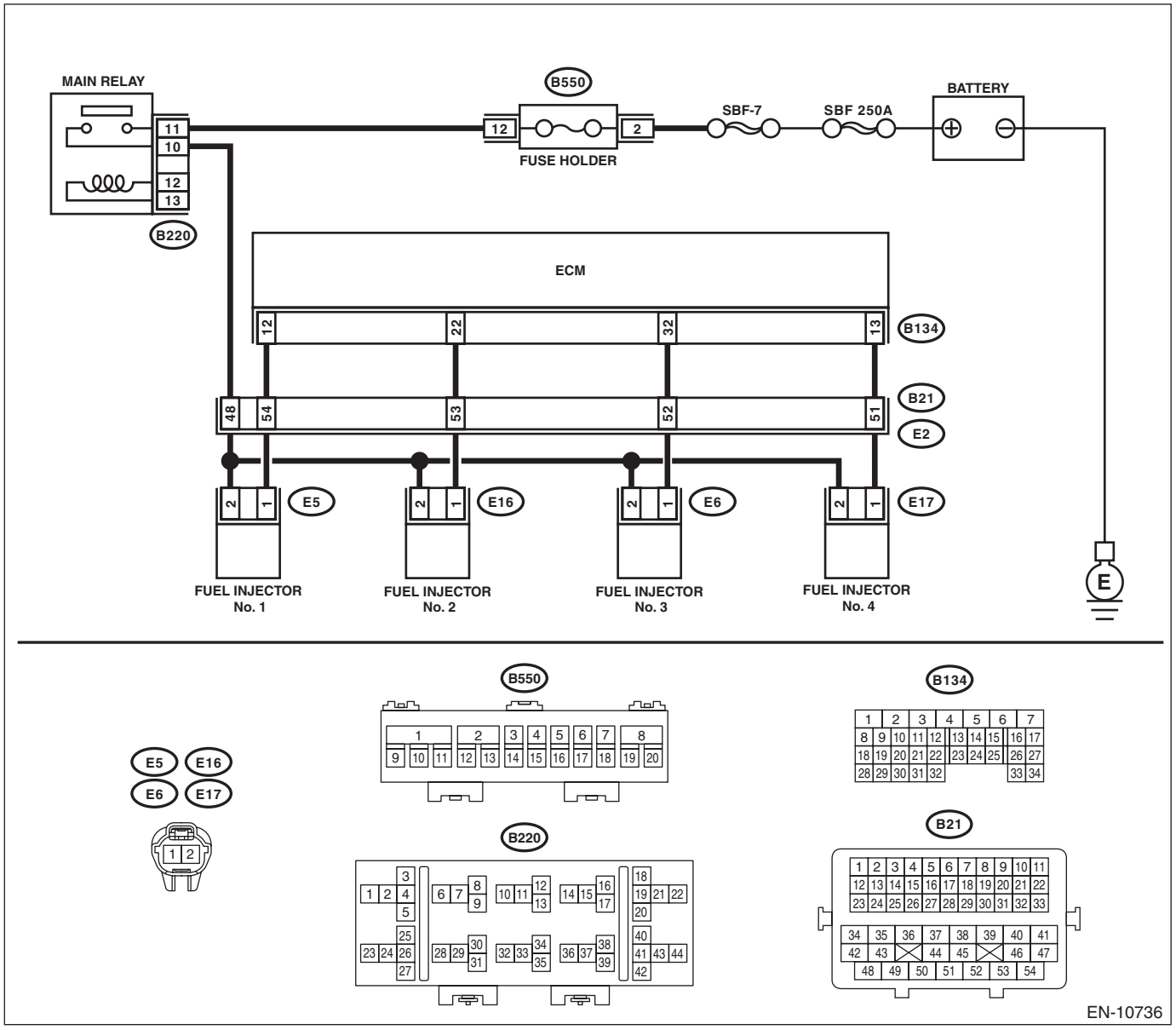


Step		Check	Yes	No
1	**CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.**	Has water entered the connector?	Completely remove any water inside.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 3) Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B136) No. 19 — (E24) No. 3:*** ***(B136) No. 18 — (E24) No. 4:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and front oxygen (A/F) sensor connector • Poor contact of coupling connector

	Step	Check	Yes	No
3	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 19 — Chassis ground:*** ***(B136) No. 18 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector.
4	**CHECK OUTPUT SIGNAL FOR ECM.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. ***Connector & terminal*** ***(E24) No. 3 (+) — Chassis ground (–):***	Is the voltage 4.5 V or more?	Go to step **6**.	Go to step **5**.
5	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. ***Connector & terminal*** ***(E24) No. 4 (+) — Chassis ground (–):***	Is the voltage 4.95 V or more?	Go to step **6**.	Go to step **7**.
6	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. ***Connector & terminal*** ***(E24) No. 3 (+) — Chassis ground (–):*** ***(E24) No. 4 (+) — Chassis ground (–):***	Is the voltage 8 V or more?	Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).>	Repair the poor contact of ECM connector.
7	**CHECK EXHAUST SYSTEM.**	Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step **8**.
8	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step **9**.
9	**CHECK FUEL PRESSURE.** **WARNING:** **Place "NO OPEN FLAMES" signs near the working area.** **CAUTION:** **Be careful not to spill fuel.** 1) Connect the front oxygen (A/F) sensor connector. 2) Measure the fuel pressure. <Ref. to ME(H4DO(w/o HEV))-35, INSPECTION, Fuel Pressure.> **CAUTION:** **Release fuel pressure before removing the fuel pressure gauge.**	Is the measured value 340 — 400 kPa (3.5 — 4.1 kg/cm^2, 49 — 58 psi)?	Go to step **10**.	Check the fuel pump and fuel delivery line. <Ref. to FU(H4DO(HEV))-127, INSPECTION, Fuel Pump.> <Ref. to FU(H4DO(HEV))-157, INSPECTION, Fuel Delivery and Evaporation Lines.>

	Step	Check	Yes	No
10	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm up completely. 2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Coolant Temp.» 75°C (167°F) or more?	Go to step **11**.	Replace the engine coolant temperature sensor. <Ref. to FU(H4DO(HEV))-41, Engine Coolant Temperature Sensor.>
11	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F). 2) Place the select lever in "P" range or "N" range. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Mass Air Flow» 2.0 — 5.0 g/s (0.26 — 0.66 lb/m)?	Go to step **12**.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>
12	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F). 2) Place the select lever in "P" range or "N" range. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Open the front hood. 6) Measure the ambient temperature. 7) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Subtract ambient temperature from «Intake Air Temp.». Is the obtained value –10 — 50°C (–18 — 90°F)?	Go to step **13**.	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, Mass Air Flow and Intake Air Temperature Sensor.>

	Step	Check	Yes	No
13	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum) 2) Read the value of «Oxygen sensor #12» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Oxygen sensor #12» 0.490 V or more?	Go to step **14**.	Go to step **15**.
14	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm. 2) Read the value of «Oxygen sensor #12» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Oxygen sensor #12» 0.250 V or less?	Go to step **16**.	Go to step **15**.
15	**CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.**	Has water entered the connector?	Completely remove any water inside.	Go to step **17**.
16	**CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.** 1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), then keep the engine idling for 5 minutes or more. 2) Read the value of «Oxygen sensor #12» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "Current Data Display For Engine". <Ref. to EN(H4DO HEV)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Oxygen sensor #12» 0.250 V or less for 5 minutes or more?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DO(HEV))-78, Front Oxygen (A/F) Sensor.>	Go to step **17**.

	Step	Check	Yes	No
17	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM connector and rear oxygen sensor connector. ***Connector & terminal*** ***(B136) No. 21 — (E25) No. 3:*** ***(B135) No. 30 — (E25) No. 4:***	Is the resistance less than 1 Ω?	Go to step **18**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and rear oxygen sensor connector • Poor contact of coupling connector
18	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between rear oxygen sensor connector and chassis ground. ***Connector & terminal*** ***(E25) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H4DO(HEV))-78, Front Oxygen (A/F) Sensor.>	Go to step **19**.
19	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 12 (+) — Chassis ground (–):*** ***#2 (B134) No. 22 (+) — Chassis ground (–):*** ***#3 (B134) No. 32 (+) — Chassis ground (–):*** ***#4 (B134) No. 13 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **24**.	Go to step **20**.
20	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Measure the resistance between fuel injector connector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 1 — Engine ground:*** ***#2 (E16) No. 1 — Engine ground:*** ***#3 (E6) No. 1 — Engine ground:*** ***#4 (E17) No. 1 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **21**.	Repair the short circuit to ground in harness between ECM connector and fuel injector connector.
21	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 12 — (E5) No. 1:*** ***#2 (B134) No. 22 — (E16) No. 1:*** ***#3 (B134) No. 32 — (E6) No. 1:*** ***#4 (B134) No. 13 — (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **22**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and fuel injector connector • Poor contact of coupling connector
22	**CHECK FUEL INJECTOR.** Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **23**.	Replace the faulty fuel injector. <Ref. to FU(H4DO(HEV))-69, Fuel Injector.>

	Step	Check	Yes	No
23	**CHECK POWER SUPPLY LINE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel injector connector of faulty cylinders and engine ground. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Repair the poor contact of all connectors in fuel injector circuit.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between the main relay and fuel injector connector on faulty cylinders • Poor contact of coupling connector • Poor contact of main relay connector
24	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 12 (+) — Chassis ground (–):*** ***#2 (B134) No. 22 (+) — Chassis ground (–):*** ***#3 (B134) No. 32 (+) — Chassis ground (–):*** ***#4 (B134) No. 13 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power in harness between ECM connector and fuel injector connectors.	Go to step **25**.
25	**CHECK FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **26**.	Replace the faulty fuel injector. <Ref. to FU(H4DO(HEV))-69, Fuel Injector.>
26	**CHECK INSTALLATION CONDITION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.**	Is the camshaft position sensor or crankshaft position sensor loosely installed?	Tighten the camshaft position sensor or crankshaft position sensor. <Ref. to FU(H4DO(HEV))-53, INSTALLATION, Camshaft Position Sensor.> <Ref. to FU(H4DO(HEV))-48, INSTALLATION, Crankshaft Position Sensor.>	Go to step **27**.
27	**CHECK CRANKSHAFT POSITION SENSOR PLATE.**	Is the crankshaft position sensor plate rusted or does it have broken teeth?	Replace the crankshaft position sensor plate. <Ref. to ME(H4DO(w/o HEV))-304, Cylinder Block.>	Go to step **28**.

	Step	Check	Yes	No
28	**CHECK INSTALLATION CONDITION OF TIMING CHAIN.** Turn the crankshaft using ST, and align the alignment mark on crank sprocket with alignment mark on cylinder block. ST 18252AA000 CRANKSHAFT SOCKET	Is the timing chain dislocated from its proper position?	Correct the installation condition of timing chain. <Ref. to ME(H4DO(w/o HEV))-169, Timing Chain Assembly.>	Go to step **29**.
29	**CHECK FUEL LEVEL.**	Is the fuel meter indication higher than the “Lower” level?	Go to step **30**.	Refill the fuel so that the fuel meter indication is higher than the “Lower” level, and proceed to the next step. Go to step **30**.
30	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Clear the memory using the Subaru Select Monitor or general scan tool. <Ref. to EN(H4DO HEV)(diag)-66, Clear Memory Mode.> 2) Start the engine, and drive the vehicle 10 minutes or more.	Does the malfunction indicator light illuminate or blink?	Go to step **32**.	Go to step **31**.
31	**CHECK CAUSE OF MISFIRE.**	Was the cause of misfire identified when the engine is running?	Finish diagnostics operation, if the engine has no abnormality.	Repair the poor contact of connector. NOTE: In this case, repair the following item: • Poor contact of ignition coil connector • Poor contact of fuel injector connector on faulty cylinders • Poor contact of ECM connector • Poor contact of coupling connector
32	**CHECK AIR INTAKE SYSTEM.**	Is there any fault in air intake system?	Repair the air intake system. NOTE: Check the following items. • Are there air leaks or air suction caused by loose or dislocated nuts and bolts? • Are there cracks or any disconnection of hoses?	Go to step **33**.
33	**CHECK MISFIRE SYMPTOM.** 1) Turn the ignition switch to ON. 2) Check for DTC. <Ref. to EN(H4DO HEV)(diag)-51, Read Diagnostic Trouble Code (DTC).>	Does the Subaru Select Monitor or general scan tool indicate only one DTC?	Go to step **36**.	Go to step **34**.
34	**CHECK DTC.**	Is DTC P0301 and P0303 displayed on the Subaru Select Monitor or general scan tool?	Go to step **37**.	Go to step **35**.

Step		Check	Yes	No
35	CHECK DTC.	Is DTC P0302 and P0304 displayed on the Subaru Select Monitor or general scan tool?	Go to step **38**.	Go to step **39**.
36	ONLY ONE CYLINDER.	Is there any fault in the cylinder?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Ignition coil • Fuel injector • Compression ratio	Go to DTC P0171. <Ref. to EN(H4DO HEV)(diag)-182, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
37	GROUP OF #1 AND #3 CYLINDERS.	Are there any faults in #1 and #3 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Ignition coil • Fuel injector • Compression ratio • Skipping timing chain teeth	Go to DTC P0171. <Ref. to EN(H4DO HEV)(diag)-182, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
38	GROUP OF #2 AND #4 CYLINDERS.	Are there any faults in #2 and #4 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Ignition coil • Fuel injector • Compression ratio • Skipping timing chain teeth	Go to DTC P0171. <Ref. to EN(H4DO HEV)(diag)-182, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
39	CYLINDER AT RANDOM.	Is the engine idle rough?	Go to DTC P0171. <Ref. to EN(H4DO HEV)(diag)-182, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Ignition coil • Fuel injector • Compression ratio

FG:DTC P2270 O2 SENSOR SIGNAL BIASED/STUCK LEAN (BANK 1 SENSOR 2)

DTC DETECTING CONDITION:

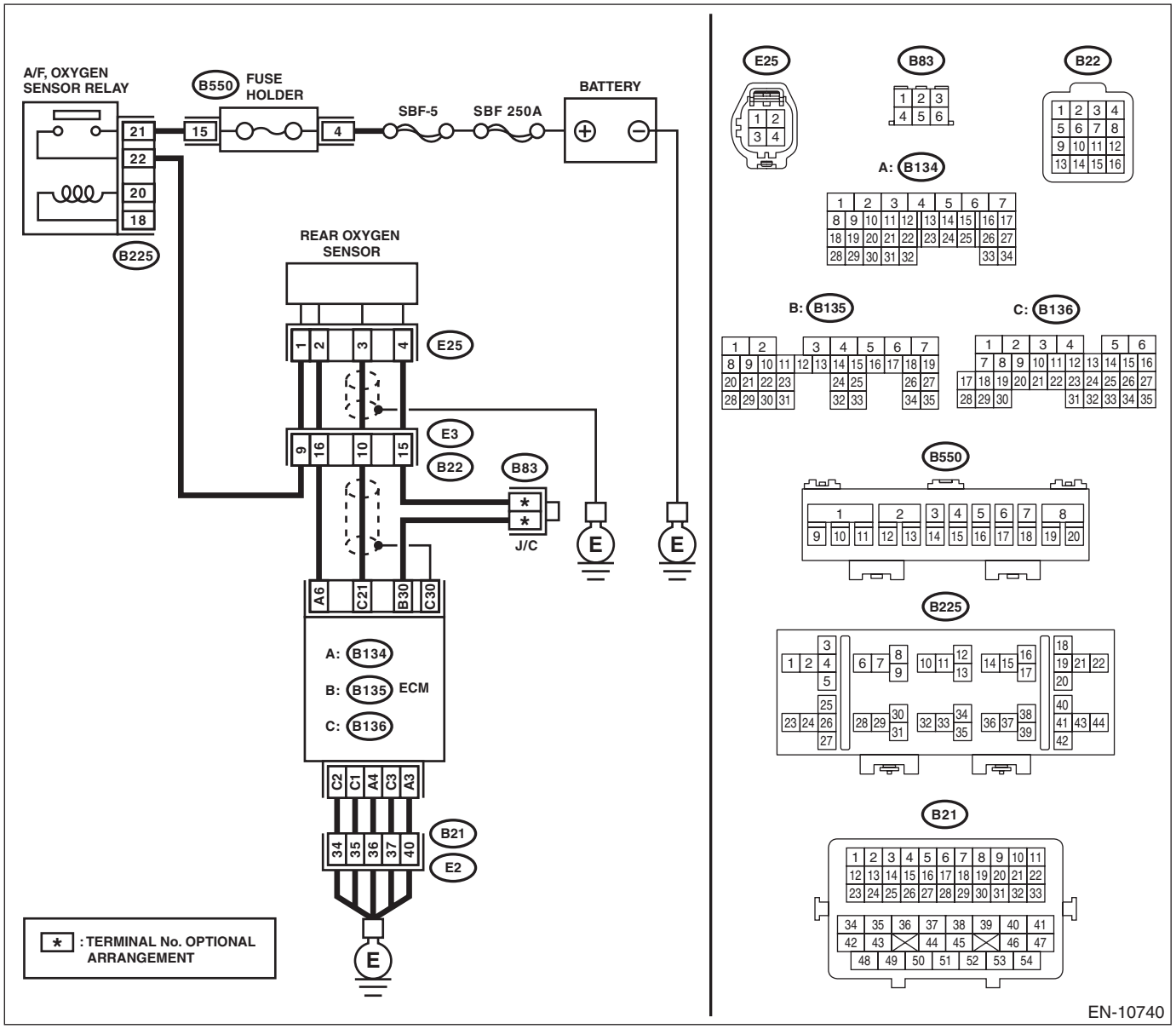
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-197, DTC P2270 O2 SENSOR SIGNAL BIASED/ STUCK LEAN (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK REAR OXYGEN SENSOR CONNECTOR.**	Has water entered the connector?	Completely remove any water inside.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM connector and rear oxygen sensor connector. ***Connector & terminal*** ***(B136) No. 30 — (E25) No. 4:*** ***(B135) No. 21 — (E25) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between ECM connector and rear oxygen sensor connector.
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between rear oxygen sensor connector and engine ground. ***Connector & terminal*** ***(E25) No. 3 (+) — Engine ground (–):***	Is the voltage 0.15 V or more?	Repair the short circuit to power in the harness between ECM connector and rear oxygen sensor connector.	Go to step **4**.
4	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Looseness and improper fitting of exhaust system parts • Damage (crack, hole etc.) of parts • Damage (crack, hole etc.) between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace faulty parts.	Replace the rear oxygen sensor. <Ref. to FU(H4DO(HEV))-82, Rear Oxygen Sensor.>

FH:DTC P2271 O2 SENSOR SIGNAL BIASED/STUCK RICH (BANK 1 SENSOR 2)

DTC DETECTING CONDITION:

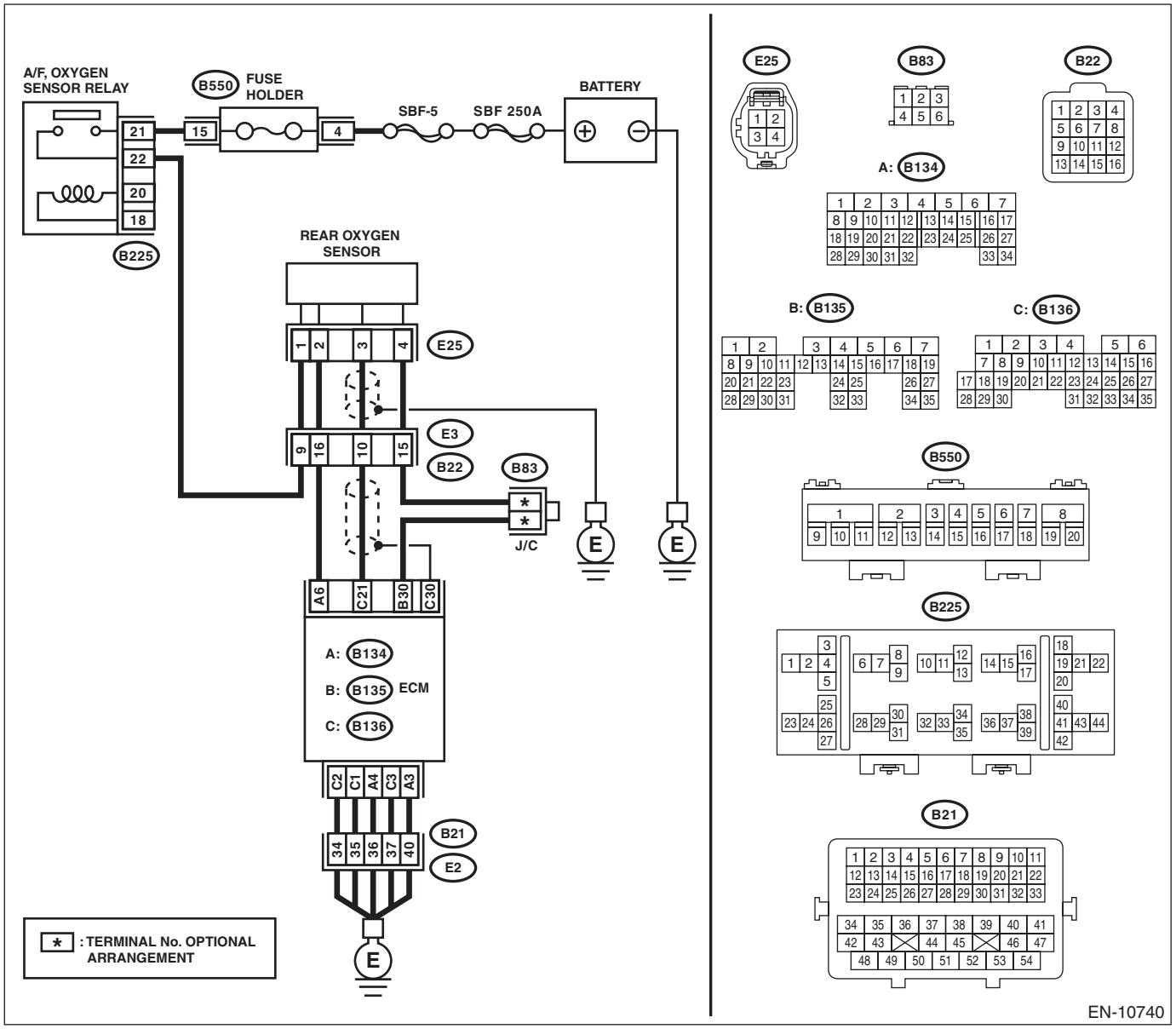
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-199, DTC P2271 O2 SENSOR SIGNAL BIASED/ STUCK RICH (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK REAR OXYGEN SENSOR CONNECTOR.**	Has water entered the connector?	Completely remove any water inside.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM connector and rear oxygen sensor connector. ***Connector & terminal*** ***(B135) No. 30 — (E25) No. 4:*** ***(B135) No. 21 — (E25) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between ECM connector and rear oxygen sensor connector.
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** Measure the resistance between the ECM connector and engine ground. ***Connector & terminal*** ***(B135) No. 30 — Engine ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit to ground in harness between ECM connector and rear oxygen sensor connector.
4	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Looseness and improper fitting of exhaust system parts • Damage (crack, hole etc.) of parts • Damage (crack, hole etc.) between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace faulty parts.	Replace the rear oxygen sensor. <Ref. to FU(H4DO(HEV))-82, Rear Oxygen Sensor.>

FI: DTC P2401 EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT LOW

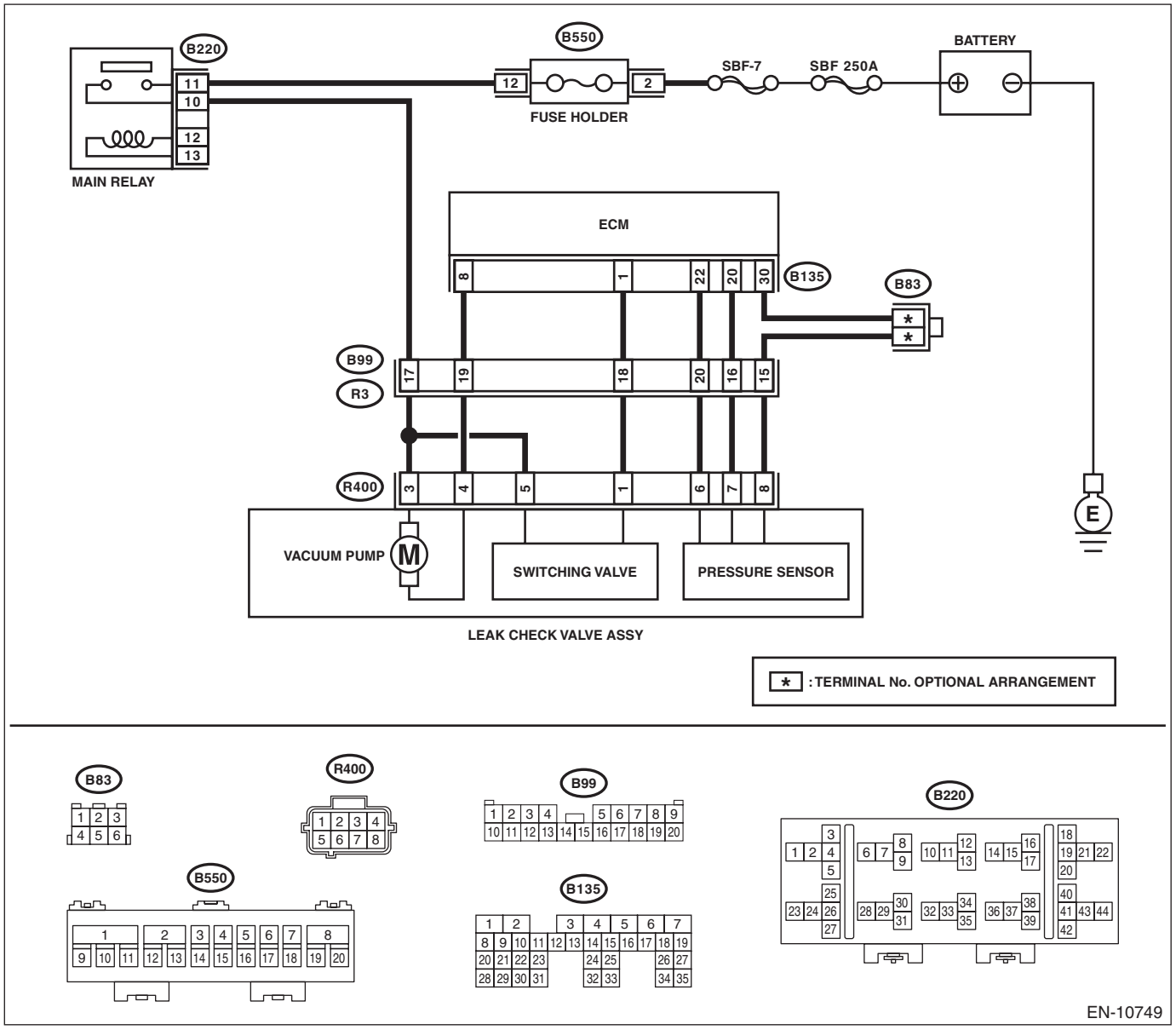
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-200, DTC P2401 EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 8 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Go to step **3**.
2	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary open or short circuit of harness or temporary poor contact of connector may be the cause.
3	**CHECK POWER SUPPLY TO LEAK CHECK VALVE ASSEMBLY.** Measure the voltage between the leak check valve assembly connector and engine ground. ***Connector & terminal*** ***(R400) No. 3 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **4**.	Repair the power supply circuit.
4	**CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and the leak check valve assembly. 3) Measure the resistance between leak check valve assembly and chassis ground. ***Connector & terminal*** ***(R400) No. 4 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit to ground in harness between ECM connector and leak check valve assembly connector.
5	**CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.** Measure the resistance of harness between ECM connector and the leak check valve assembly connector. ***Connector & terminal*** ***(B135) No. 8 — (R400) No. 4:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and the leak check valve assembly connector • Poor contact of coupling connector

Step		Check	Yes	No
6	**CHECK LEAK CHECK VALVE ASSEMBLY.** Check the vacuum pump of the leak check valve assembly. <Ref. to EC(H4DO(HEV))-48, CHECK VACUUM PUMP, INSPECTION, Leak Check Valve Assembly.>	Is the vacuum pump of the leak check valve assembly OK?	Repair the poor contact in the leak check valve assembly connector.	Replace the leak check valve assembly. <Ref. to EC(H4DO(HEV))-39, Leak Check Valve Assembly.>

FJ: DTC P2402 EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT HIGH

DTC DETECTING CONDITION:

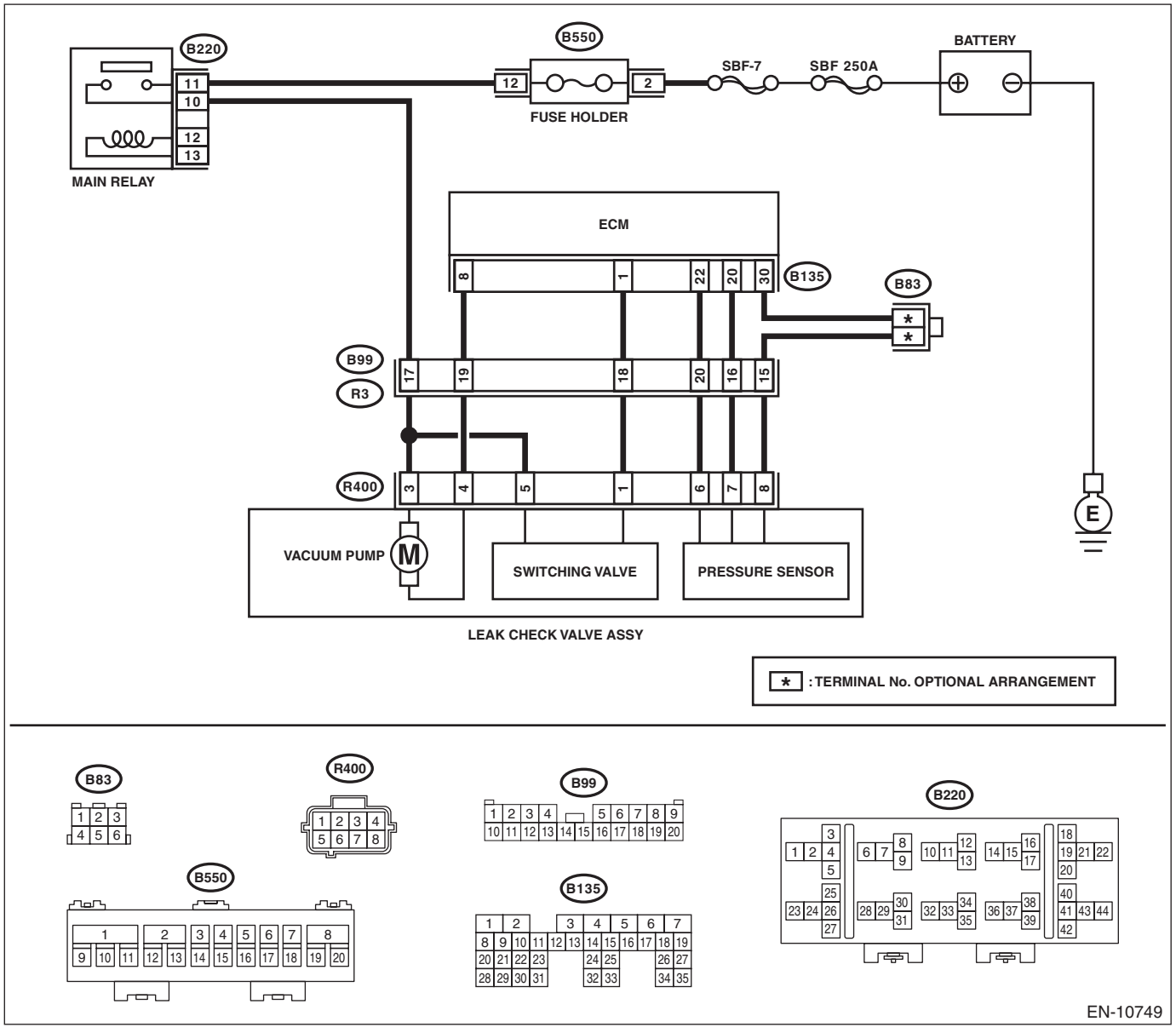
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-201, DTC P2402 EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the leak check valve assembly. 3) Turn the ignition switch to ON. 4) Measure the voltage between leak check valve assembly and chassis ground. ***Connector & terminal*** ***(R400) No. 4 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power in harness between ECM connector and leak check valve assembly connector.	Go to step **2**.
2	**CHECK LEAK CHECK VALVE ASSEMBLY.** 1) Turn the ignition switch to OFF. 2) Check the vacuum pump of the leak check valve assembly. <Ref. to EC(H4DO(HEV))-48, CHECK VACUUM PUMP, INSPECTION, Leak Check Valve Assembly.>	Is the vacuum pump of the leak check valve assembly OK?	Repair the poor contact in the leak check valve assembly connector.	Replace the leak check valve assembly. <Ref. to EC(H4DO(HEV))-39, Leak Check Valve Assembly.>

FK:DTC P2404 EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP SENSE CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

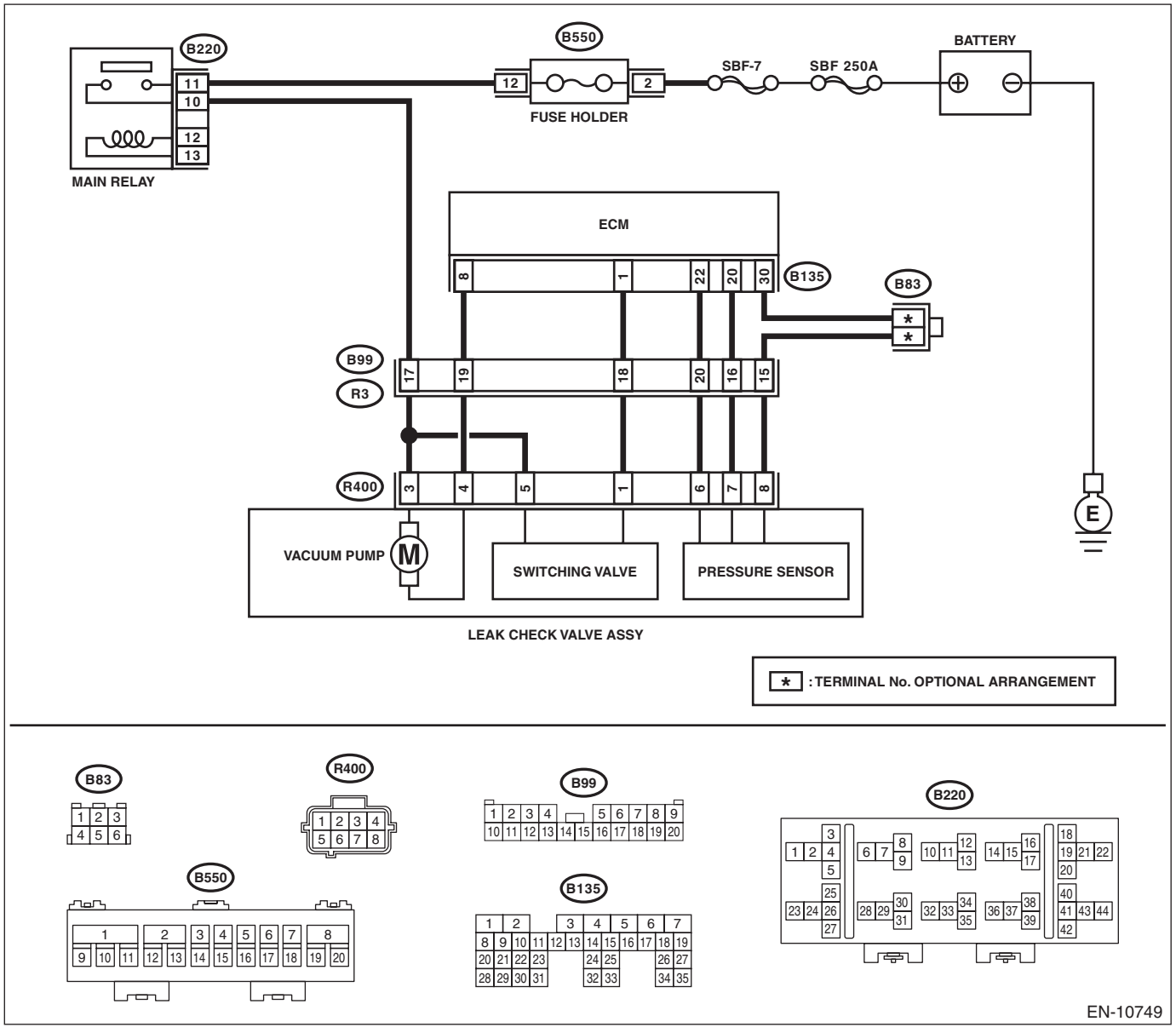
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-202, DTC P2404 EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP SENSE CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK ELCM PUMP.** Operate the ELCM pump using the Subaru Select Monitor. NOTE: For detailed procedures, refer to "System Operation Check Mode". <Ref. to EN(H4DO HEV)(diag)-67, System Operation Check Mode.>	Does the ELCM pump operate?	Go to step **6**.	Go to step **3**.
3	**CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the leak check valve assembly. 3) Turn the ignition switch to ON. 4) Measure the voltage between the leak check valve assembly connector and chassis ground. ***Connector & terminal*** ***(R400) No. 3 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between the main relay and the leak check valve assembly connector • Poor contact of main relay connector • Poor contact of coupling connector
4	**CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and the leak check valve assembly connector. ***Connector & terminal*** ***(B135) No. 8 — (R400) No. 4:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and the leak check valve assembly connector • Poor contact of coupling connector
5	**CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.** 1) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 8 — Chassis ground:***	Is the resistance 1 MΩ or more?	Replace the leak check valve assembly. <Ref. to EC(H4DO(HEV))-39, Leak Check Valve Assembly.>	Repair the short circuit to ground in harness between ECM connector and leak check valve assembly connector.

	Step	Check	Yes	No
6	**CHECK ELCM SWITCHING VALVE.** Operate the ELCM switching valve using the Subaru Select Monitor. NOTE: For detailed procedures, refer to "System Operation Check Mode". <Ref. to EN(H4DO HEV)(diag)-67, System Operation Check Mode.>	Does the ELCM switching valve operate?	Go to step **10**.	Go to step **7**.
7	**CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the leak check valve assembly. 3) Turn the ignition switch to ON. 4) Measure the voltage between the leak check valve assembly connector and chassis ground. ***Connector & terminal*** ***(R400) No. 5 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **8**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between the main relay and the leak check valve assembly connector • Poor contact of main relay connector • Poor contact of coupling connector
8	**CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and the leak check valve assembly connector. ***Connector & terminal*** ***(B135) No. 1 — (R400) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and the leak check valve assembly connector • Poor contact of coupling connector
9	**CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.** 1) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 1 — Chassis ground:***	Is the resistance 1 MΩ or more?	Replace the leak check valve assembly. <Ref. to EC(H4DO(HEV))-39, Leak Check Valve Assembly.>	Repair the short circuit to ground in harness between ECM connector and leak check valve assembly connector.

Step		Check	Yes	No
10	**CHECK EVAPORATIVE EMISSION CONTROL SYSTEM.** Perform drive cycle I. <Ref. to EN(H4DO HEV)(diag)-62, DRIVE CYCLE I, PROCEDURE, Drive Cycle.>	Is DTC P2404 displayed on the display?	Replace the leak check valve assembly. <Ref. to EC(H4DO(HEV))-39, Leak Check Valve Assembly.>	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.

FL: DTC P2419 EVAPORATIVE EMISSION SYSTEM SWITCHING VALVE CONTROL CIRCUIT LOW

DTC DETECTING CONDITION:

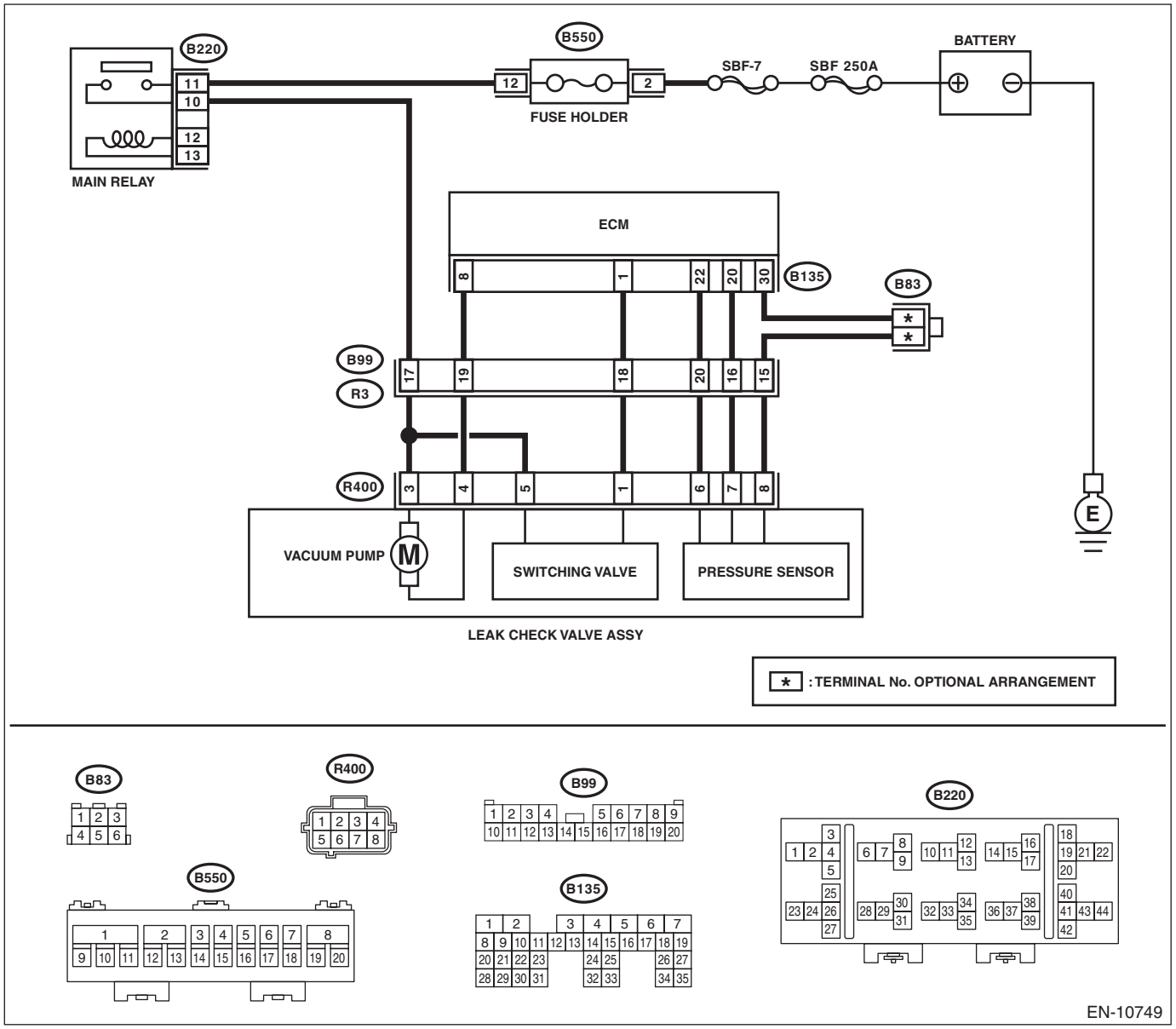
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-203, DTC P2419 EVAPORATIVE EMISSION SYSTEM SWITCHING VALVE CONTROL CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Go to step **3**.
2	**CHECK FOR POOR CONTACT.** Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary open or short circuit of harness or temporary poor contact of connector may be the cause.
3	**CHECK POWER SUPPLY TO LEAK CHECK VALVE ASSEMBLY.** Measure the voltage between the leak check valve assembly connector and engine ground. ***Connector & terminal*** ***(R400) No. 5 (+) — Engine ground (–):***	Is the voltage 10 V or more?	Go to step **4**.	Repair the power supply circuit.
4	**CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and the leak check valve assembly. 3) Measure the resistance between leak check valve assembly and chassis ground. ***Connector & terminal*** ***(R400) No. 1 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit to ground in harness between ECM connector and leak check valve assembly connector.
5	**CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.** Measure the resistance of harness between ECM connector and the leak check valve assembly connector. ***Connector & terminal*** ***(B135) No. 1 — (R400) No. 1:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and the leak check valve assembly connector • Poor contact of coupling connector

Step		Check	Yes	No
6	**CHECK LEAK CHECK VALVE ASSEMBLY.** Check the switching valve of the leak check valve assembly. <Ref. to EC(H4DO(HEV))-47, CHECK SWITCHING VALVE, INSPECTION, Leak Check Valve Assembly.>	Is the switching valve of the leak check valve assembly OK?	Repair the poor contact in the leak check valve assembly connector.	Replace the leak check valve assembly. <Ref. to EC(H4DO(HEV))-39, Leak Check Valve Assembly.>

FM:DTC P2420 EVAPORATIVE EMISSION SYSTEM SWITCHING VALVE CONTROL CIRCUIT HIGH

DTC DETECTING CONDITION:

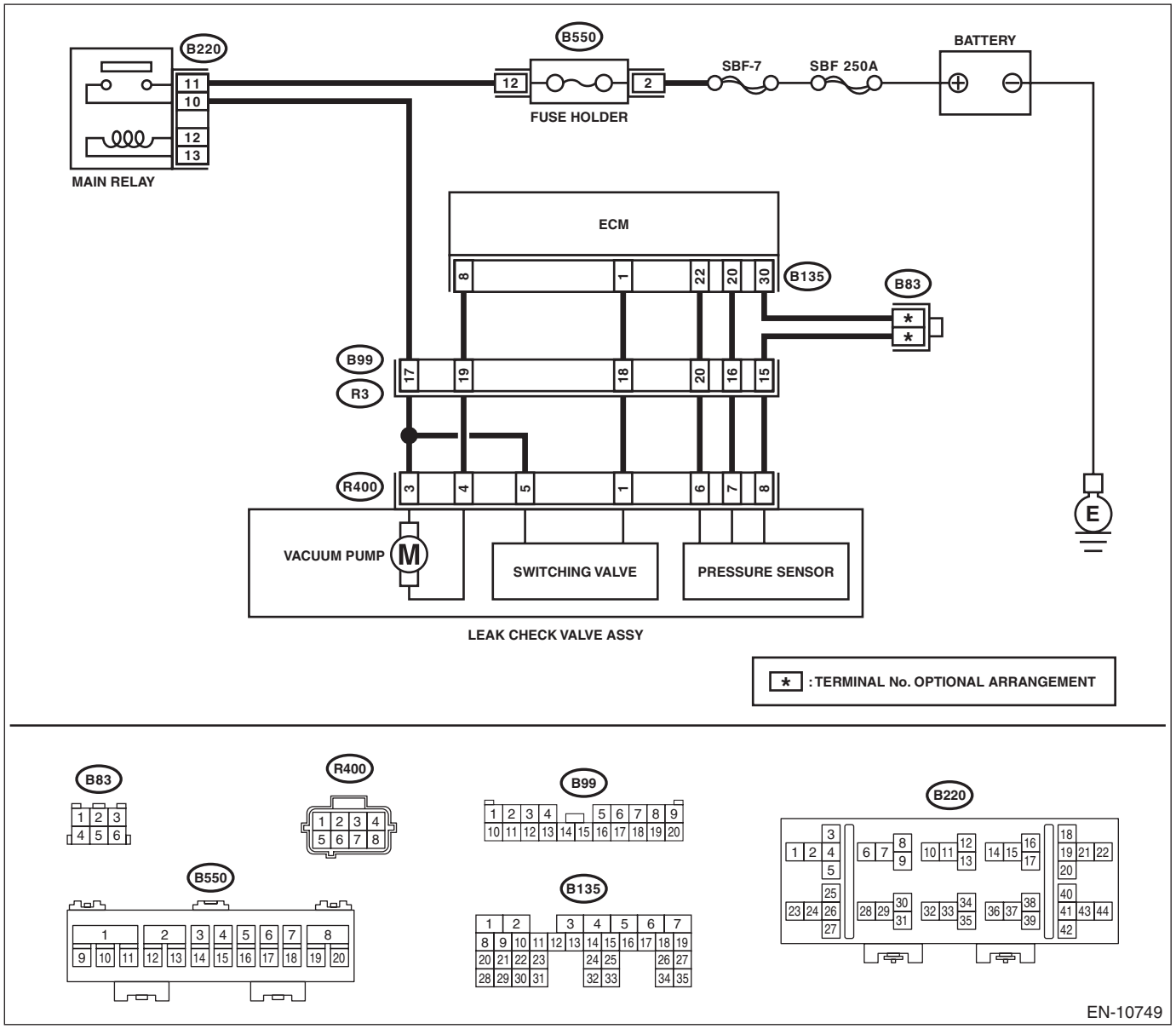
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-204, DTC P2420 EVAPORATIVE EMISSION SYSTEM SWITCHING VALVE CONTROL CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the leak check valve assembly. 3) Turn the ignition switch to ON. 4) Measure the voltage between leak check valve assembly and chassis ground. ***Connector & terminal*** ***(R400) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit to power in harness between ECM connector and leak check valve assembly connector.	Go to step **2**.
2	**CHECK LEAK CHECK VALVE ASSEMBLY.** 1) Turn the ignition switch to OFF. 2) Check the switching valve of the leak check valve assembly. <Ref. to EC(H4DO(HEV))-47, CHECK SWITCHING VALVE, INSPECTION, Leak Check Valve Assembly.>	Is the switching valve of the leak check valve assembly OK?	Repair the poor contact in the leak check valve assembly connector.	Replace the leak check valve assembly. <Ref. to EC(H4DO(HEV))-39, Leak Check Valve Assembly.>

FN:DTC P2530 IGNITION SWITCH RUN POSITION CIRCUIT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-205, DTC P2530 IGNITION SWITCH RUN POSITION CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

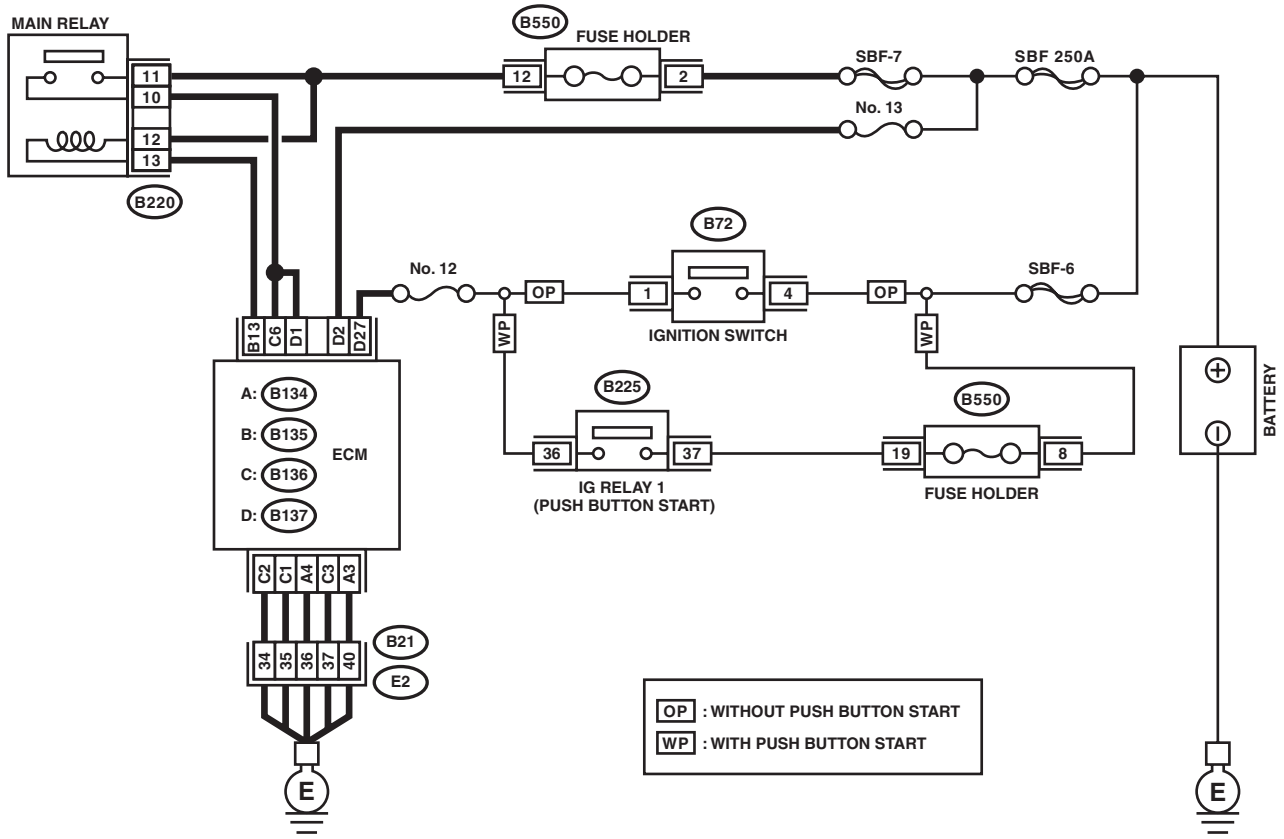
Improper idling

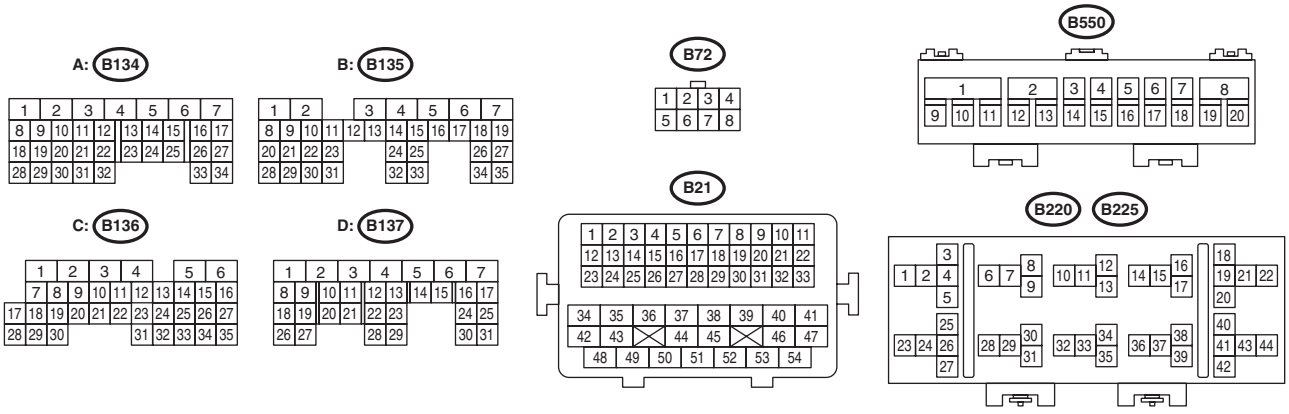
CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- Engine electrical system (without push button start) <Ref. to WI(HEV)-100, WITHOUT PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>
- Engine electrical system (with push button start) <Ref. to WI(HEV)-114, WITH PUSH BUTTON START, WIRING DIAGRAM, Engine Electrical System.>





EN-10733

Step		Check	Yes	No
1	**CHECK ECM CONNECTOR.** Check the connecting condition of ECM connector.	Is the ECM connector correctly connected?	Go to step **2**.	Connect the ECM connector correctly.

	Step	Check	Yes	No
2	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Connect the check board. ST 18460AA050 CHECK BOARD 3) Measure the voltage between ECM connector and engine ground while wiggling the harness between ECM connector and F/B connector. ***Connector & terminal*** ***(B137) No. 2 (+) — Engine ground (–):***	Is the voltage 8 V or more all the time?	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, the following items may be the cause of fault. • Open circuit or short circuit to ground in harness between ECM connector and F/B connector • Poor contact of fuse (F/B No. 5) • Poor contact of IG2 relay connector • Poor contact of IG2 relay	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit or short circuit to ground in harness between ECM connector and F/B connector • Poor contact of fuse (F/B No. 5) • Poor contact of IG2 relay connector • Poor contact of IG2 relay

FO:DTC P2610 ECM/PCM INTERNAL ENGINE OFF TIMER PERFORMANCE

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-206, DTC P2610 ECM/PCM INTERNAL ENGINE OFF TIMER PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 **CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Replace the ECM. <Ref. to FU(H4DO(HEV))-85, Engine Control Module (ECM).> NOTE: The soak timer IC is built into the ECM.

FP:DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(HEV)(diag)-2, Basic Diagnostic Procedure.>

FQ:DTC U0075 CONTROL MODULE COMMUNICATION BUS "PU-CAN" OFF

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(HEV)(diag)-2, Basic Diagnostic Procedure.>

FR:DTC U0101 LOST COMMUNICATION WITH TCM

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(HEV)(diag)-2, Basic Diagnostic Procedure.>

FS:DTC U0122 LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(HEV)(diag)-2, Basic Diagnostic Procedure.>

FT:DTC U0155 LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER (IPC) CONTROL MODULE

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(HEV)(diag)-2, Basic Diagnostic Procedure.>

FU:DTC U0284 LOST COMMUNICATION WITH ACTIVE GRILLE SHUTTER MODULE "A"

DTC DETECTING CONDITION:

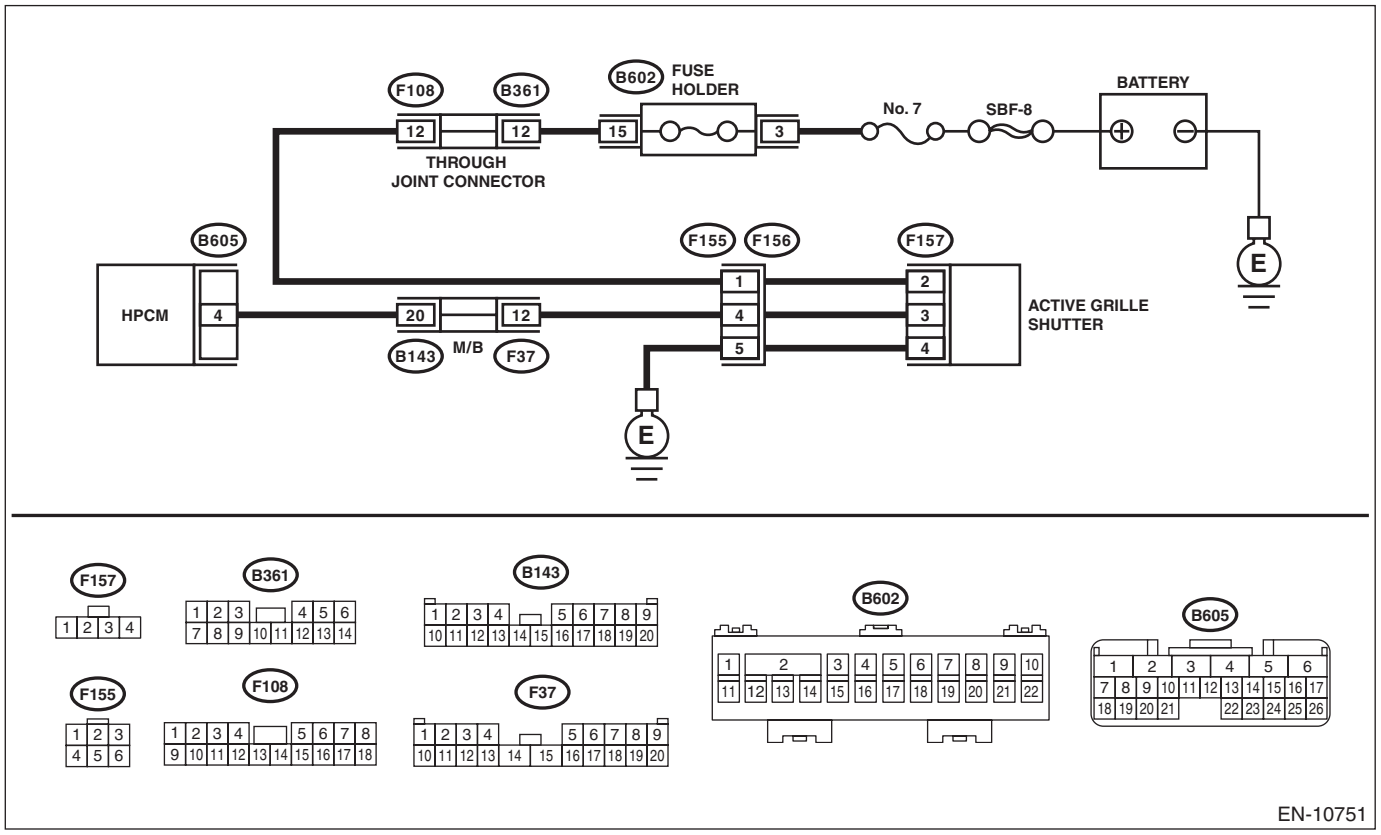
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H4DO HEV)-218, DTC U0284 LOST COMMUNICATION WITH ACTIVE GRILLE SHUTTER MODULE "A", Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H4DO HEV)(diag)-66, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H4DO HEV)(diag)-52, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

Active grille shutter <Ref. to WI(HEV)-50, Active Grille Shutter.>



Step		Check	Yes	No
1	**CHECK DTC.** Check for DTC. <Ref. to EN(H4DO HEV)(diag)-51, Read Diagnostic Trouble Code (DTC).>	Is DTC U0284 displayed in «Present fault»?	Go to step **2**.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.

	Step	Check	Yes	No
2	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC of engine control system displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO HEV)(diag)-92, List of Diagnostic Trouble Code (DTC).>	Go to step **3**.
3	**CHECK DTC OF HYBRID POWERTRAIN CONTROL SYSTEM, DRIVE MOTOR CONTROL SYSTEM AND BATTERY ENERGY CONTROL SYSTEM.** Check DTC of hybrid powertrain control system, drive motor control system and battery energy control system.	Are DTCs of hybrid powertrain control system, drive motor control system or battery energy control system displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to HEV(diag)-74, List of Diagnostic Trouble Code (DTC).>	Go to step **4**.
4	**CHECK HARNESS BETWEEN HPCM AND ACTIVE GRILLE SHUTTER CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the 12 volt auxiliary battery. <Ref. to NT-5, BATTERY, NOTE, Note.> 3) Disconnect the connector from HPCM and active grille shutter. 4) Measure the resistance between active grille shutter connector and chassis ground. ***Connector & terminal*** ***(F157) No. 3 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit to ground in harness between HPCM and active grille shutter connector.
5	**CHECK HARNESS BETWEEN HPCM AND ACTIVE GRILLE SHUTTER CONNECTOR.** Measure the resistance between HPCM and active grille shutter connector. ***Connector & terminal*** ***(B605) No. 4 — (F157) No. 3:***	Is the resistance less than 10 Ω?	Go to step **6**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between HPCM and active grille shutter connector • Poor contact of coupling connector
6	**CHECK ACTIVE GRILLE SHUTTER POWER SUPPLY.** 1) Connect the 12 volt auxiliary battery. <Ref. to NT-5, BATTERY, NOTE, Note.> 2) Measure the voltage between active grille shutter connector and chassis ground. ***Connector & terminal*** ***(F157) No. 2 (+) — Chassis ground (–):***	Is the voltage 9 V or more?	Go to step **7**.	Repair the power supply circuit.

Step		Check	Yes	No
7	**CHECK HARNESS BETWEEN ACTIVE GRILLE SHUTTER CONNECTOR AND CHASSIS GROUND.** Measure the resistance of harness between active grille shutter connector and chassis ground. ***Connector & terminal*** ***(F157) No. 4 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the active grille shutter. <Ref. to HEV-77, Active Grille Shutter.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between active grille shutter connector and chassis ground • Poor contact of coupling connector

FV:DTC U0293 LOST COMMUNICATION WITH HYBRID POWERTRAIN CONTROL MODULE

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(HEV)(diag)-2, Basic Diagnostic Procedure.>

FW:DTC U0402 INVALID DATA RECEIVED FROM TCM

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(HEV)(diag)-2, Basic Diagnostic Procedure.>

FX:DTC U0416 INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(HEV)(diag)-2, Basic Diagnostic Procedure.>

FY:DTC U0423 INVALID DATA RECEIVED FROM INSTRUMENT PANEL CLUSTER CONTROL MODULE

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(HEV)(diag)-2, Basic Diagnostic Procedure.>

FZ:DTC U0594 INVALID DATA RECEIVED FROM HYBRID POWERTRAIN CONTROL MODULE

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(HEV)(diag)-2, Basic Diagnostic Procedure.>

GA:DTC U1101 LOST COMMUNICATION WITH TCM PU-CAN

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(HEV)(diag)-2, Basic Diagnostic Procedure.>

GB:DTC U1293 LOST COMMUNICATION WITH HYBRID POWERTRAIN CONTROL MODULE PU-CAN

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(HEV)(diag)-2, Basic Diagnostic Procedure.>

GC:DTC U1402 INVALID DATA RECEIVED FROM TCM PU-CAN

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(HEV)(diag)-2, Basic Diagnostic Procedure.>

GD:DTC U1594 INVALID DATA RECEIVED FROM HYBRID POWERTRAIN CONTROL MODULE PU-CAN

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(HEV)(diag)-2, Basic Diagnostic Procedure.>

19.General Diagnostic Table

A: INSPECTION

1. ENGINE

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to ME(H4DO(w/o HEV))-421, Engine Trouble in General.>

Symptoms	Faulty parts
1. Engine stalls during idling.	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Ignition parts (*1) 4) Engine coolant temperature sensor (*2) 5) Crankshaft position sensor (*3) 6) Camshaft position sensor (*3) 7) Fuel injection parts (*4) 8) Electronic throttle control
2. Rough idling	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Ignition parts (*1) 5) Air intake system (*5) 6) Fuel injection parts (*4) 7) Electronic throttle control 8) Crankshaft position sensor (*3) 9) Camshaft position sensor (*3) 10) Oxygen sensor 11) Fuel pump and fuel pump relay 12) EGR control valve
3. Engine does not return to idle.	1) Engine coolant temperature sensor 2) Electronic throttle control 3) Manifold absolute pressure sensor 4) Mass air flow and intake air temperature sensor 5) EGR control valve 6) Accelerator pedal position sensor 7) Engine oil temperature sensor
4. Poor acceleration	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Electronic throttle control 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay 6) Engine coolant temperature sensor (*2) 7) Crankshaft position sensor (*3) 8) Camshaft position sensor (*3) 9) Engine torque control signal circuit 10) Ignition parts (*1) 11) EGR control valve 12) Accelerator pedal position sensor 13) Engine oil temperature sensor
5. Engine stalls, hesitates, or sputters at acceleration.	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Purge control solenoid valve 7) Fuel injection parts (*4) 8) Electronic throttle control 9) Fuel pump and fuel pump relay 10) EGR control valve

Symptoms	Faulty parts
6. Surging	1) Mass air flow and intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Fuel injection parts (*4) 7) Electronic throttle control 8) Fuel pump and fuel pump relay 9) EGR control valve
7. Spark knock	1) Mass air flow and intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor 4) Knock sensor 5) Fuel injection parts (*4) 6) Fuel pump and fuel pump relay 7) EGR control valve
8. After burning in exhaust system	1) Mass air flow and intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor (*2) 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay

*1: Check ignition coil and spark plug.
*2: Indicate the symptom occurring only in cold temperatures.
*3: Ensure the secure installation.
*4: Check fuel injector and fuel filter.
*5: Inspect air leak in air intake system.

GENERAL DESCRIPTION

GD(H4DO HEV)

Page

1. List of Diagnostic Trouble Code (DTC) 2
2. Diagnostic Trouble Code (DTC) Detecting Criteria 11

1. General Description

A: SPECIFICATION

Specifications for the HEV model are included in the EX (H4DO (w/o HEV)) section. <Ref. to EX(H4DO(w/o HEV))-2, General Description.>

COOLING

CO(H4DO(HEV))

Page
1. General Description 2

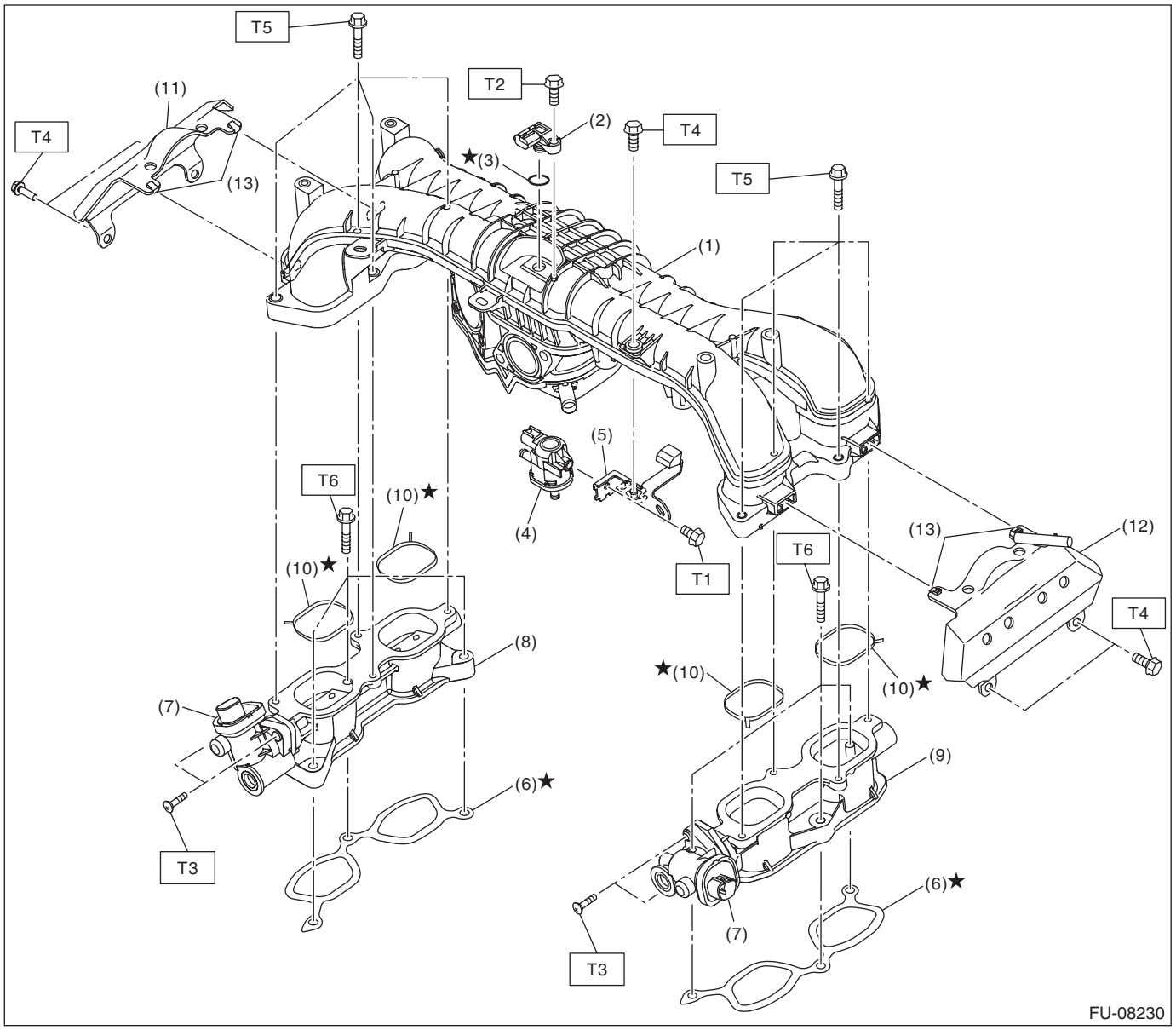
1. General Description

A: SPECIFICATION

Fuel tank	Capacity	52 L (13.7 US gal, 11.4 Imp gal)
	Location	Under rear seat
Fuel pump	Type	Impeller
	Shutoff discharge pressure	750 kPa (7.7 kg/cm^2, 108.8 psi) or less
	Discharge rate	82 L (21.7 US gal, 18 Imp gal)/h or more [12.5 V at 343 kPa (3.5 kg/cm^2, 49.7 psi)]
Fuel filter		In-tank type

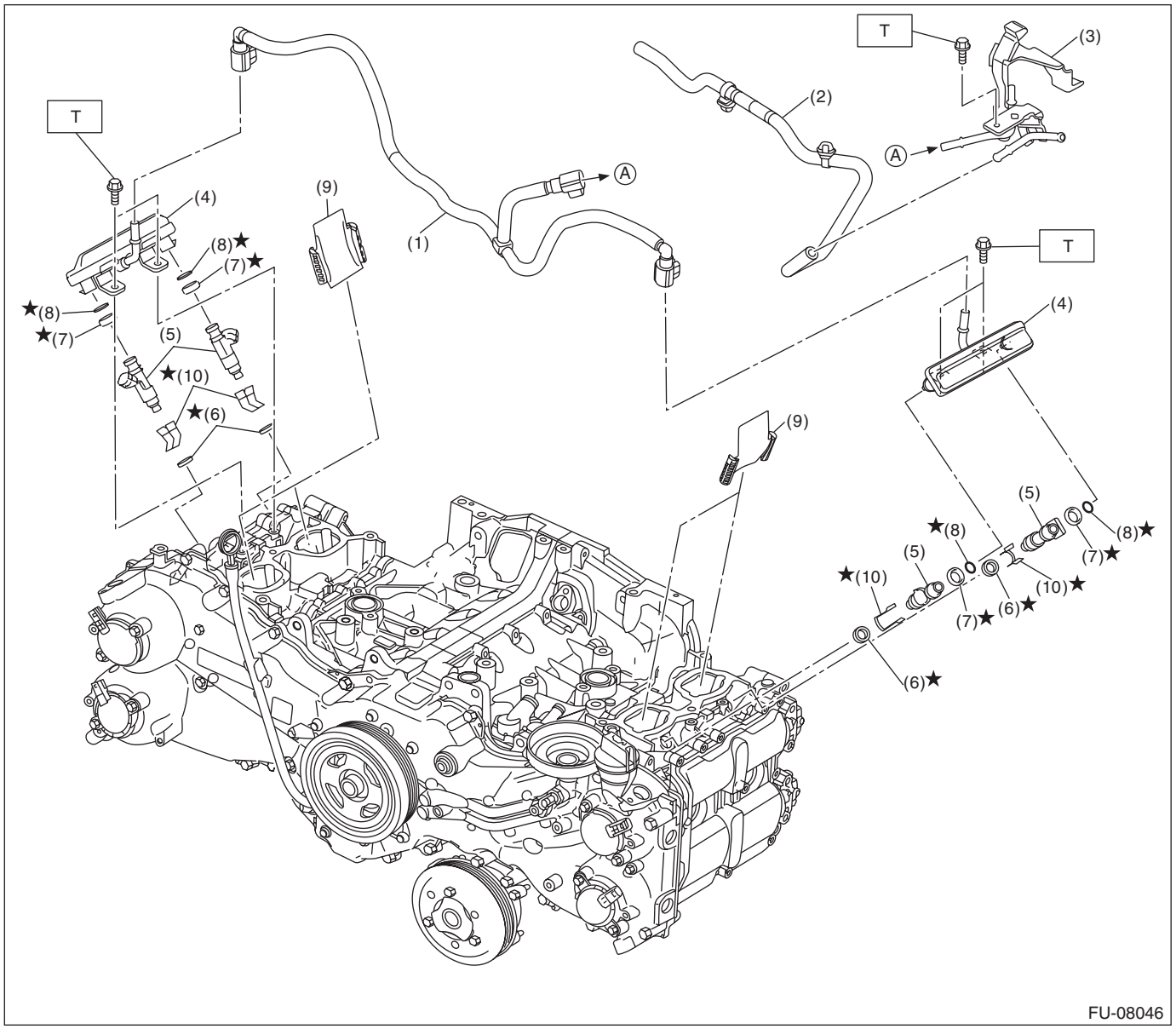
B: COMPONENT

1. INTAKE MANIFOLD 1



(1)	Intake manifold	(8)	Tumble generator valve LH	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Manifold absolute pressure sensor	(9)	Tumble generator valve RH	***T1: 3.4 (0.3, 2.5)***
(3)	O-ring	(10)	Gasket	***T2: 4 (0.4, 3.0)***
(4)	Purge control solenoid valve	(11)	Intake manifold protector LH	***T3: 6 (0.6, 4.4)***
(5)	Purge control solenoid valve bracket	(12)	Intake manifold protector RH	***T4: 6.4 (0.7, 4.7)***
(6)	Gasket	(13)	Cushion	***T5: 8.3 (0.8, 6.1)***
(7)	Tumble generator valve actuator			***T6: 25 (2.5, 18.4)***

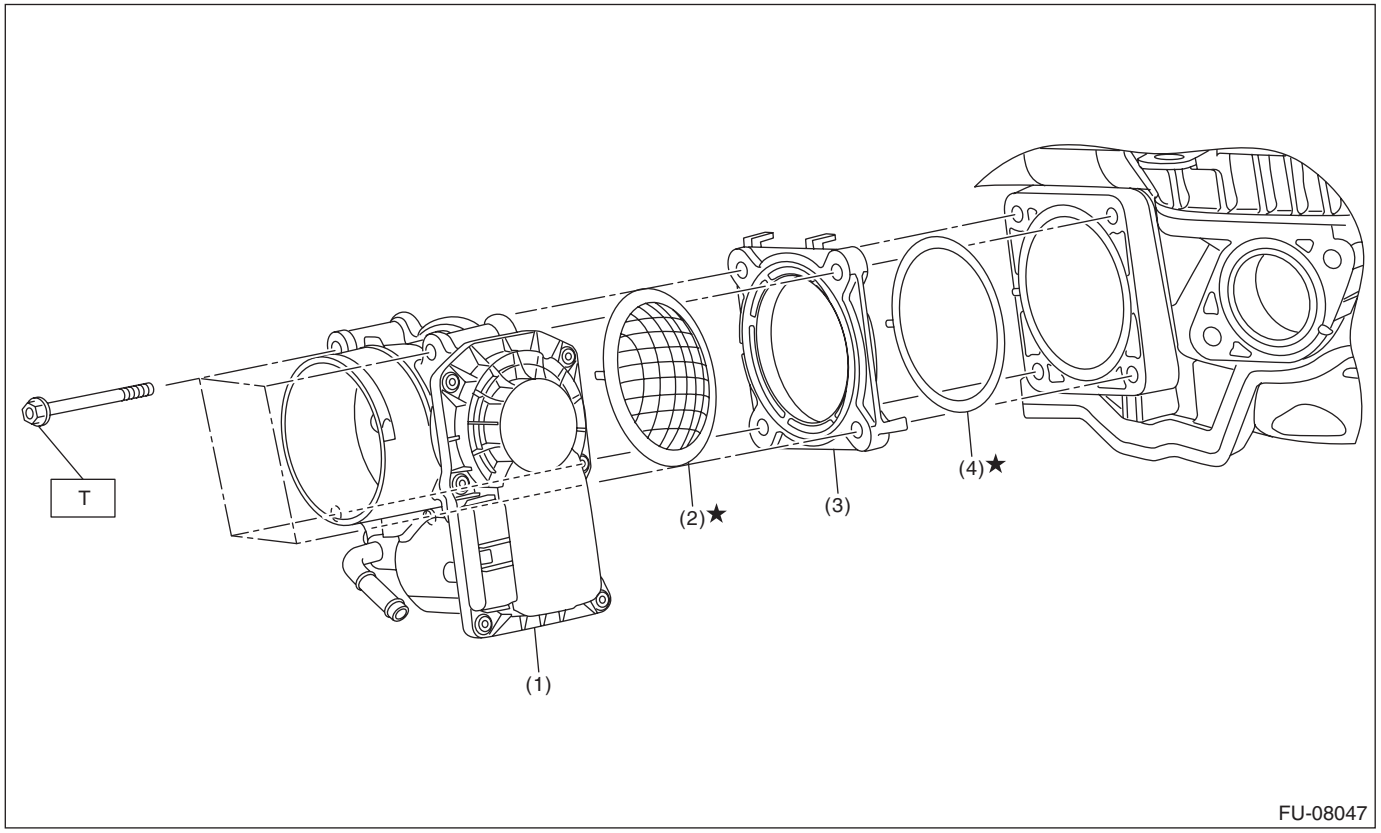
2. INTAKE MANIFOLD 2



(1) Fuel delivery pipe
(2) Vacuum hose
(3) Fuel pipe ASSY
(4) Fuel pipe
(5) Fuel injector
(6) Seal ring
(7) Rubber
(8) O-ring
(9) Cylinder head plate
(10) Fuel injector holder

Tightening torque: N·m (kgf-m, ft-lb)
T: 6.4 (0.7, 4.7)

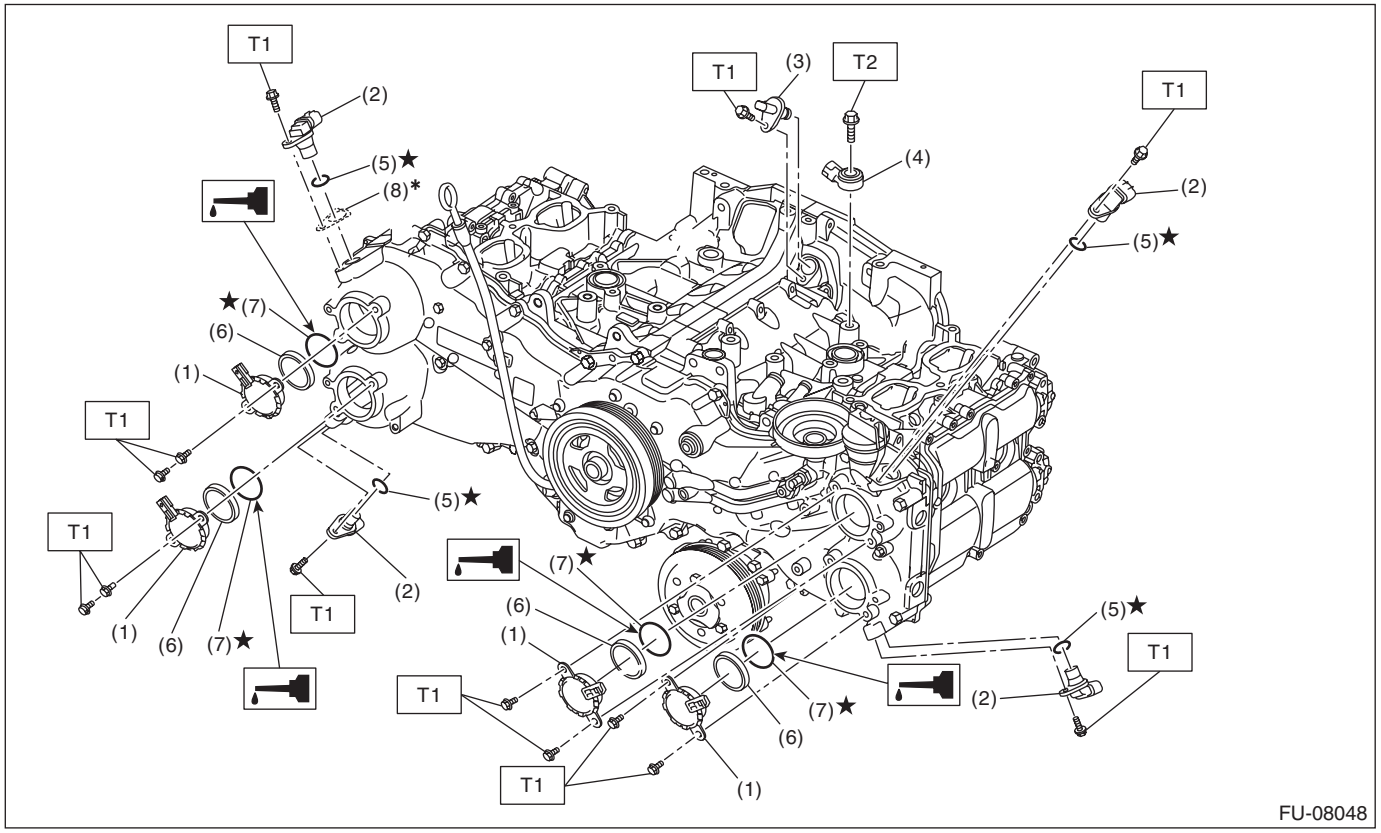
3. THROTTLE BODY



(1) Throttle body
(2) Gasket A
(3) Throttle chamber duct
(4) Gasket B

Tightening torque: N·m (kgf-m, ft-lb)
T: <Ref. to FU(H4DO(HEV))-16, INSTALLATION, Throttle Body.>

4. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS

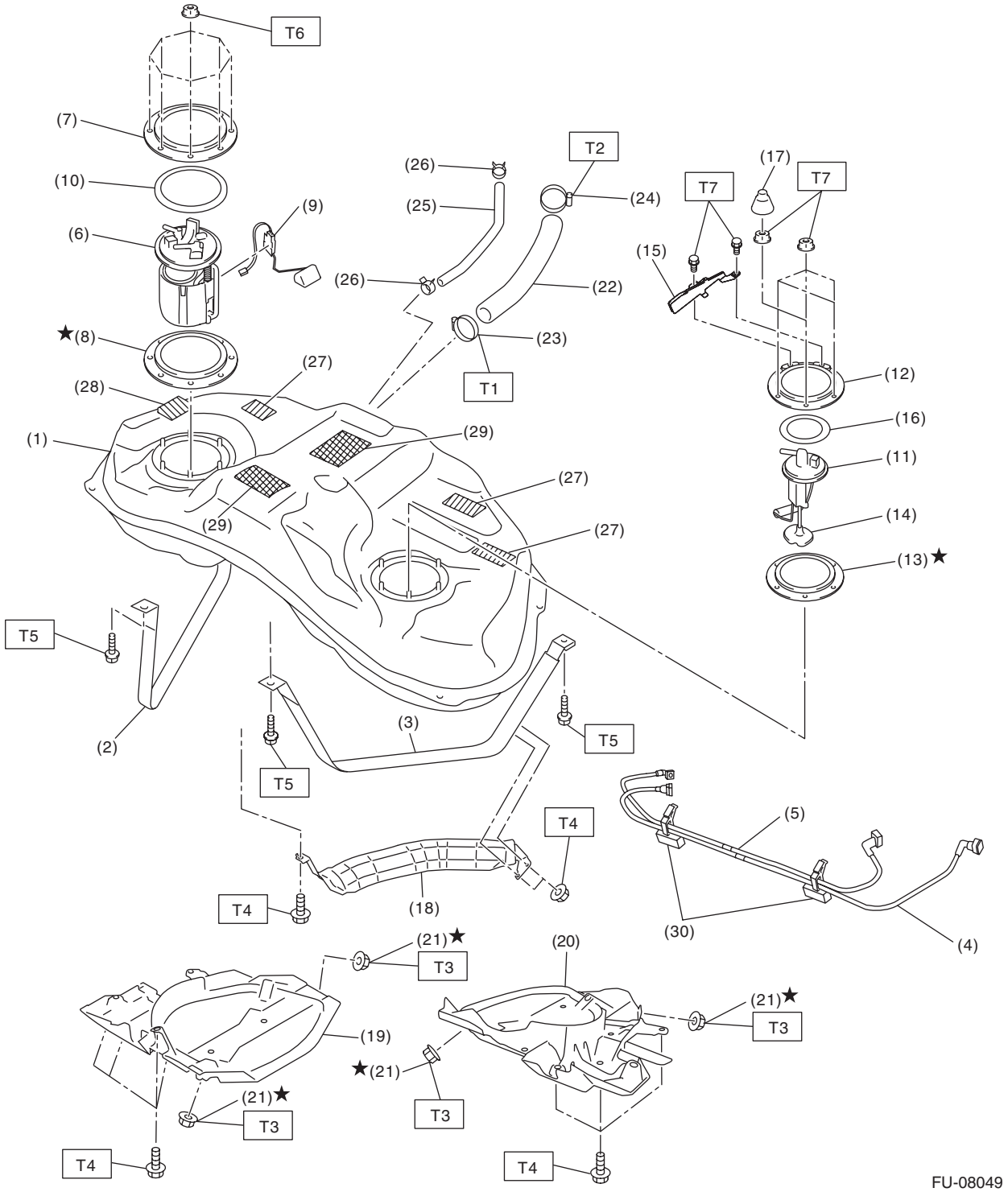


(1) Oil control solenoid
(2) Camshaft position sensor
(3) Crankshaft position sensor
(4) Knock sensor
(5) O-ring
(6) Back-up ring
(7) O-ring
(8) Spacer

* Zero or one spacer for gap adjustment.

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.7, 4.7)
T2: 24 (2.4, 17.7)

5. FUEL TANK


T6
(7)
(10)
(9)
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(26)
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T2
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T7
T7
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T5
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T4
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(4)
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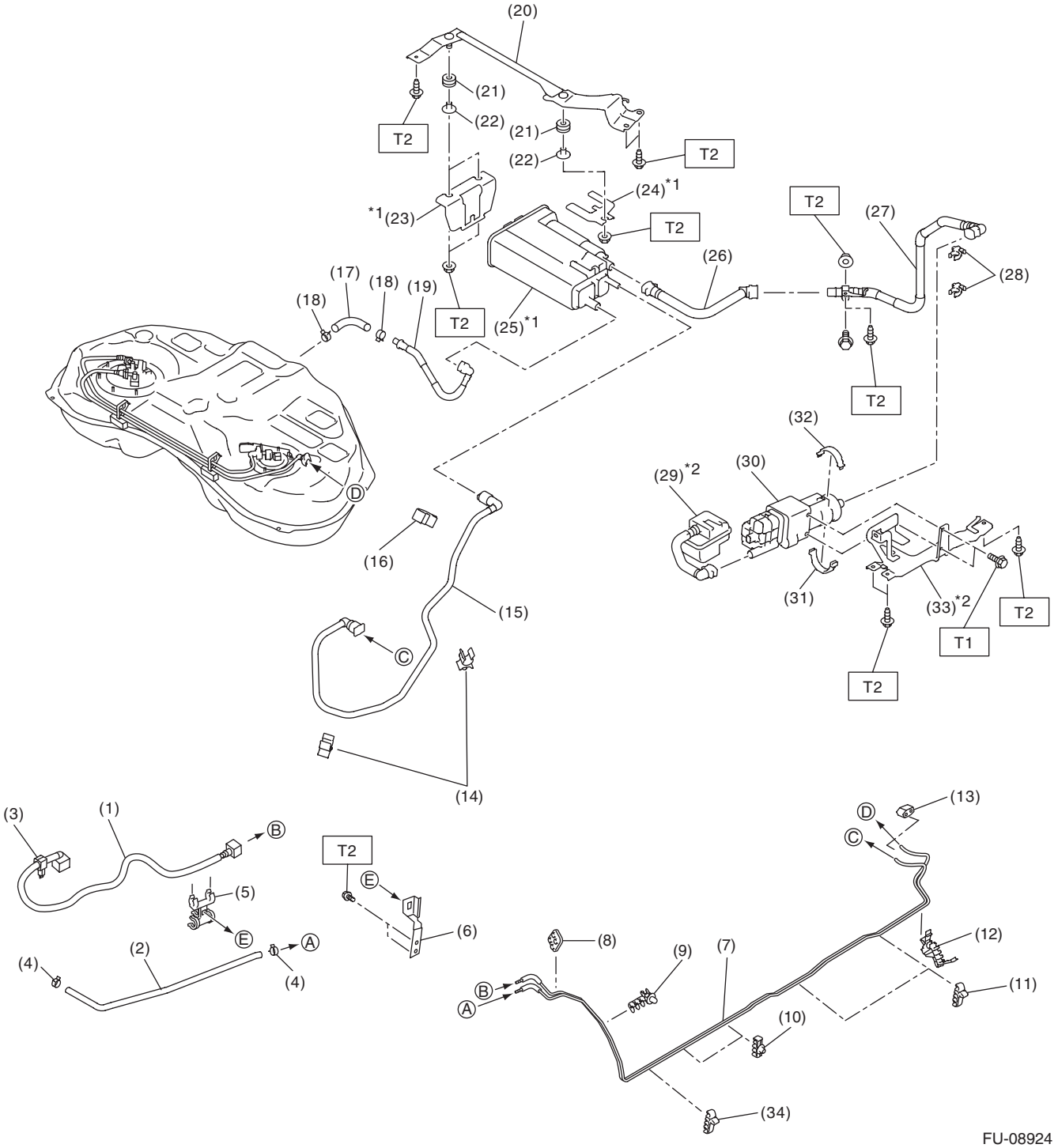
T3
(20)
(21)★
T3
(19)
★(21)
T3
(21)★
T3
T4
T4
FU-08049

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

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: 33 (3.4, 24.3)
T6: <Ref. to FU(H4DO(HEV))-126, INSTALLATION, Fuel Pump.>
T7: <Ref. to FU(H4DO(HEV))-135, INSTALLATION, Fuel Sub Level Sensor.>

6. FUEL LINE


(20)
(21)
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T2
(24)*1
*1(23)
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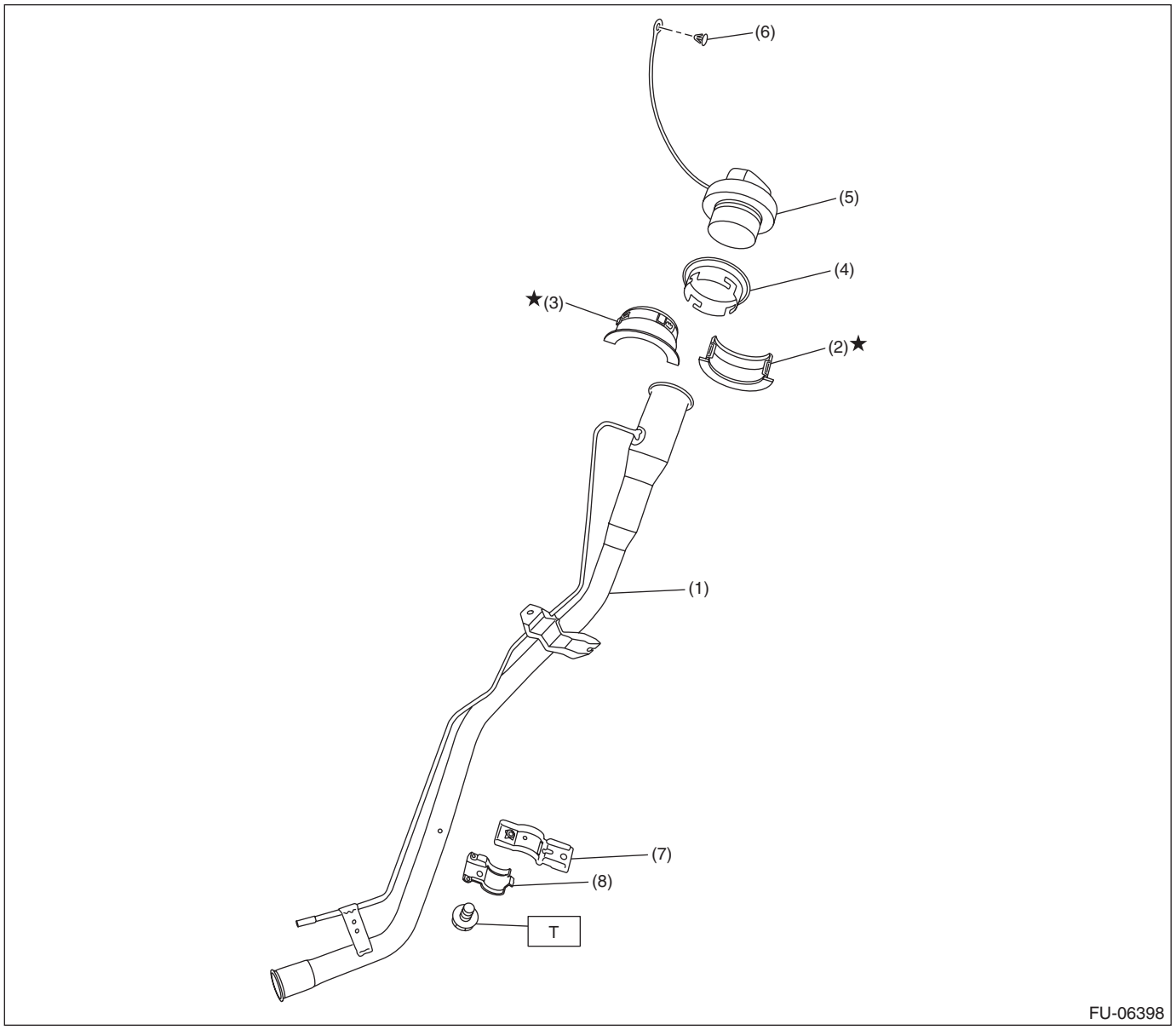
(13)
(34)
FU-08924

(1) Fuel delivery tube
(2) Evaporation hose
(3) Tube clamp
(4) Clip
(5) Hose clamp
(6) Hose clamp bracket
(7) Fuel pipe ASSY
(8) Fuel pipe front grommet
(9) Pipe clamp
(10) Pipe clamp
(11) Pipe clamp (with gasket)
(12) Pipe clamp
(13) Fuel pipe rear grommet
(14) Tube clamp
(15) Purge tube
(16) Clip
(17) Vent hose
(18) Clip
(19) Vent tube
(20) Canister bracket A
(21) Cushion
(22) Collar
(23) Canister bracket B
(24) Canister bracket C
(25) Canister
(26) Drain tube A
(27) Drain tube B
(28) Tube clamp
(29) Drain filter
(30) Leak check valve ASSY
(31) Clamp A
(32) Clamp B
(33) Drain bracket
(34) Pipe clamp (without gasket)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5.4 (0.6, 4.0)
T2: 7.5 (0.8, 5.5)

*1 When removing the canister bracket from the canister, use the new canister and canister bracket to install.
*2 When removing the drain bracket from the drain filter, use the new drain filter and drain bracket to install.

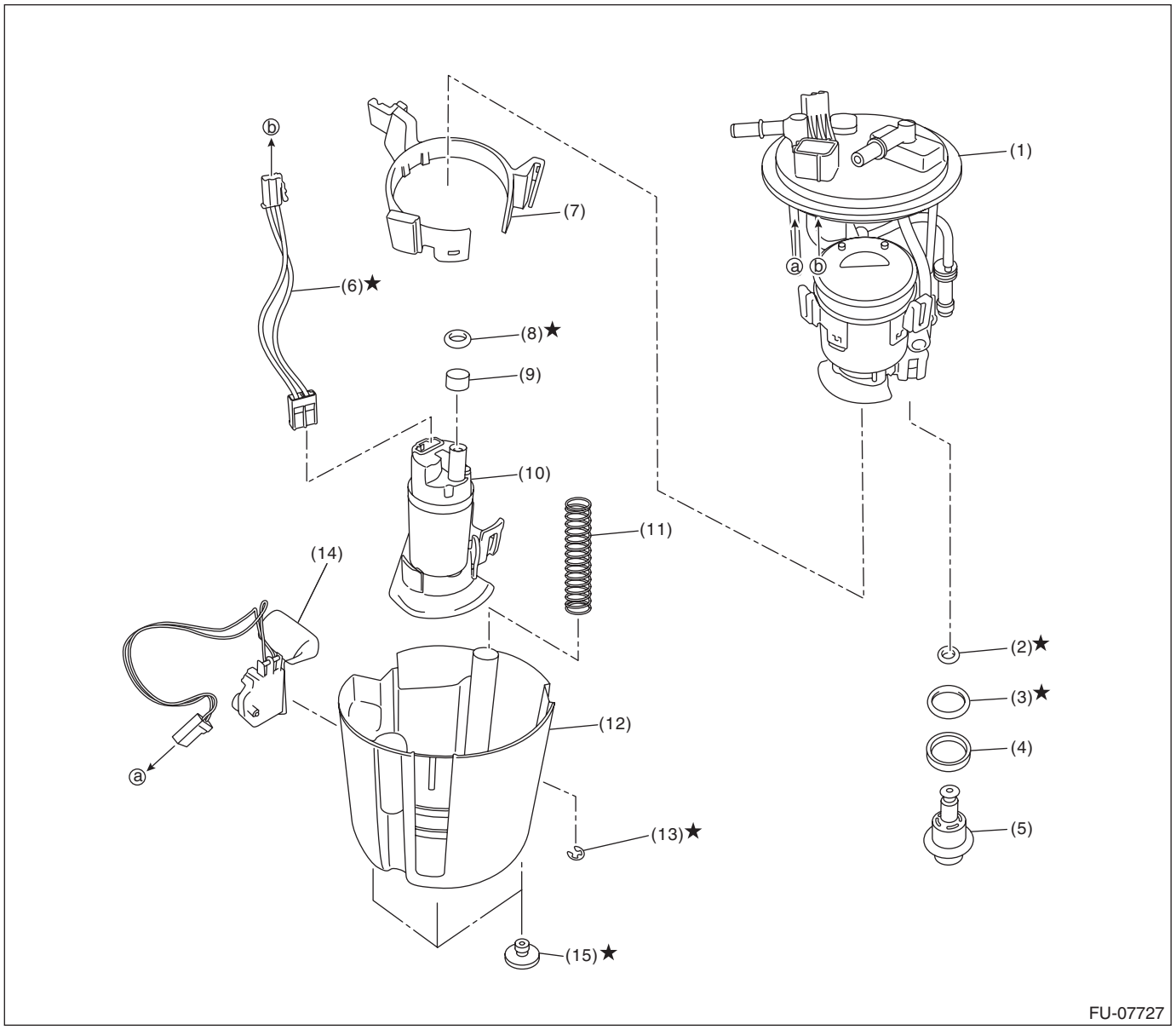
7. FUEL FILLER PIPE



(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) Upper bracket
(8) Lower bracket

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

8. FUEL PUMP



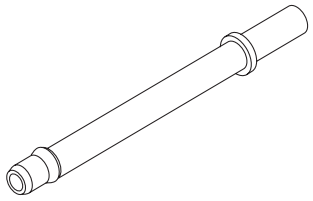
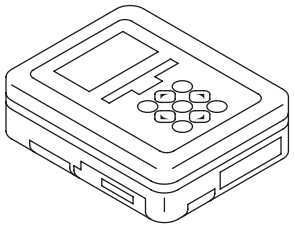
(1) Fuel filter ASSY
(2) O-ring
(3) O-ring
(4) Back-up ring
(5) Pressure regulator
(6) Connector cable
(7) Fuel pump holder
(8) O-ring
(9) Spacer
(10) Fuel pump
(11) Spring
(12) Fuel chamber ASSY
(13) Clip
(14) Fuel level sensor
(15) Cushion

C: CAUTION

- Prior to starting work, pay special attention to the following:
  1. Always wear work clothes, a work cap, and 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.

D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18471AA000	18471AA000	FUEL PIPE ADAPTER	Used for draining fuel.
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for setting of each function and trouble-shooting for electrical system. NOTE: For detailed operation procedures of Subaru Select Monitor III, refer to “PC application help for Subaru Select Monitor”.

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.
Oscilloscope	Used for inspecting the waveform of each sensor.
Mighty Vac	Used for inspecting the manifold absolute pressure sensor.

2. Throttle Body

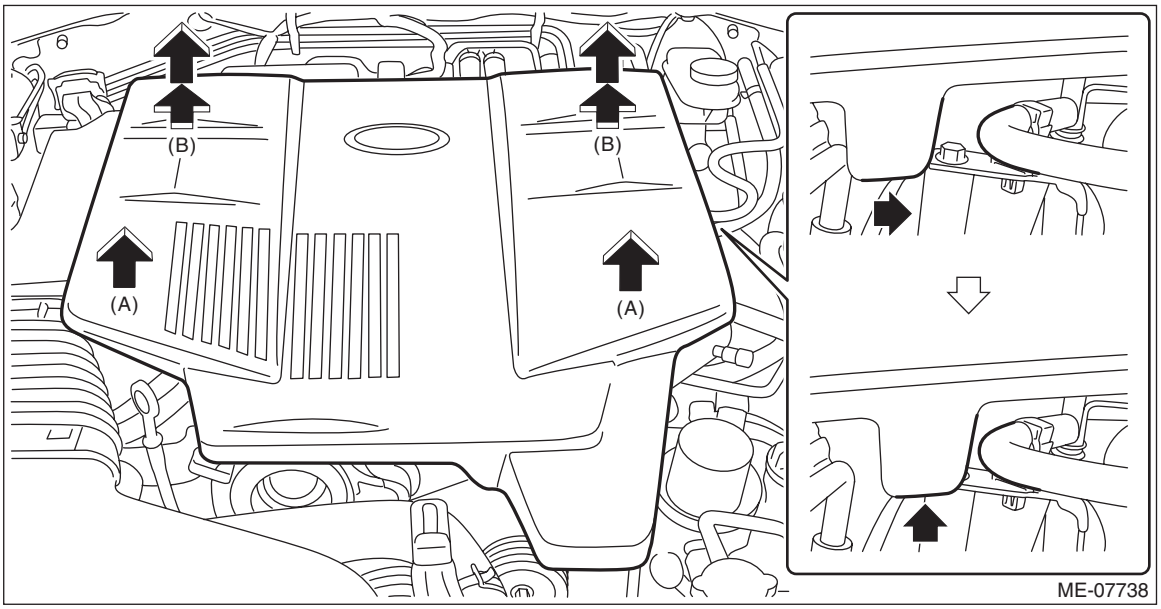
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

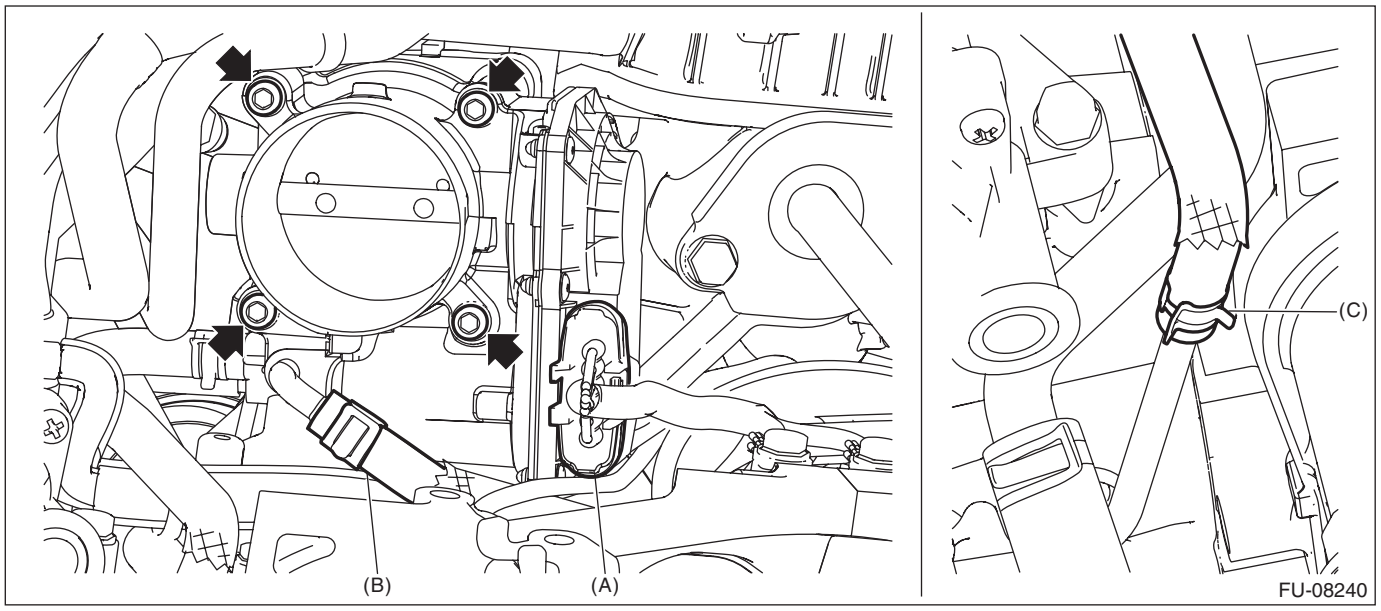
2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



3) Lift up the vehicle.
4) Remove the under cover. <Ref. to EI-32, REMOVAL, Front Under Cover.>
5) Drain approximately 3.0 L (3.2 US qt, 2.6 Imp qt) of coolant. <Ref. to CO(H4DO(w/o HEV))-16, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
6) Remove the air cleaner case. <Ref. to IN(H4DO(HEV))-6, REMOVAL, Air Cleaner Case.>
7) Remove the air intake boot No. 2. <Ref. to IN(H4DO(HEV))-11, AIR INTAKE BOOT NO. 2, REMOVAL, Air Intake Boot.>

8) Disconnect the connectors (A) from the throttle position sensor.
9) Disconnect the preheater hose (B) from the throttle body.
10) Disconnect the preheater hose (C) from the water pipe assembly LH.
11) Remove the throttle body from the intake manifold.

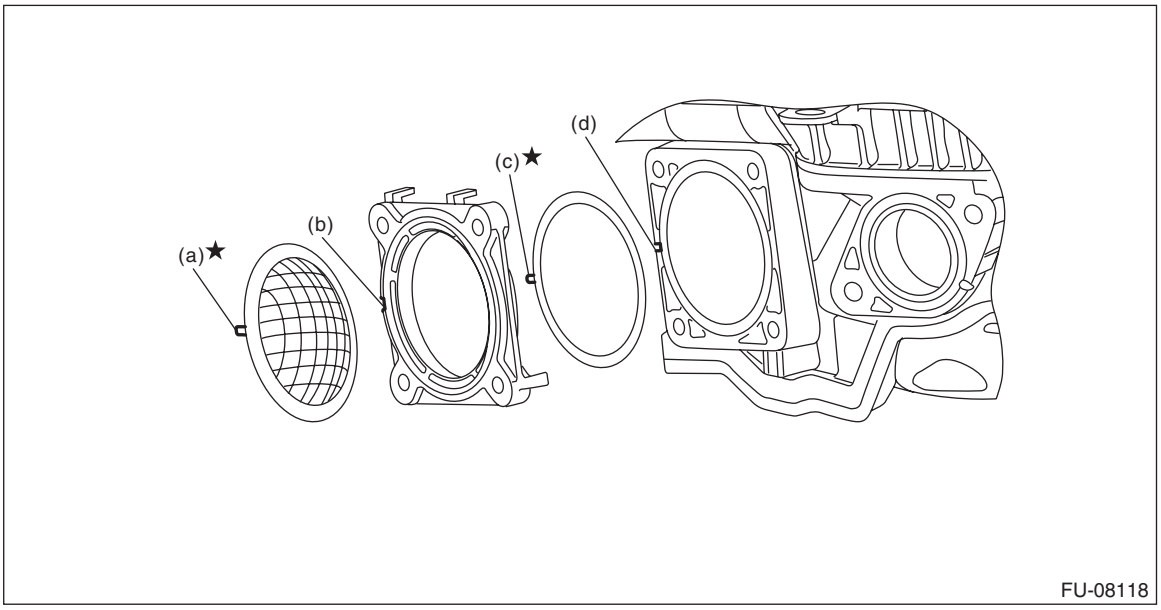


12) Disconnect the preheater hose from throttle body.

B: INSTALLATION

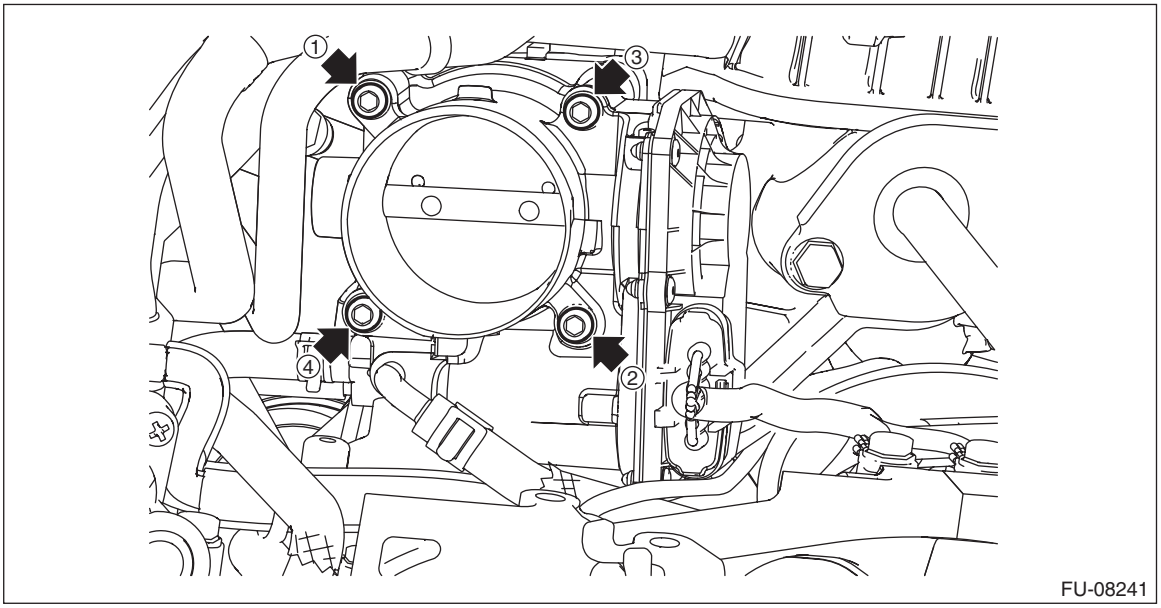
Install in the reverse order of removal.

NOTE:
- Use a new gasket.
- Install it by aligning the protrusion of the gasket with the groove of the throttle chamber duct or the intake manifold.



(a) Gasket A protrusion (b) Throttle chamber duct groove (c) Gasket B protrusion
(d) Intake manifold groove

- Tighten with the specified torque in the numerical sequence as shown in the figure, and further tighten with the specified torque in the numerical sequence as shown in the figure.

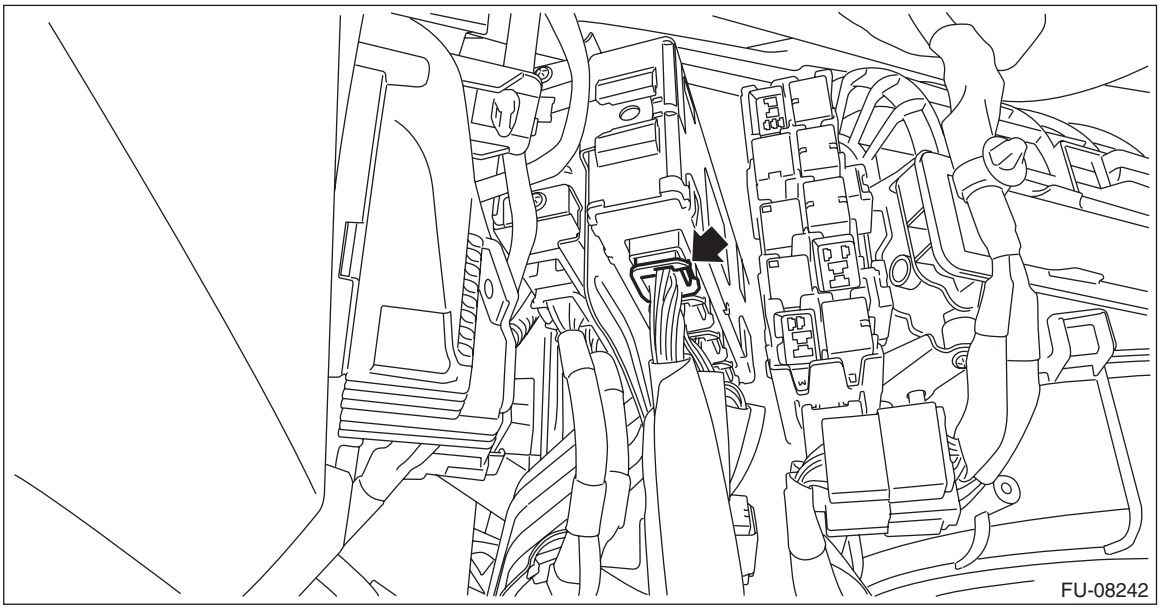


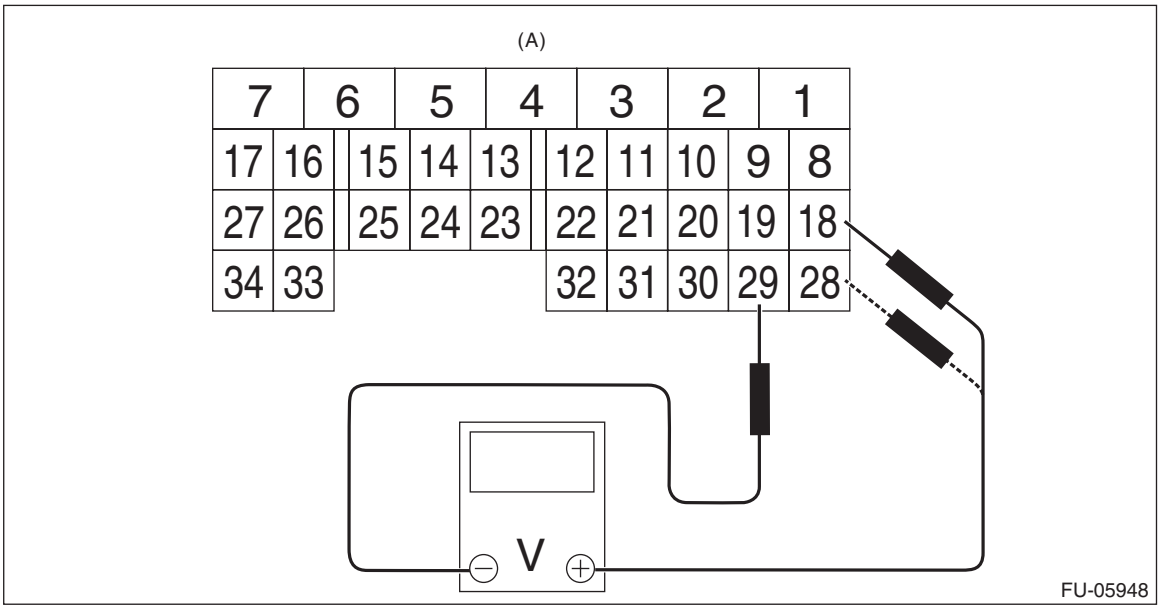
Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)

C: INSPECTION

1. THROTTLE SENSOR (METHOD WITH CIRCUIT TESTER)

1) Remove the glove box. <Ref. to EI-78, REMOVAL, Glove Box.>
2) After warming-up the engine, turn the ignition switch to OFF.
3) Turn the ignition switch to ON. (engine OFF)
4) Measure the voltage between ECM connector terminals.





(A) To ECM connector

Throttle sensor	Accelerator pedal	Terminal No.	Standard
Main	Not depressed (full closed)	18 (+) and 29 (–)	Approx. 0.6 V
	Depressed (full opened)		Approx. 4.0 V
Sub	Not depressed (full closed)	28 (+) and 29 (–)	Approx. 1.5 V
	Depressed (full opened)		Approx. 4.2 V

5) 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 HEV)(diag)-36, DISPLAY CURRENT ENGINE DATA, OPERATION, Subaru Select Monitor.>

Throttle sensor	Throttle opening angle signal	Standard
Main	0.0%	Approx. 0.6 V
	100.0%	Approx. 4.0 V
Sub	0.0%	Approx. 1.5 V
	100.0%	Approx. 4.2 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.

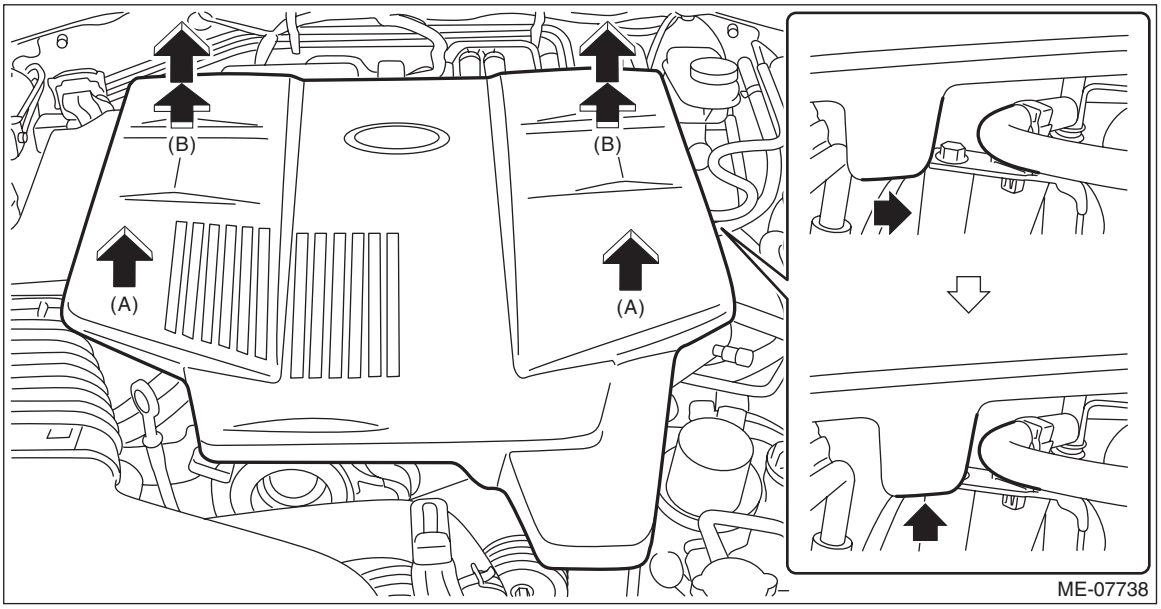
3. Intake Manifold

A: REMOVAL

1) Release the fuel pressure. <Ref. to FU(H4DO(HEV))-98, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
3) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

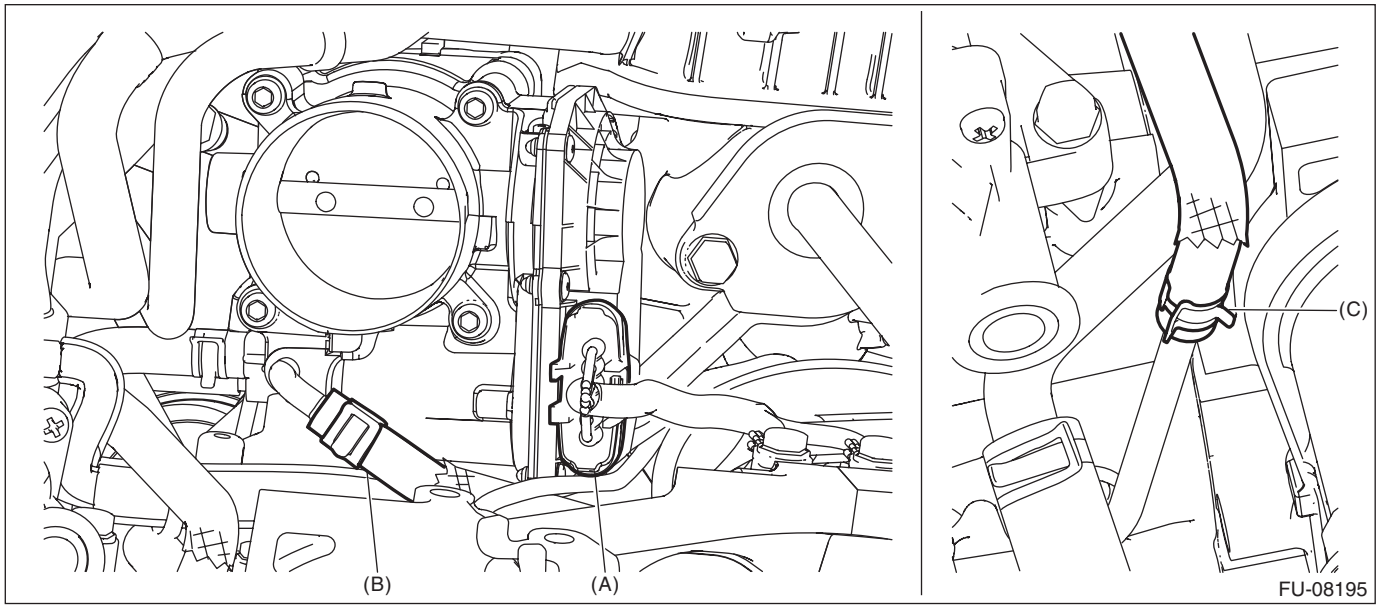
NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



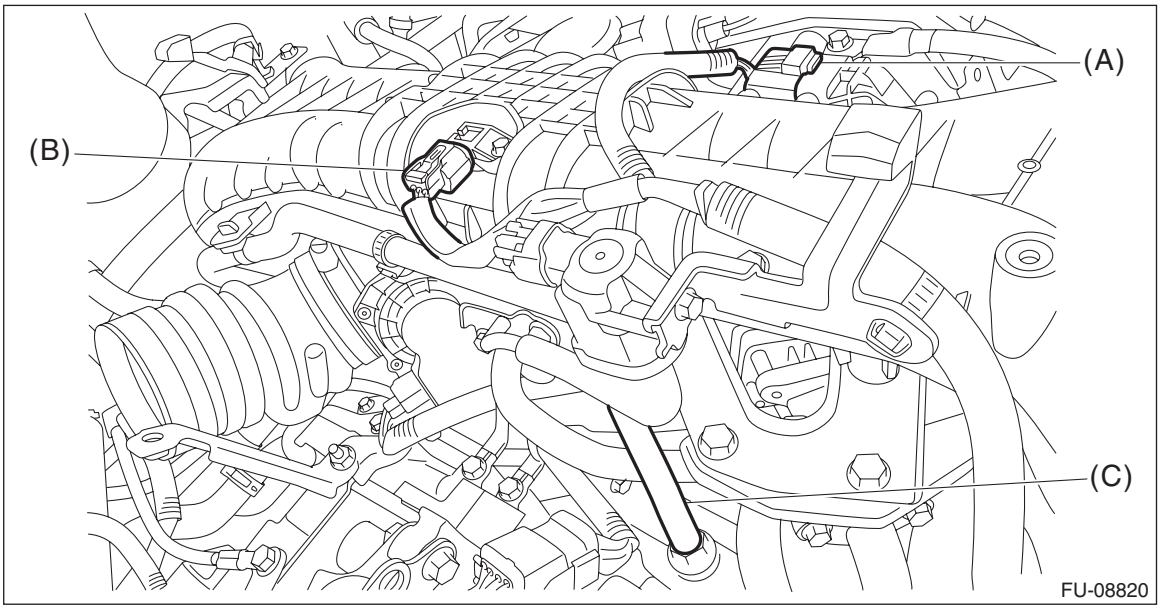
4) Open the fuel filler lid and remove the fuel filler cap.

NOTE:
This operation is required to release the inner pressure of the fuel tank.
5) Lift up the vehicle.
6) Remove the under cover. <Ref. to EI-32, REMOVAL, Front Under Cover.>
7) Drain approximately 3.0 L (3.2 US qt, 2.6 Imp qt) of coolant. <Ref. to CO(H4DO(w/o HEV))-16, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
8) Remove the air cleaner case. <Ref. to IN(H4DO(HEV))-6, REMOVAL, Air Cleaner Case.>
9) Remove the air intake boot No. 2. <Ref. to IN(H4DO(HEV))-11, AIR INTAKE BOOT NO. 2, REMOVAL, Air Intake Boot.>

10) Disconnect the connectors (A) from the throttle position sensor.
11) Disconnect the preheater hose (B) from the throttle body.
12) Disconnect the preheater hose (C) from the water pipe assembly LH.

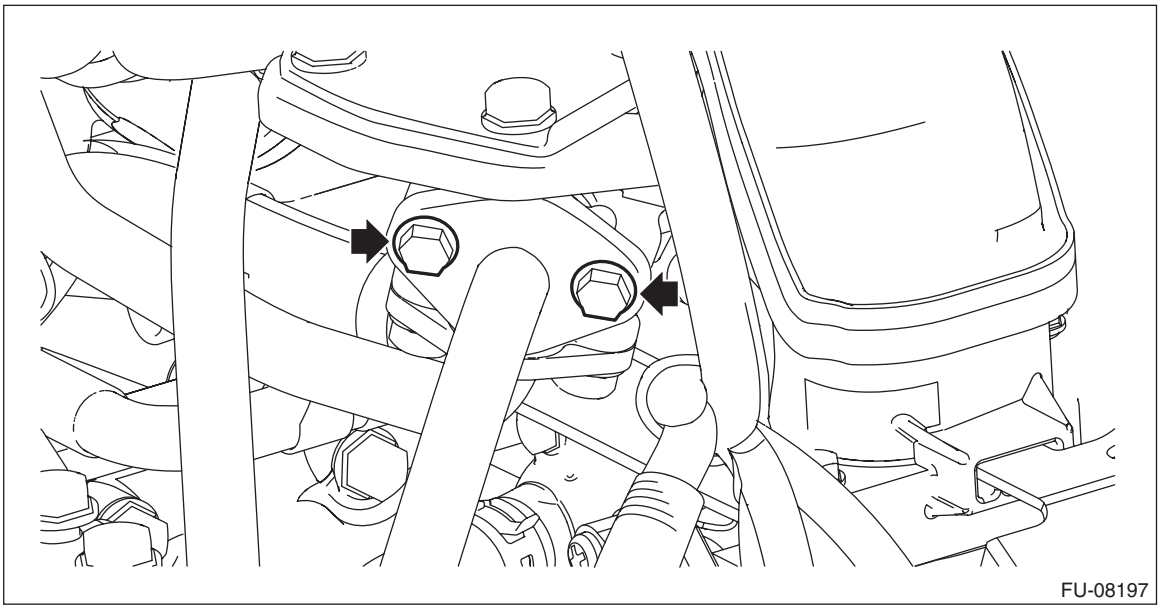


13) Disconnect the connector (A) from ISG.
14) Disconnect the connector (B) from manifold absolute pressure sensor.
15) Disconnect the PCV hose (C) from the PCV valve.

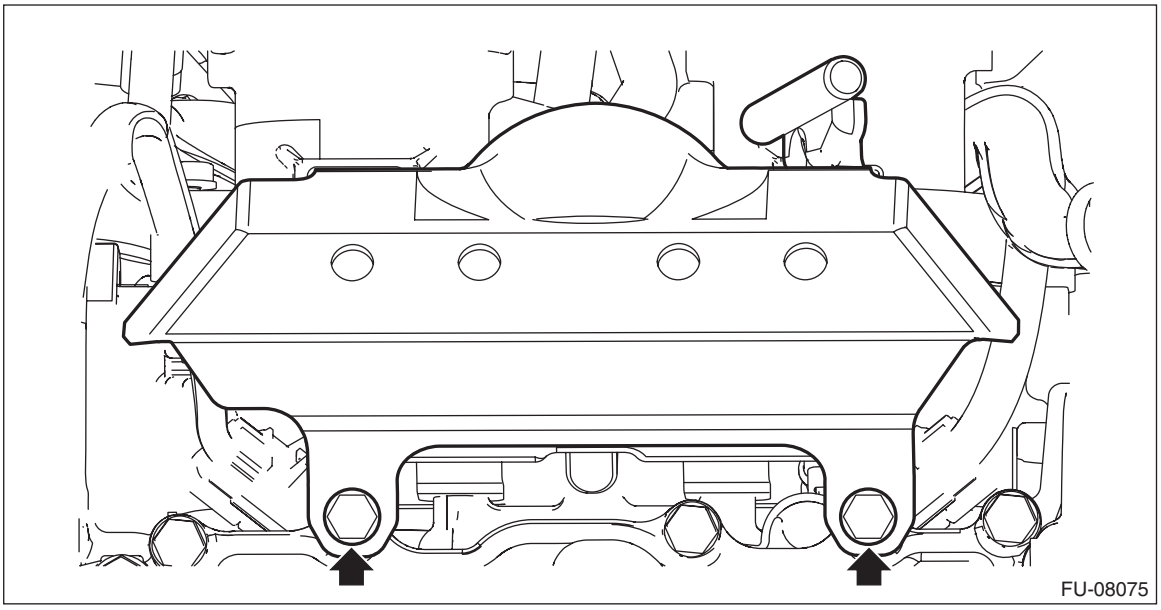


16) Remove the purge control solenoid valve. <Ref. to EC(H4DO(HEV))-21, REMOVAL, Purge Control Solenoid Valve.>

17) Remove the bolts securing the EGR cooler to the EGR control valve.



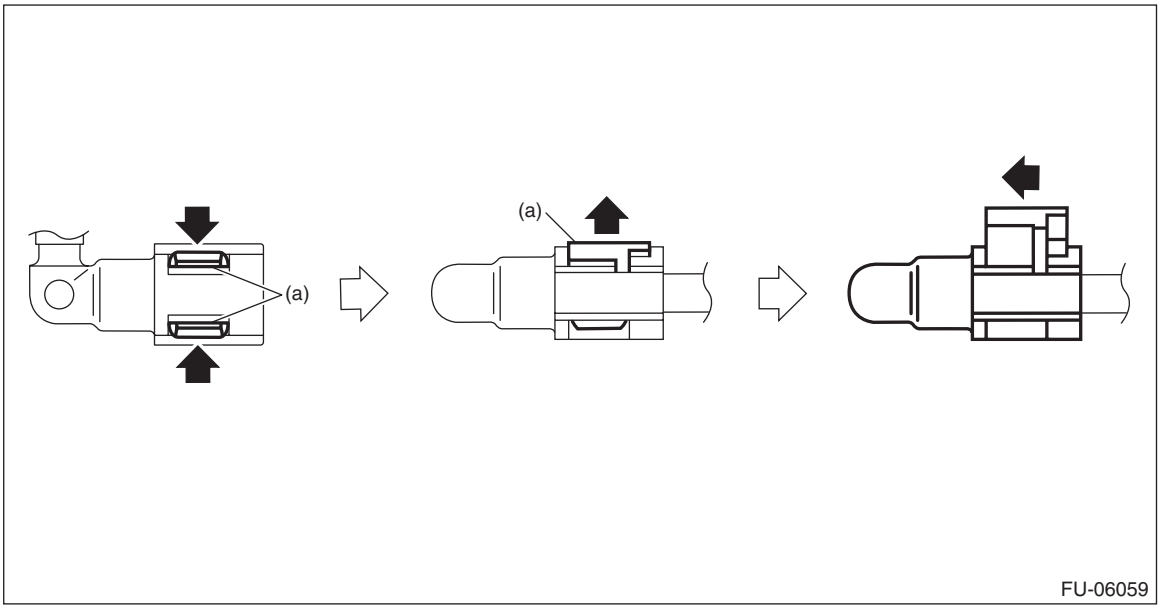
18) Remove the intake manifold protector RH.



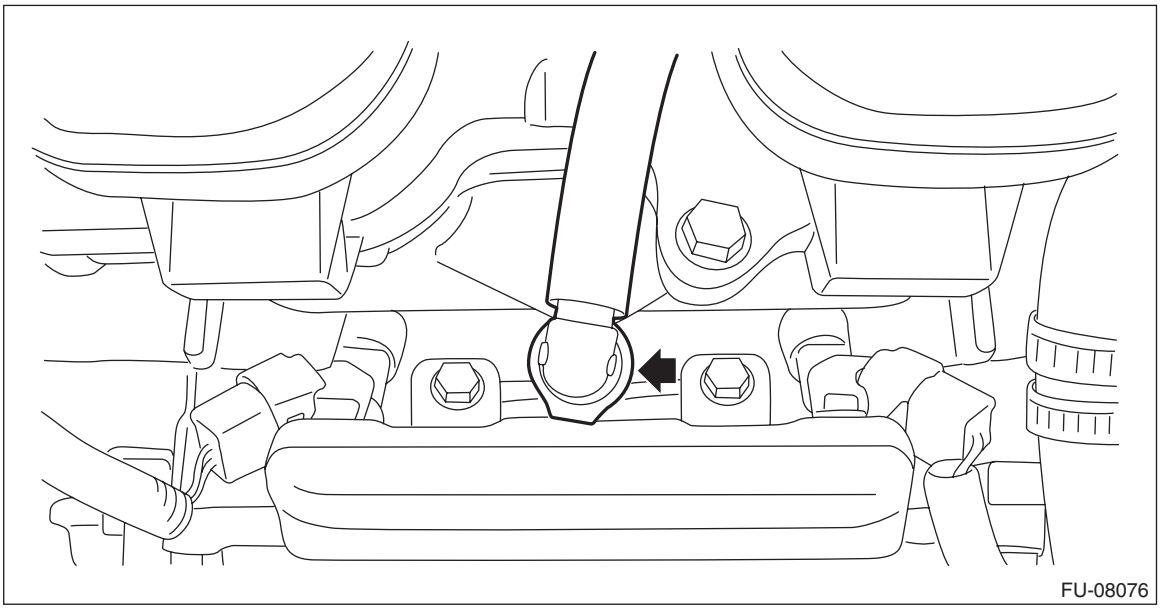
19) Disconnect the fuel delivery pipe from the fuel pipe RH.

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



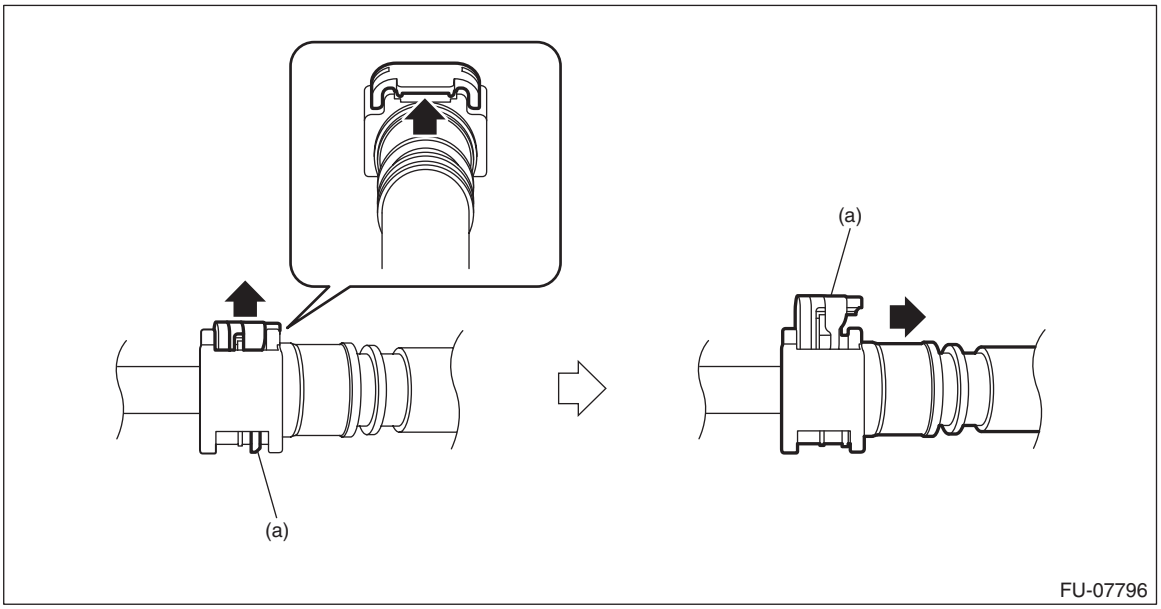
20) Remove the intake manifold protector LH in the same manner, and disconnect the fuel delivery pipe from the fuel pipe LH.

21) 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.**

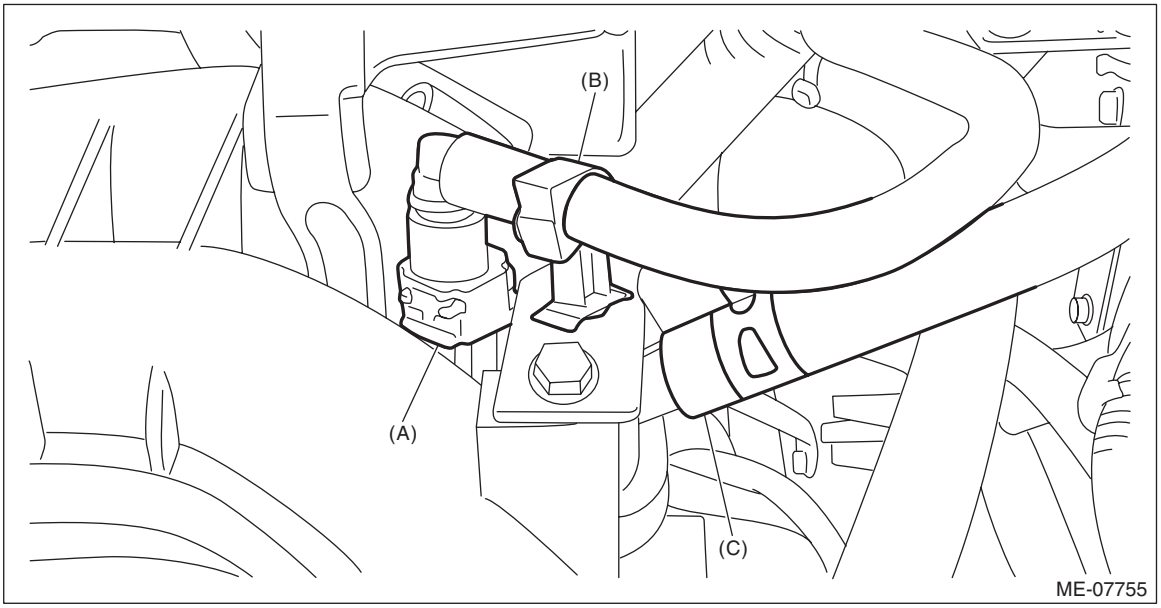
(1) Disconnect the quick connector (A) of the fuel delivery tube from the fuel pipe assembly, and remove the clip (B) securing the fuel delivery tube.

NOTE:
Disconnect the quick connector as shown in the figure.

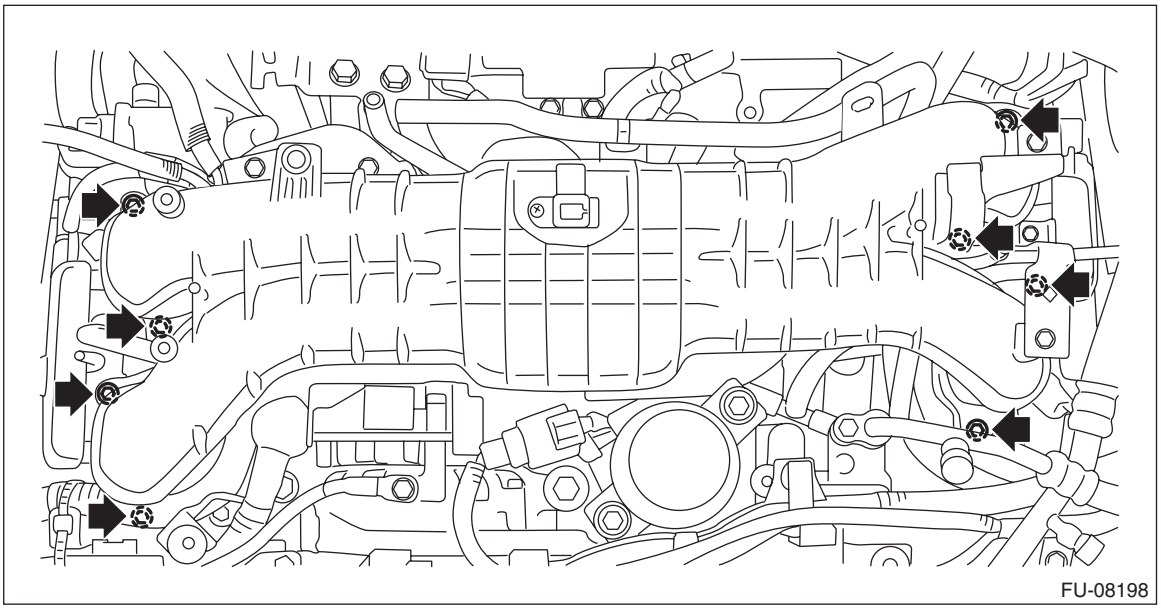


(a) Slider

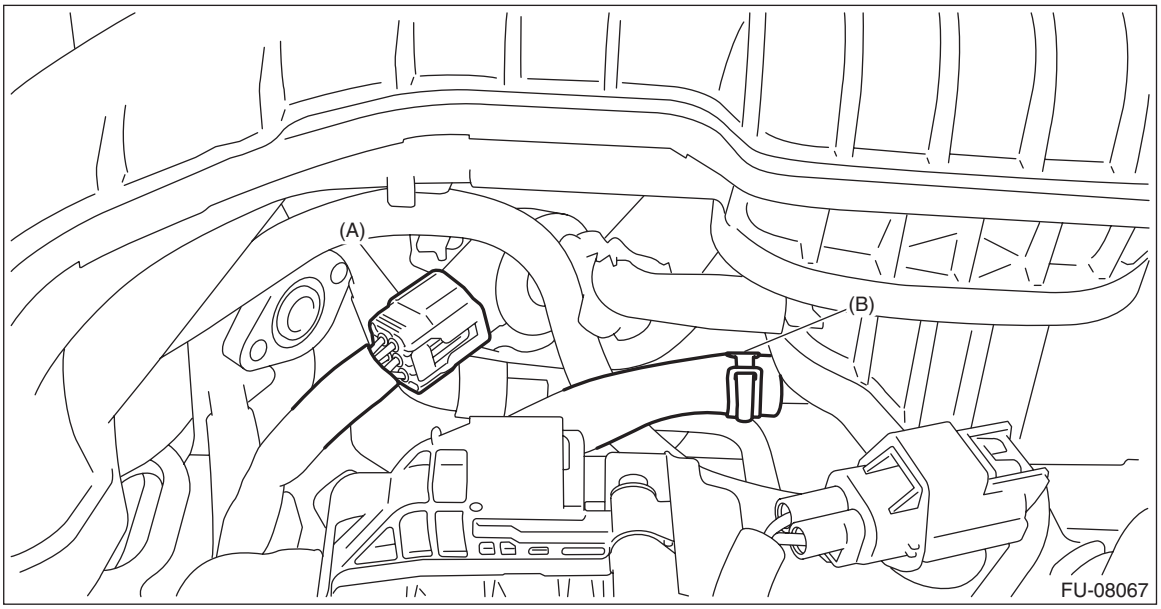
(2) Disconnect the evaporation hose (C) from the fuel pipe assembly.



22) Remove the bolts which hold the intake manifold to the tumble generator valve assembly.

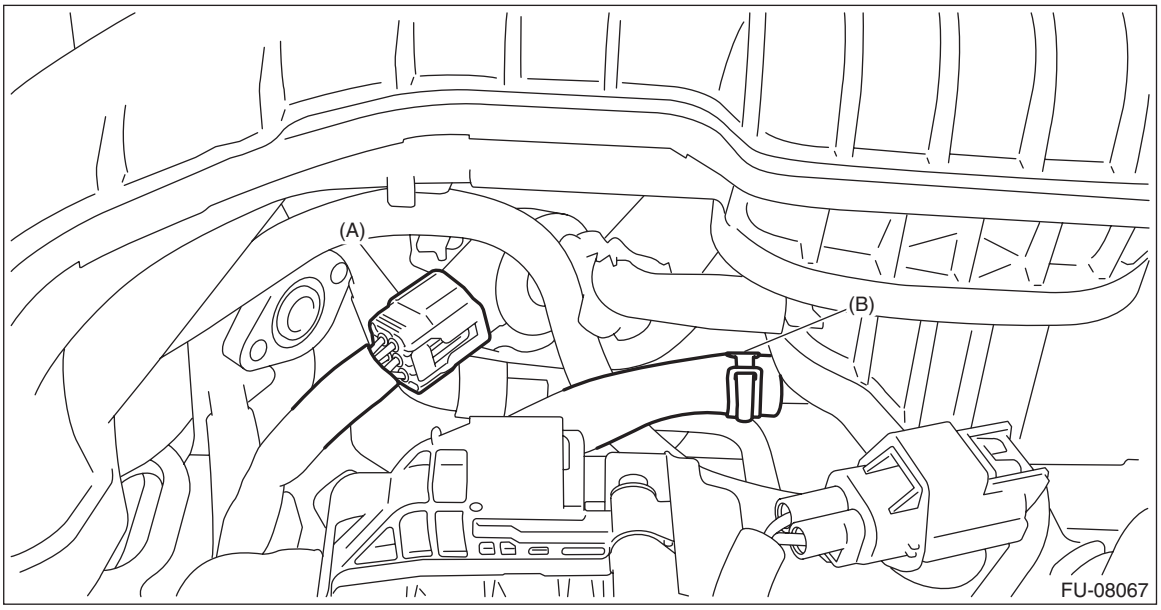


23) Lift the intake manifold, and disconnect the connector (A) from the EGR control valve.
24) Disconnect the brake vacuum hose (B) from the intake manifold, and remove the intake manifold.



B: INSTALLATION

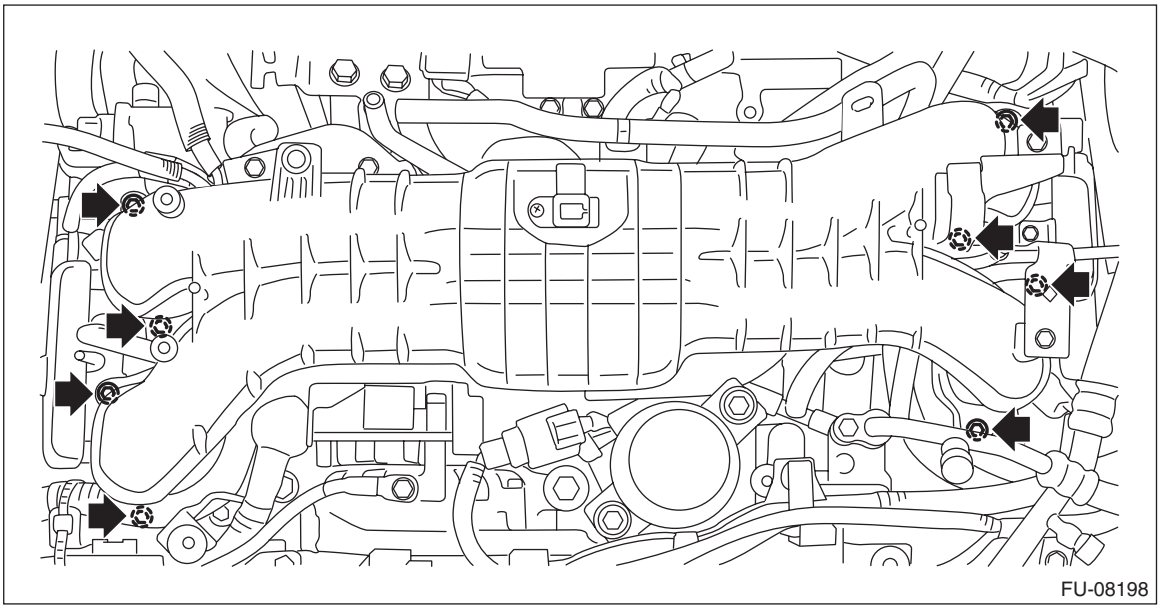
1) Connect the connector (A) to the EGR control valve, and connect the brake vacuum hose (B) to the intake manifold.



2) Install the intake manifold to the tumble generator valve assembly.

NOTE:
Use a new gasket.

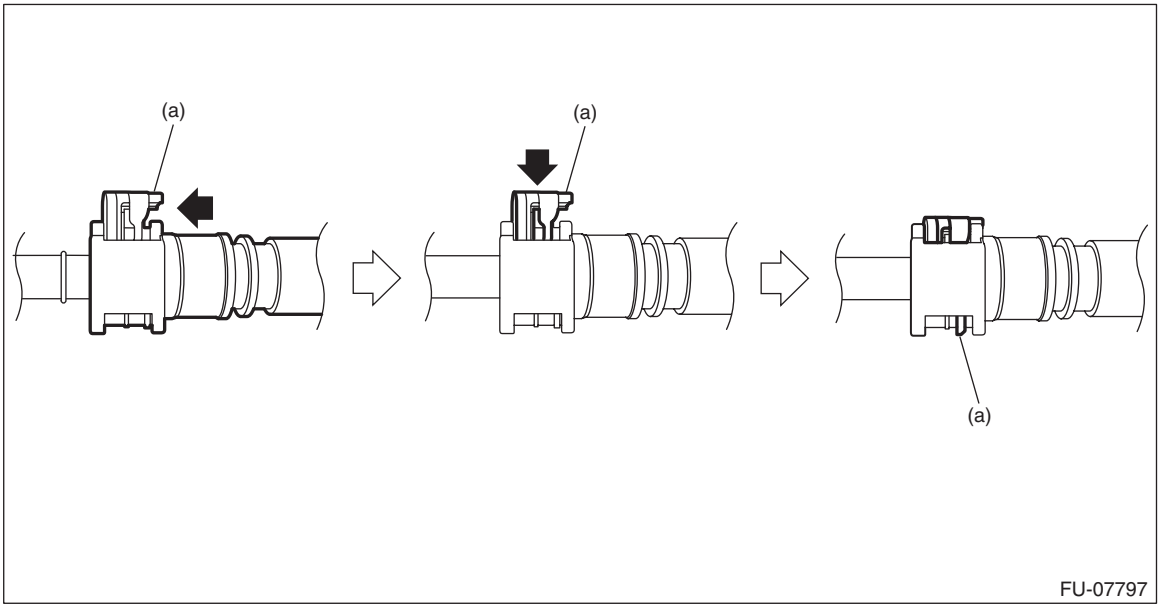
Tightening torque:
8.3 N·m (0.8 kgf-m, 6.1 ft-lb)



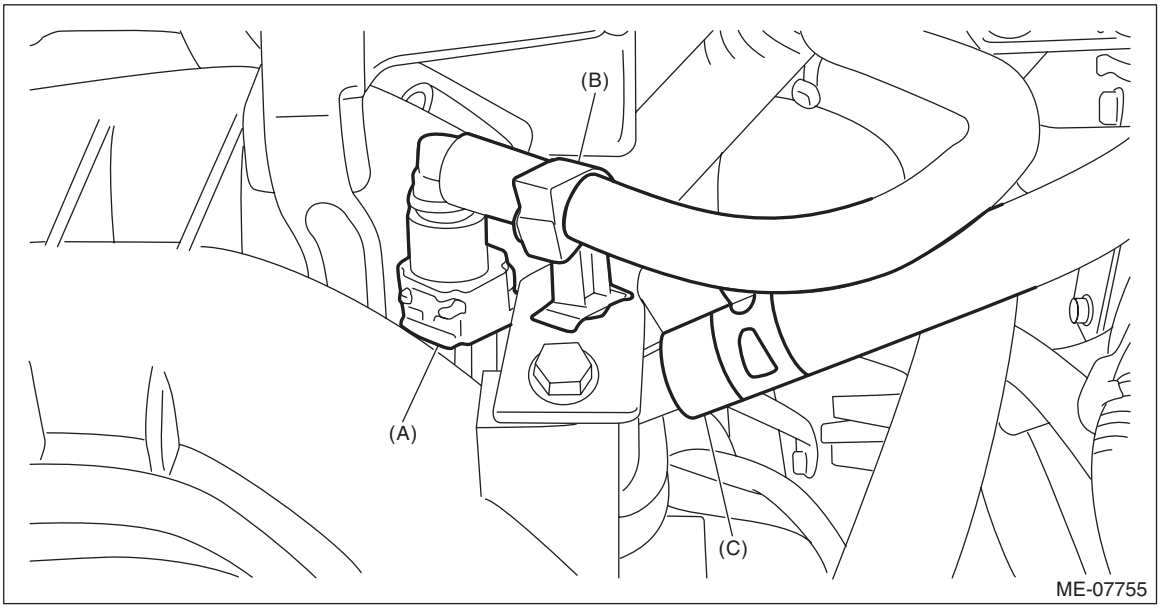
3) Connect the fuel delivery tube and evaporation hose.
(1) Connect the evaporation hose (C) to fuel pipe assembly.
(2) Connect the quick connector (A) of the fuel delivery tube to the fuel pipe assembly, and secure the fuel delivery tube using clip (B).

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 it all the way in before locking the slider.
• When it is difficult to lock the slider, check that the connector is fully inserted.
• After locking the slider, check again that the quick connector is securely connected.

NOTE:
Connect the quick connector as shown in the figure.



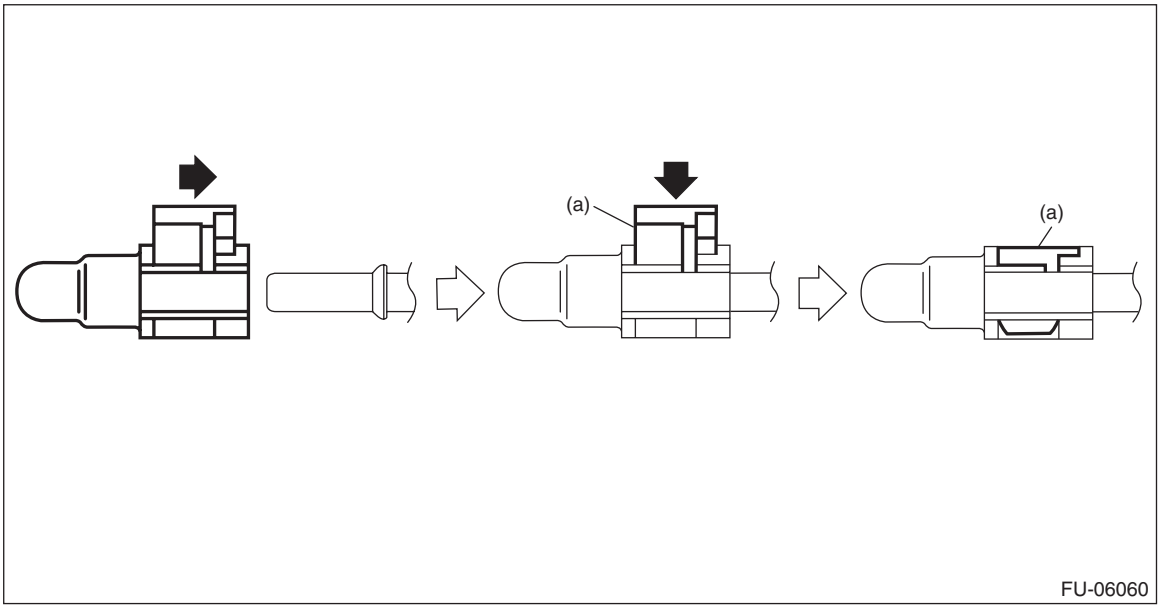
(a) Slider



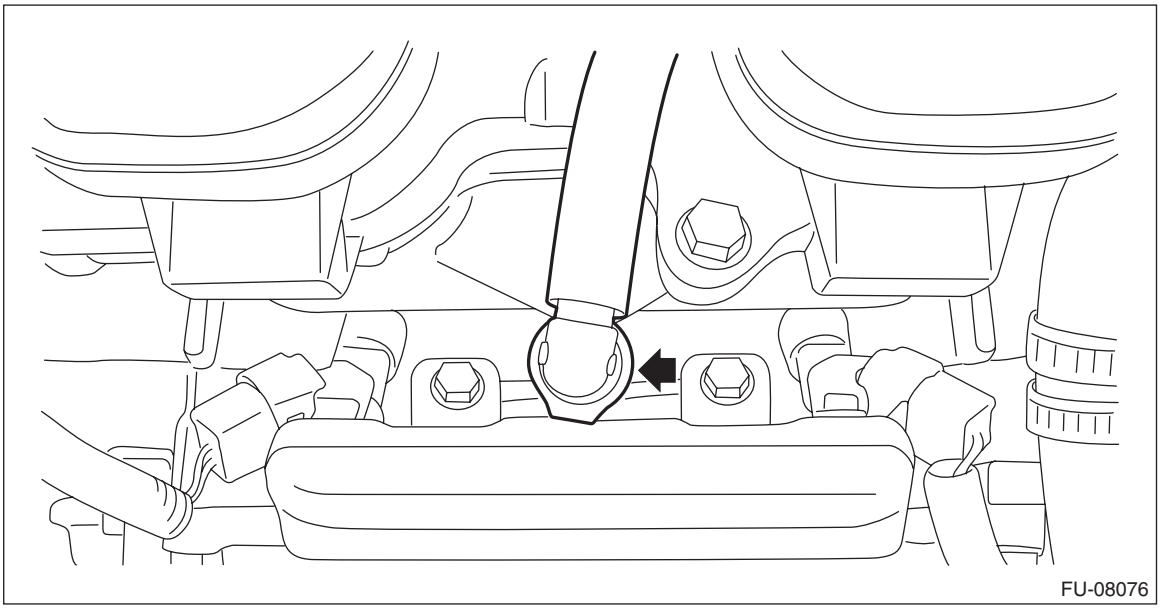
4) Connect the fuel delivery pipe to the fuel pipe RH.

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 it all the way in before locking the slider.**
- **When it is difficult to lock the slider, check that the connector is fully inserted.**
- **After locking the slider, check again that the quick connector is securely connected.**

NOTE:
Connect the quick connector as shown in the figure.

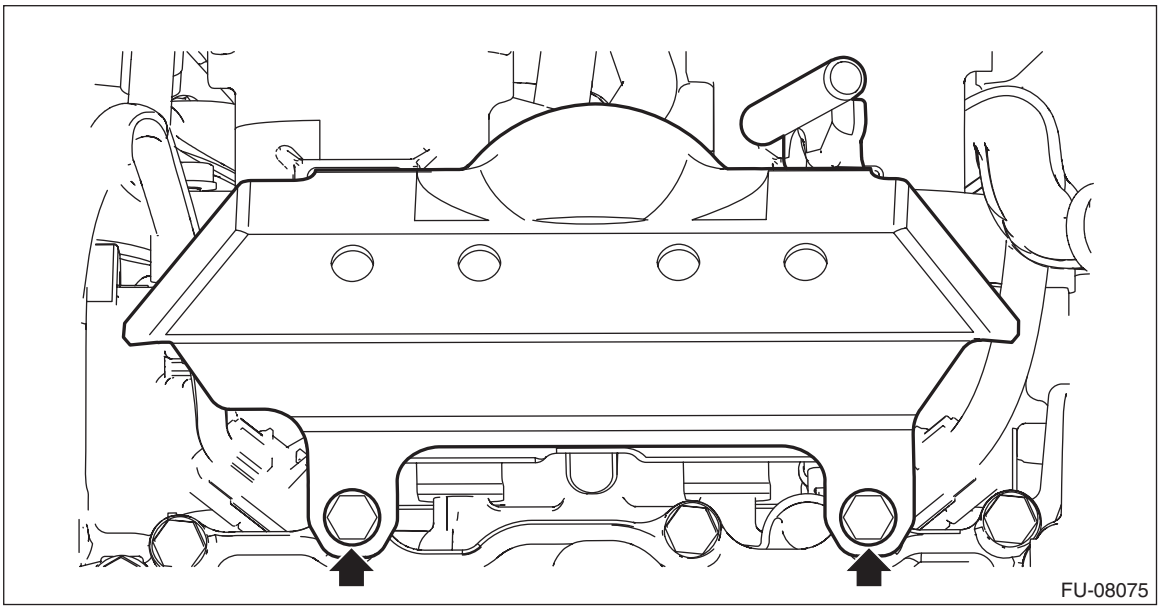


(a) Slider



5) Install the intake manifold protector RH.

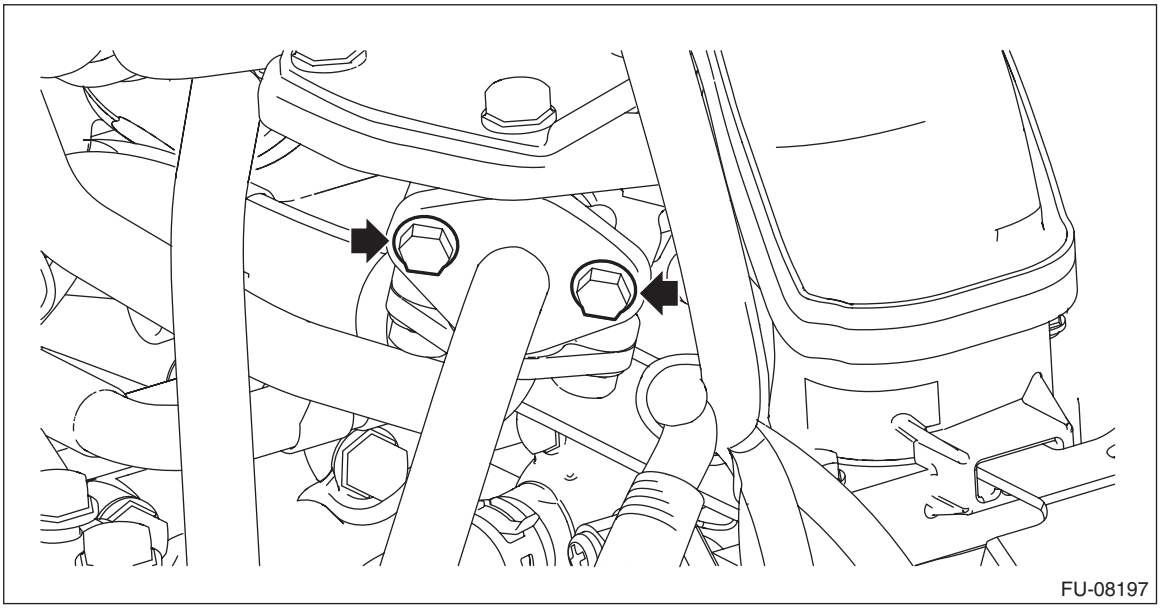
Tightening torque:
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



6) Connect the fuel delivery pipe to the fuel pipe LH in the same manner, and install the intake manifold protector LH.
7) Tighten the bolt which secures the EGR cooler to the EGR control valve.

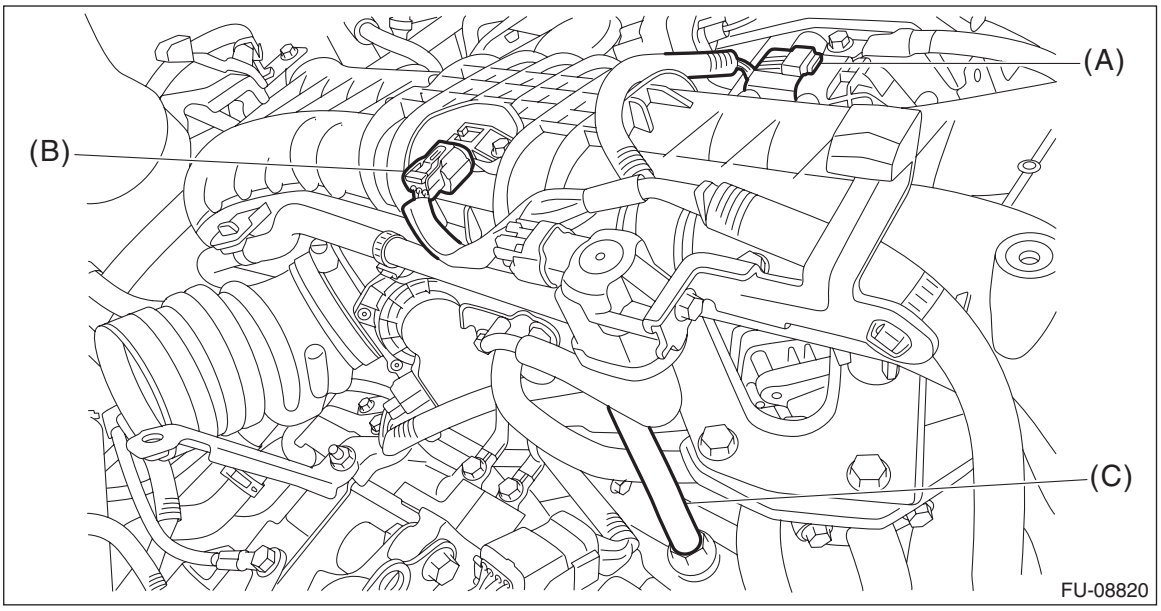
NOTE:
Use a new gasket.

Tightening torque:
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

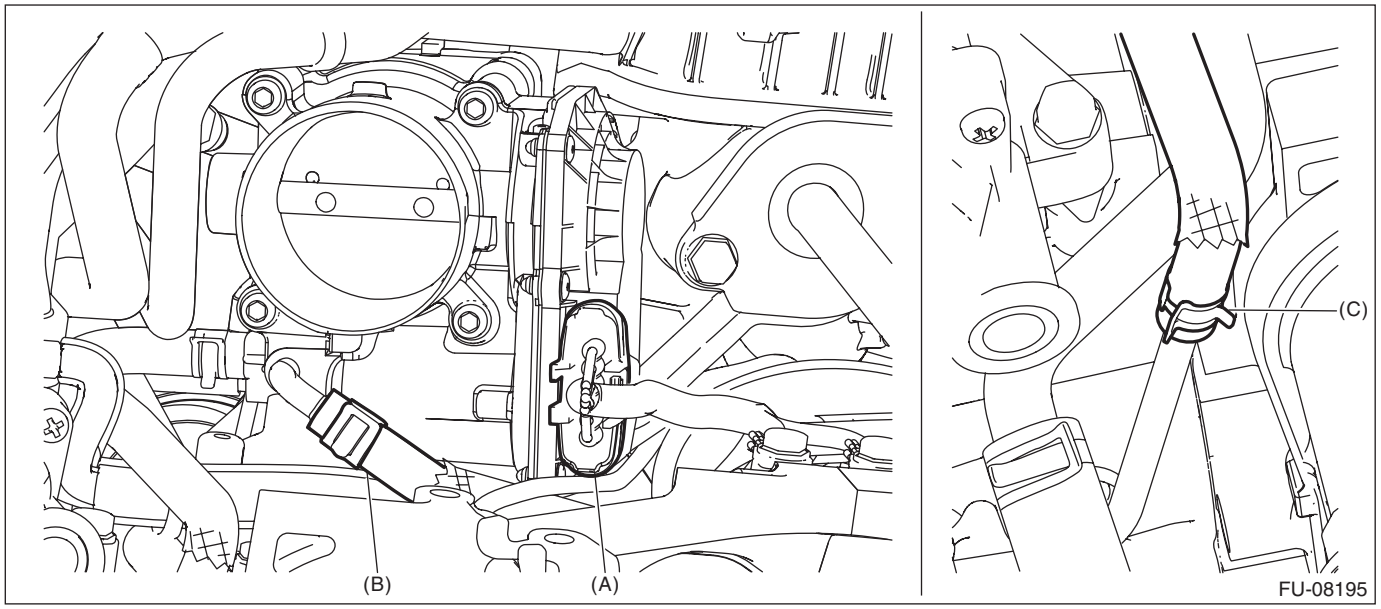


8) Install the purge control solenoid valve. <Ref. to EC(H4DO(HEV))-22, INSTALLATION, Purge Control Solenoid Valve.>

9) Connect the connector (A) to ISG.
10) Connect the connector (B) to the manifold absolute pressure sensor.
11) Install the PCV hose (C) to the PCV valve.



12) Connect the connector (A) to the throttle position sensor.
13) Connect the preheater hoses (B) to the throttle body.
14) Connect the preheater hose (C) to the water pipe assembly LH.

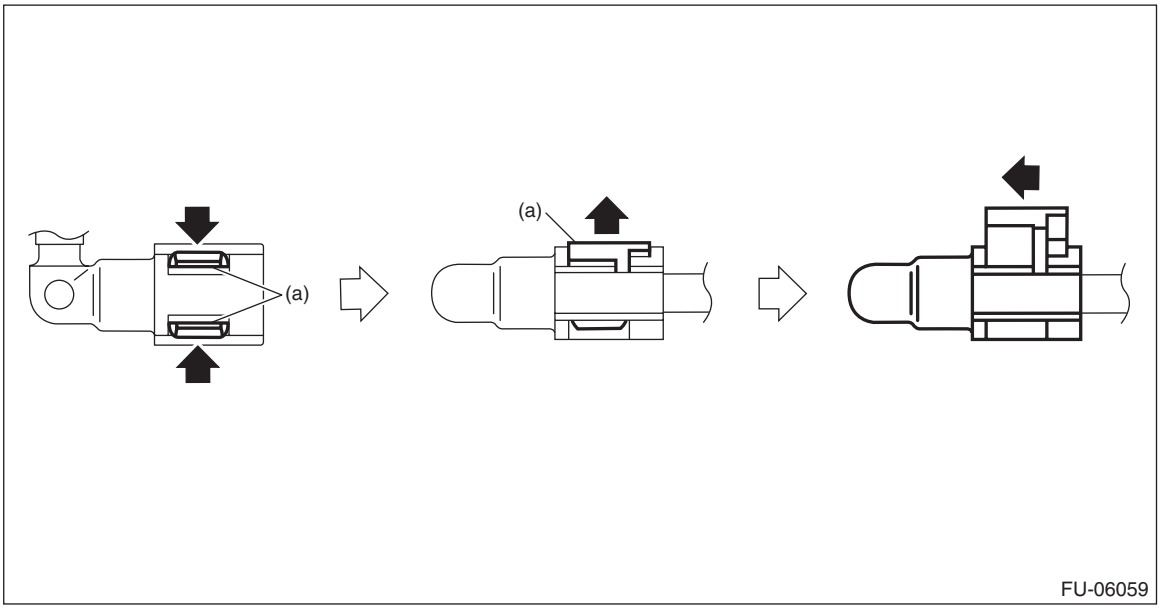


15) Install the air intake boot No. 2. <Ref. to IN(H4DO(HEV))-14, AIR INTAKE BOOT NO. 2, INSTALLATION, Air Intake Boot.>
16) Install the air cleaner case. <Ref. to IN(H4DO(HEV))-8, INSTALLATION, Air Cleaner Case.>
17) Lift up the vehicle.
18) Install the under cover. <Ref. to EI-32, INSTALLATION, Front Under Cover.>
19) Lower the vehicle.
20) Install the collector cover.
21) Connect the battery ground terminal. <Ref. to NT-5, BATTERY, NOTE, Note.>
22) Fill engine coolant. <Ref. to CO(H4DO(w/o HEV))-16, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

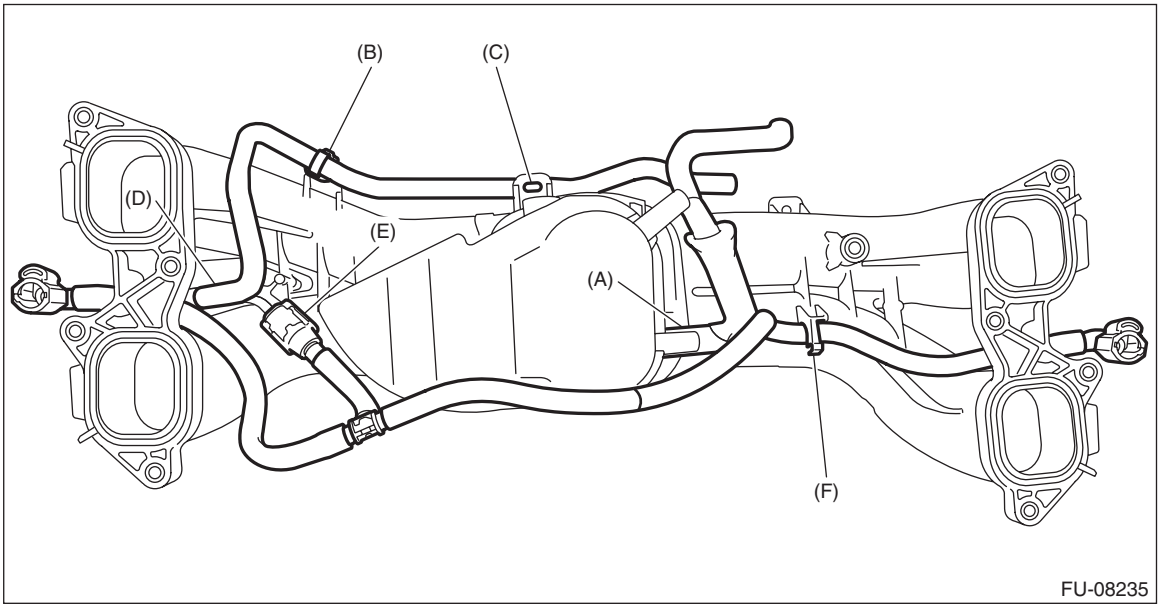
C: DISASSEMBLY

1) Remove the throttle body. <Ref. to FU(H4DO(HEV))-14, REMOVAL, Throttle Body.>
2) Remove the manifold absolute pressure sensor. <Ref. to FU(H4DO(HEV))-66, REMOVAL, Manifold Absolute Pressure Sensor.>
3) Remove the EGR pipe and the EGR control valve. <Ref. to EC(H4DO(HEV))-29, REMOVAL, EGR Pipe.> <Ref. to EC(H4DO(HEV))-26, REMOVAL, EGR Control Valve.>
4) Remove the PCV hose A. <Ref. to EC(H4DO(HEV))-51, REMOVAL, PCV Hose.>
5) Remove the vacuum hose (A) from the intake manifold.
6) Remove the clip (B) and the clip (C) securing the vacuum hose to the intake manifold, and remove the vacuum hose (D).
7) Disconnect the quick connector of the fuel delivery pipe (E) from the fuel pipe assembly, and remove the fuel delivery pipe (E) from the clip (F).

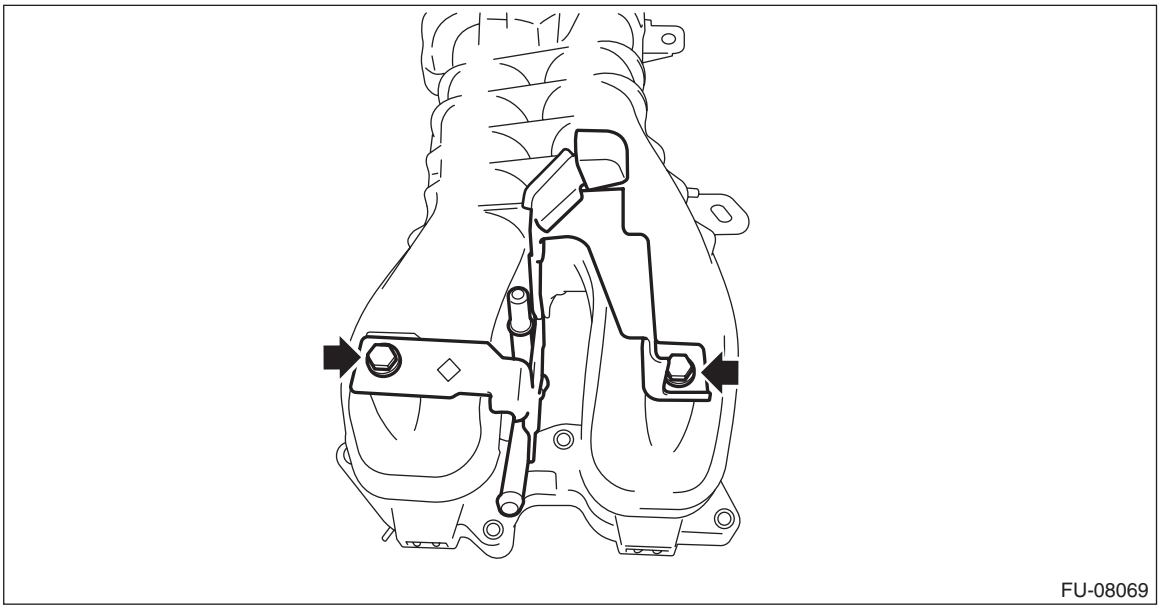
NOTE:
Disconnect the quick connector as shown in the figure.



(a) Slider



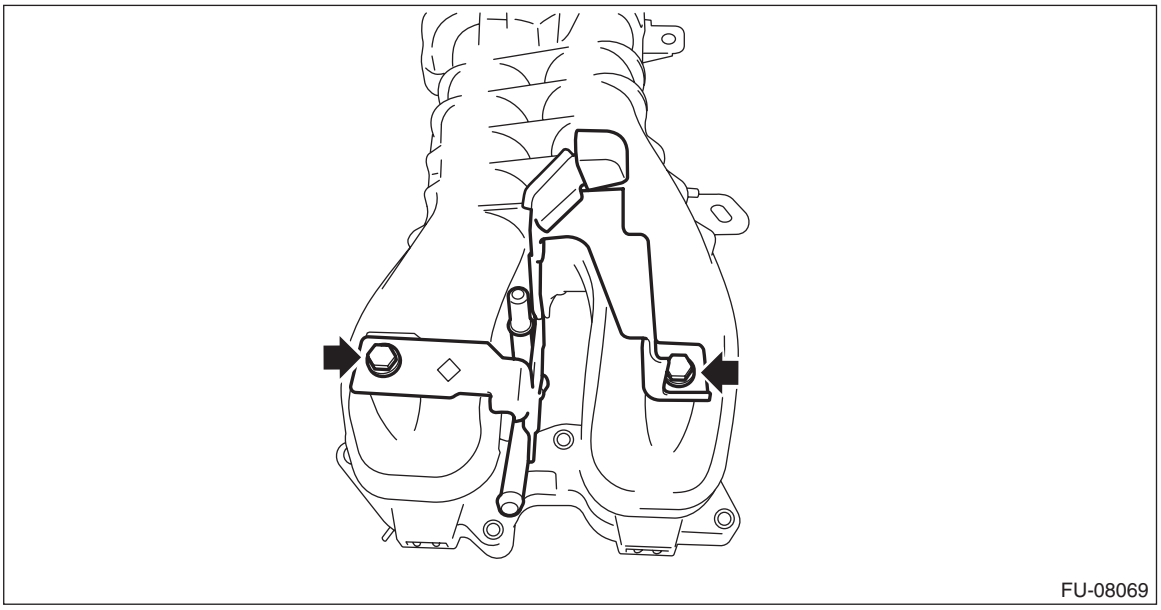
8) Remove the fuel pipe assembly from the intake manifold.



D: ASSEMBLY

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

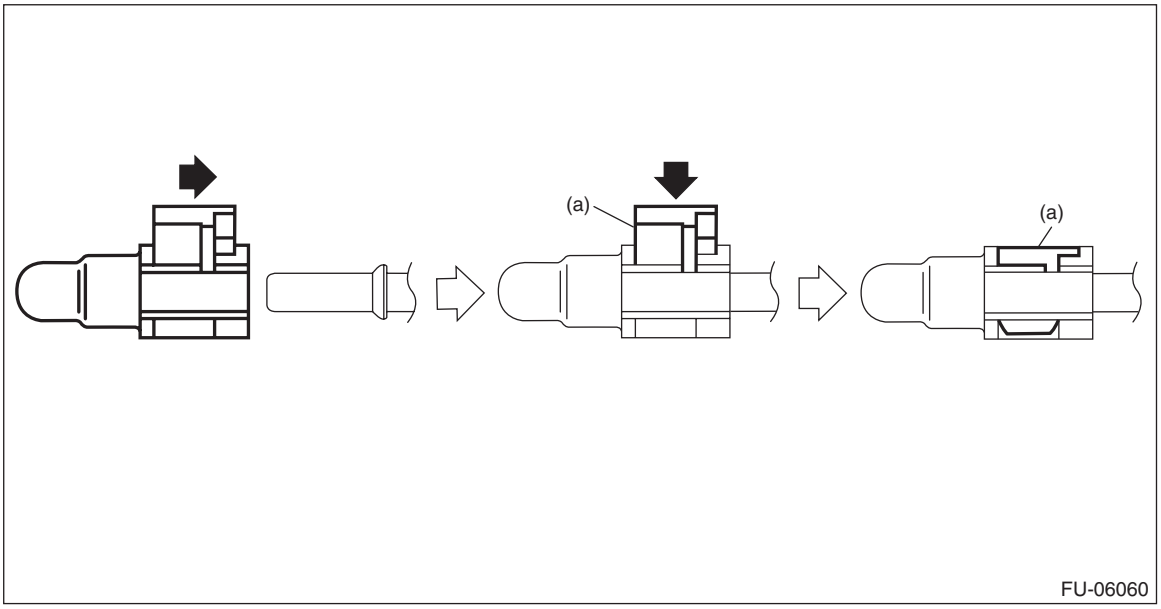
Tightening torque:
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



2) Install the fuel delivery pipe (E) to the clip (F), and connect the quick connector of the fuel delivery pipe (E) to the fuel pipe assembly.

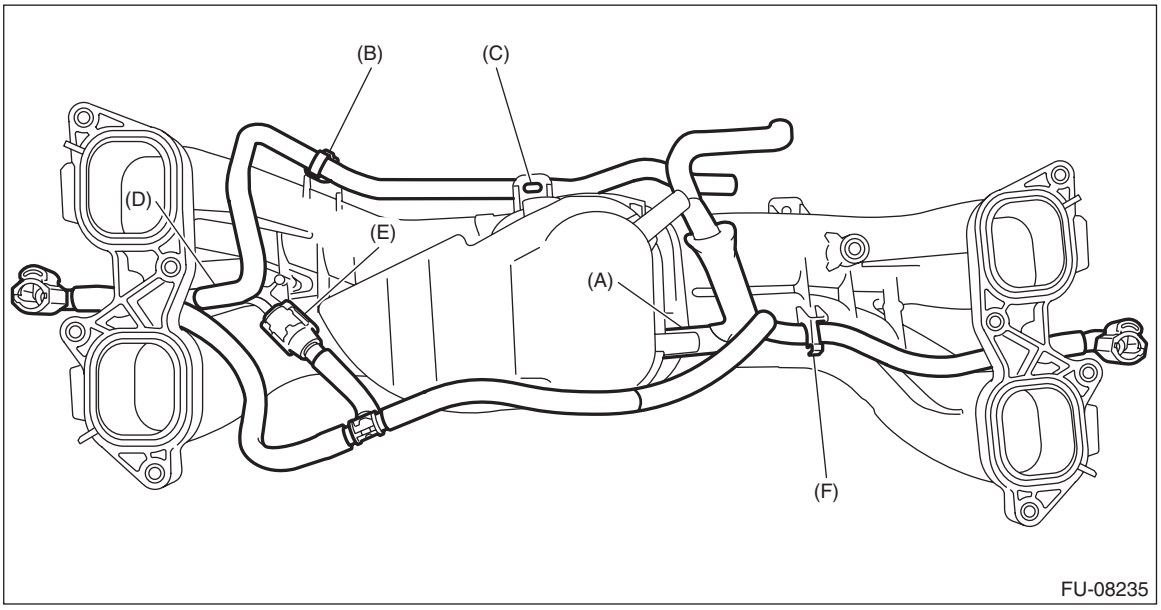
CAUTION:
• Check that there is no damage or dust on the quick connector. If necessary, clean the seal surface of the pipe.
• When connecting the quick connector, make sure to insert it all the way in before locking the slider.
• When it is difficult to lock the slider, check that the connector is fully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

NOTE:
Connect the quick connector as shown in the figure.



(a) Slider

3) Install the clip (B) and the clip (C) securing the vacuum hose to the intake manifold, and connect the vacuum hose (D).
4) Connect the vacuum hose (A) to the intake manifold.



5) Install the PCV hose A. <Ref. to EC(H4DO(HEV))-52, INSTALLATION, PCV Hose.>
6) Install the EGR pipe and the EGR control valve. <Ref. to EC(H4DO(HEV))-30, INSTALLATION, EGR Pipe.> <Ref. to EC(H4DO(HEV))-27, INSTALLATION, EGR Control Valve.>
7) Install the manifold absolute pressure sensor. <Ref. to FU(H4DO(HEV))-67, INSTALLATION, Manifold Absolute Pressure Sensor.>
8) Install the throttle body. <Ref. to FU(H4DO(HEV))-16, INSTALLATION, Throttle Body.>

E: INSPECTION

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

4. Engine Wiring Harness

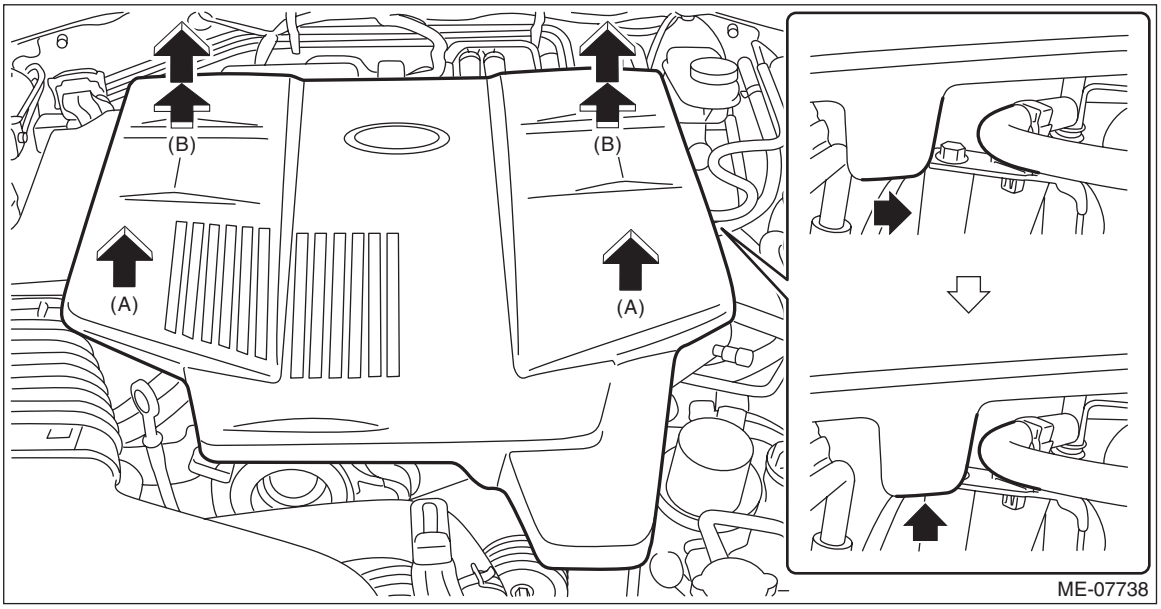
A: REMOVAL

1) Release the fuel pressure. <Ref. to FU(H4DO(HEV))-98, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

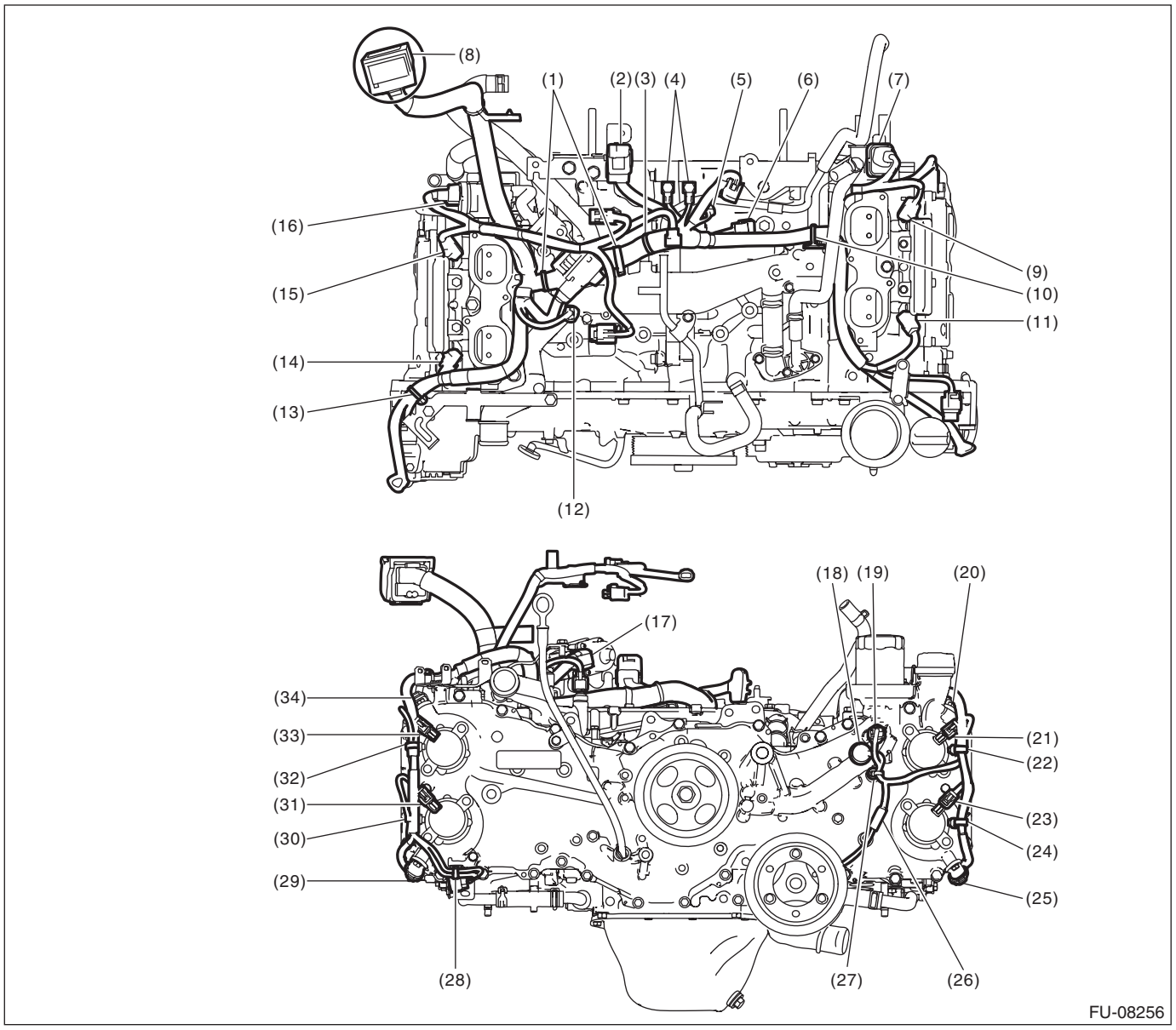
3) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



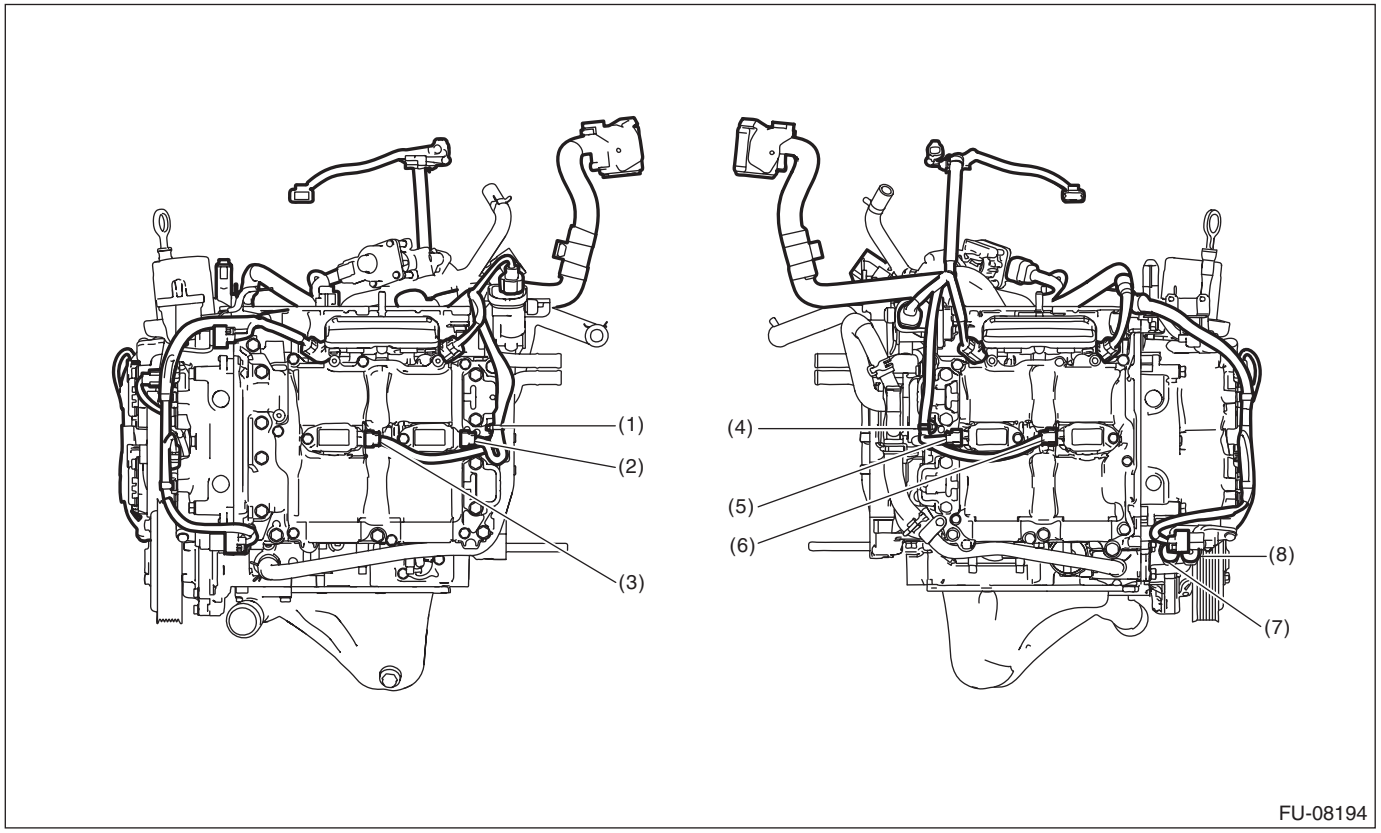
4) Open the fuel filler lid and remove the fuel filler cap.
5) Remove the intake manifold. <Ref. to FU(H4DO(HEV))-19, REMOVAL, Intake Manifold.>

6) Disconnect the connector from the engine, and then remove the engine wiring harness.
- Structural diagram 1



(1) Remove the clip from the screw hole.
(2) Engine harness connector (16P)
(3) Remove the clip from the brake pipe bracket.
(4) Engine ground (2 locations)
(5) Crankshaft position sensor
(6) Knock sensor
(7) Tumble generator valve actuator LH
(8) Engine harness connector (54P)
(9) Fuel injector (#4)
(10) Remove the clip from the hole of the water pipe assembly.
(11) Fuel injector (#2)
(12) Engine coolant temperature sensor
(13) Remove the clip from the bracket.
(14) Fuel injector (#1)
(15) Fuel injector (#3)
(16) Tumble generator valve actuator RH
(17) EGR control valve
(18) Oil pressure switch
(19) Engine oil temperature sensor
(20) Intake camshaft position sensor LH
(21) Intake oil control solenoid LH
(22) Remove the clip from the screw hole.
(23) Exhaust oil control solenoid LH
(24) Remove the clip from the screw hole.
(25) Exhaust camshaft position sensor LH
(26) Oil level switch connector
(27) Remove the clip from the screw hole.
(28) Remove the clip from the oval hole.
(29) Exhaust camshaft position sensor RH
(30) Remove the clip from the screw hole.
(31) Exhaust oil control solenoid RH
(32) Remove the clip from the screw hole.
(33) Intake oil control solenoid RH
(34) Intake camshaft position sensor RH

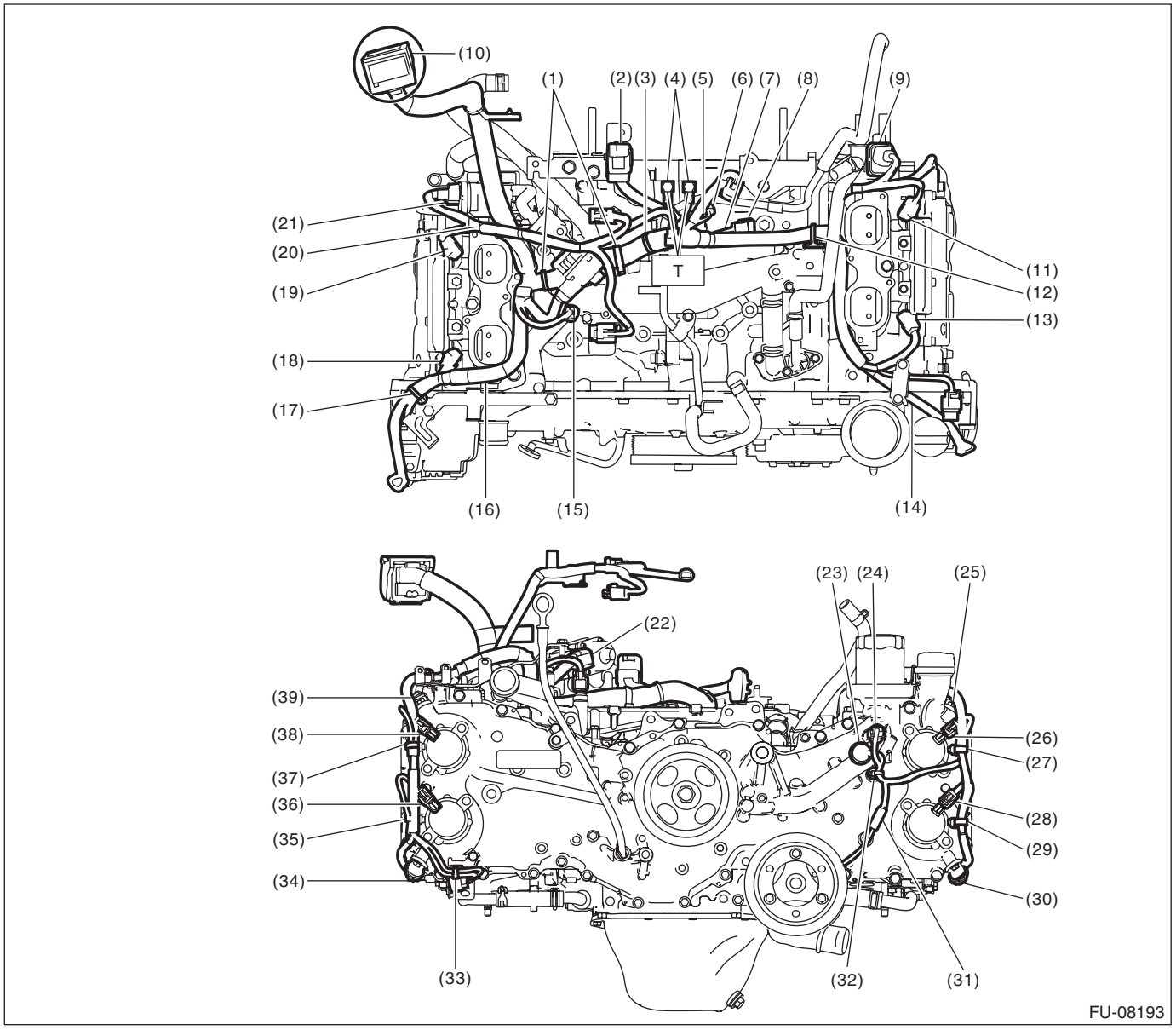
- Structural diagram 2



(1) Remove the clip from the screw hole.
(2) Ignition coil No. 4
(3) Ignition coil No. 2
(4) Remove the clip from the screw hole.
(5) Ignition coil No. 3
(6) Ignition coil No. 1
(7) Front oxygen (A/F) sensor
(8) Rear oxygen sensor

B: INSTALLATION

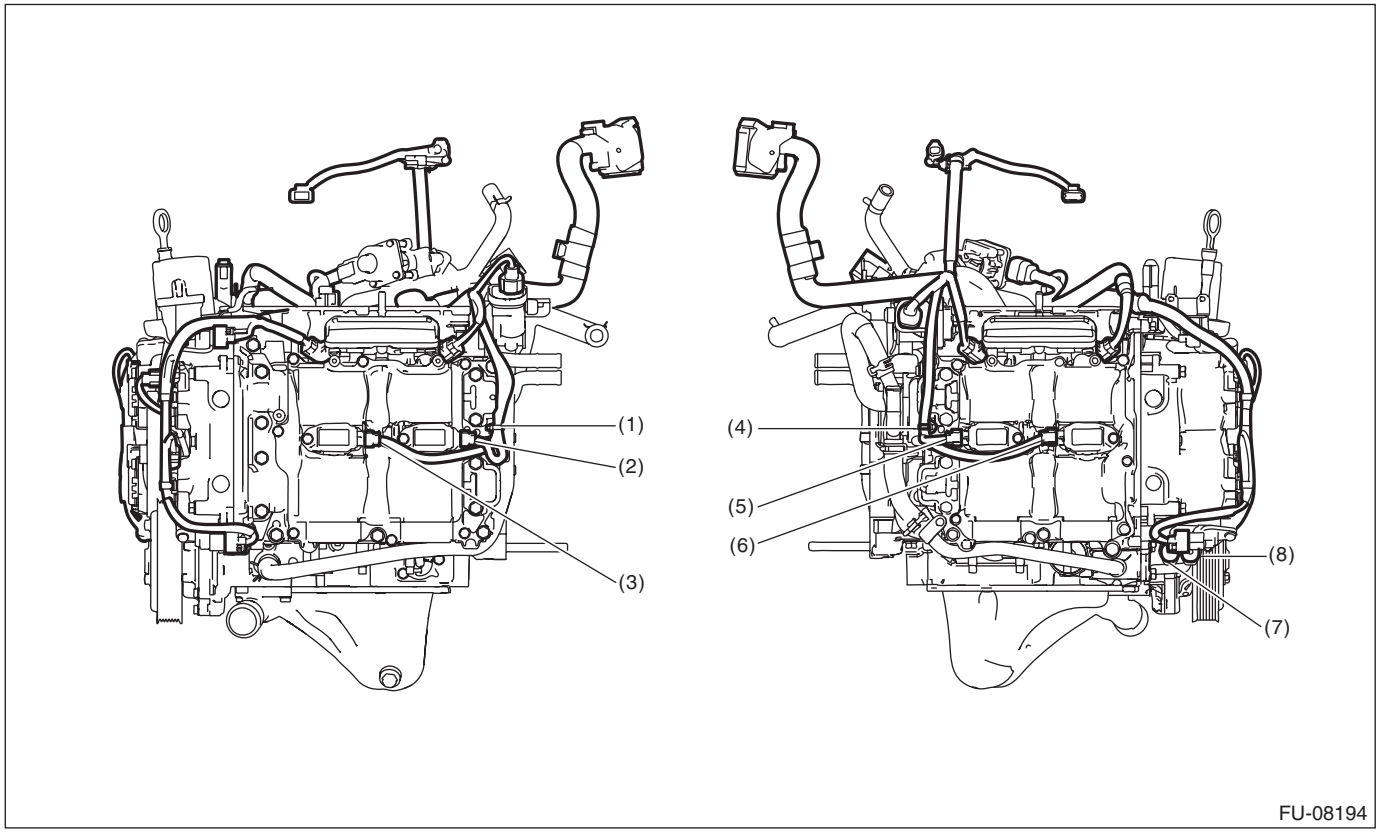
1) Route the engine wiring harness around the engine and connect connectors.
- Structural diagram 1



(1) Secure the clip to the screw hole.
(2) Engine harness connector (16P)
(3) Secure the clip to the brake pipe bracket.
(4) Engine ground (2 locations)
(5) Pass the crankshaft position sensor harness on the upper side of the preheater hose.
(6) Crankshaft position sensor
(7) Pass the knock sensor harness on the front side of the preheater hose.
(8) Knock sensor
(9) Tumble generator valve actuator LH
(10) Engine harness connector (54P)
(11) Fuel injector (#4)
(12) Secure the clip to the hole of the water pipe assembly.
(13) Fuel injector (#2)
(14) Pass the engine wiring harness under the bracket.
(15) Engine coolant temperature sensor
(16) Be careful of pinching when installing the intake manifold.
(17) Secure the clip to the bracket.
(18) Fuel injector (#1)
(19) Fuel injector (#3)
(20) Be careful of pinching when installing the intake manifold.
(21) Tumble generator valve actuator RH
(22) EGR control valve
(23) Oil pressure switch
(24) Engine oil temperature sensor
(25) Intake camshaft position sensor LH
(26) Intake oil control solenoid LH
(27) Secure the clip to the screw hole.
(28) Exhaust oil control solenoid LH
(29) Secure the clip to the screw hole.
(30) Exhaust camshaft position sensor LH
(31) Oil level switch connector
(32) Secure the clip to the screw hole.
(33) Secure the clip to the oval hole.
(34) Exhaust camshaft position sensor RH
(35) Secure the clip to the screw hole.
(36) Exhaust oil control solenoid RH
(37) Secure the clip to the screw hole.
(38) Intake oil control solenoid RH
(39) Intake camshaft position sensor RH

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

- Structural diagram 2



(1) Secure the clip to the screw hole.
(2) Ignition coil No. 4
(3) Ignition coil No. 2
(4) Secure the clip to the screw hole.
(5) Ignition coil No. 3
(6) Ignition coil No. 1
(7) Front oxygen (A/F) sensor
(8) Rear oxygen sensor

2) Install the intake manifold. <Ref. to FU(H4DO(HEV))-25, INSTALLATION, Intake Manifold.>
3) Install the collector cover.
4) Connect the battery ground terminal. <Ref. to NT-5, BATTERY, NOTE, Note.>

C: INSPECTION

Check that the engine wiring harness does not have deformation, cracks and any other damage.

5. Engine Coolant Temperature Sensor

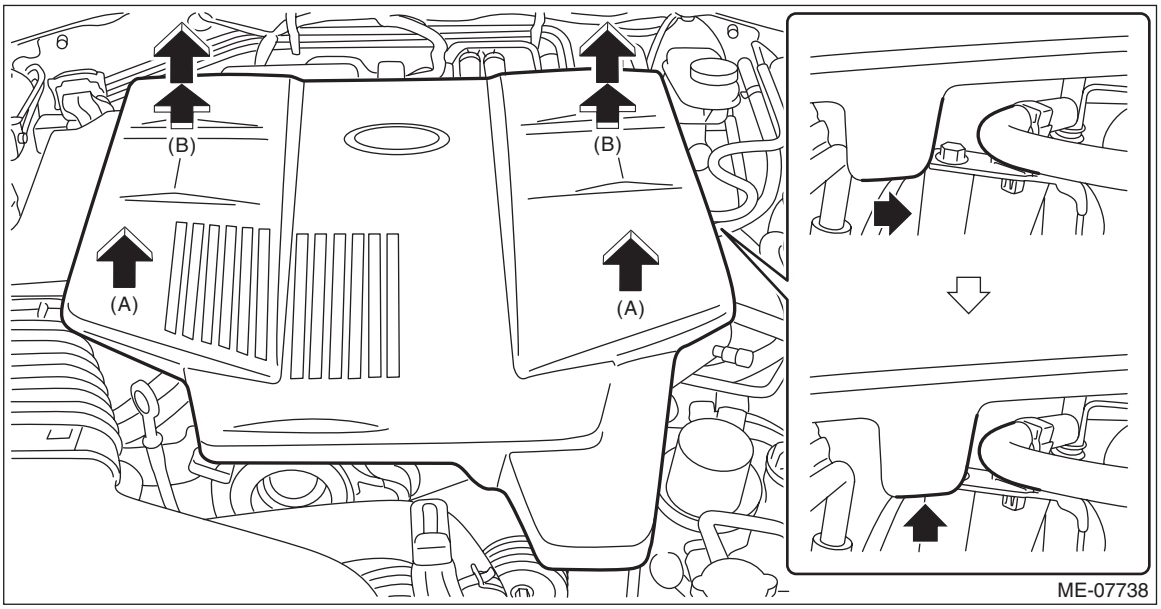
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

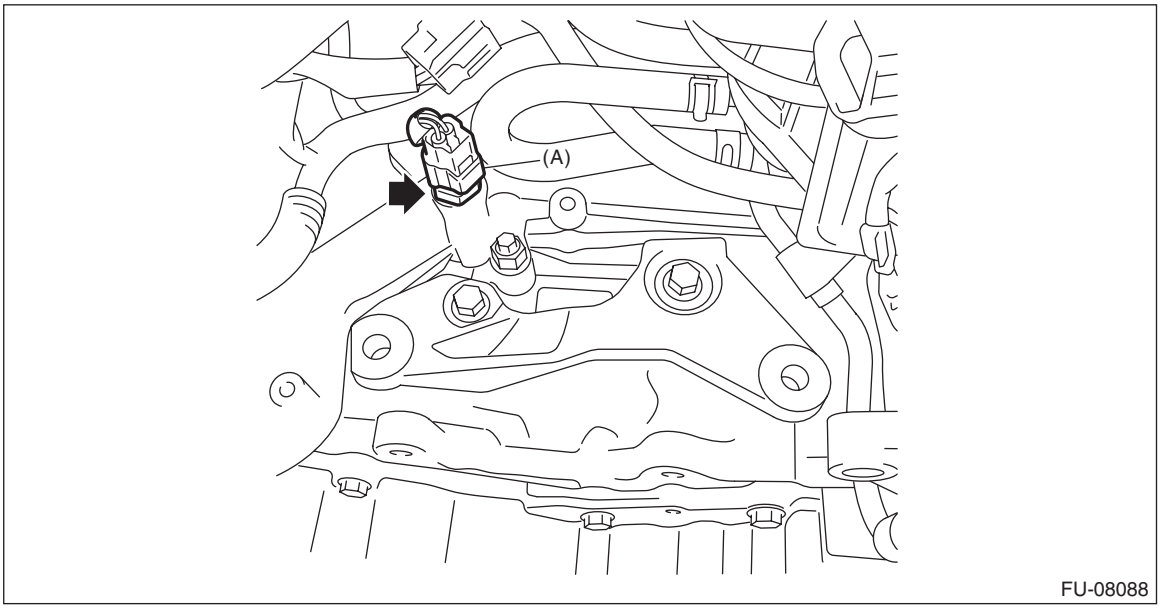
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



3) Drain engine coolant. <Ref. to CO(H4DO(w/o HEV))-16, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
4) Remove the ISG. <Ref. to SC(H4DO(HEV))-32, REMOVAL, Integrated Starter Generator (ISG).>
5) 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.

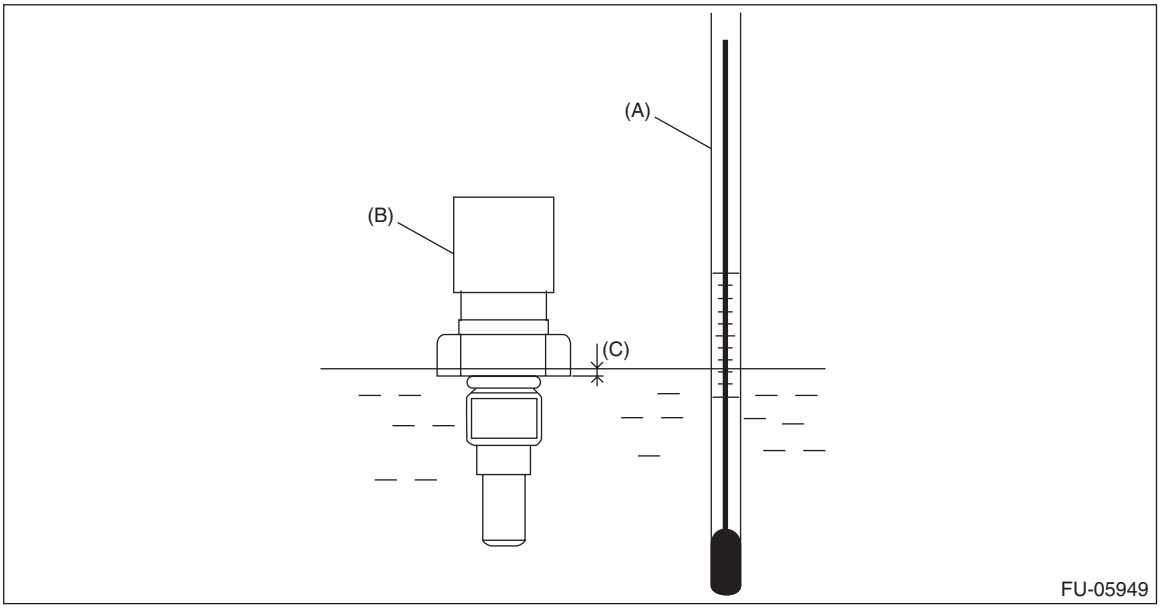
NOTE:
Use a new gasket.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

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.

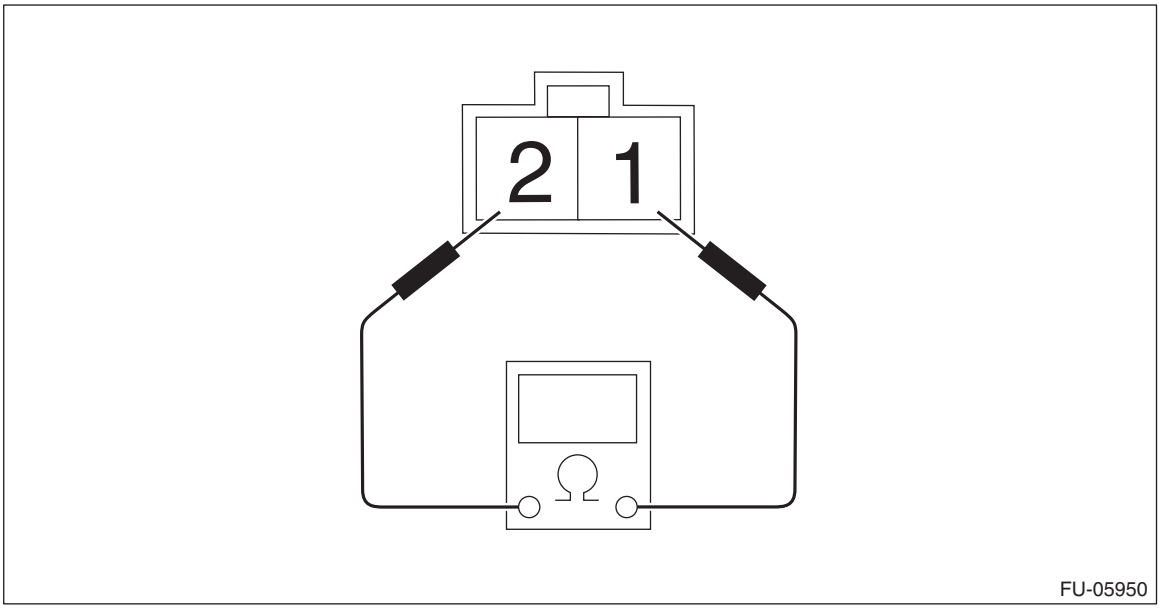
CAUTION:
Take care not to allow water to get into the engine coolant temperature sensor connector. Completely remove any water inside.



(A) Thermometer
(B) Engine coolant temperature sensor
(C) Hexagonal part height: To approx. $^{1}/_{3}$

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.



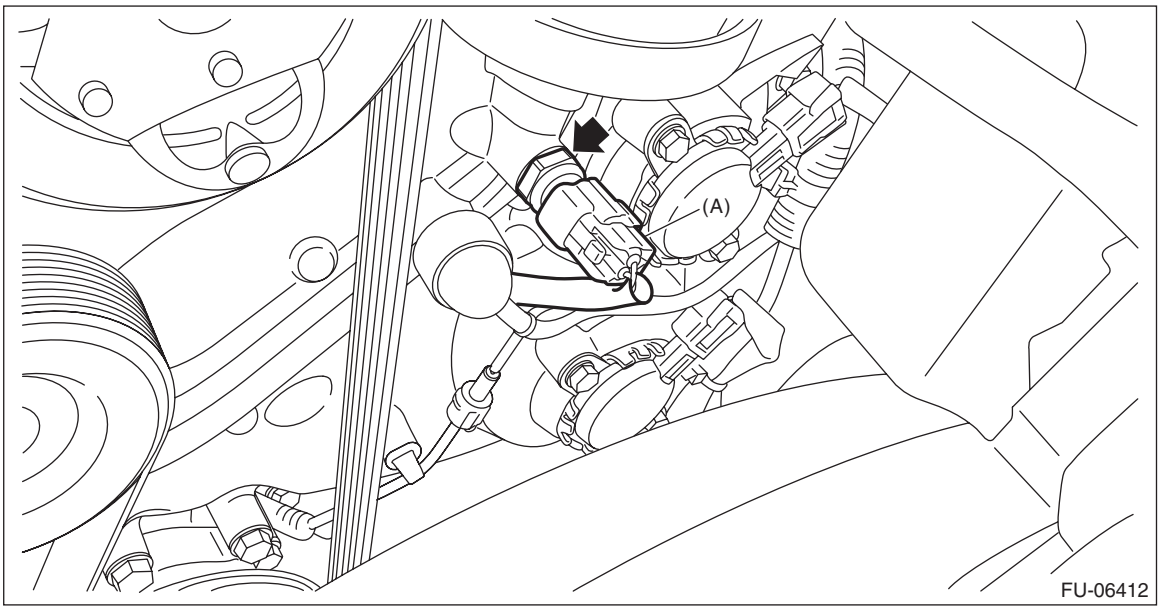
Water temperature	Terminal No.	Standard
20°C (68°F)	1 and 2	Approx. 2.45±0.2 kΩ
80°C (176°F)		Approx. 0.318±0.013 kΩ

6. Engine Oil Temperature Sensor

A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Disconnect the connector (A) from the engine oil temperature sensor, and remove the engine oil temperature sensor from the chain cover.



B: INSTALLATION

Install in the reverse order of removal.

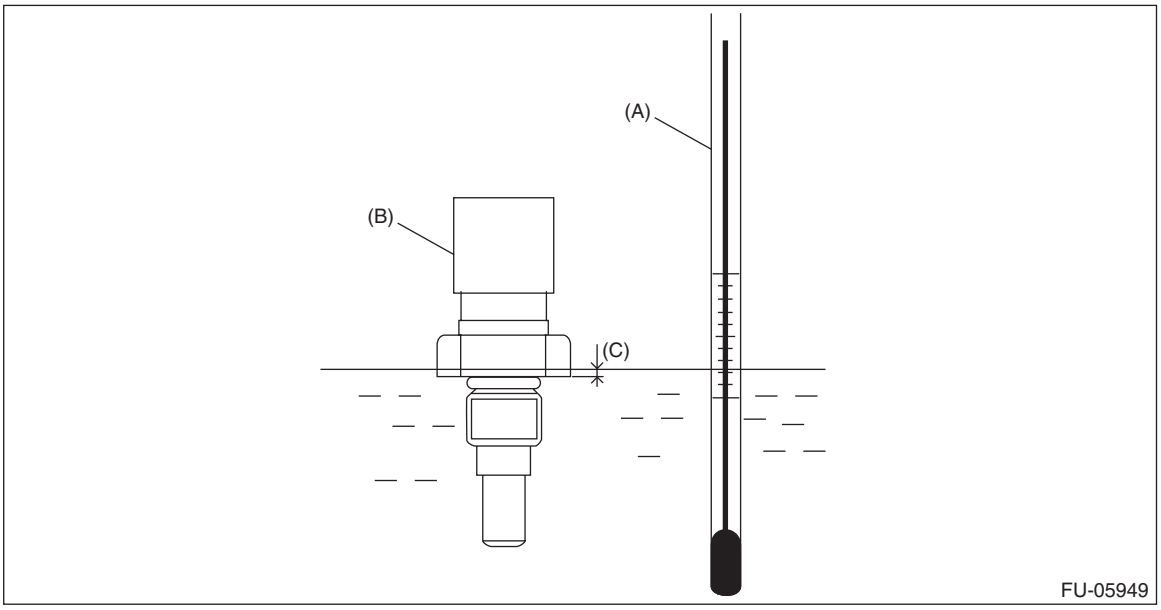
NOTE:
Use a new gasket.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

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.

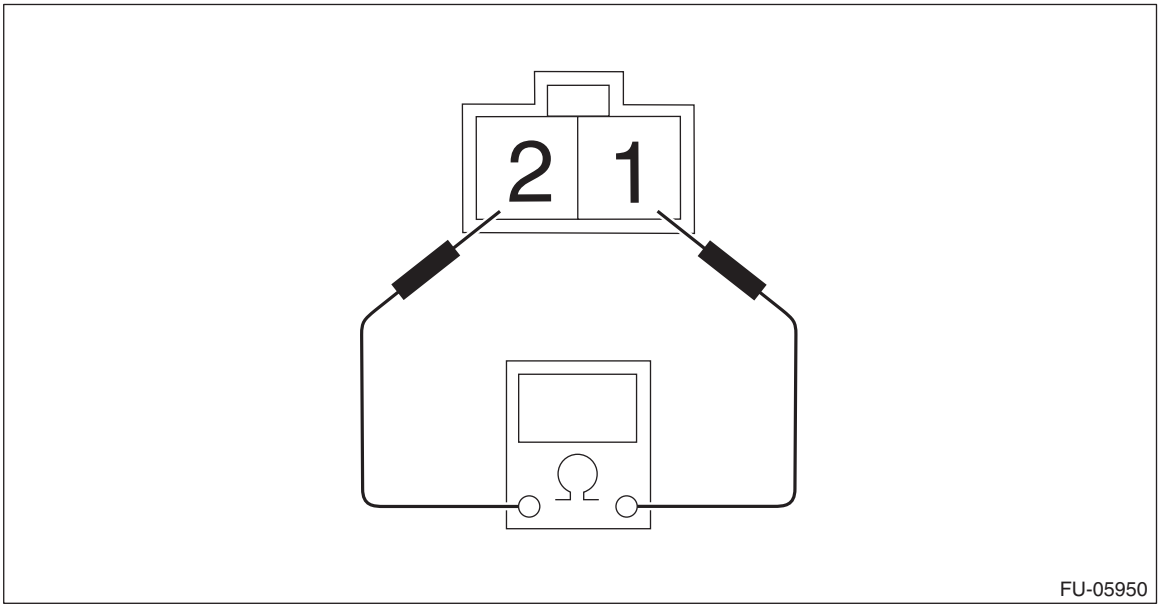
CAUTION:
Take care not to allow water to get into the engine oil temperature sensor connector. Completely remove any water inside.



(A) Thermometer
(B) Engine oil temperature sensor
(C) Hexagonal part height: To approx. $^{1}/_{3}$

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.



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

7. Crankshaft Position Sensor

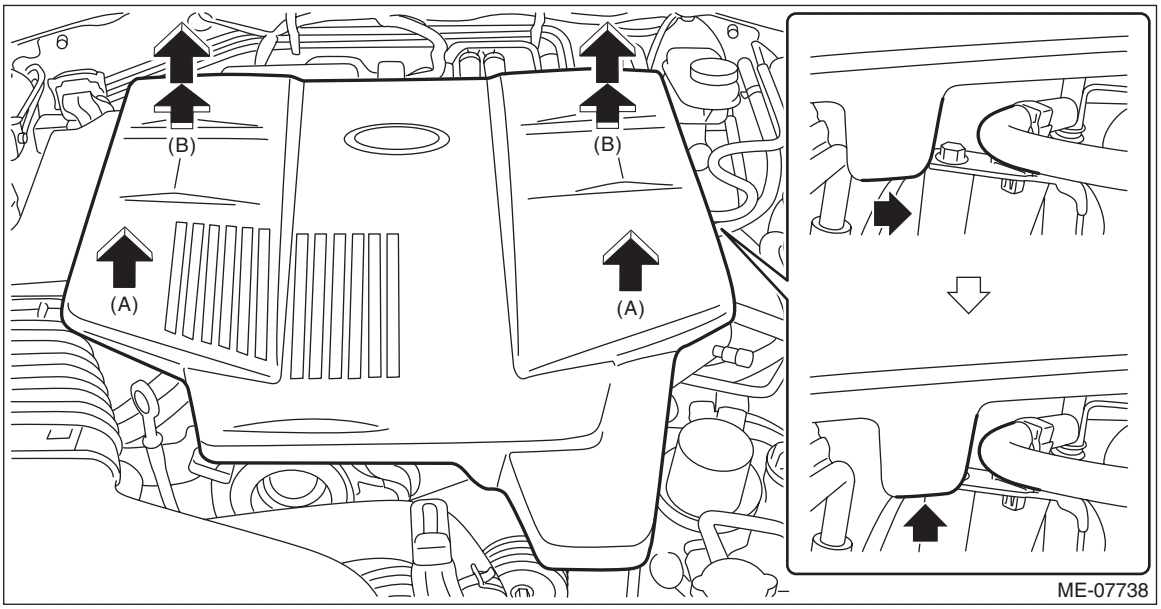
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

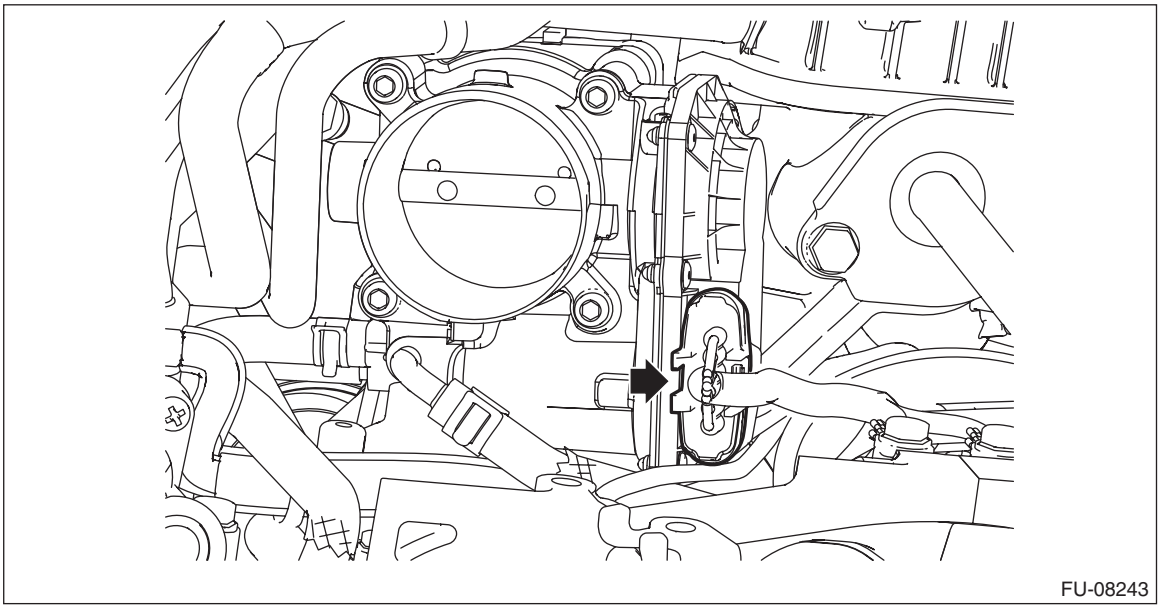
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

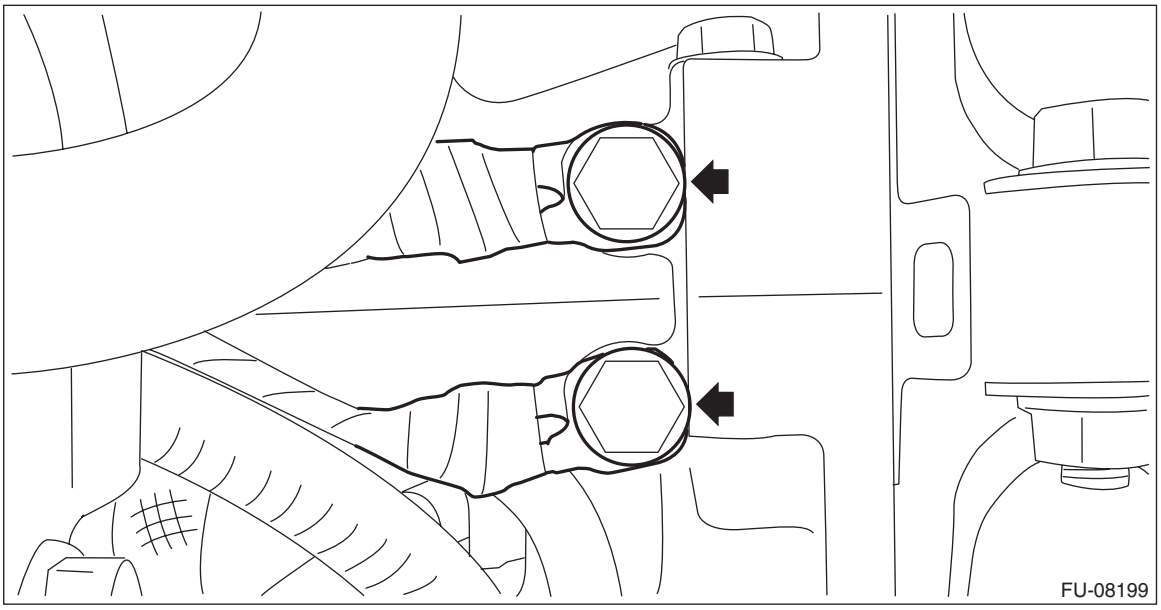
NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



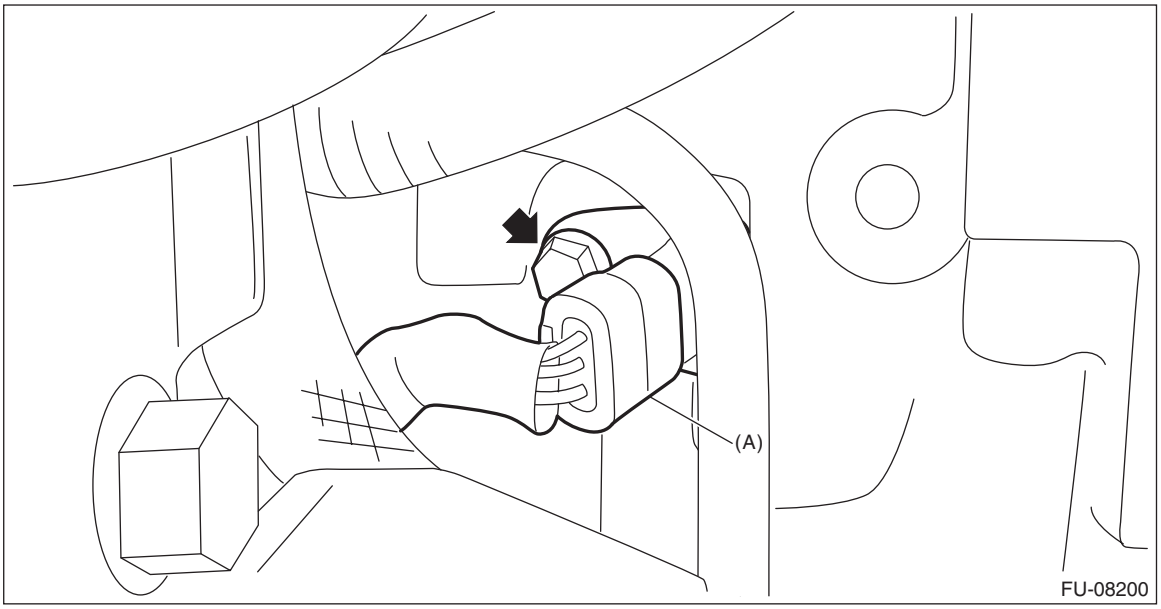
3) Remove the air cleaner case. <Ref. to IN(H4DO(HEV))-6, REMOVAL, Air Cleaner Case.>
4) Remove the air intake boot No. 2. <Ref. to IN(H4DO(HEV))-11, AIR INTAKE BOOT NO. 2, REMOVAL, Air Intake Boot.>
5) Disconnect the connector from the throttle body.



6) Disconnect the engine ground from the engine assembly.



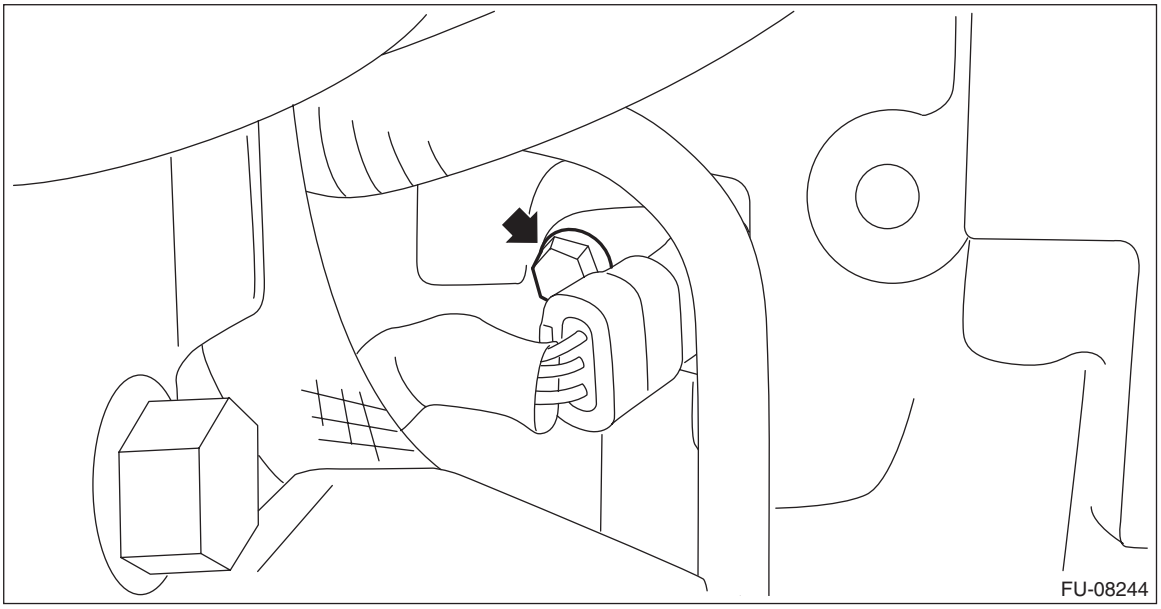
7) Disconnect the connector (A) from the crankshaft position sensor, and remove the crankshaft position sensor from the cylinder block.



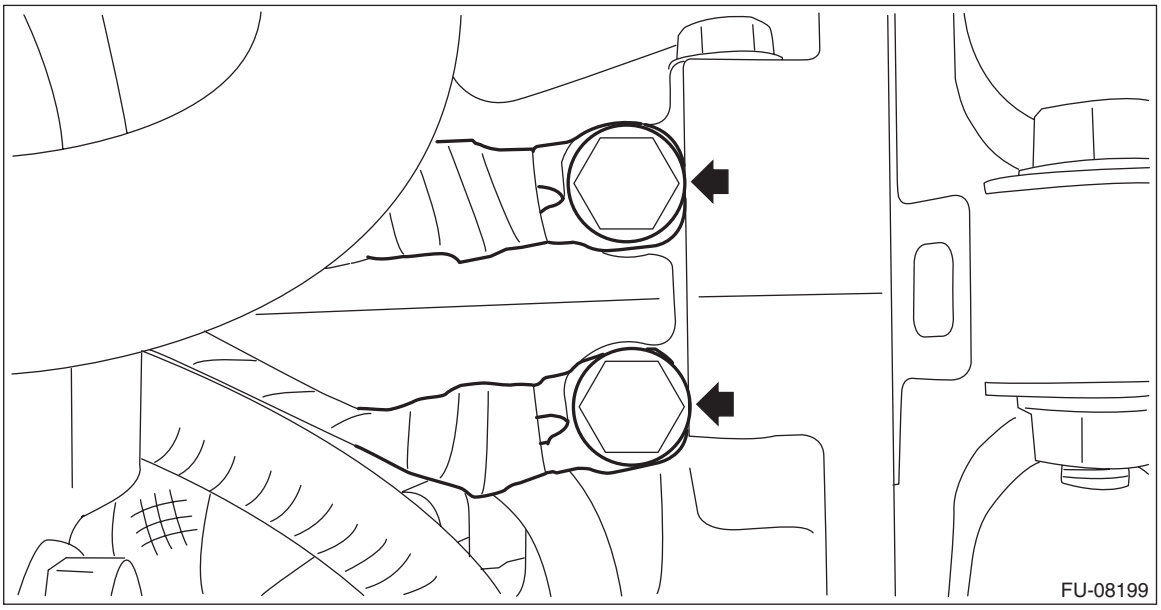
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



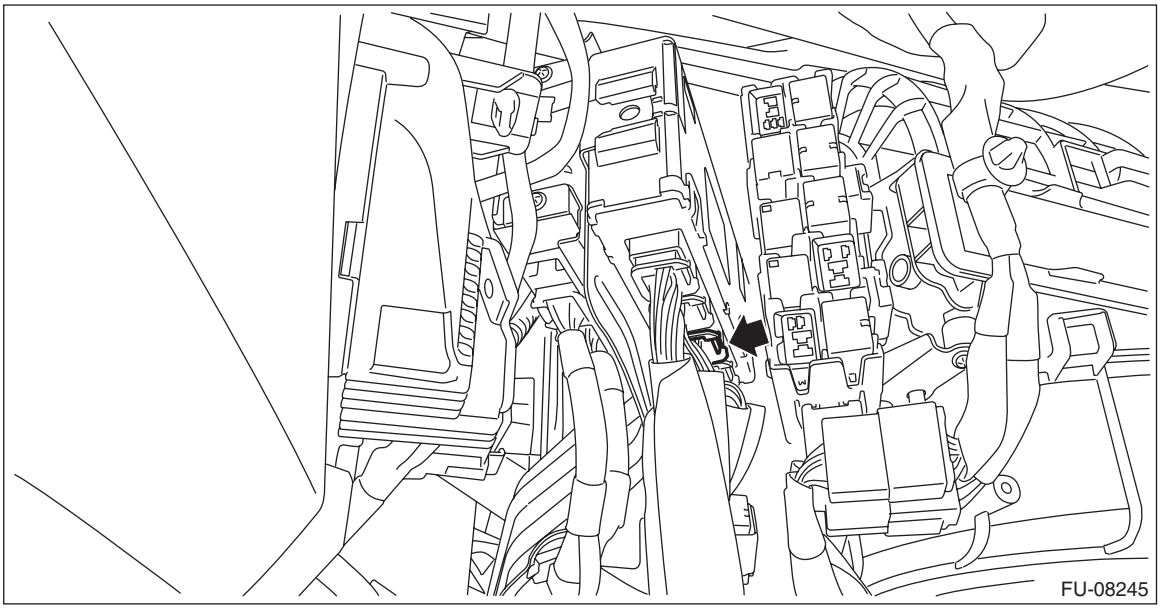
Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)

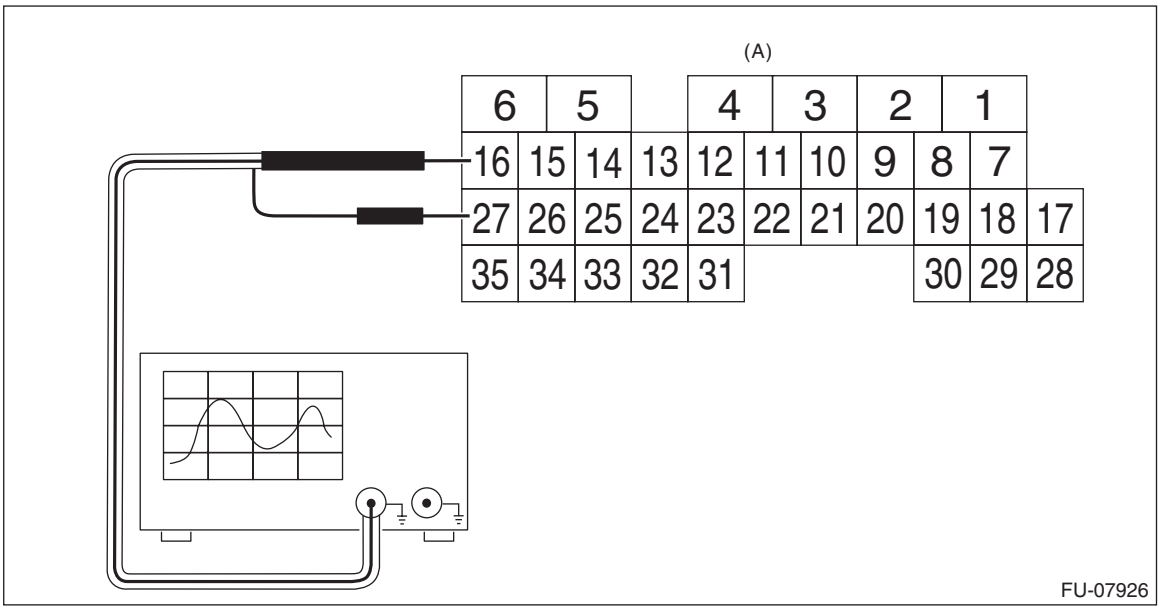


C: INSPECTION

1. CRANKSHAFT POSITION SENSOR (METHOD WITH OSCILLOSCOPE)

1) Prepare an oscilloscope.
2) Remove the glove box. <Ref. to EI-78, REMOVAL, Glove Box.>
3) Connect the probe to ECM connector.





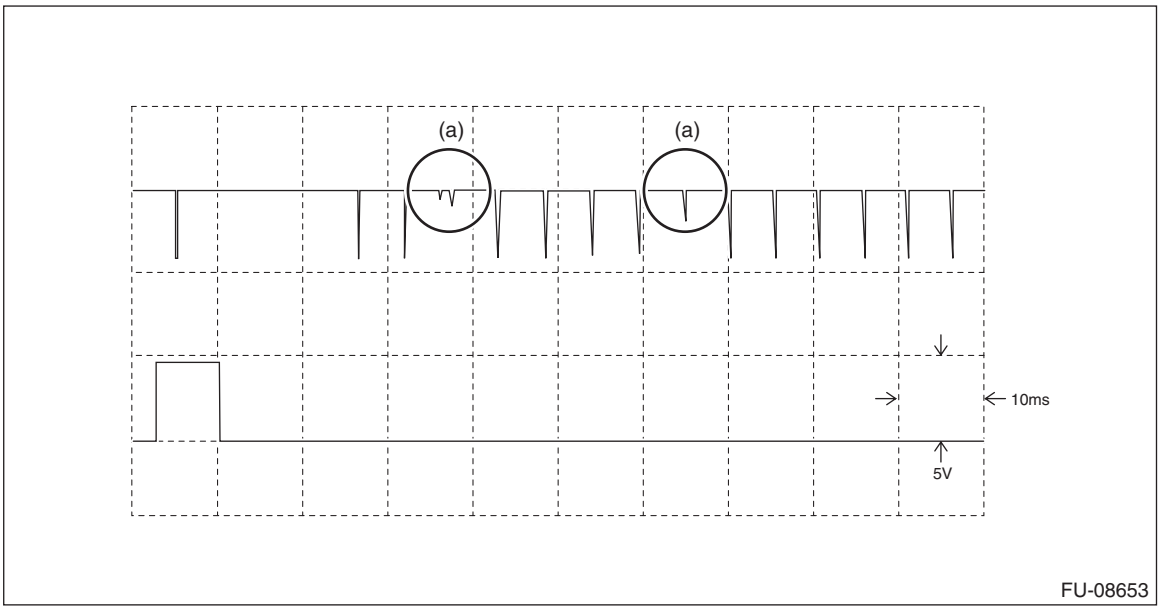
(A) To ECM connector

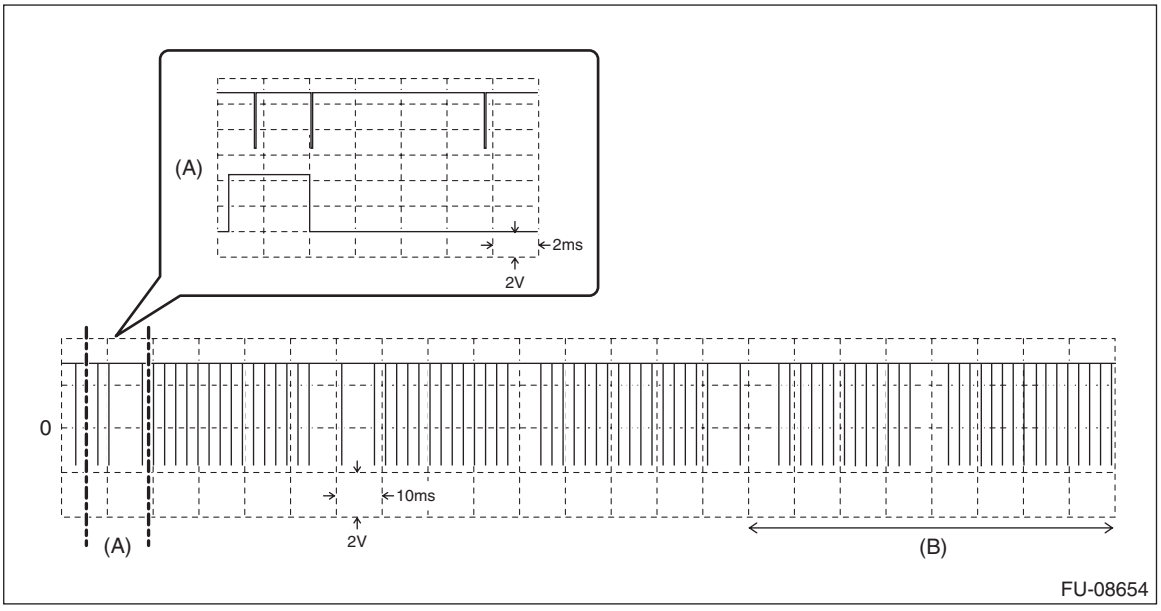
Terminal No.	Probe
16	+
27	–

4) Start the engine and let it idle.

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

NOTE:
The waveform of the crankshaft position sensor may be shown as in diagram (a) using the oscilloscope function of the Subaru Select Monitor. This is not a malfunction of Subaru Select Monitor or crankshaft position sensor, because the output unit of the crankshaft position sensor is 45 μseconds, which is smaller than the minimal measurement unit of the Subaru Select Monitor that is 50 μseconds.





(A) Magnified waveform of crankshaft position sensor
(B) One crankshaft rotation

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

2. OTHER INSPECTIONS

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

8. 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(TH58A)-175, 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(TH58A)-176, INSTALLATION, Drive Plate.>

C: INSPECTION

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

9. Camshaft Position Sensor

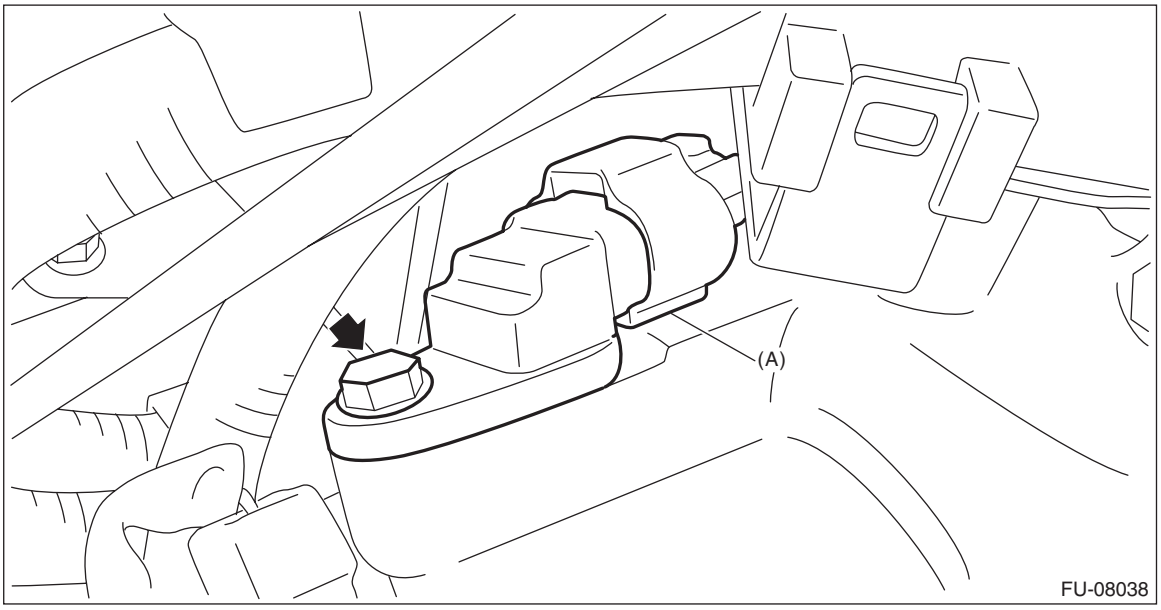
A: REMOVAL

1. INTAKE SIDE

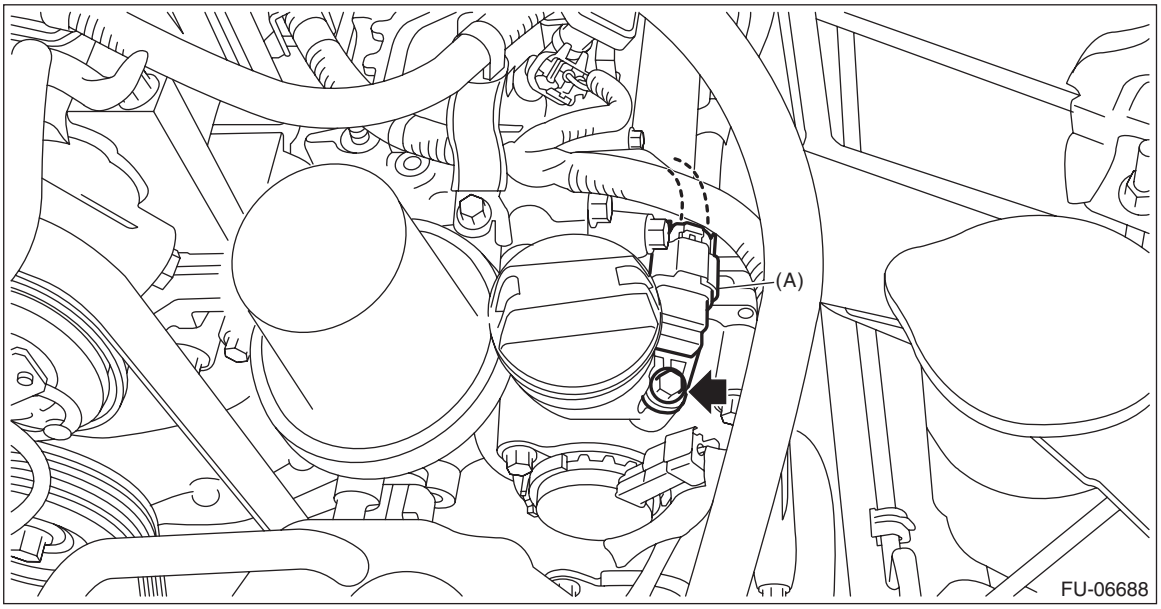
1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Remove the air intake duct. (RH side only) <Ref. to IN(H4DO(HEV))-15, REMOVAL, Air Intake Duct.>
3) Remove the air intake boot No. 1. (RH side only) <Ref. to IN(H4DO(HEV))-10, AIR INTAKE BOOT NO. 1, REMOVAL, Air Intake Boot.>
4) Disconnect the connector (A) from the camshaft position sensor, and remove the camshaft position sensor from the chain cover.

- RH side



- LH side

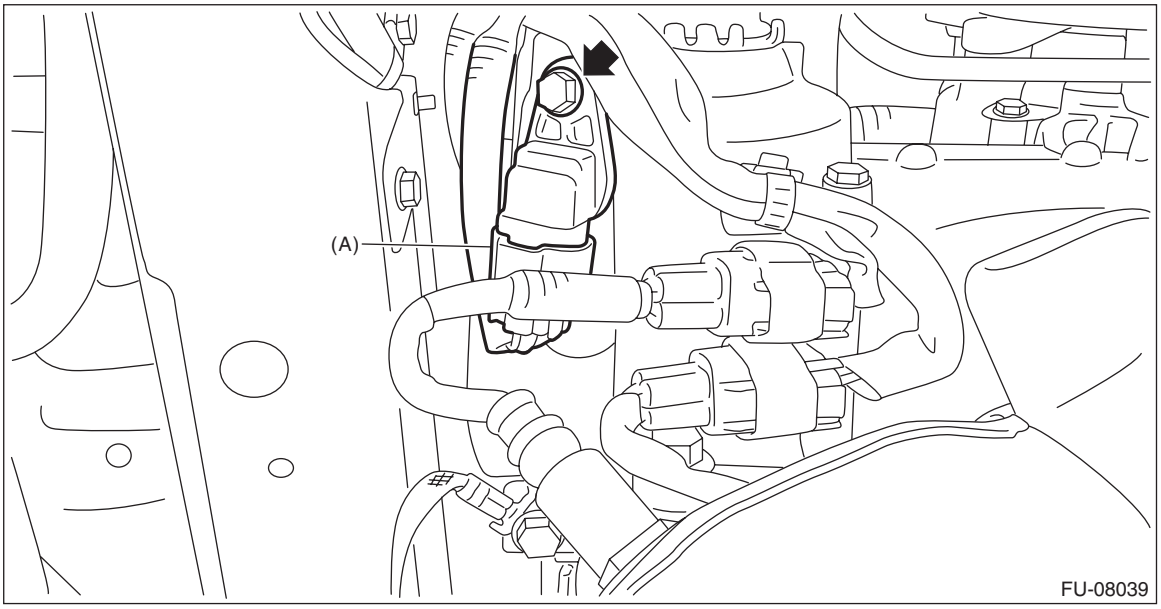


2. EXHAUST SIDE

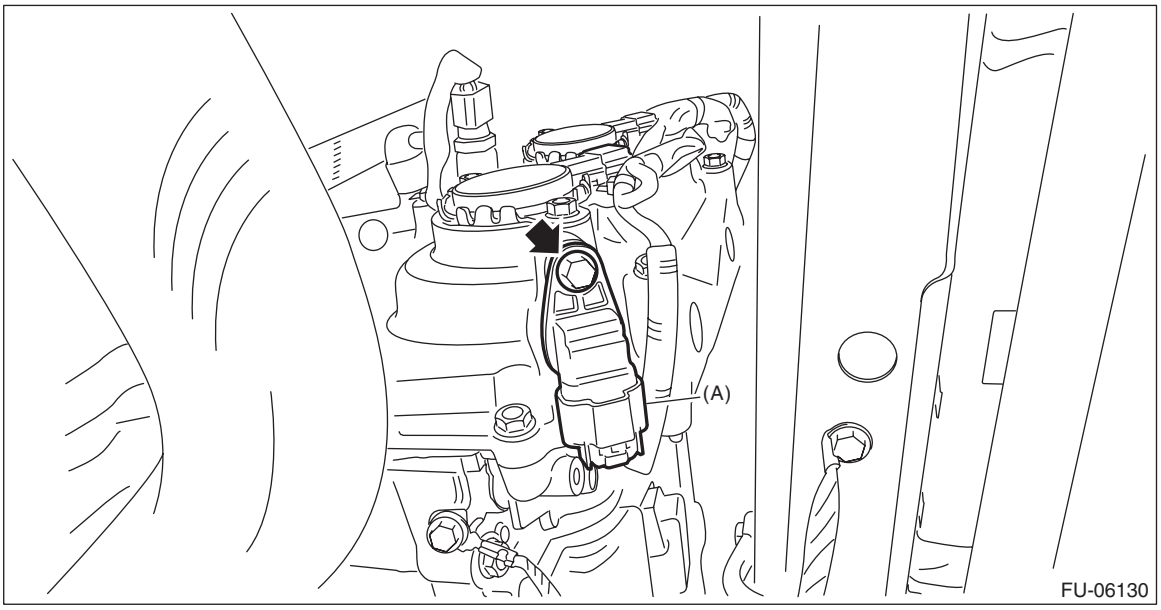
1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Remove the under cover. <Ref. to EI-32, 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.

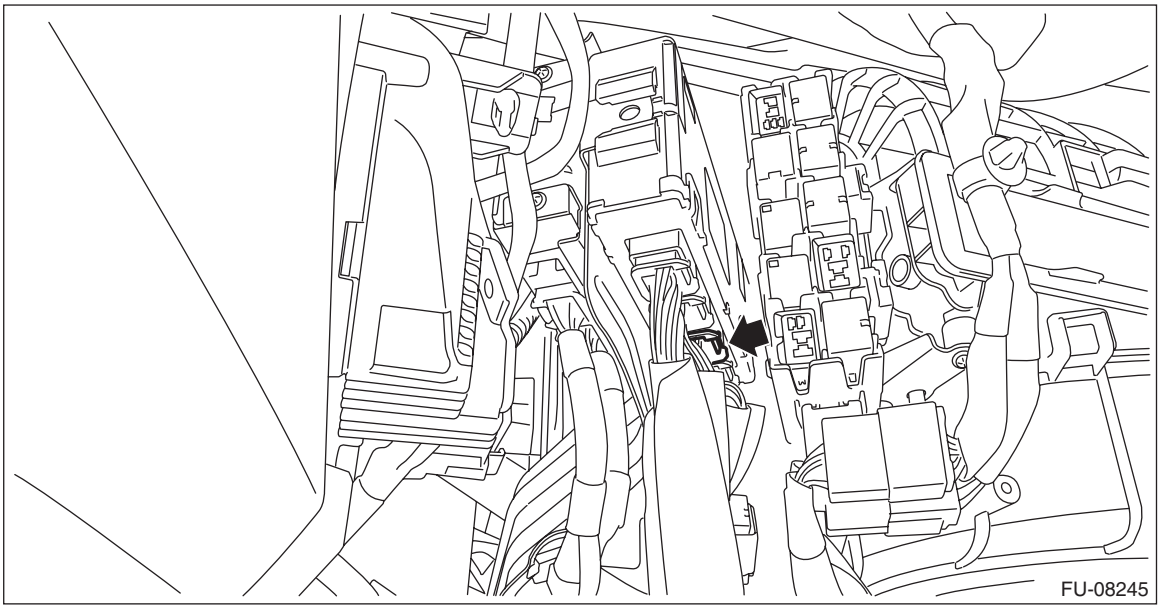
NOTE:
- Use new O-rings.
- Apply engine oil to O-ring.

Tightening torque:
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

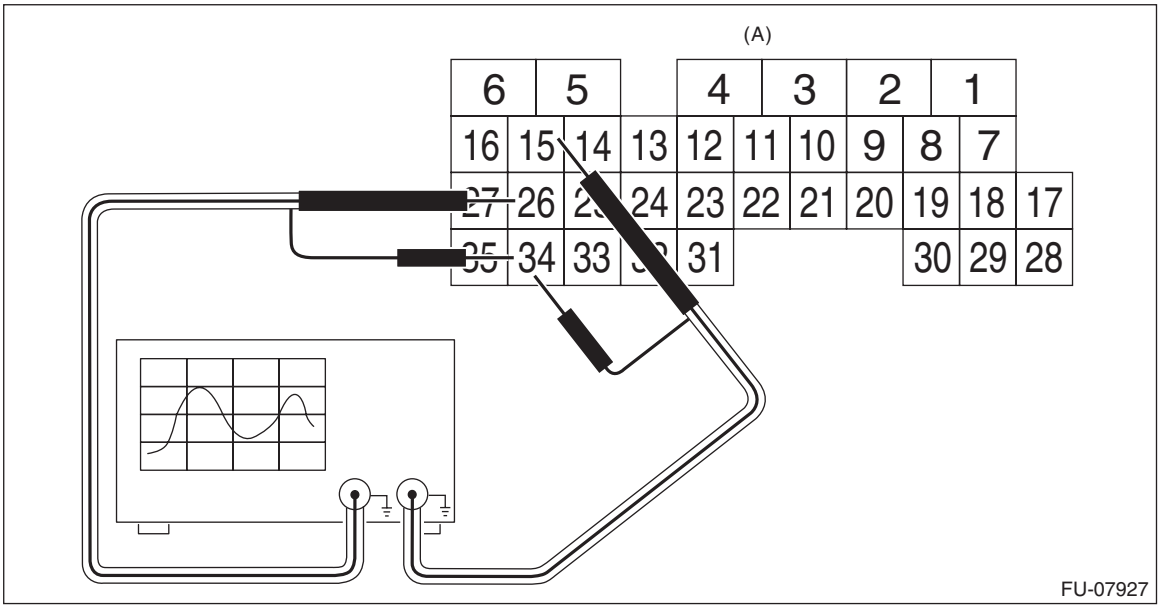
C: INSPECTION

1. CAMSHAFT POSITION SENSOR (METHOD WITH OSCILLOSCOPE)

1) Prepare an oscilloscope.
2) Remove the glove box. <Ref. to EI-78, REMOVAL, Glove Box.>
3) Connect the probe to ECM connector.

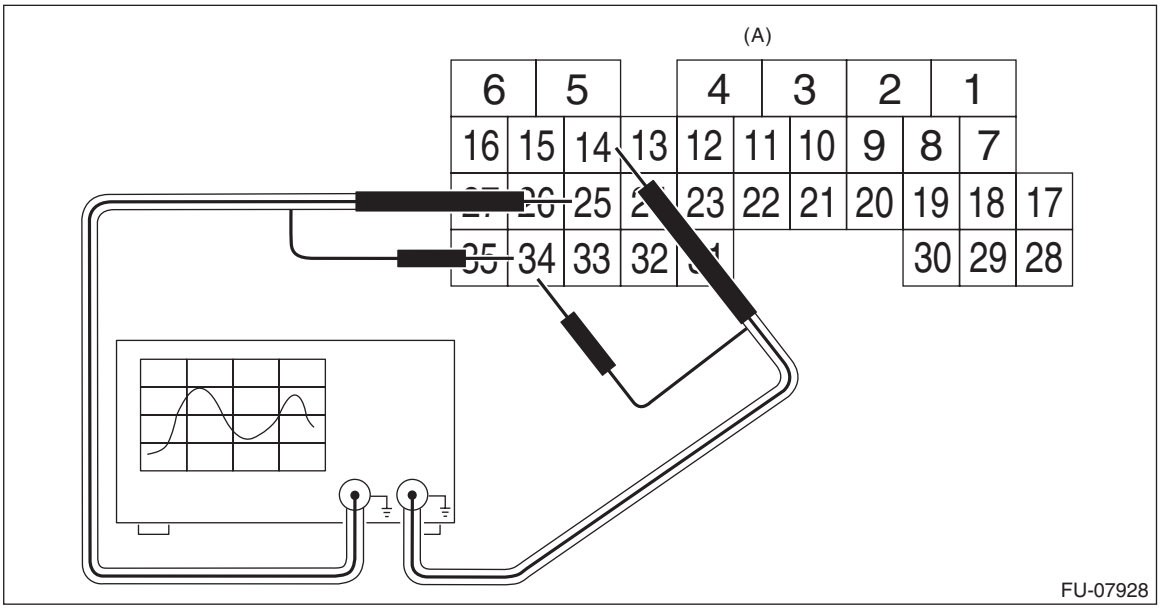


- Intake camshaft position sensor



(A) To ECM connector

- Exhaust camshaft position sensor



(A) To ECM connector

Camshaft position sensor		Terminal No.	Probe
Intake	RH	26	+
	LH	15	+
Exhaust	RH	14	+
	LH	25	+
RH and LH		34	–

4) Start the engine and let it idle.
5) Check the waveforms and voltage.

NOTE:
For waveform and voltage, refer to “Engine Control Module (ECM) I/O Signal”. <Ref. to EN(H4DO HEV)(diag)-19, ELECTRICAL SPECIFICATION, Control Module I/O Signal.>
6) 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.

10.Oil Control Solenoid

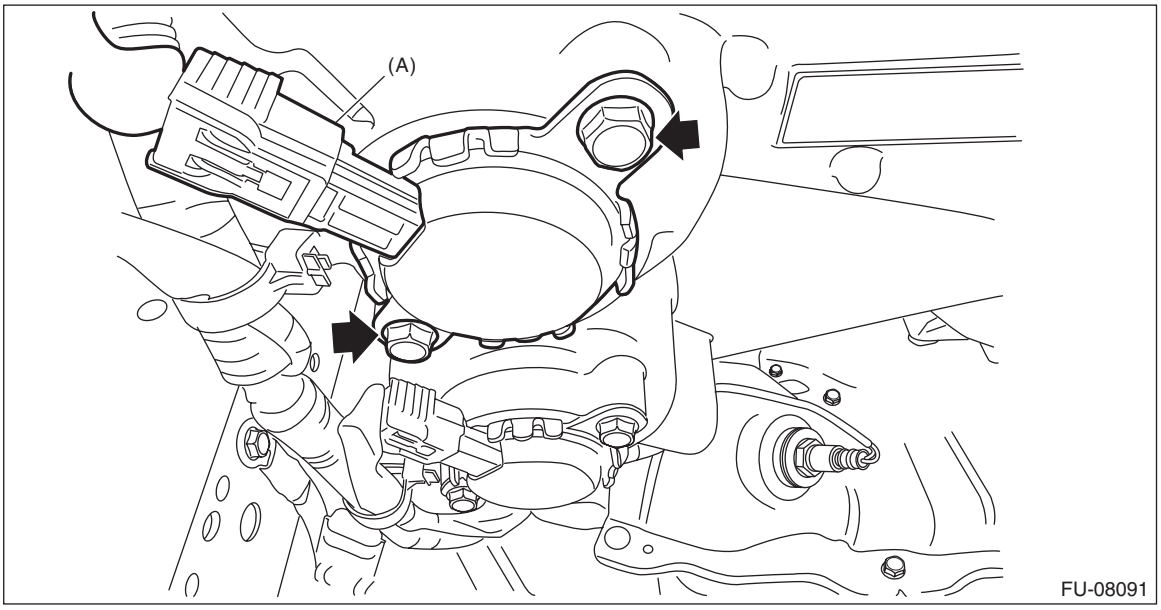
A: REMOVAL

1. INTAKE SIDE

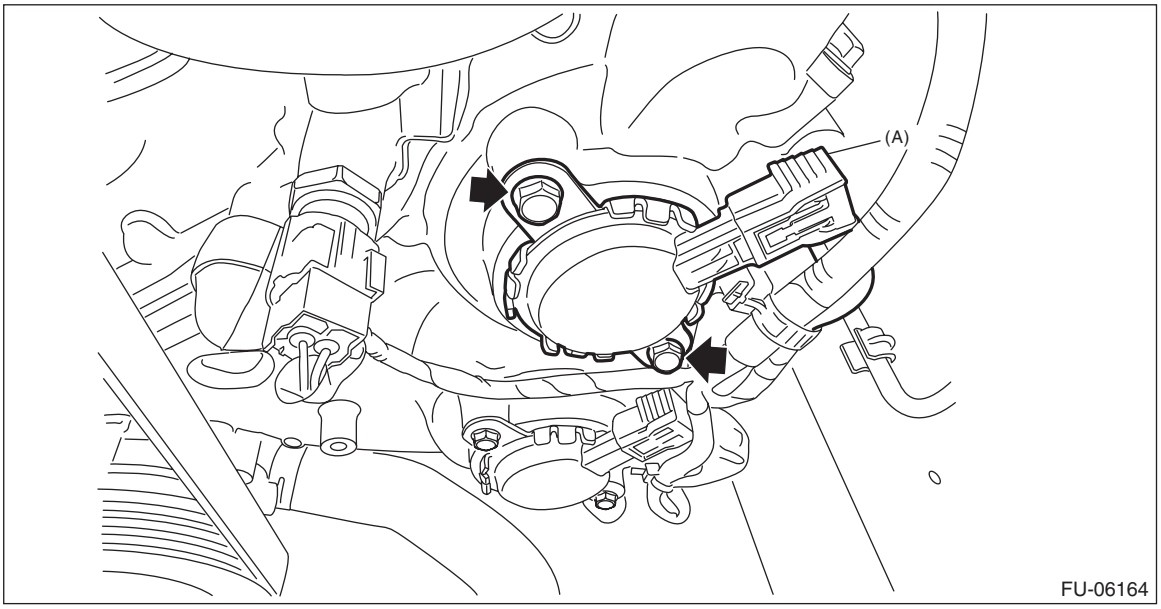
1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Remove the air intake duct. (RH side only) <Ref. to IN(H4DO(HEV))-15, REMOVAL, Air Intake Duct.>
3) Remove the reservoir tank. (LH side only) <Ref. to CO(H4DO(w/o HEV))-97, REMOVAL, Reservoir Tank.>
4) Disconnect the connector (A) from the oil control solenoid, and remove the oil control solenoid from the chain cover.

- RH side



- LH side

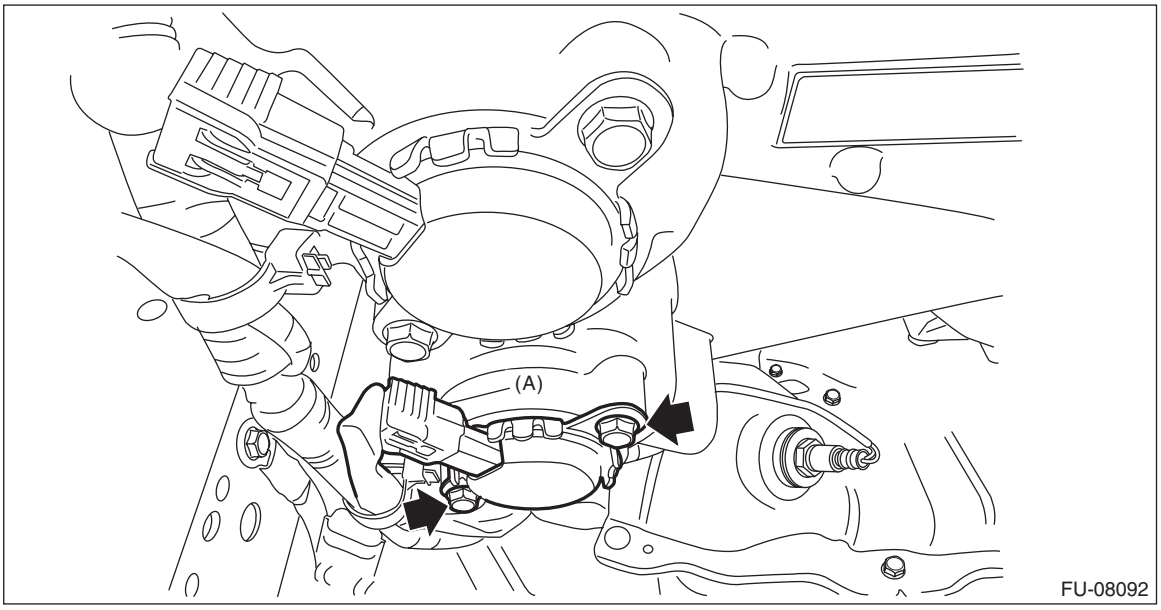


2. EXHAUST SIDE

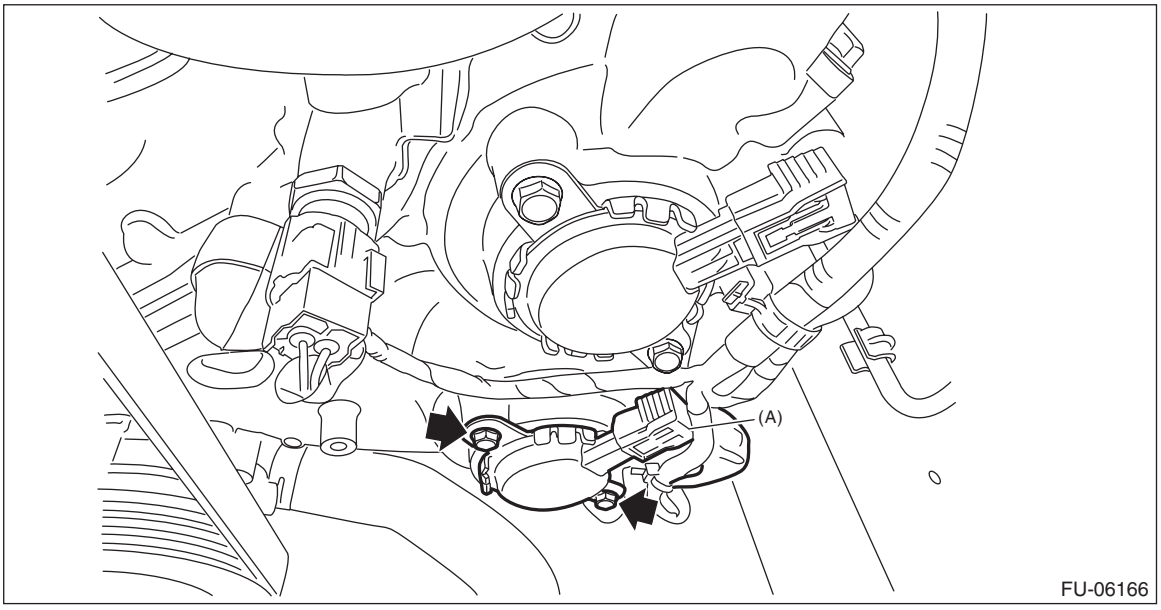
1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Remove the air intake duct. (RH side only) <Ref. to IN(H4DO(HEV))-15, REMOVAL, Air Intake Duct.>
3) Remove the reservoir tank. (LH side only) <Ref. to CO(H4DO(w/o HEV))-97, REMOVAL, Reservoir Tank.>
4) 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

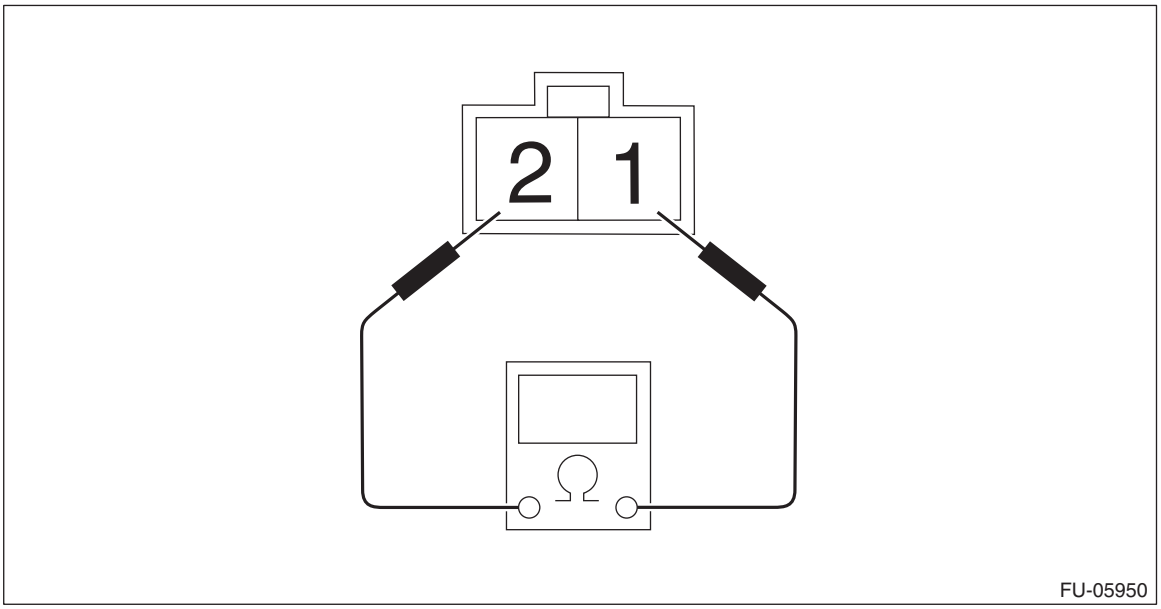
Install in the reverse order of removal.

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)

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±0.4 Ω (when 20°C (68°F))

11.Knock Sensor

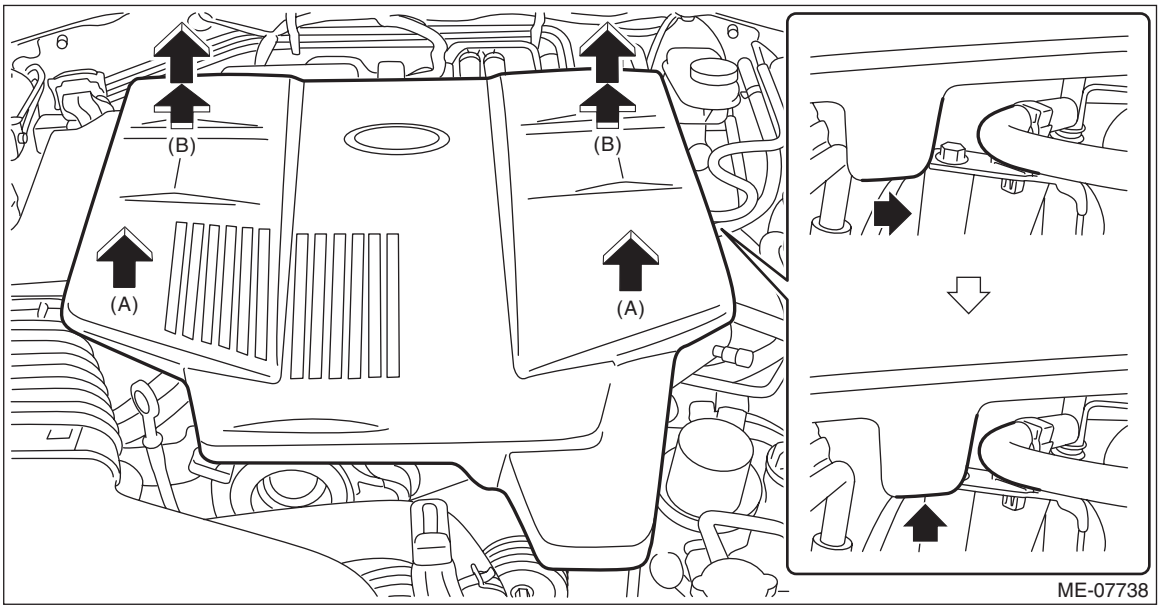
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

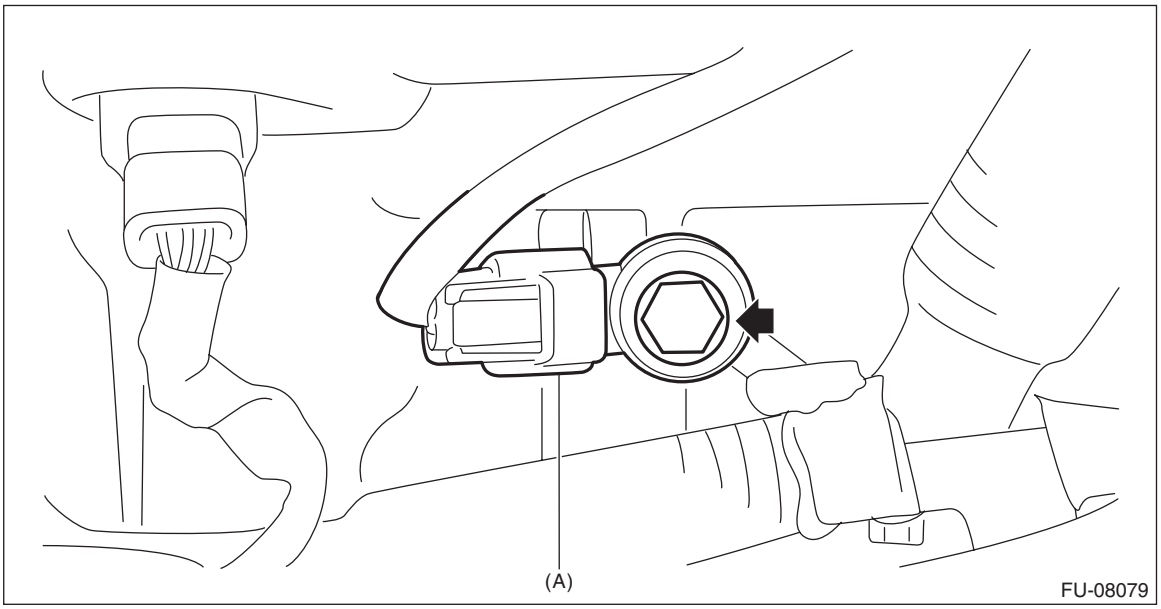
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



3) Remove the throttle body. <Ref. to FU(H4DO(HEV))-14, REMOVAL, Throttle Body.>
4) Disconnect the connector (A) from the knock sensor, and remove the knock sensor from the cylinder block.

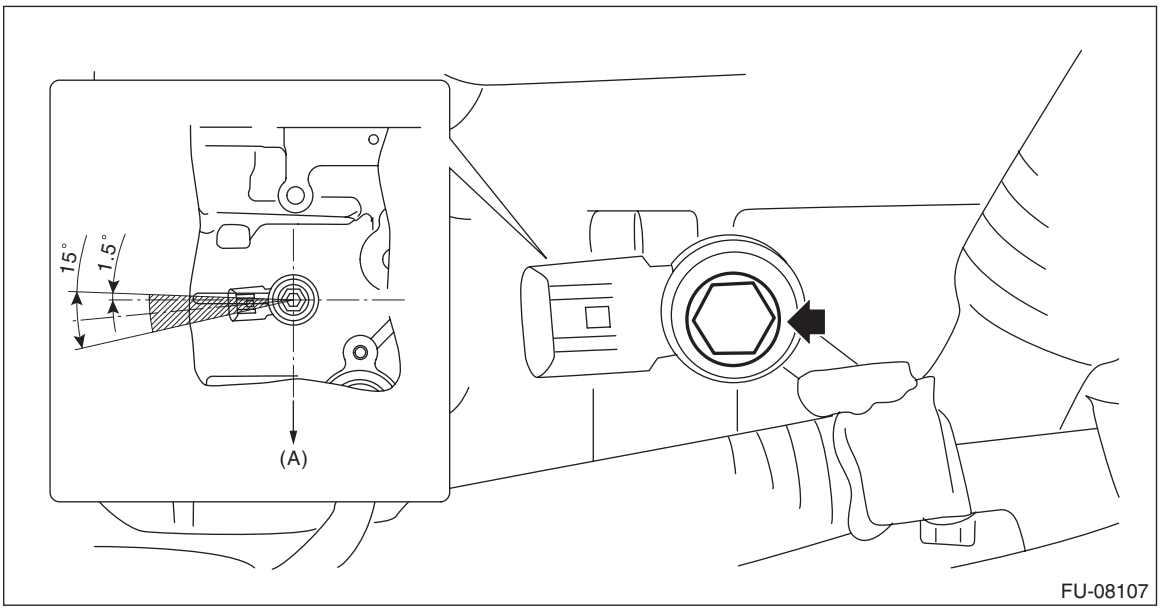


B: INSTALLATION

1) Install the knock sensor to the cylinder block.

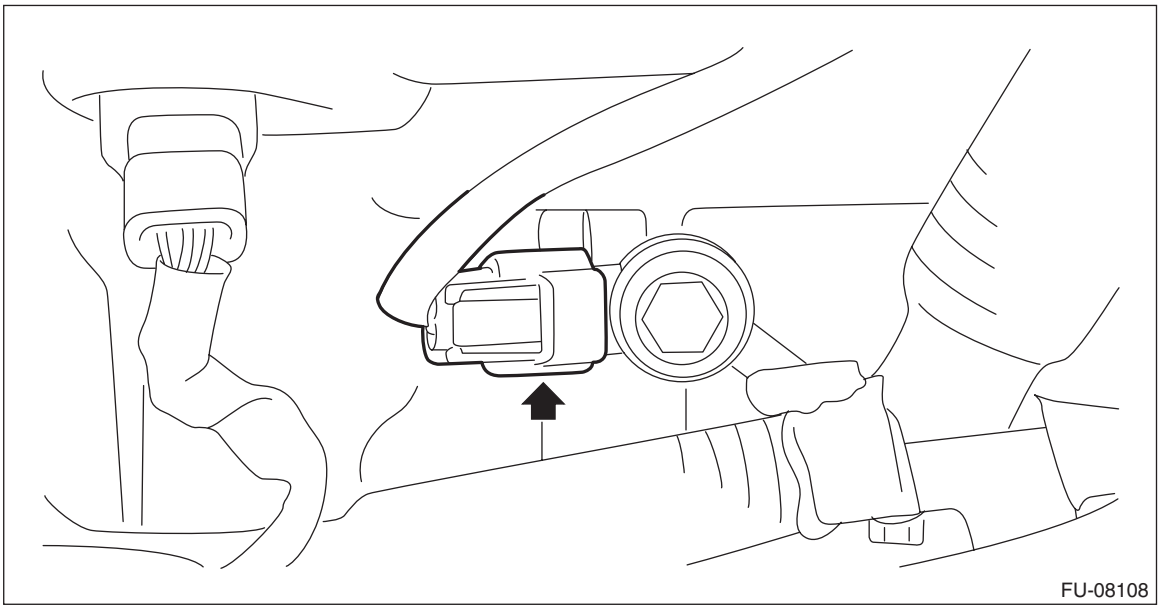
NOTE:
The knock sensor should be installed so that the center of the connector is positioned at a 76.5 — 91.5° angle relative to the front of engine.

Tightening torque:
24 N·m (2.4 kgf-m, 17.7 ft-lb)



(A) Front of engine

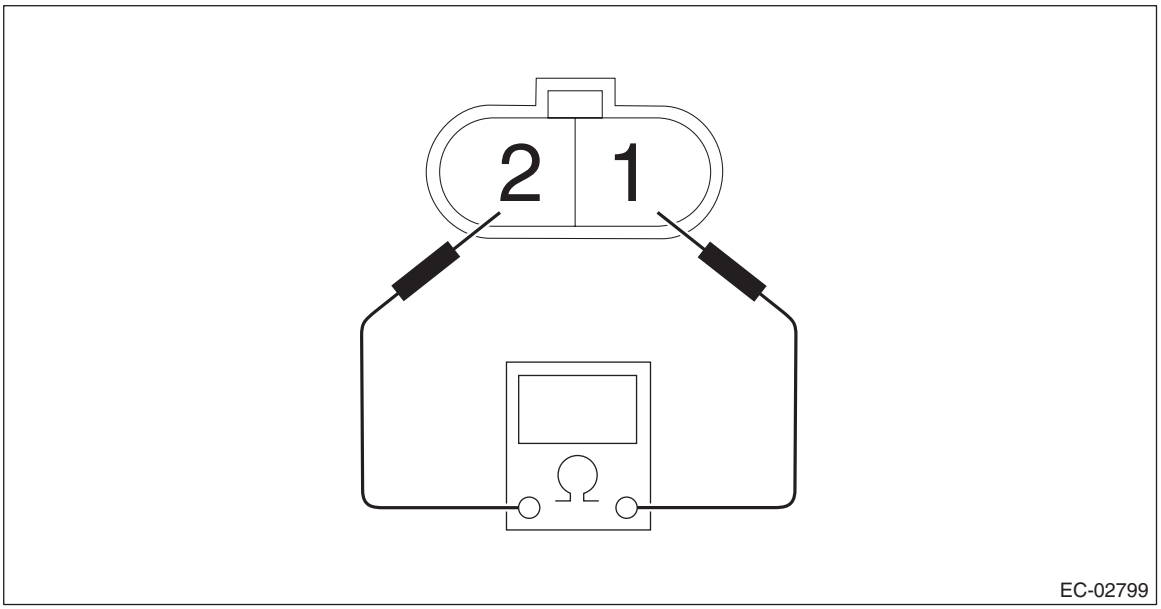
2) Connect the connector to the knock sensor.



3) Install the throttle body. <Ref. to FU(H4DO(HEV))-16, INSTALLATION, Throttle Body.>
4) Install the collector cover.
5) Connect the battery ground terminal. <Ref. to NT-5, BATTERY, NOTE, Note.>

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

12.Throttle Position Sensor

A: SPECIFICATION

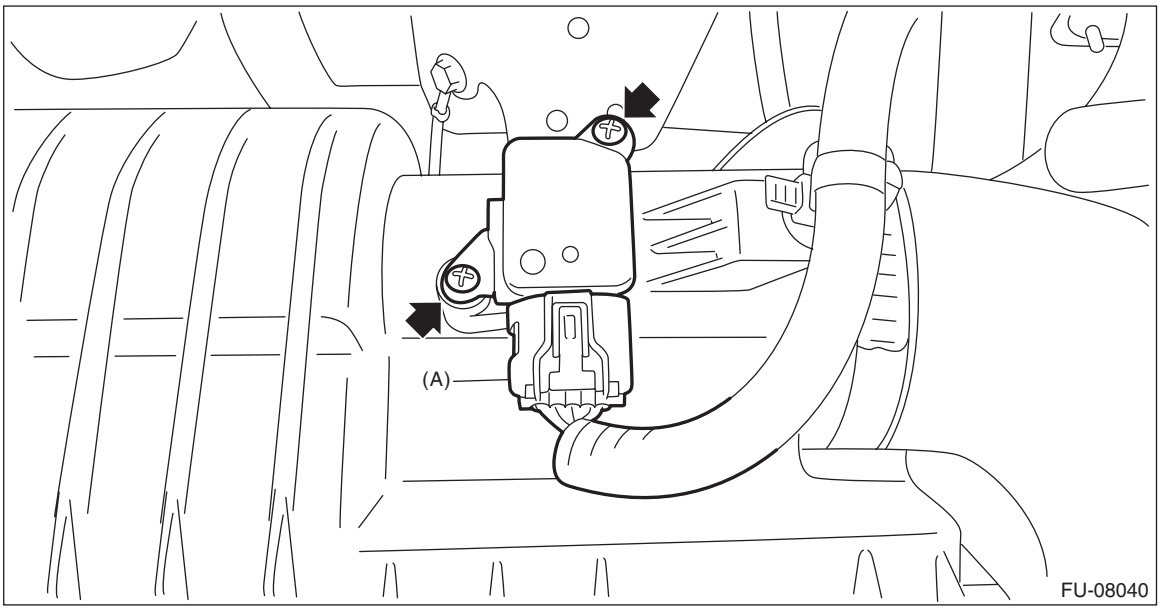
Throttle body is a non-disassembled part, so do not remove the throttle position sensor from throttle body. Refer to “Throttle Body” for removal and installation procedure. <Ref. to FU(H4DO(HEV))-14, REMOVAL, Throttle Body.> <Ref. to FU(H4DO(HEV))-16, INSTALLATION, Throttle Body.>

13.Mass Air Flow and Intake Air Temperature Sensor

A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
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

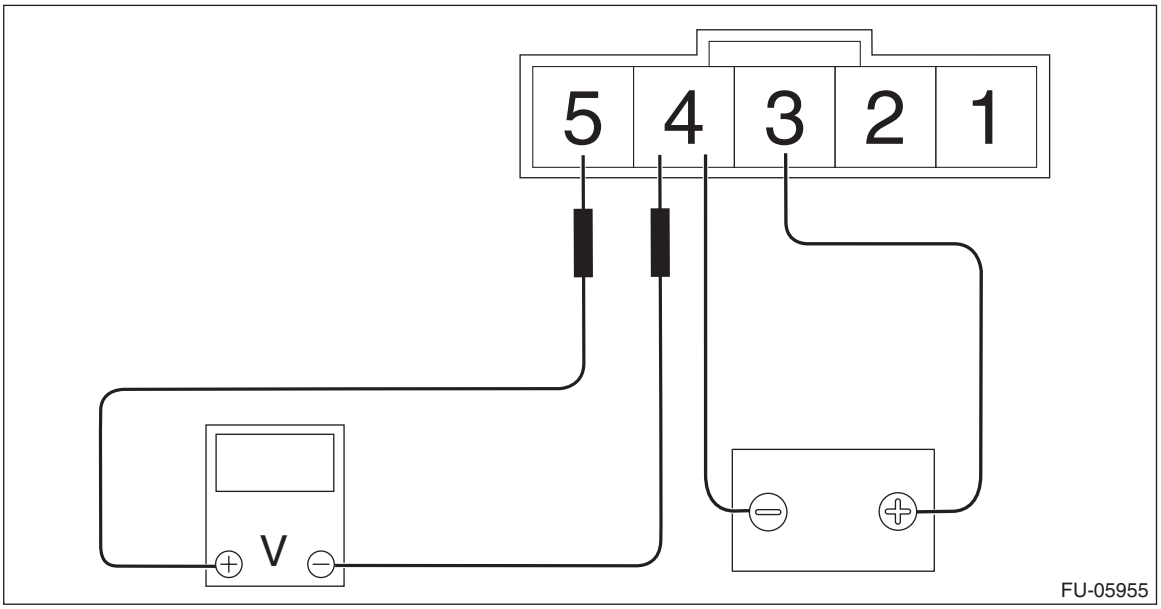
Install in the reverse order of removal.

Tightening torque:
1 N·m (0.1 kgf-m, 0.7 ft-lb)

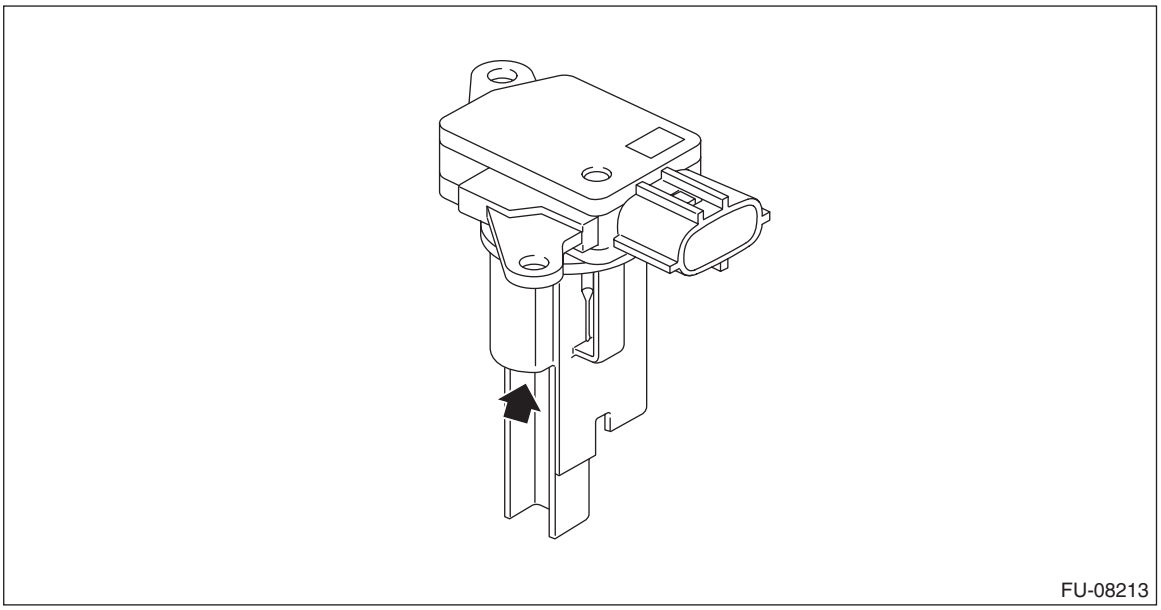
C: INSPECTION

1. CHECK THE MASS AIR FLOW SENSOR UNIT

1) Connect the battery positive terminal to terminal No. 3 and the battery ground terminal to terminal No. 4, the circuit tester positive terminal to terminal No. 5 and the circuit tester ground terminal to terminal No. 4.

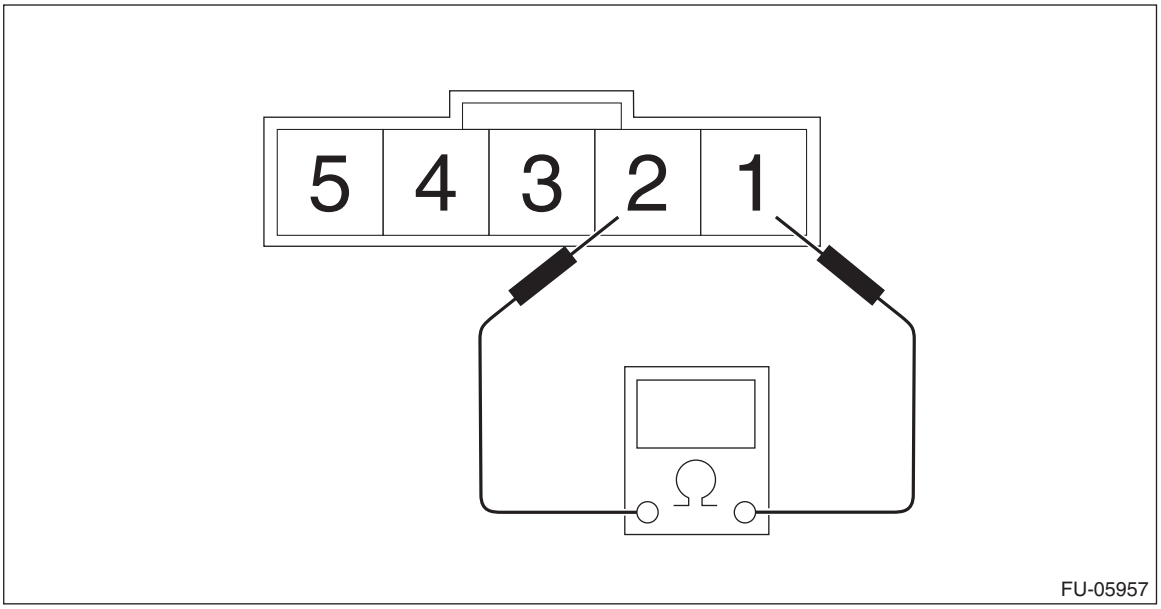


2) Check the voltage changes when air is blown from the arrow pointing area to the mass air flow sensor unit.



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)	1 and 2	16.0±2.4 kΩ
20°C (68°F)		2.45±0.24 kΩ
60°C (140°F)		0.58±0.087 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.

14.Manifold Absolute Pressure Sensor

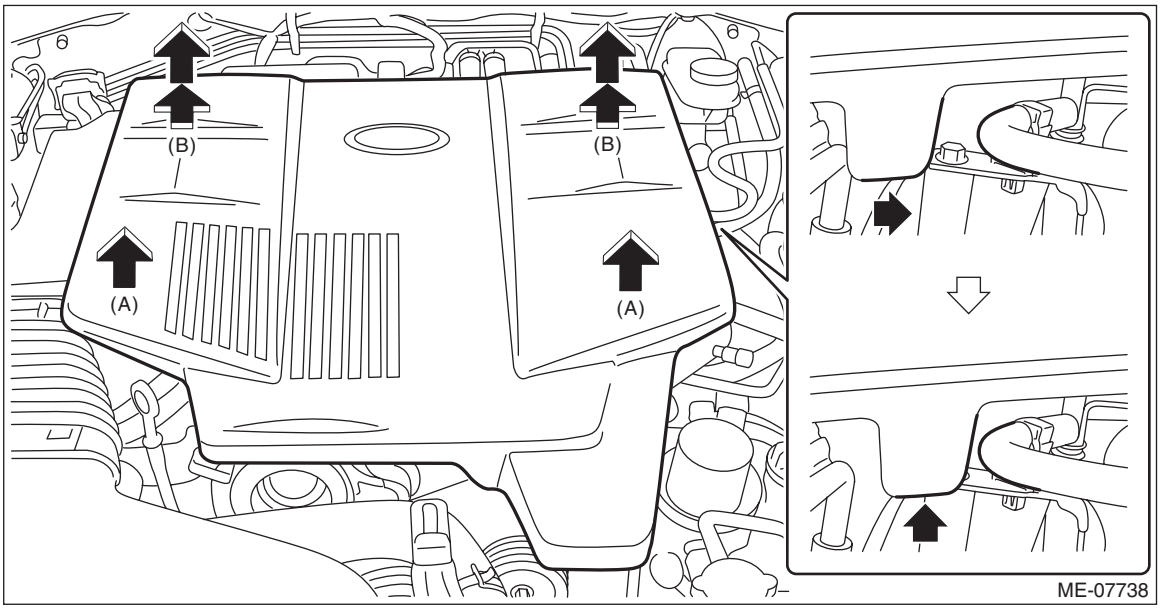
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

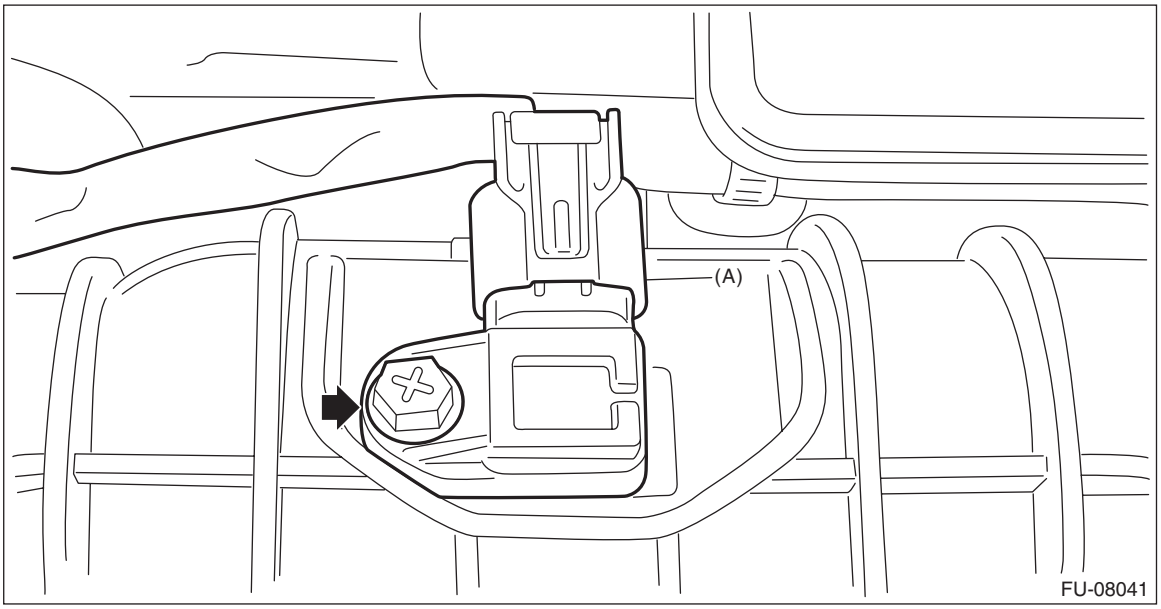
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



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



B: INSTALLATION

Install in the reverse order of removal.

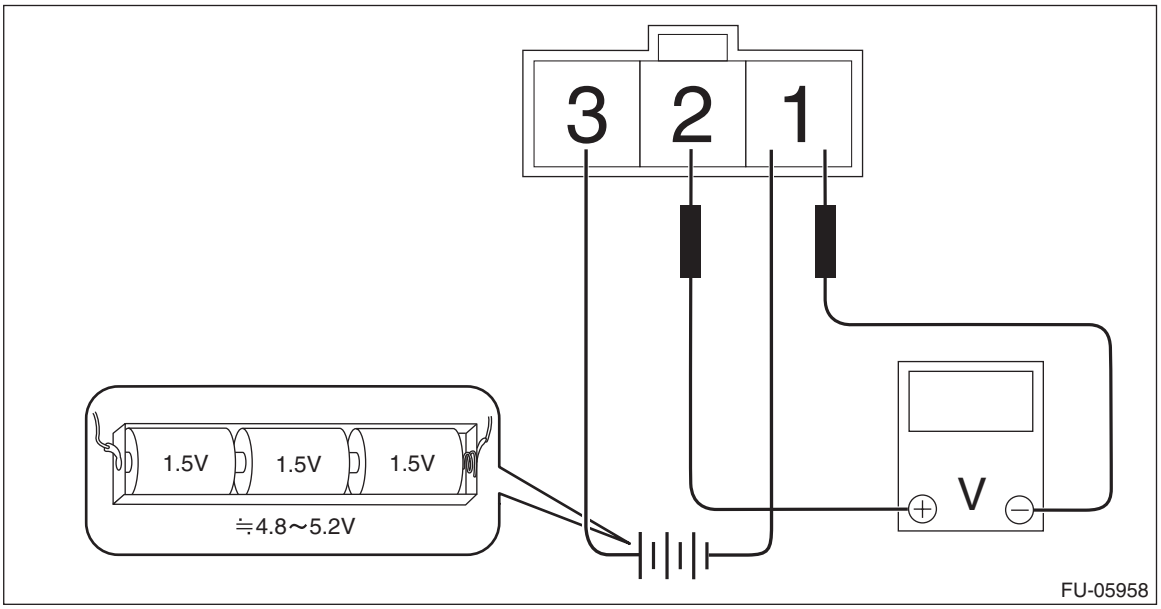
NOTE:
Use new O-rings.

Tightening torque:
4 N·m (0.4 kgf-m, 3.0 ft-lb)

C: INSPECTION

1) Check that the manifold absolute pressure sensor has no deformation, cracks or other damages.
2) Connect dry-cell battery positive terminal to terminal No. 3 and dry-cell battery ground terminal to terminal No. 1, circuit tester positive terminal to terminal No. 2 and the circuit tester negative terminal to terminal No. 1.

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.
- For power supply, 5 V DC voltage source can also be used.

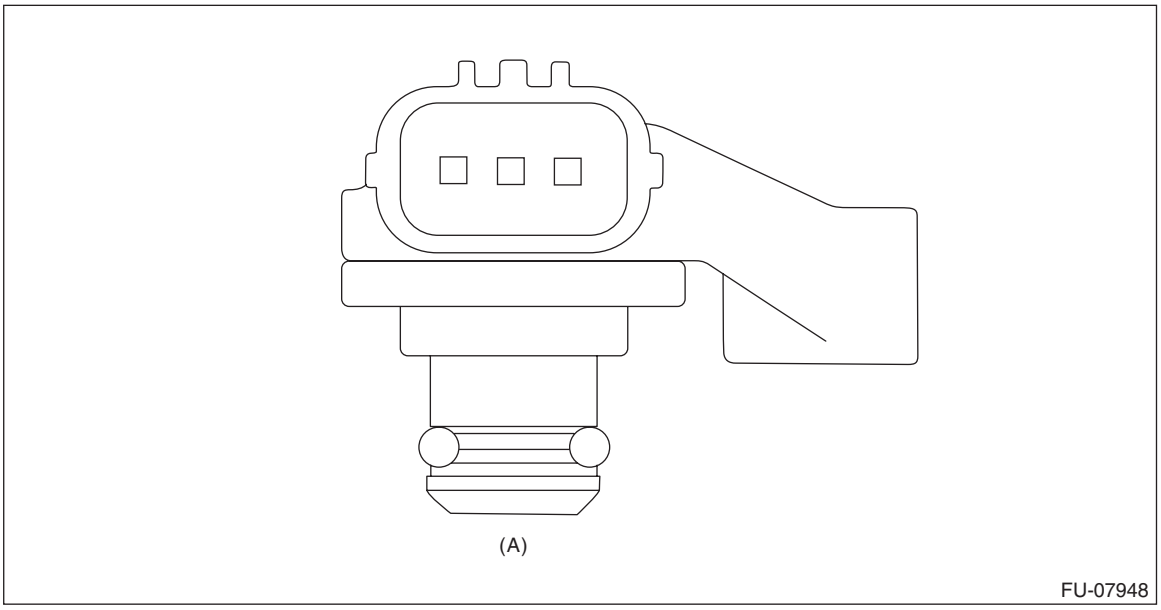


3) Check the voltage at a normal atmospheric pressure.

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

Terminal No.	Standard
2 (+) and 1 (–)	Approx. 4.2 V (when 25°C (77°F))

4) Connect the Mighty Vac to the pressure port (A) of manifold absolute pressure sensor.



5) Check the voltage when generating vacuum using Mighty Vac.

CAUTION:
Do not apply vacuum of less than –88 kPa (–0.9 kg/cm^2, –12.8 psi). Doing so may damage the manifold absolute pressure sensor.

NOTE:
When vacuum occurs at the pressure port of manifold absolute pressure sensor, the voltage will drop from the value as in step 3).

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

15.Fuel Injector

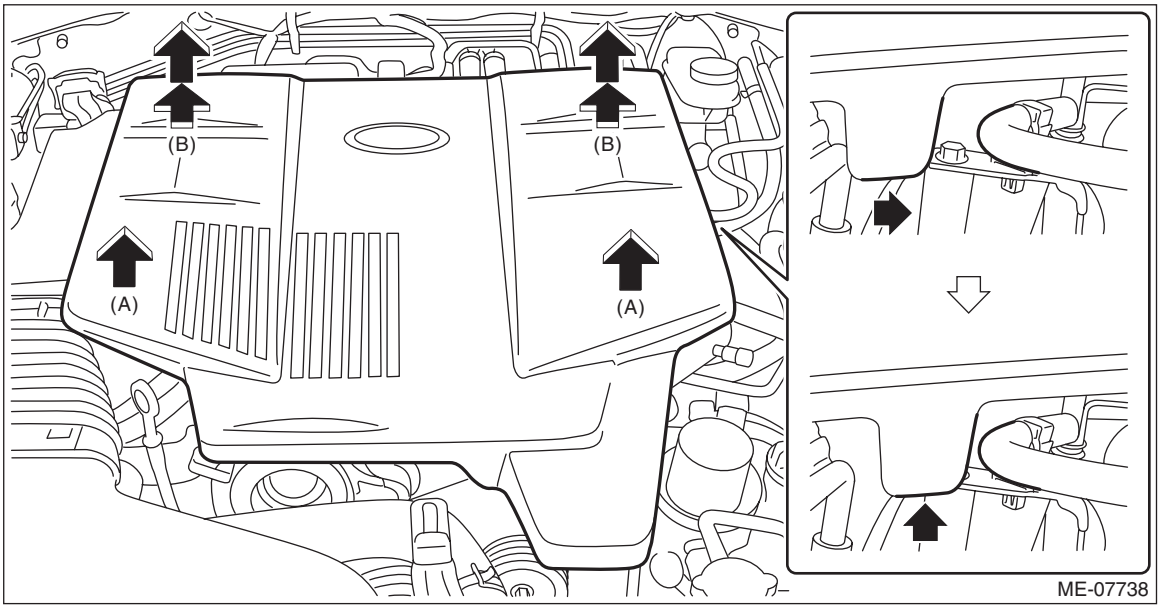
A: REMOVAL

1) Release the fuel pressure. <Ref. to FU(H4DO(HEV))-98, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

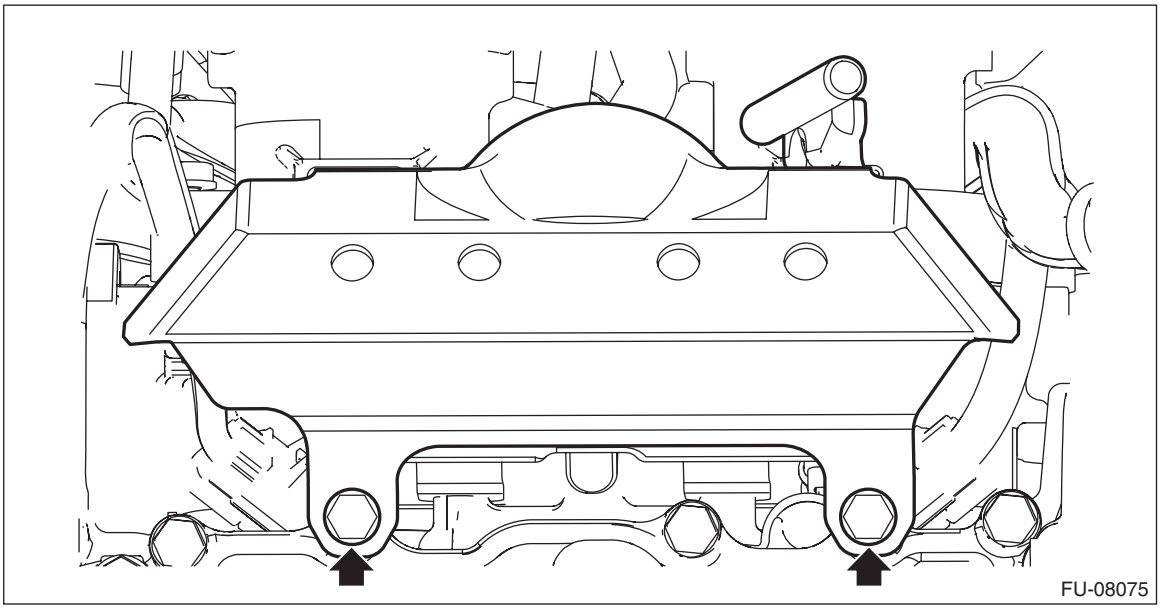
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

3) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



4) Open the fuel filler lid and remove the fuel filler cap.
5) Remove the intake duct. (RH side only) <Ref. to IN(H4DO(HEV))-16, REMOVAL, Intake Duct.>
6) Remove the intake manifold protector RH.

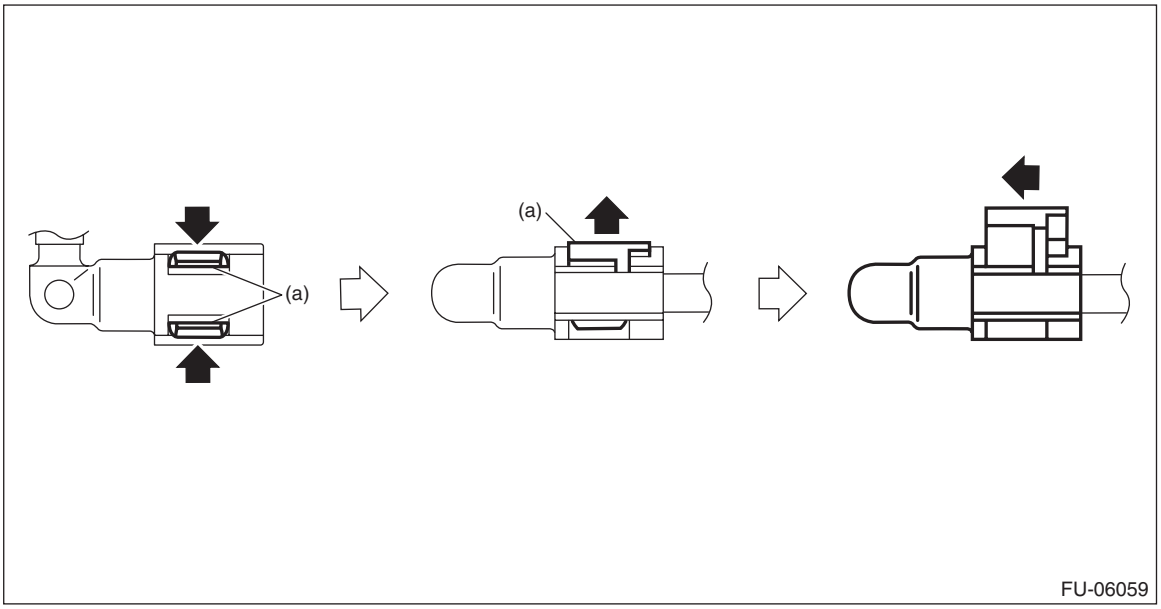


7) Disconnect the connectors (A) from fuel injector.

8) Disconnect the quick connector (B) of the fuel delivery pipe from the fuel pipe.

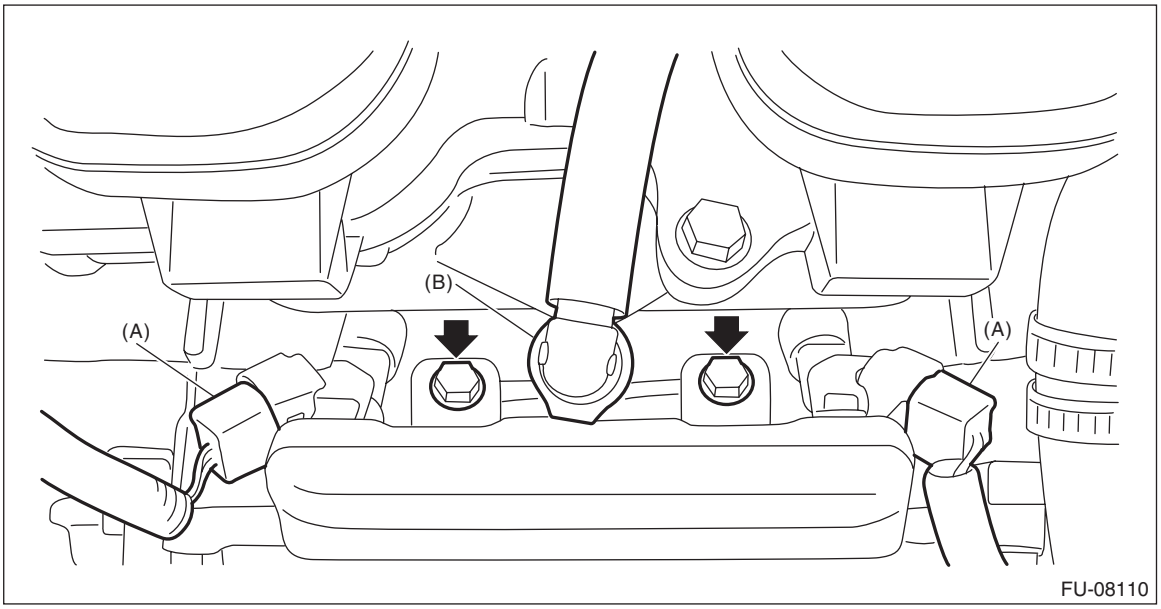
CAUTION:
- **Be careful not to spill fuel.**
- **Catch the fuel from the pipes using a container or cloth.**

NOTE:
Disconnect the quick connector as shown in the figure.

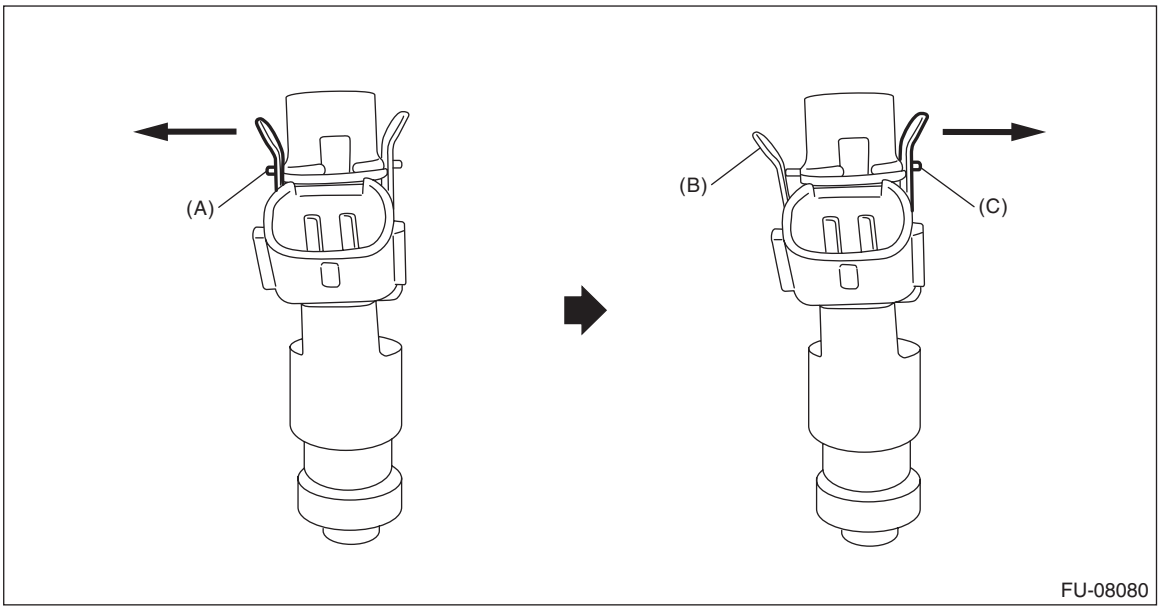


(a) Slider

9) Remove the bolts which hold fuel pipe onto the cam carrier, and remove the fuel pipe together with the fuel injector.



10) Remove the fuel injector from the fuel pipe.
(1) Remove the fuel injector holder from one side of flange section (A) of the fuel pipe.
(2) While holding one side of fuel injector holder (B) you removed in step (1) by finger, remove the other side of fuel injector holder from the flange section (C) of the fuel pipe.

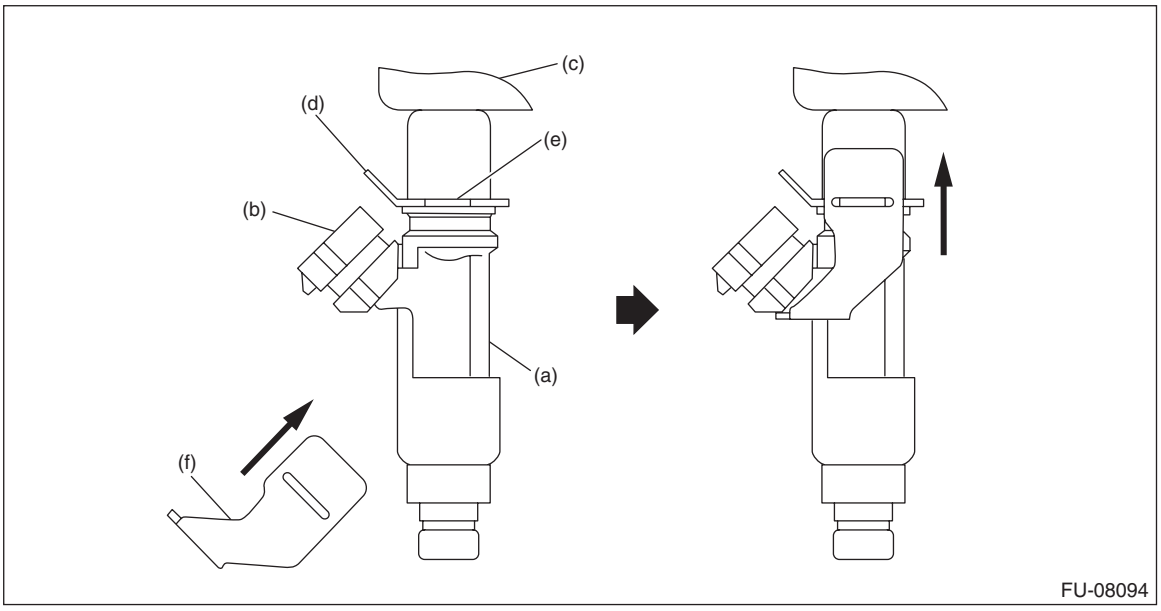


(3) Remove the fuel injector holder from the fuel pipe and fuel injector, and remove the fuel injector from the fuel pipe.
(4) Remove the fuel injector on the LH side in the same manner.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
- Use new fuel injector holder, O-rings, rubbers and seal rings.
- Install the fuel injector so that the connector joint faces the connector rotation stopper side of the fuel pipe.
- Securely put the flange section of fuel pipe into the groove of fuel injector holder.

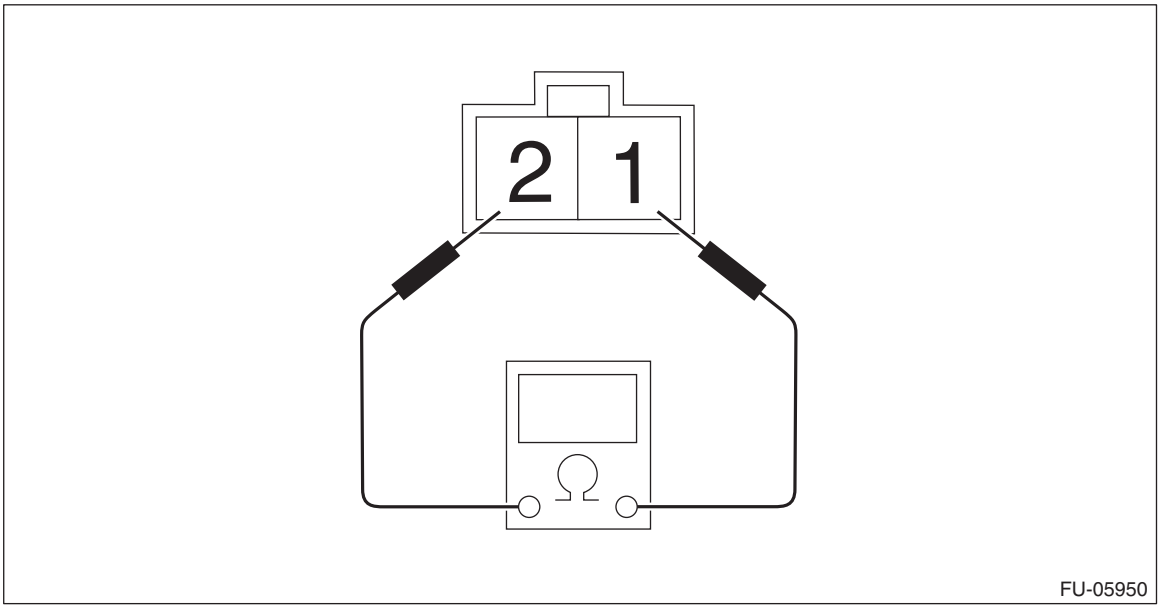


(a)	Fuel injector	(b)	Connector joint	(c)	Fuel pipe
(d)	Connector rotation stopper	(e)	Flange section	(f)	Fuel injector holder

Tightening torque:
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

C: 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. 12.0 Ω (when 20°C (68°F))

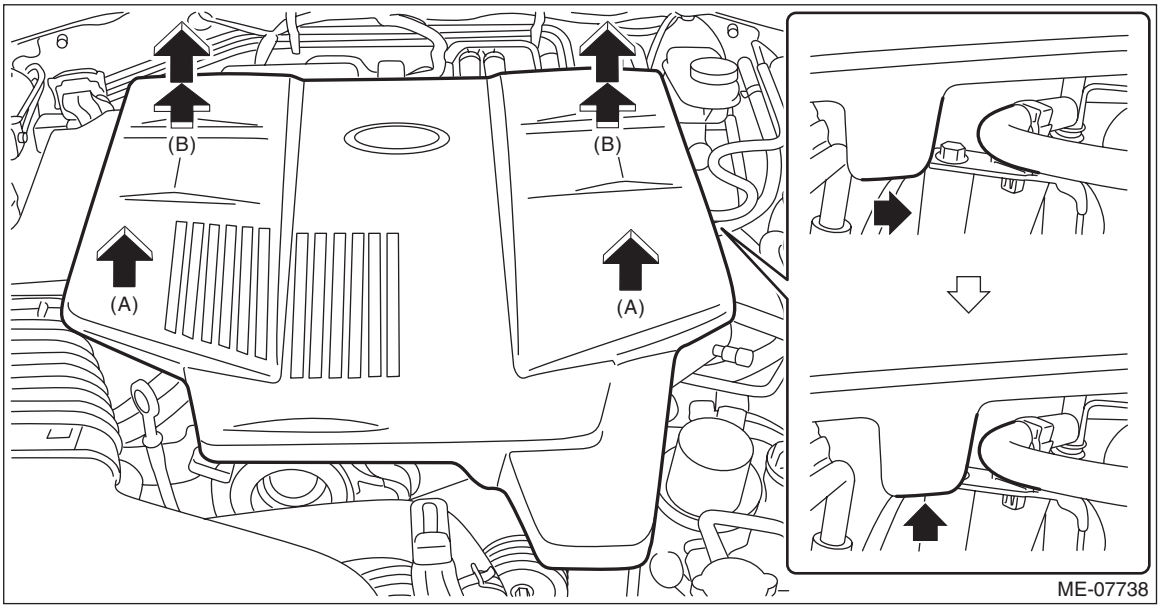
16.Tumble Generator Valve Assembly

A: REMOVAL

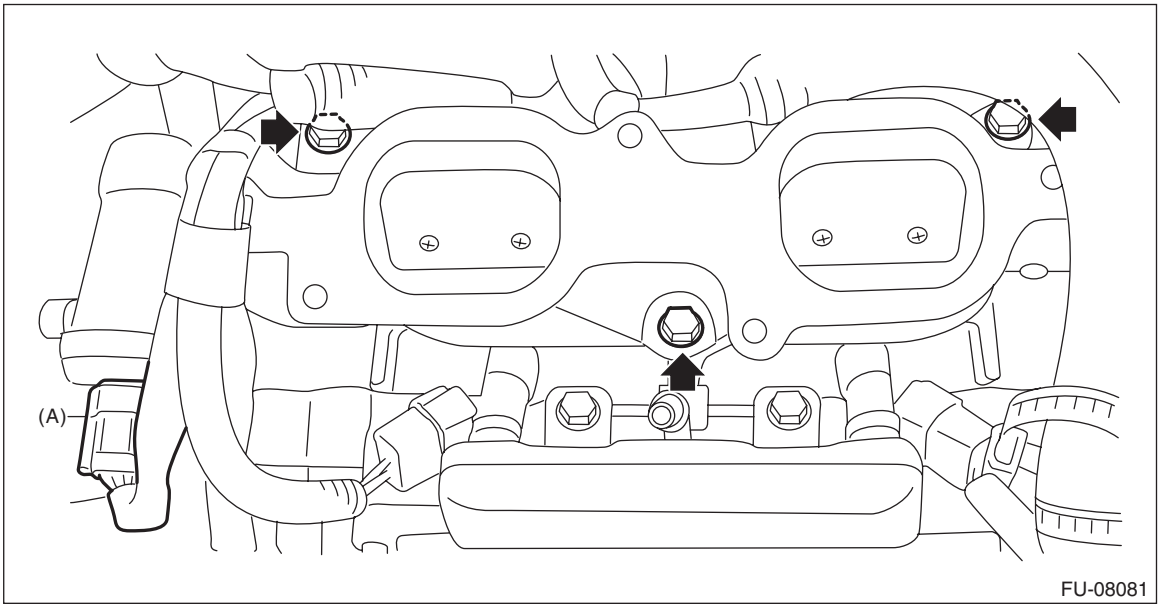
1) Release the fuel pressure. <Ref. to FU(H4DO(HEV))-98, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
3) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

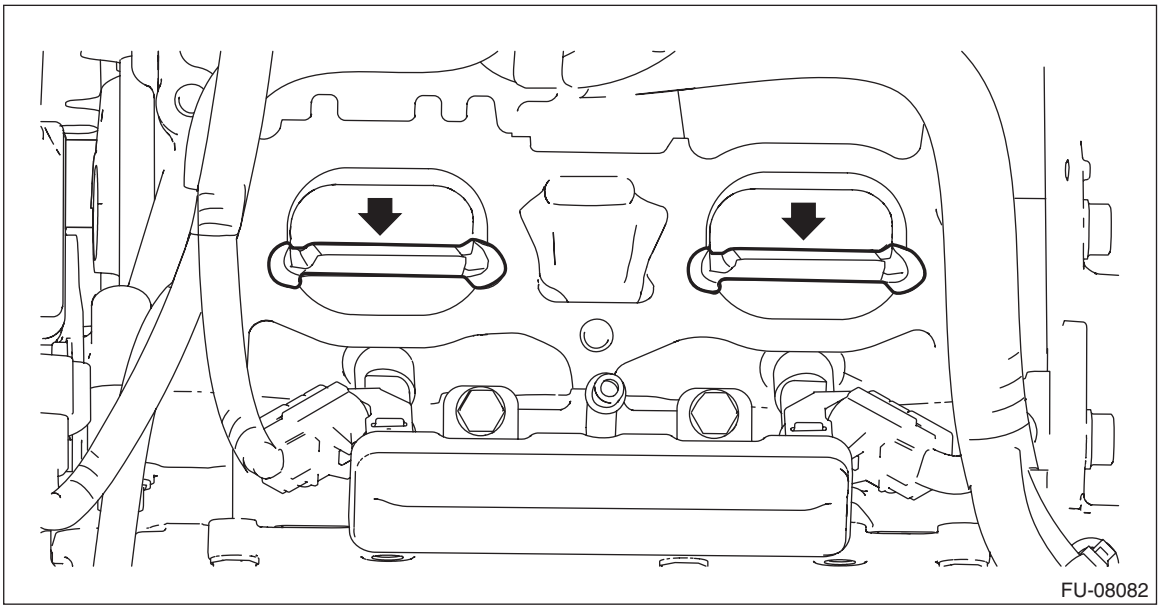
NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



4) Open the fuel filler lid and remove the fuel filler cap.
5) Remove the intake manifold. <Ref. to FU(H4DO(HEV))-19, REMOVAL, Intake Manifold.>
6) Disconnect the connector (A) from the tumble generator valve assembly RH.
7) Remove the tumble generator valve assembly RH from the cylinder head.



8) Remove the cylinder head plate from cylinder head RH.



9) Remove the tumble generator valve assembly LH and cylinder head plate in the same manner.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.

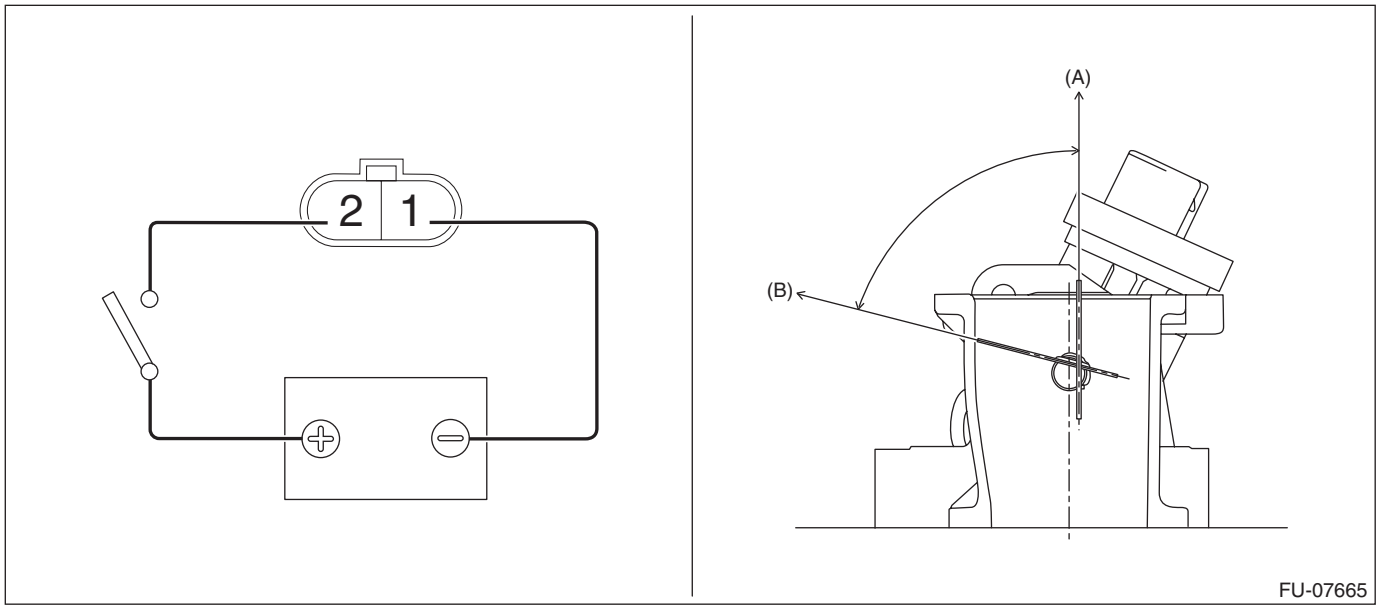
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)

C: INSPECTION

1. CHECK MOTOR

1) Connect the battery positive terminal to terminal No. 2 and the battery ground terminal to terminal No. 1, and check that the valve is fully opened on LH side and the valve is fully closed on RH side.

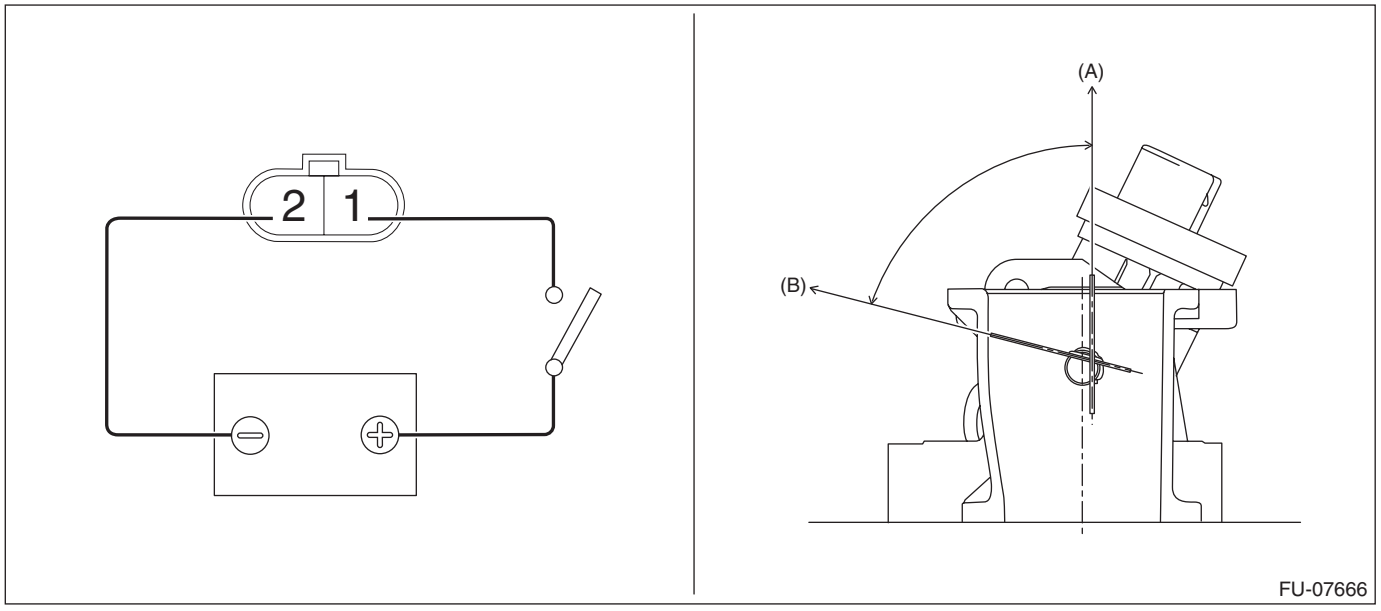
CAUTION:
Do not power the motor for more than 10 seconds.



(A) Full open (B) Full closed

2) Connect the battery positive terminal to terminal No. 1 and the battery ground terminal to terminal No. 2, and check that the valve is fully closed on LH side and the valve is fully opened on RH side.

CAUTION:
Do not power the motor for more than 10 seconds.



(A) Full open (B) Full closed

2. OTHER INSPECTIONS

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

17.Tumble Generator Valve Actuator

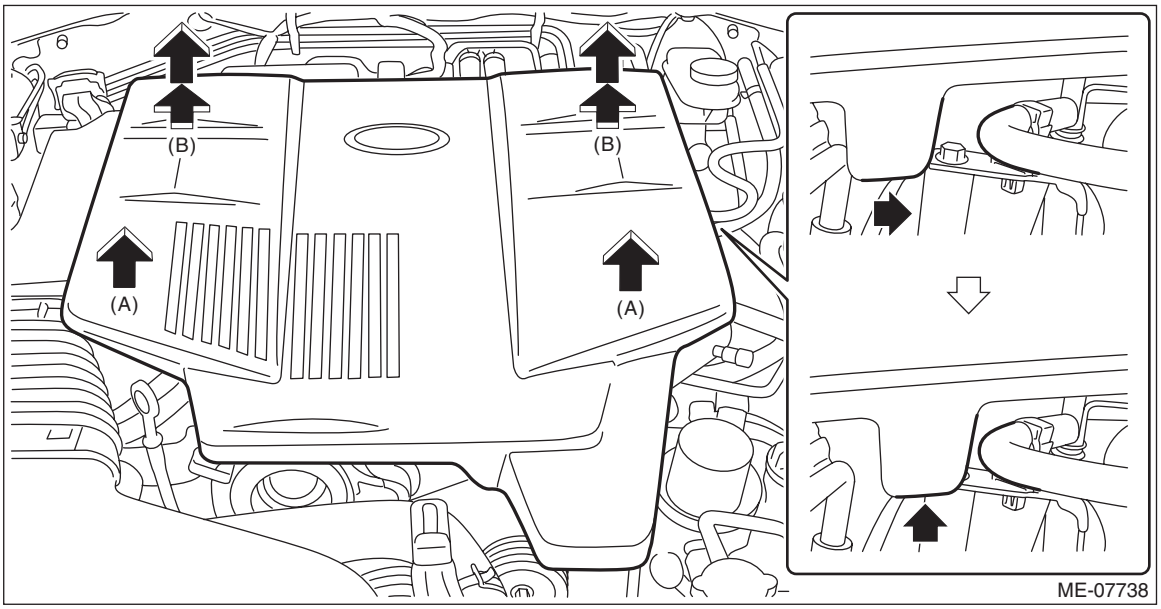
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

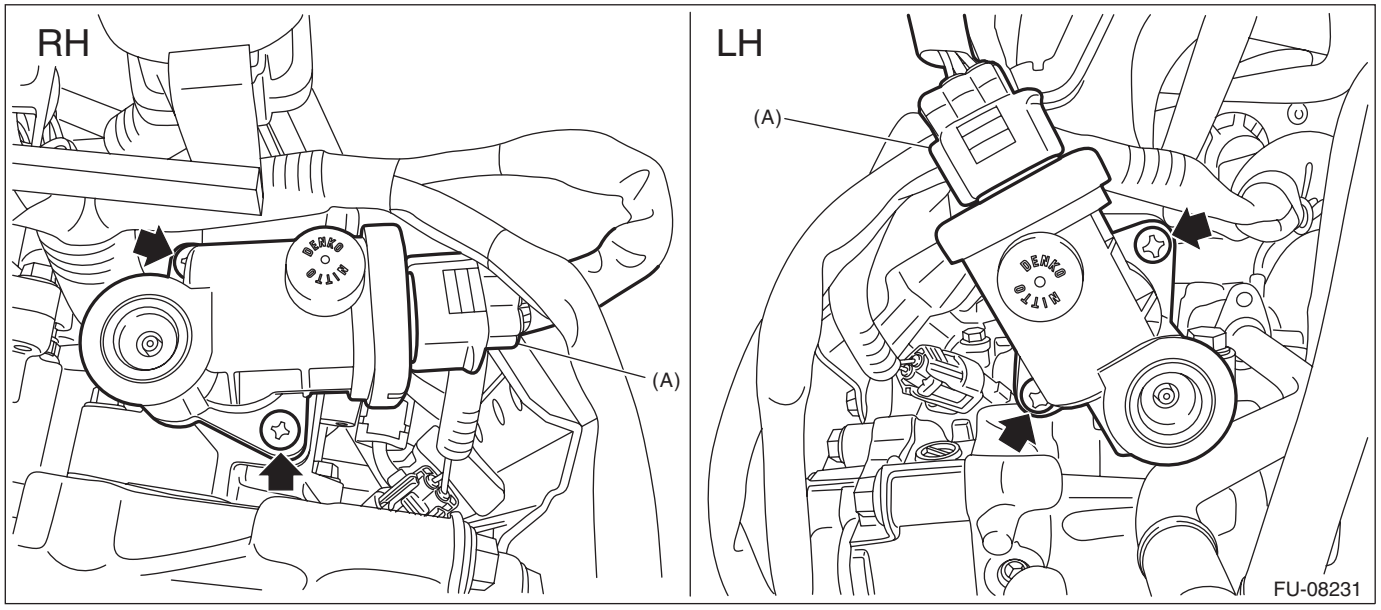
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



3) Disconnect the connector (A) from tumble generator valve assembly, and remove the tumble generator valve actuator.

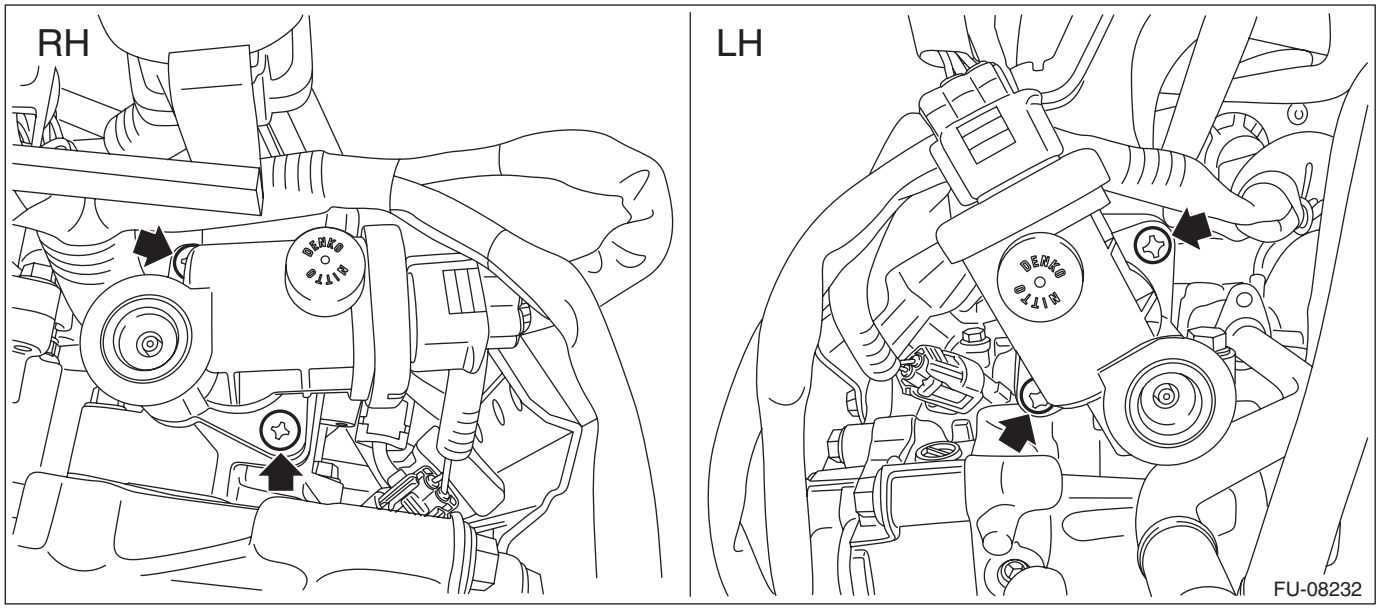


B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.

Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)



C: INSPECTION

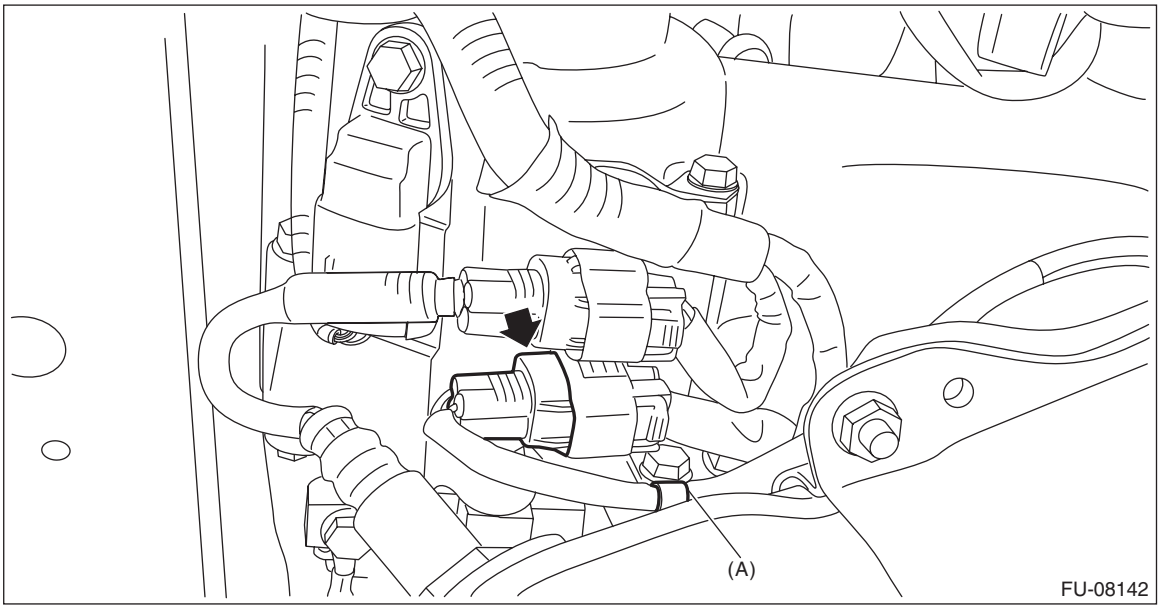
1) Check that the tumble generator valve actuator has no deformation, cracks or other damages.
2) Check tumble generator valve actuator for contamination or clogging.

18.Front Oxygen (A/F) Sensor

A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

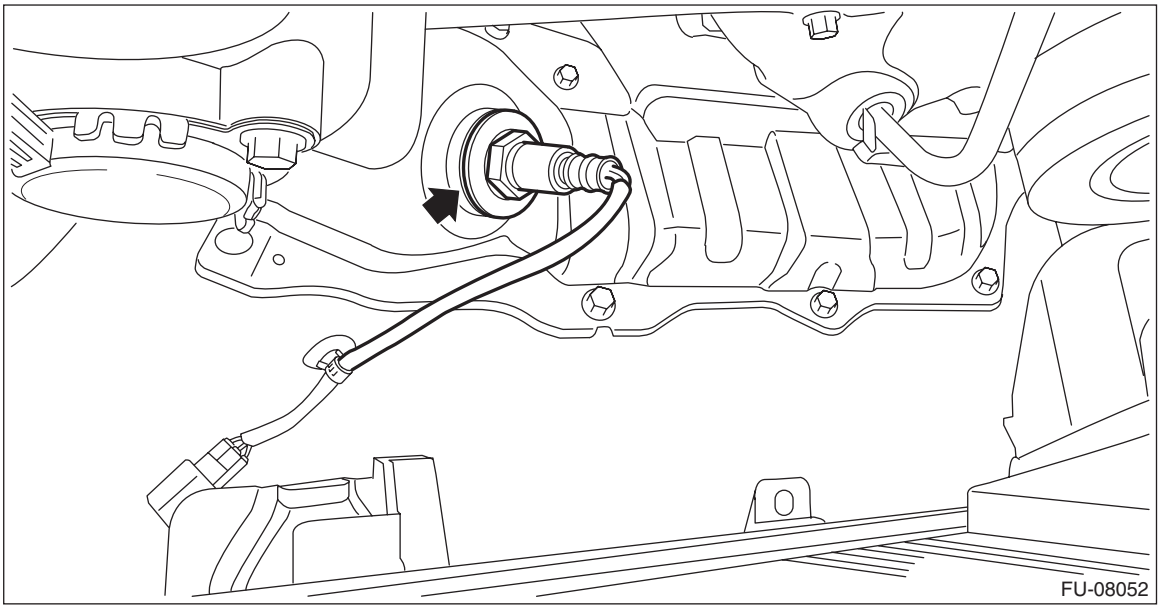
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Remove the radiator sub fan and fan motor assembly. <Ref. to CO(H4DO(w/o HEV))-93, REMOVAL, Radiator Sub Fan and Fan Motor.>
3) Lift up the vehicle.
4) Remove the under cover. <Ref. to EI-32, REMOVAL, Front Under Cover.>
5) Disconnect the front oxygen (A/F) sensor connector, and remove the clip (A) holding the front oxygen (A/F) sensor harness.



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

8) 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.



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.

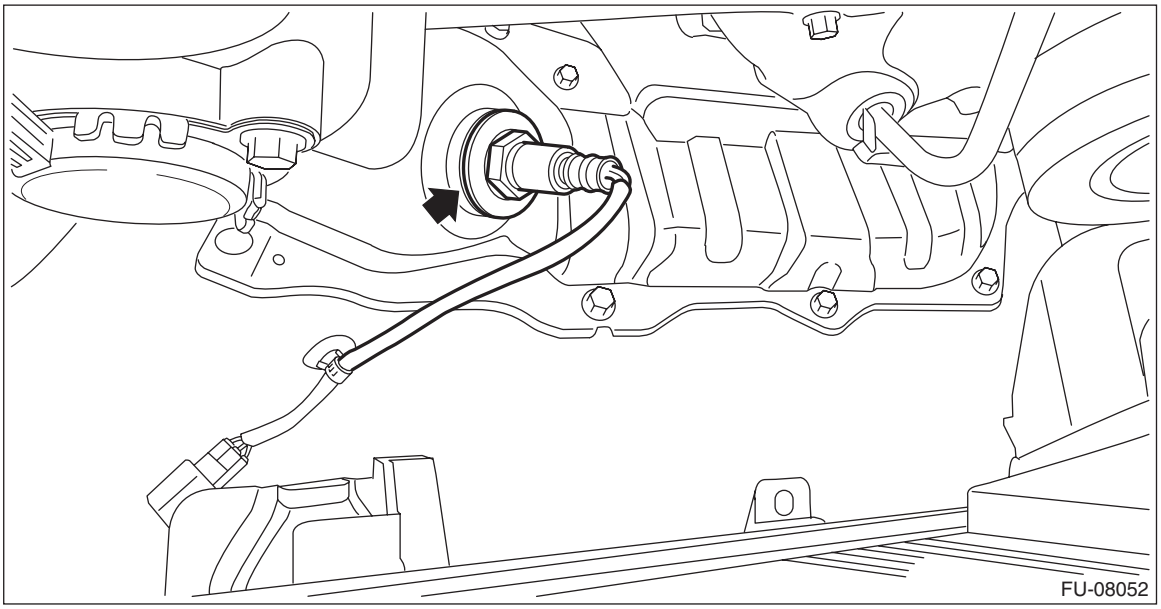
1) Before installing front oxygen (A/F) sensor, apply anti-seize compound only to the threaded portion of front oxygen (A/F) sensor to make the next removal easier.

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

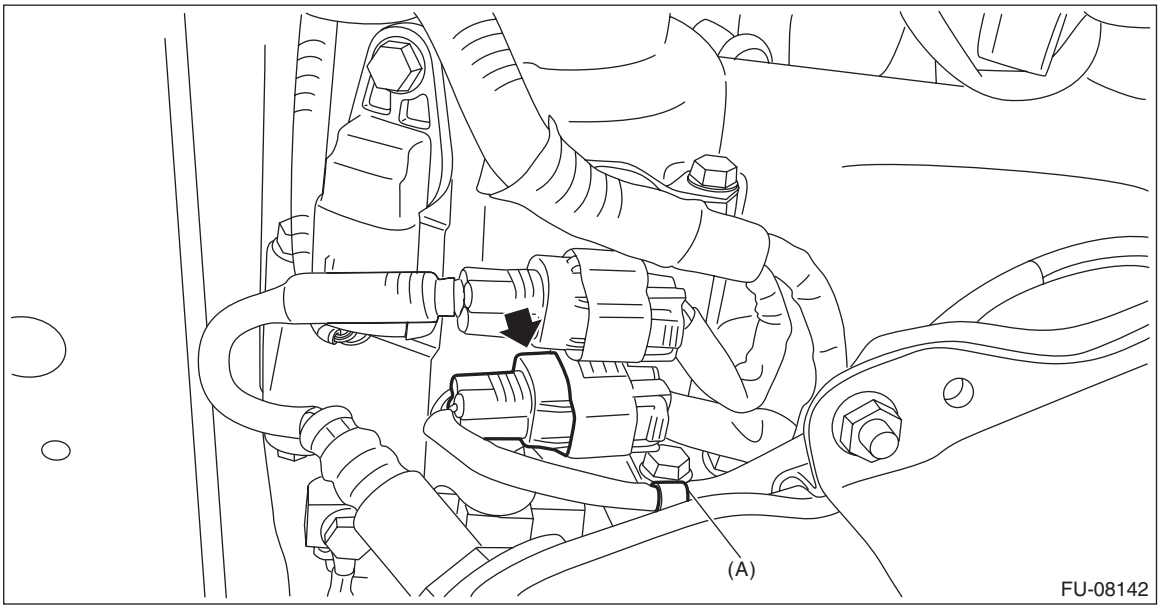
Anti-seize compound:
NEVER-SEEZ NSN, JET LUBE SS-30 or equivalent

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

Tightening torque:
21 N·m (2.1 kgf-m, 15.5 ft-lb)



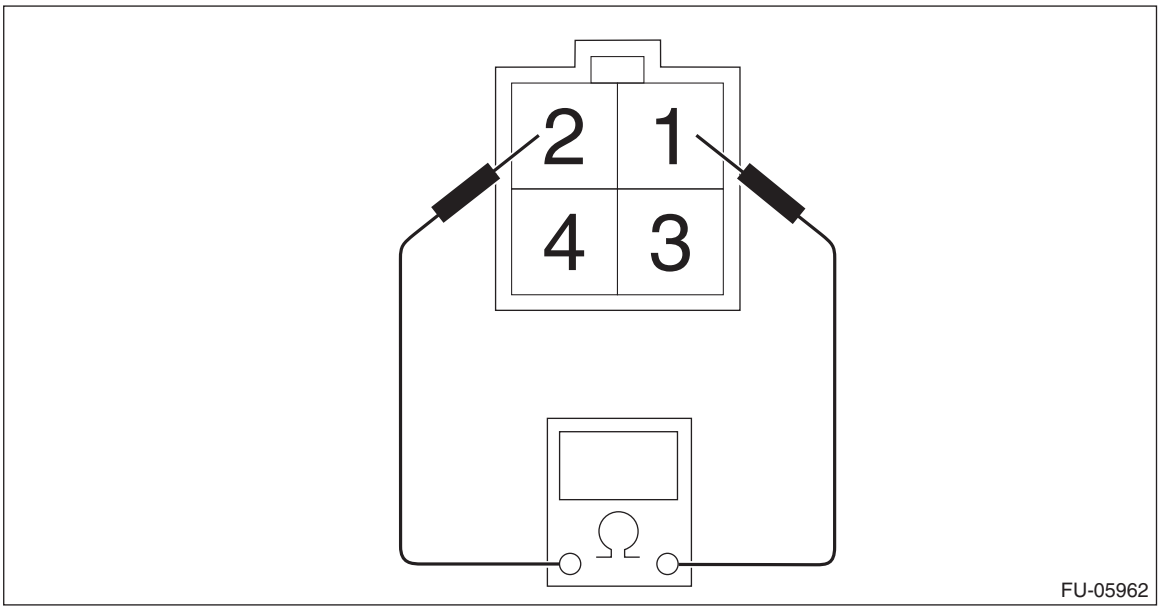
3) Lift up the vehicle.
4) Connect the front oxygen (A/F) sensor connector, and secure the front oxygen (A/F) sensor harness by using the clip (A).



5) Install the under cover. <Ref. to EI-32, INSTALLATION, Front Under Cover.>
6) Lower the vehicle.
7) Install the radiator sub fan and fan motor assembly. <Ref. to CO(H4DO(w/o HEV))-94, INSTALLATION, Radiator Sub Fan and Fan Motor.>
8) Connect the battery ground terminal. <Ref. to NT-5, BATTERY, NOTE, Note.>

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.



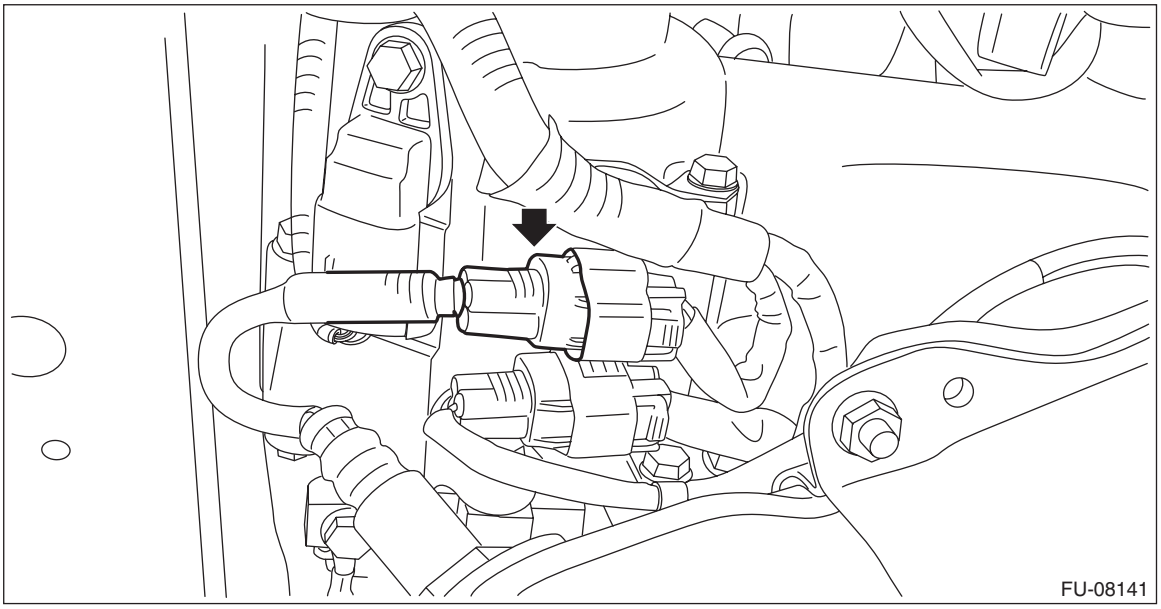
Terminal No.	Standard
1 and 2	$2.0^{+0.42}_{-0.2}$ Ω (when 20°C (68°F))

19.Rear Oxygen Sensor

A: REMOVAL

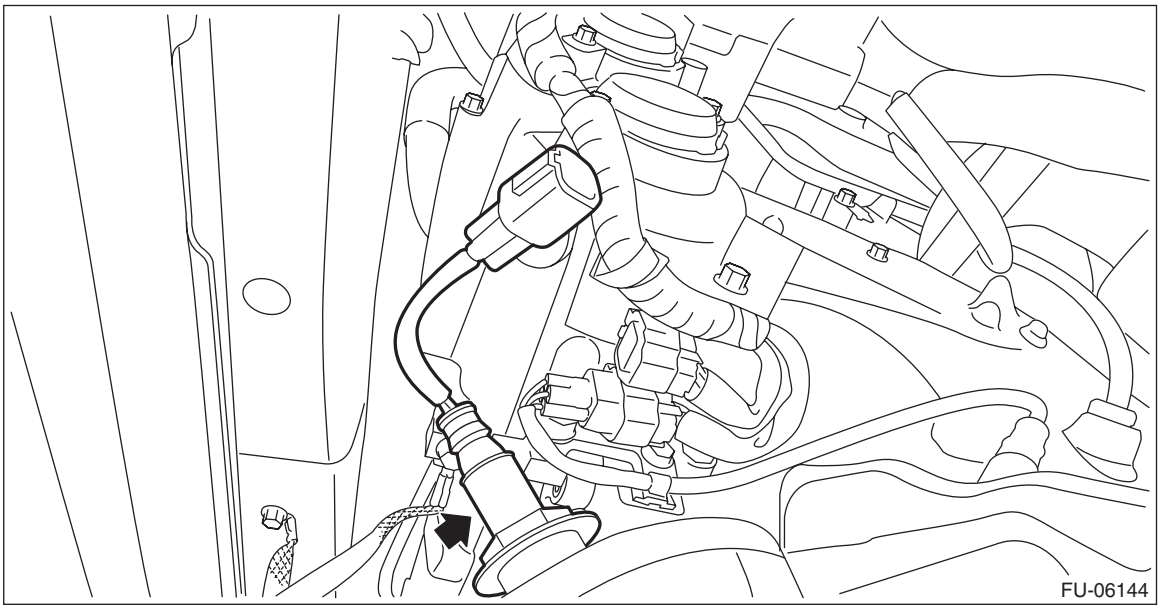
1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Lift up the vehicle.
3) Remove the under cover. <Ref. to EI-32, REMOVAL, Front Under Cover.>
4) Disconnect the rear oxygen sensor connector.



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.



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.

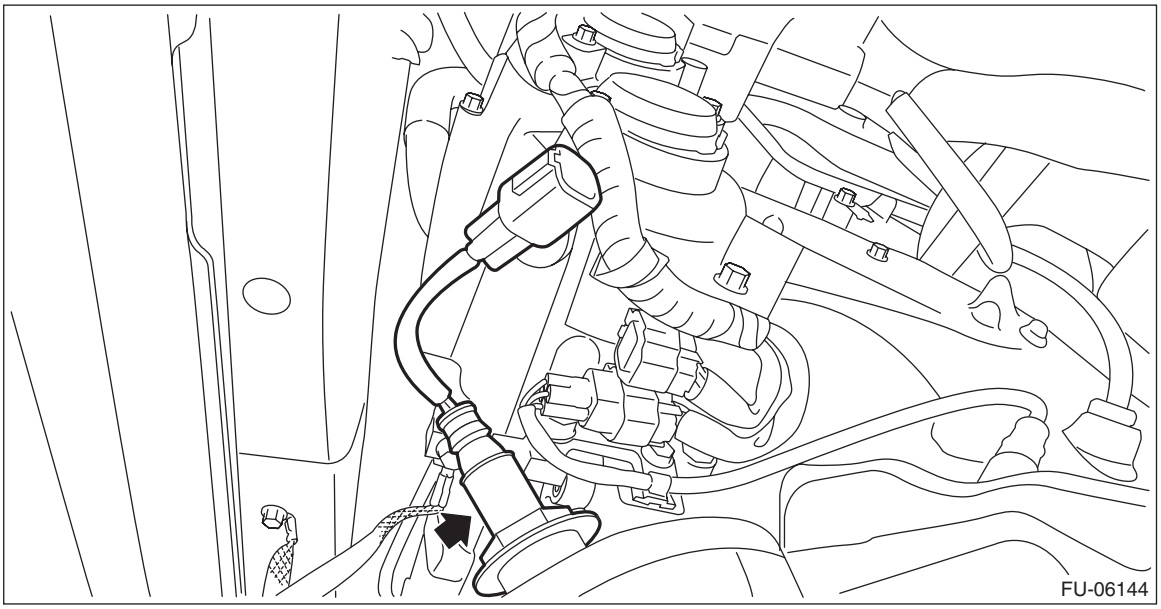
1) Before installing rear oxygen sensor, apply the anti-seize compound only to the threaded portion of rear oxygen sensor to make the next removal easier.

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

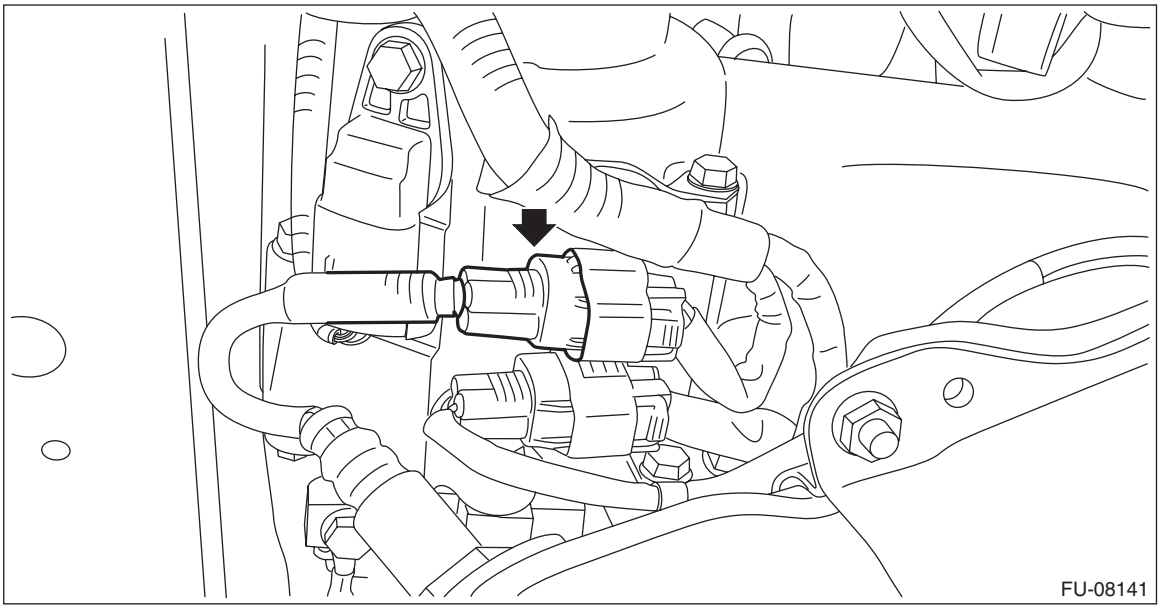
2) Install the rear oxygen sensor.

Tightening torque:
21 N·m (2.1 kgf-m, 15.5 ft-lb)



3) Connect the rear oxygen sensor connector.

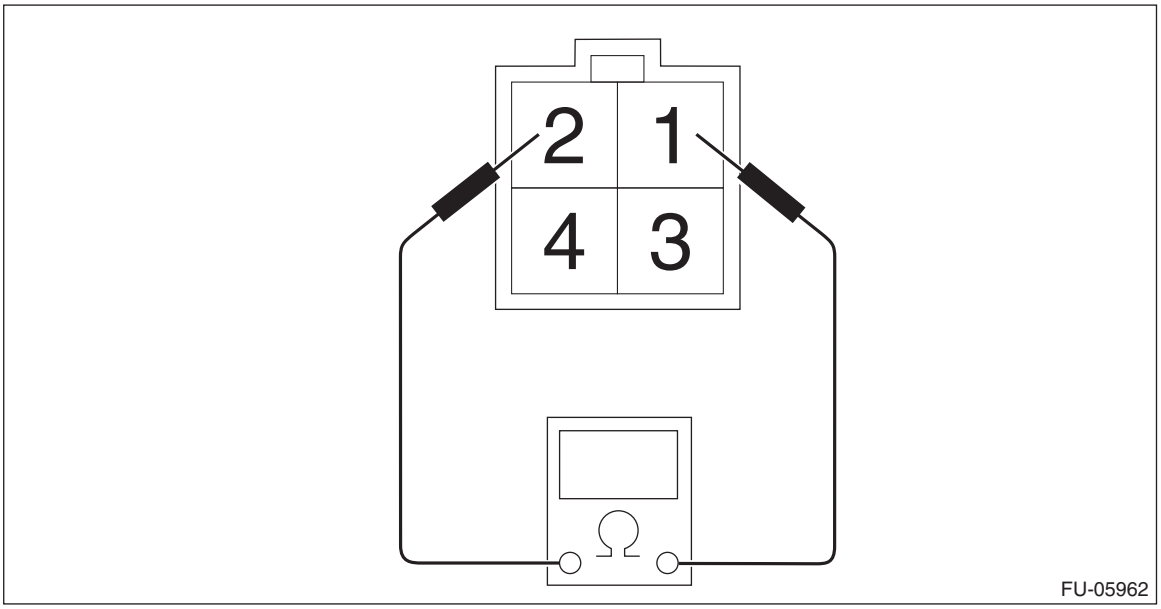
NOTE:
Be careful not to allow the rear oxygen sensor harness to interfere with the sensor unit and the front oxygen (A/F) sensor harness.



4) Install the under cover. <Ref. to EI-32, INSTALLATION, Front Under Cover.>
5) Lower the vehicle.
6) Connect the battery ground terminal. <Ref. to NT-5, BATTERY, NOTE, Note.>

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	$5.6^{+1.7}_{-0.6}$ Ω (when 20°C (68°F))

20.Engine Control Module (ECM)

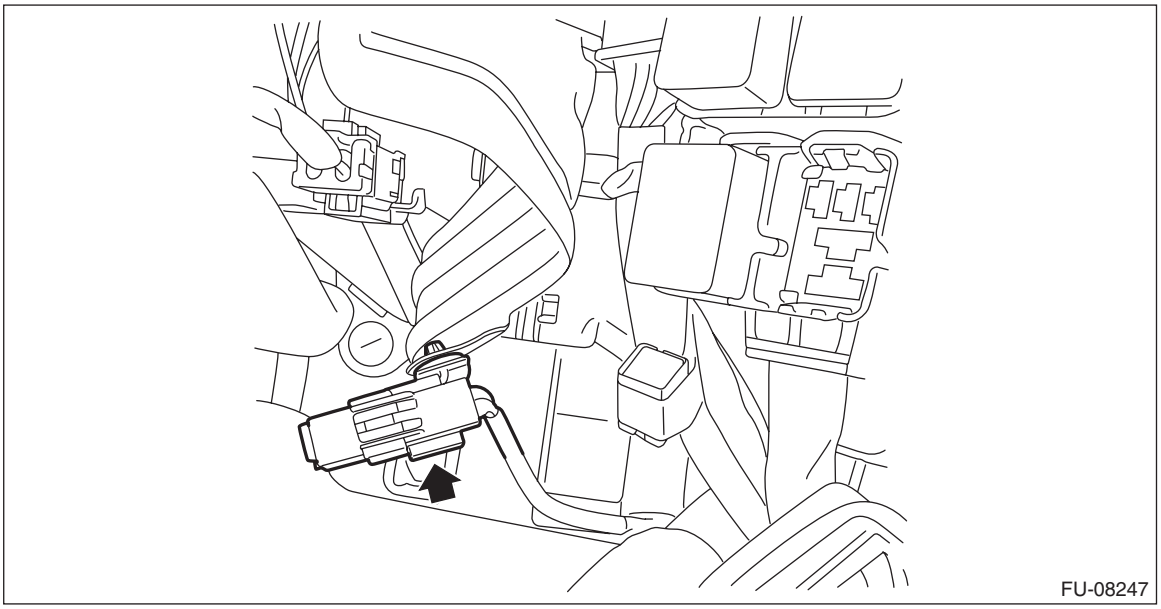
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

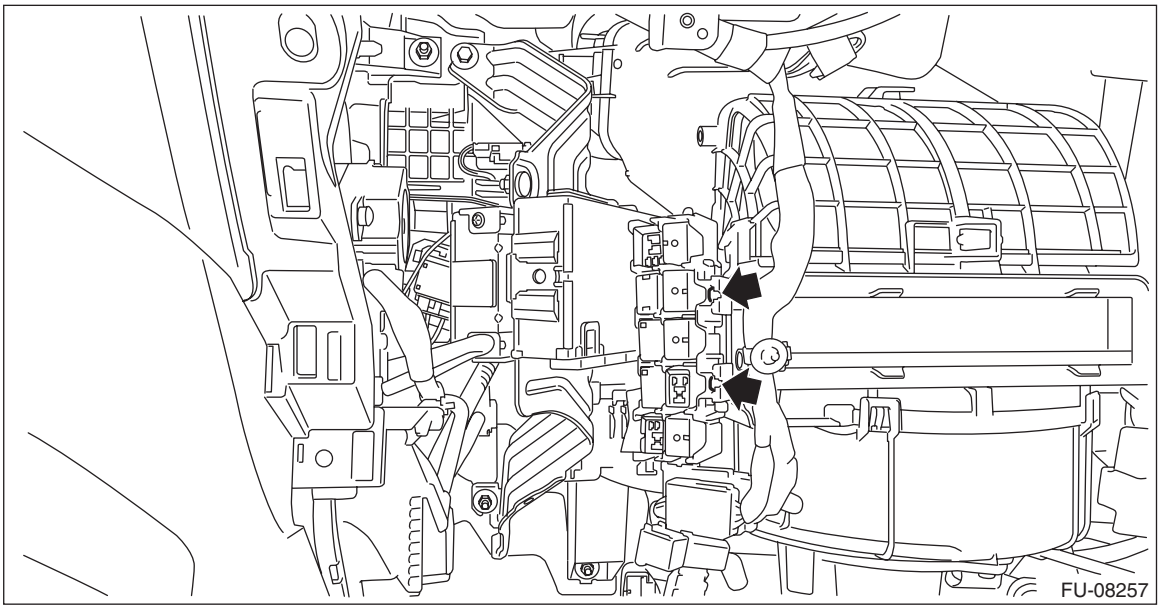
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Remove the glove box. <Ref. to EI-78, REMOVAL, Glove Box.>
3) Disconnect the connectors from ECM and the hybrid powertrain control module.

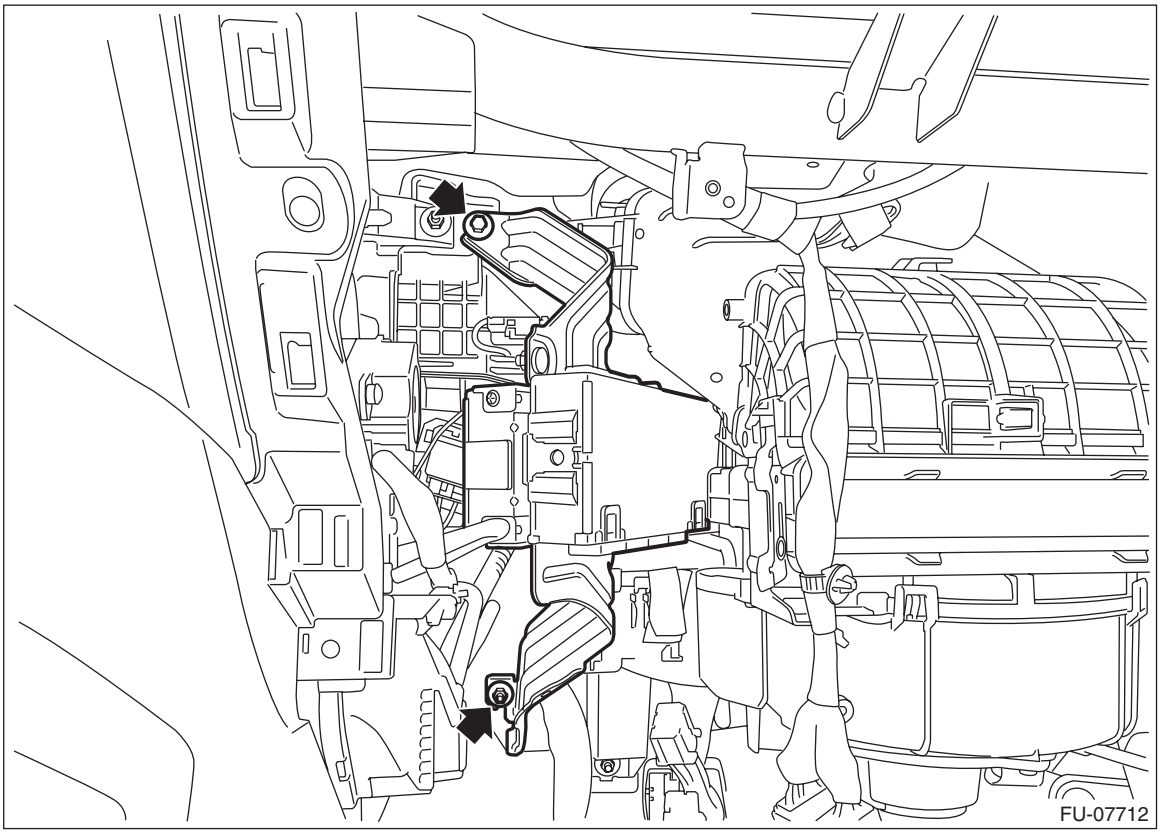
4) Remove the clip securing the linear solenoid relay from the bracket.



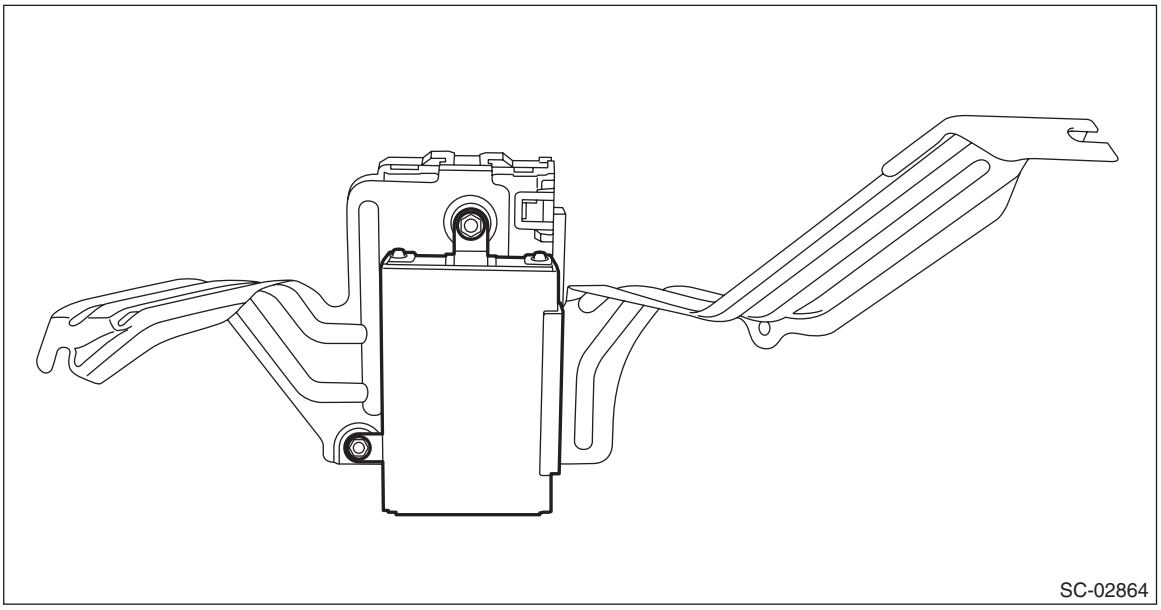
5) Push down the claws, and remove the relay block.



6) Remove the bolts and nuts, and remove the ECM.



7) Remove the hybrid powertrain control module.



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".)
• When the ECM has been replaced, be sure to perform the ACTGS calibration operation (perform ACTGS control system operation inspection). <Ref. to EN(H4DO HEV)(diag)-67, OPERATION, System Operation Check Mode.>
• If replacing ECM or the bracket, replace both parts with new parts at a time.
• After installing the bracket to ECM, do not separate the bracket.
• If the bracket has been installed to ECM in the wrong direction, replace both parts to new parts.

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:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

C: INSPECTION

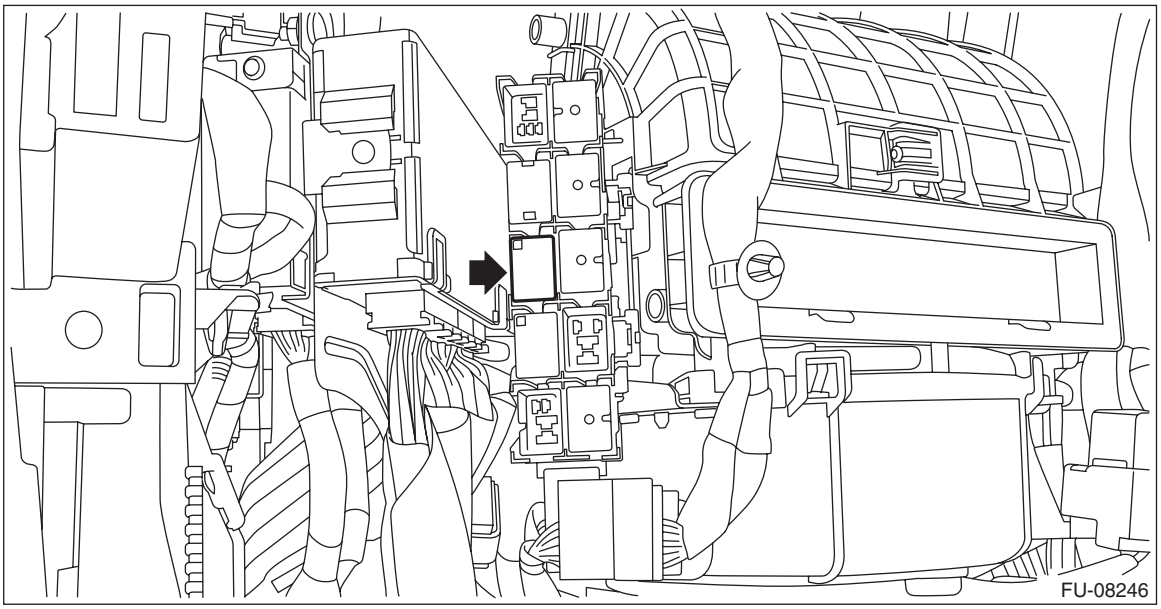
Check that the ECM has no deformation, cracks or other damages.

21.Main Relay

A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Remove the glove box. <Ref. to EI-78, REMOVAL, Glove Box.>
3) Remove the main relay from relay block.

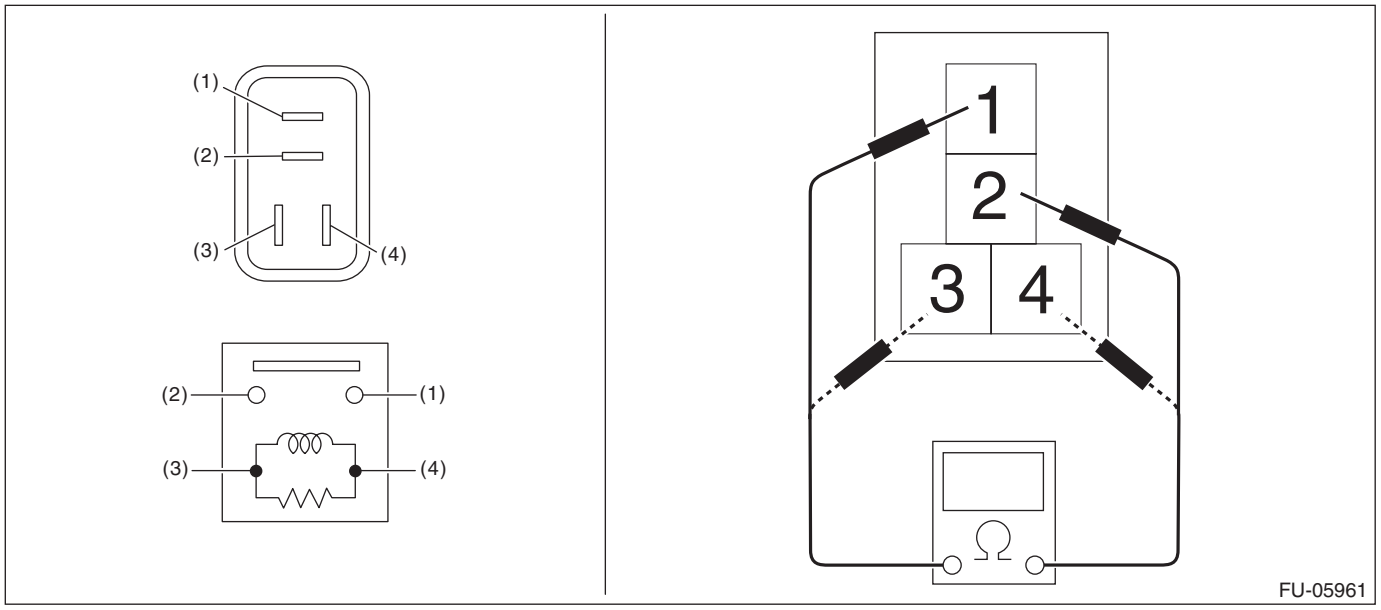


B: INSTALLATION

Install in the reverse order of removal.

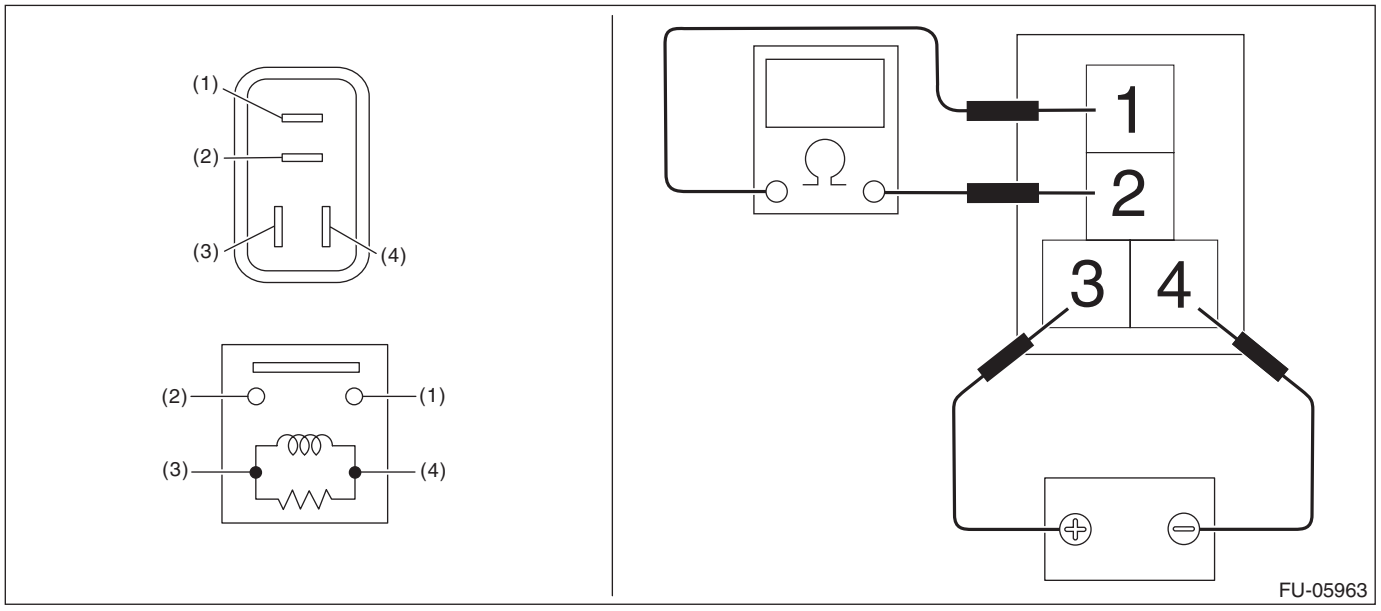
C: INSPECTION

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 MΩ or more
3 and 4	130.4 — 230.8 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 main relay terminals.



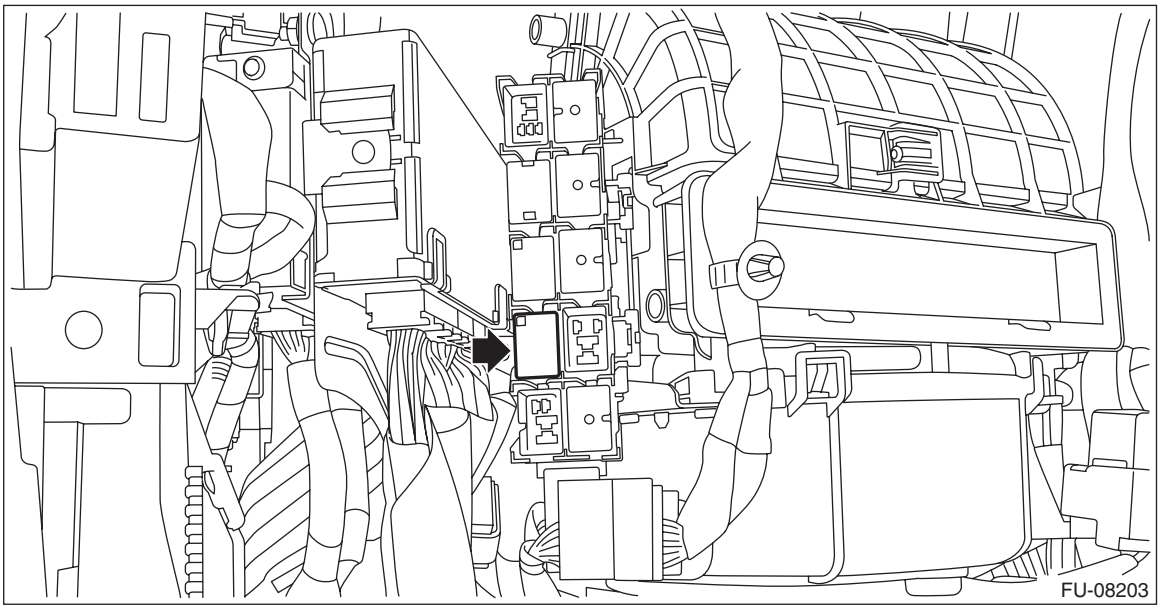
Terminal No.	Standard
1 and 2	Less than 1 Ω

22.IG Relay

A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Remove the glove box. <Ref. to EI-78, REMOVAL, Glove Box.>
3) Remove the IG relay from the relay block.

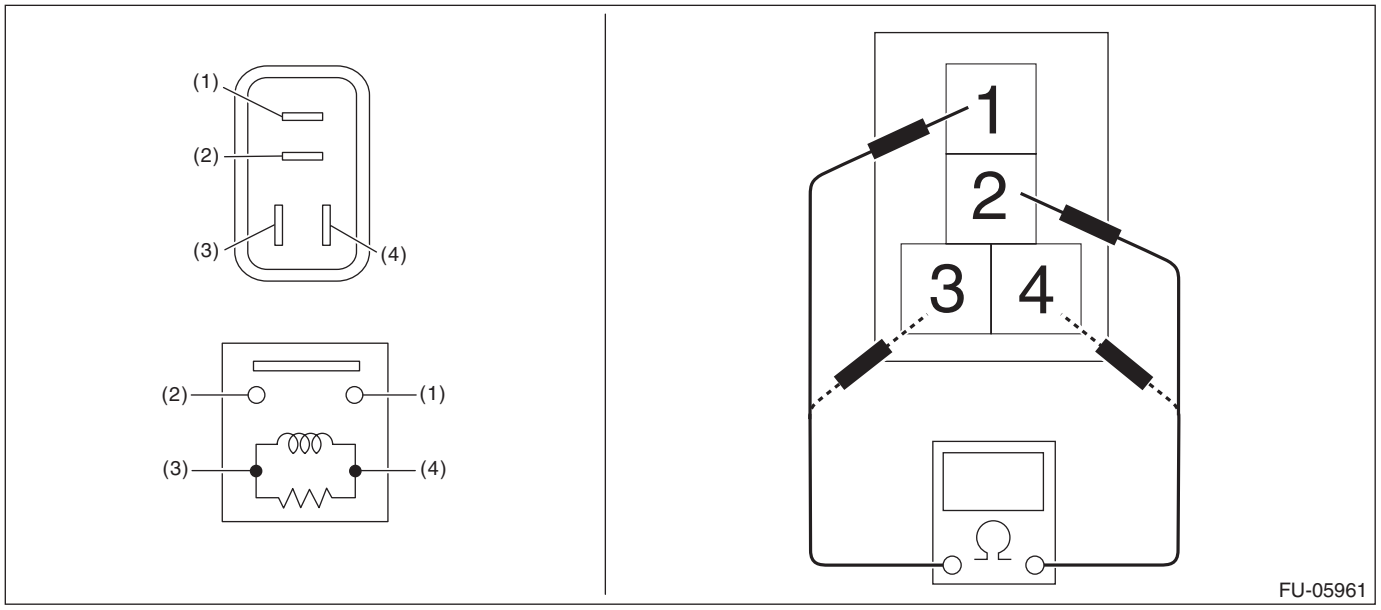


B: INSTALLATION

Install in the reverse order of removal.

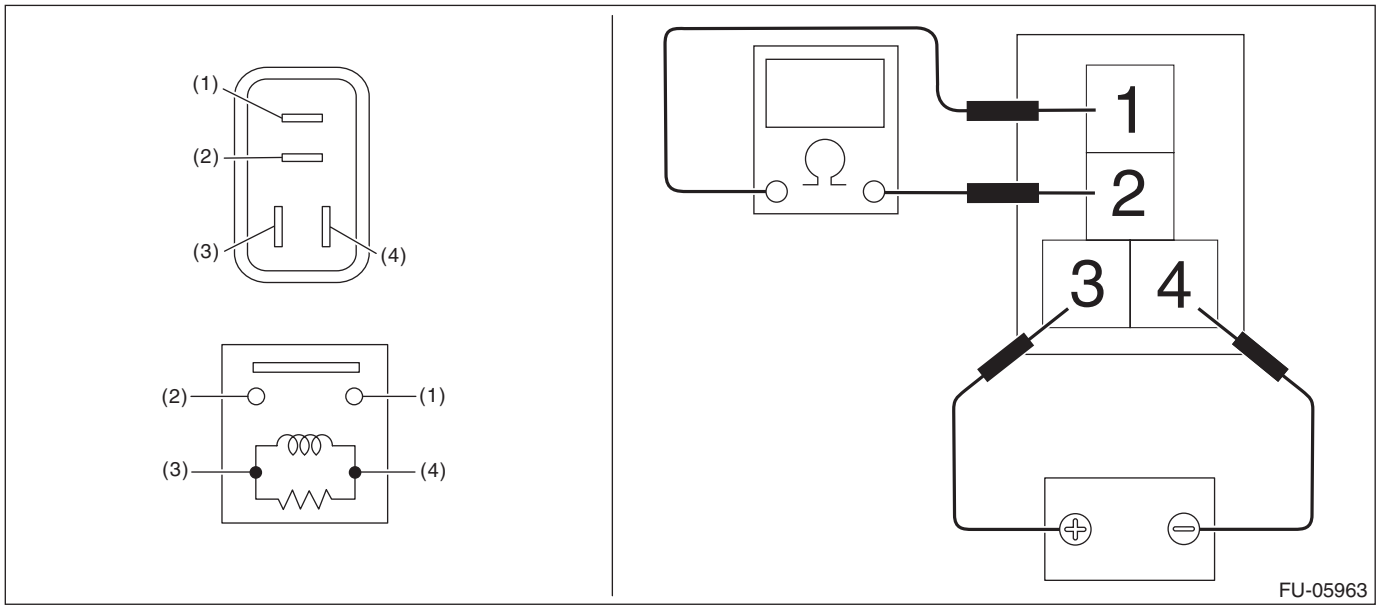
C: INSPECTION

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))

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.



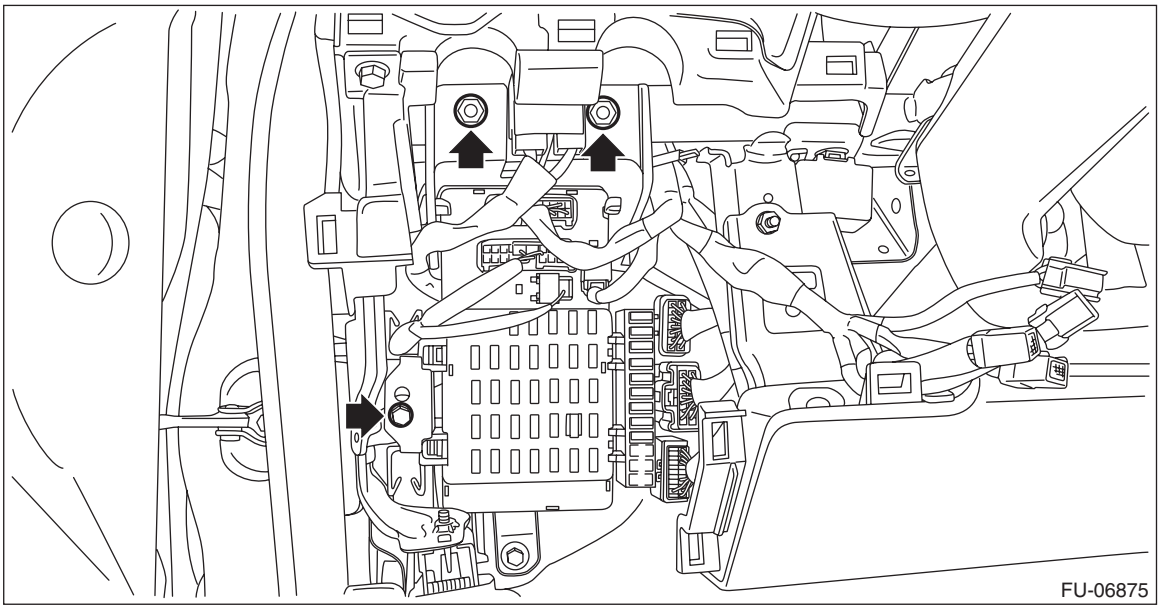
Terminal No.	Standard
1 and 2	Less than 1 Ω

23.Oxygen Sensor Relay

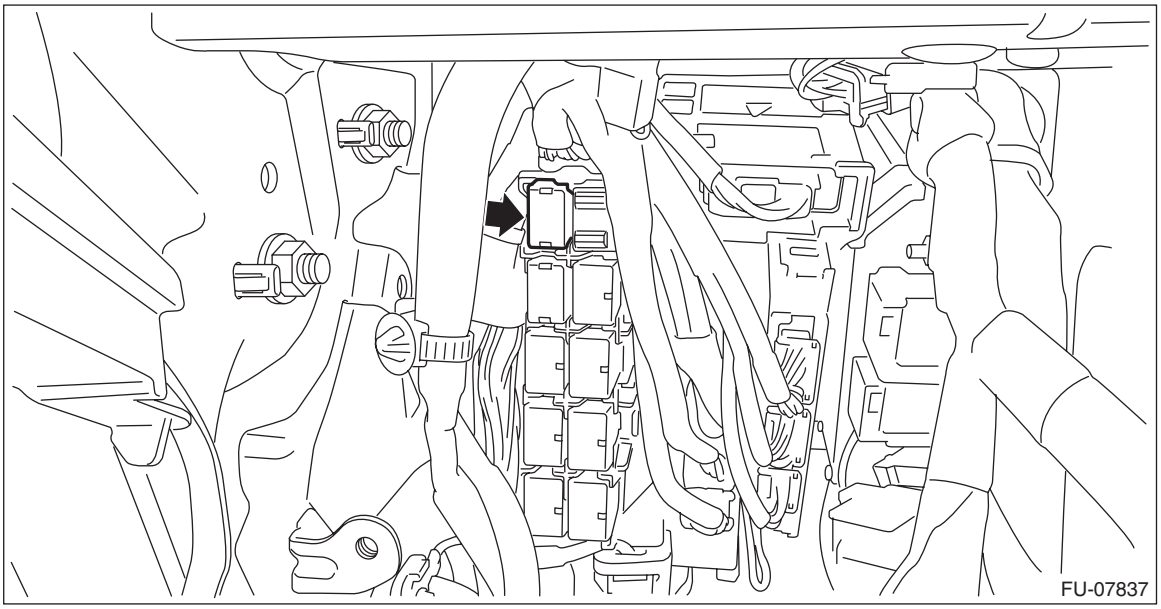
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Remove the instrument panel lower cover. <Ref. to EI-76, REMOVAL, Instrument Panel Lower Cover.>
3) Remove the bolts and nuts securing the fuse block and move down the fuse block.



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



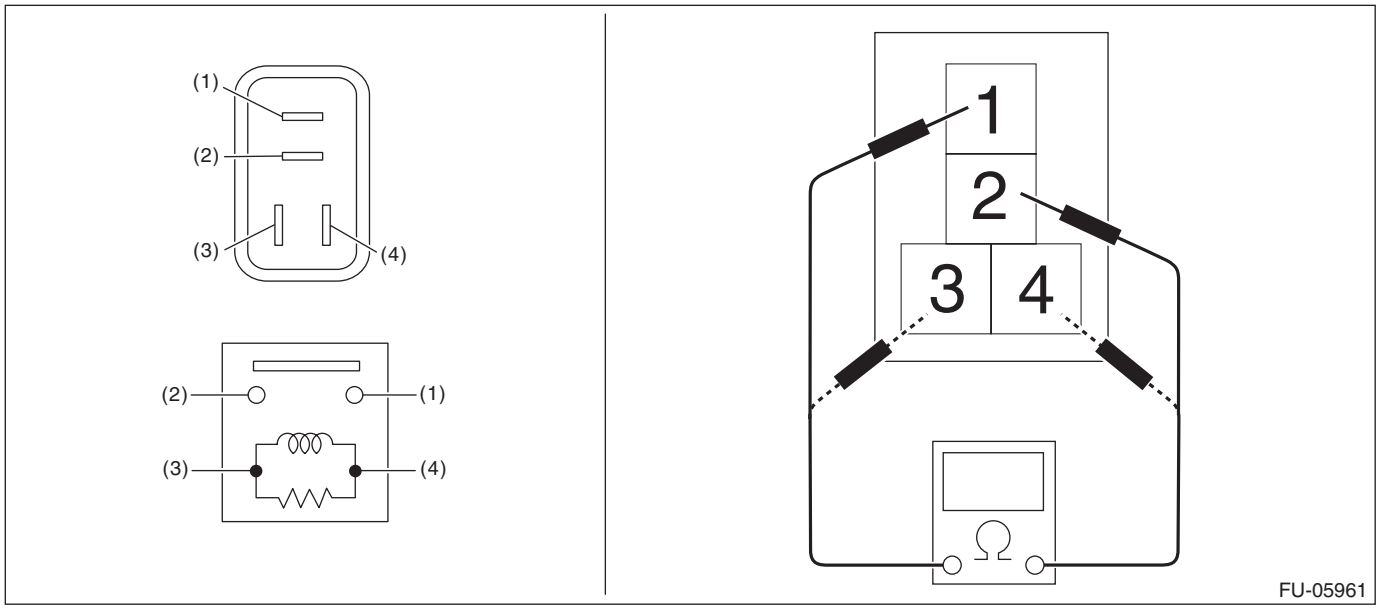
B: INSTALLATION

Install in the reverse order of removal.

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

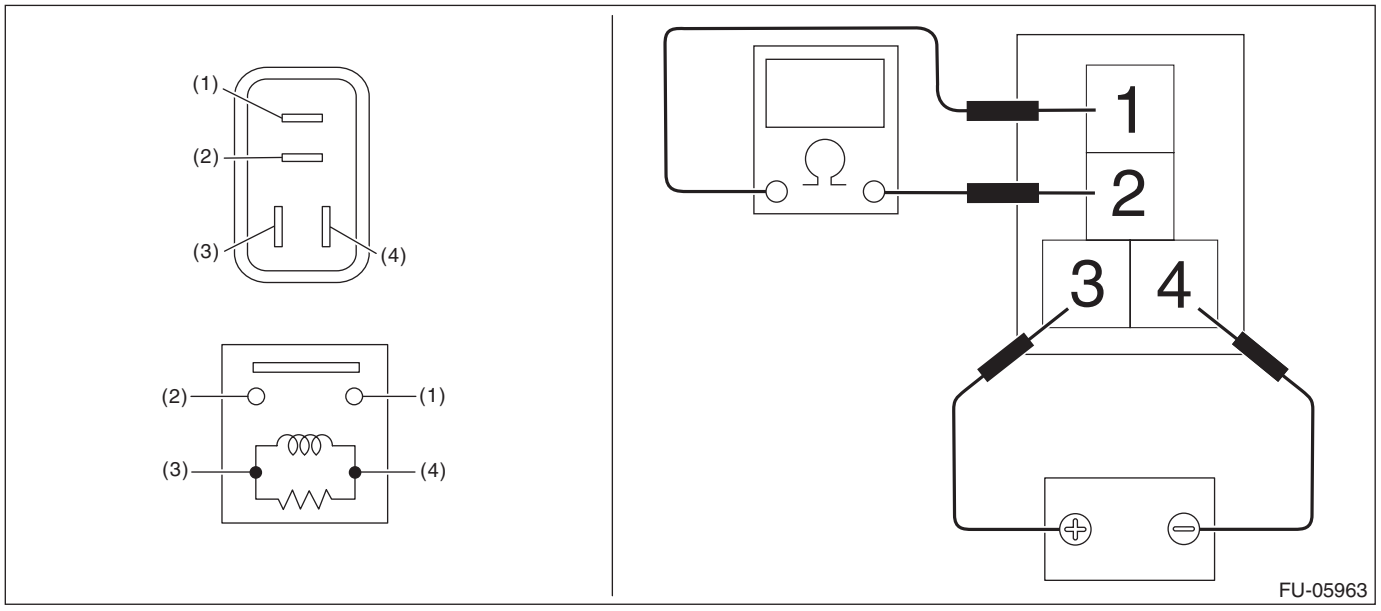
C: INSPECTION

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



Terminal No.	Standard
1 and 2	1 MΩ 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.



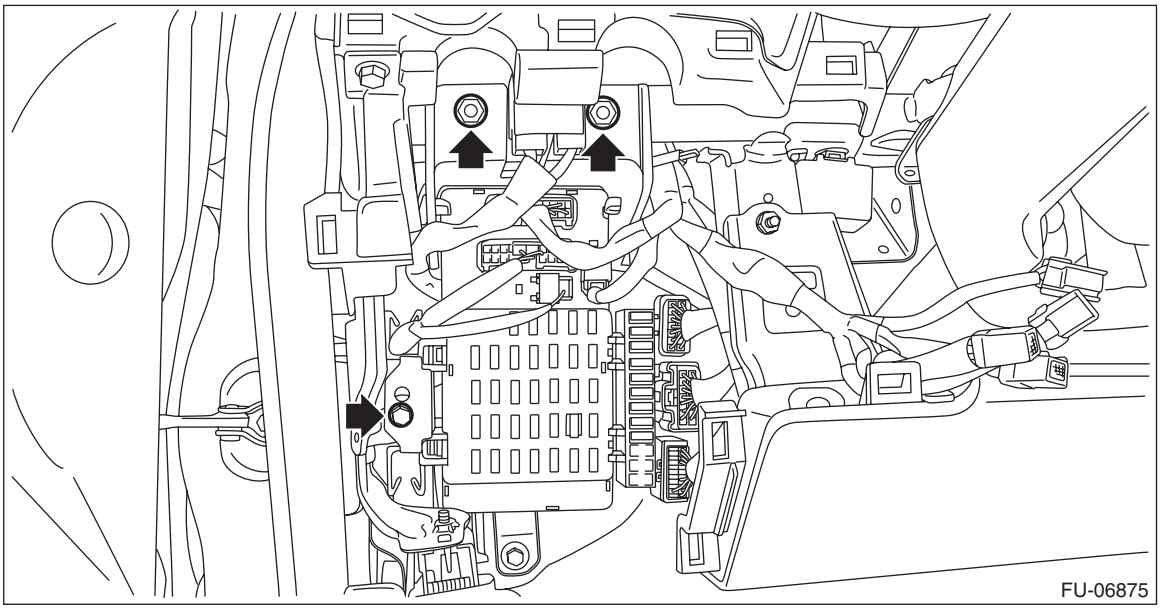
Terminal No.	Standard
1 and 2	Less than 1 Ω

24.Electronic Throttle Control Relay

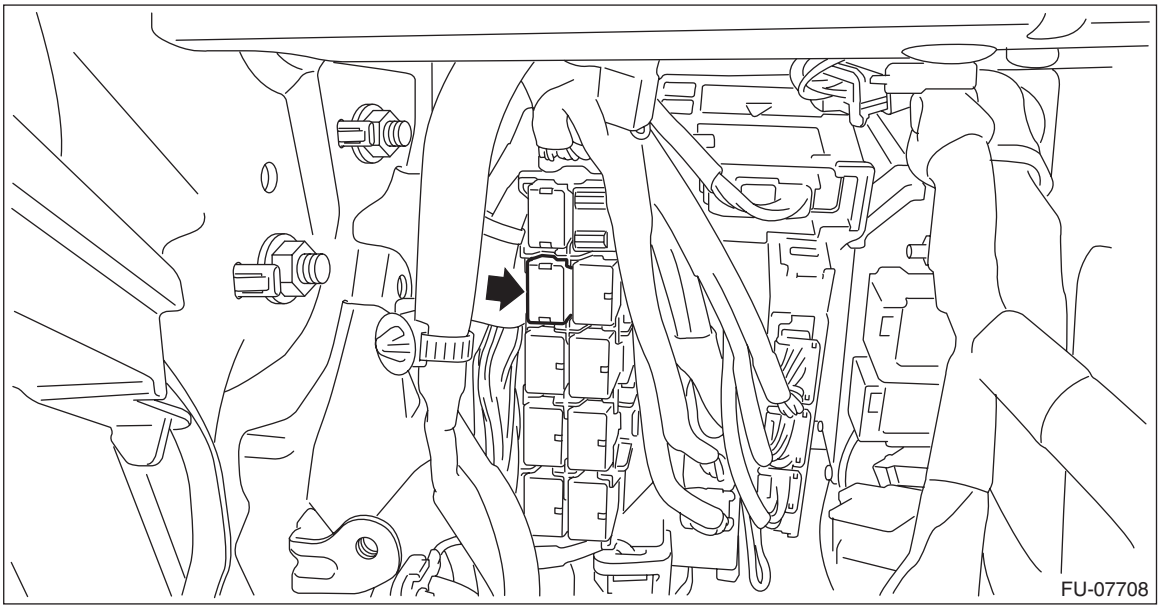
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Remove the instrument panel lower cover. <Ref. to EI-76, REMOVAL, Instrument Panel Lower Cover.>
3) Remove the bolts and nuts securing the fuse block and move down the fuse block.



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



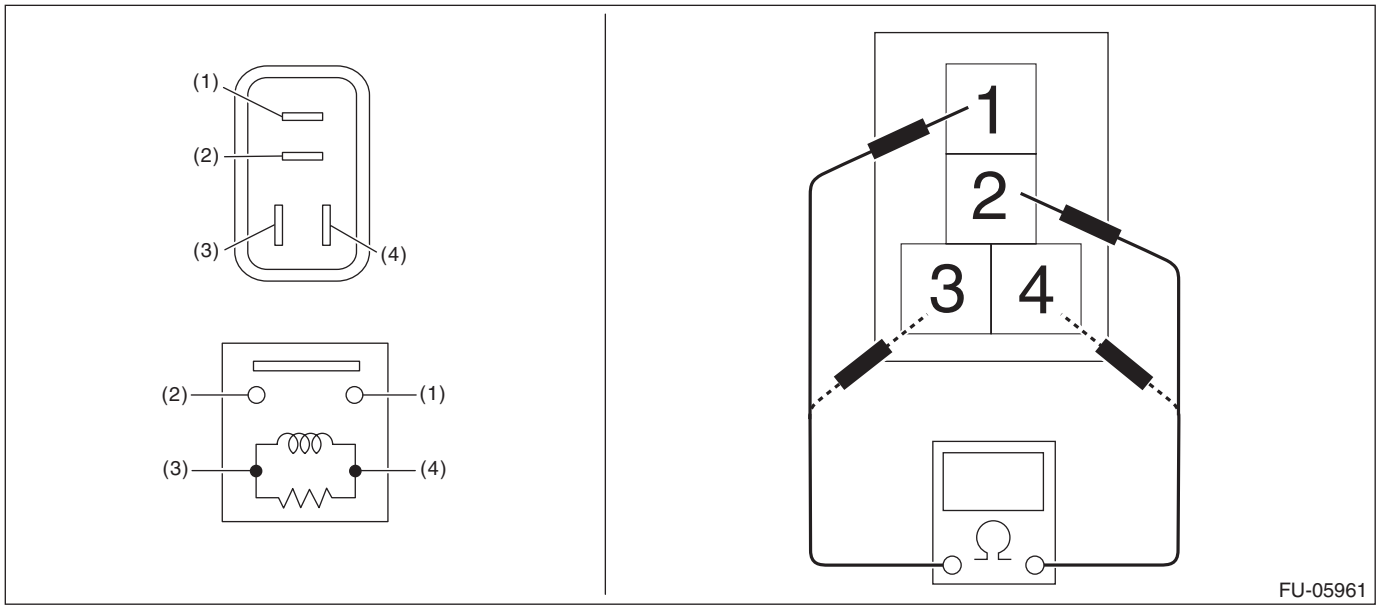
B: INSTALLATION

Install in the reverse order of removal.

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

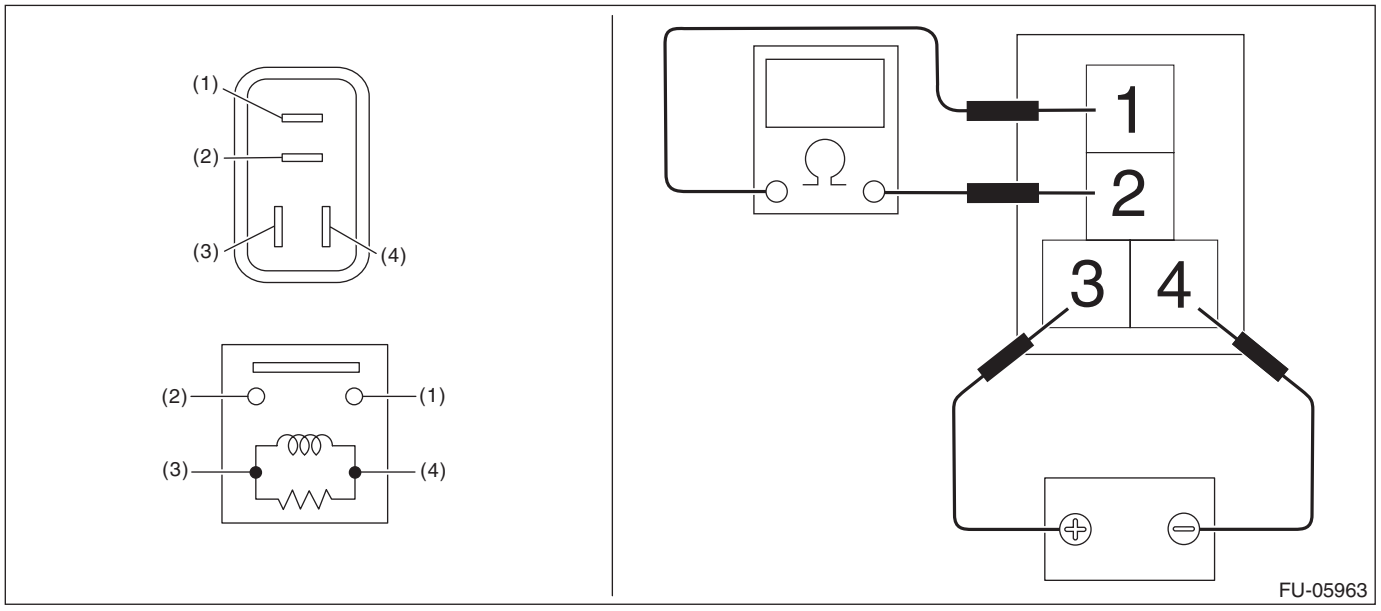
C: INSPECTION

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 MΩ 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.



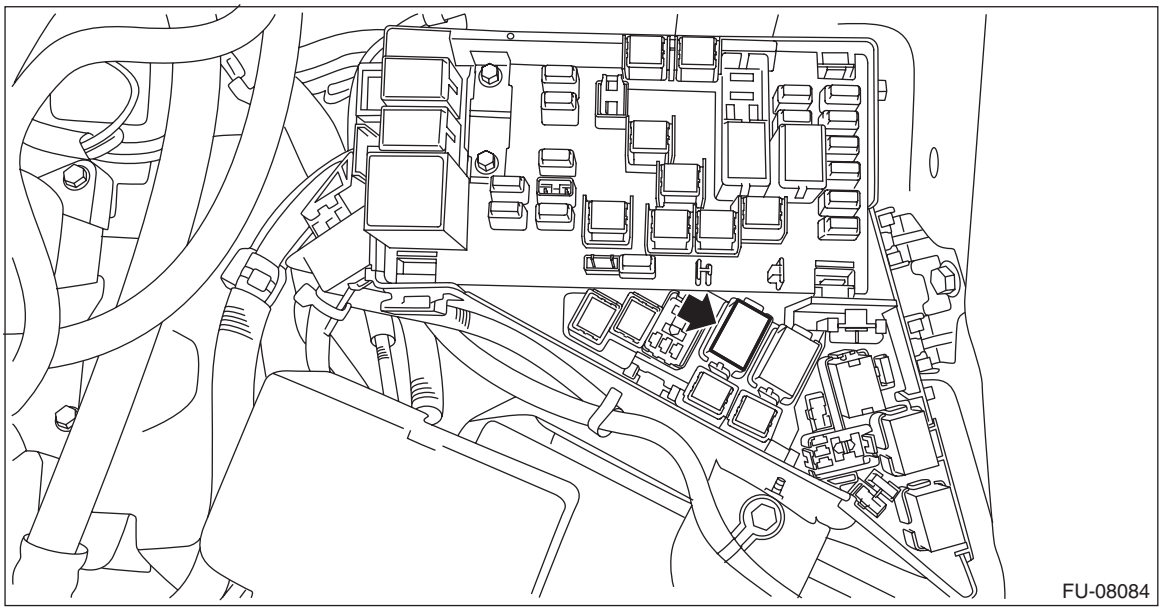
Terminal No.	Standard
1 and 2	Less than 1 Ω

25.Fuel Pump Relay

A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Remove the fuel pump relay from the main fuse box.

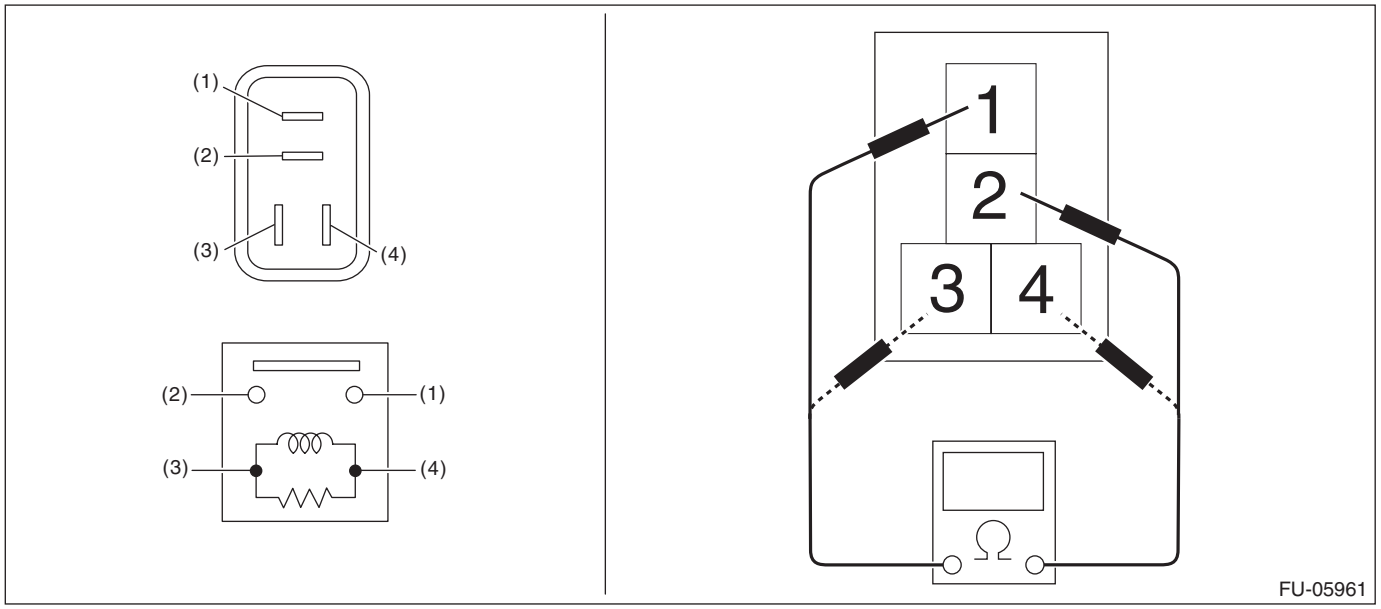


B: INSTALLATION

Install in the reverse order of removal.

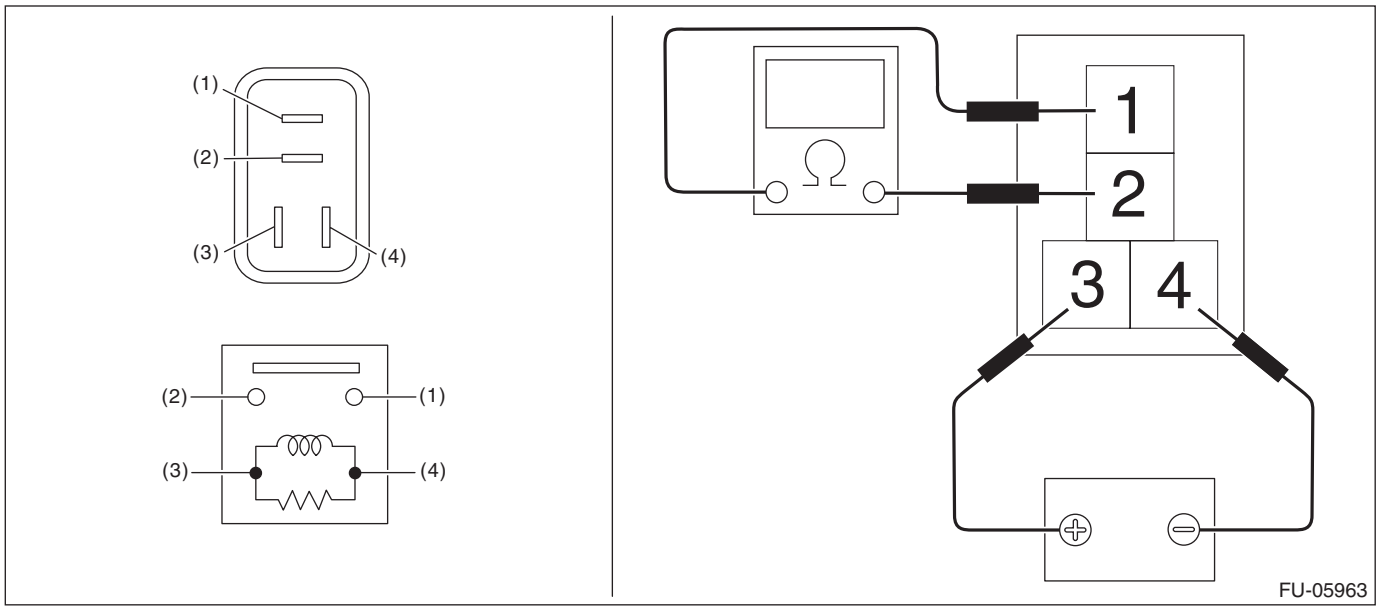
C: INSPECTION

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 MΩ 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 pump relay terminals.



Terminal No.	Standard
1 and 2	Less than 1 Ω

26.Fuel

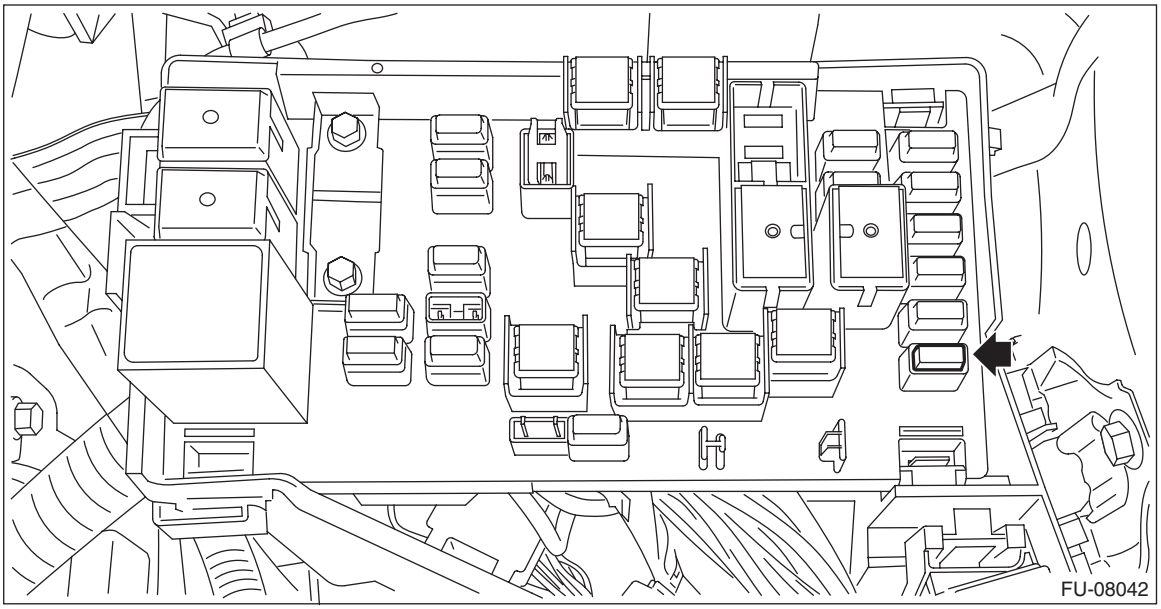
A: PROCEDURE

1. RELEASING OF FUEL PRESSURE

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

CAUTION:
Be careful not to spill fuel.

1) Turn the ignition switch to OFF.
2) Remove the fuse of fuel pump from main fuse box.



3) Start the engine and run it until it stalls.
4) After the engine stalls, crank it for five more seconds.
5) Turn the ignition switch to OFF.
6) Install the fuse of fuel pump to the main fuse box.

2. DRAINING FUEL (WITH SUBARU SELECT MONITOR)

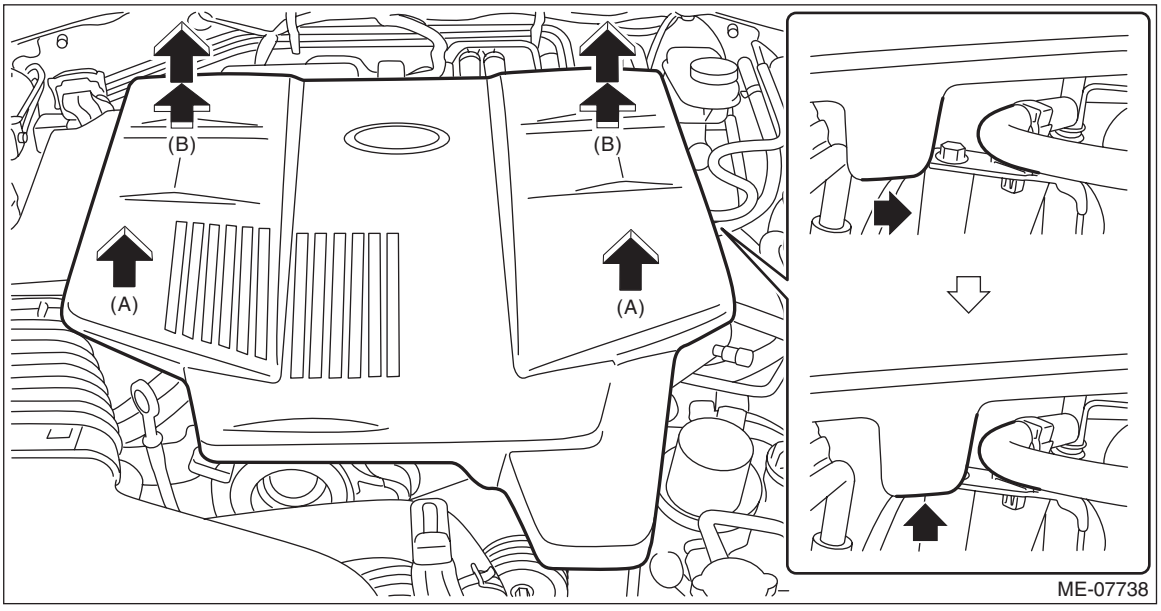
WARNING:
Place “NO OPEN FLAMES” signs near the working area.

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(H4DO(HEV))-102, DRAINING FUEL (THROUGH THE FUEL FILLER HOSE), PROCEDURE, Fuel.>
• Be careful not to let the battery run-out.
• Be aware that the fuel may remain in the fuel tank after draining the fuel.

1) Release the fuel pressure. <Ref. to FU(H4DO(HEV))-98, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

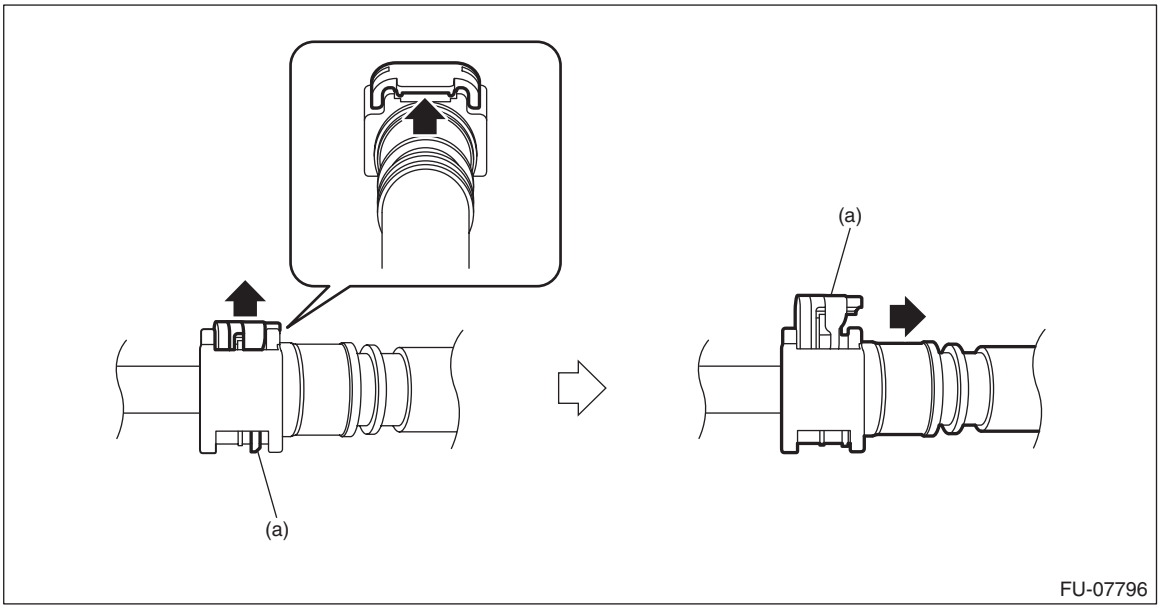
NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



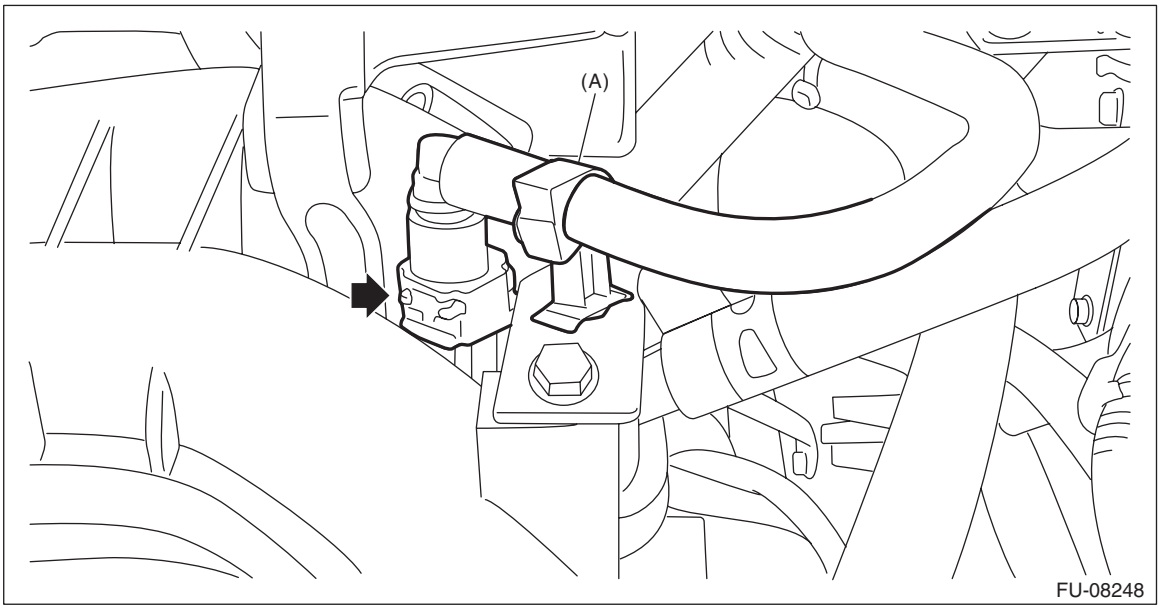
3) Disconnect the quick connector on the fuel delivery tube from the fuel pipe assembly, and remove the clip (A) securing the fuel delivery tube to the fuel pipe assembly.

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



4) Connect ST to the fuel delivery tube.
ST 18471AA000 FUEL PIPE ADAPTER
5) Connect the gasoline proof hose to ST and put the end of the hose in the container.

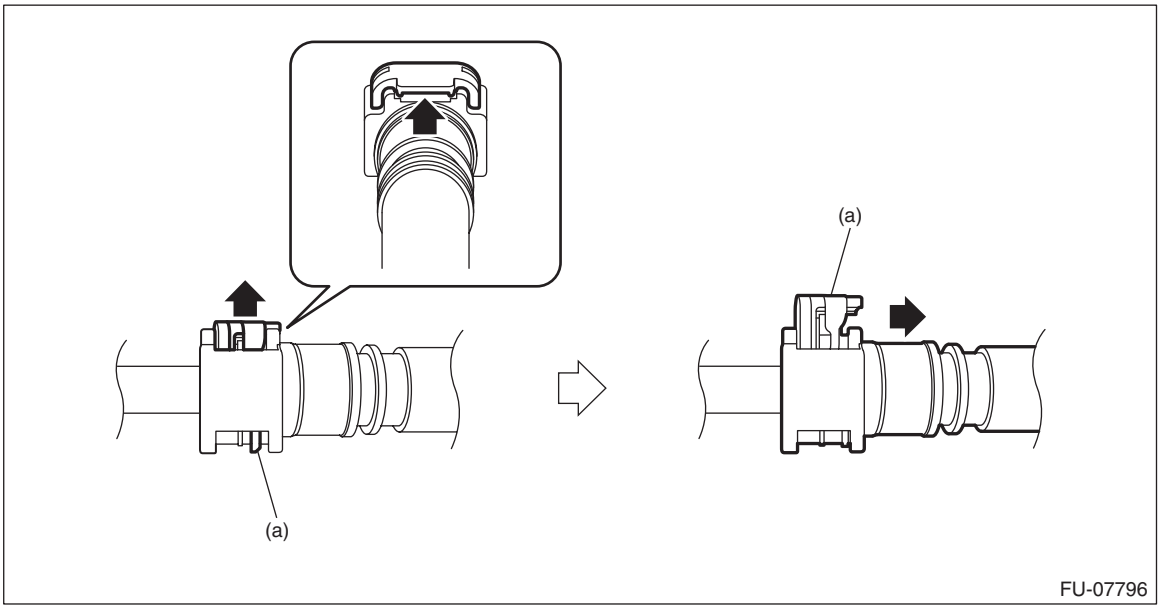
6) Drive the fuel pump and drain the fuel using Subaru Select Monitor.

CAUTION:
Be careful not to spill fuel.

NOTE:
For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.
7) Install the related parts in the reverse order after draining the fuel.

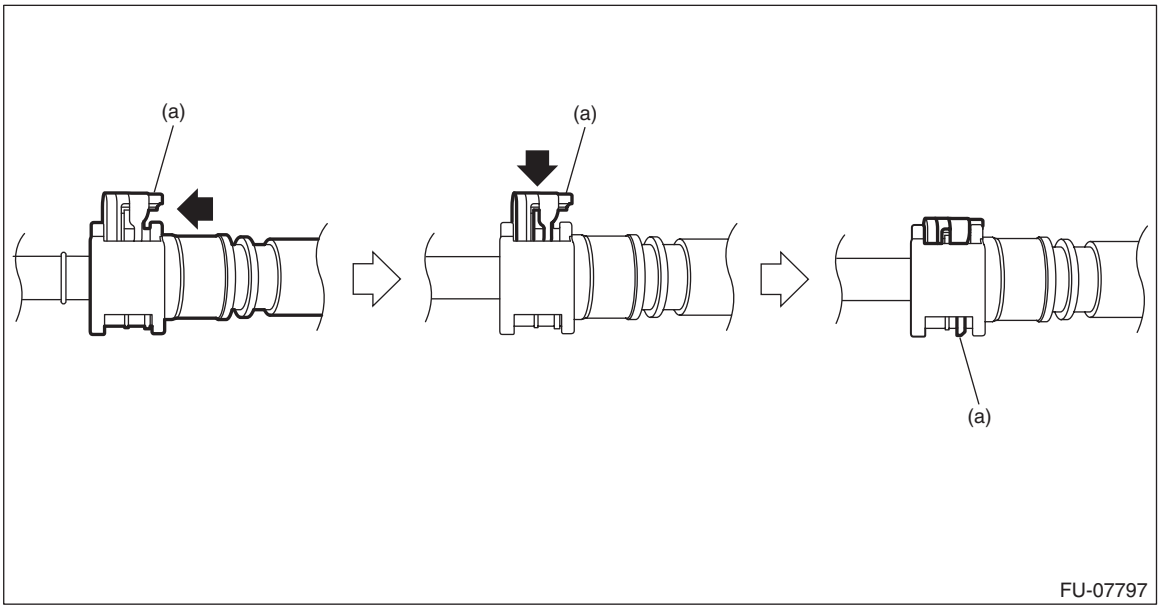
CAUTION:
- **Be careful not to spill fuel.**
- **Catch the fuel from the tubes using a container or cloth.**
- **Check that there is no damage or dust on the quick connector. If necessary, clean the seal surface of the pipe.**
- **When connecting the quick connector, make sure to insert it all the way in before locking the slider.**
- **When it is difficult to lock the slider, check that the connector is fully inserted.**
- **After locking the slider, check again that the quick connector is securely connected.**

NOTE:
- Disconnect the quick connector on the fuel delivery tube as shown in the figure.



(a) Slider

- Connect the quick connector on the fuel delivery tube as shown in the figure.



(a) Slider

3. DRAINING FUEL (THROUGH THE FUEL FILLER HOSE)

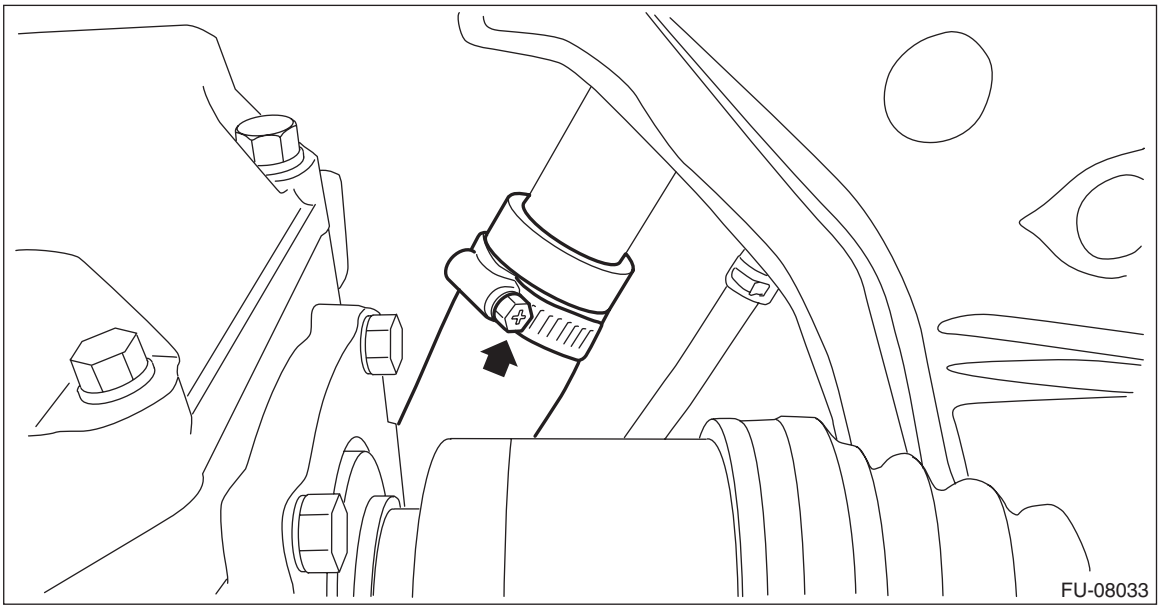
WARNING:
Place "NO OPEN FLAMES" signs near the working area.

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.**

NOTE:
Be aware that the fuel may remain in the fuel tank after draining the fuel.
1) Lift up the vehicle.
2) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4DO(w/o HEV))-18, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DO(w/o HEV))-22, 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.**



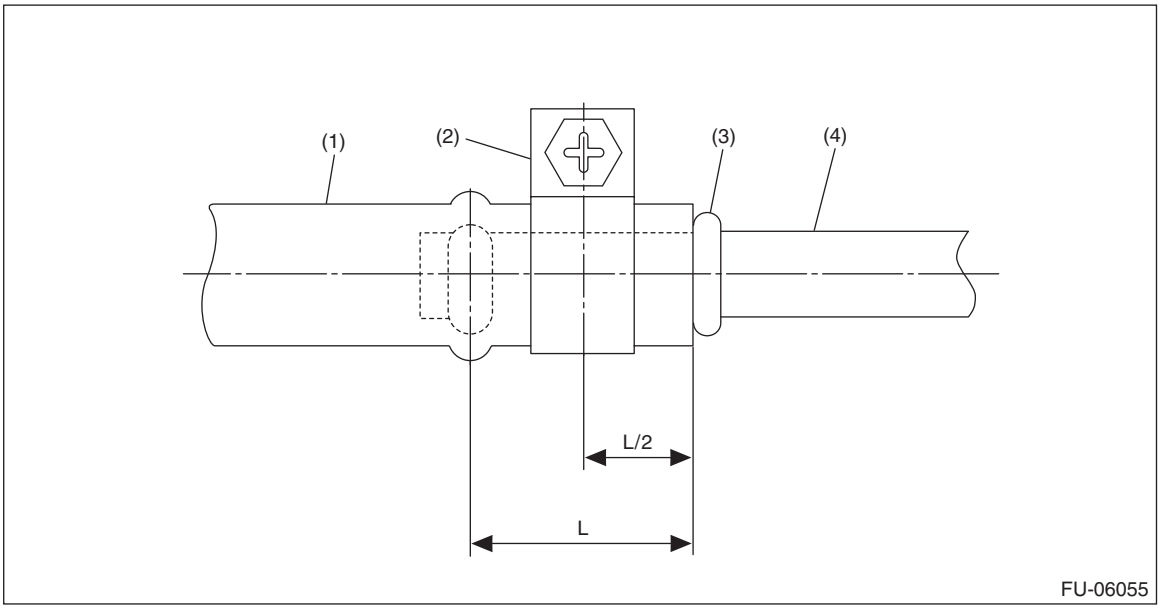
6) Set the container under the vehicle and insert the gasoline proof hose (ø10 or less) into the fuel filler hose to drain the fuel.

CAUTION:
Be careful not to spill fuel.

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)

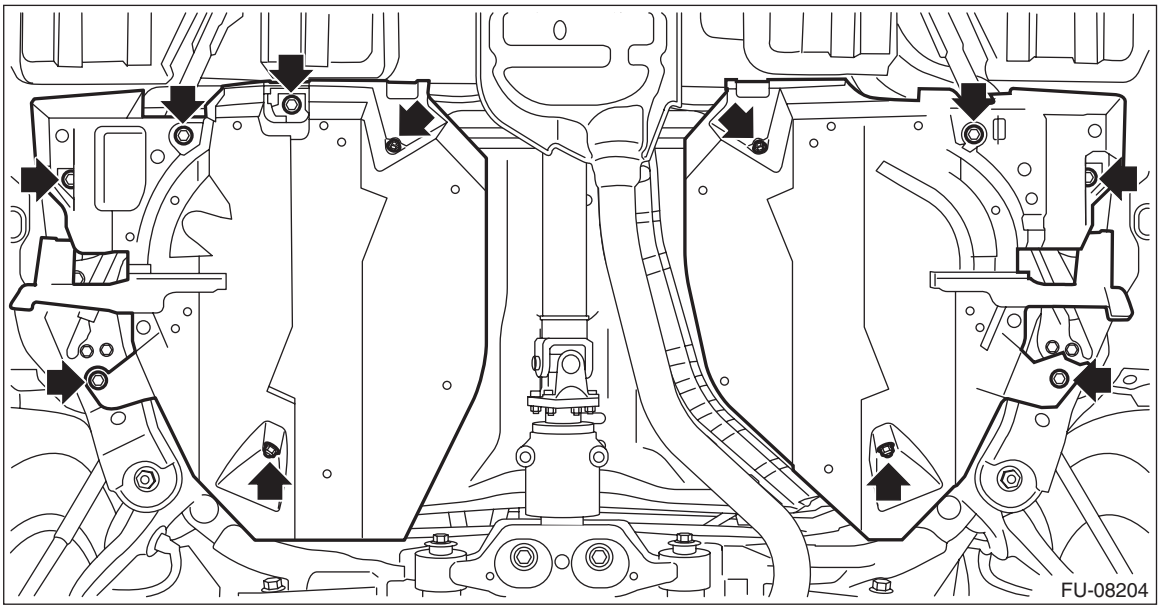


(1) Fuel filler hose
(2) Clamp
(3) Spool
(4) Fuel filler pipe

27.Fuel Tank Protector

A: REMOVAL

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

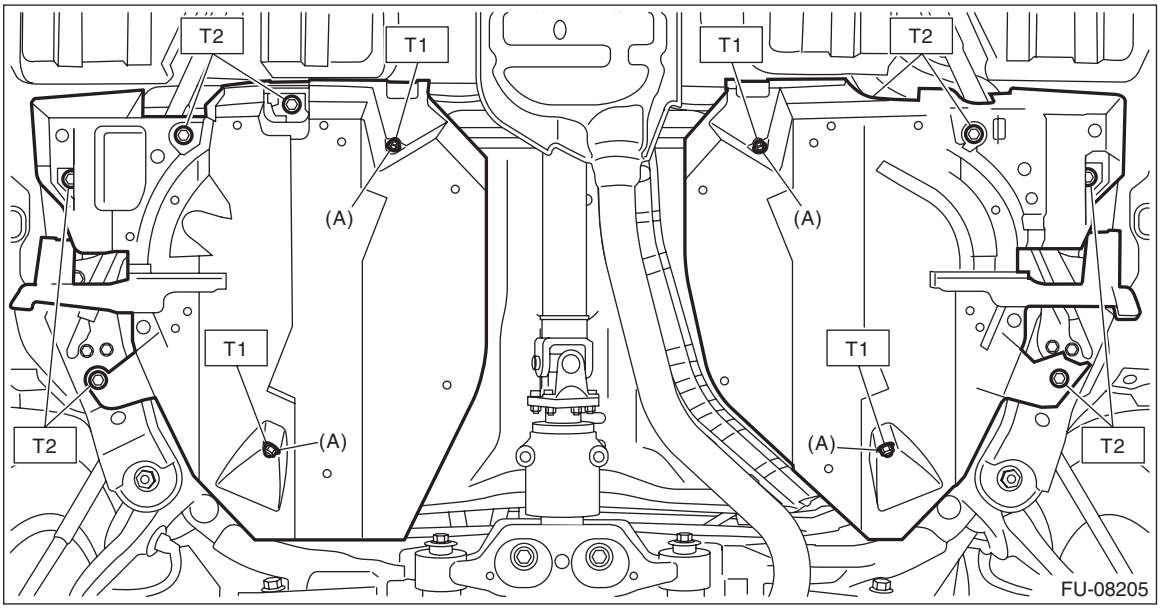


B: INSTALLATION

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

28.Fuel Tank

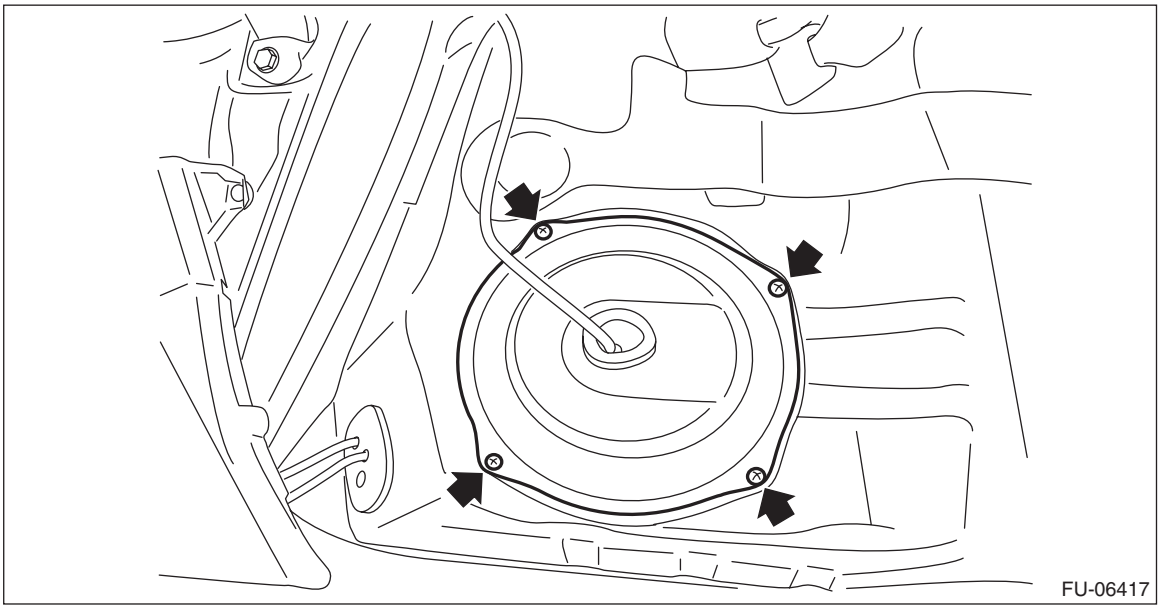
A: REMOVAL

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

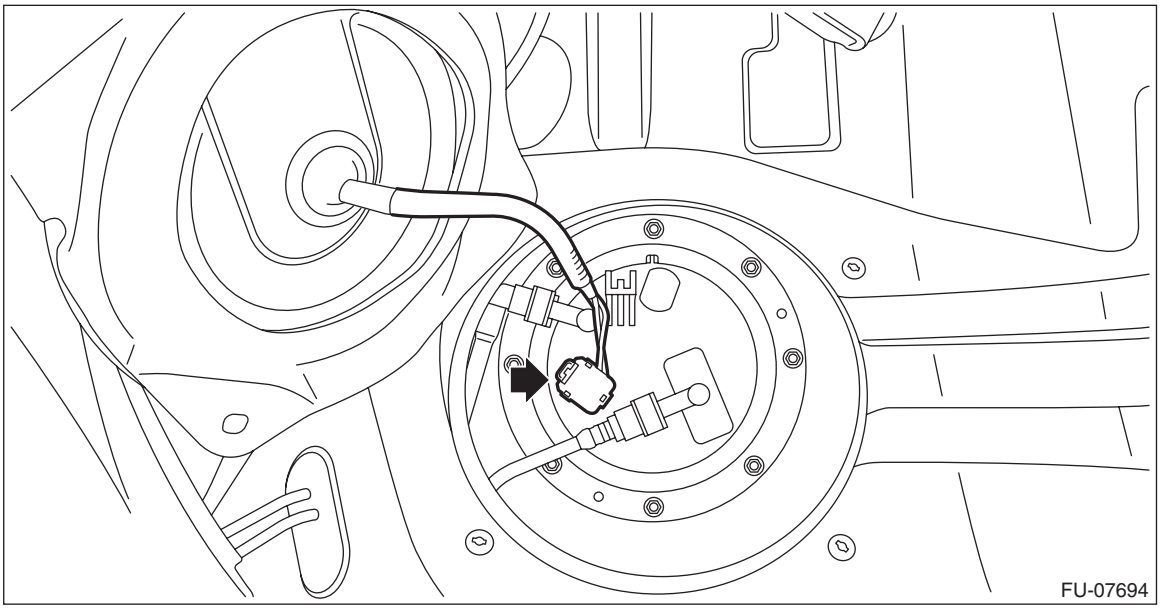
CAUTION:
- **Be careful not to spill fuel.**
- **Catch the fuel from the tubes using a container or cloth.**

1) Release the fuel pressure. <Ref. to FU(H4DO(HEV))-98, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Drain fuel. <Ref. to FU(H4DO(HEV))-99, DRAINING FUEL (WITH SUBARU SELECT MONITOR), PROCEDURE, Fuel.>
3) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

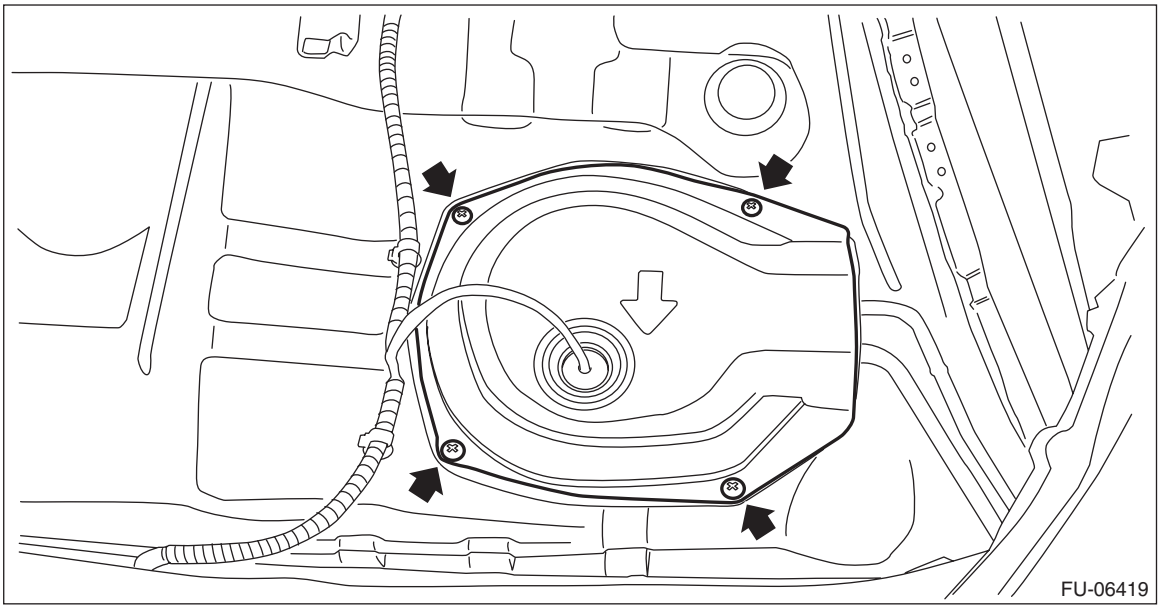
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
4) Remove the rear seat cushion. <Ref. to SE-23, REMOVAL, Rear Seat.>
5) Remove the service hole cover of fuel pump.



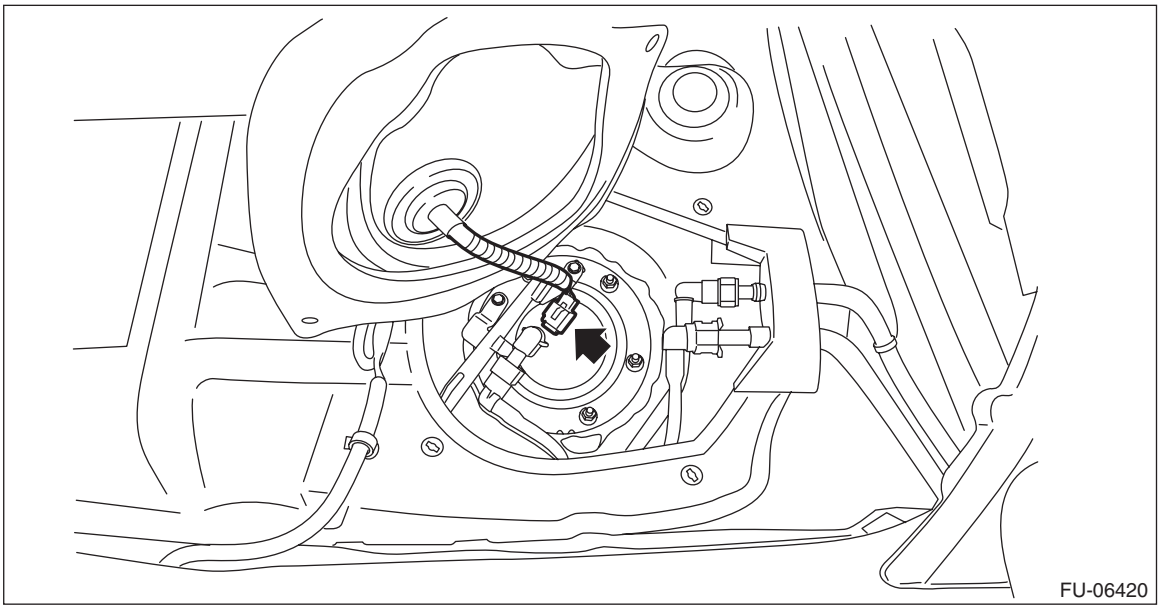
6) Disconnect connectors from the fuel pump, and move aside the service hole cover.



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

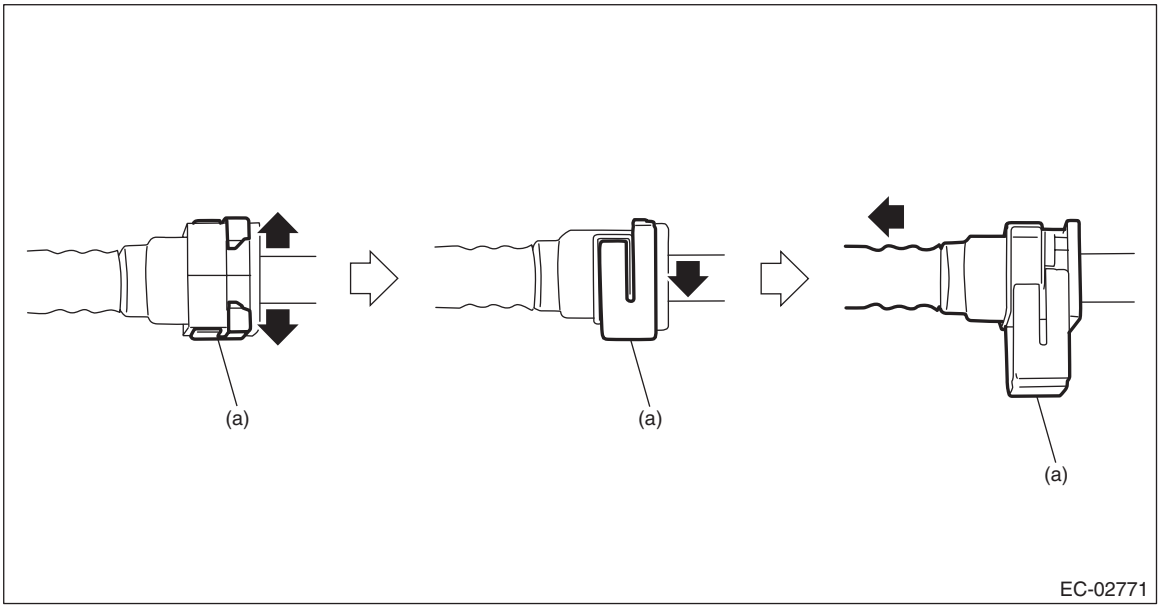


8) Disconnect the connector from the fuel sub level sensor, and move aside the service hole cover.

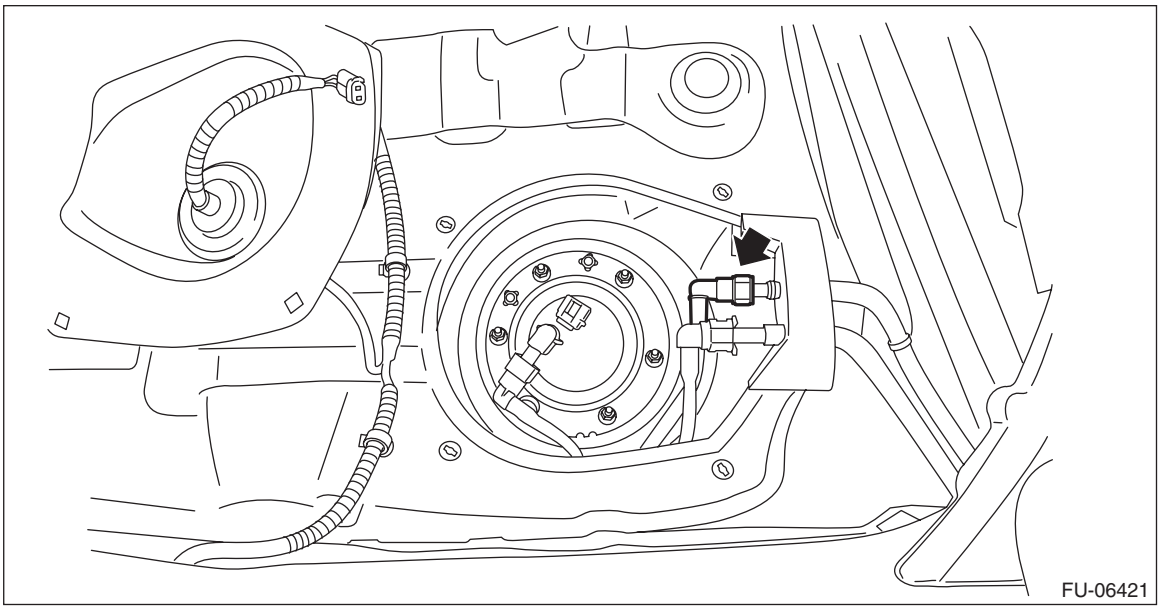


9) Disconnect the quick connector on the fuel delivery tube.

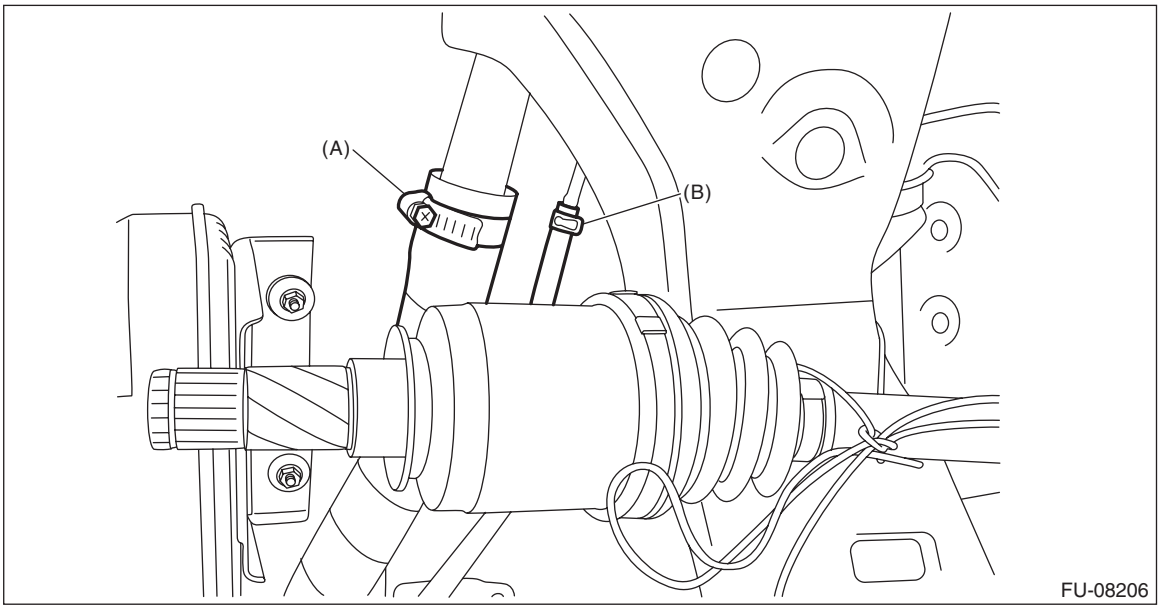
NOTE:
Disconnect the quick connector as shown in the figure.



(a) Slider

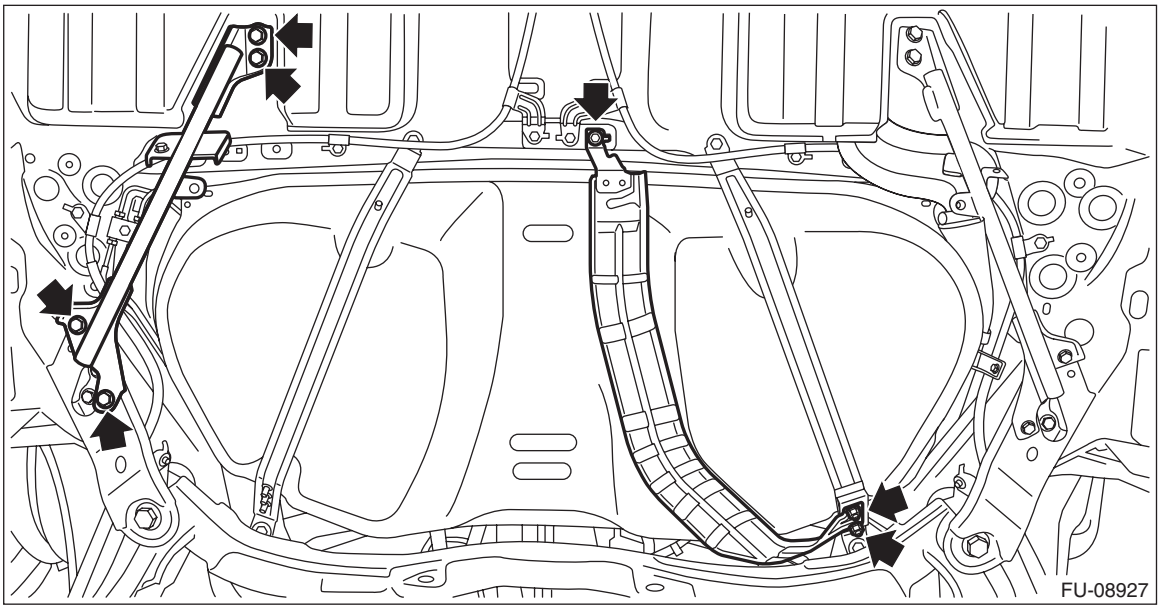


10) Lift up the vehicle.
11) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4DO(w/o HEV))-18, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DO(w/o HEV))-22, REMOVAL, Muffler.>
12) Remove the rear differential. <Ref. to DI-41, REMOVAL, Rear Differential (VA-type).>
13) Disconnect the fuel filler hose (A) and evaporation hose (B) from the fuel filler pipe assembly.

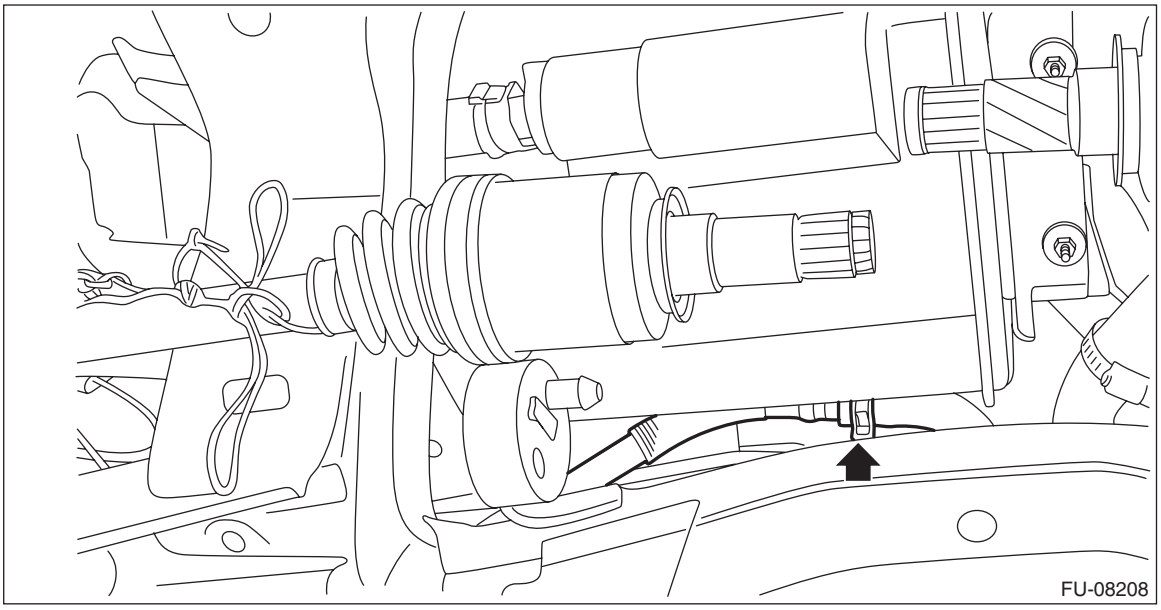


14) Remove the fuel tank protector. <Ref. to FU(H4DO(HEV))-104, REMOVAL, Fuel Tank Protector.>

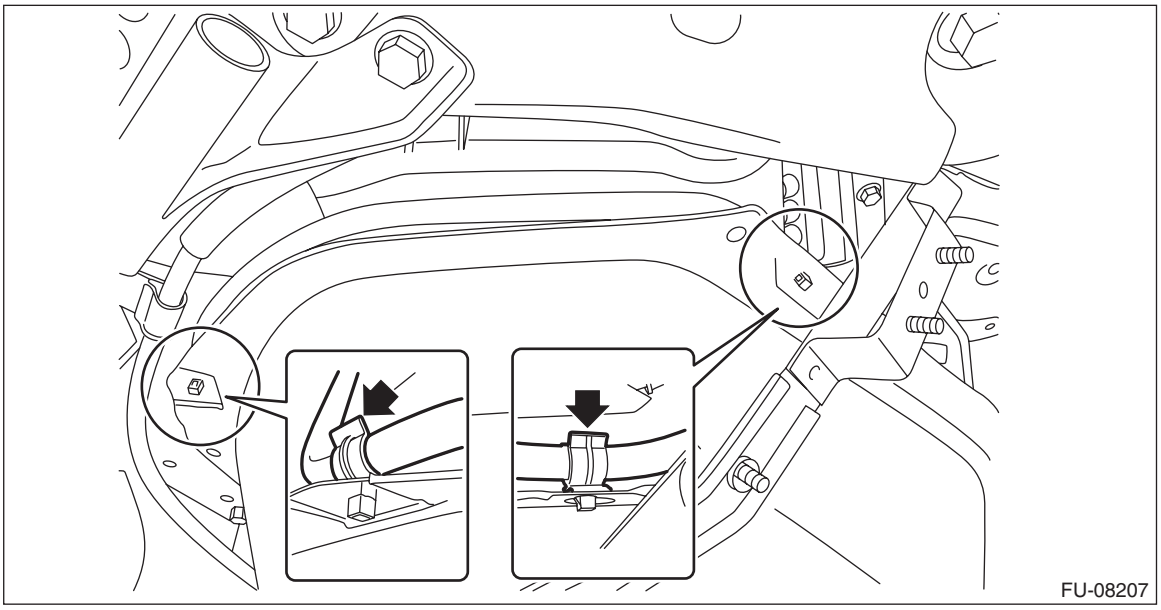
15) Remove the heat shield cover and the stay - rear frame COMPL RH.



16) Disconnect the vent tube from the vent hose.

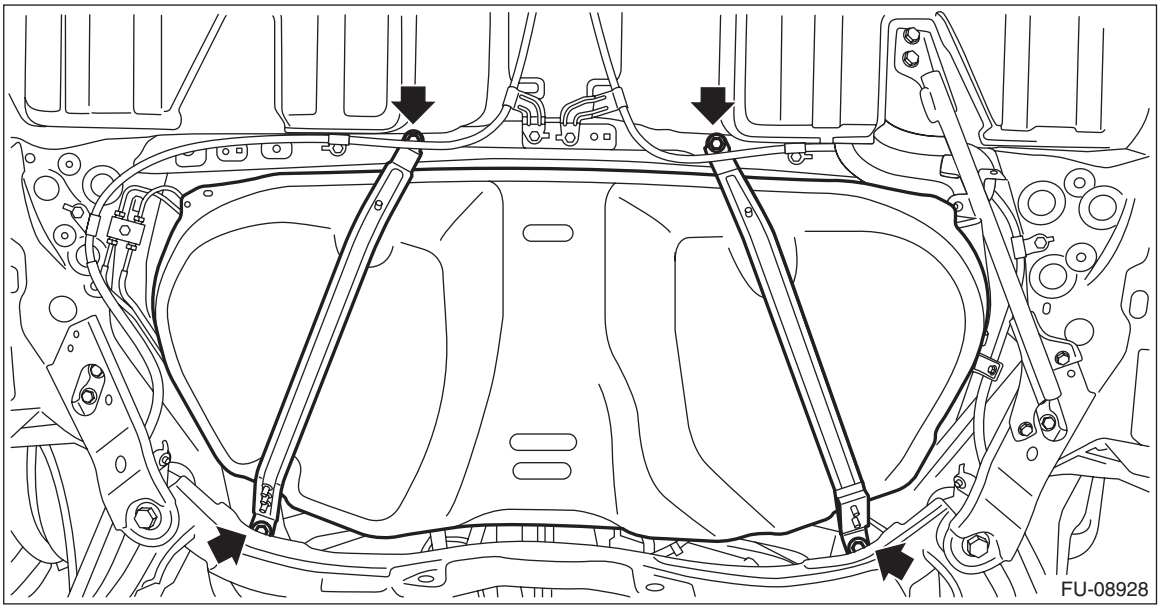


17) Remove the purge tube from the tube clamp.



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.

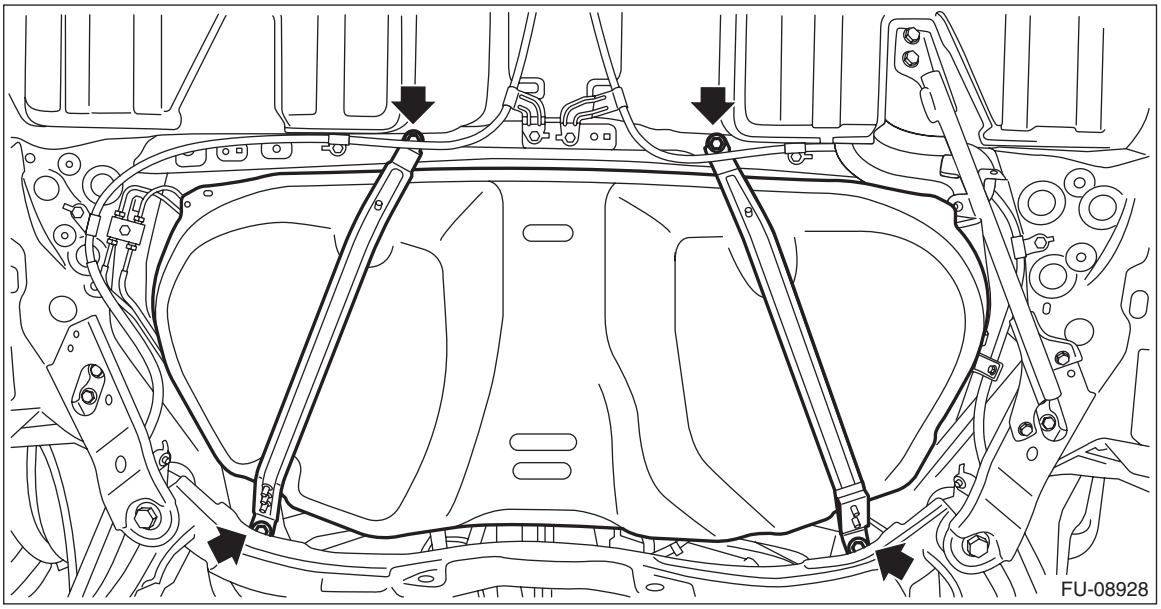
WARNING:
- **A helper is required to perform this work.**
- **Fuel may remain in the fuel tank. This will cause the left and right sides to be unbalanced. Be careful not to drop the fuel tank.**



B: INSTALLATION

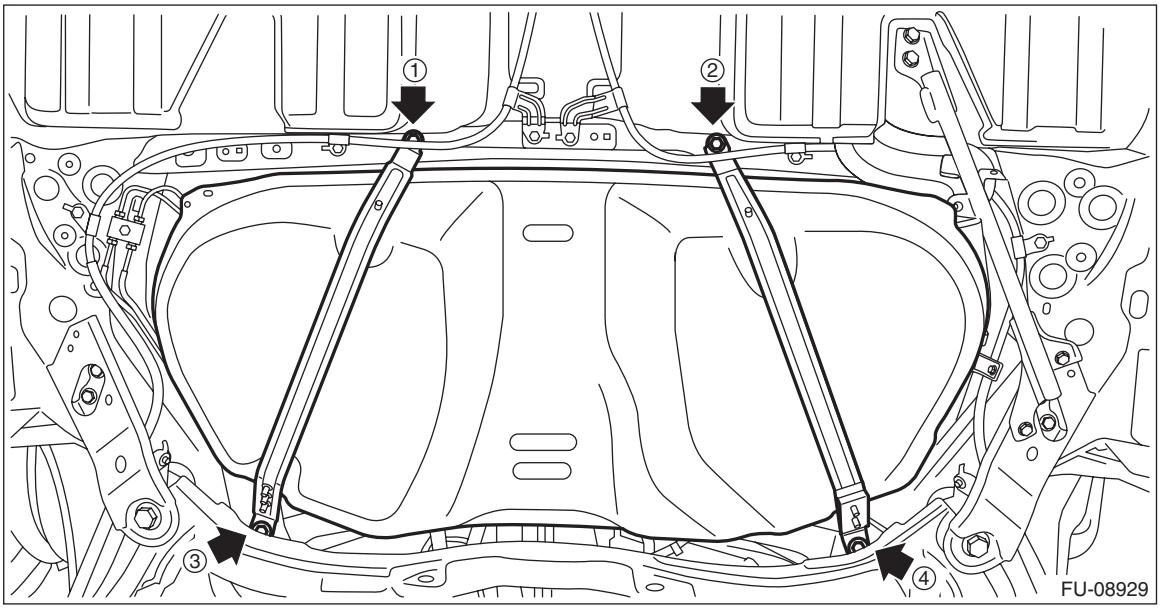
1) Support the fuel tank with a transmission jack, set the fuel tank in place, and temporarily tighten the bolts of the fuel tank band.

WARNING:
A helper is required to perform this work.

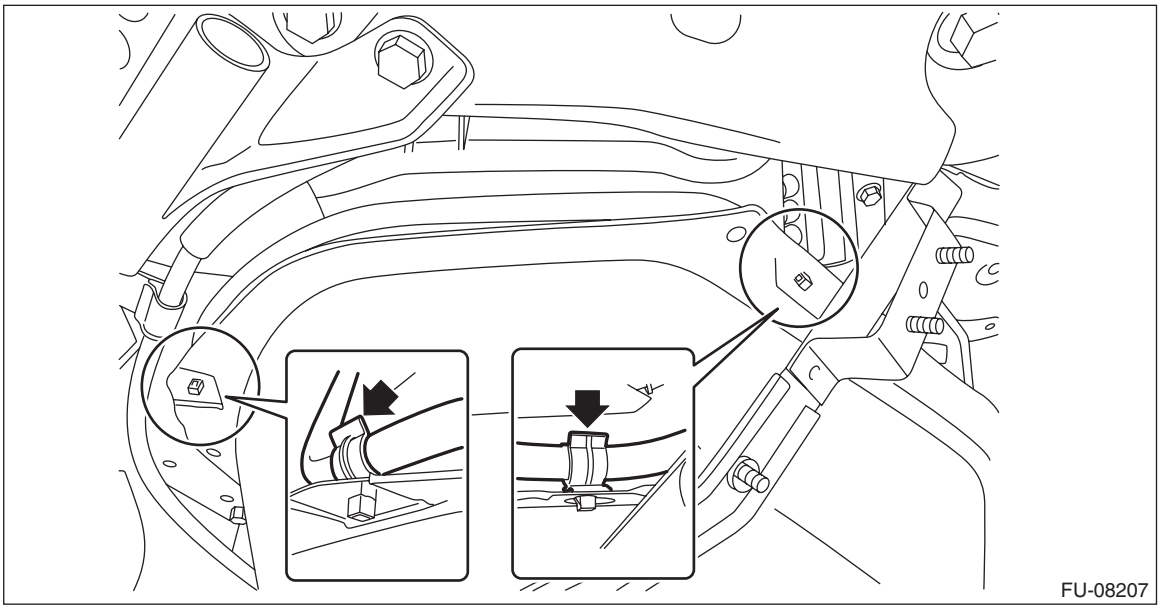


2) Tighten the bolts of the fuel tank band in the order shown in the figure.

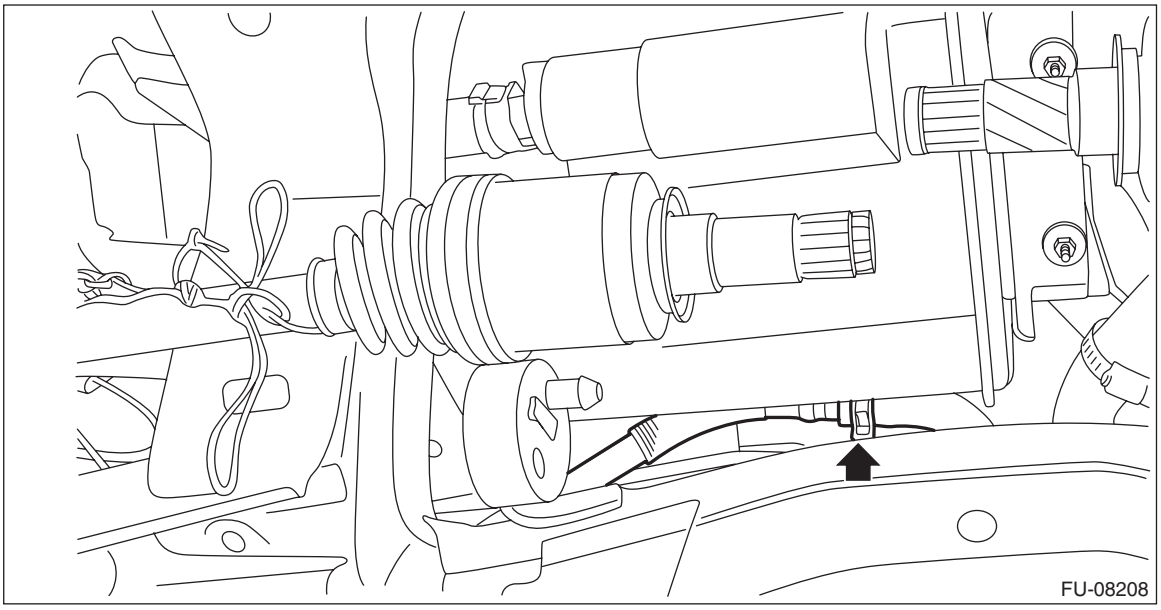
Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)



3) Install the purge tube to the tube clamp.

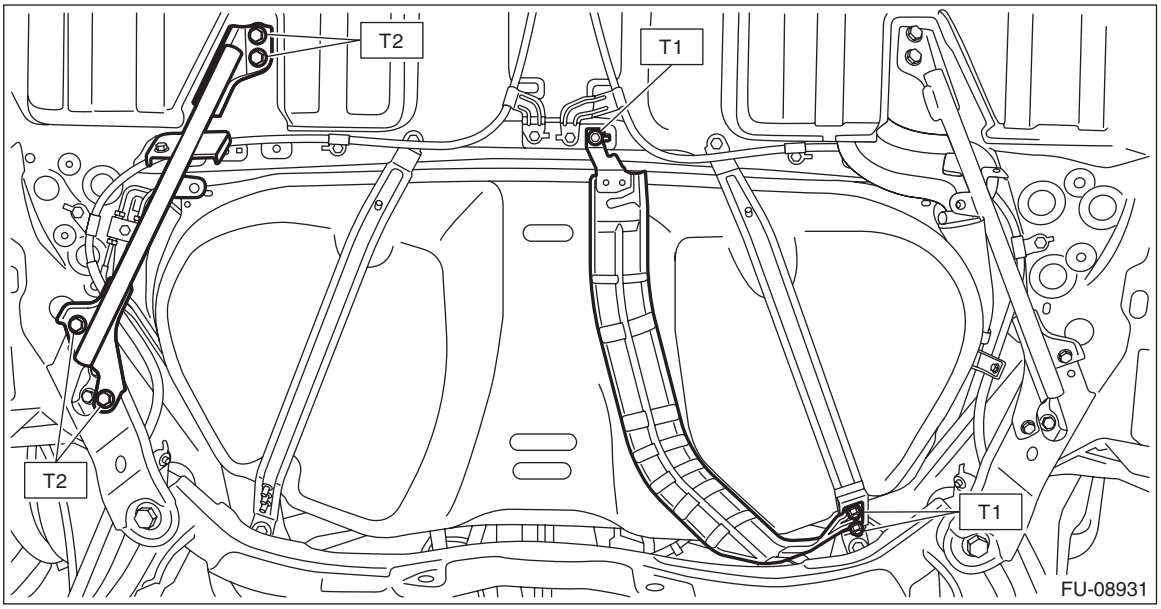


4) Connect the vent tube to the vent hose.



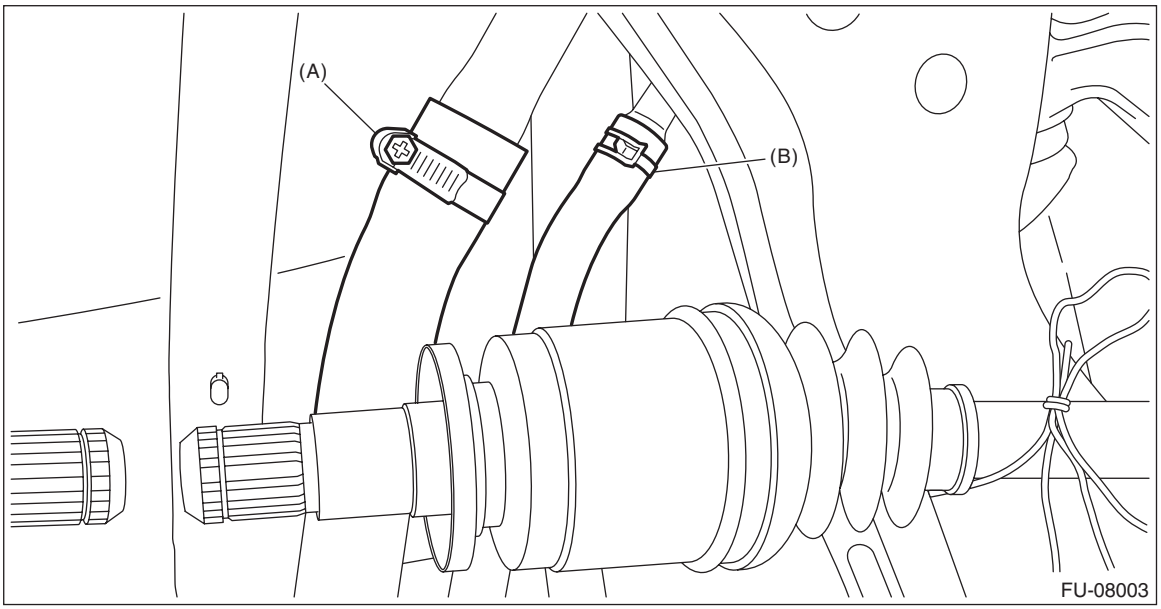
5) Install the heat shield cover and the stay - rear frame COMPL RH.

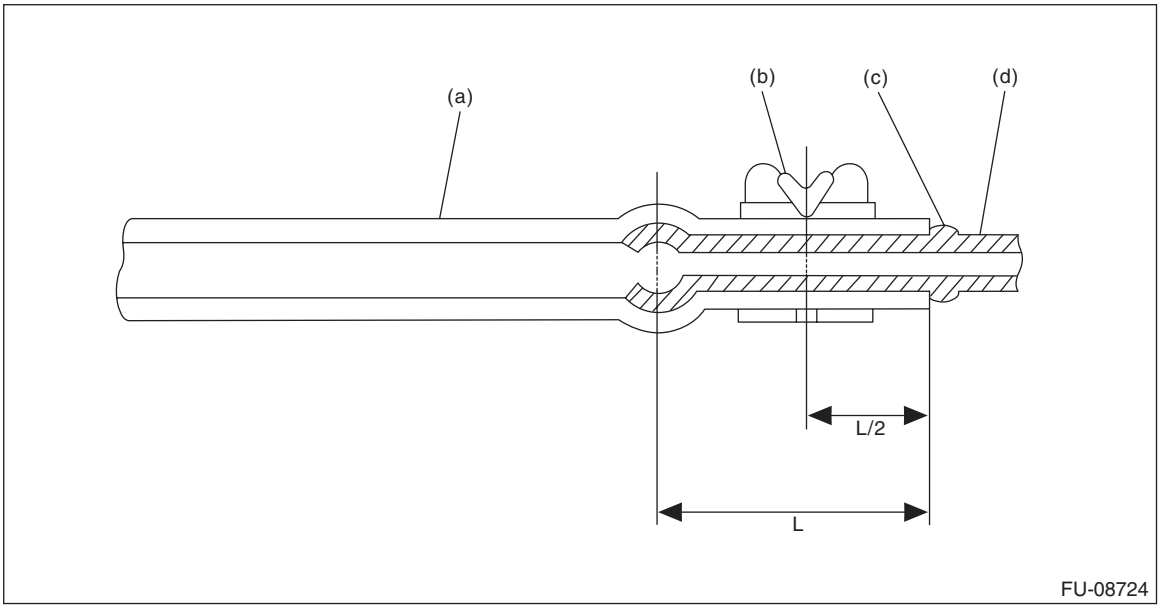
Tightening torque:
T1: 18 N·m (1.8 kgf-m, 13.3 ft-lb)
T2: 33 N·m (3.4 kgf-m, 24.3 ft-lb)



6) 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)





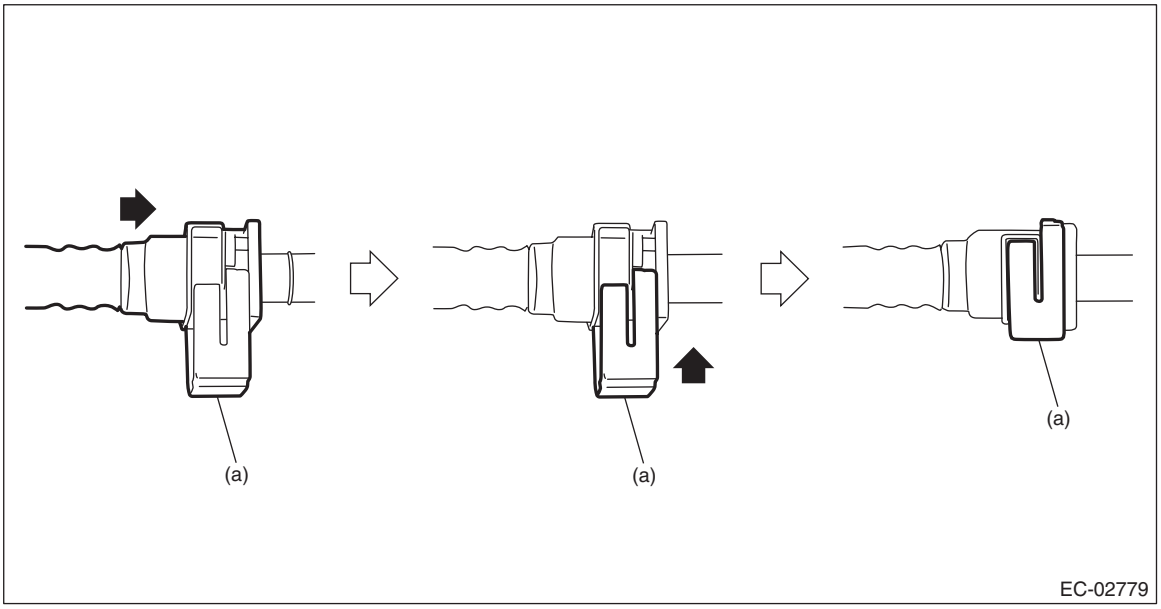
(a) Hose
(b) Clamp or clip
(c) Spool or bump
(d) Pipe

7) Install the fuel tank protector. <Ref. to FU(H4DO(HEV))-104, INSTALLATION, Fuel Tank Protector.>
8) Install the rear differential. <Ref. to DI-41, INSTALLATION, Rear Differential (VA-type).>
9) Install the rear exhaust pipe and muffler. <Ref. to EX(H4DO(w/o HEV))-20, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DO(w/o HEV))-25, INSTALLATION, Muffler.>

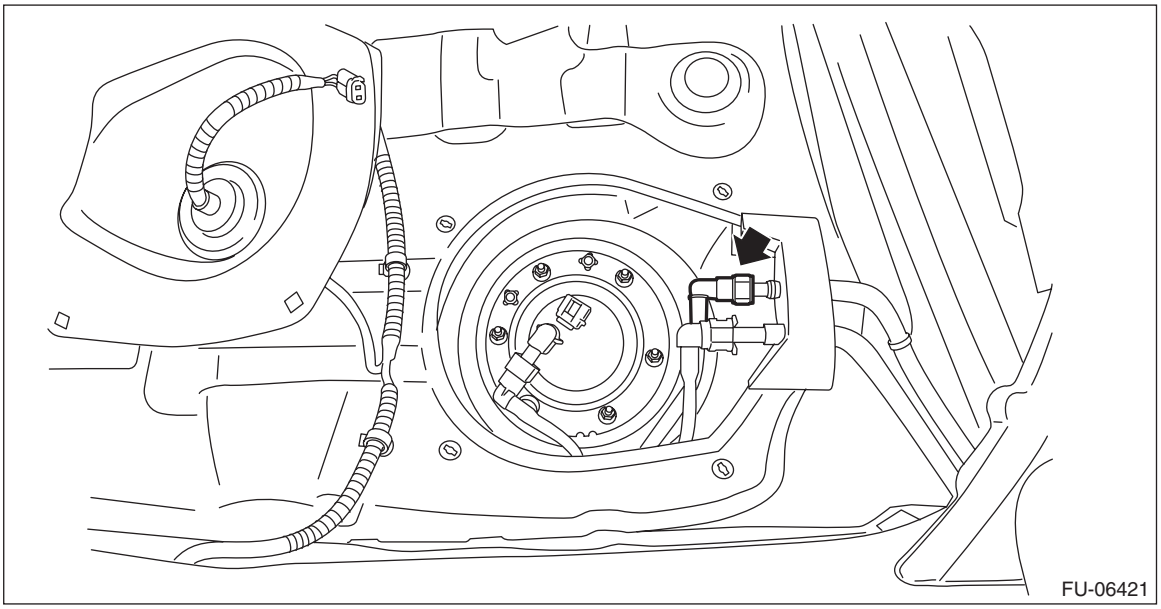
10) Connect the quick connector of the fuel delivery tube.

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 it all the way in before locking the slider.**
- **When it is difficult to lock the slider, check that the connector is fully inserted.**
- **After locking the slider, check again that the quick connector is securely connected.**

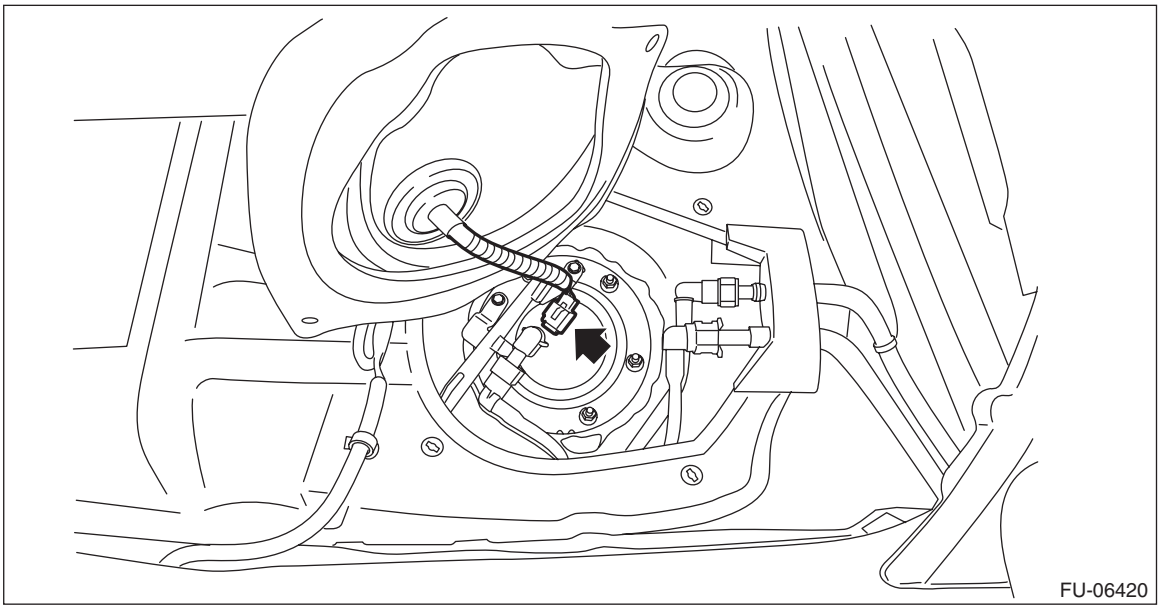
NOTE:
Connect the quick connector as shown in the figure.



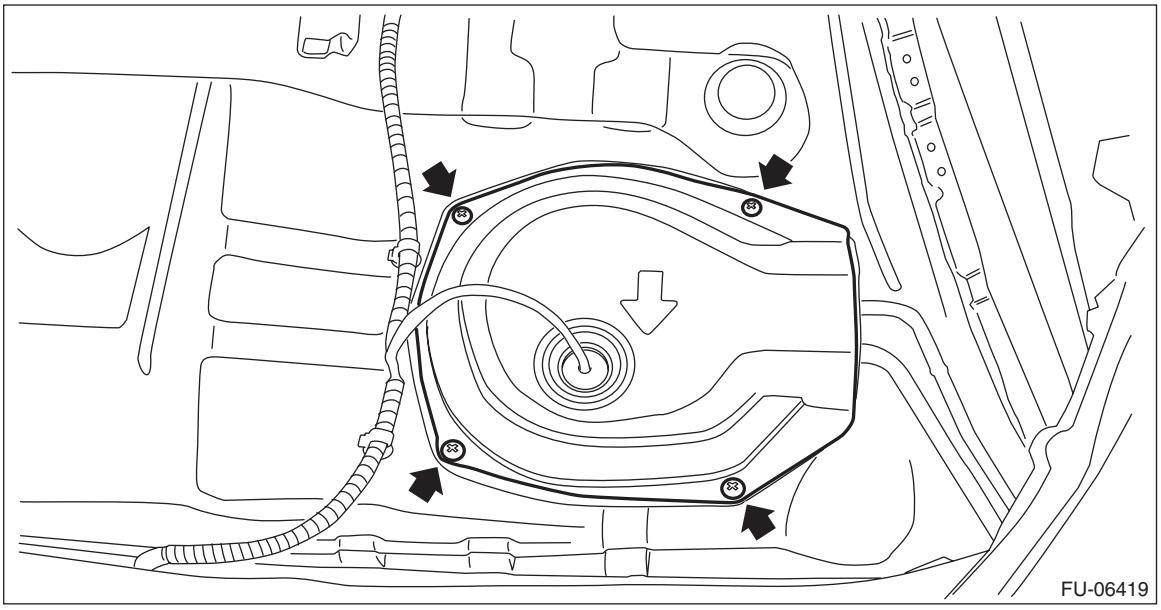
(a) Slider



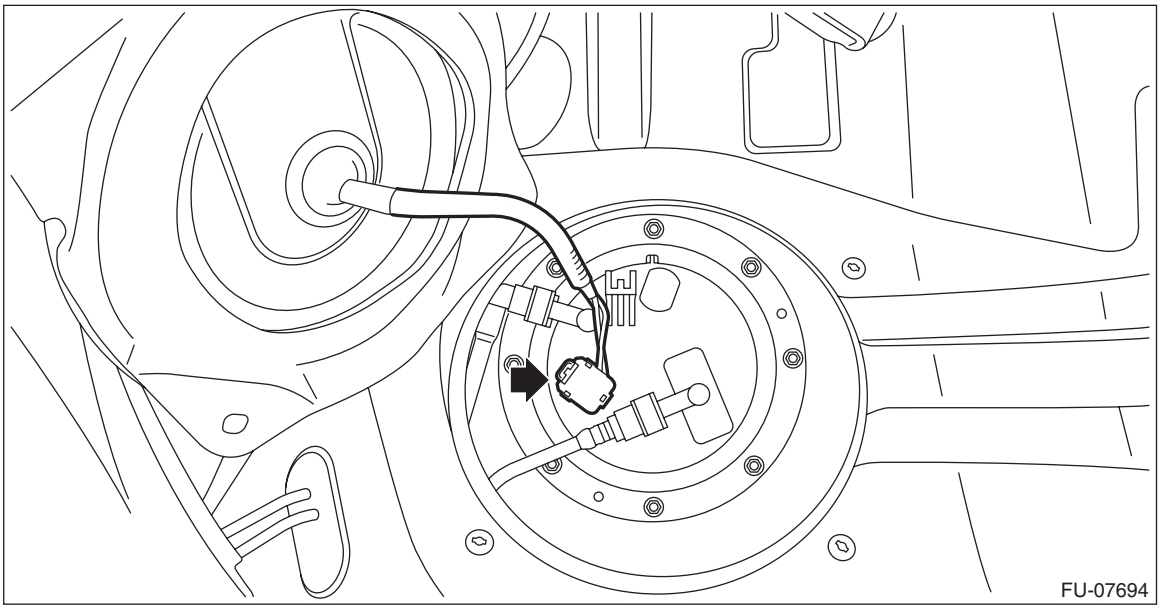
11) Connect the connector to the fuel sub level sensor.



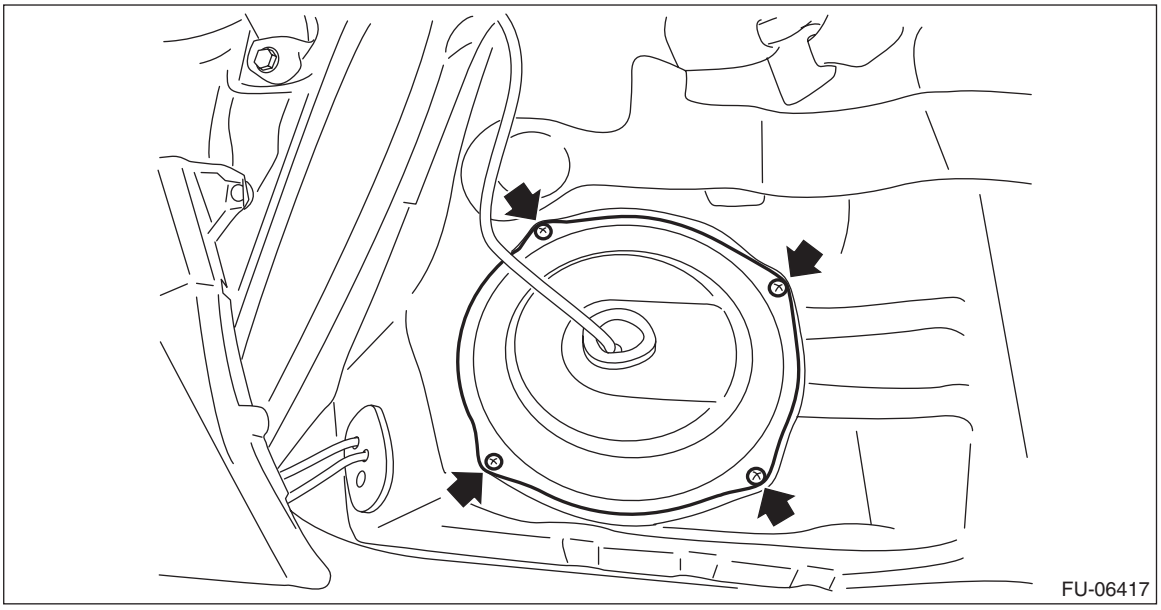
12) Install the service hole cover of fuel sub level sensor.



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-27, INSTALLATION, Rear Seat.>
16) Connect the battery ground terminal. <Ref. to NT-5, BATTERY, NOTE, Note.>

C: INSPECTION

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

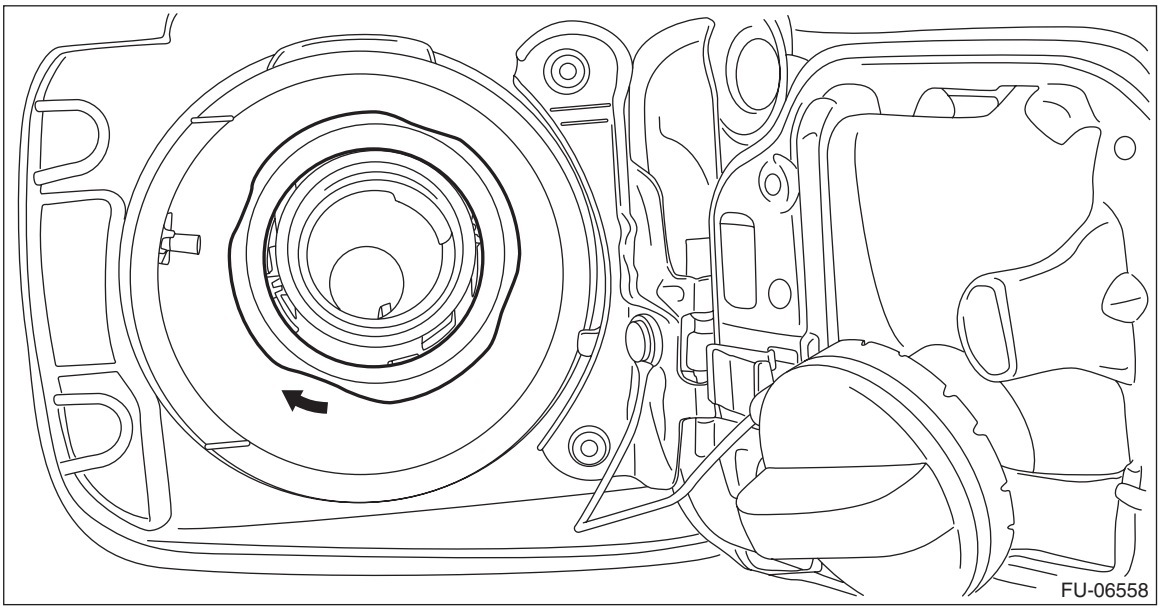
29.Fuel Filler Pipe

A: REMOVAL

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

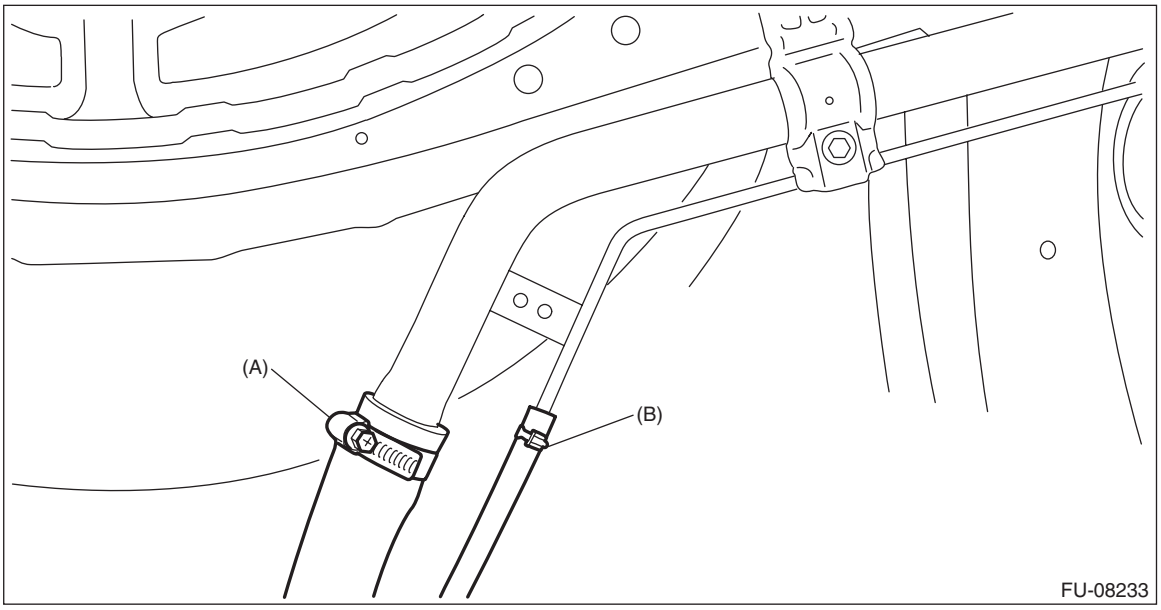
CAUTION:
Be careful not to spill fuel.
1) Release the fuel pressure. <Ref. to FU(H4DO(HEV))-98, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Drain fuel. <Ref. to FU(H4DO(HEV))-99, DRAINING FUEL (WITH SUBARU SELECT MONITOR), PROCEDURE, Fuel.>
3) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
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.

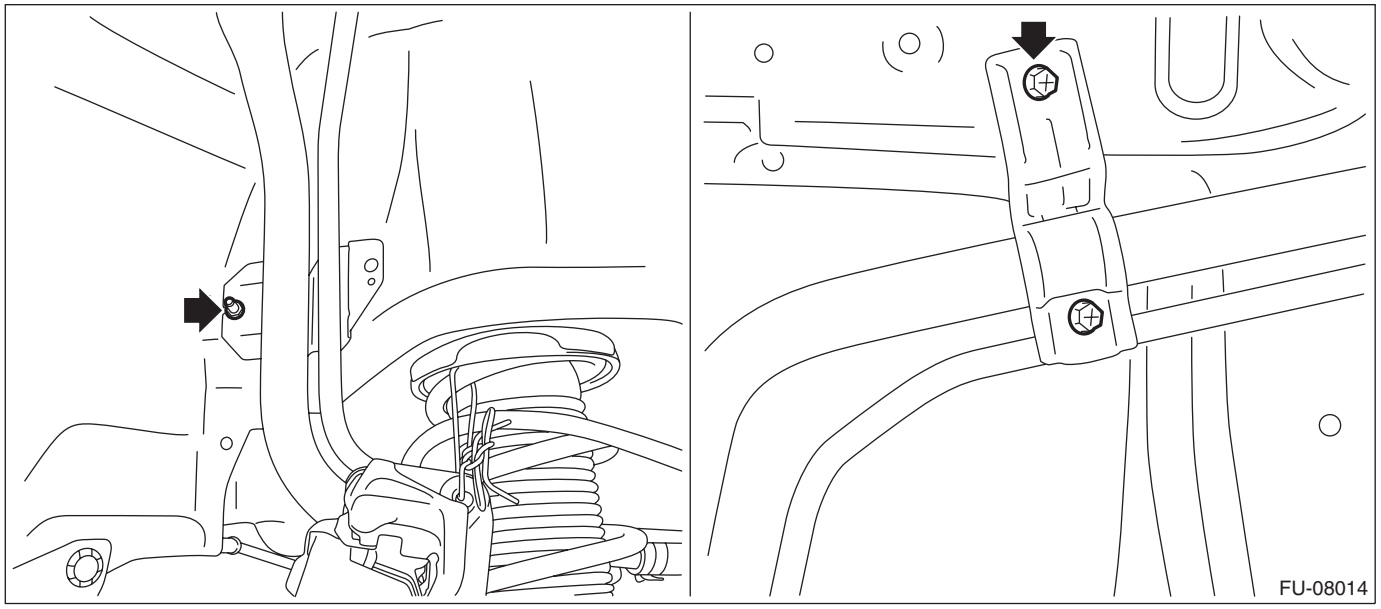


6) Remove the rear sub frame assembly. <Ref. to RS-9, REMOVAL, Rear Sub Frame.>
7) Remove the rear mud guard RH. <Ref. to EI-33, REMOVAL, Mud Guard.>

8) Disconnect the fuel filler hose (A) and evaporation hose (B) from the fuel filler pipe assembly.



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

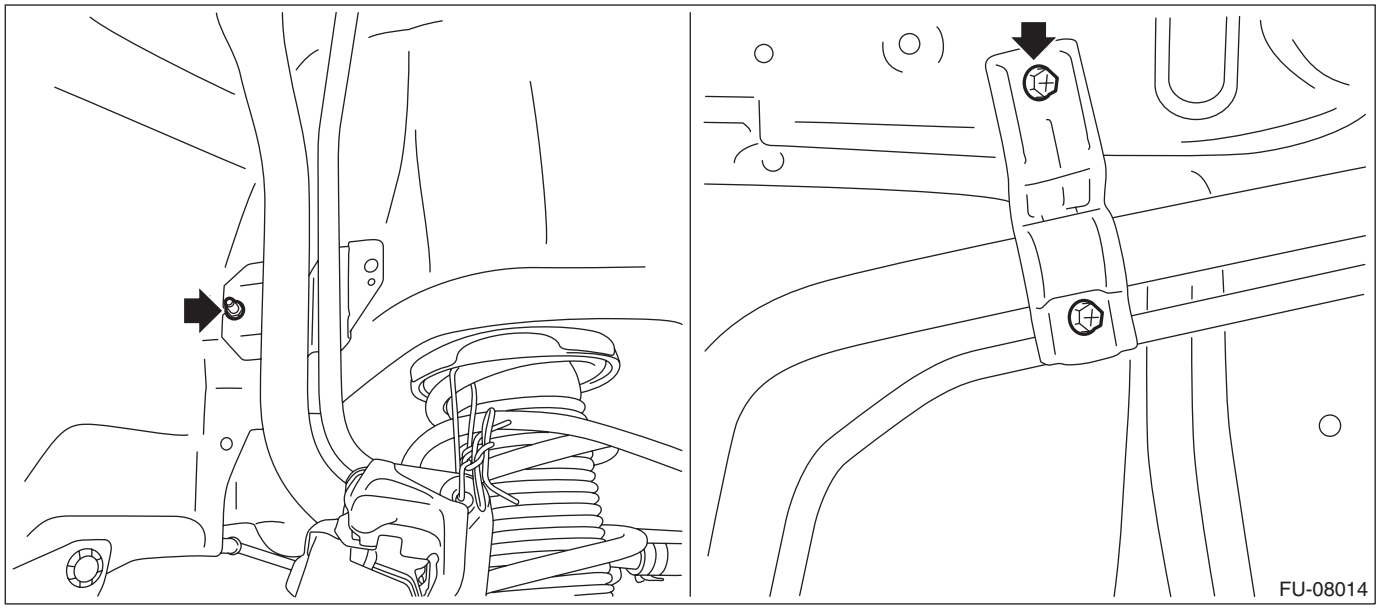


10) Remove the fuel filler pipe assembly from the underside of the vehicle.

B: INSTALLATION

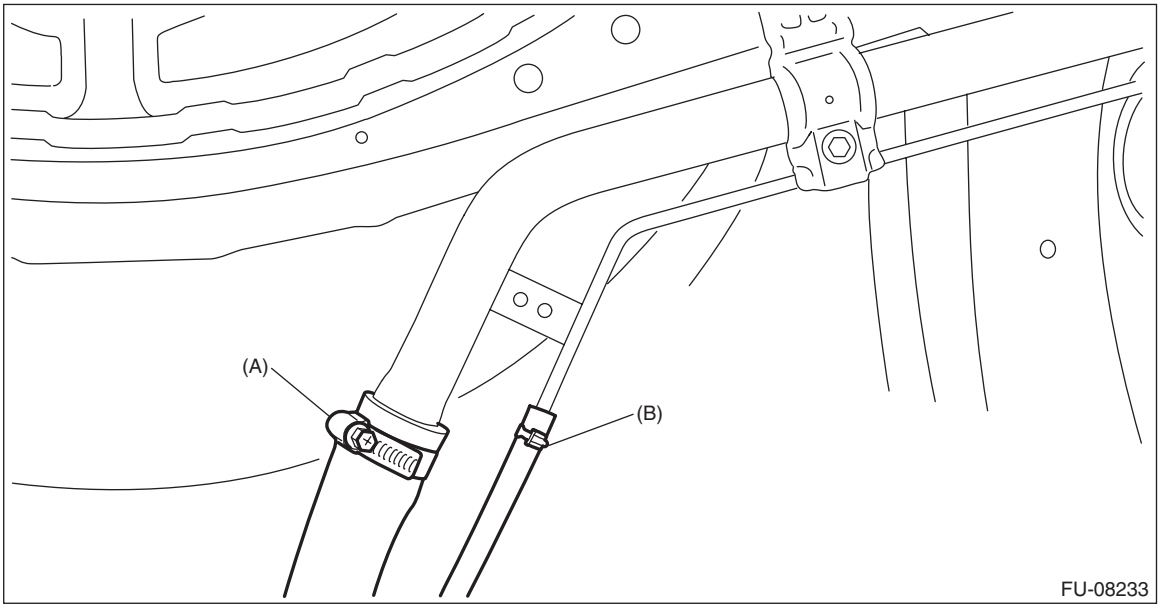
1) Open the fuel filler lid.
2) Insert the fuel filler pipe assembly into the rubber saucer from inside of the rear fender.
3) Install the fuel filler pipe assembly to the vehicle.

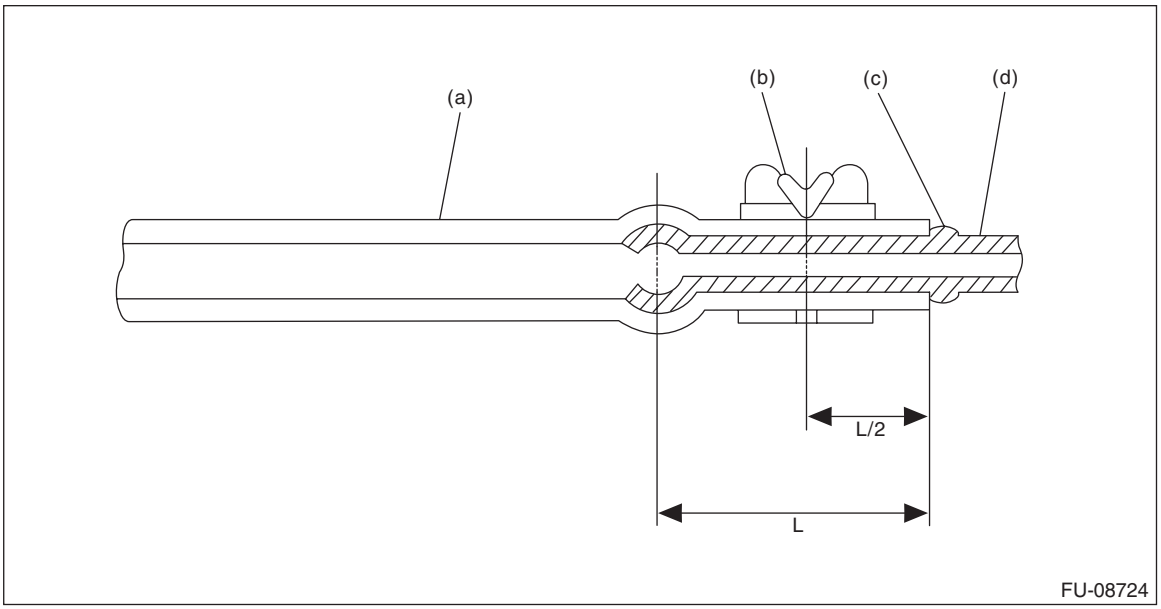
Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



4) 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)





(a) Hose
(b) Clamp or clip
(c) Spool or bump
(d) Pipe

5) Install the rear mud guard RH. <Ref. to EI-33, INSTALLATION, Mud Guard.>
6) Install the rear sub frame assembly. <Ref. to RS-15, INSTALLATION, Rear Sub Frame.>
7) Connect the battery ground terminal. <Ref. to NT-5, BATTERY, NOTE, Note.>
8) Inspect the wheel alignment and adjust if necessary. <Ref. to FS-7, Wheel Alignment.>
9) Perform reinitialization of the auto headlight beam leveler system. (Model with auto headlight beam leveler) <Ref. to LI-20, PROCEDURE, Auto Headlight Beam Leveler System.>
10) Adjust the steering angle sensor. <Ref. to VDC-26, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

C: 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.

30.Fuel Pump

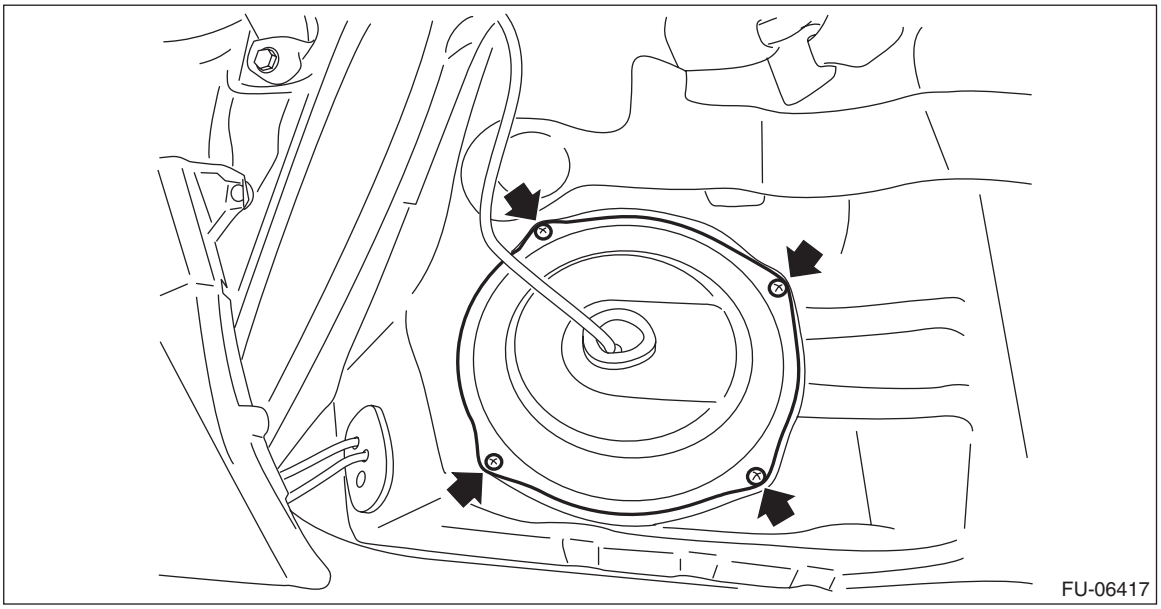
A: REMOVAL

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

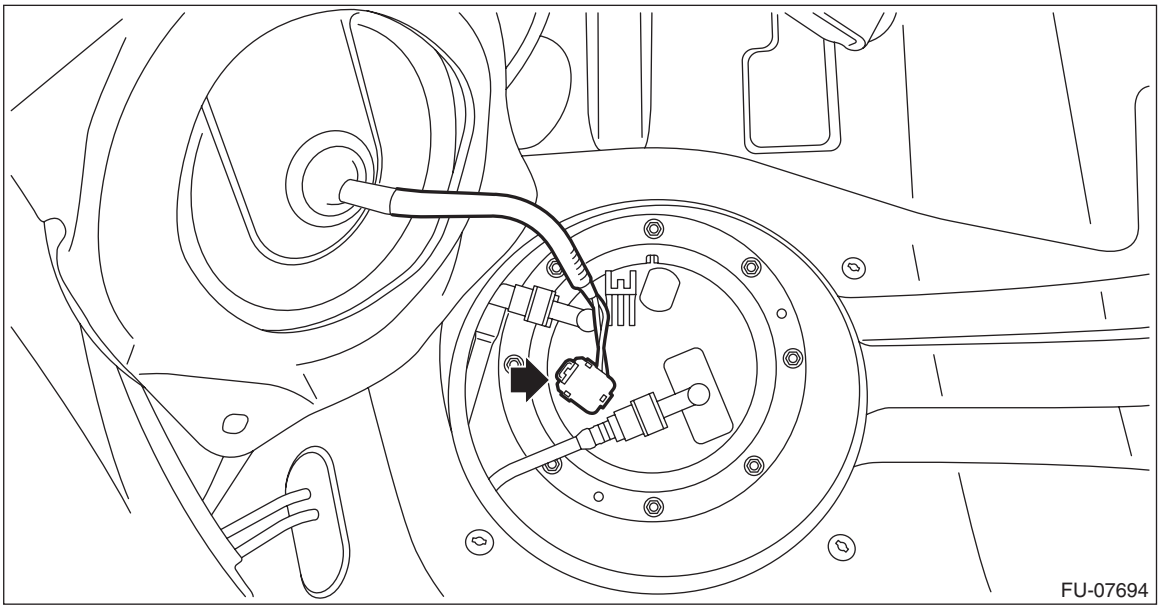
CAUTION:
- **Be careful not to spill fuel.**
- **Catch the fuel from the tubes using a container or cloth.**
- **If the fuel gauge indicates that two thirds or more of the fuel is remaining, be sure to drain fuel before starting work to avoid the fuel to spill.**

NOTE:
Fuel pump assembly consists of fuel pump, fuel filter and fuel level sensor.
1) Release the fuel pressure. <Ref. to FU(H4DO(HEV))-98, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Drain fuel. <Ref. to FU(H4DO(HEV))-99, DRAINING FUEL (WITH SUBARU SELECT MONITOR), PROCEDURE, Fuel.>
3) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
4) Remove the rear seat cushion. <Ref. to SE-23, REMOVAL, Rear Seat.>
5) Remove the service hole cover of fuel pump.

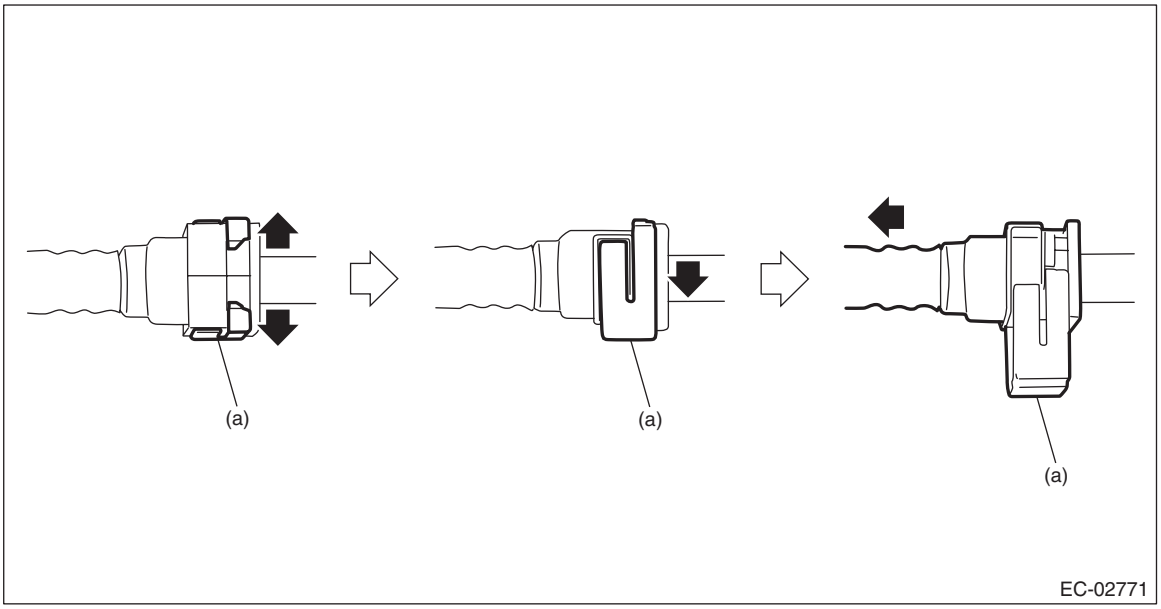


6) Disconnect connectors from the fuel pump, and move aside the service hole cover.

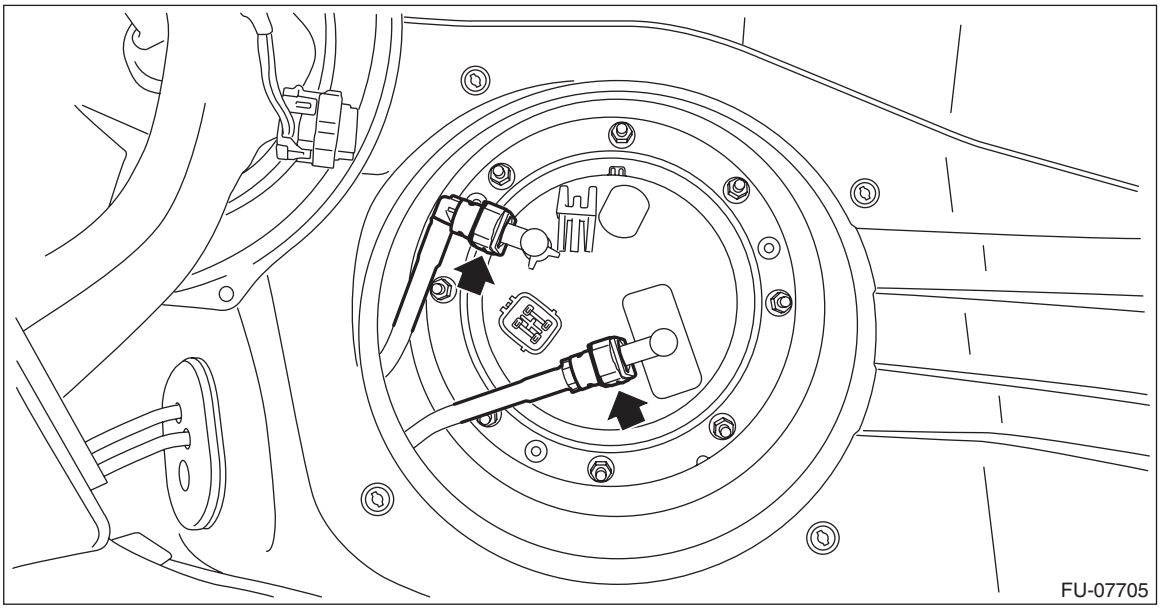


7) Disconnect the quick connector of fuel delivery tube and jet pump tube.

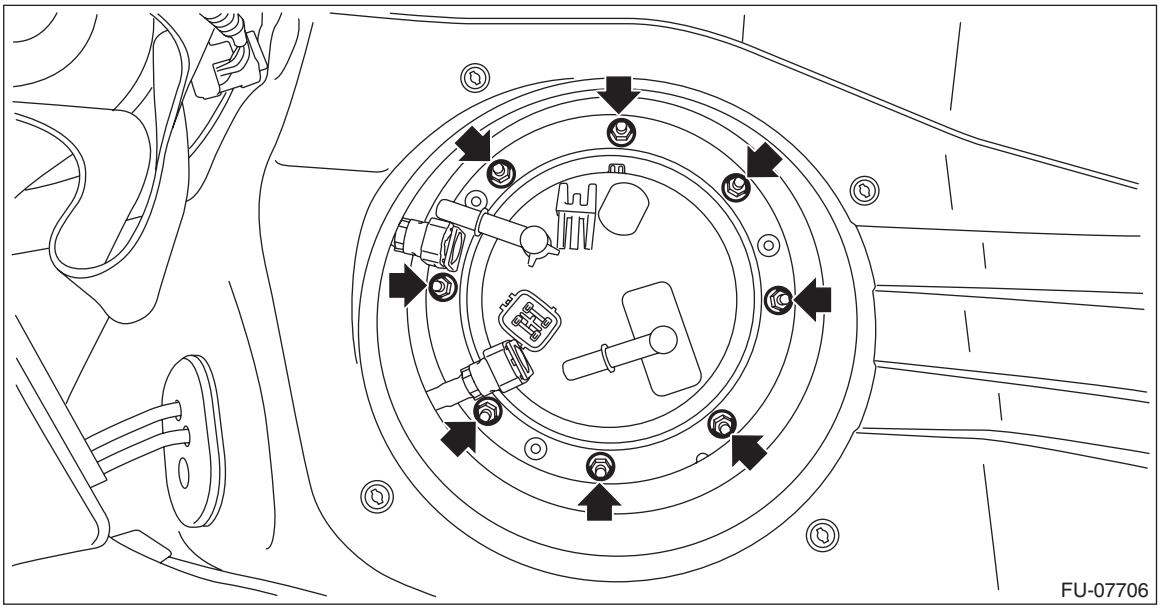
NOTE:
Disconnect the quick connector as shown in the figure.



(a) Slider



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.

CAUTION:
Be careful not to let the arm and float of fuel level sensor contact the fuel tank.

B: INSTALLATION

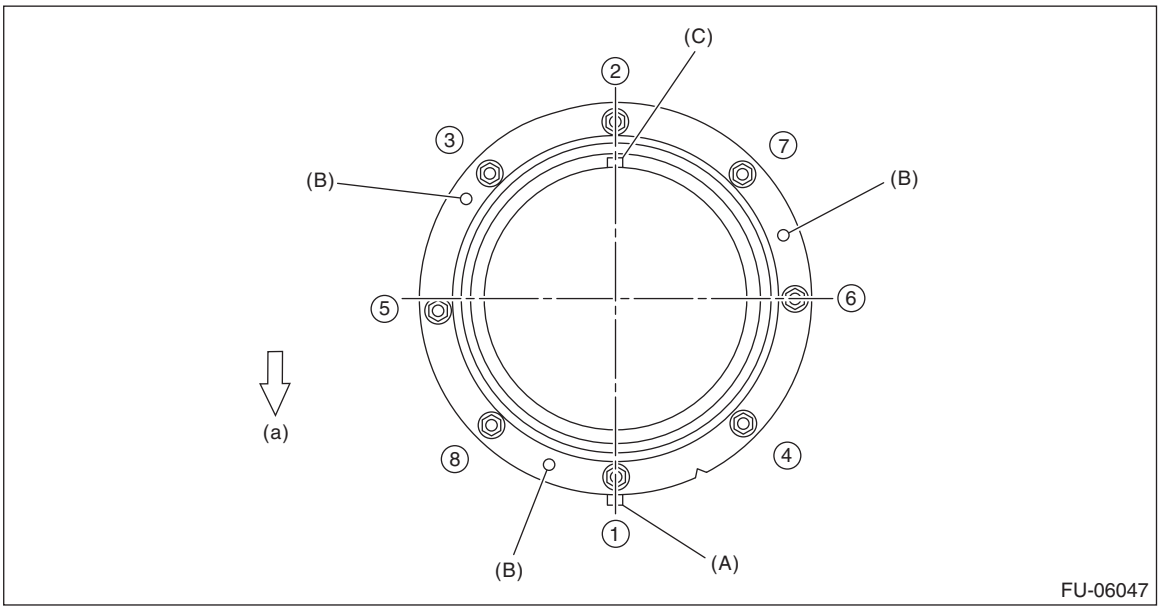
Install in the reverse order of removal while being careful of the following.

CAUTION:
Set the arm and float of the fuel level sensor while paying attention to prevent them from contacting the fuel tank. If the arm of the fuel level sensor is bent, the fuel gauge may not read correctly.

- 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 the protrusion (C) of the fuel pump upper plate cushion with the protrusion (C) of fuel pump assembly.
- Align the protrusion (C) of fuel pump upper plate cushion with the cutout on the fuel pump upper plate.
- Insert the protrusion (B) of gasket to the fuel pump upper plate. (3 places)
- Tighten the nuts to the specified torque in the order as shown in the figure.

NOTE:
- Use a new gasket.

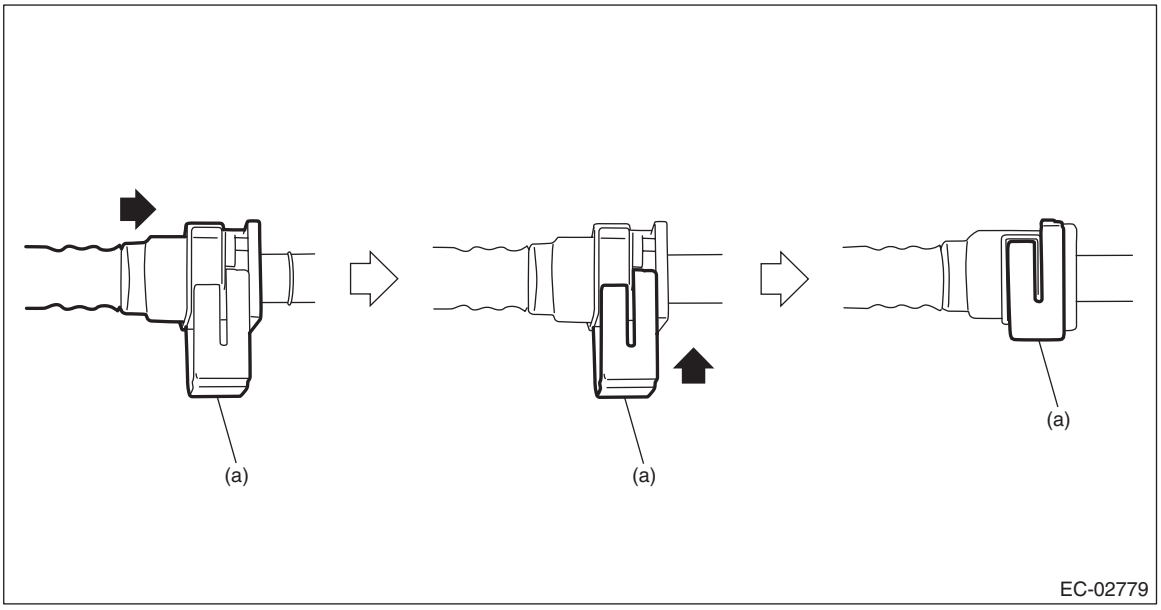
Tightening torque:
4.4 N·m (0.4 kgf-m, 3.2 ft-lb)



(a) Front side of vehicle

- 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 it all the way in before locking the slider.**
- **When it is difficult to lock the slider, check that the connector is fully inserted.**
- **After locking the slider, check again that the quick connector is securely connected.**

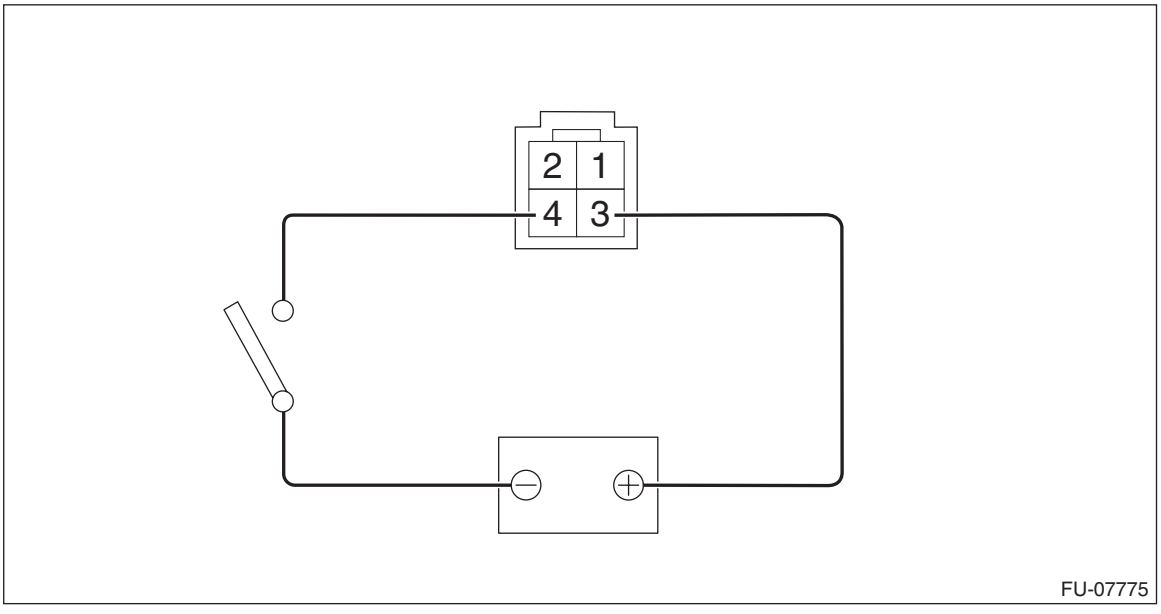


(a) Slider

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.**



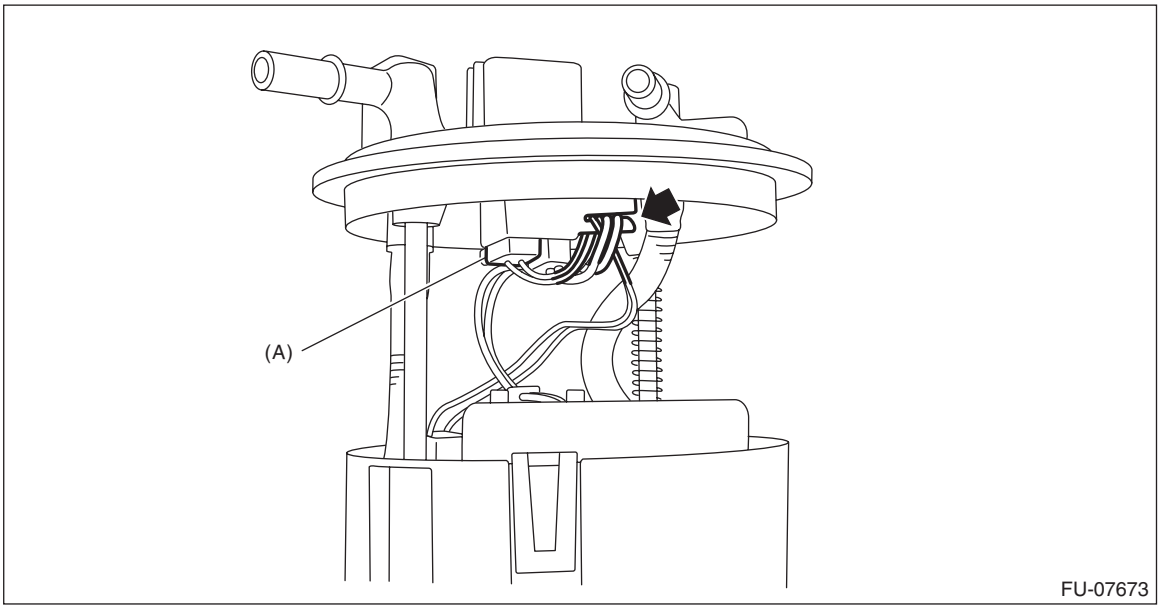
31.Fuel Level Sensor

A: REMOVAL

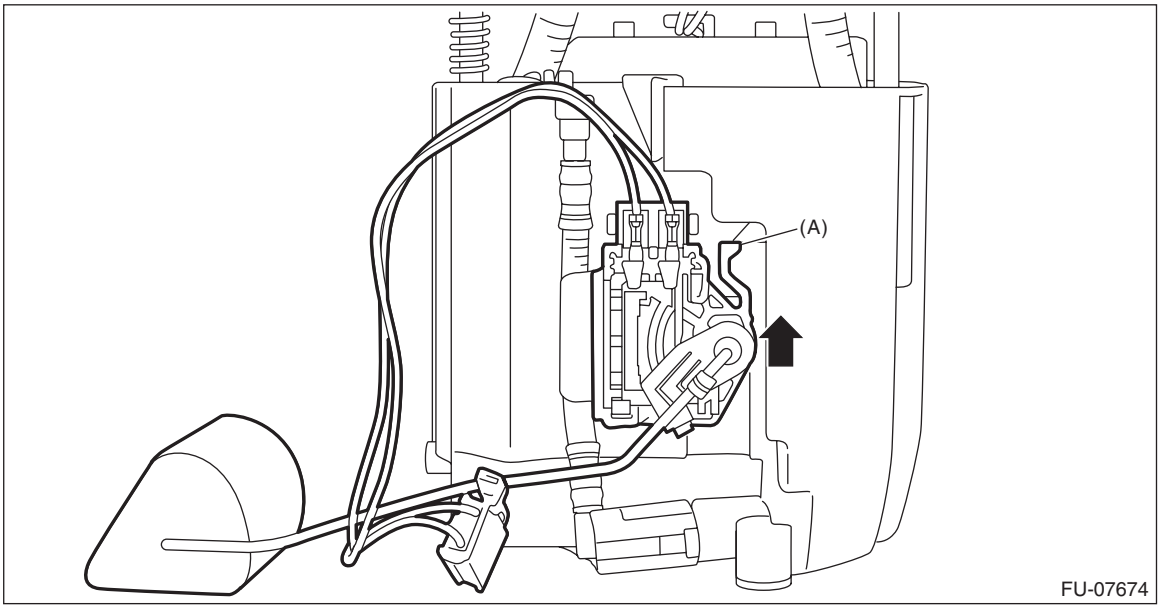
WARNING:
Place “NO OPEN FLAMES” signs near the working area.

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(H4DO(HEV))-122, 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.



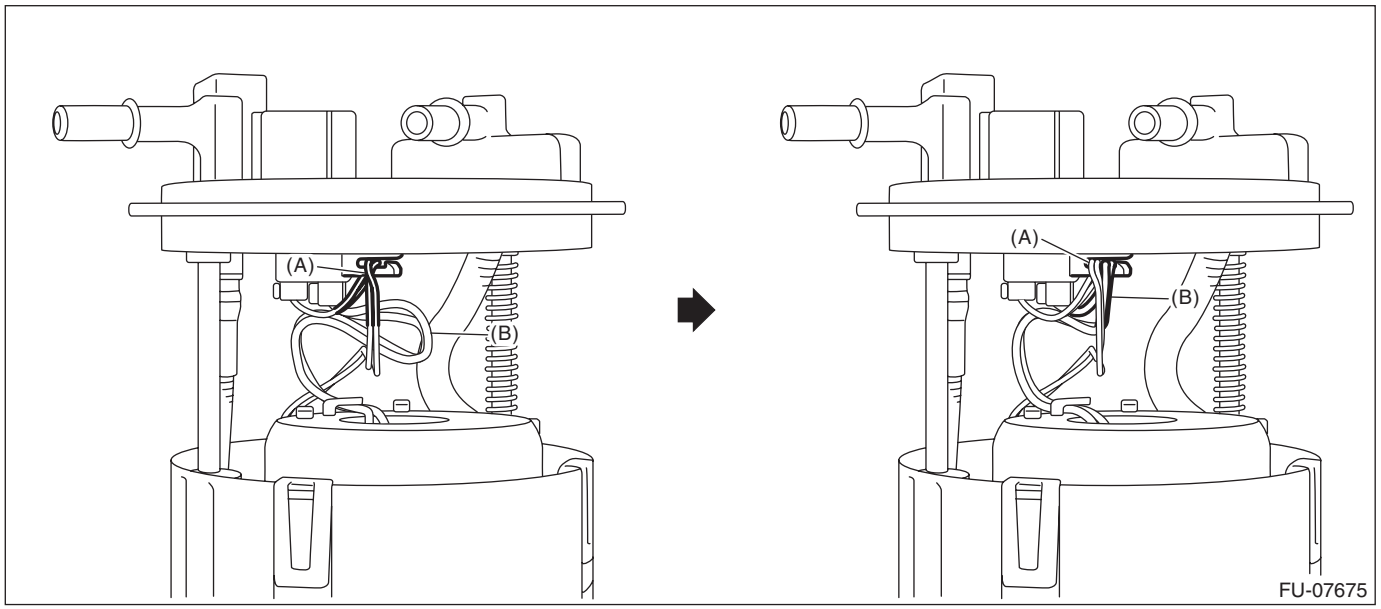
3) While pressing the claw (A) of the fuel level sensor, slide the fuel level sensor in the direction of the arrow, and remove the fuel level sensor.



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.

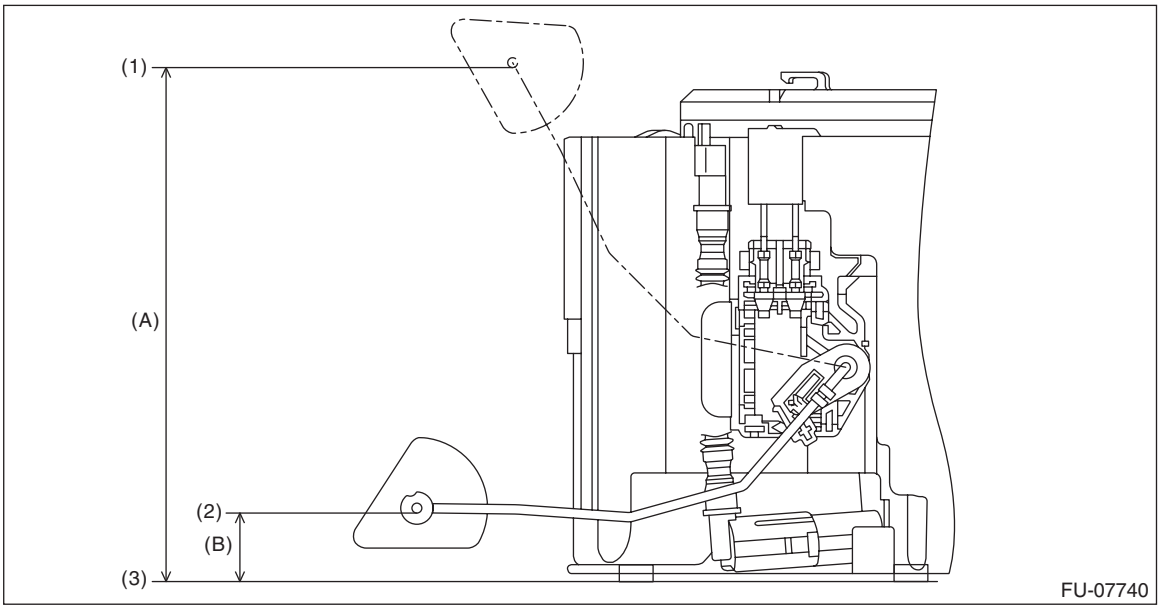


(A) Fuel level sensor harness (B) Connector cable

C: INSPECTION

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

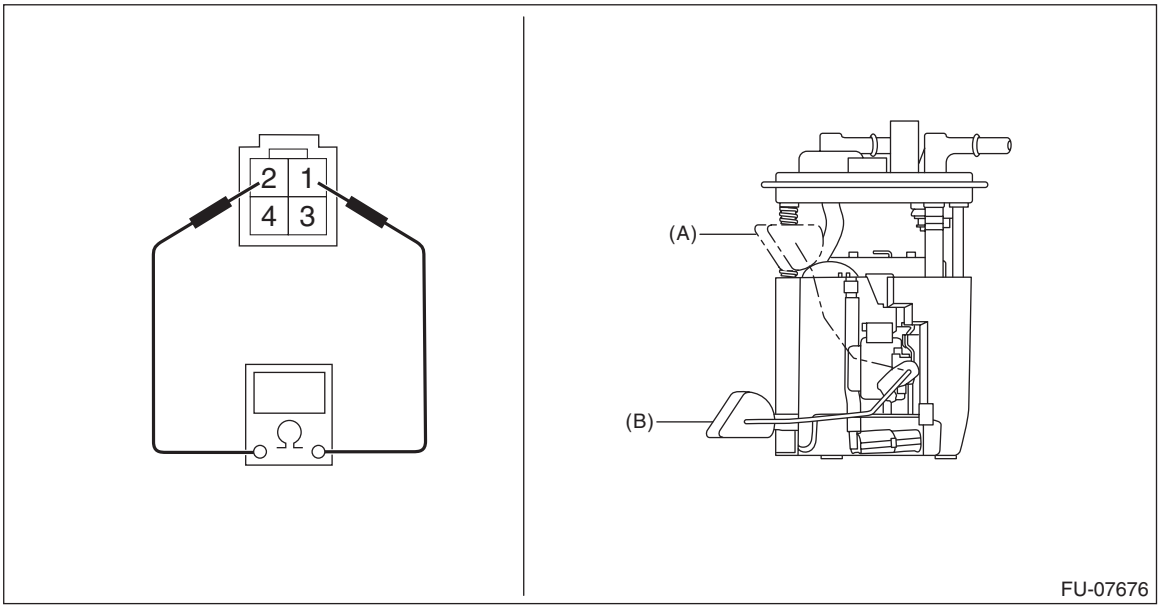
NOTE:
When inspecting the fuel level sensor, perform the work with the sensor installed to the fuel pump.



(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

32.Fuel Sub Level Sensor

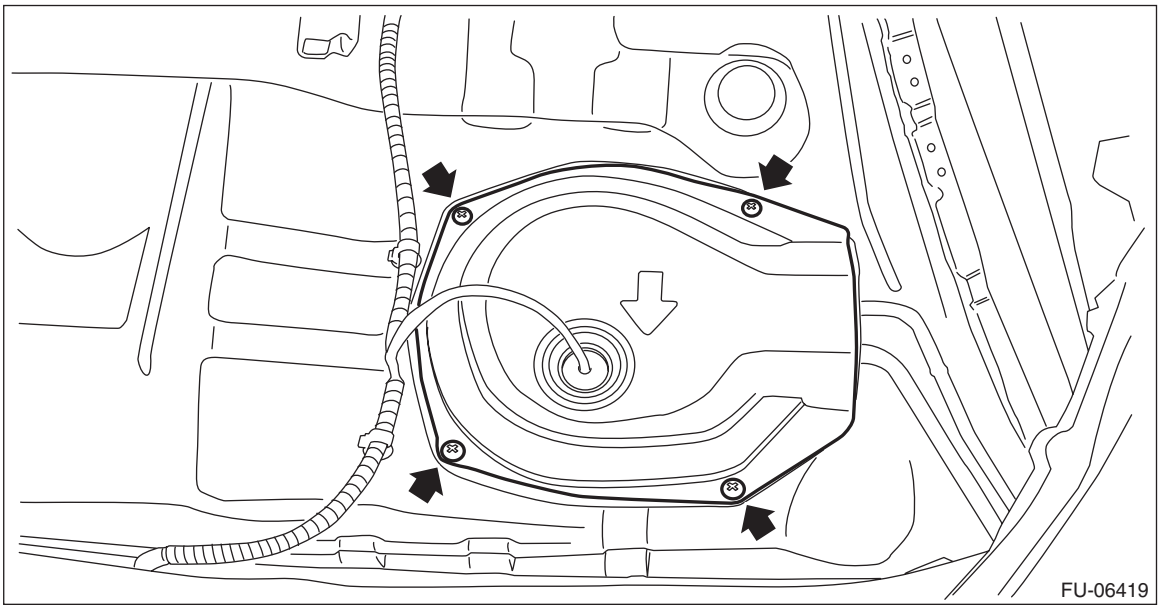
A: REMOVAL

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

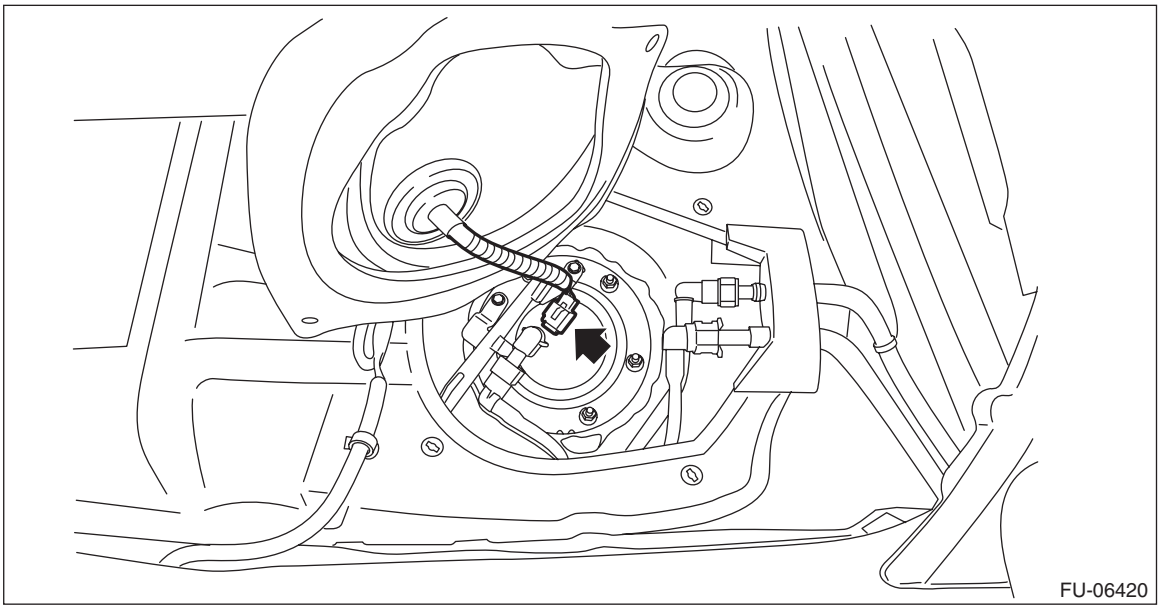
CAUTION:
- **Be careful not to spill fuel.**
- **Catch the fuel from the tubes using a container or cloth.**
- **If the fuel gauge indicates that two thirds or more of the fuel is remaining, be sure to drain fuel before starting work to avoid the fuel to spill.**

1) Release the fuel pressure. <Ref. to FU(H4DO(HEV))-98, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Drain fuel. <Ref. to FU(H4DO(HEV))-99, DRAINING FUEL (WITH SUBARU SELECT MONITOR), PROCEDURE, Fuel.>
3) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
4) Remove the rear seat cushion. <Ref. to SE-23, REMOVAL, Rear Seat.>
5) Remove the service hole cover of fuel sub level sensor.

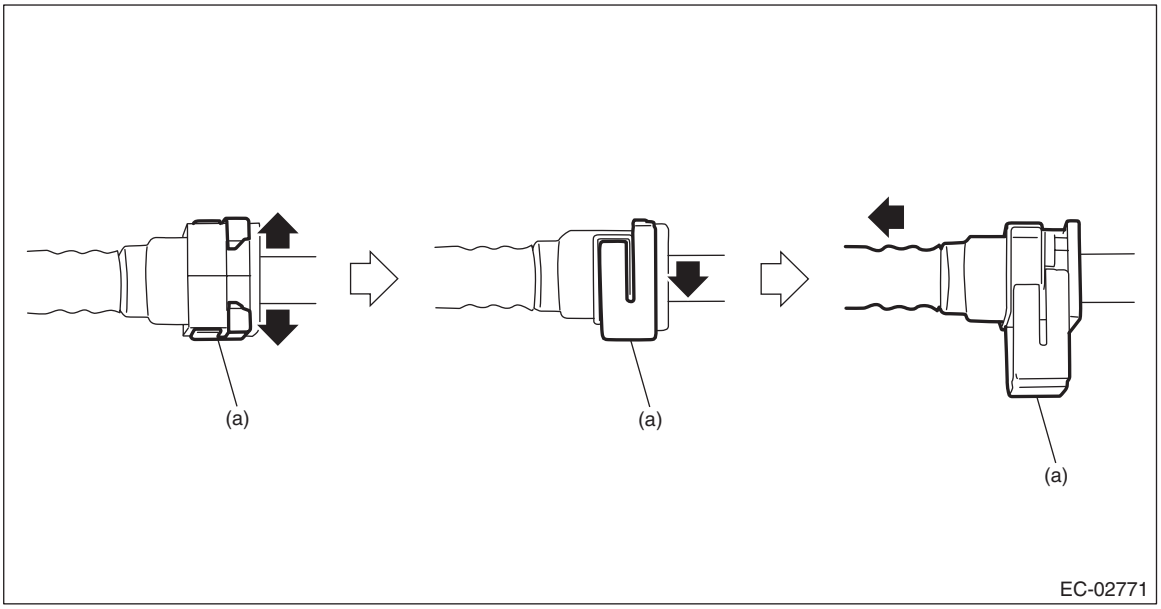


6) Disconnect the connector from the fuel sub level sensor, and move aside the service hole cover.

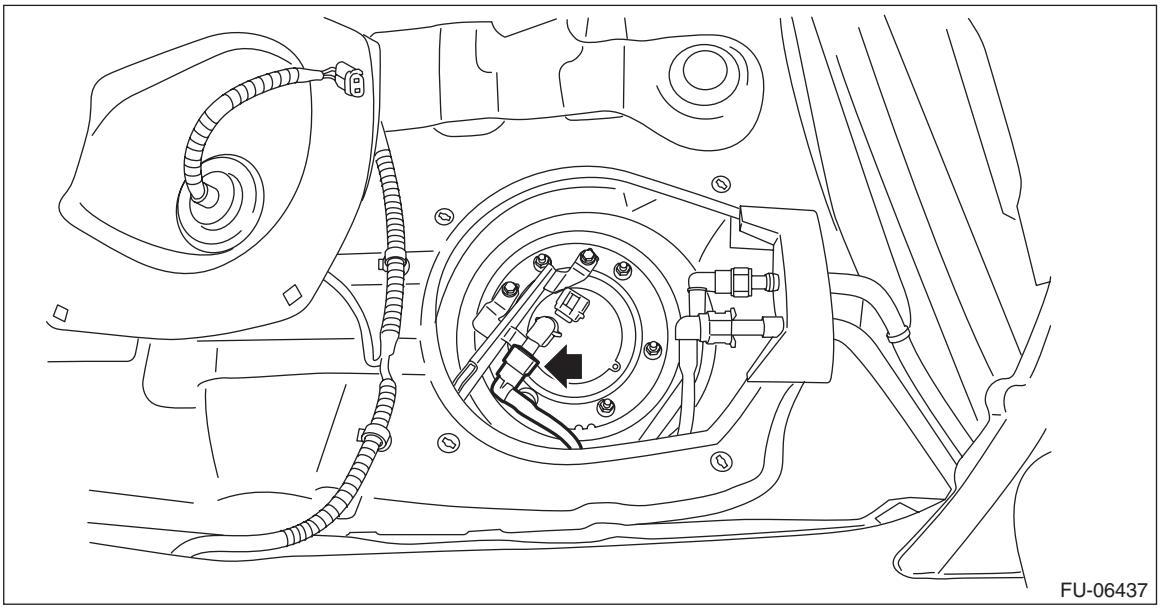


7) Disconnect the quick connector of the jet pump tube.

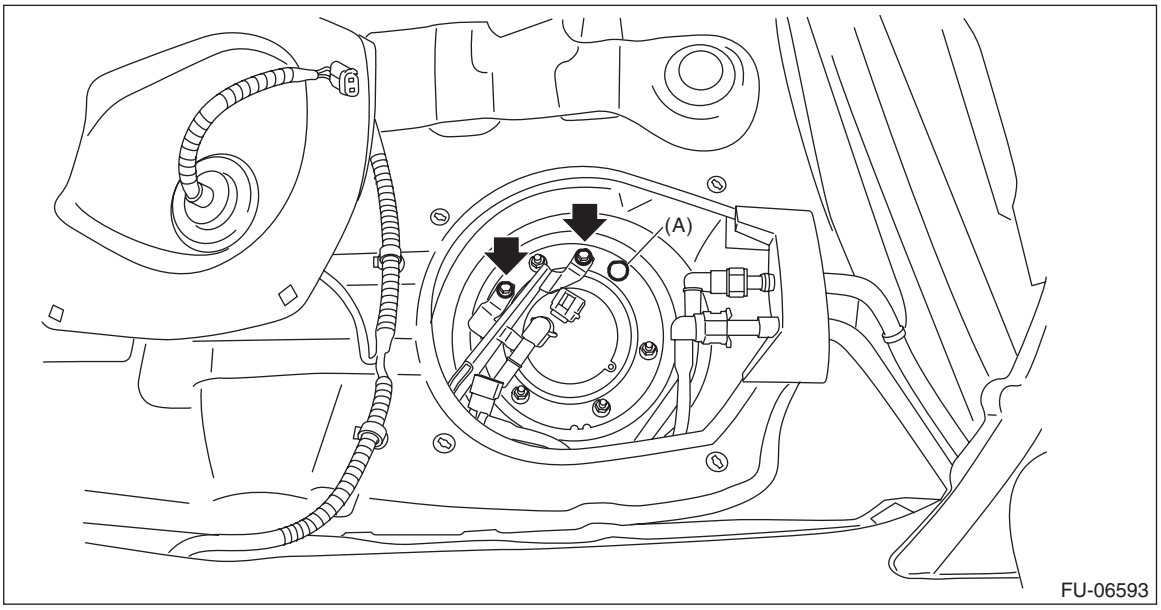
NOTE:
Disconnect the quick connector as shown in the figure.



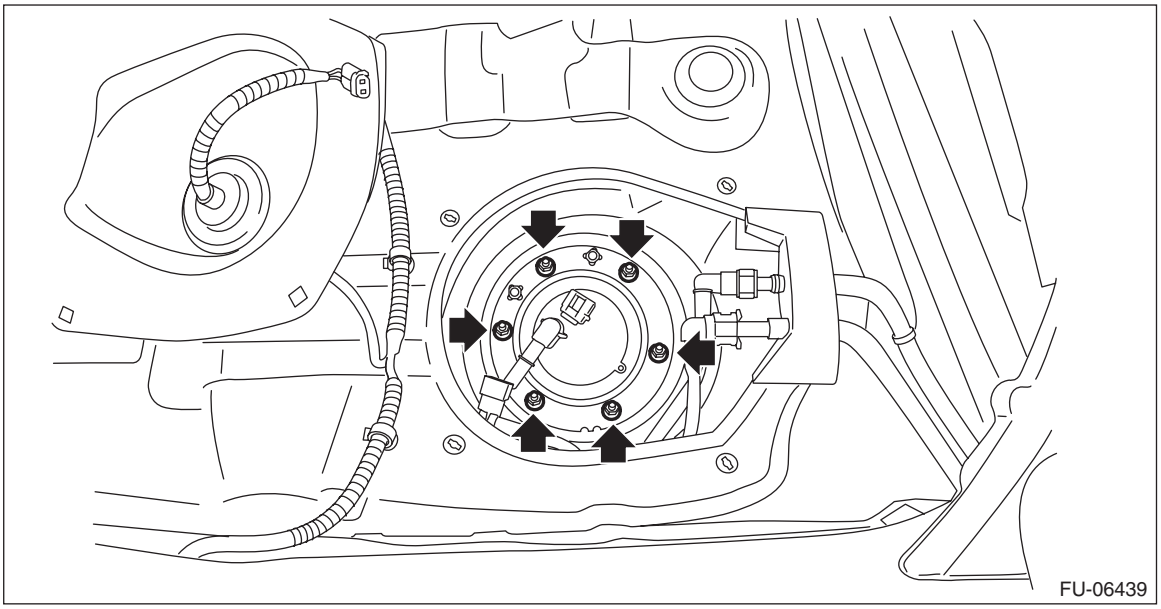
(a) Slider



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



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.

CAUTION:
Be careful not to let the arm and float of the fuel sub level sensor contact the fuel tank.

B: INSTALLATION

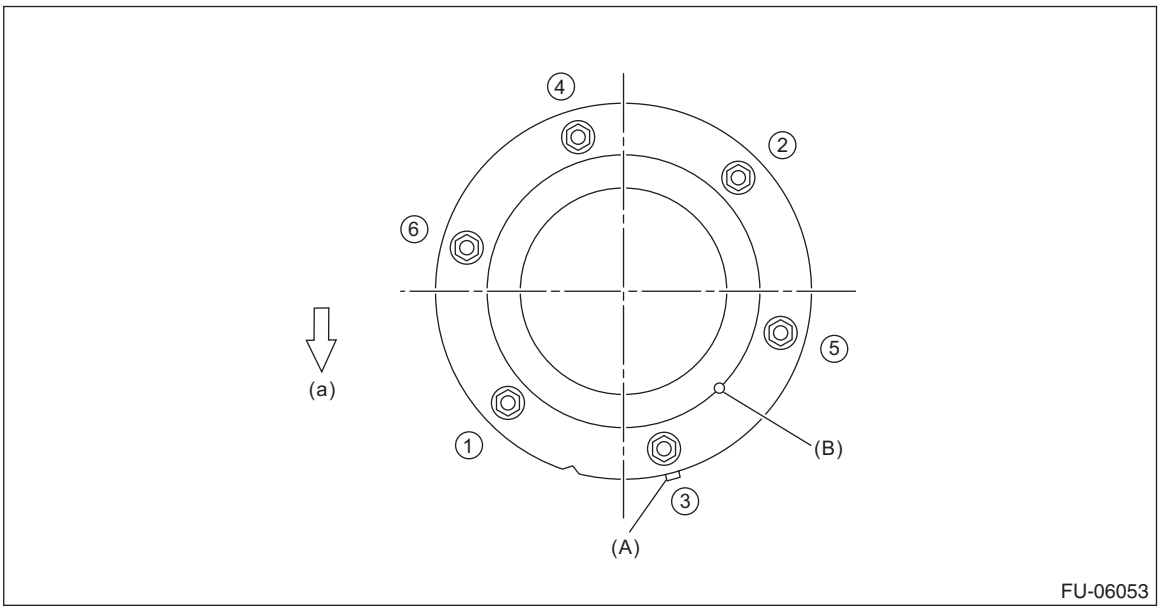
Install in the reverse order of removal while being careful of the following.

CAUTION:
Set the arm and float of the fuel sub level sensor while paying attention to prevent them from contacting the fuel tank. If the arm of the fuel sub level sensor is bent, the fuel gauge may not read correctly.

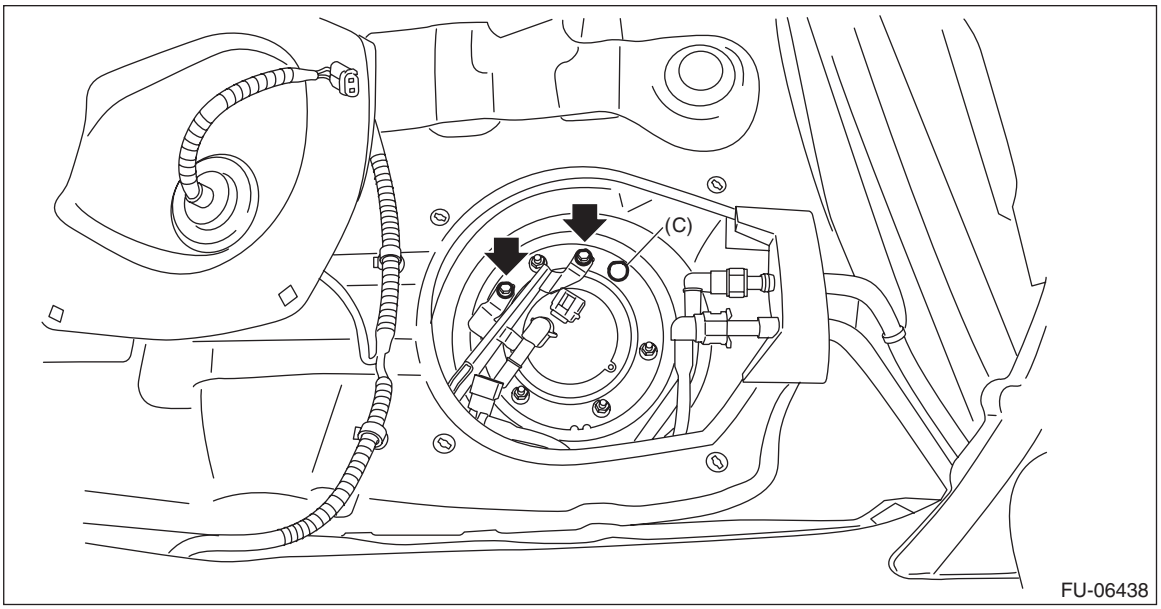
- Make sure the sealing portion is free from fuel or foreign matter before installation.
- Align protrusion (A) of the gasket to the position shown in the figure.
- Align the cutout in the fuel sub level sensor upper plate cushion with the protrusion (B) of the fuel sub level sensor.
- Align the protrusion (B) of the fuel sub level sensor upper plate cushion with 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)

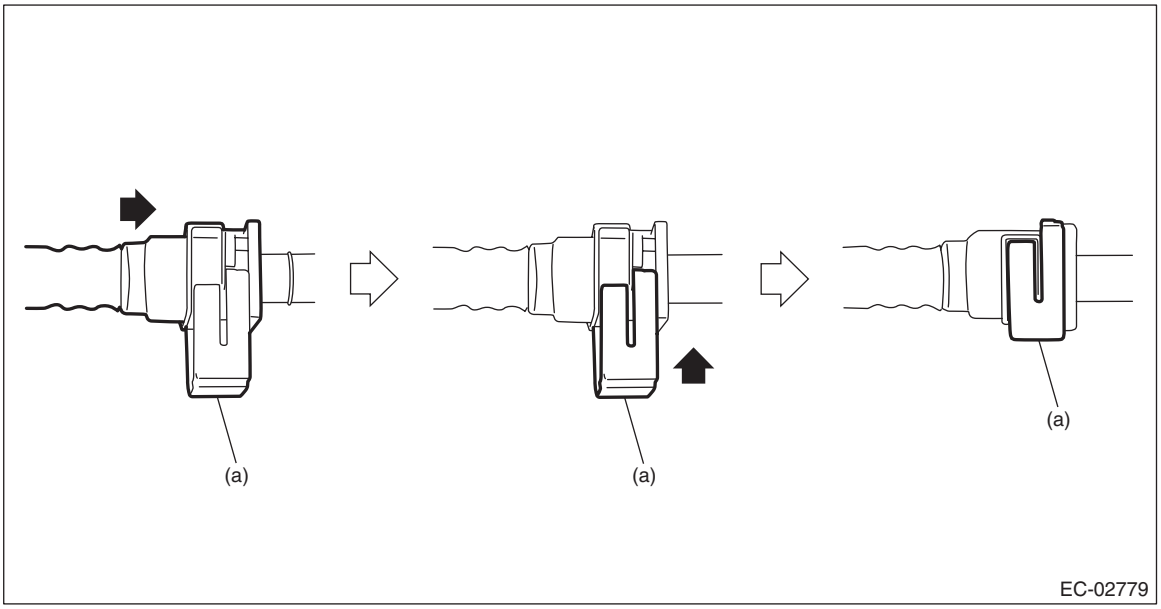


(a) Front side of vehicle



- Connect the quick connector as shown in the figure.

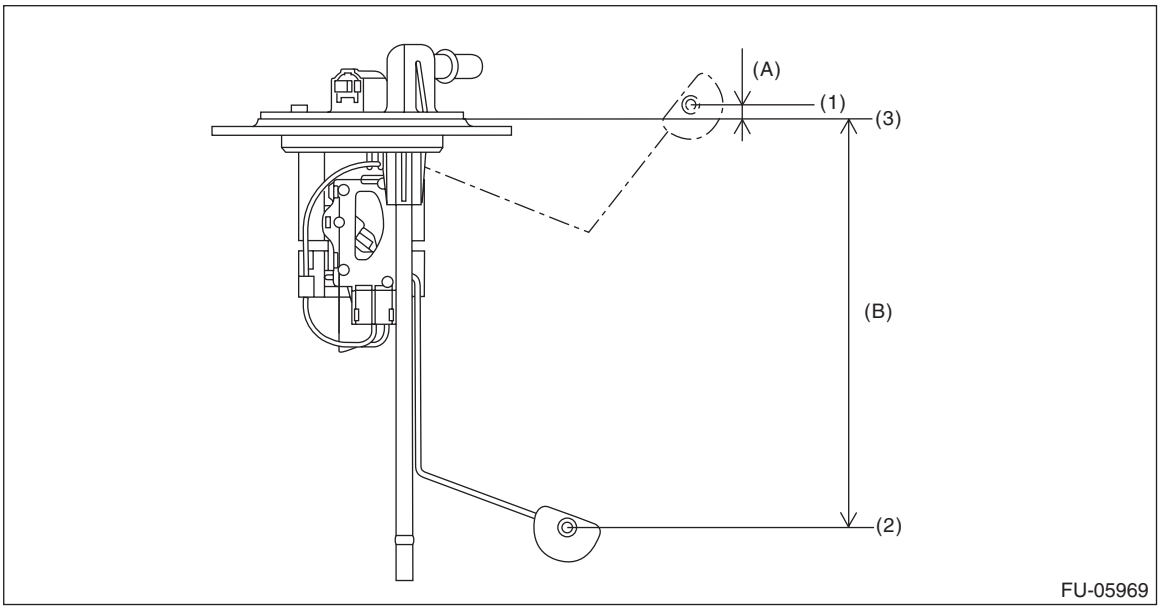
CAUTION:
- **Check that there is no damage or dust on the quick connector. If necessary, clean the seal surface of the pipe.**
- **When connecting the quick connector, make sure to insert it all the way in before locking the slider.**
- **When it is difficult to lock the slider, check that the connector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



(a) Slider

C: INSPECTION

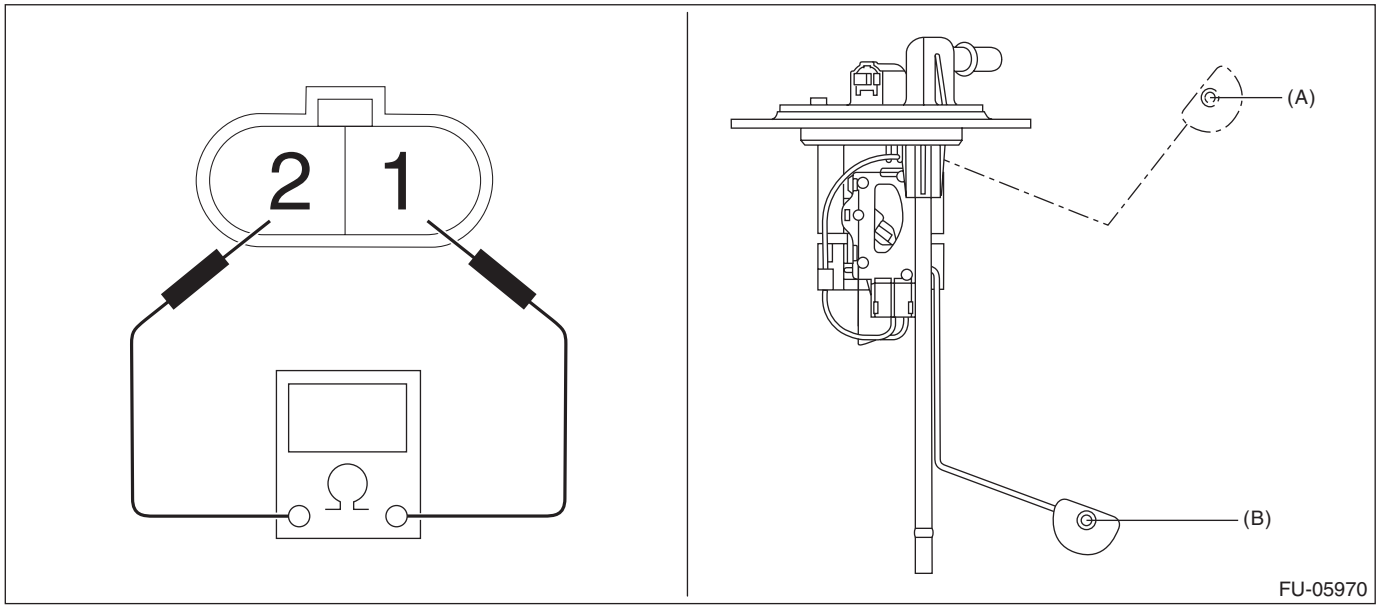
1) Check that the fuel sub level sensor has no damage.
2) Measure the fuel sub level sensor float position.



(1) FULL (2) EMPTY (3) Datum points

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

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



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

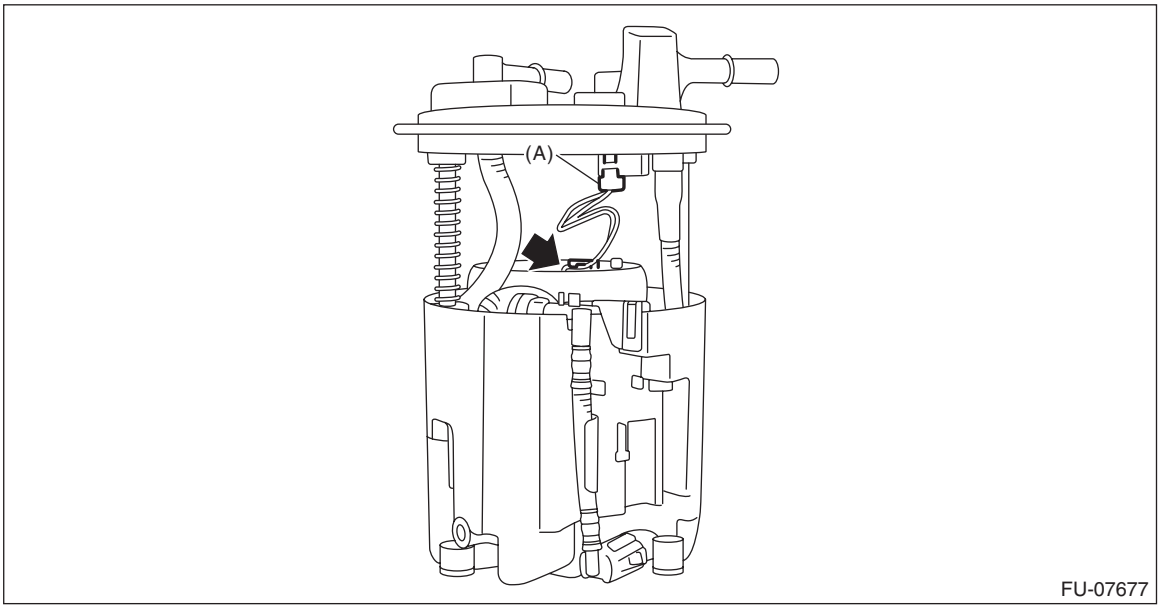
33.Fuel Filter

A: REMOVAL

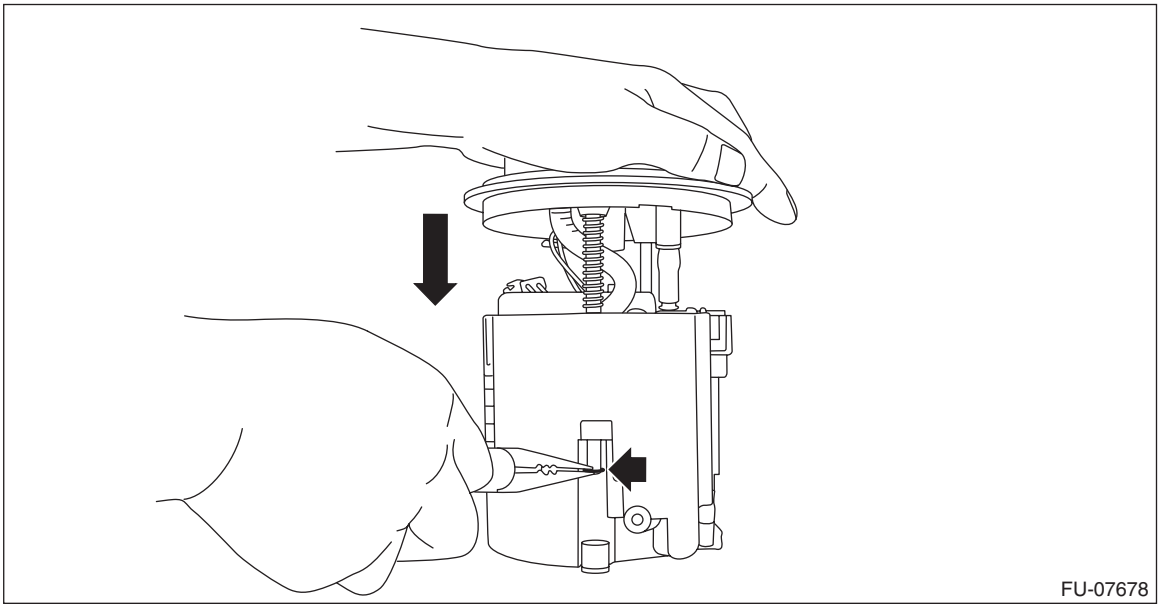
WARNING:
Place “NO OPEN FLAMES” signs near the working area.

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.**

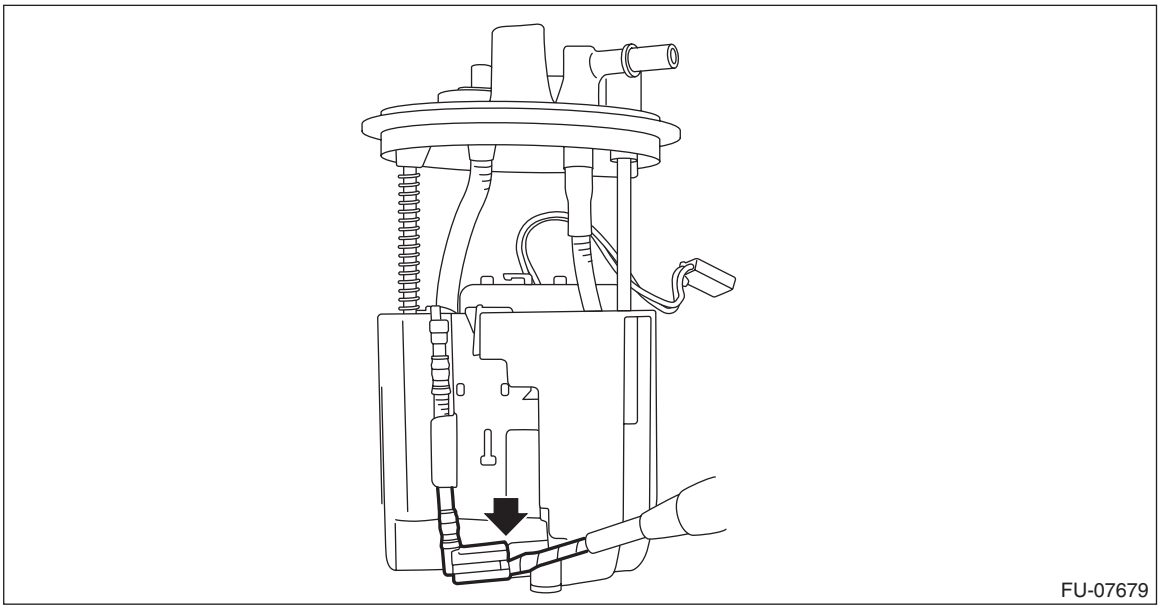
NOTE:
The fuel filter is built in fuel pump assembly.
1) Remove the fuel pump assembly. <Ref. to FU(H4DO(HEV))-122, REMOVAL, Fuel Pump.>
2) Remove the fuel level sensor. <Ref. to FU(H4DO(HEV))-128, REMOVAL, Fuel Level Sensor.>
3) Remove the connector cable from the clip, and disconnect the connector (A) of the connector cable.



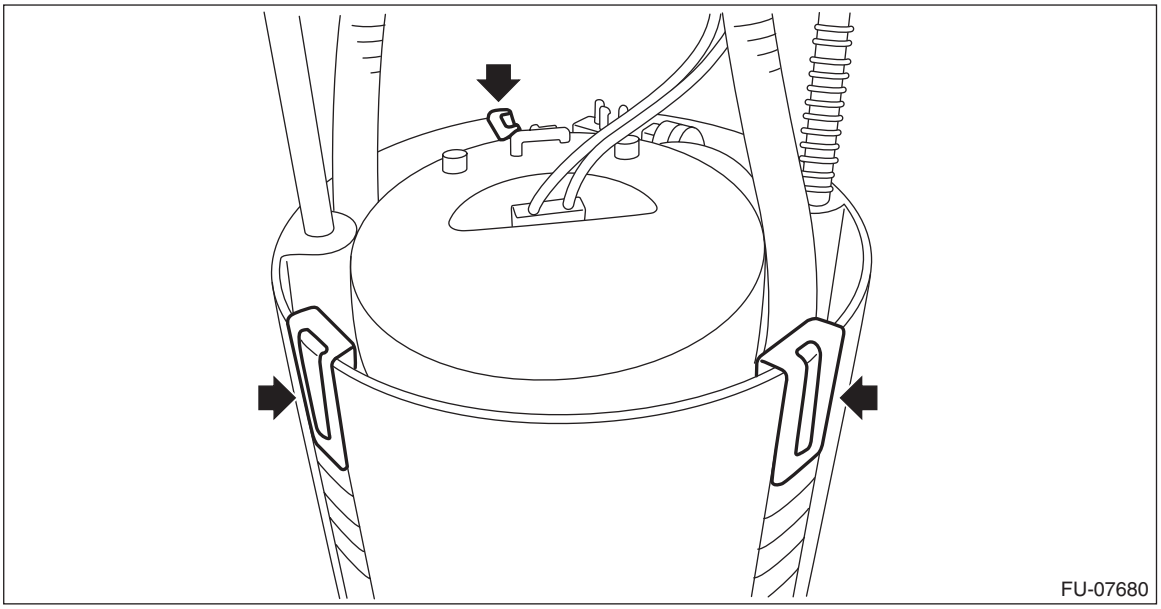
4) Push the fuel filter assembly in the direction of the arrow to compress, and detach the connecting clip.



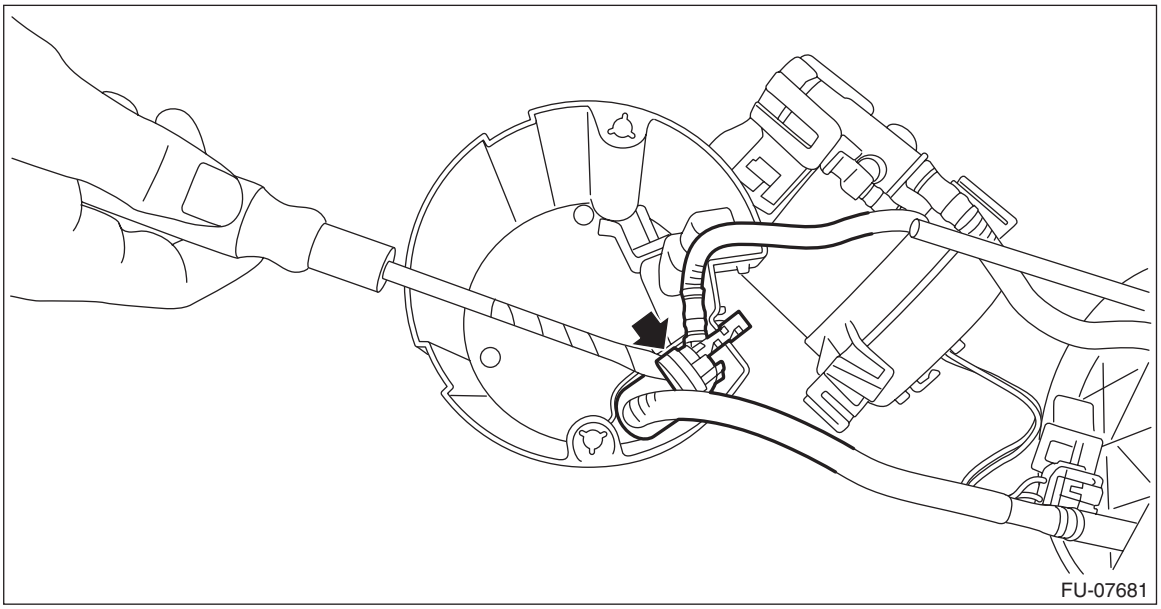
5) Release the claw using a flat tip screwdriver or similar tool wrapped with a protection tape, and remove the tube assembly from the fuel chamber assembly.



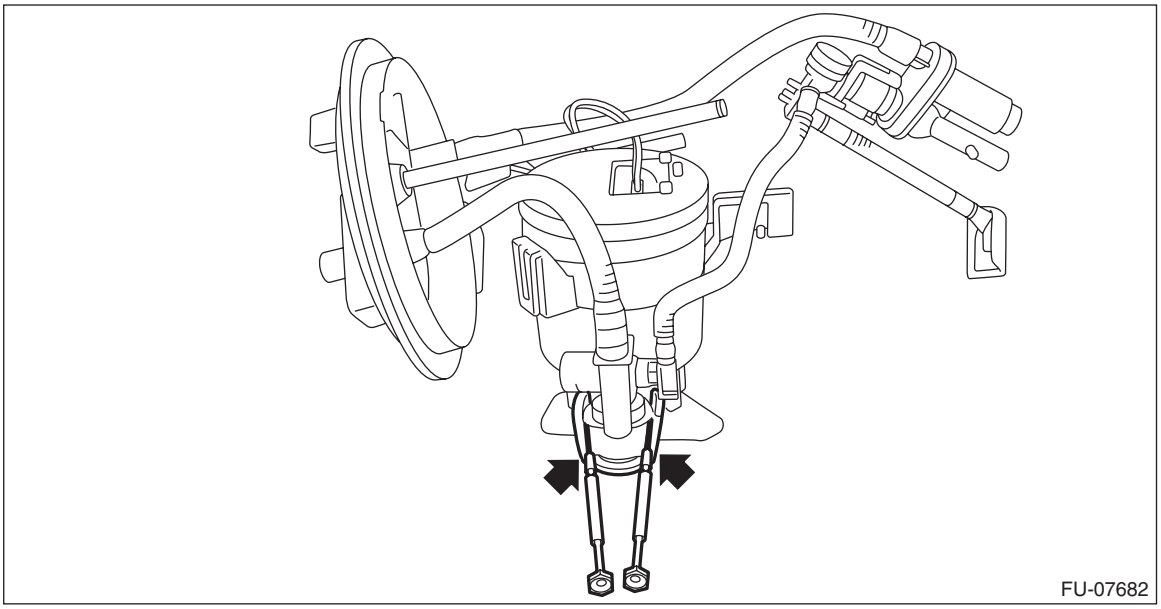
6) Release three claws on the fuel pump holder from the fuel chamber assembly, and raise the fuel filter assembly.



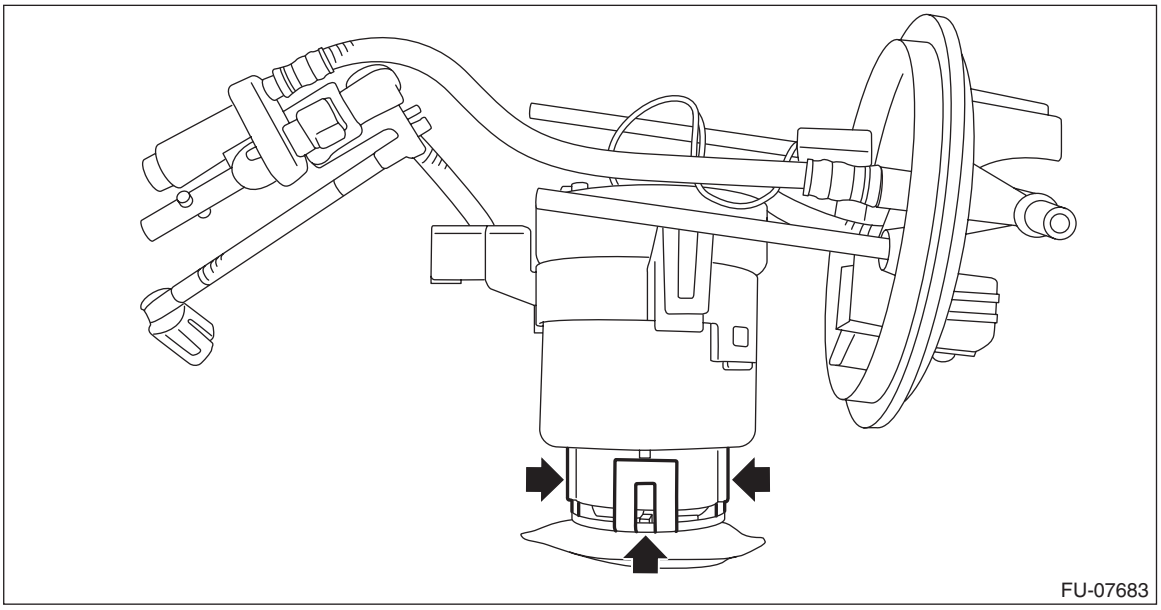
7) Using a flat tip screwdriver or similar tool wrapped with a protection tape, remove the tube assembly from the fuel chamber assembly, and separate the fuel filter assembly and fuel chamber assembly.



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

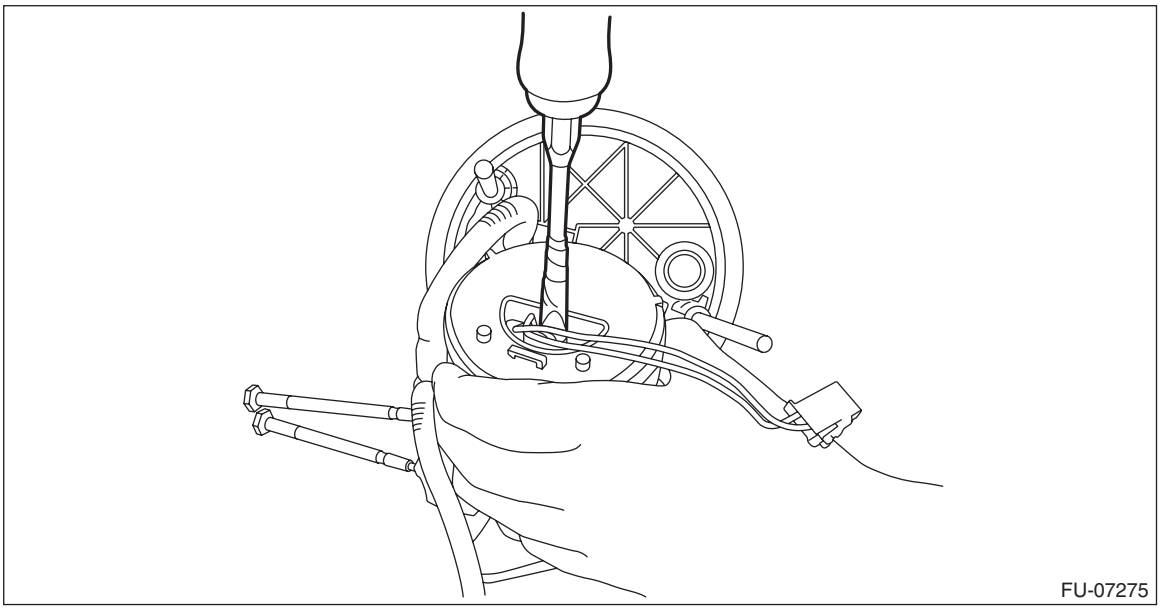


9) Release the claws on the fuel pump.

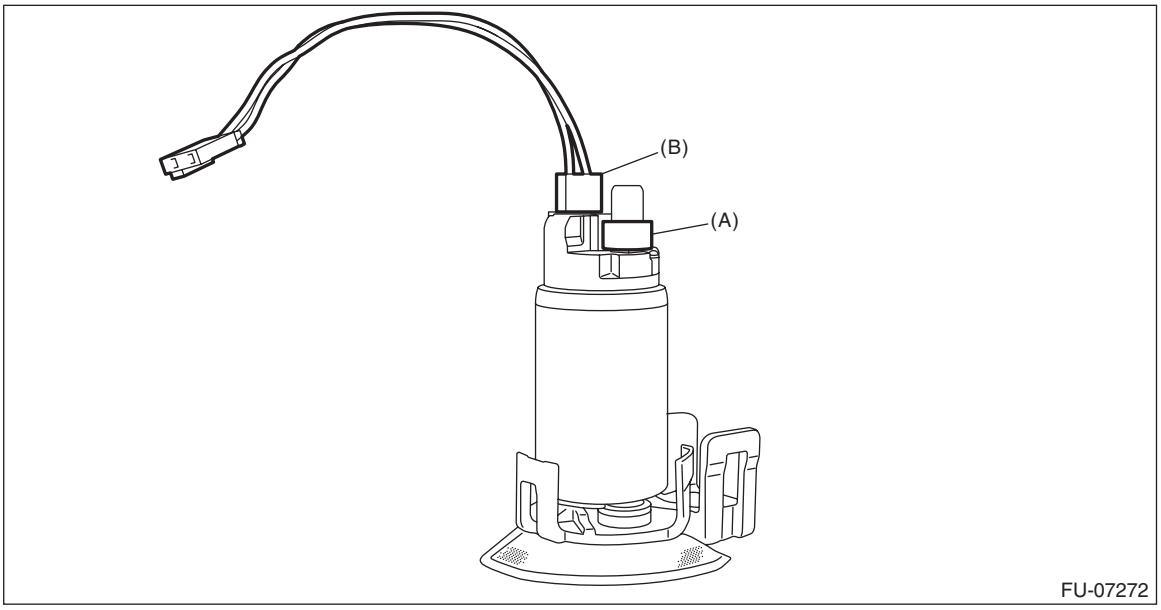


10) Using a flat tip screwdriver or similar tool wrapped with a protection tape, press on the fuel pump and remove the fuel pump together with the fuel pump holder from the fuel filter assembly.

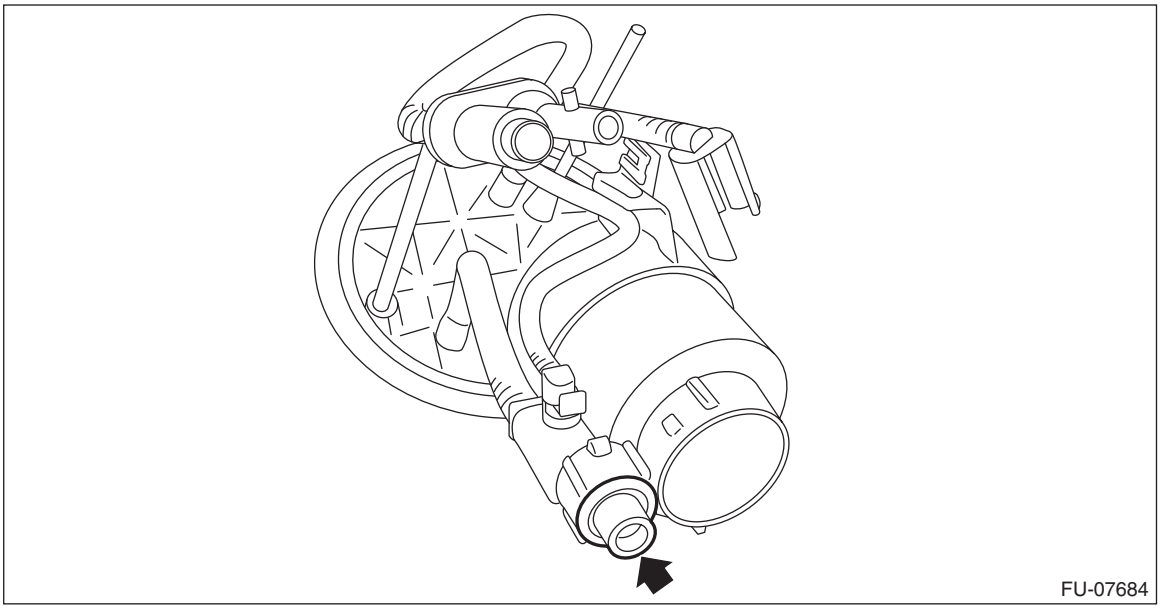
CAUTION:
If O-rings remain on the fuel filter assembly side, carefully remove them with a precision screwdriver or similar tool wrapped with a protection tape.



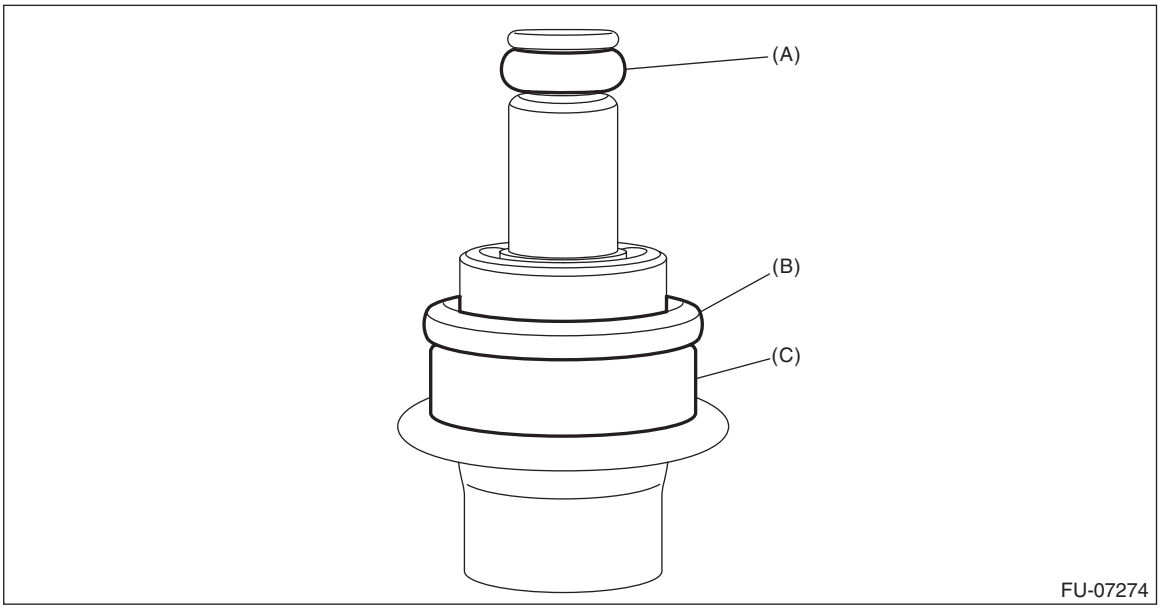
11) Remove the spacer (A) and connector cable (B) from the fuel pump.



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



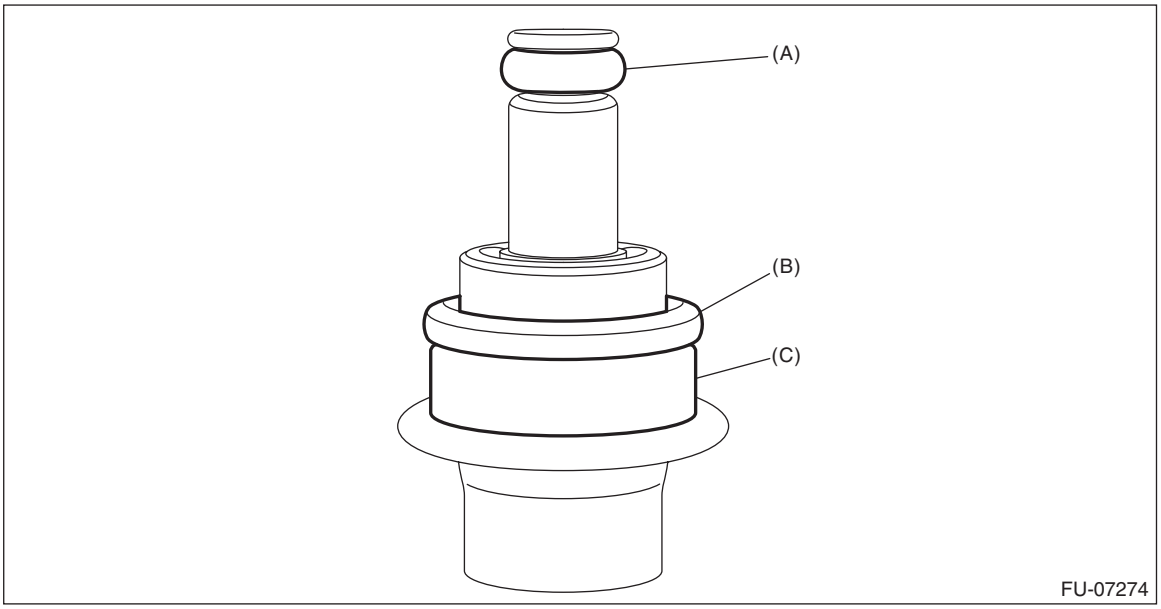
13) Remove O-ring (A), O-ring (B), and backup ring (C) from the pressure regulator.



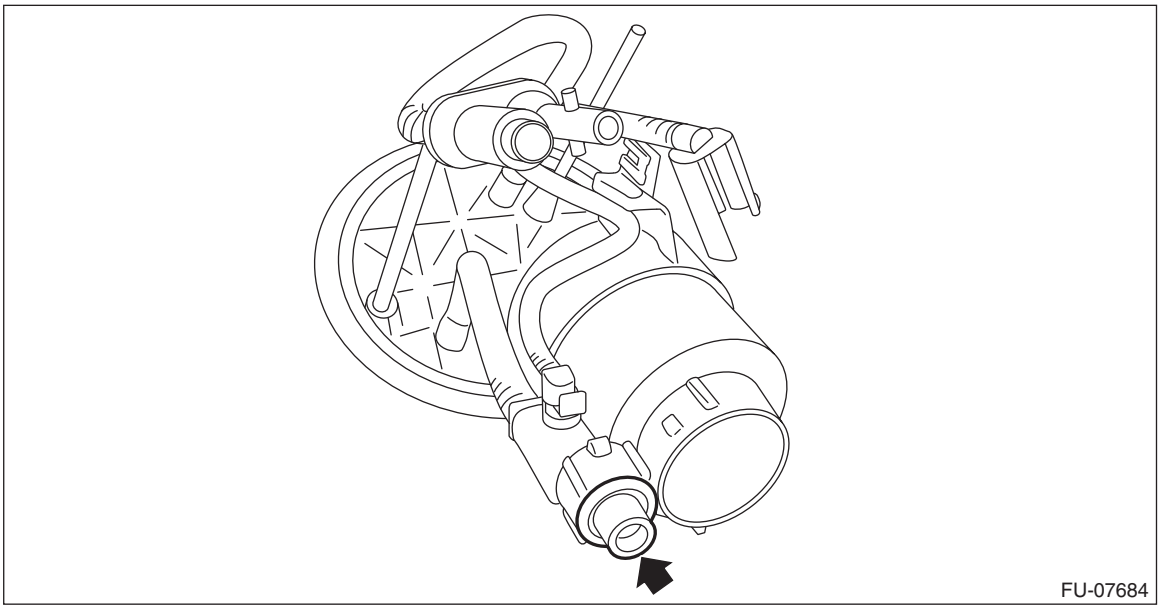
B: INSTALLATION

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.

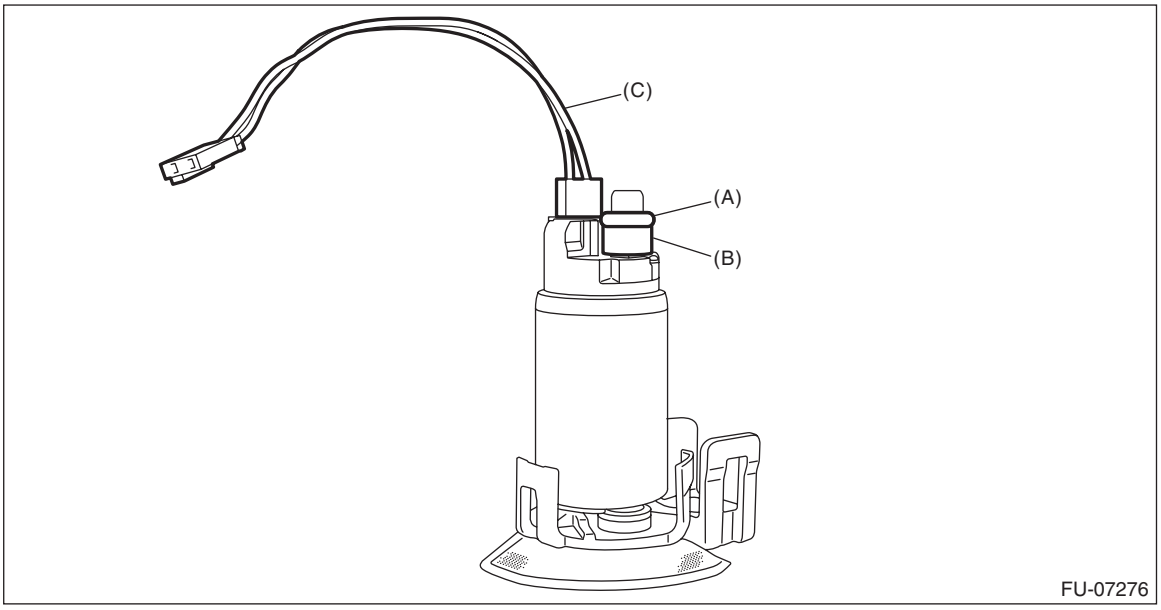


2) Install the pressure regulator to the fuel filter assembly.



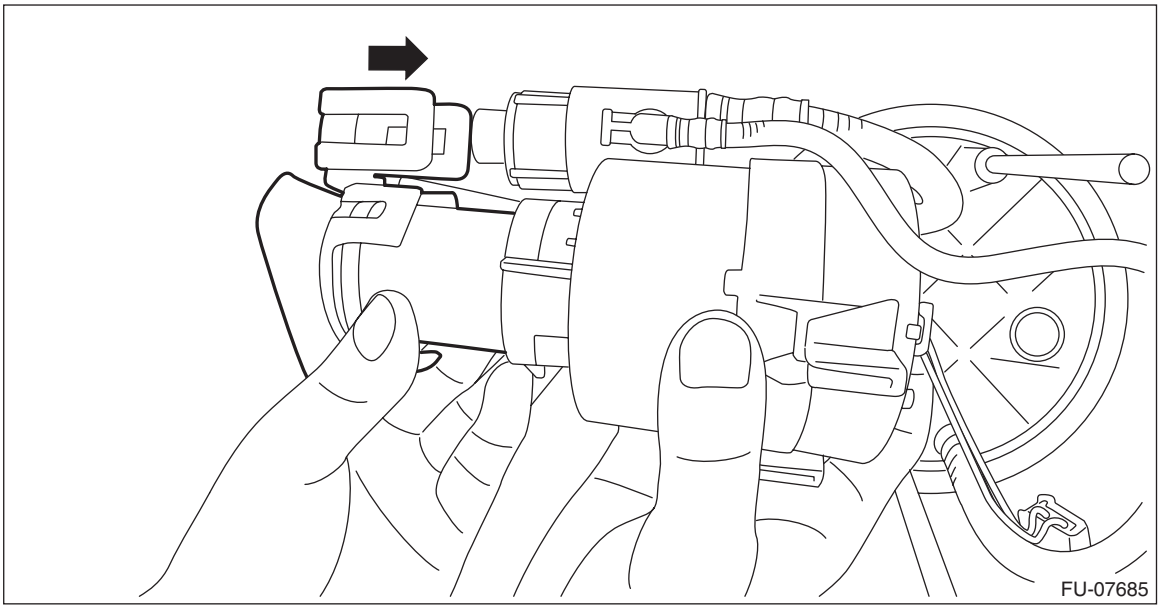
3) Install O-ring (A), spacer (B), and connector cable (C) to the fuel pump.

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

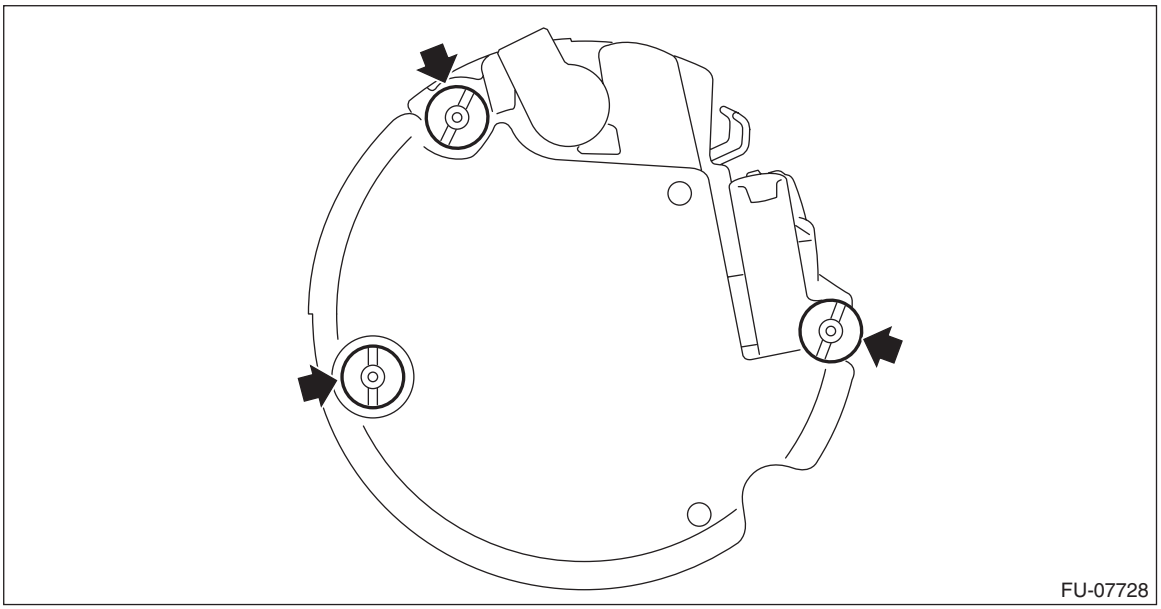


4) Install the fuel pump to the fuel filter assembly.

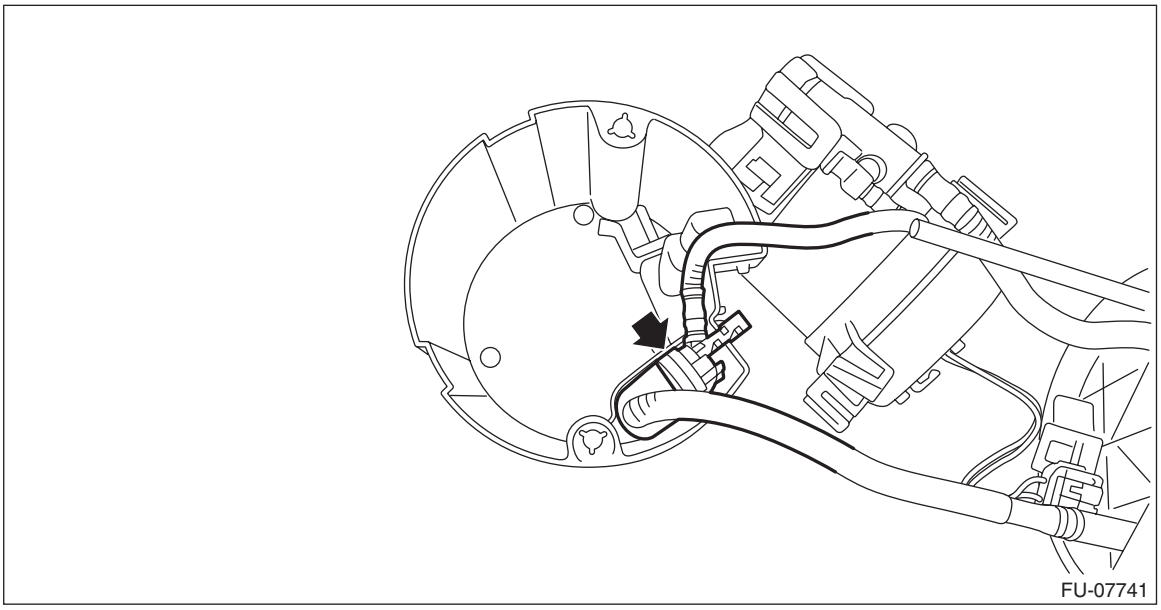
NOTE:
After installation, make sure five claws are correctly engaged in each position.



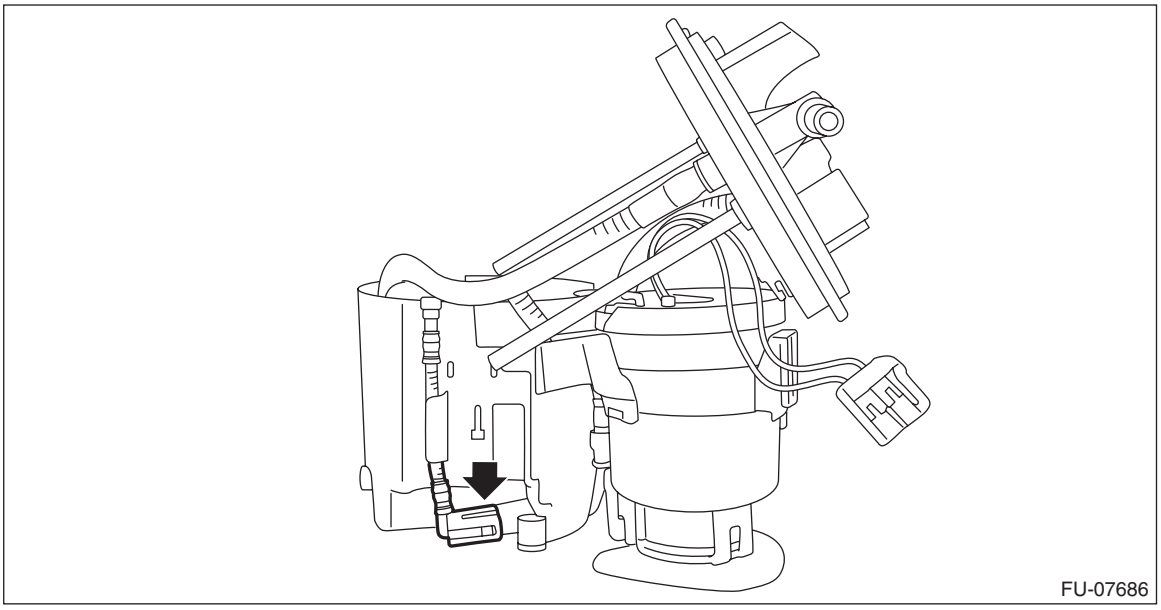
5) Check that the cushions of the fuel chamber assembly for dislocation. If any of them is dislocated, install a new cushion.



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



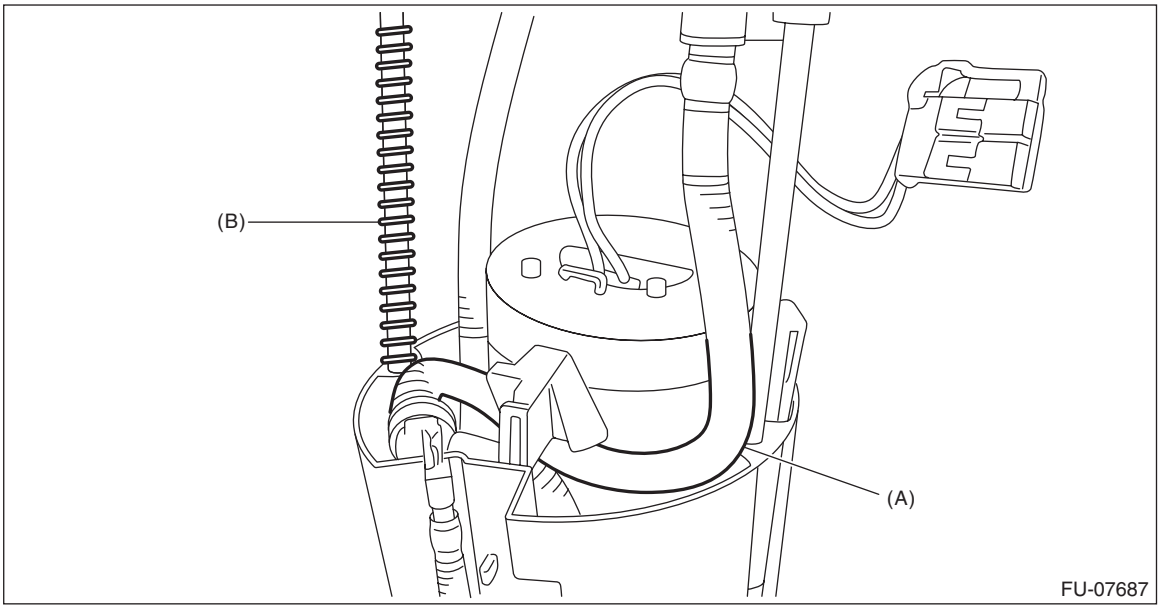
7) Connect the tube assembly to the fuel chamber assembly.



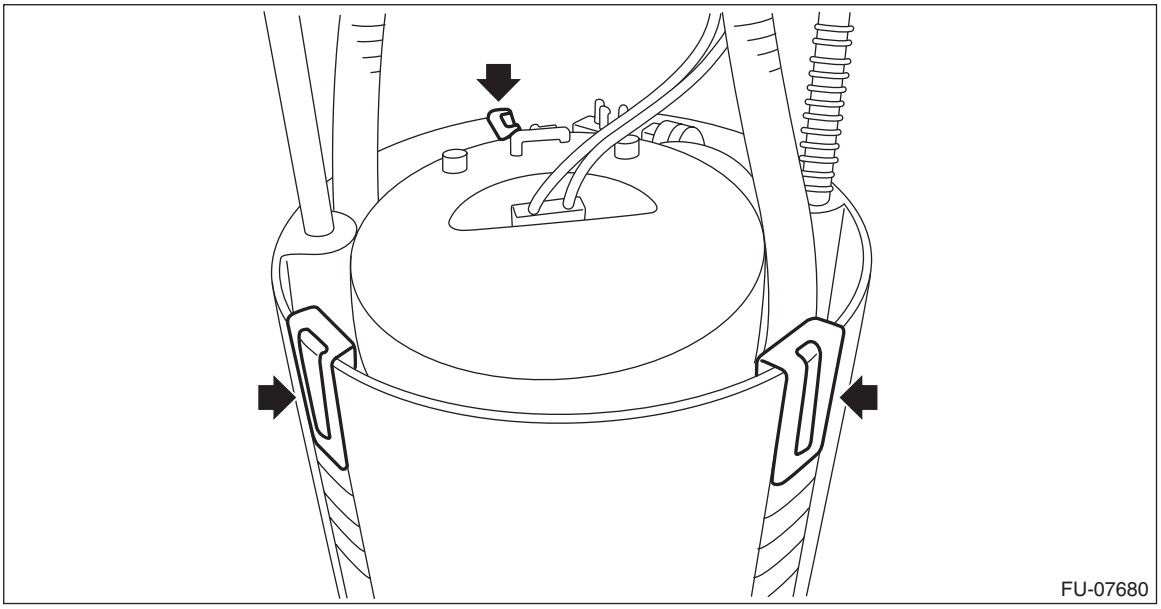
8) Install the fuel filter assembly to the fuel chamber assembly.

NOTE:

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

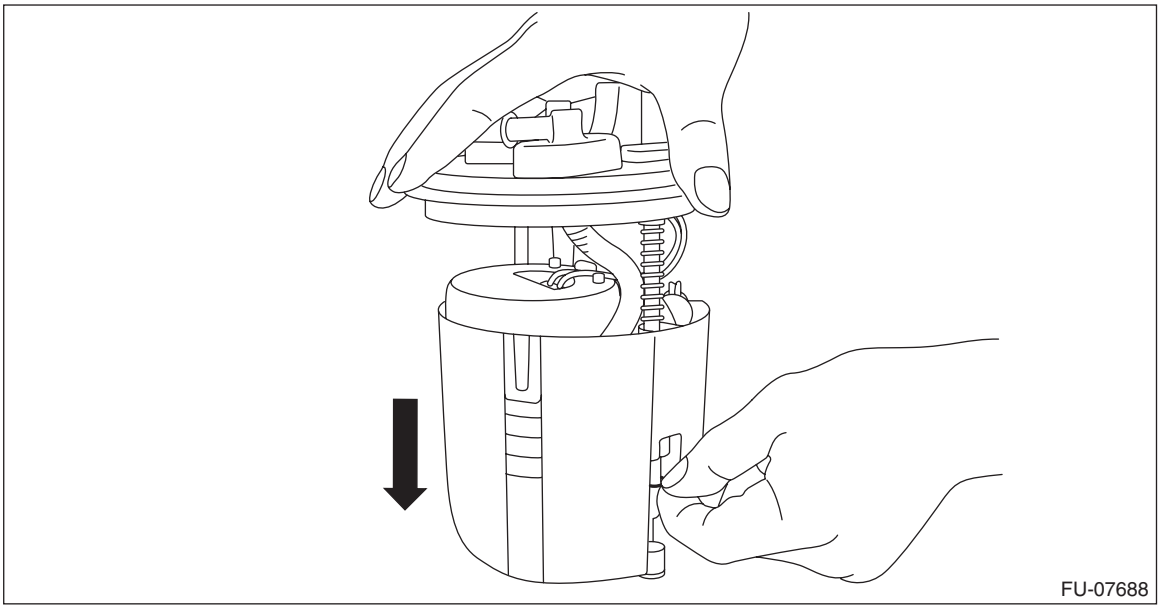


- Check that the claw connecting the fuel camber assembly and the fuel filter assembly is securely fastened.

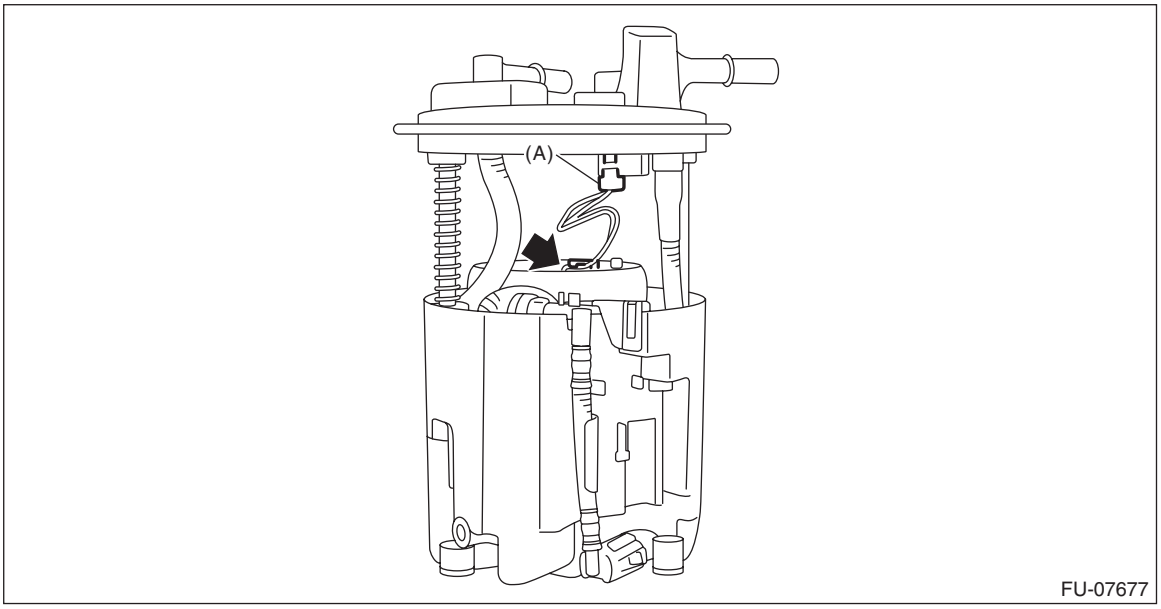


9) Push the fuel filter assembly in the direction of the arrow to compress, and attach the clip.

NOTE:
Use a new clip.



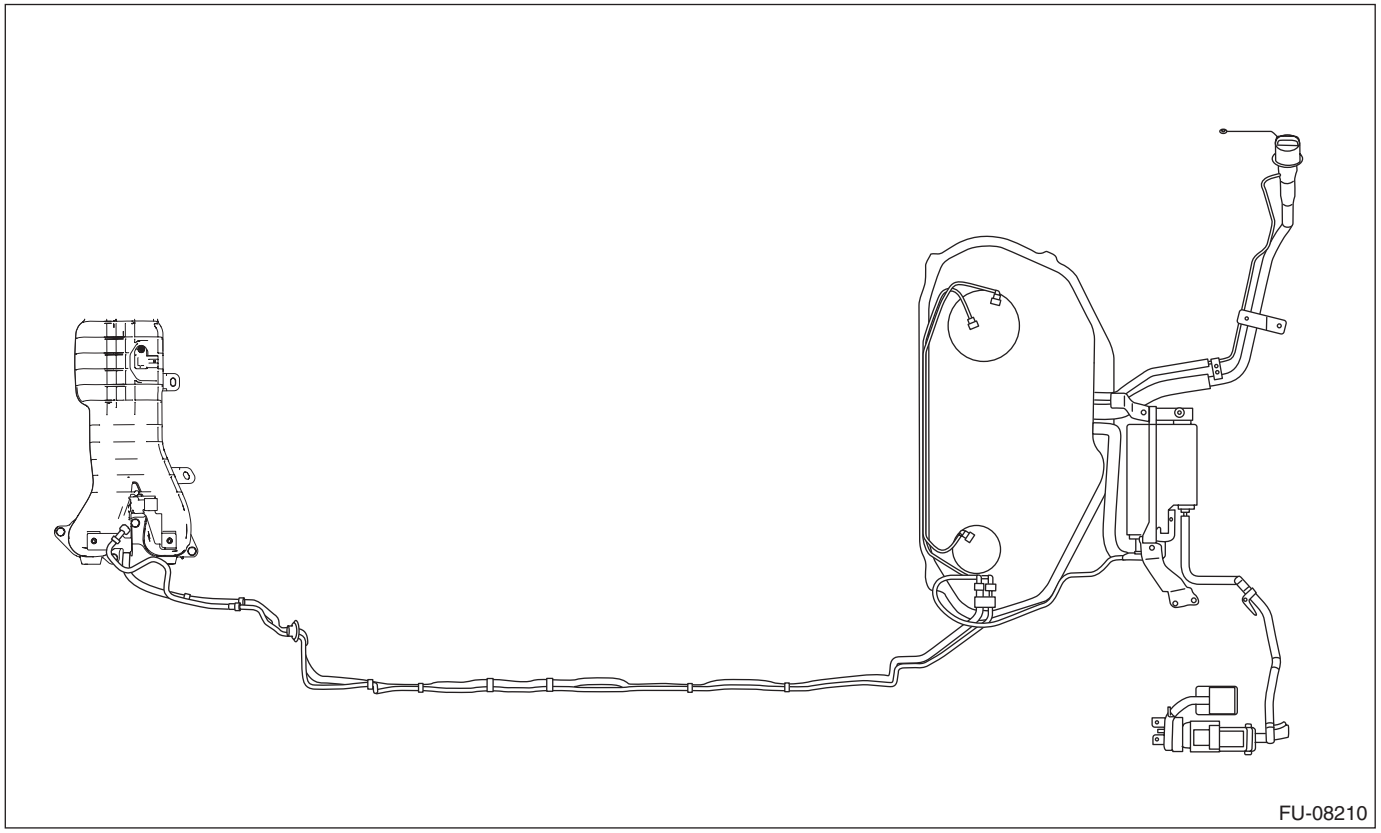
10) Secure the connector cable with the clip, and connect the connector (A) of the connector cable.



11) Install the fuel level sensor. <Ref. to FU(H4DO(HEV))-129, INSTALLATION, Fuel Level Sensor.>
12) Inspect the fuel level sensor. <Ref. to FU(H4DO(HEV))-130, INSPECTION, Fuel Level Sensor.>
13) Install the fuel pump assembly. <Ref. to FU(H4DO(HEV))-126, INSTALLATION, Fuel Pump.>

34.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(H4DO(HEV))-98, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler lid and remove the fuel filler cap.

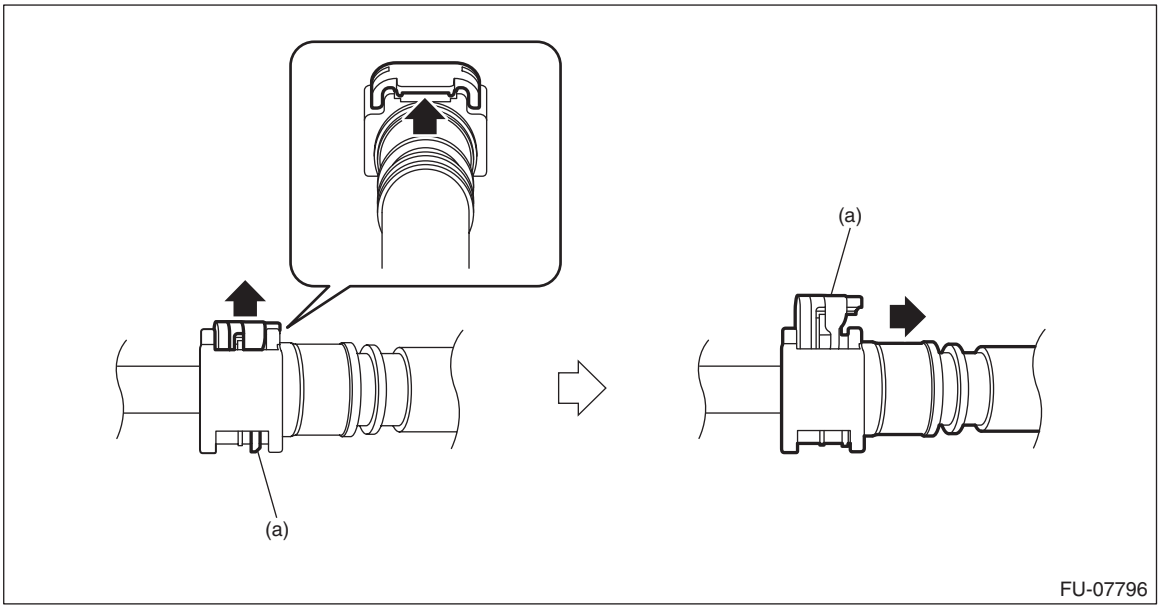
NOTE:
This operation is required to release the inner pressure of the fuel tank.

3) Remove the floor mat. <Ref. to EI-160, REMOVAL, Floor Mat.>

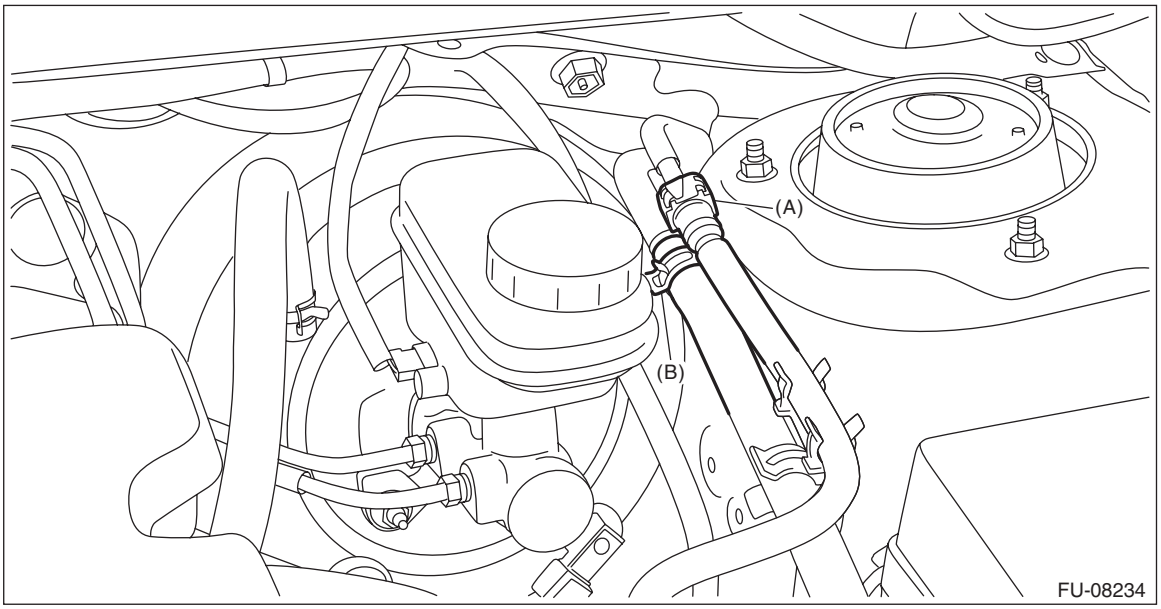
4) In the engine compartment, disconnect the fuel delivery tube (A) and evaporation hose (B).

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

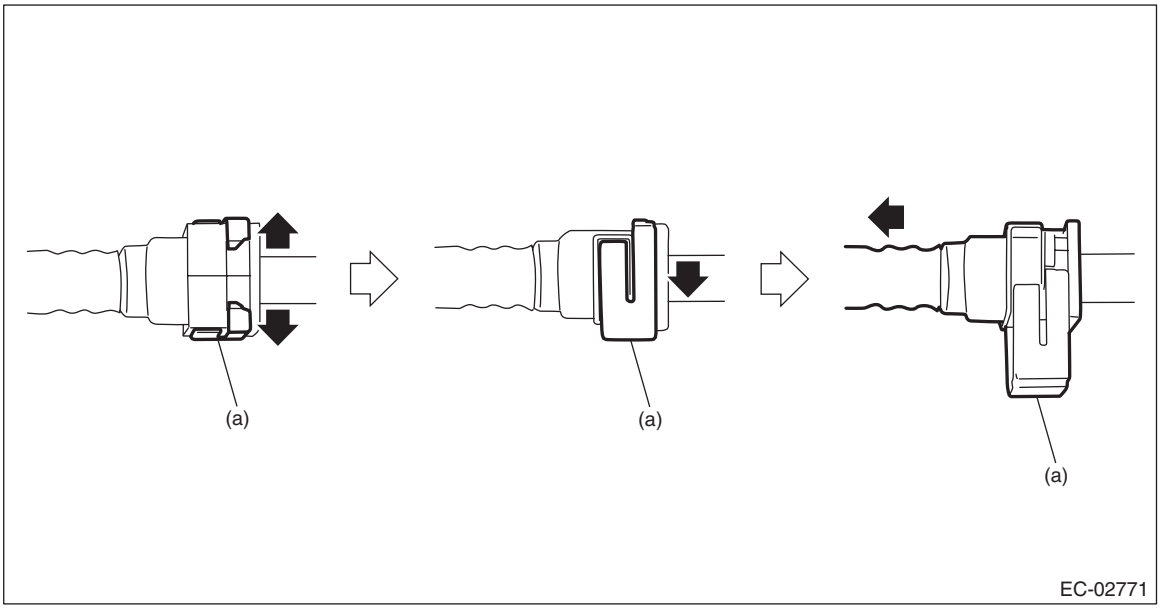


5) Remove the fuel tank. <Ref. to FU(H4DO(HEV))-105, REMOVAL, Fuel Tank.>

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 hoses using a container or cloth.**

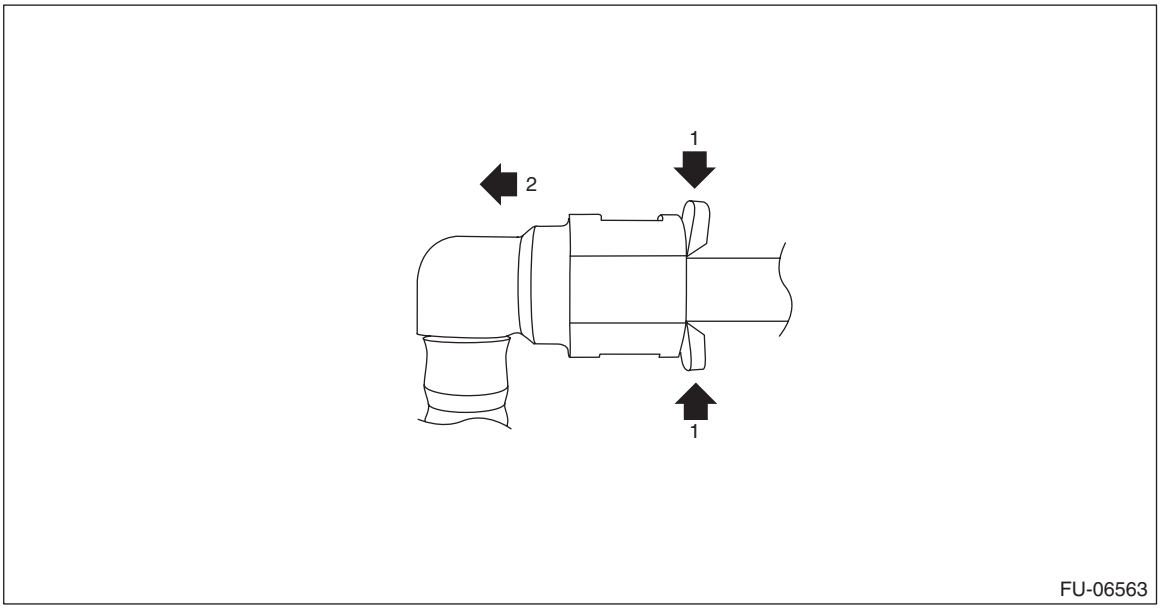
NOTE:
Disconnect the quick connector as shown in the figure.



(a) Slider

7) Remove the clip (A) from the purge tube.
8) Disconnect the quick connector and remove the purge tube from the fuel pipe assembly.

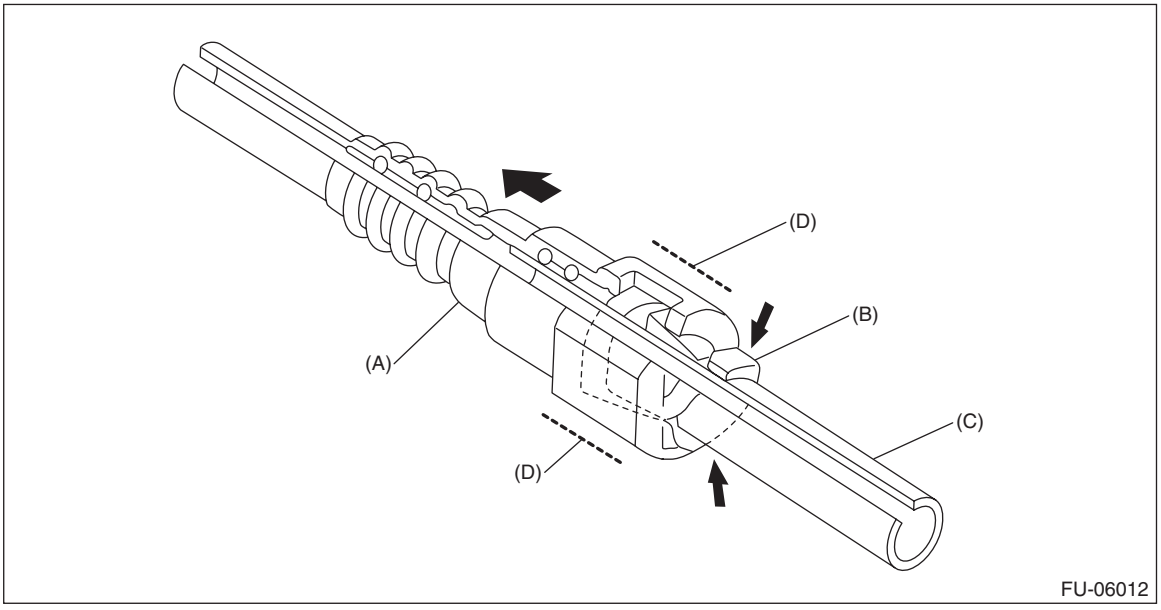
NOTE:
Disconnect the quick connector as shown in the figure.



9) Disconnect the quick connector and remove the purge tube from the canister.
1. Push the retainer in the direction of the arrow, disconnect the quick connector from pipe.

CAUTION:
- **Be careful not to spill fuel.**
- **Catch the fuel from hoses using a container or cloth.**
- **To disconnect the connector, hold (D) shown in the figure and pull in axial direction.**
- **If the connector and pipe are sticking to each other, push and pull the connector with the retainer pushed in the direction of the arrow, and then pull the connector after it starts moving freely.**
- **When disconnecting the connector, do not bend or twist the tube forcibly. If the tube is bent, replace with a new part.**

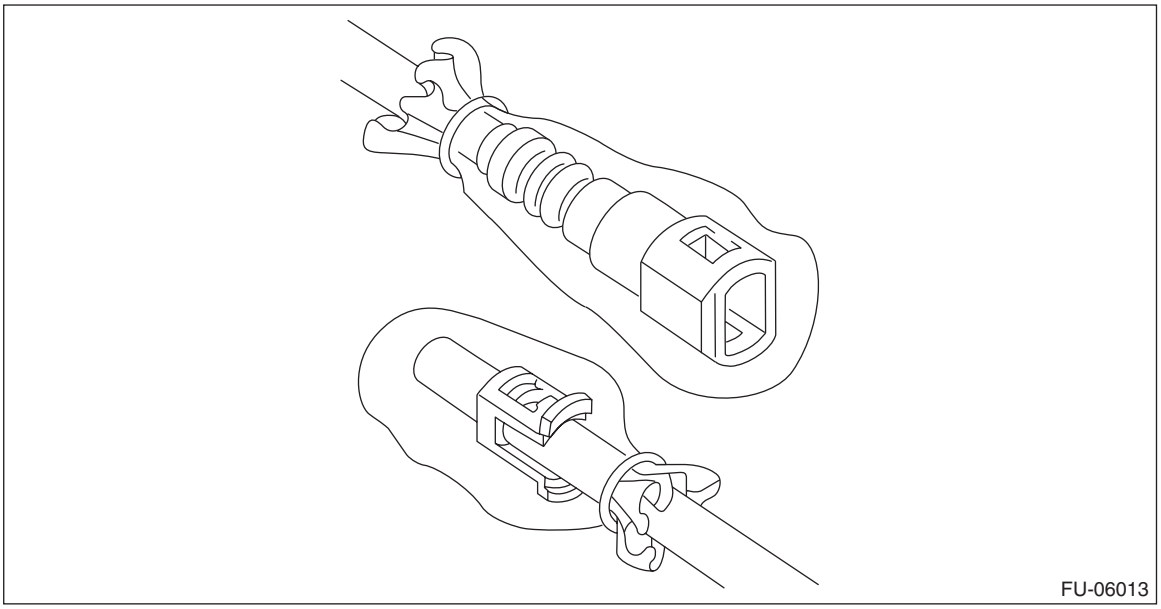
NOTE:
Clean the pipe and quick connector, if they are covered with dust.

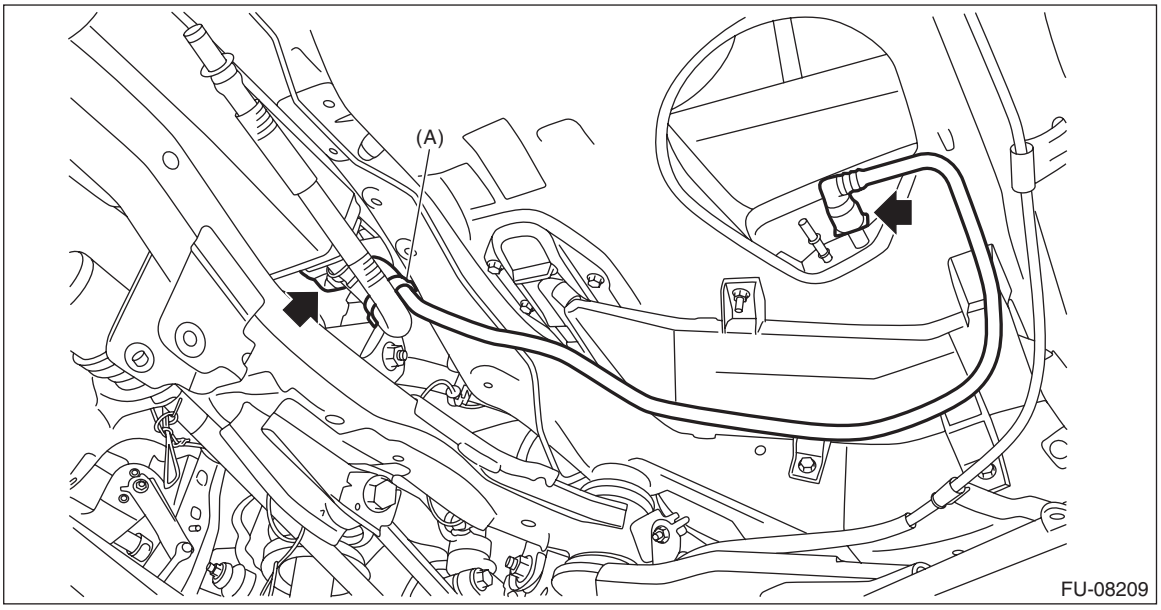


(A) Quick connector
(B) Retainer
(C) Pipe
(D) Connector holding position

2. To prevent from damaging or entering foreign matter, wrap the pipes and quick connectors with plastic bag etc.

CAUTION:
When reusing the retainer, do not disconnect the retainer from the pipe.


FU-06013



FU-08209

10) Remove the fuel pipe assembly from vehicle.

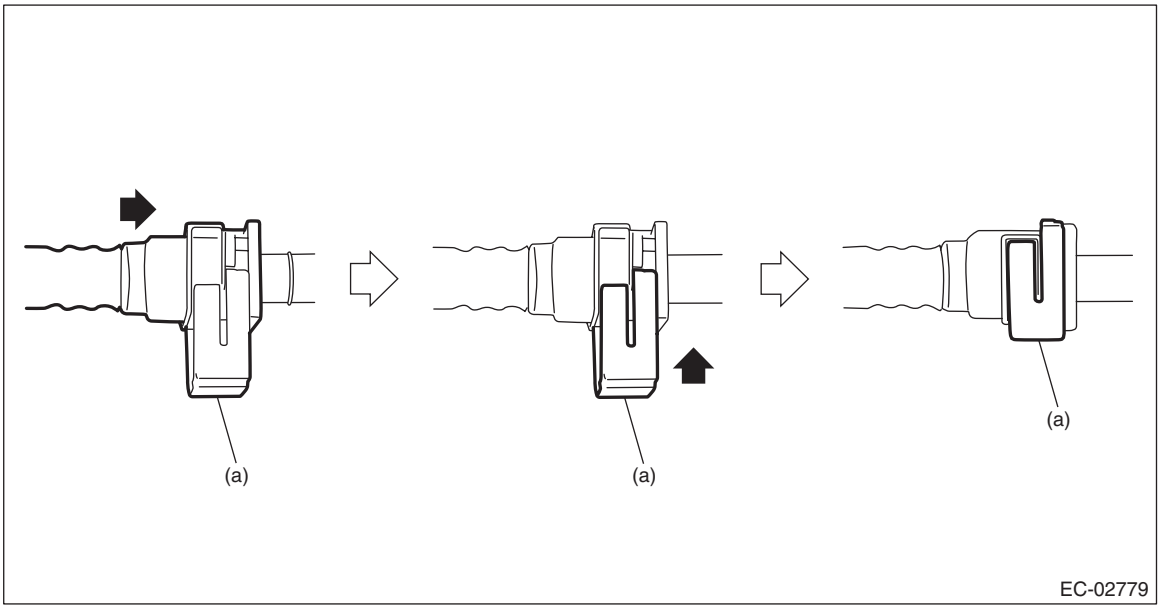
B: INSTALLATION

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

1. 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 it all the way in before locking the slider.**
- **When it is difficult to lock the slider, check that the connector is fully inserted.**
- **After locking the slider, check again that the quick connector is securely connected.**

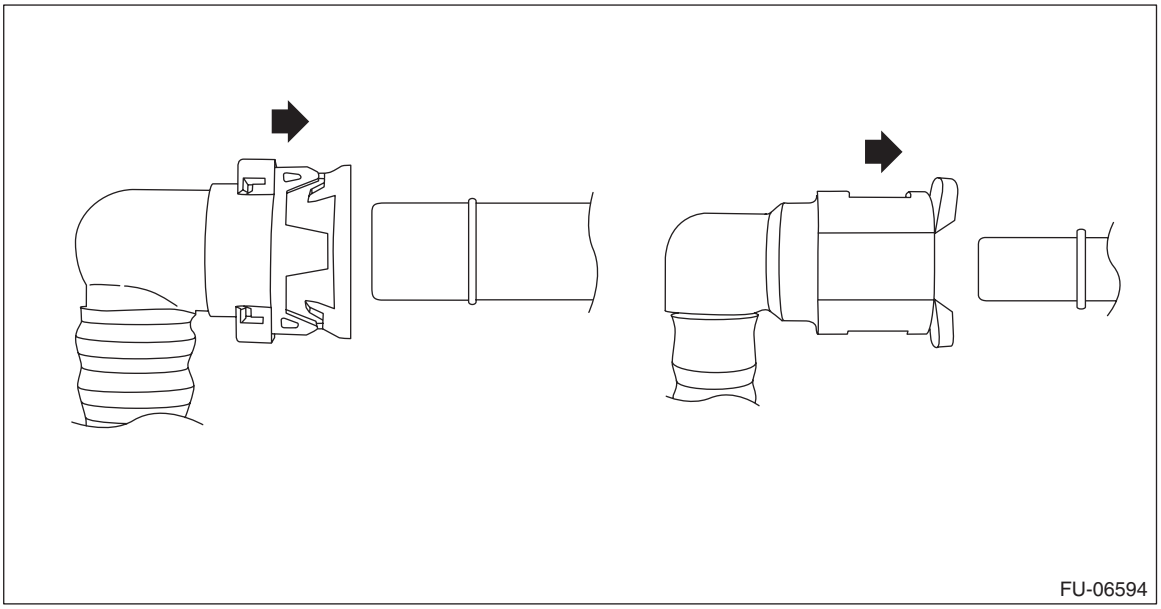


(a) Slider

2. CONNECTING THE EVAPORATION LINE QUICK CONNECTOR

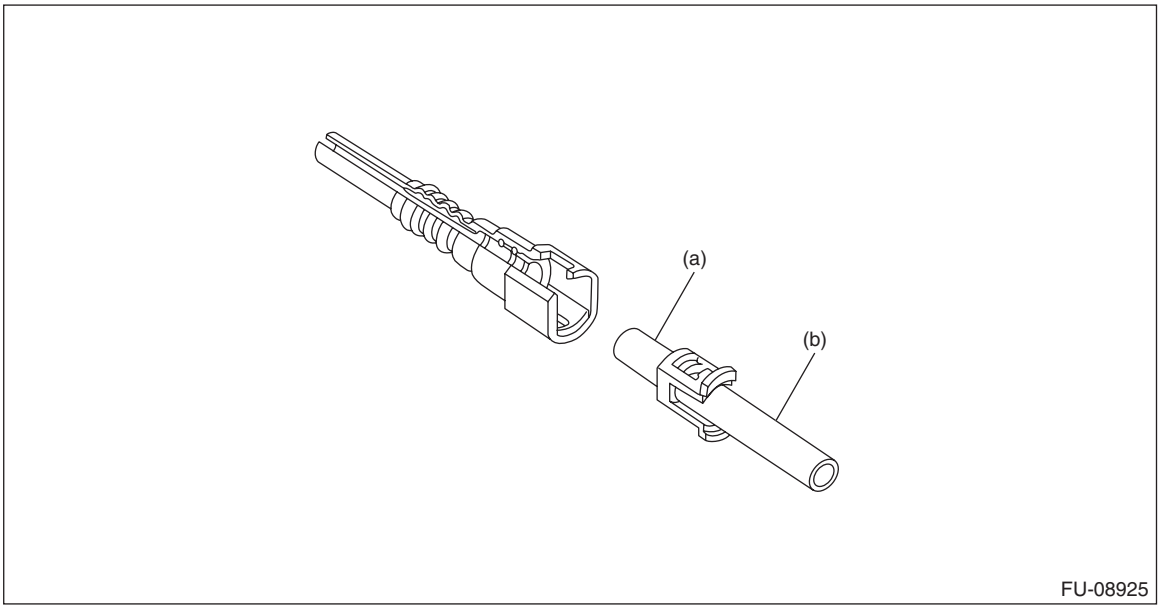
Connect the quick connector as shown in the figure.

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



3. CONNECTION OF QUICK CONNECTOR OF PURGE TUBE (CANISTER SIDE)

CAUTION:
• Make sure there are no damage or dust on connections. If necessary, clean seal surface of pipe.

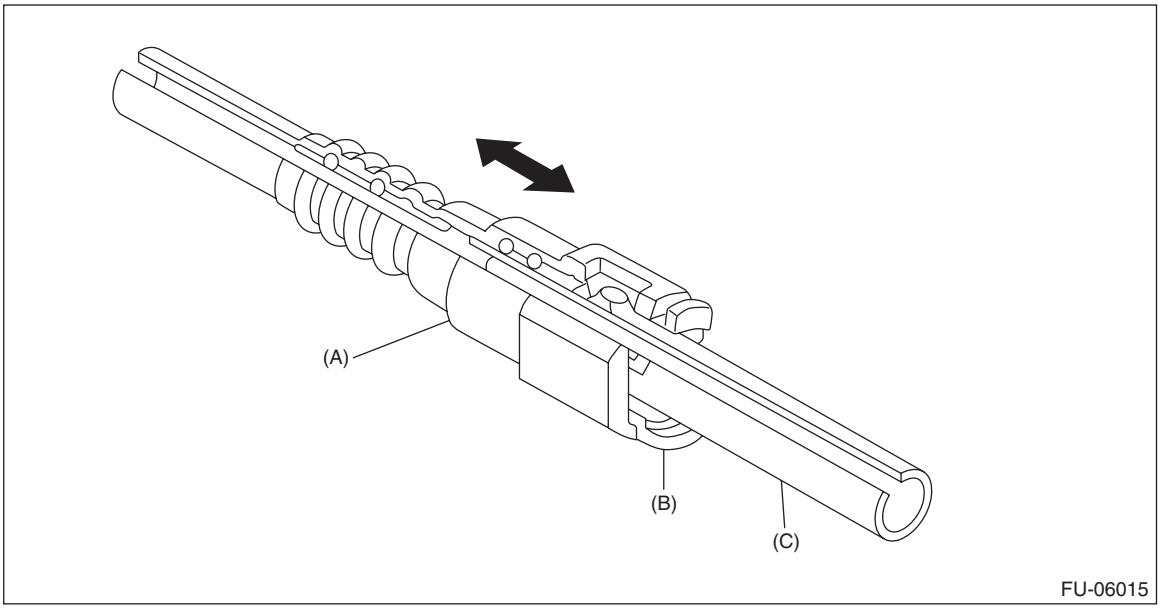


(a) Seal surface (b) Pipe

• When reusing the retainer, make sure that neither scratches nor deformation exist on the retainer. If it is faulty, use a new part.

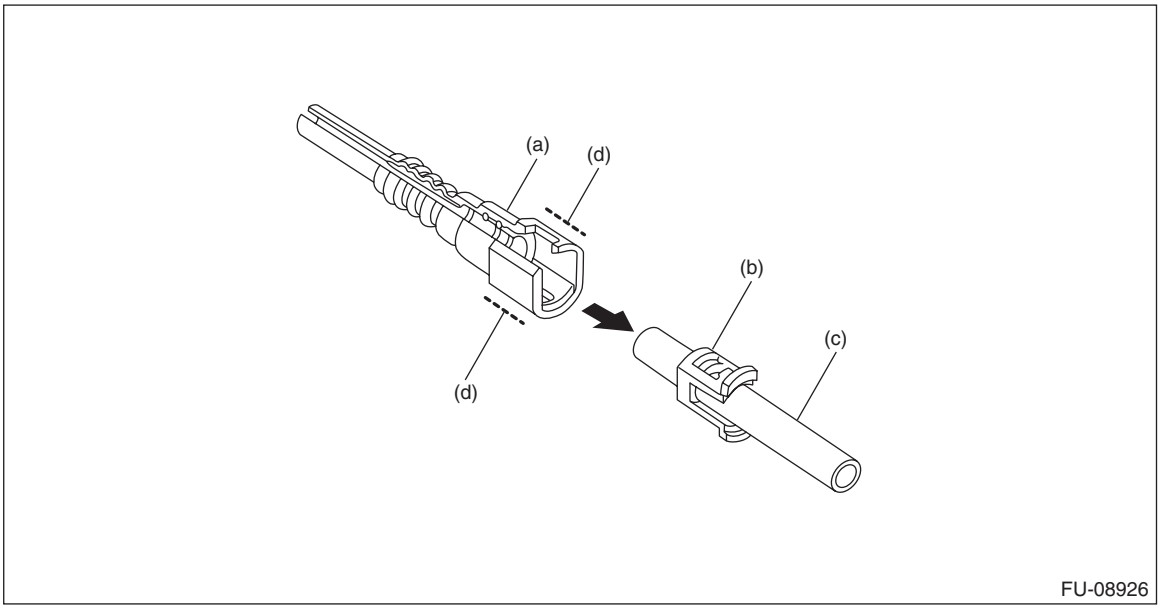
1) Connect the quick connector to pipe.

CAUTION:
- **Make sure that the quick connector is securely connected.**



(A) Quick connector (B) Retainer (C) Pipe

- **Make sure the two retainer pawls are engaged in their mating positions in the quick connector.**
- **Be sure to inspect tubes and their connections for any leakage of fuel.**
- **To connect the connector, hold (d) shown in the figure and push in axial direction.**
- **When connecting the connector, do not bend or twist the tube forcibly. If the tube is bent, replace with a new part.**

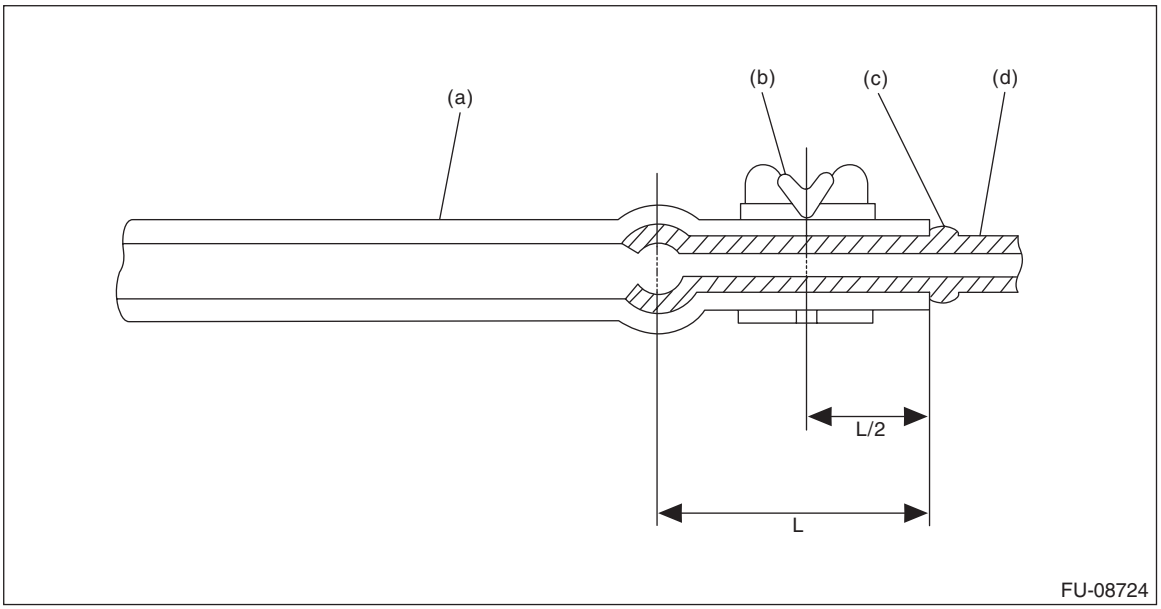


(a) Quick connector (c) Pipe
(b) Retainer (d) Connector holding position

4. 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 15 to 20 mm (0.6 to 0.8 in) to the pipe.



(a) Hose
(b) Clip
(c) Spool or bump
(d) Pipe

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.

35.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 fuel filter assembly.
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. Defective gasket of fuel saucer or fuel filler pipe assembly	Correct or replace the gasket.
	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.
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.

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

EC(H4DO(HEV))

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1. List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Note
B1570	Antenna	<Ref. to GD(H4DO HEV)-11, DTC B1570 ANTENNA, Diagnostic Trouble Code (DTC) Detecting Criteria.>
B1571	Reference Code Incompatibility	<Ref. to GD(H4DO HEV)-12, DTC B1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Trouble Code (DTC) Detecting Criteria.>
B1572	IMM Circuit Failure (Except Antenna Circuit)	<Ref. to GD(H4DO HEV)-12, DTC B1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
B1574	Key Communication Failure	<Ref. to GD(H4DO HEV)-12, DTC B1574 KEY COMMUNICATION FAILURE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
B1575	Incorrect Immobilizer Key	<Ref. to GD(H4DO HEV)-12, DTC B1575 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>
B1576	EGI Control Module EEPROM	<Ref. to GD(H4DO HEV)-12, DTC B1576 EGI CONTROL MODULE EEPROM, Diagnostic Trouble Code (DTC) Detecting Criteria.>
B1577	IMM Control Module EEPROM	<Ref. to GD(H4DO HEV)-12, DTC B1577 IMM CONTROL MODULE EEPROM, Diagnostic Trouble Code (DTC) Detecting Criteria.>
B1578	Meter Failure	<Ref. to GD(H4DO HEV)-12, DTC B1578 METER FAILURE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P000A	A Camshaft Position Slow Response (Bank 1)	<Ref. to GD(H4DO HEV)-13, DTC P000A A CAMSHAFT POSITION SLOW RESPONSE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P000B	B Camshaft Position Slow Response (Bank 1)	<Ref. to GD(H4DO HEV)-14, DTC P000B B CAMSHAFT POSITION SLOW RESPONSE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P000C	A Camshaft Position Slow Response (Bank 2)	<Ref. to GD(H4DO HEV)-14, DTC P000C A CAMSHAFT POSITION SLOW RESPONSE (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P000D	B Camshaft Position Slow Response (Bank 2)	<Ref. to GD(H4DO HEV)-14, DTC P000D B CAMSHAFT POSITION SLOW RESPONSE (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0010	"A" Camshaft Position Actuator Circuit/Open (Bank 1)	<Ref. to GD(H4DO HEV)-15, DTC P0010 "A" CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0011	Intake Camshaft Position - Timing Over-Advanced or System Performance (Bank 1)	<Ref. to GD(H4DO HEV)-16, DTC P0011 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0013	B Camshaft Position Actuator Circuit/Open (Bank 1)	<Ref. to GD(H4DO HEV)-17, DTC P0013 B CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0014	Exhaust AVCS System 1 (Range/ Performance)	<Ref. to GD(H4DO HEV)-18, DTC P0014 EXHAUST AVCS SYSTEM 1 (RANGE/PERFORMANCE), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0016	Crankshaft Position - Camshaft Position Correlation (Bank1)	<Ref. to GD(H4DO HEV)-19, DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0017	Crank and Cam Timing B System Failure (Bank 1)	<Ref. to GD(H4DO HEV)-20, DTC P0017 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0018	Crankshaft Position - Camshaft Position Correlation (Bank2)	<Ref. to GD(H4DO HEV)-21, DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0019	Crank and Cam Timing B System Failure (Bank 2)	<Ref. to GD(H4DO HEV)-21, DTC P0019 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0020	"A" Camshaft Position Actuator Circuit/Open (Bank 2)	<Ref. to GD(H4DO HEV)-21, DTC P0020 "A" CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0021	Intake Camshaft Position - Timing Over-Advanced or System Performance (Bank 2)	<Ref. to GD(H4DO HEV)-21, DTC P0021 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

DTC	Item	Note
P0023	B Camshaft Position Actuator Circuit/Open (Bank 2)	<Ref. to GD(H4DO HEV)-21, DTC P0023 B CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0024	Exhaust AVCS System 2 (Range/Performance)	<Ref. to GD(H4DO HEV)-21, DTC P0024 EXHAUST AVCS SYSTEM 2 (RANGE/PERFORMANCE), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to GD(H4DO HEV)-22, DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	<Ref. to GD(H4DO HEV)-23, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	<Ref. to GD(H4DO HEV)-24, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	<Ref. to GD(H4DO HEV)-25, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	<Ref. to GD(H4DO HEV)-26, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0068	MAP/MAF - Throttle Position Correlation	<Ref. to GD(H4DO HEV)-27, DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0071	Ambient Temperature Sensor Circuit "A" Range/Performance	<Ref. to GD(H4DO HEV)-29, DTC P0071 AMBIENT TEMPERATURE SENSOR CIRCUIT "A" RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0072	Ambient Temperature Sensor Circuit "A" Low	<Ref. to GD(H4DO HEV)-31, DTC P0072 AMBIENT TEMPERATURE SENSOR CIRCUIT "A" LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0073	Ambient Temperature Sensor Circuit "A" High	<Ref. to GD(H4DO HEV)-32, DTC P0073 AMBIENT TEMPERATURE SENSOR CIRCUIT "A" HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0101	Mass or Volume Air Flow Circuit Range/Performance	<Ref. to GD(H4DO HEV)-33, DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0102	Mass or Volume Air Flow Circuit Low Input	<Ref. to GD(H4DO HEV)-35, DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0103	Mass or Volume Air Flow Circuit High Input	<Ref. to GD(H4DO HEV)-36, DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	<Ref. to GD(H4DO HEV)-37, DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	<Ref. to GD(H4DO HEV)-38, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0111	Intake Air Temperature Sensor Range/Performance Problem	<Ref. to GD(H4DO HEV)-39, DTC P0111 INTAKE AIR TEMPERATURE SENSOR RANGE/PERFORMANCE PROBLEM, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0112	Intake Air Temperature Sensor 1 Circuit Low	<Ref. to GD(H4DO HEV)-42, DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0113	Intake Air Temperature Sensor 1 Circuit High	<Ref. to GD(H4DO HEV)-43, DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance	<Ref. to GD(H4DO HEV)-44, DTC P0116 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0117	Engine Coolant Temperature Circuit Low	<Ref. to GD(H4DO HEV)-46, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0118	Engine Coolant Temperature Circuit High	<Ref. to GD(H4DO HEV)-47, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

DTC	Item	Note
P0122	Throttle/Pedal Position Sensor/ Switch “A” Circuit Low	<Ref. to GD(H4DO HEV)-48, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0123	Throttle/Pedal Position Sensor/ Switch “A” Circuit High	<Ref. to GD(H4DO HEV)-49, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	<Ref. to GD(H4DO HEV)-50, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0128	Coolant Thermostat (Engine Coolant Temperature Below Thermostat Regulating Temperature)	<Ref. to GD(H4DO HEV)-51, DTC P0128 COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	<Ref. to GD(H4DO HEV)-54, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	<Ref. to GD(H4DO HEV)-55, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	<Ref. to GD(H4DO HEV)-56, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	<Ref. to GD(H4DO HEV)-57, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	<Ref. to GD(H4DO HEV)-58, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P013A	O2 Sensor Slow Response - Rich to Lean (Bank 1 Sensor 2)	<Ref. to GD(H4DO HEV)-59, DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P013B	O2 Sensor Slow Response - Lean to Rich (Bank 1 Sensor 2)	<Ref. to GD(H4DO HEV)-61, DTC P013B O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P013E	O2 Sensor Delayed Response - Rich to Lean (Bank 1 Sensor 2)	<Ref. to GD(H4DO HEV)-63, DTC P013E O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P013F	O2 Sensor Delayed Response - Lean to Rich (Bank 1 Sensor 2)	<Ref. to GD(H4DO HEV)-65, DTC P013F O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0141	O2 Sensor Heater Circuit (Bank1 Sensor2)	<Ref. to GD(H4DO HEV)-67, DTC P0141 O2 SENSOR HEATER CIRCUIT (BANK1 SENSOR2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P014C	O2 Sensor Slow Response - Rich to Lean (Bank 1 Sensor 1)	<Ref. to GD(H4DO HEV)-68, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P014D	O2 Sensor Slow Response - Lean to Rich (Bank 1 Sensor 1)	<Ref. to GD(H4DO HEV)-70, DTC P014D O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P015A	O2 Sensor Delayed Response - Rich to Lean (Bank 1 Sensor 1)	<Ref. to GD(H4DO HEV)-71, DTC P015A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P015B	O2 Sensor Delayed Response - Lean to Rich (Bank 1 Sensor 1)	<Ref. to GD(H4DO HEV)-73, DTC P015B O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0171	System Too Lean (Bank 1)	<Ref. to GD(H4DO HEV)-74, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0172	System Too Rich (Bank 1)	<Ref. to GD(H4DO HEV)-75, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0196	Engine Oil Temperature Sensor Circuit Range/Performance	<Ref. to GD(H4DO HEV)-76, DTC P0196 ENGINE OIL TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

DTC	Item	Note
P0197	Engine Oil Temperature Sensor Low	<Ref. to GD(H4DO HEV)-78, DTC P0197 ENGINE OIL TEMPERATURE SENSOR LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0198	Engine Oil Temperature Sensor High	<Ref. to GD(H4DO HEV)-79, DTC P0198 ENGINE OIL TEMPERATURE SENSOR HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0201	Injector #1	<Ref. to GD(H4DO HEV)-80, DTC P0201 INJECTOR #1, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0202	Injector #2	<Ref. to GD(H4DO HEV)-80, DTC P0202 INJECTOR #2, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0203	Injector #3	<Ref. to GD(H4DO HEV)-80, DTC P0203 INJECTOR #3, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0204	Injector #4	<Ref. to GD(H4DO HEV)-80, DTC P0204 INJECTOR #4, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0222	Throttle/Pedal Position Sensor/ Switch “B” Circuit Low	<Ref. to GD(H4DO HEV)-81, DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0223	Throttle/Pedal Position Sensor/ Switch “B” Circuit High	<Ref. to GD(H4DO HEV)-82, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0300	Random/Multiple Cylinder Misfire Detected	<Ref. to GD(H4DO HEV)-82, DTC P0300 RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0301	Cylinder 1 Misfire Detected	<Ref. to GD(H4DO HEV)-83, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0302	Cylinder 2 Misfire Detected	<Ref. to GD(H4DO HEV)-89, DTC P0302 CYLINDER 2 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0303	Cylinder 3 Misfire Detected	<Ref. to GD(H4DO HEV)-89, DTC P0303 CYLINDER 3 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0304	Cylinder 4 Misfire Detected	<Ref. to GD(H4DO HEV)-89, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0327	Knock Sensor 1 Circuit Low (Bank 1 or Single Sensor)	<Ref. to GD(H4DO HEV)-90, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0328	Knock Sensor 1 Circuit High (Bank 1 or Single Sensor)	<Ref. to GD(H4DO HEV)-91, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0335	Crankshaft Position Sensor “A” Circuit	<Ref. to GD(H4DO HEV)-92, DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0336	Crankshaft Position Sensor “A” Circuit Range/Performance	<Ref. to GD(H4DO HEV)-94, DTC P0336 CRANKSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	<Ref. to GD(H4DO HEV)-96, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0341	Camshaft Position Sensor "A" Circuit Range/Performance (Bank 1 or Single Sensor)	<Ref. to GD(H4DO HEV)-98, DTC P0341 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0345	Camshaft Position Sensor “A” Circuit (Bank 2)	<Ref. to GD(H4DO HEV)-99, DTC P0345 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0346	Camshaft Position Sensor "A" Circuit Range/Performance (Bank 2)	<Ref. to GD(H4DO HEV)-99, DTC P0346 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0351	Ignition Coil A Primary/Secondary Circuit	<Ref. to GD(H4DO HEV)-100, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0352	Ignition Coil B Primary/Secondary Circuit	<Ref. to GD(H4DO HEV)-100, DTC P0352 IGNITION COIL B PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0353	Ignition Coil C Primary/Secondary Circuit	<Ref. to GD(H4DO HEV)-100, DTC P0353 IGNITION COIL C PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

DTC	Item	Note
P0354	Ignition Coil D Primary/Secondary Circuit	<Ref. to GD(H4DO HEV)-100, DTC P0354 IGNITION COIL D PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0365	Camshaft Position Sensor “B” Circuit (Bank 1)	<Ref. to GD(H4DO HEV)-101, DTC P0365 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0366	Camshaft Position Sensor B Circuit Range/Performance (Bank 1)	<Ref. to GD(H4DO HEV)-102, DTC P0366 CAMSHAFT POSITION SENSOR B CIRCUIT RANGE/PERFORMANCE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0390	Camshaft Position Sensor “B” Circuit (Bank 2)	<Ref. to GD(H4DO HEV)-103, DTC P0390 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0391	Camshaft Position Sensor B Circuit Range/Performance (Bank 2)	<Ref. to GD(H4DO HEV)-103, DTC P0391 CAMSHAFT POSITION SENSOR B CIRCUIT RANGE/PERFORMANCE (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0400	Exhaust Gas Recirculation Flow	<Ref. to GD(H4DO HEV)-104, DTC P0400 EXHAUST GAS RECIRCULATION FLOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to GD(H4DO HEV)-106, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0441	Evaporative Emission Cont. Sys. Incorrect Purge Flow	<Ref. to GD(H4DO HEV)-108, DTC P0441 EVAPORATIVE EMISSION CONT. SYS. INCORRECT PURGE FLOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0451	Evaporative Emission System Pressure Sensor/Switch Range/Performance	<Ref. to GD(H4DO HEV)-111, DTC P0451 EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0452	Evaporative Emission System Pressure Sensor/Switch Low	<Ref. to GD(H4DO HEV)-113, DTC P0452 EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0453	Evaporative Emission System Pressure Sensor/Switch High	<Ref. to GD(H4DO HEV)-114, DTC P0453 EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0455	Evaporative Emission System Leak Detected (Large Leak)	<Ref. to GD(H4DO HEV)-115, DTC P0455 EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (LARGE LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)	<Ref. to GD(H4DO HEV)-120, DTC P0456 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0458	Evaporative Emission System Purge Control Valve Circuit Low	<Ref. to GD(H4DO HEV)-121, DTC P0458 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0459	Evaporative Emission System Purge Control Valve Circuit High	<Ref. to GD(H4DO HEV)-122, DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0461	Fuel Level Sensor “A” Circuit Range/Performance	<Ref. to GD(H4DO HEV)-123, DTC P0461 FUEL LEVEL SENSOR “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0462	Fuel Level Sensor “A” Circuit Low	<Ref. to GD(H4DO HEV)-124, DTC P0462 FUEL LEVEL SENSOR “A” CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0463	Fuel Level Sensor “A” Circuit High	<Ref. to GD(H4DO HEV)-125, DTC P0463 FUEL LEVEL SENSOR “A” CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0500	Vehicle Speed Sensor “A”	<Ref. to GD(H4DO HEV)-126, DTC P0500 VEHICLE SPEED SENSOR “A”, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0506	Idle Air Control System RPM Lower Than Expected	<Ref. to GD(H4DO HEV)-127, DTC P0506 IDLE AIR CONTROL SYSTEM RPM LOWER THAN EXPECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0507	Idle Air Control System RPM Higher Than Expected	<Ref. to GD(H4DO HEV)-128, DTC P0507 IDLE AIR CONTROL SYSTEM RPM HIGHER THAN EXPECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

DTC	Item	Note
P050A	Cold Start Idle Air Control System Performance	<Ref. to GD(H4DO HEV)-129, DTC P050A COLD START IDLE AIR CONTROL SYSTEM PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P050B	Cold Start Ignition Timing Performance	<Ref. to GD(H4DO HEV)-131, DTC P050B COLD START IGNITION TIMING PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0512	Starter Request Circuit	<Ref. to GD(H4DO HEV)-132, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0560	System Voltage	<Ref. to GD(H4DO HEV)-133, DTC P0560 SYSTEM VOLTAGE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P059A	Active Grille Shutter "A" Position Sensor Circuit	<Ref. to GD(H4DO HEV)-134, DTC P059A ACTIVE GRILLE SHUTTER "A" POSITION SENSOR CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P059F	Active Grille Shutter "A" Performance	<Ref. to GD(H4DO HEV)-135, DTC P059F ACTIVE GRILLE SHUTTER "A" PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P05A0	Active Grille Shutter "A" Stuck	<Ref. to GD(H4DO HEV)-136, DTC P05A0 ACTIVE GRILLE SHUTTER "A" STUCK, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P05A1	Active Grille Shutter "A" Range Over	<Ref. to GD(H4DO HEV)-137, DTC P05A1 ACTIVE GRILLE SHUTTER "A" RANGE OVER, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P05A2	Active Grille Shutter "A" Control Circuit	<Ref. to GD(H4DO HEV)-138, DTC P05A2 ACTIVE GRILLE SHUTTER "A" CONTROL CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P05A6	Active Grille Shutter "A" Supply Voltage Circuit/Open	<Ref. to GD(H4DO HEV)-140, DTC P05A6 ACTIVE GRILLE SHUTTER "A" SUPPLY VOLTAGE CIRCUIT/OPEN, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P05C0	Active Grille Shutter "A" Over Temperature	<Ref. to GD(H4DO HEV)-141, DTC P05C0 ACTIVE GRILLE SHUTTER "A" OVER TEMPERATURE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0604	Internal Control Module Random Access Memory (RAM) Error	<Ref. to GD(H4DO HEV)-142, DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0605	Internal Control Module Read Only Memory (ROM) Error	<Ref. to GD(H4DO HEV)-143, DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0606	Control Module Processor	<Ref. to GD(H4DO HEV)-144, DTC P0606 CONTROL MODULE PROCESSOR, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P060A	Internal Control Module Monitoring Processor Performance	<Ref. to GD(H4DO HEV)-146, DTC P060A INTERNAL CONTROL MODULE MONITORING PROCESSOR PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P060B	Internal Control Module A/D Processing Performance	<Ref. to GD(H4DO HEV)-148, DTC P060B INTERNAL CONTROL MODULE A/D PROCESSING PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0616	Starter Relay Circuit Low	<Ref. to GD(H4DO HEV)-150, DTC P0616 STARTER RELAY CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0617	Starter Relay Circuit High	<Ref. to GD(H4DO HEV)-151, DTC P0617 STARTER RELAY CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P062F	Internal Control Module EEPROM Error	<Ref. to GD(H4DO HEV)-152, DTC P062F INTERNAL CONTROL MODULE EEPROM ERROR, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0700	Transmission Control System (MIL Request)	<Ref. to GD(H4DO HEV)-154, DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P081A	Starter Disable Circuit Low	<Ref. to GD(H4DO HEV)-155, DTC P081A STARTER DISABLE CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0851	Park/Neutral Switch Input Circuit Low (AT Model)	<Ref. to GD(H4DO HEV)-156, DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW (AT MODEL), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0852	Park/Neutral Switch Input Circuit High (AT Model)	<Ref. to GD(H4DO HEV)-157, DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH (AT MODEL), Diagnostic Trouble Code (DTC) Detecting Criteria.>

DTC	Item	Note
P0A7B	Battery Energy Control Module Request MIL Illumination	<Ref. to GD(H4DO HEV)-158, DTC P0A7B BATTERY ENERGY CONTROL MODULE REQUEST MIL ILLUMINATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0AC4	Hybrid Powertrain Control Module Request MIL Illumination	<Ref. to GD(H4DO HEV)-159, DTC P0AC4 HYBRID POWERTRAIN CONTROL MODULE REQUEST MIL ILLUMINATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0CA1	Drive Motor Control Module Request MIL Illumination	<Ref. to GD(H4DO HEV)-160, DTC P0CA1 DRIVE MOTOR CONTROL MODULE REQUEST MIL ILLUMINATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1160	Return Spring Failure	<Ref. to GD(H4DO HEV)-161, DTC P1160 RETURN SPRING FAILURE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1449	Evaporative Emission Cont. Sys. Air Filter Clog	<Ref. to GD(H4DO HEV)-162, DTC P1449 EVAPORATIVE EMISSION CONT. SYS. AIR FILTER CLOG, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1451	Evaporative Emission Cont. Sys.	<Ref. to GD(H4DO HEV)-163, DTC P1451 EVAPORATIVE EMISSION CONT. SYS., Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	<Ref. to GD(H4DO HEV)-164, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1493	EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input)	<Ref. to GD(H4DO HEV)-165, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	<Ref. to GD(H4DO HEV)-166, DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	<Ref. to GD(H4DO HEV)-166, DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1496	EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	<Ref. to GD(H4DO HEV)-166, DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1497	EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input)	<Ref. to GD(H4DO HEV)-166, DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1498	EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	<Ref. to GD(H4DO HEV)-166, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1499	EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input)	<Ref. to GD(H4DO HEV)-166, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2004	Intake Manifold Runner Control Stuck Open (Bank 1)	<Ref. to GD(H4DO HEV)-167, DTC P2004 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2005	Intake Manifold Runner Control Stuck Open (Bank 2)	<Ref. to GD(H4DO HEV)-168, DTC P2005 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2006	Intake Manifold Runner Control Stuck Closed (Bank 1)	<Ref. to GD(H4DO HEV)-169, DTC P2006 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2007	Intake Manifold Runner Control Stuck Closed (Bank 2)	<Ref. to GD(H4DO HEV)-170, DTC P2007 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2009	Intake Manifold Runner Control Circuit Low (Bank 1)	<Ref. to GD(H4DO HEV)-171, DTC P2009 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2012	Intake Manifold Runner Control Circuit Low (Bank 2)	<Ref. to GD(H4DO HEV)-171, DTC P2012 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

DTC	Item	Note
P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	<Ref. to GD(H4DO HEV)-172, DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)	<Ref. to GD(H4DO HEV)-173, DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2101	Throttle Actuator Control Motor Circuit Range/Performance	<Ref. to GD(H4DO HEV)-174, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2102	Throttle Actuator Control Motor Circuit Low	<Ref. to GD(H4DO HEV)-175, DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2103	Throttle Actuator Control Motor Circuit High	<Ref. to GD(H4DO HEV)-176, DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2109	Throttle/Pedal Position Sensor “A” Minimum Stop Performance	<Ref. to GD(H4DO HEV)-177, DTC P2109 THROTTLE/PEDAL POSITION SENSOR “A” MINIMUM STOP PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2119	Throttle Actuator Control Throttle Body Range/Performance	<Ref. to GD(H4DO HEV)-178, DTC P2119 THROTTLE ACTUATOR CONTROL THROTTLE BODY RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2122	Throttle/Pedal Position Sensor/ Switch “D” Circuit Low Input	<Ref. to GD(H4DO HEV)-180, DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2123	Throttle/Pedal Position Sensor/ Switch “D” Circuit High Input	<Ref. to GD(H4DO HEV)-181, DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2127	Throttle/Pedal Position Sensor/ Switch “E” Circuit Low Input	<Ref. to GD(H4DO HEV)-182, DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2128	Throttle/Pedal Position Sensor/ Switch “E” Circuit High Input	<Ref. to GD(H4DO HEV)-183, DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2135	Throttle/Pedal Position Sensor/ Switch “A”/“B” Voltage Correlation	<Ref. to GD(H4DO HEV)-184, DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A”/“B” VOLTAGE CORRELATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2138	Throttle/Pedal Position Sensor/ Switch “D”/“E” Voltage Correlation	<Ref. to GD(H4DO HEV)-186, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D”/“E” VOLTAGE CORRELATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2195	O2 Sensor Signal Biased/Stuck Lean (Bank 1 Sensor 1)	<Ref. to GD(H4DO HEV)-188, DTC P2195 O2 SENSOR SIGNAL BIASED/ STUCK LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2196	O2 Sensor Signal Biased/Stuck Rich (Bank 1 Sensor 1)	<Ref. to GD(H4DO HEV)-190, DTC P2196 O2 SENSOR SIGNAL BIASED/ STUCK RICH (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2270	Bank 1 Air-Fuel Ratio Imbalance	<Ref. to GD(H4DO HEV)-197, DTC P2270 O2 SENSOR SIGNAL BIASED/ STUCK LEAN (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2271	O2 Sensor Signal Biased/Stuck Lean (Bank 1 Sensor 2)	<Ref. to GD(H4DO HEV)-199, DTC P2271 O2 SENSOR SIGNAL BIASED/ STUCK RICH (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P219A	Bank 1 Air-Fuel Ratio Imbalance	<Ref. to GD(H4DO HEV)-192, DTC P219A BANK 1 AIR-FUEL RATIO IMBALANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	<Ref. to GD(H4DO HEV)-200, DTC P2401 EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	<Ref. to GD(H4DO HEV)-201, DTC P2402 EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

DTC	Item	Note
P2404	Evaporative Emission System Leak Detection Pump Sense Circuit Range/Performance	<Ref. to GD(H4DO HEV)-202, DTC P2404 EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP SENSE CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2419	Evaporative Emission System Switching Valve Control Circuit Low	<Ref. to GD(H4DO HEV)-203, DTC P2419 EVAPORATIVE EMISSION SYSTEM SWITCHING VALVE CONTROL CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2420	Evaporative Emission System Switching Valve Control Circuit High	<Ref. to GD(H4DO HEV)-204, DTC P2420 EVAPORATIVE EMISSION SYSTEM SWITCHING VALVE CONTROL CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2530	Ignition Switch Run Position Circuit	<Ref. to GD(H4DO HEV)-205, DTC P2530 IGNITION SWITCH RUN POSITION CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2610	ECM/PCM Internal Engine Off Timer Performance	<Ref. to GD(H4DO HEV)-206, DTC P2610 ECM/PCM INTERNAL ENGINE OFF TIMER PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0073	Control Module Communication Bus Off	<Ref. to GD(H4DO HEV)-214, DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0075	Control Module Communication Bus "PU-CAN" Off	<Ref. to GD(H4DO HEV)-215, DTC U0075 CONTROL MODULE COMMUNICATION BUS "PU-CAN" OFF, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0101	Lost Communication With TCM	<Ref. to GD(H4DO HEV)-216, DTC U0101 LOST COMMUNICATION WITH TCM, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0122	Lost Communication With Vehicle Dynamics Control Module	<Ref. to GD(H4DO HEV)-217, DTC U0122 LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	<Ref. to GD(H4DO HEV)-217, DTC U0155 LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER (IPC) CONTROL MODULE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0284	Lost Communication With Active Grille Shutter Module "A"	<Ref. to GD(H4DO HEV)-218, DTC U0284 LOST COMMUNICATION WITH ACTIVE GRILLE SHUTTER MODULE "A", Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0293	Lost Communication With Hybrid Powertrain Control Module	<Ref. to GD(H4DO HEV)-219, DTC U0293 LOST COMMUNICATION WITH HYBRID POWERTRAIN CONTROL MODULE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0402	Invalid Data Received From TCM	<Ref. to GD(H4DO HEV)-220, DTC U0402 INVALID DATA RECEIVED FROM TCM, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0416	Invalid Data Received From Vehicle Dynamics Control Module	<Ref. to GD(H4DO HEV)-220, DTC U0416 INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	<Ref. to GD(H4DO HEV)-220, DTC U0423 INVALID DATA RECEIVED FROM INSTRUMENT PANEL CLUSTER CONTROL MODULE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0594	Invalid Data Received From Hybrid Powertrain Control Module	<Ref. to GD(H4DO HEV)-221, DTC U0594 INVALID DATA RECEIVED FROM HYBRID POWERTRAIN CONTROL MODULE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U1101	Lost Communication With TCM PU-CAN	<Ref. to GD(H4DO HEV)-222, DTC U1101 LOST COMMUNICATION WITH TCM PU-CAN, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U1293	Lost Communication With Hybrid Powertrain Control Module PU-CAN	<Ref. to GD(H4DO HEV)-223, DTC U1293 LOST COMMUNICATION WITH HYBRID POWERTRAIN CONTROL MODULE PU-CAN, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U1402	Invalid Data Received From TCM PU-CAN	<Ref. to GD(H4DO HEV)-224, DTC U1402 INVALID DATA RECEIVED FROM TCM PU-CAN, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U1594	Invalid Data Received From Hybrid Powertrain Control Module PU-CAN	<Ref. to GD(H4DO HEV)-225, DTC U1594 INVALID DATA RECEIVED FROM HYBRID POWERTRAIN CONTROL MODULE PU-CAN, Diagnostic Trouble Code (DTC) Detecting Criteria.>

2. Diagnostic Trouble Code (DTC) Detecting Criteria

A: DTC B1570 ANTENNA

1. OUTLINE OF DIAGNOSIS

DTC	Item	Outline of Diagnosis
B1570	Antenna	Faulty antenna
B1571	Reference Code Incompatibility	Reference code incompatibility between body integrated unit and ECM
B1572	IMM Circuit Failure (Except Antenna Circuit)	Communication failure between body integrated unit and ECM
B1574	Key Communication Failure	The body integrated unit to confirm the key (transponder) ID code has malfunction, of the transponder is faulty.
B1575	Incorrect Immobilizer Key	Incorrect immobilizer key (Use of unregistered key in body integrated unit)
B1576	EGI Control Module EEPROM	ECM malfunctioning
B1577	IMM Control Module EEPROM	Body integrated unit malfunctioning
B1578	Meter Failure	Reference code incompatibility between combination meter and body integrated unit

2. ENABLE CONDITIONS

When starting the engine.

3. GENERAL DRIVING CYCLE

Perform the diagnosis only after starting the engine.

4. DIAGNOSTIC METHOD

Judge as NG when the conditions for the outline of the diagnosis of the top are established.

B: DTC B1571 REFERENCE CODE INCOMPATIBILITY

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC B1570. <Ref. to GD(H4DO HEV)-11, DTC B1570 ANTENNA, Diagnostic Trouble Code (DTC) Detecting Criteria.>

C: DTC B1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC B1570. <Ref. to GD(H4DO HEV)-11, DTC B1570 ANTENNA, Diagnostic Trouble Code (DTC) Detecting Criteria.>

D: DTC B1574 KEY COMMUNICATION FAILURE

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC B1570. <Ref. to GD(H4DO HEV)-11, DTC B1570 ANTENNA, Diagnostic Trouble Code (DTC) Detecting Criteria.>

E: DTC B1575 INCORRECT IMMOBILIZER KEY

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC B1570. <Ref. to GD(H4DO HEV)-11, DTC B1570 ANTENNA, Diagnostic Trouble Code (DTC) Detecting Criteria.>

F: DTC B1576 EGI CONTROL MODULE EEPROM

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC B1570. <Ref. to GD(H4DO HEV)-11, DTC B1570 ANTENNA, Diagnostic Trouble Code (DTC) Detecting Criteria.>

G: DTC B1577 IMM CONTROL MODULE EEPROM

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC B1570. <Ref. to GD(H4DO HEV)-11, DTC B1570 ANTENNA, Diagnostic Trouble Code (DTC) Detecting Criteria.>

H: DTC B1578 METER FAILURE

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC B1570. <Ref. to GD(H4DO HEV)-11, DTC B1570 ANTENNA, Diagnostic Trouble Code (DTC) Detecting Criteria.>

I: DTC P000A A CAMSHAFT POSITION SLOW RESPONSE (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect the AVCS system malfunction.
Judge NG when the amount of AVCS actual timing advance does not approach to the amount of AVCS target timing advance.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Time of establishing all secondary parameter conditions	≥ 1000 ms
Battery voltage	≥ 10.9 V
Engine speed	≥ 500 rpm
Engine oil temperature	≥ –40 °C (–40 °F)
AVCS control	Operation
Target timing advance change amount (per 64 ms)	< 3.2 °CA

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously when the engine speed increases and AVCS operates.

4. DIAGNOSTIC METHOD

When the differences of target timing advance amount and actual timing advance amount is calculated during AVCS control, and the difference per predetermined time is the specified value or larger.
Judge as NG when the following conditions are established within the predetermined time.

Judgment Value

Malfunction Criteria	Threshold Value
Σ(Target position – Actual position)	> 4000 °CA (Bank 1) > 4000 °CA (Bank 2)
or	
Σ(Target position – Actual position)	< –4000 °CA (Bank 1) < –4000 °CA (Bank 2)

Time Needed for Diagnosis: 25000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

J: DTC P000B B CAMSHAFT POSITION SLOW RESPONSE (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect the exhaust AVCS system malfunction.
Judge NG when the amount of exhaust AVCS actual timing advance does not approach the amount of exhaust AVCS target timing advance.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Time of establishing all secondary parameter conditions	≥ 1000 ms
Battery voltage	≥ 10.9 V
Engine speed	≥ 500 rpm
Engine oil temperature	≥ –40 °C (–40 °F)
Exhaust AVCS control	Operation
Target timing advance change amount (per 64 ms)	< 3.2 °CA

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously when the engine speed increases and exhaust AVCS operates.

4. DIAGNOSTIC METHOD

When the differences of target timing advance amount and actual timing advance amount is calculated during exhaust AVCS control, and the difference per predetermined time is the specified value or larger.
Judge as NG when the following conditions are established within the predetermined time.

Judgment Value

Malfunction Criteria	Threshold Value
Σ(Target position – Actual position)	> 4000 °CA (Bank 1) > 4000 °CA (Bank 2)
or	
Σ(Target position – Actual position)	< –4000 °CA (Bank 1) < –4000 °CA (Bank 2)

Time Needed for Diagnosis: 25000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

K: DTC P000C A CAMSHAFT POSITION SLOW RESPONSE (BANK 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to P000A. <Ref. to GD(H4DO HEV)-13, DTC P000A A CAMSHAFT POSITION SLOW RESPONSE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

L: DTC P000D B CAMSHAFT POSITION SLOW RESPONSE (BANK 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to P000B. <Ref. to GD(H4DO HEV)-14, DTC P000B B CAMSHAFT POSITION SLOW RESPONSE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

M: DTC P0010 "A" CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the oil control solenoid.
Judge as NG when the current is small even though the duty signal is large.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Oil control solenoid control duty	≥ 99.61 %

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Oil control solenoid control present current	< 0.306 A

Time Needed for Diagnosis: 2000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

N: DTC P0011 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect the AVCS system malfunction.
Judge as NG when the conditions during which the differences of AVCS target timing advance amount and AVCS actual timing advance amount is large continues.

2. ENABLE CONDITION

- Normal

Secondary Parameters	Enable Conditions
Time of establishing all secondary parameter conditions	≥ 10000 ms
Battery voltage	≥ 10.9 V
Engine speed	≥ 500 rpm
Engine oil temperature	≥ –40 °C (–40 °F)
AVCS control	Operation

- Intermediate lock

Secondary Parameters	Enable Conditions
Time of establishing all secondary parameter conditions	≥ 2000 ms
Battery voltage	≥ 10.9 V
Engine speed	≥ 500 rpm
Engine oil temperature	≥ –40 °C (–40 °F)
AVCS control	Intermediate lock
Elapsed time after starting the engine	> 500 ms

3. GENERAL DRIVING CYCLE

- Normal

Perform the diagnosis continuously when the engine speed increases and AVCS operates.

- Intermediate lock

Perform the diagnosis when the AVCS is carrying out the intermediate lock control at the engine start.

4. DIAGNOSTIC METHOD

When the conditions during which the differences of AVCS target timing advance amount and AVCS actual timing advance amount is large continues for certain amount of time.
Judge as NG when the following conditions are established within the predetermined time.

Judgment Value

Malfunction Criteria	Threshold Value
• Normal (Target position – Actual position)	> 10 °CA or < –10 °CA
• Intermediate lock (Target position – Actual position)	> 10 °CA or < –10 °CA

Time Needed for Diagnosis:

- Normal: 10000 ms
- Intermediate lock: 2000 ms

Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

O: DTC P0013 B CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the oil control solenoid.
Judge as NG when the current is small even though the duty signal is large.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Oil control solenoid control duty	≥ 99.61 %

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Oil control solenoid control present current	< 0.306 A

Time Needed for Diagnosis: 2000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

P: DTC P0014 EXHAUST AVCS SYSTEM 1 (RANGE/PERFORMANCE)

1. OUTLINE OF DIAGNOSIS

Detect the exhaust AVCS system malfunction.
Judge as NG when the conditions during which the differences of exhaust AVCS target timing advance amount and exhaust AVCS actual timing advance amount is large continues.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Time of establishing all secondary parameter conditions	≥ 10000 ms
Battery voltage	≥ 10.9 V
Engine speed	≥ 500 rpm
Engine oil temperature	≥ –40 °C (–40 °F)
Exhaust AVCS control	Operation

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously when the engine speed increases and exhaust AVCS operates.

4. DIAGNOSTIC METHOD

When the conditions during which the differences of exhaust AVCS target timing advance amount and exhaust AVCS actual timing advance amount is large continues for certain amount of time.
Judge as NG when the following conditions are established within the predetermined time.

Judgment Value

Malfunction Criteria	Threshold Value
(Target position – Actual position)	> 10 °CA or < –10 °CA

Time Needed for Diagnosis: 10000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

Q: DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK1)

1. OUTLINE OF DIAGNOSIS

Detect the AVCS system malfunction.
Judge as NG when standard timing advance amount is far from learning angle.

2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Engine speed	≥ 1300 rpm and < 3000 rpm
Engine coolant temperature	≥ 50 °C (122 °F)
AVCS control	Not in operation
Target timing advance	0°CA

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting engine and while AVCS is not operating.

4. DIAGNOSTIC METHOD

Judge as NG when the absolute value of the difference between cam signal input position and learning value is out of specification.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
|Crankshaft position when camshaft position sensor signal is input – Learning value|	> 10 °CA

Time Needed for Diagnosis: 400 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

NOTE:
Initial standard learning value is the value of crank angle initially input at the production plant. And then it will be updated every time normal judgment has been completed. Learning value will not be updated if NG judgment occurs because timing belt or chain derails suddenly in process or because wrong assembly occurs during servicing.

R: DTC P0017 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect the exhaust AVCS system malfunction.
Judge as NG when standard timing advance amount is far from learning angle.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Engine speed	≥ 500 rpm and < 1200 rpm
Engine coolant temperature	≥ 50 °C (122 °F)
Exhaust AVCS control	Not in operation
Target timing advance	0°CA

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously while the exhaust AVCS is not operating after warming up.

4. DIAGNOSTIC METHOD

Judge as NG when the absolute value of the difference between cam signal input position and learning value is out of specification.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
|Crankshaft position when camshaft position sensor signal is input – Learning value|	> 10 °CA

Time Needed for Diagnosis: 400 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

NOTE:
Initial standard learning value is the value of crank angle initially input at the production plant. And then it will be updated every time normal judgment has been completed. Learning value will not be updated if NG judgment occurs because timing belt or chain derails suddenly in process or because wrong assembly occurs during servicing.

S: DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P0016. <Ref. to GD(H4DO HEV)-19, DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

T: DTC P0019 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P0017. <Ref. to GD(H4DO HEV)-20, DTC P0017 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

U: DTC P0020 "A" CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P0010. <Ref. to GD(H4DO HEV)-15, DTC P0010 "A" CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

V: DTC P0021 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P0011. <Ref. to GD(H4DO HEV)-16, DTC P0011 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

W: DTC P0023 B CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P0013. <Ref. to GD(H4DO HEV)-17, DTC P0013 B CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

X: DTC P0024 EXHAUST AVCS SYSTEM 2 (RANGE/PERFORMANCE)

1. OUTLINE OF DIAGNOSIS

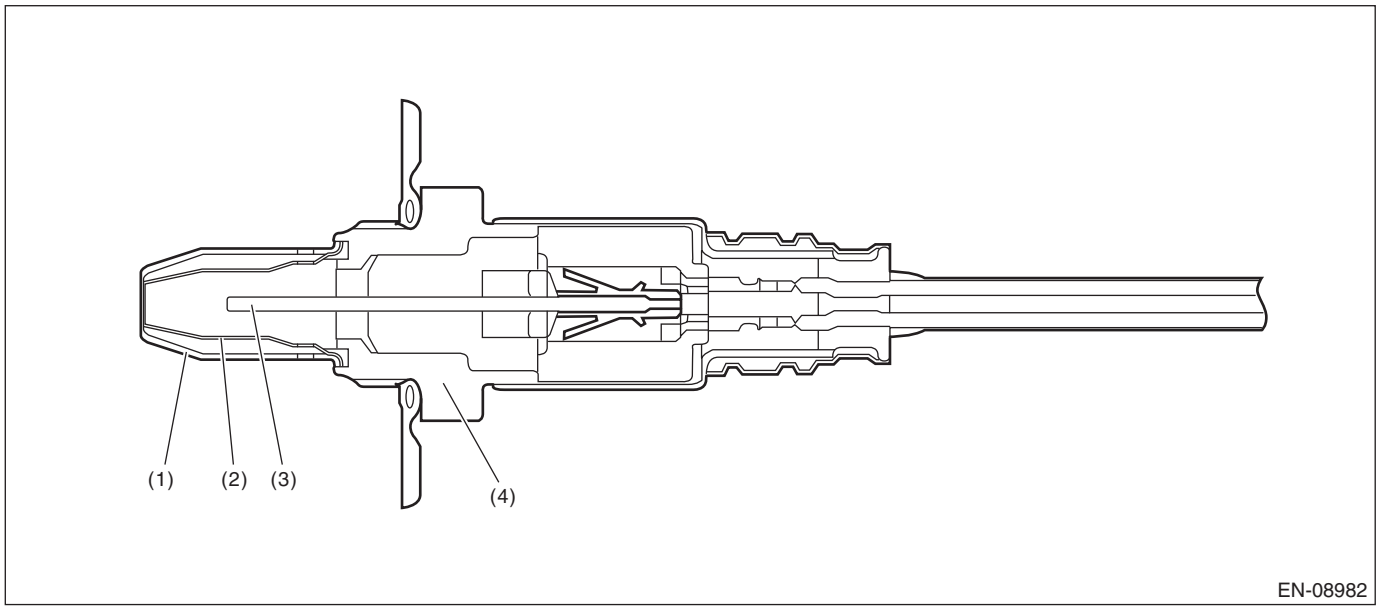
NOTE:
For the detection standard, refer to DTC P0014. <Ref. to GD(H4DO HEV)-18, DTC P0014 EXHAUST AVCS SYSTEM 1 (RANGE/PERFORMANCE), Diagnostic Trouble Code (DTC) Detecting Criteria.>

Y: DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

Detect functional errors of the front oxygen (A/F) sensor heater.
Judge as NG when it is determined that the front oxygen (A/F) sensor impedance is large when looking at engine status such as deceleration fuel cut.

2. COMPONENT DESCRIPTION



(1) Element cover (outer)
(2) Element cover (inner)
(3) Sensor element
(4) Sensor housing

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Heater current	Permitted
A/F sensor heater final control	Main energization status
After fuel cut	≥ 20000 ms

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after 42000 ms or more have passed since the engine started.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Front oxygen (A/F) sensor impedance	> 82 Ω

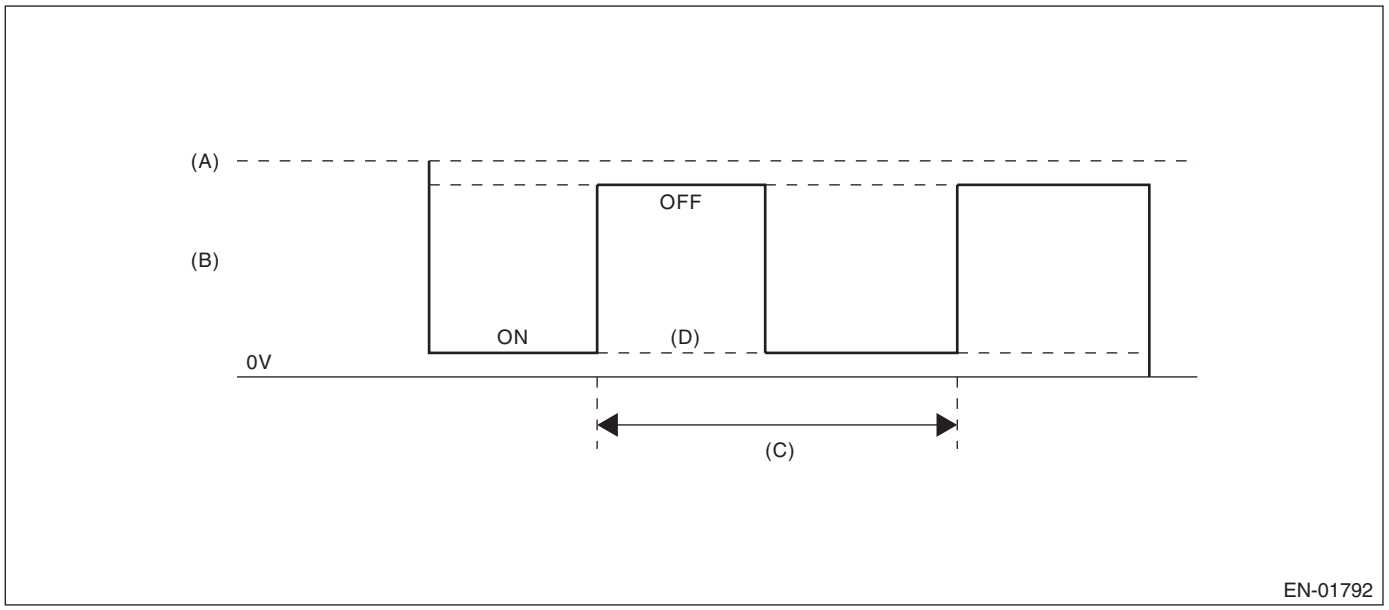
Time Needed for Diagnosis: 10000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

Z: DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

Detect front oxygen (A/F) sensor heater open or short circuit.
The front oxygen (A/F) sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.
Judge as NG when the terminal voltage remains Low.

2. COMPONENT DESCRIPTION



(A) Battery voltage
(B) Front oxygen (A/F) sensor heater output voltage
(C) 128 ms
(D) Low error

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Front oxygen (A/F) sensor heater control duty	< 87.5 %

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 1.9 V

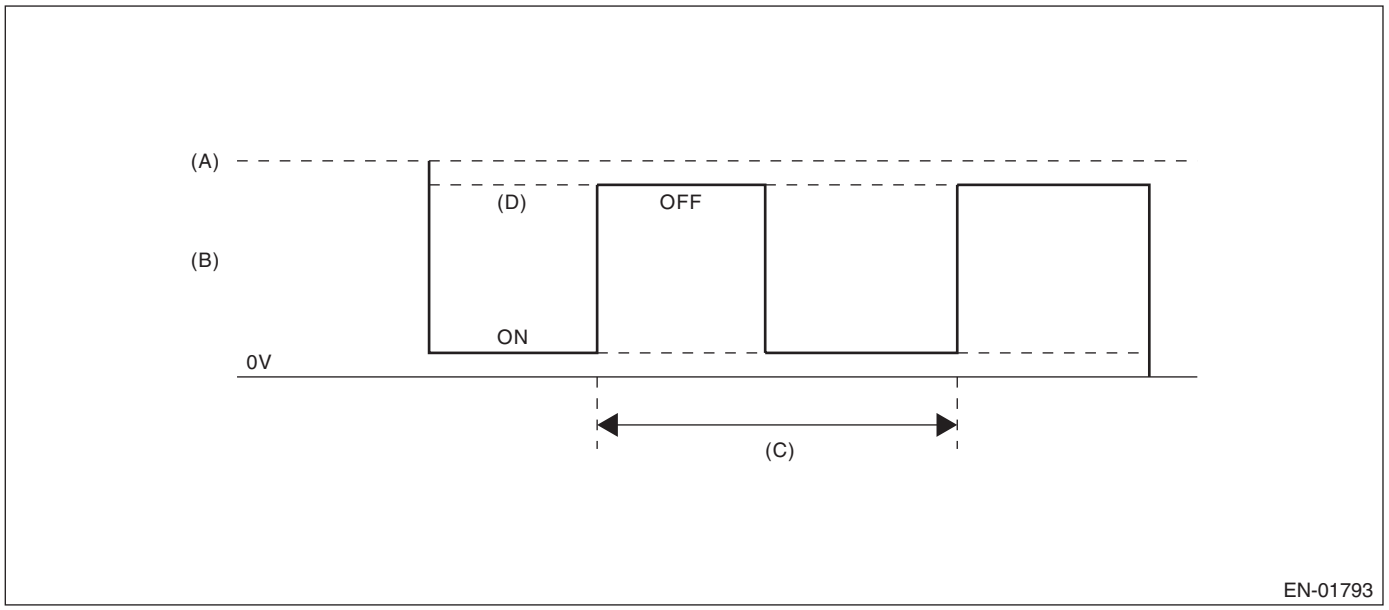
Time Needed for Diagnosis: 1 second
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AA:DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

Detect front oxygen (A/F) sensor heater open or short circuit.
The front oxygen (A/F) sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.
Judge as NG when the terminal voltage remains High.

2. COMPONENT DESCRIPTION



(A) Battery voltage
(B) Front oxygen (A/F) sensor heater output voltage
(C) 128 ms
(D) High error

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Front oxygen (A/F) sensor heater control duty	> 12.5 %

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 1.9 V

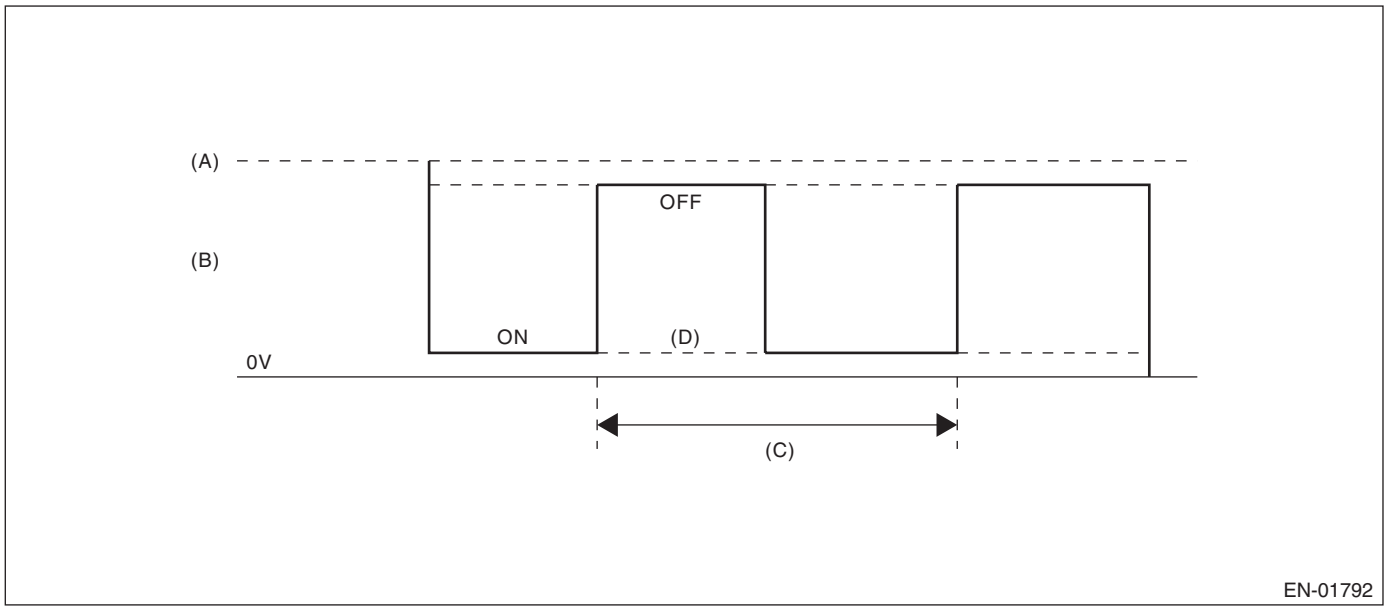
Time Needed for Diagnosis: 2 seconds
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AB:DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

Detect the rear oxygen sensor heater open or short circuit.
The rear oxygen sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.
Judge as NG when the terminal voltage remains Low.

2. COMPONENT DESCRIPTION



(A) Battery voltage
(B) Output voltage of the rear oxygen sensor heater
(C) 256 ms (cycle)
(D) Low error

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Elapsed time after starting the engine	≥ 1 s
Rear oxygen sensor heater control duty	< 75 %

4. GENERAL DRIVING CYCLE

After starting the engine, perform the diagnosis continuously when engine is low speed.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< Battery voltage × 0.2

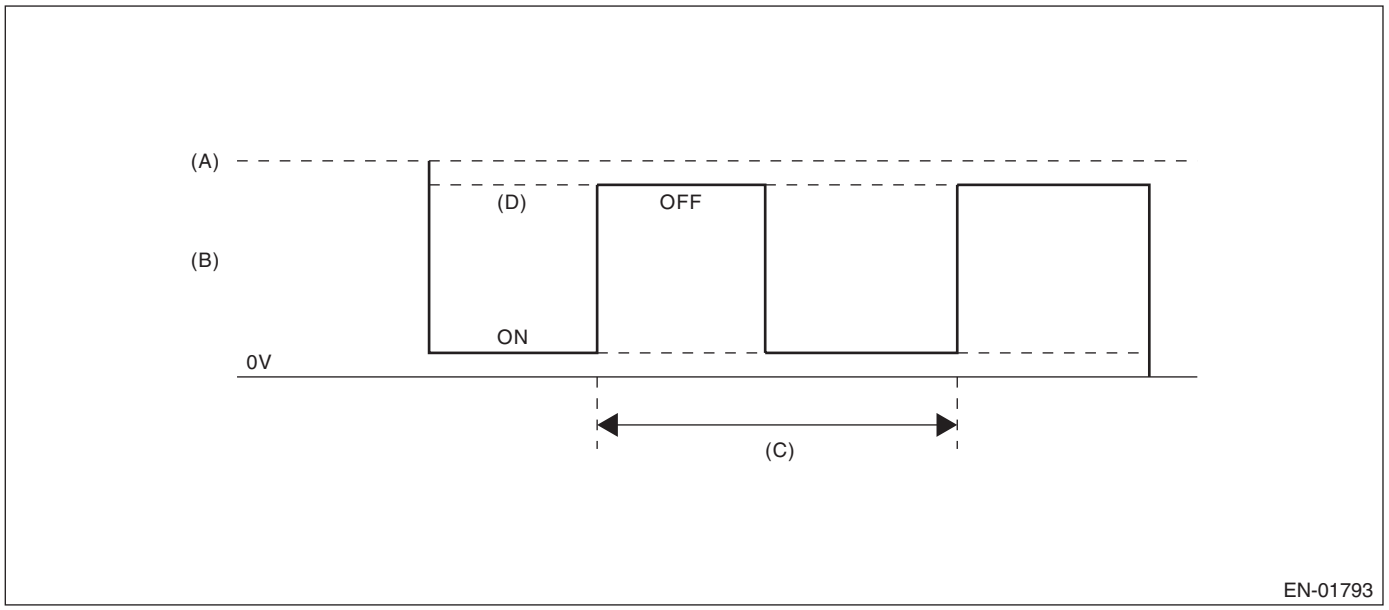
Time Needed for Diagnosis: 10 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

AC:DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

Detect the rear oxygen sensor heater open or short circuit.
The rear oxygen sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.
Judge as NG when the terminal voltage remains High.

2. COMPONENT DESCRIPTION



(A) Battery voltage
(B) Output voltage of the rear oxygen sensor heater
(C) 256 ms (cycle)
(D) High error

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Elapsed time after starting the engine	≥ 1 s
Rear oxygen sensor heater control duty	≥ 20 %

4. GENERAL DRIVING CYCLE

After starting the engine, perform the diagnosis continuously when engine is low speed.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	> Battery voltage × 0.3

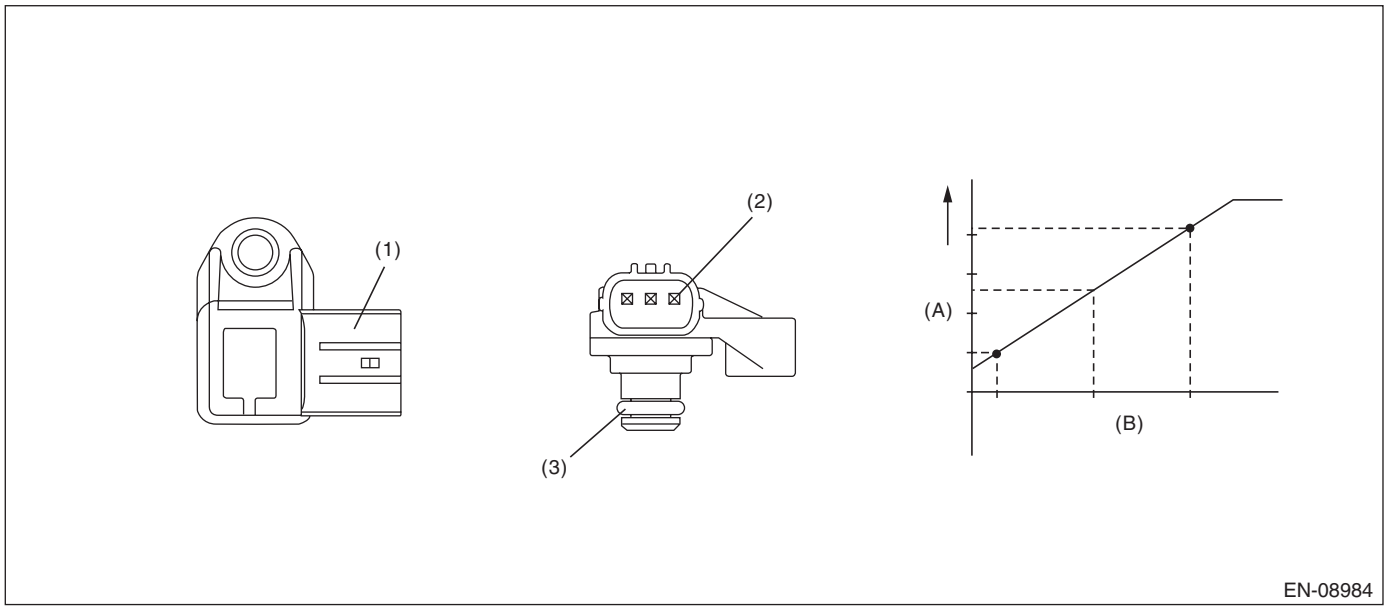
Time Needed for Diagnosis: 2.56 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

AD:DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION

1. OUTLINE OF DIAGNOSIS

Detect problems in the intake manifold pressure sensor output properties.
Judge as NG when the intake air pressure AD value is Low whereas it seemed to be High from the viewpoint of engine condition, or when it is High whereas it seemed to be Low from the engine condition.

2. COMPONENT DESCRIPTION



(A) Output voltage
(B) Absolute pressure
(1) Connector
(2) Terminals
(3) O-ring

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Engine coolant temperature	≥ 60 °C (140 °F)

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after idling.

5. DIAGNOSTIC METHOD

Judge as NG when Low side or High side becomes NG.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Low	
Engine speed	< 2900 rpm
Throttle position	≥ 3.4 °
Output voltage	< 0.95 V
Engine load	> 0.36 g/rev (0.01 oz/rev)
High	
Engine speed	500 rpm — 2000 rpm
Throttle position	< 9.6 °
Output voltage	≥ 3.61 V
Engine load	< 0.34 g/rev (0.01 oz/rev)

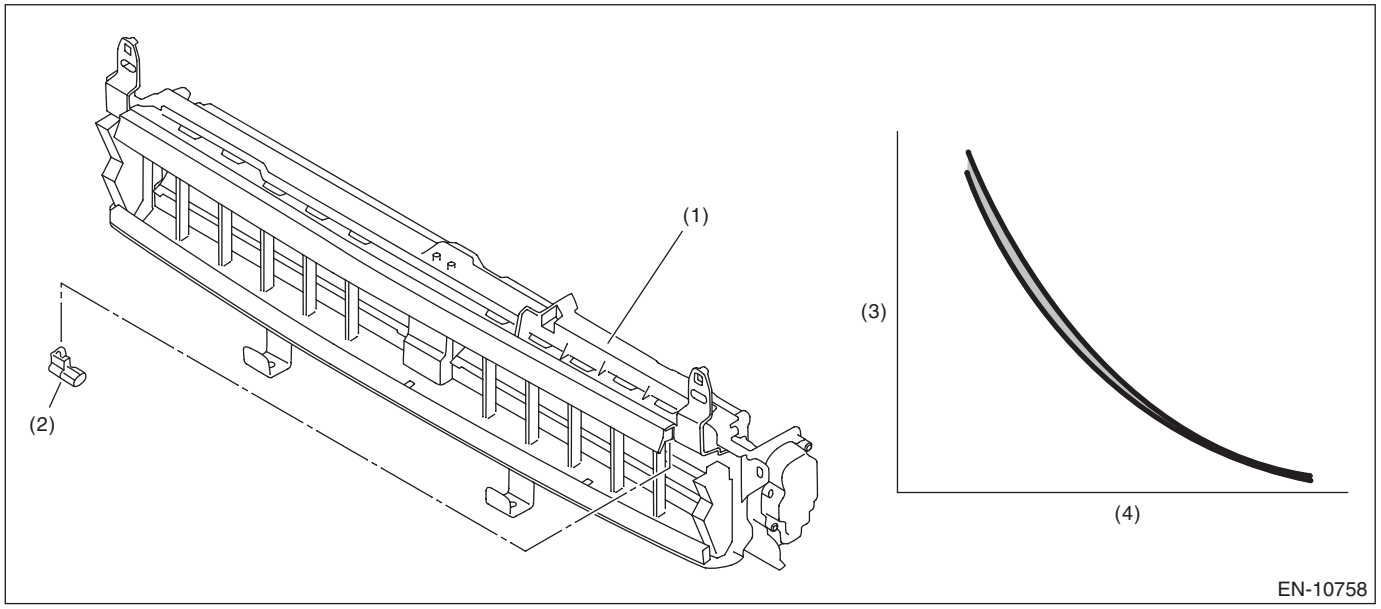
Time Needed for Diagnosis:
Low side: 5000 ms
High side: 5000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

AE:DTC P0071 AMBIENT TEMPERATURE SENSOR CIRCUIT "A" RANGE/PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Detect the characteristic abnormality of the ambient air temperature sensor.
Perform diagnosis in reference to the ambient air temperature sensor value, intake air temperature sensor value and engine coolant temperature sensor value after engine start after predetermined time have passed in soak time. Judge as NG when the difference is more than the specific value in comparison respectively between ambient and intake air temperature, ambient and engine coolant temperature.

2. COMPONENT DESCRIPTION



(1) Active grille shutter
(2) Ambient air temperature sensor
(3) Resistance value (kΩ)
(4) Ambient air temperature (°C (°F))

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Soaking time	≥ 21600 s
Block heater judgment	Completed
Block heater activation	not activate

Block heater judgment

Parameter	Enable Conditions
Engine speed	> 500 rpm

Judge as “Block heater is not activate” when the following conditions are established.

Judgment Value

Judgment criteria	Threshold Value
Σ (Engine coolant temperature – Engine coolant temperature at engine start)	≥ –10 °C (–18°F)

Time Needed for Judgment: 1 s × 20 times

4. GENERAL DRIVING CYCLE

Perform diagnosis only once after engine start after constant soak time.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
|Ambient air temperature 30 s after engine start – Intake air temperature 30 s after engine start|	> Value from Map
|Ambient air temperature at engine start – Engine coolant temperature at engine start|	> 25 °C (45°F)

Map

Ambient air temperature °C (°F)	-30 (-22)	30 (86)	45 (113)	60 (140)
|Ambient air temperature 30 s after engine start – Intake air temperature 30 s after engine start| °C (°F)	20 (36°F)	20 (36°F)	32 (57.6°F)	32 (57.6°F)

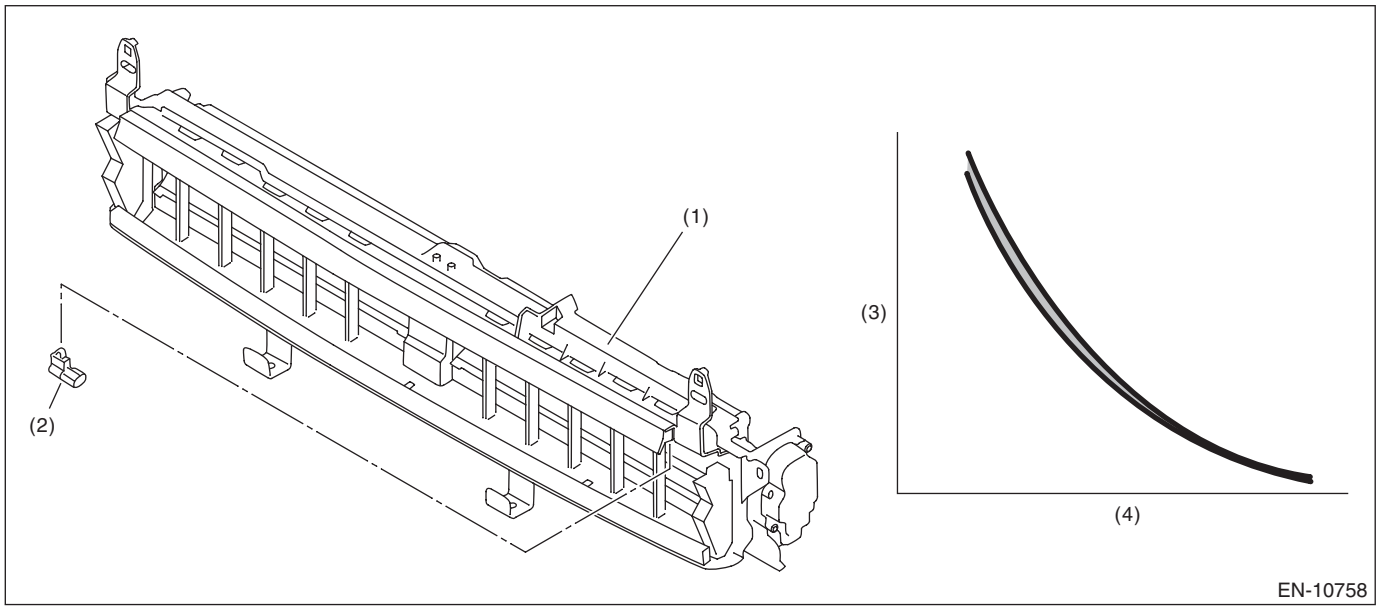
Time Needed for Diagnosis: 64 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

AF:DTC P0072 AMBIENT TEMPERATURE SENSOR CIRCUIT "A" LOW

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of ambient air temperature sensor installed in active grille shutter.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Active grille shutter
(2) Ambient air temperature sensor
(3) Resistance value (kΩ)
(4) Ambient air temperature (°C (°F))

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.42 V

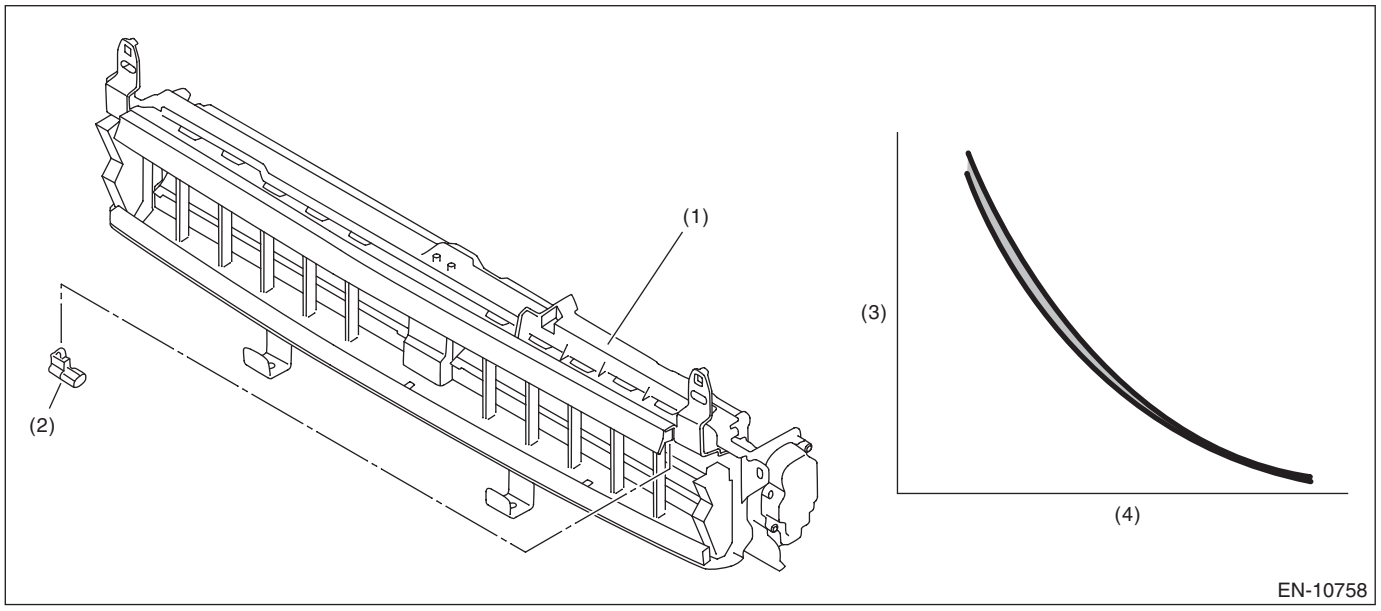
Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AG:DTC P0073 AMBIENT TEMPERATURE SENSOR CIRCUIT "A" HIGH

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of ambient air temperature sensor installed in active grille shutter.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Active grille shutter
(2) Ambient air temperature sensor
(3) Resistance value (kΩ)
(4) Ambient air temperature (°C (°F))

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	> 4.88 V

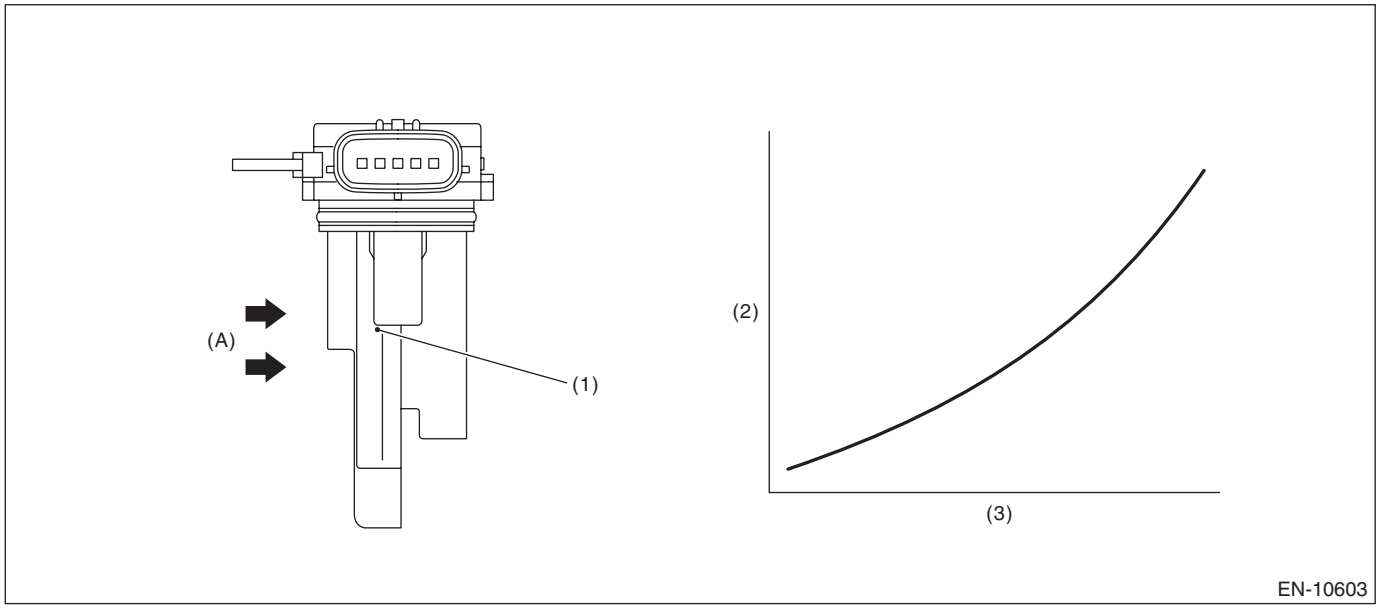
Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AH:DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of air flow sensor output properties.
Judge as a low side NG when the air flow voltage indicates a small value regardless of running in a state where the air flow voltage increases. Judge as a high side NG when the air flow voltage indicates a large value regardless of running in a state where the air flow voltage decreases. Judge air flow sensor property NG when the Low side or High side becomes NG.

2. COMPONENT DESCRIPTION



(A) Air

(1) Air flow sensor (2) Voltage (V) (3) Amount of intake air (kg (lb)/s)

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Engine coolant temperature	≥ 60 °C (140 °F)

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after idling.

5. DIAGNOSTIC METHOD

Judge as NG when Low side or High side becomes NG.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Low	
Output voltage	< 1.27 V
Engine speed	≥ 1600 rpm
Throttle opening angle	≥ 5.6 °
Intake manifold pressure	≥ 66.7 kPa (500 mmHg, 19.7 inHg)
High (1)	
Output voltage	≥ 2.44 V
Engine speed	500 rpm — 2000 rpm
Throttle opening angle	< 9.3 °
Intake manifold pressure	≥ 44.8 kPa (336.3 mmHg, 13.2 inHg)
High (2)	
Output voltage	≥ 2.44 V
Engine speed	500 rpm — 2000 rpm
Throttle opening angle	< 9.3 °
Intake manifold pressure	≥ 44.8 kPa (336.3 mmHg, 13.2 inHg)
Fuel system diagnosis	Rich side malfunction

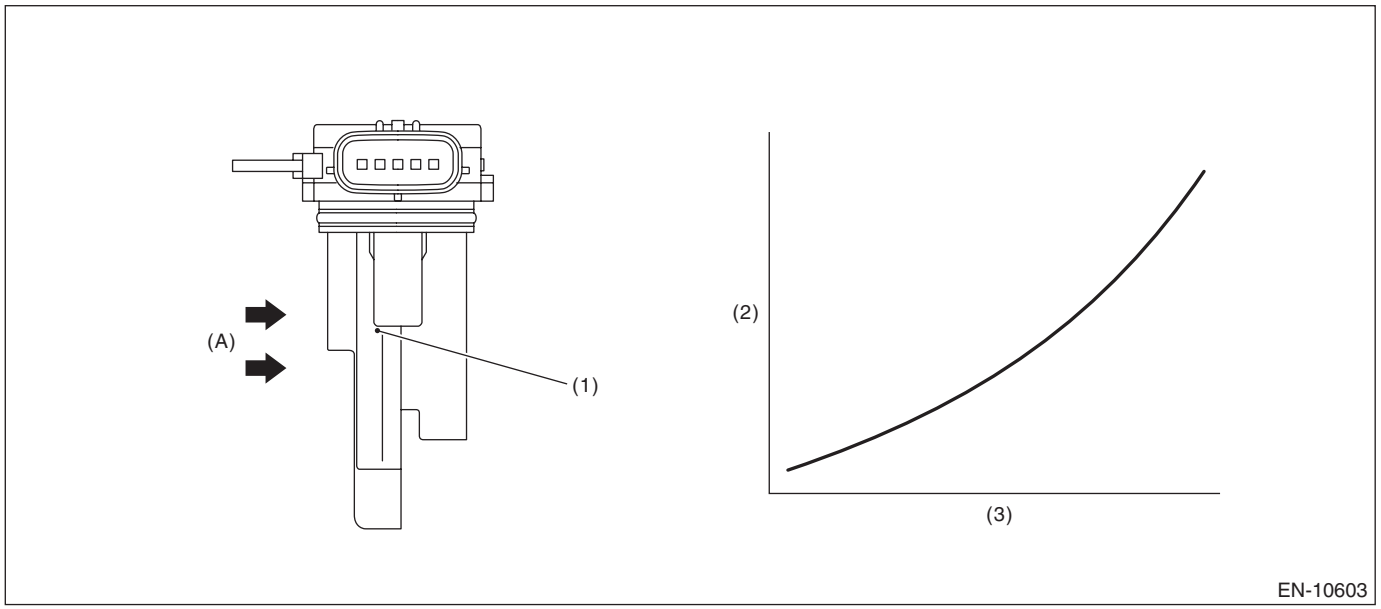
Time Needed for Diagnosis:
Low: 5000 ms
High: 5000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

AI: DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT

1. OUTLINE OF DIAGNOSIS

Detect open or short circuits of the air flow sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Air

(1) Air flow sensor (2) Voltage (V) (3) Amount of intake air (kg (lb)/s)

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.127 V

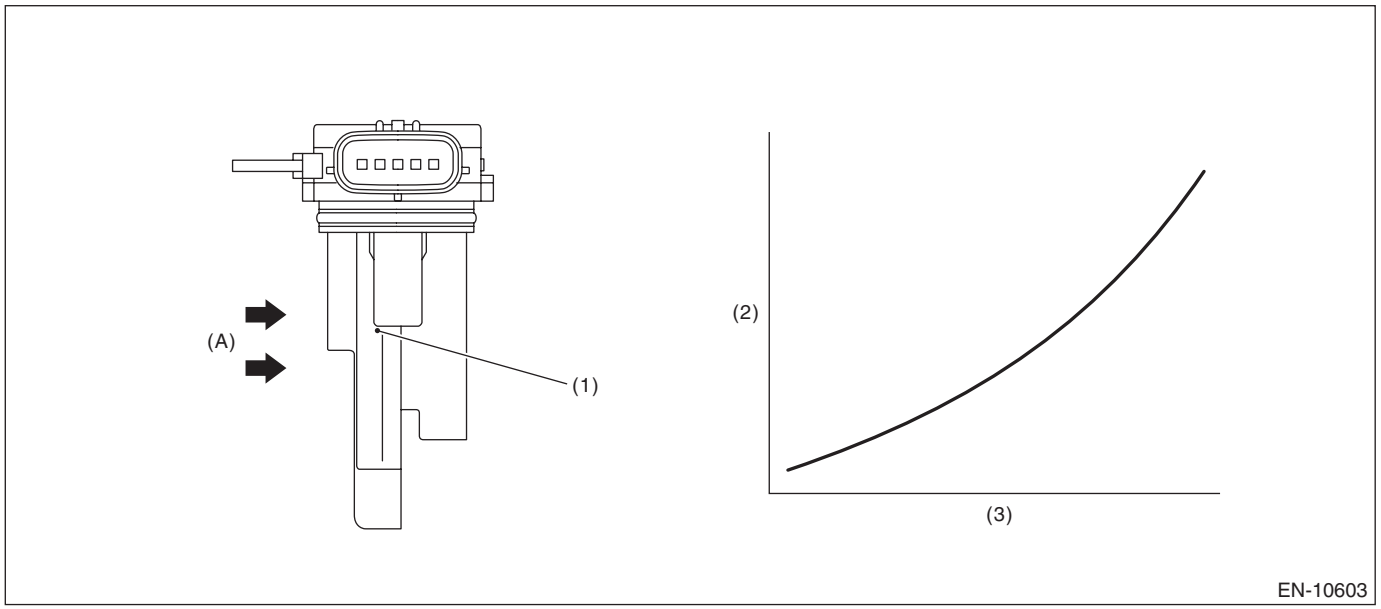
Time Needed for Diagnosis: 500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AJ:DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT

1. OUTLINE OF DIAGNOSIS

Detect open or short circuits of the air flow sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Air

(1) Air flow sensor (2) Voltage (V) (3) Amount of intake air (kg (lb)/s)

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.43 V

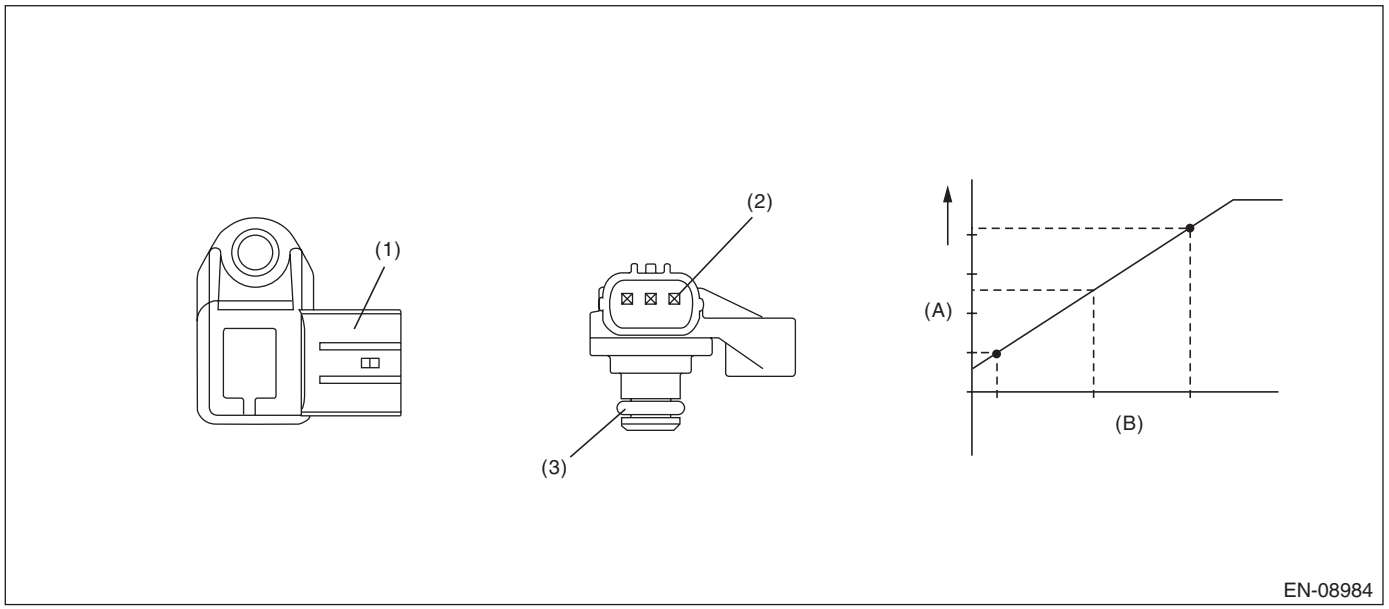
Time Needed for Diagnosis: 500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AK:DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of intake manifold pressure sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Output voltage
(B) Absolute pressure
(1) Connector
(2) Terminals
(3) O-ring

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.608 V

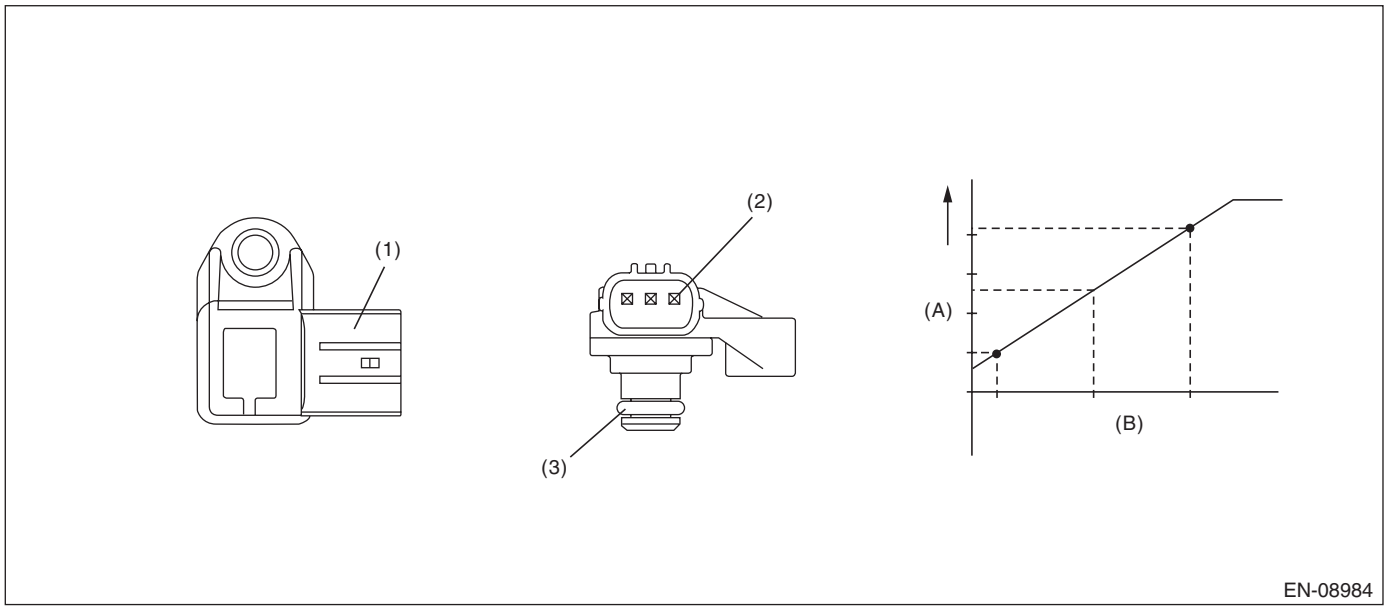
Time Needed for Diagnosis: 2000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AL:DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of intake manifold pressure sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Output voltage
(B) Absolute pressure
(1) Connector
(2) Terminals
(3) O-ring

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 3.906 V

Time Needed for Diagnosis: 2000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

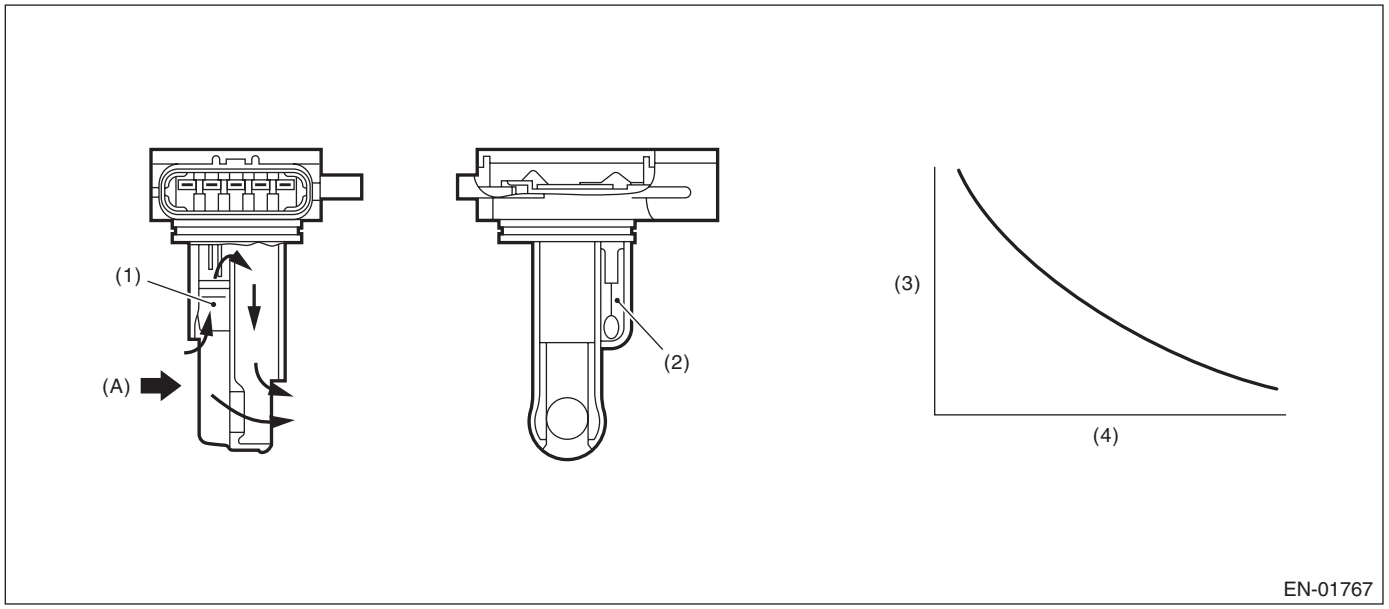
AM:DTC P0111 INTAKE AIR TEMPERATURE SENSOR RANGE/PERFORMANCE PROBLEM

1. OUTLINE OF DIAGNOSIS

Detect the abnormality of the intake air temperature sensor output characteristics. Perform the following two diagnosis, and judge as NG if either is NG.

- **Diagnosis 1 (relative diagnosis):** Perform diagnosis in reference to the intake air temperature sensor value, engine coolant temperature sensor value and ambient air temperature sensor value after engine start after predetermined time have passed in soak time. Judge as NG when the difference is more than the specific value in comparison respectively between intake air and engine coolant temperature, intake air and ambient air temperature.
- **Diagnosis 2 (stuck diagnosis):** Observe the engine condition, and if there is no variation in the driving condition under which the intake air temperature is considered to change, judge as NG.

2. COMPONENT DESCRIPTION



(A) Air

(1) Air flow sensor
(2) Intake air temperature sensor
(3) Resistance value (Ω)
(4) Intake air temperature °C (°F)

3. ENABLE CONDITION

Diagnosis 1

Secondary Parameters	Enable Conditions
Soaking time	≥ 21600 s
Block heater judgment	Completed
Block heater activation	not activate

Diagnosis 2

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Engine coolant temperature	≥ 60 °C (140 °F)
Intake air amount sum value	≥ Value of Map 1
Number of experiences under conditions below	≥ 3 time(s)
• Continuous time when vehicle speed is less than 4 km/h (2.5 MPH)	≥ Value from Map 2
• Continuous time when vehicle speed is 40 km/h (24.9 MPH) or more and intake air amount is 10 g/s (0.35 oz/s) or more.	≥ 15 s

Map 1

Engine coolant temperature °C (°F)	-30 (-22)	-10 (14)	0 (32)	10 (50)	20 (68)
Intake air amount sum value (g (oz))	60000 (2116.2)	8500 (299.8)	7500 (264.53)	7000 (246.89)	5000 (176.35)

Map 2

Engine coolant temperature °C (°F)	-30 (-22)	-10 (14)	0 (32)	10 (50)
Continuous time (s) when vehicle speed is less than 4 km/h (2.5 MPH)	180	100	70	45

4. GENERAL DRIVING CYCLE

- **Diagnosis 1:** Perform diagnosis only once after engine start after constant soak time.
- **Diagnosis 2:** Perform the diagnosis when the vehicle speed condition is met after warming up from a cold condition.

5. DIAGNOSTIC METHOD

Judge as NG when diagnosis 1 or diagnosis 2 becomes NG.

Diagnosis 1

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
|Intake air temperature 30 s after engine start – engine coolant temperature at engine start|	> Value of Map 3
|Intake air temperature 30 s after engine start – Ambient air temperature 30 s after engine start|	> Value of Map 4

Map 3

Ambient air temperature °C (°F)	-30 (-22)	30 (86)	45 (113)	60 (140)
|Intake air temperature 30 s after engine start – engine coolant temperature at engine start| °C (°F)	12 (21.6°F)	12 (21.6°F)	22 (39.6°F)	22 (39.6°F)

Map 4

Ambient air temperature °C (°F)	-30 (-22)	30 (86)	45 (113)	60 (140)
|Intake air temperature 30 s after engine start – Ambient air temperature 30 s after engine start| °C (°F)	20 (36°F)	20 (36°F)	32 (57.6°F)	32 (57.6°F)

Time Needed for Diagnosis: Less than 1 second

Diagnosis 2

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage difference between Max. and Min.	< 0.02 V (Equivalent to approximately 0.5°C (0.9°F) near 25°C (77°F)) (Equivalent to approximately 0.9°C (1.6°F) near –7°C (19.4°F))

Time Needed for Diagnosis: Less than 1 second

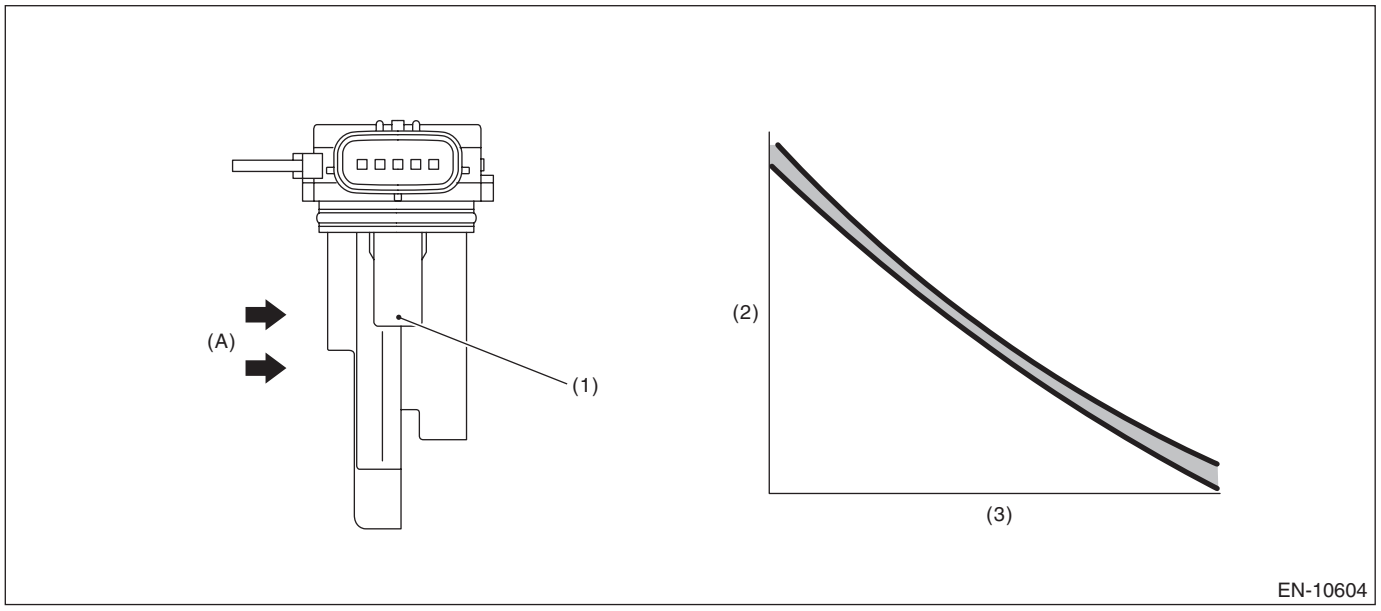
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

AN:DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the intake air temperature sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Air

(1) Intake air temperature sensor (2) Resistance value (Ω) (3) Intake air temperature °C (°F)

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.4 V

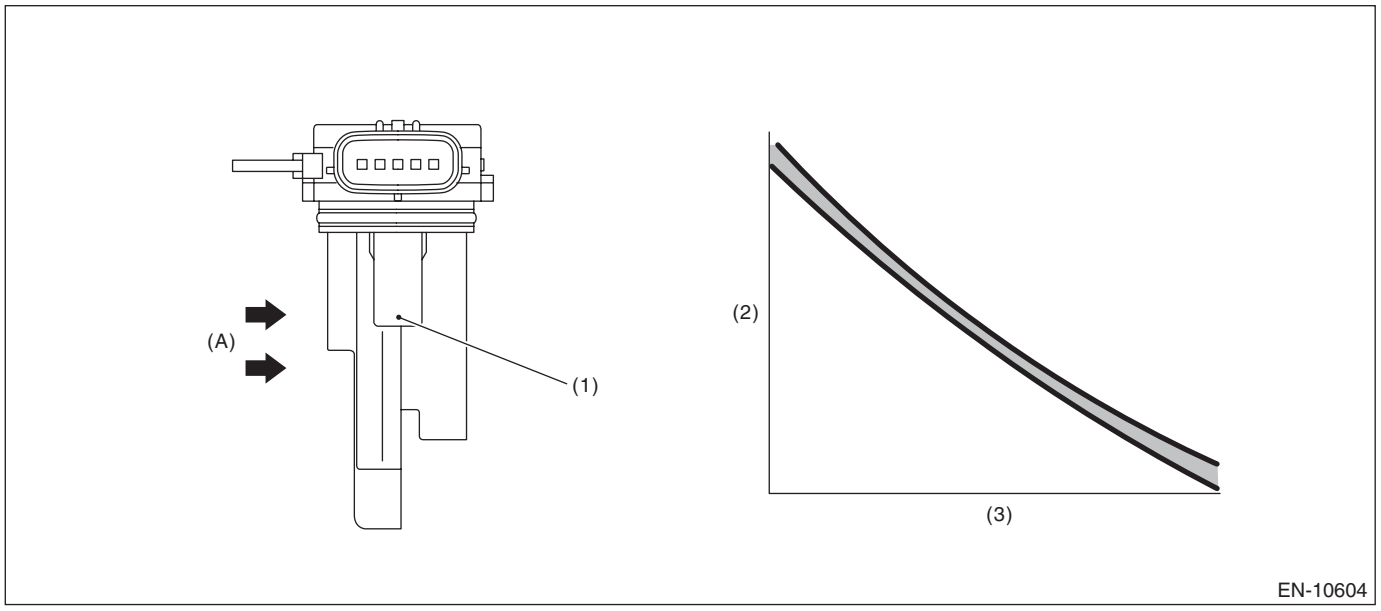
Time Needed for Diagnosis: 500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AO:DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the intake air temperature sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Air

(1) Intake air temperature sensor (2) Resistance value (Ω) (3) Intake air temperature °C (°F)

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.707 V

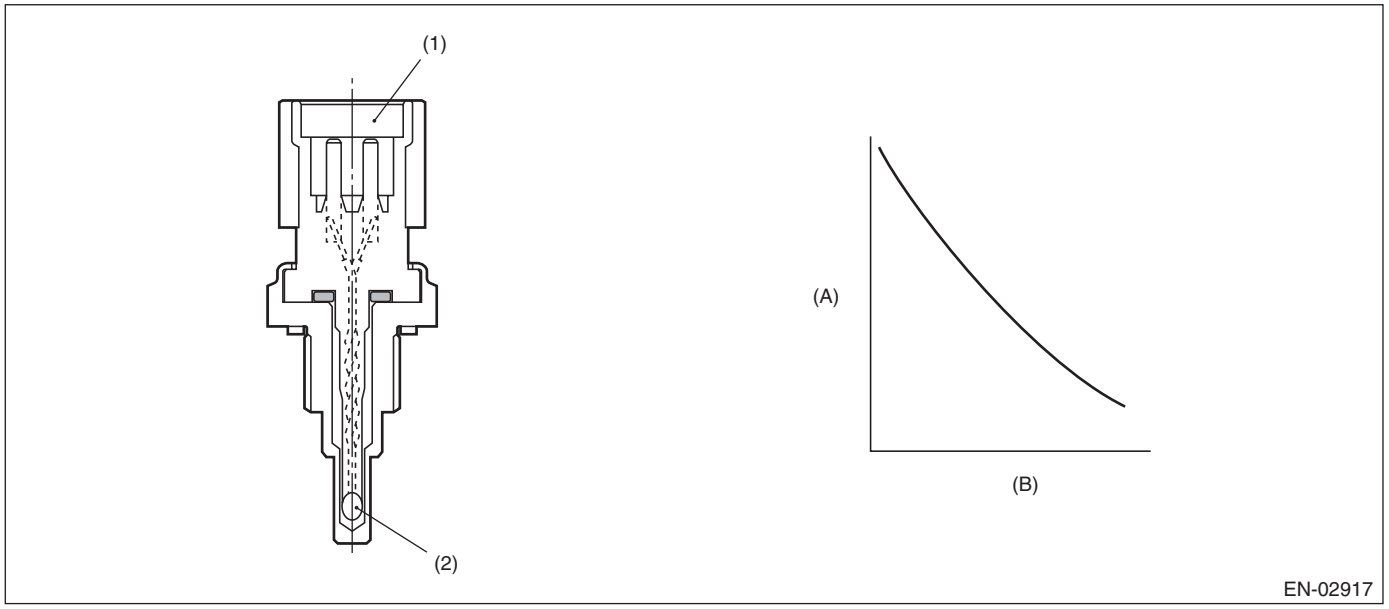
Time Needed for Diagnosis: 500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AP:DTC P0116 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of the engine coolant temperature sensor characteristics.
Perform diagnosis in reference to the engine coolant temperature sensor value, intake air temperature sensor value and ambient air temperature sensor value after engine start after predetermined time have passed in soak time. Judge as NG when the difference is more than the specific value in comparison respectively between engine coolant and ambient air temperature, engine coolant and intake air temperature.

2. COMPONENT DESCRIPTION



(A) Resistance value (kΩ)
(B) Temperature °C (°F)
(1) Connector
(2) Thermistor element

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Soaking time	≥ 21600 s
Block heater judgment	Completed
Block heater activation	not activate

4. GENERAL DRIVING CYCLE

Perform diagnosis only once after engine start after constant soak time.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
|Engine coolant temperature at engine start – Intake air temperature 30 s after engine start|	> Value from Map
|Engine coolant temperature at engine start – ambient air temperature at engine start|	> 25 °C (45°F)

Map

Ambient air temperature °C (°F)	-30 (-22)	30 (86)	45 (113)	60 (140)
|Engine coolant temperature at engine start – Intake air temperature 30 s after engine start| °C (°F)	12 (21.6°F)	12 (21.6°F)	22 (39.6°F)	22 (39.6°F)

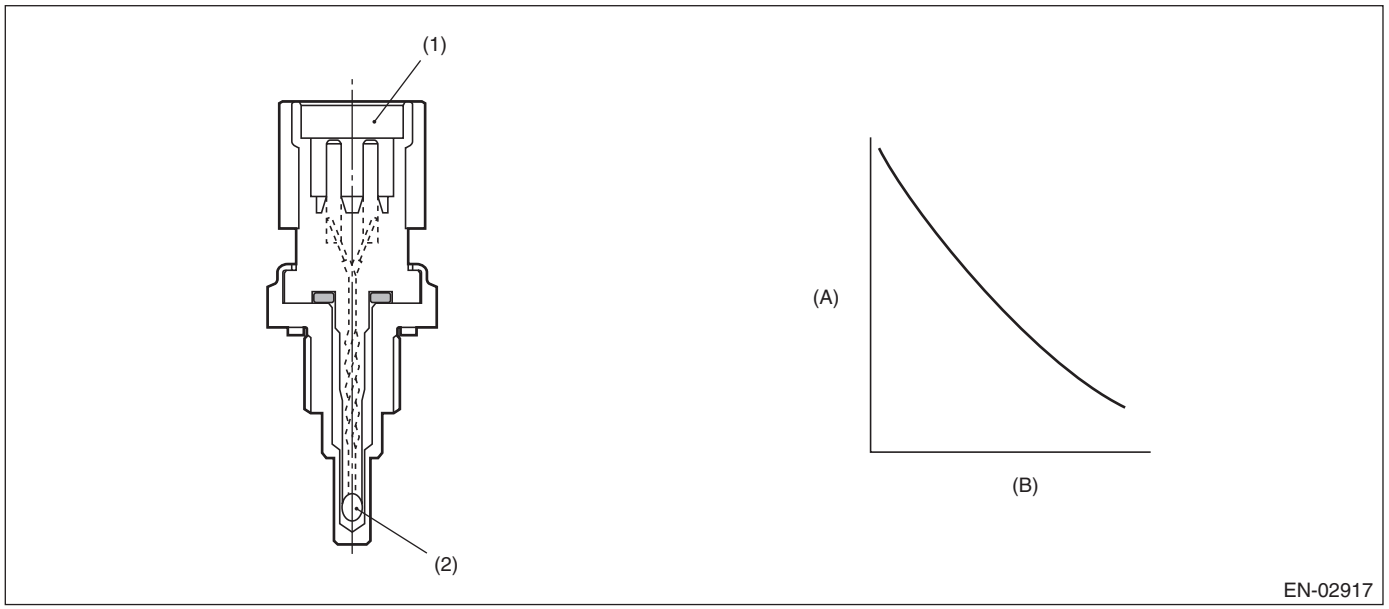
Time Needed for Diagnosis: Less than 1 second
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

AQ:DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the engine coolant temperature sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Resistance value (kΩ)
(B) Temperature °C (°F)
(1) Connector
(2) Thermistor element

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.349 V

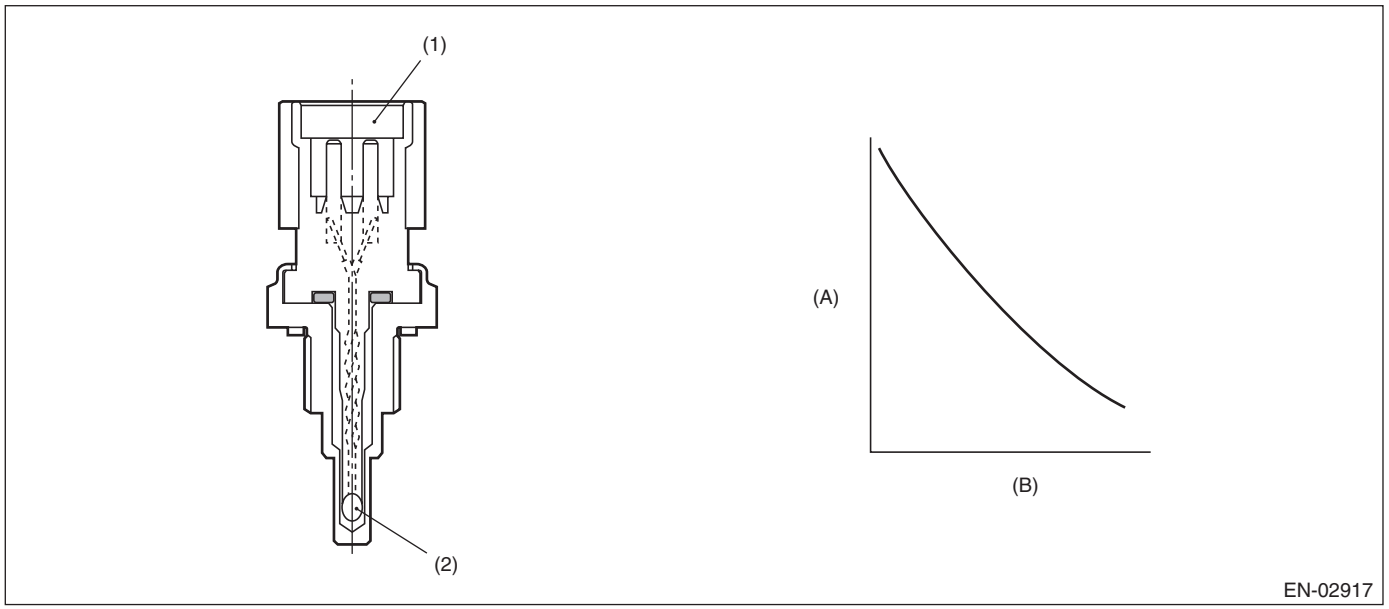
Time Needed for Diagnosis: 500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AR:DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the engine coolant temperature sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Resistance value (kΩ)
(B) Temperature °C (°F)
(1) Connector
(2) Thermistor element

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.698 V

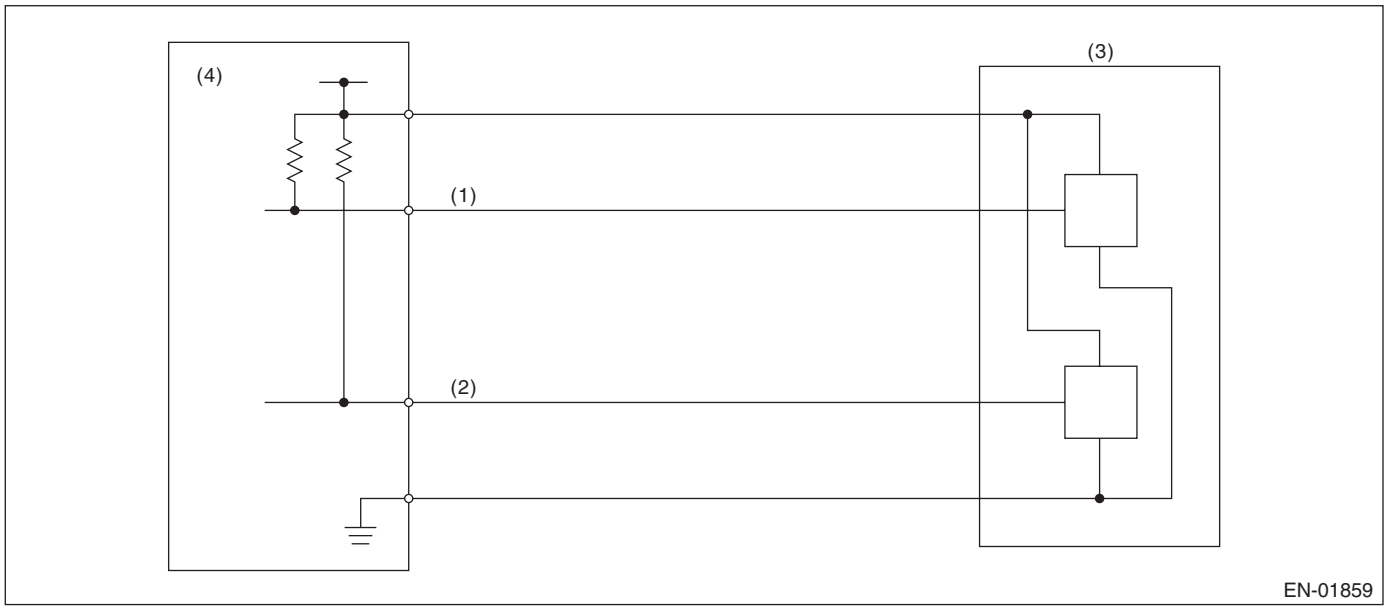
Time Needed for Diagnosis: 500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AS:DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 1.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Throttle position sensor 1 signal
(2) Throttle position sensor 2 signal
(3) Throttle position sensor
(4) Engine control module (ECM)

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 6 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

JUDGMENT VALUE

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	≤ 0.267 V

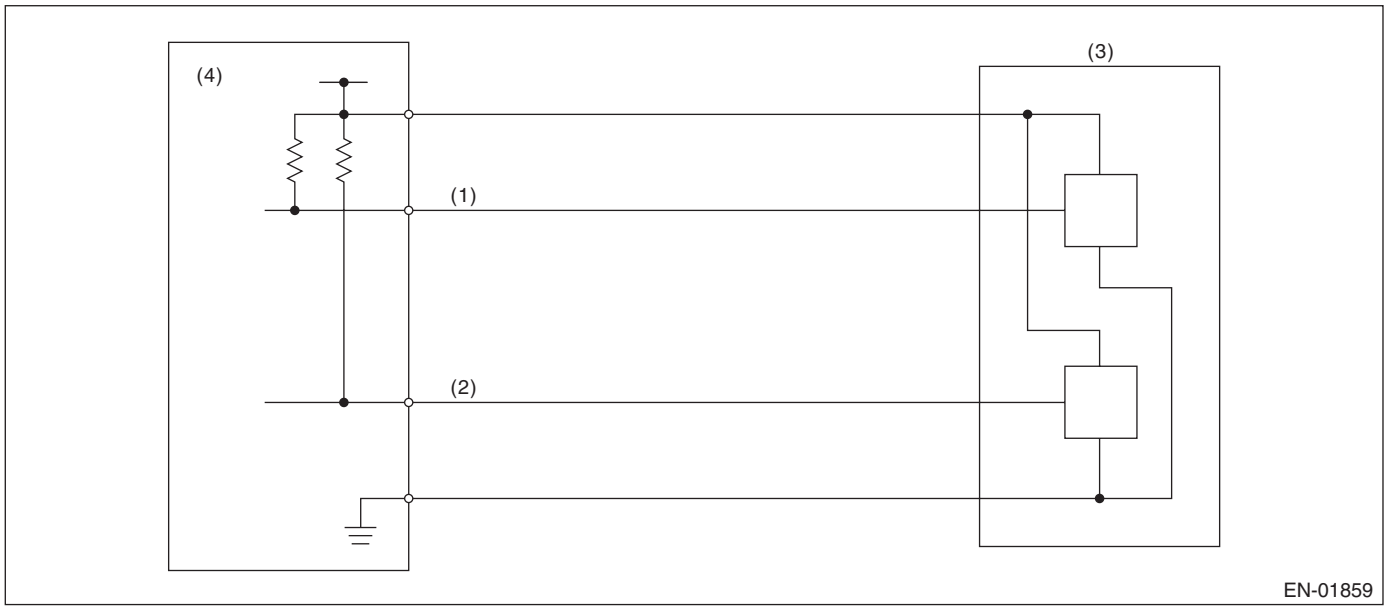
Time Needed for Diagnosis: 24 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AT:DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 1.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Throttle position sensor 1 signal
(2) Throttle position sensor 2 signal
(3) Throttle position sensor
(4) Engine control module (ECM)

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 6 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	≥ 4.727 V

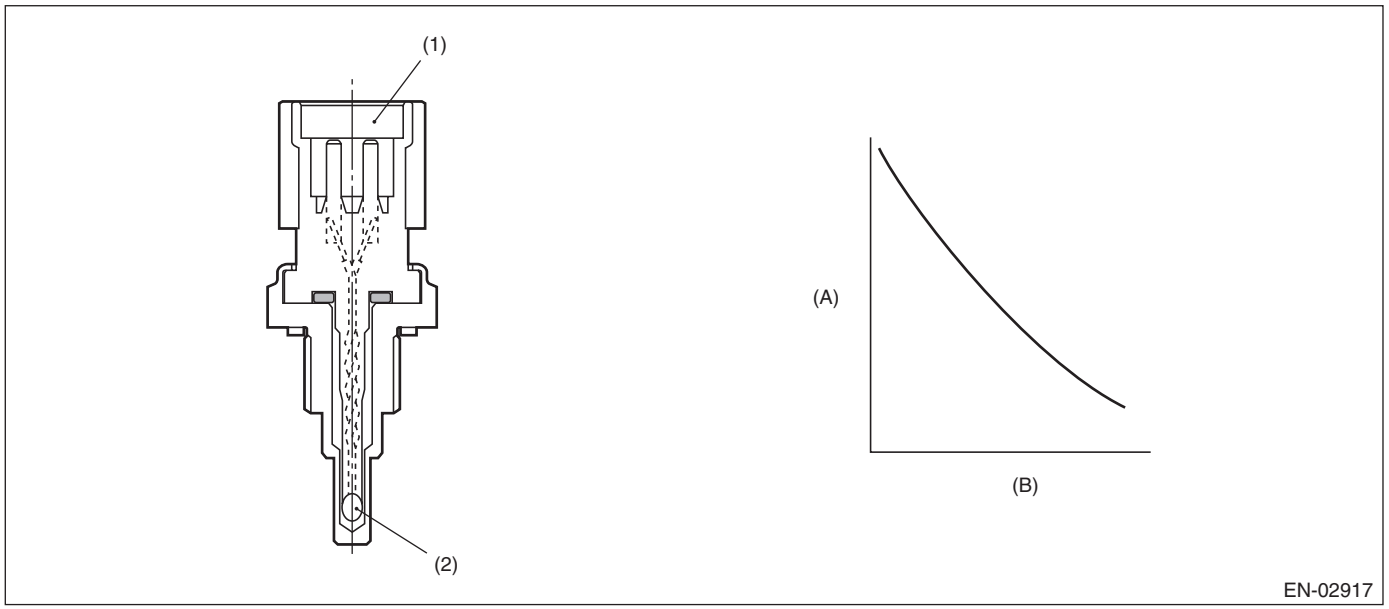
Time Needed for Diagnosis: 24 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AU:DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of engine coolant temperature sensor output property.
Judge as NG when the engine coolant temperature has not risen to the specific value after the predetermined time has passed since engine start.

2. COMPONENT DESCRIPTION



(A) Resistance value (kΩ)
(B) Temperature °C (°F)
(1) Connector
(2) Thermistor element

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Engine coolant temperature at engine starting	< –15 °C (5 °F)
Engine speed	> 500 rpm

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once after starting the engine in cold condition.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Engine coolant temperature	< –15 °C (5 °F)
Elapsed time after starting the engine	
(At the time of (The smaller value of either Engine coolant temperature or Intake air temperature at engine start) ≥ –23.3°C (–9.9°F))	≥ 120 s
or	
(At the time of (The smaller value of either Engine coolant temperature or Intake air temperature at engine start) < –23.3°C (–9.9°F))	≥ 300 s

Time Needed for Diagnosis: 120 s or 300 s
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

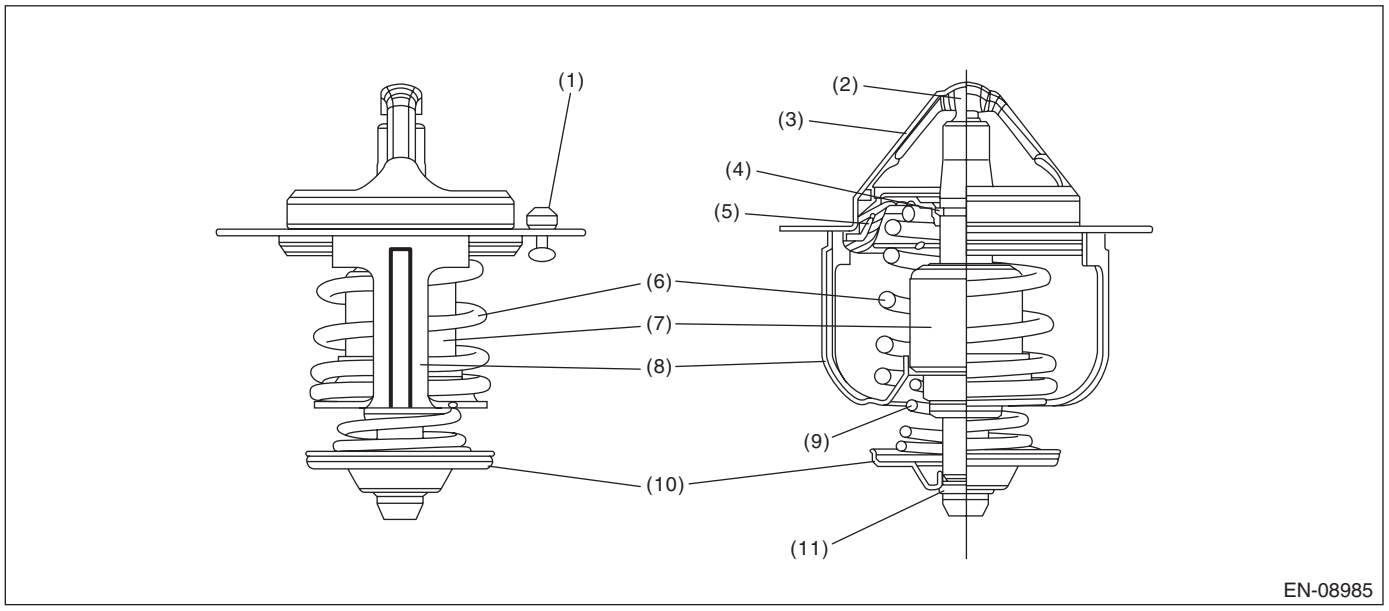
AV:DTC P0128 COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE)

1. OUTLINE OF DIAGNOSIS

Detect malfunctions of the thermostat function.
Judge as NG when any one of the following conditions is established.

- When the actual engine coolant temperature does not reach the maximum temperature necessary to perform other OBDII diagnosis and Σ (Estimated engine coolant temperature – actual engine coolant temperature) exceeded the predetermined value. (Judgment 1)
- When the actual engine coolant temperature does not reach the range within –11°C (–19.8°F) from the regulated temperature and Σ (Estimated engine coolant temperature – actual engine coolant temperature) exceeded the predetermined value. (Judgment 2)
- When the difference between the estimated coolant temperature and the actual engine coolant temperature exceeds the predetermined value, and Σ (Estimated engine coolant temperature – actual engine coolant temperature) exceeded the predetermined value. (Judgment 3)

2. COMPONENT DESCRIPTION



(1) Jiggle valve
(2) Piston
(3) Flange
(4) Stop ring
(5) Dust seal
(6) Main spring
(7) Wax element
(8) Frame
(9) Bypass spring
(10) Bypass valve
(11) Stop ring

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
<Judgment 1>	
Battery voltage	≥ 10.9 V
Estimate ambient temperature	≥ –7 °C (19.4 °F)
Vehicle speed	≥ 30 km/h (18.6 MPH)
Estimated coolant temperature	≥ Value of Map 1
Engine coolant temperature at engine starting	< 62 °C (143.6 °F)
<Judgment 2>	
Battery voltage	≥ 10.9 V
Estimate ambient temperature	≥ –7 °C (19.4 °F)
Vehicle speed	≥ 30 km/h (18.6 MPH)
Estimated coolant temperature	≥ Value from Map 2
Engine coolant temperature at engine starting	< 62 °C (143.6 °F)
<Judgment 3>	
Battery voltage	≥ 10.9 V
Estimate ambient temperature	≥ –7 °C (19.4 °F)
Vehicle speed	≥ 30 km/h (18.6 MPH)
Estimated coolant temperature	≥ Value from Map 3
Engine coolant temperature at engine starting	< 62 °C (143.6 °F)

Map 1

Engine coolant temperature at engine starting °C (°F)	-7 (19.4)	8 (46.4)	10 (50)	25 (77)
Estimated coolant temperature °C (°F)	60 (140)	60 (140)	60 (140)	60 (140)

Map 2

Engine coolant temperature at engine starting °C (°F)	-7 (19.4)	8 (46.4)	10 (50)	25 (77)
Estimated coolant temperature °C (°F)	70.2 (158.4)	80.2 (176.4)	80.2 (176.4)	80.2 (176.4)

Map 3

Engine coolant temperature at engine starting °C (°F)	-7 (19.4)	10 (50)	25 (77)	29 (84.2)
Estimated coolant temperature °C (°F)	59 (138.2)	70 (158)	78 (172.4)	80.2 (176.4)

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once after starting the engine.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
When any one of the followings is established:	
<Judgment 1>	
Actual engine coolant temperature and Σ (Estimated engine coolant temperature – actual engine coolant temperature)	< Value of Map 4 > Value of Map 5
<Judgment 2>	
Actual engine coolant temperature and Σ (Estimated engine coolant temperature – actual engine coolant temperature)	< Regulated temperature – Value of Map 6 > Value of Map 7
<Judgment 3>	
Estimated engine coolant temperature – actual engine coolant temperature and Σ (Estimated engine coolant temperature – actual engine coolant temperature)	> Value of Map 8 > Value of Map 9

Map 4

Estimate ambient temperature °C (°F)	-7 (19.4)	8 (46.4)	10 (50)	25 (77)
Threshold Value °C (°F)	60 (140)	60 (140)	60 (140)	60 (140)

Map 5

Engine coolant temperature at engine starting °C (°F)	-7 (19.4)	0 (32)	8 (46.4)	10 (50)	25 (77)	35 (95)
Threshold Value °C (°F)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1200 (2160)

Map 6

Estimate ambient temperature °C (°F)	-7 (19.4)	8 (46.4)	10 (50)	25 (77)
Threshold Value °C (°F)	21.1 (30.1)	11.1 (20)	11.1 (20)	11.1 (20)

Map 7

Engine coolant temperature at engine starting °C (°F)	-7 (19.4)	0 (32)	8 (46.4)	10 (50)	30 (86)	35 (95)
Threshold Value °C (°F)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1500 (2700)

Map 8

Estimate ambient temperature °C (°F)	-7 (19.4)	8 (46.4)	10 (50)	25 (77)
Threshold Value °C (°F)	11.1 (20)	11.1 (20)	11.1 (20)	11.1 (20)

Map 9

Engine coolant temperature at engine starting °C (°F)	-7 (19.4)	8 (46.4)	10 (50)	25 (77)
Threshold Value °C (°F)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)

Time Needed for Diagnosis: 300 — 700 seconds

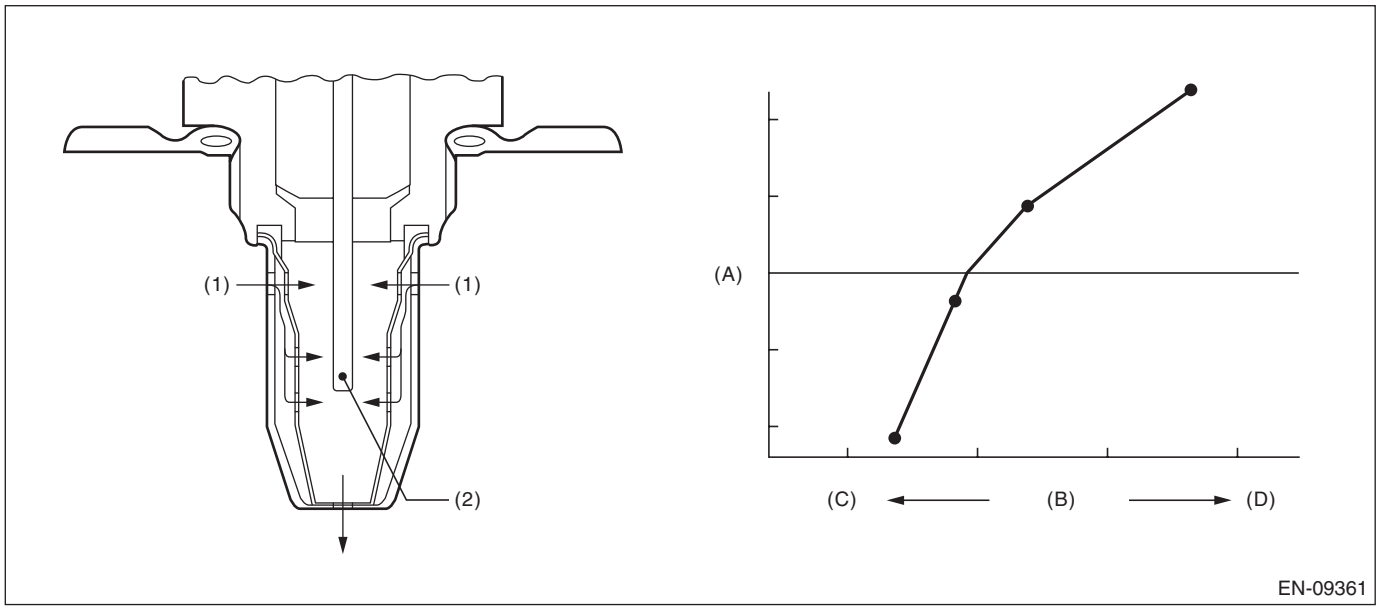
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

AW:DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of sensor.
Judge as NG, when the element voltage is out of the specified range.

2. COMPONENT DESCRIPTION



(A) Electromotive force (B) Air fuel ratio (C) Rich
(D) Lean

(1) Exhaust gas (2) ZrO_2

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
(1) Input voltage (+) or (2) Input voltage (–) or (3) |Input voltage (+) – Input voltage (–)| and 3.8 V < Input voltage (–) < 4.7 V	< 0.4 V < 0.4 V < 0.1 V

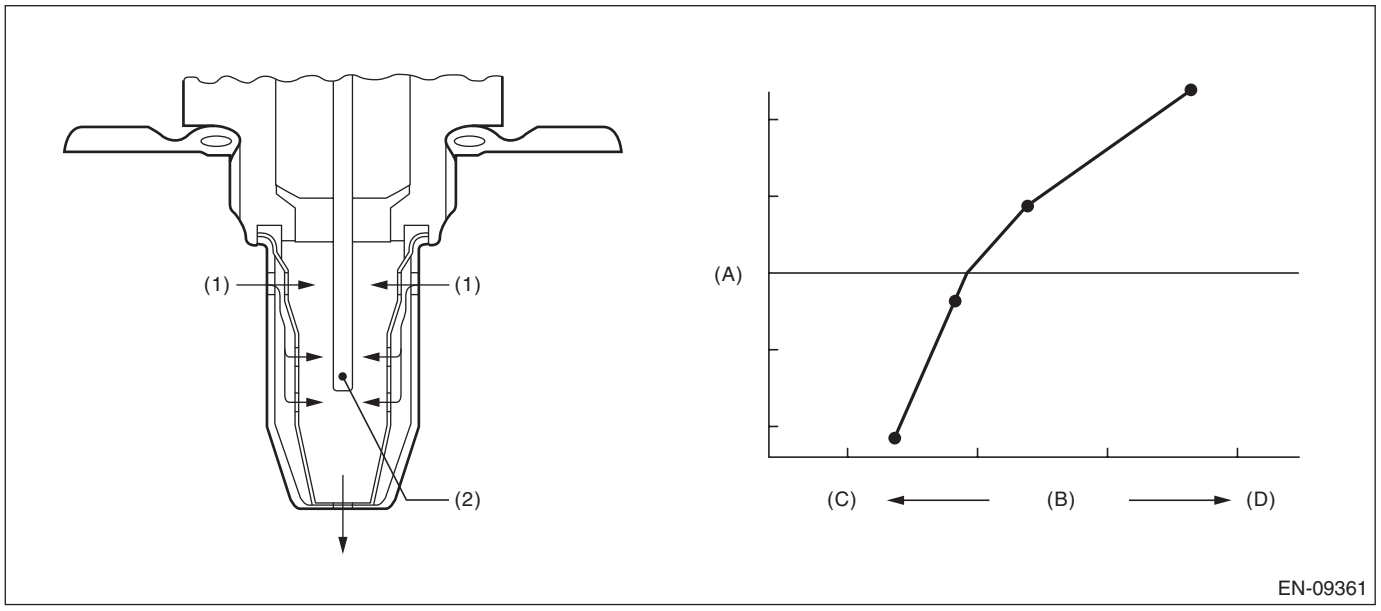
Time Needed for Diagnosis:
(1): 1000 ms
(2): 1000 ms
(3): 1000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AX:DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of sensor.
Judge as NG, when the element voltage is out of the specified range.

2. COMPONENT DESCRIPTION



(A) Electromotive force (B) Air fuel ratio (C) Rich
(D) Lean

(1) Exhaust gas (2) ZrO_2

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
(1) Input voltage (+) or (2) Input voltage (–)	> 4.7 V > 4.7 V

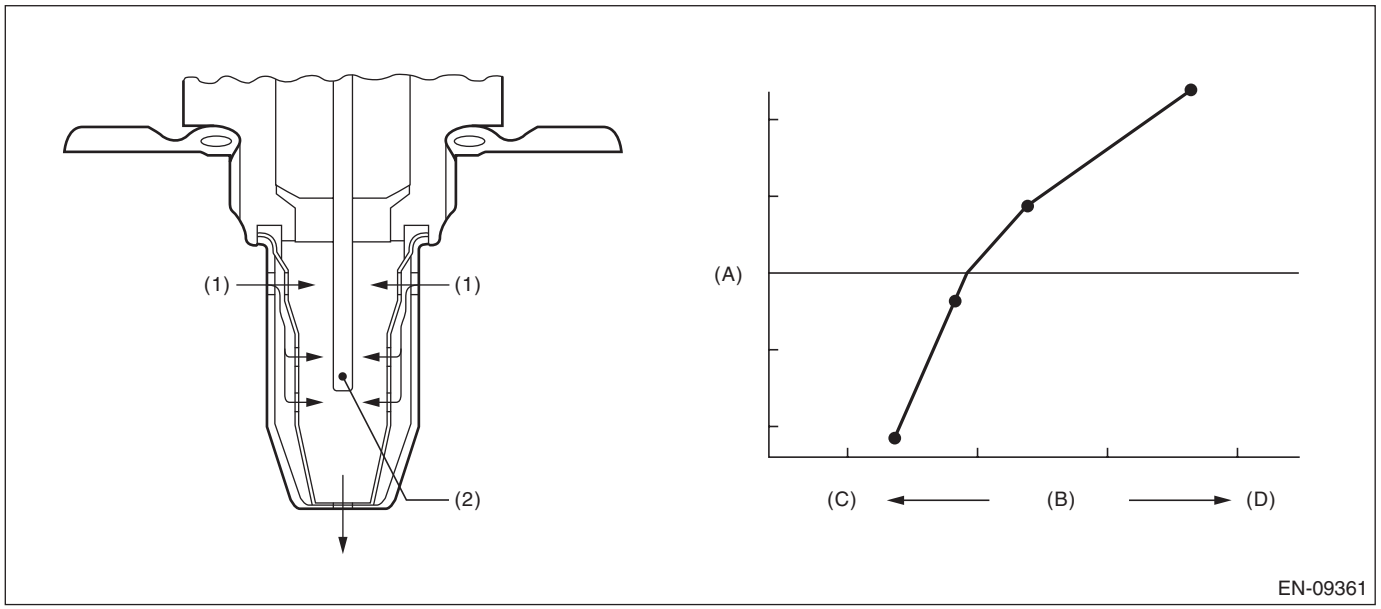
Time Needed for Diagnosis:
(1): 1000 ms
(2): 1000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AY:DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

Detect open circuits of the sensor.
Judge as NG when the impedance of the element is large.

2. COMPONENT DESCRIPTION



(A) Electromotive force (B) Air fuel ratio (C) Rich
(D) Lean

(1) Exhaust gas (2) ZrO_2

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Time of heater control duty at 70 % or more	≥ 36000 ms

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Front oxygen (A/F) sensor impedance	> 450 Ω

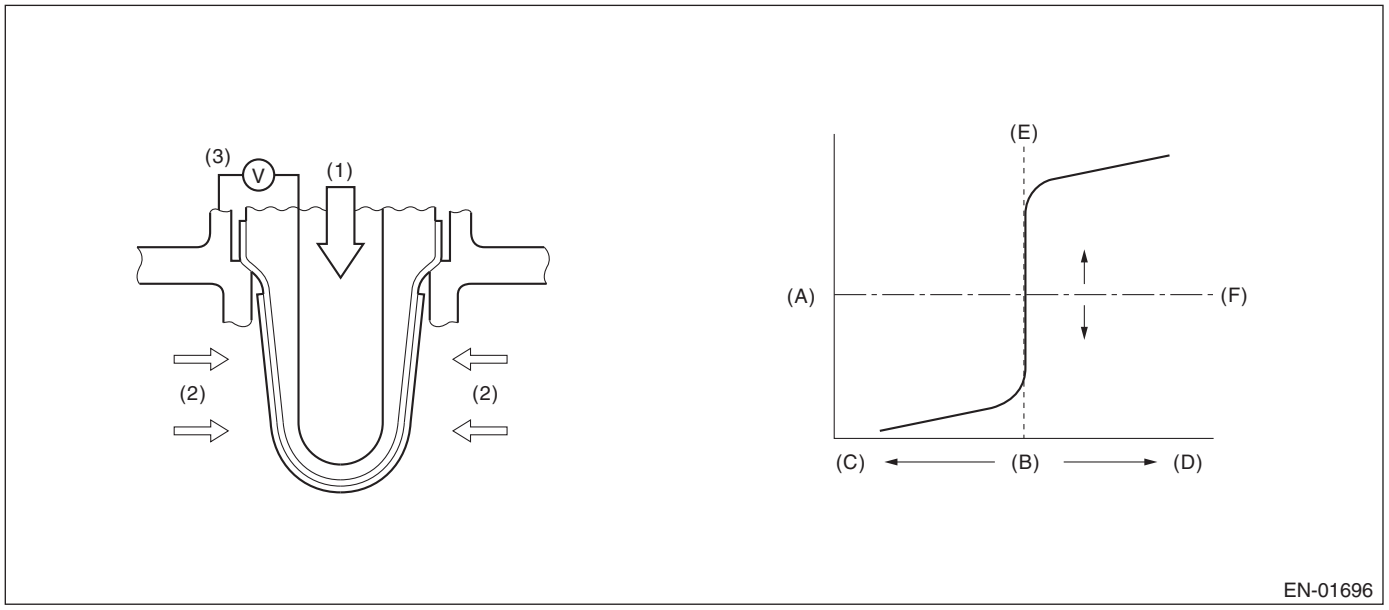
Time Needed for Diagnosis: 5000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

AZ:DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

Detect continuity NG of the oxygen sensor. If the oxygen sensor voltage reading is not within the probable range considering the operating conditions, judge as NG.

2. COMPONENT DESCRIPTION



(A)	Electromotive force	(B)	Air fuel ratio	(C)	Lean
(D)	Rich	(E)	Theoretical air fuel ratio	(F)	Comparative voltage
(1)	Atmosphere	(2)	Exhaust gas	(3)	Electromotive force

3. ENABLE CONDITION

Used for judgment

Secondary Parameters	Enable Conditions
High	
Battery voltage	≥ 10.9 V
Low (1)	
Closed loop control at the oxygen sensor	In operation
Battery voltage	≥ 10.9 V
Amount of intake air	≥ 10 g/s (0.35 oz/s)
Low (2)	
Closed loop control at the oxygen sensor	In operation
Battery voltage	≥ 10.9 V
Amount of intake air	< 10 g/s (0.35 oz/s)

4. GENERAL DRIVING CYCLE

After starting the engine, continuously perform the diagnosis with the same engine condition.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

JUDGMENT VALUE

Malfunction Criteria	Threshold Value	DTC
High Sensor output voltage	> 1.2 V	P0138
Low Sensor output voltage	< 0.03 V	P0137

Time Needed for Diagnosis:
High: 2500 ms
Low (1): 20000 ms
Low (2): 40000 ms

Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

BA:DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

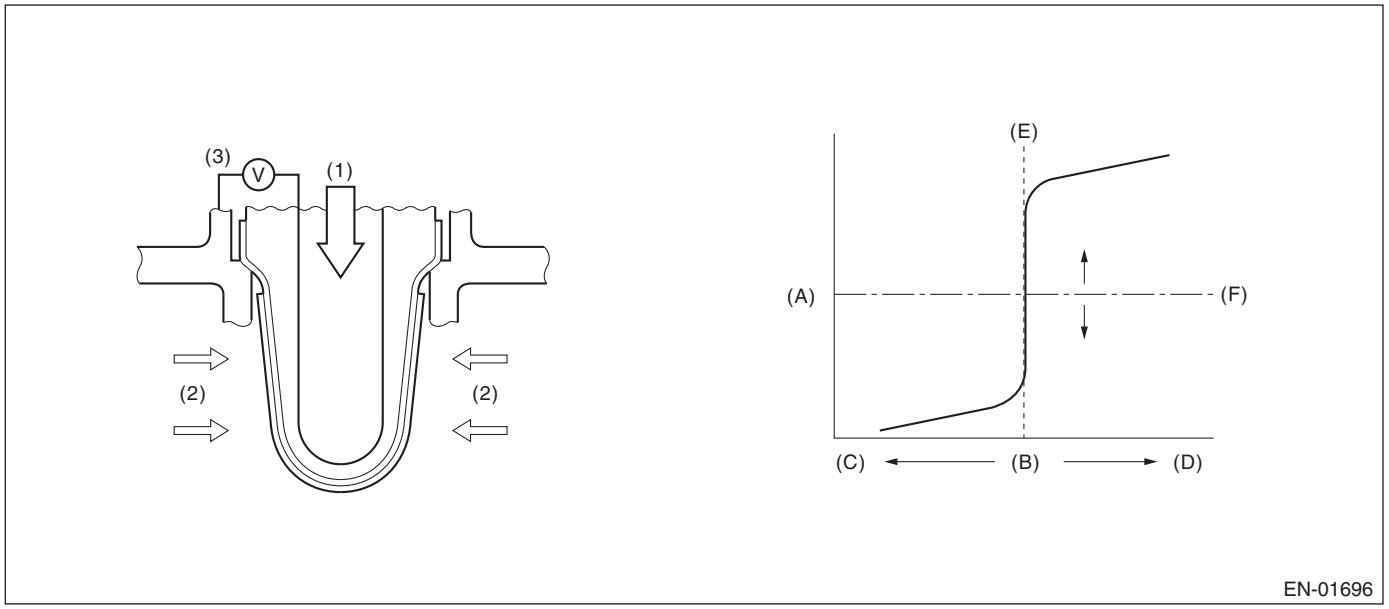
NOTE:
For the detection standard, refer to DTC P0137. <Ref. to GD(H4DO HEV)-57, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

BB:DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

Detect the slow response of rich → lean for rear oxygen sensor output.
When the deceleration fuel cut has occurred, detect the trouble by calculating the time when the rear oxygen sensor output passes through the predetermined range of voltages.
Judge as NG when the response time is larger than the threshold value.

2. COMPONENT DESCRIPTION



(A)	Electromotive force	(B)	Air fuel ratio	(C)	Lean
(D)	Rich	(E)	Theoretical air fuel ratio	(F)	Comparative voltage
(1)	Atmosphere	(2)	Exhaust gas	(3)	Electromotive force

3. ENABLE CONDITIONS

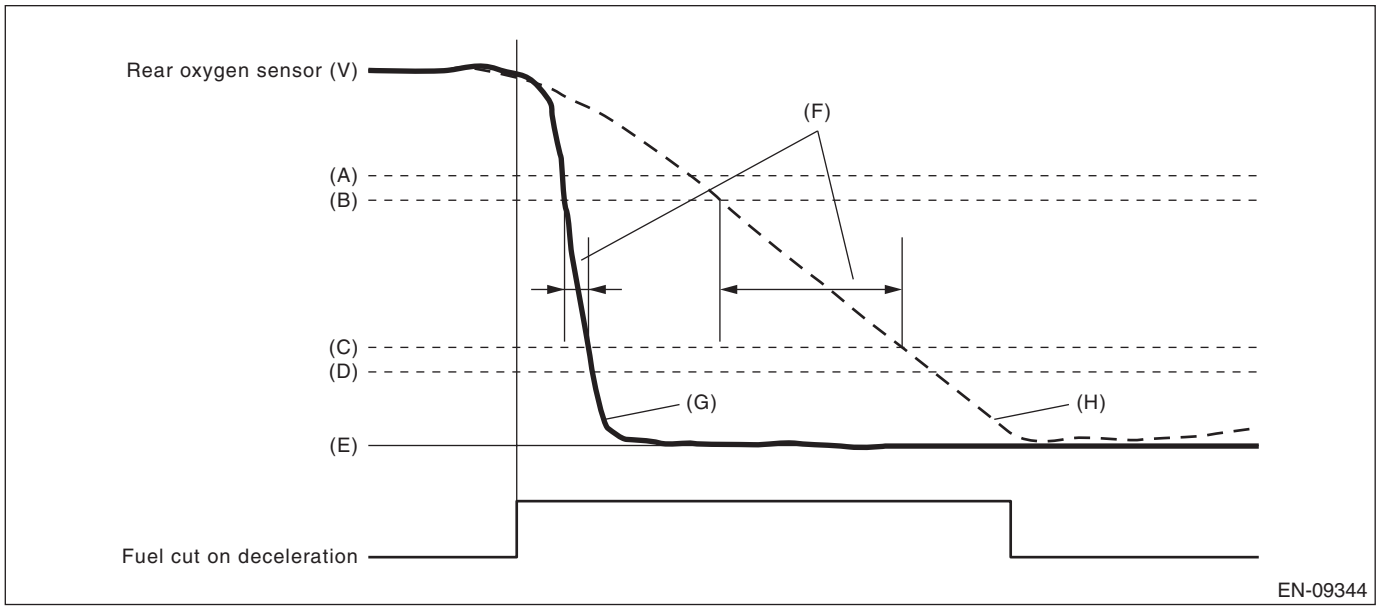
Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
Current calculation time of the rear oxygen sensor heater after starting	≥ 180000 ms
Engine speed when fuel cut starts	≥ 1000 rpm
Rear oxygen sensor voltage when fuel cut starts	≥ 0.55 V
Fuel cut time	≥ 5000 ms
Engine coolant temperature when fuel cut starts	≥ –40 °C (–40 °F)
Estimated temperature of rear oxygen sensor element when fuel cut starts	≥ 500 °C (932 °F)

4. GENERAL DRIVING CYCLE

Perform diagnosis once during deceleration fuel cut from a constant and high speed driving, when rear oxygen sensor is warmed up sufficiently.

5. DIAGNOSTIC METHOD

Detect the trouble by calculating the response time of the rear oxygen sensor during fuel cut.



(A) 0.55 V
(B) 0.50 V
(C) 0.20 V
(D) 0.15 V
(E) 0 V
(F) Diagnostic parameter
(G) Normal
(H) Malfunction

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Time when rear oxygen sensor voltage changed from 0.5 V to 0.2 V	> 491 ms

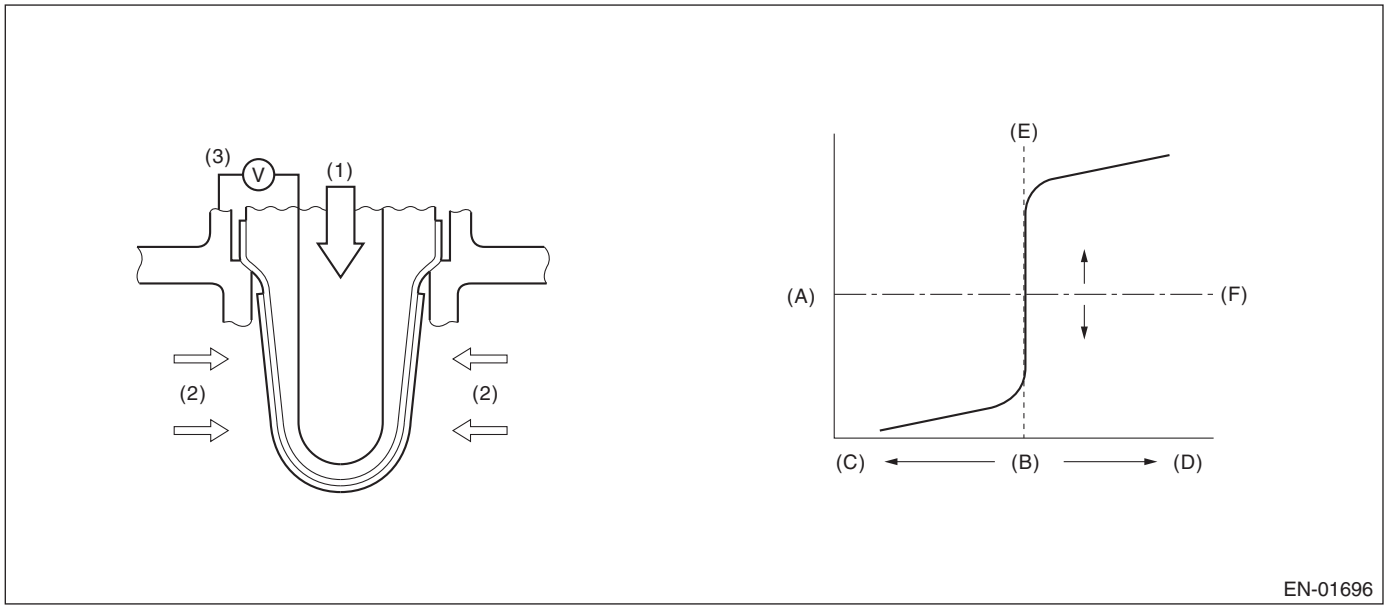
Time Needed for Diagnosis: 491 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

BC:DTC P013B O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

Detect the slow response of lean → rich for rear oxygen sensor output.
After the deceleration fuel cut has occurred, detect the trouble by calculating the time when the rear oxygen sensor output passes through the predetermined range of voltages.
Judge as NG when the response time is larger than the threshold value.

2. COMPONENT DESCRIPTION



(A)	Electromotive force	(B)	Air fuel ratio	(C)	Lean
(D)	Rich	(E)	Theoretical air fuel ratio	(F)	Comparative voltage
(1)	Atmosphere	(2)	Exhaust gas	(3)	Electromotive force

3. ENABLE CONDITIONS

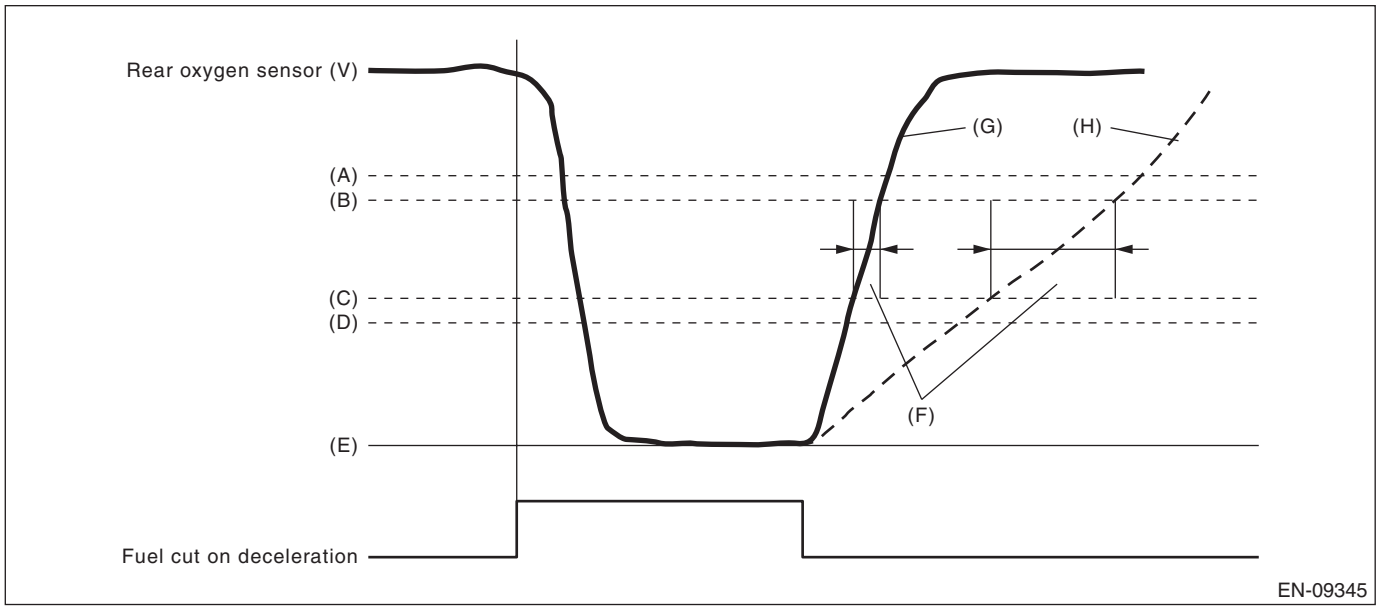
Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
Front oxygen (A/F) sensor closed loop control	Operation
Fuel cut time	≥ 5000 ms

4. GENERAL DRIVING CYCLE

Perform diagnosis only once after recovering from a deceleration fuel cut continued for more than predetermined time.

5. DIAGNOSTIC METHOD

Detect the trouble by calculating the response time of the rear oxygen sensor after fuel cut.



(A) 0.55 V
(B) 0.50 V
(C) 0.30 V
(D) 0.25 V
(E) 0 V
(F) Diagnostic parameter
(G) Normal
(H) Malfunction

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Time when rear oxygen sensor voltage changed from 0.3 V to 0.5 V	> 4000 ms

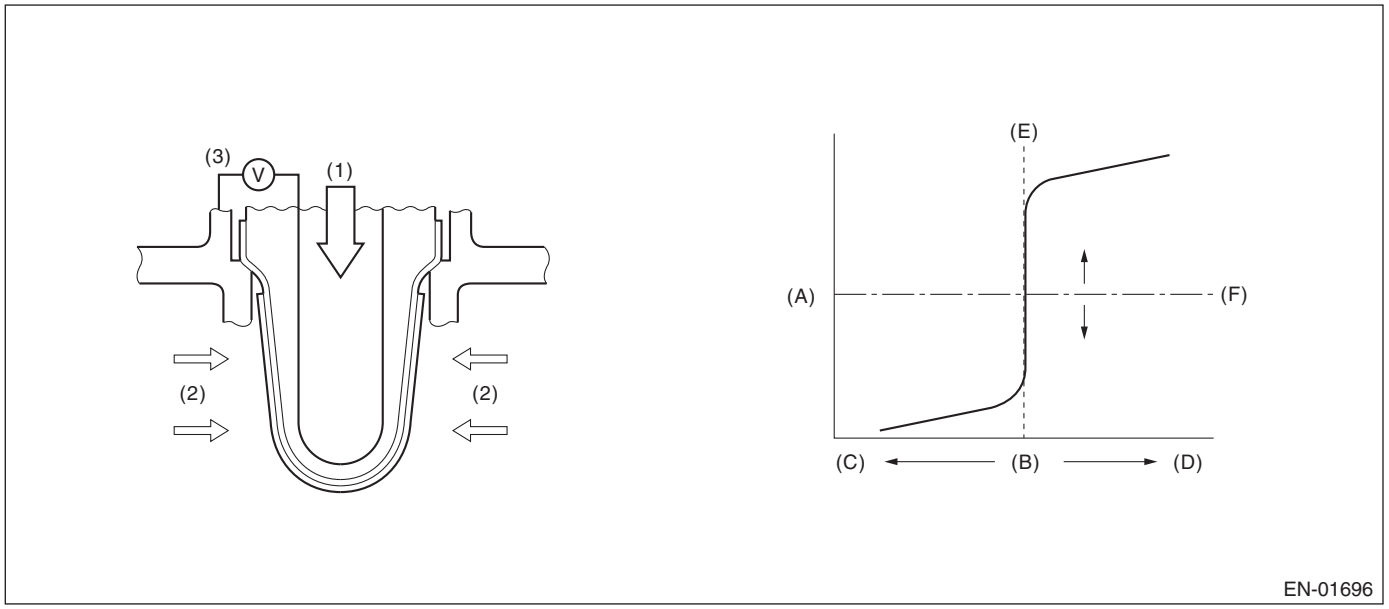
Time Needed for Diagnosis: 4000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

BD:DTC P013E O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

Detect the delayed response of rear oxygen sensor output for rich → lean.
After the deceleration fuel cut has started, detect the trouble by calculating the time when the rear oxygen sensor output decreases to the predetermined voltages.
Judge as NG when the response time is larger than the threshold value.

2. COMPONENT DESCRIPTION



(A)	Electromotive force	(B)	Air fuel ratio	(C)	Lean
(D)	Rich	(E)	Theoretical air fuel ratio	(F)	Comparative voltage
(1)	Atmosphere	(2)	Exhaust gas	(3)	Electromotive force

3. ENABLE CONDITIONS

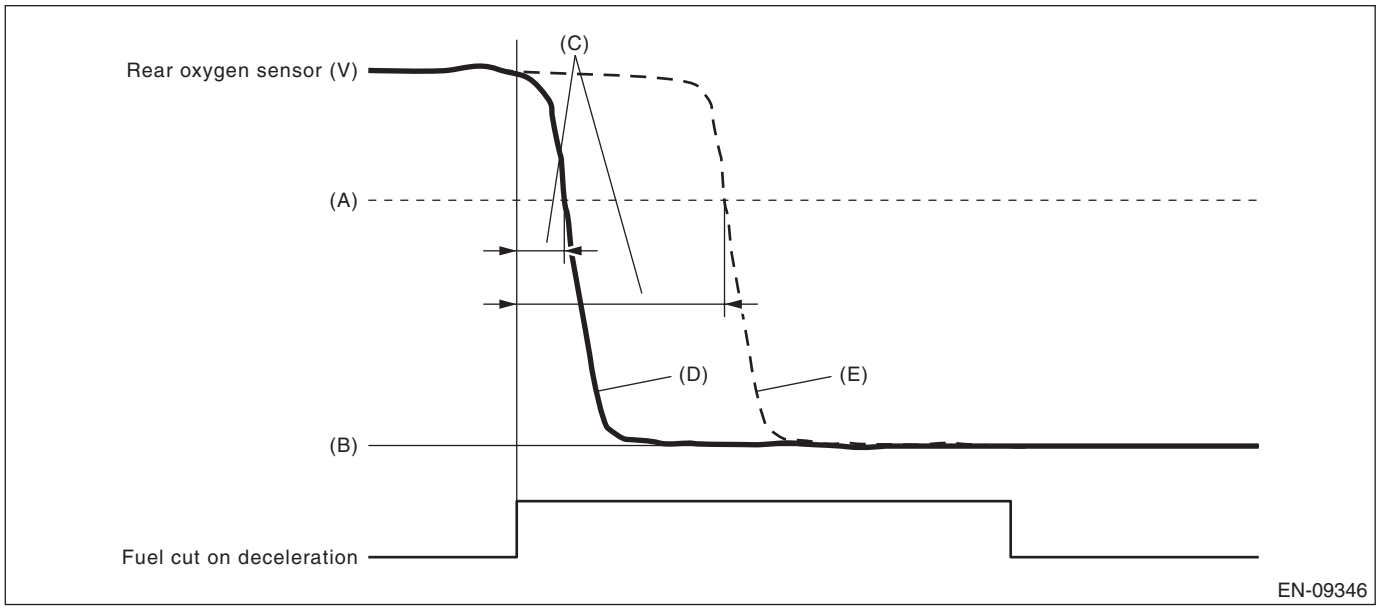
Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
Engine speed when fuel cut starts	≥ 1000 rpm
Rear oxygen sensor voltage when fuel cut starts	≥ 0.55 V
Fuel cut time	≥ 5000 ms
Engine coolant temperature when fuel cut starts	≥ –40 °C (–40 °F)
Estimated temperature of rear oxygen sensor element when fuel cut starts	≥ 500 °C (932 °F)

4. GENERAL DRIVING CYCLE

Perform diagnosis once during deceleration fuel cut from a constant and high speed driving, when rear oxygen sensor is warmed up sufficiently.

5. DIAGNOSTIC METHOD

Detect the trouble by calculating the time from the beginning of the fuel cut to the beginning of the rear oxygen sensor voltage starting to drop.



(A) 0.5 V
(B) 0 V
(C) Diagnostic parameter
(D) Normal
(E) Malfunction

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Time when rear oxygen sensor voltage changed to 0.5 V after the fuel cut started	> 4000 ms

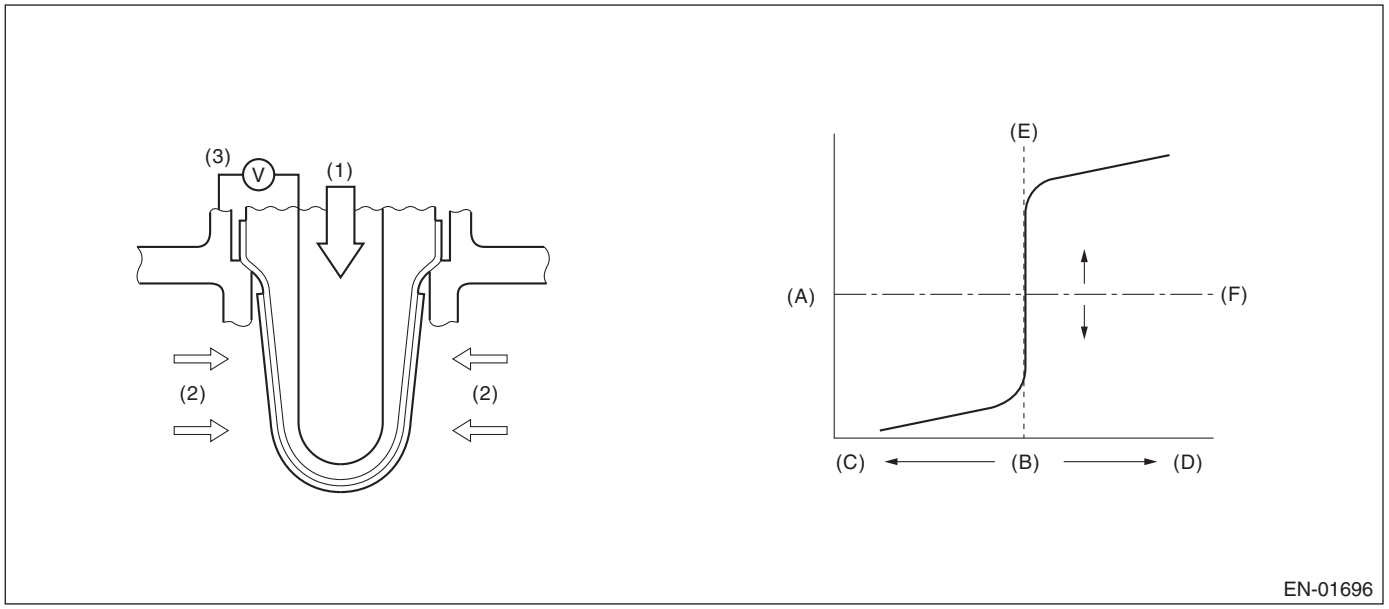
Time Needed for Diagnosis: 4000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

BE:DTC P013F O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

Detect the delayed response of rear oxygen sensor output for lean → rich.
After the deceleration fuel cut has completed, detect the trouble by calculating the time when the rear oxygen sensor output increases to the predetermined voltages.
Judge as NG when the response time is larger than the threshold value.

2. COMPONENT DESCRIPTION



(A)	Electromotive force	(B)	Air fuel ratio	(C)	Lean
(D)	Rich	(E)	Theoretical air fuel ratio	(F)	Comparative voltage
(1)	Atmosphere	(2)	Exhaust gas	(3)	Electromotive force

3. ENABLE CONDITIONS

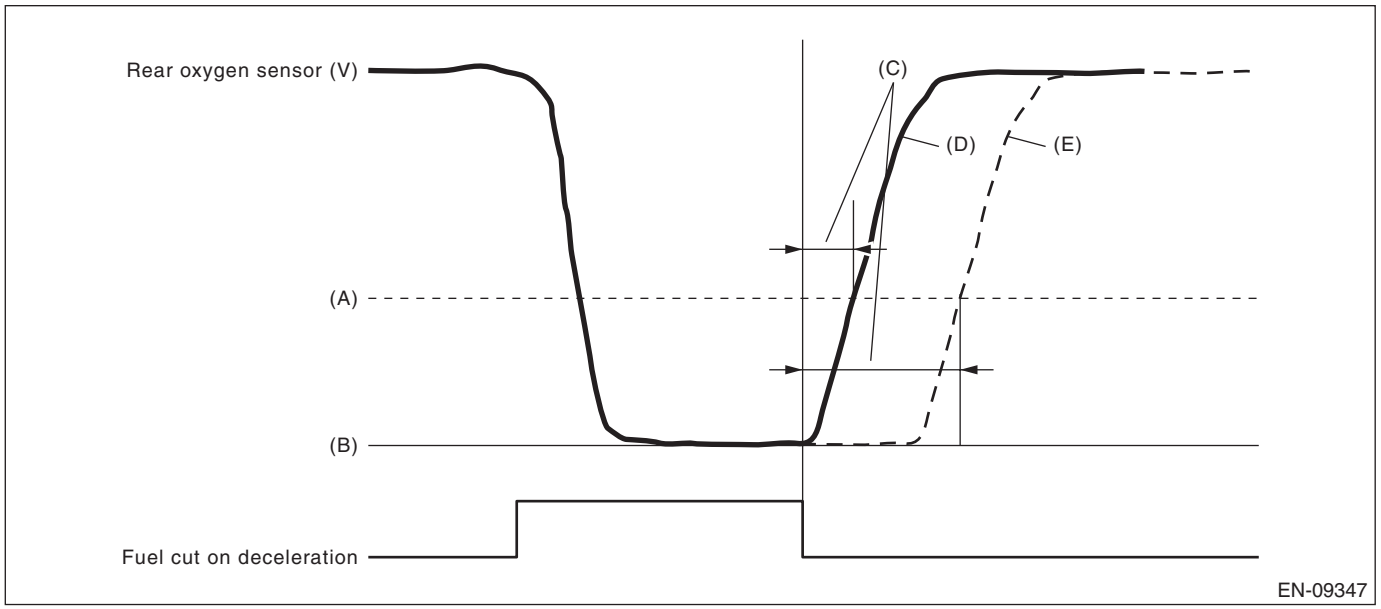
Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
Front oxygen (A/F) sensor closed loop control	Operation
Engine speed	≥ 500 rpm
Rear oxygen sensor voltage when fuel cut has completed	< 0.15 V
Fuel cut time	≥ 5000 ms
Engine coolant temperature when fuel cut has completed	≥ –40 °C (–40 °F)
Estimated element temperature of rear oxygen sensor when fuel cut has completed	≥ 500 °C (932 °F)

4. GENERAL DRIVING CYCLE

Perform diagnosis only once when recovering from the deceleration fuel cut continued for more than predetermined time with the rear oxygen sensor warmed up sufficiently.

5. DIAGNOSTIC METHOD

Detect the trouble by calculating the time from the completion of the fuel cut to the beginning of the rear oxygen sensor voltage starting to rise.



(A) 0.3 V
(B) 0 V
(C) Diagnostic parameter
(D) Normal
(E) Malfunction

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
The number of times that the rear oxygen sensor voltage changed to 0.3 V after the fuel cut has completed (time counter)	> 3750 time(s)

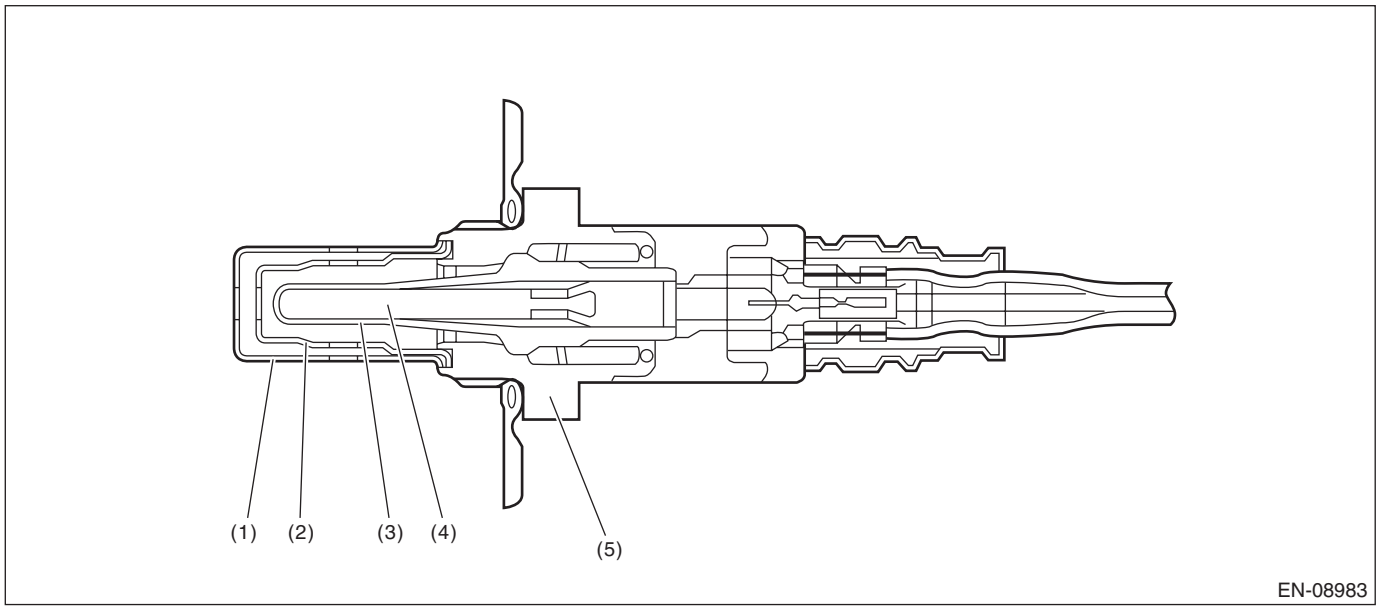
Time Needed for Diagnosis: 32 ms × 3750 time(s)
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

BF:DTC P0141 O2 SENSOR HEATER CIRCUIT (BANK1 SENSOR2)

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of rear oxygen sensor heater.
While observing the engine condition, judge as NG if the rear oxygen sensor impedance is great.

2. COMPONENT DESCRIPTION



(1) Element cover (outer)
(2) Element cover (inner)
(3) Sensor element
(4) Ceramic heater
(5) Sensor housing

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Elapsed time after starting the engine	≥ 1000 ms
A/F sensor element impedance	≤ 82 Ω
A/F sensor heater control duty	≤ 75 %
Rear oxygen sensor heater control duty	< 70 %

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after 1000 ms or more have passed since the engine started.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< Battery voltage × 0.88

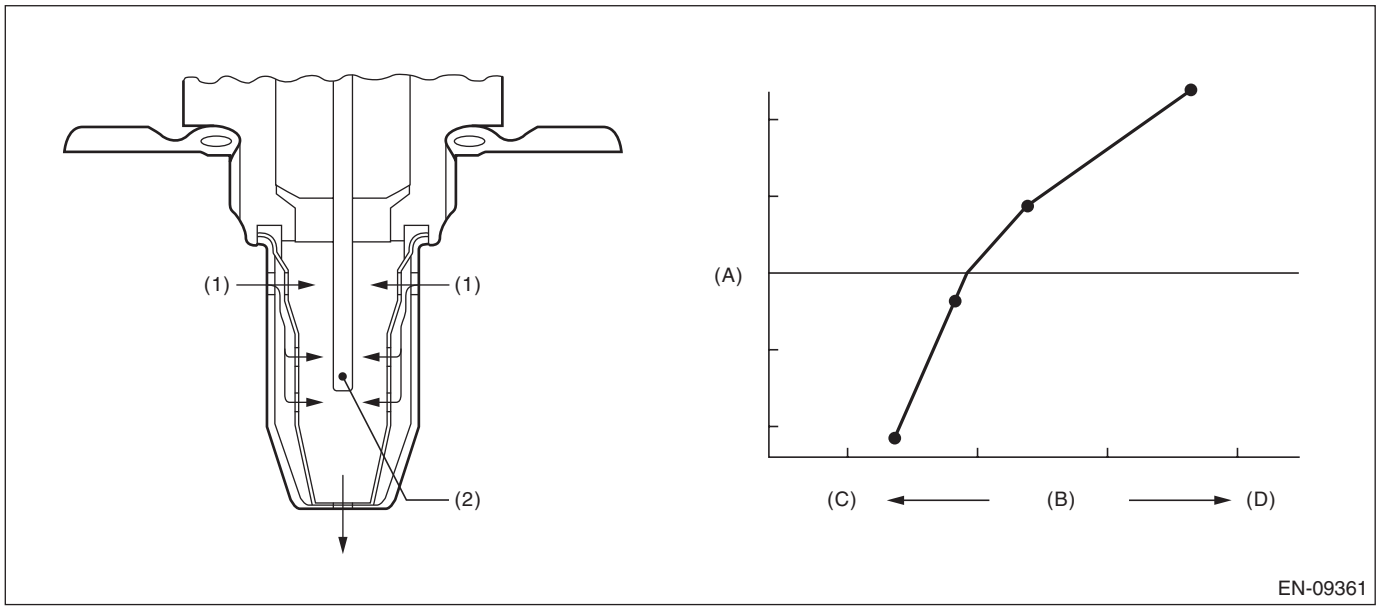
Time Needed for Diagnosis: 4 ms × 2500 time(s)
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

BG:DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

Detect the slow response of front oxygen (A/F) sensor.
For diagnosis, detect the trouble by processing the λ waveform in normal driving without forcibly changing the target air fuel ratio.

2. COMPONENT DESCRIPTION



(A) Electromotive force (B) Air fuel ratio (C) Rich
(D) Lean

(1) Exhaust gas (2) ZrO_2

3. ENABLE CONDITIONS

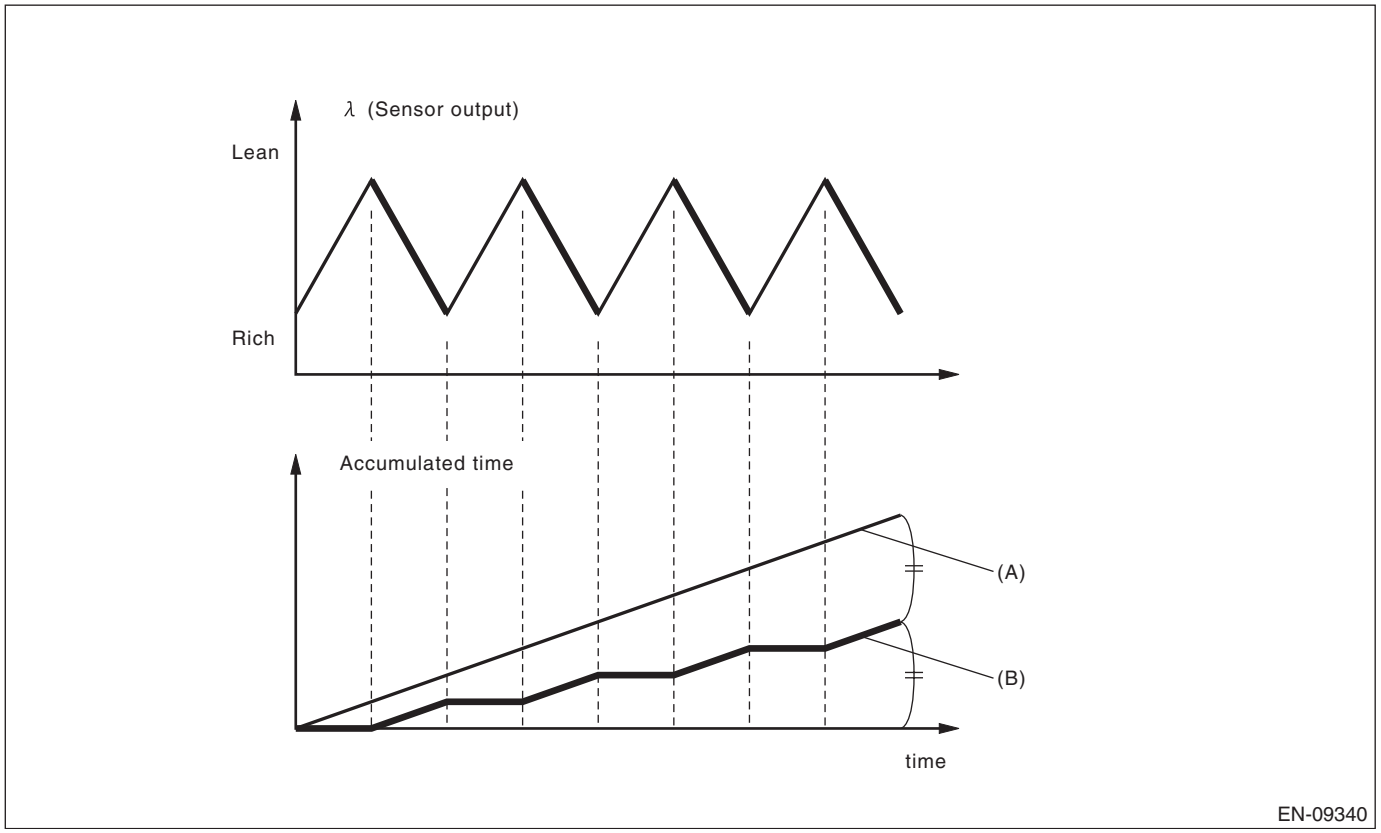
Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
Closed loop control with main feedback	Operation
Engine speed	≥ 1000 rpm
Amount of intake air	≥ 10 g/s (0.35 oz/s)
Elapsed time after returning from the fuel cut	≥ 3000 ms
Accelerator pedal position	≠ 0%

4. GENERAL DRIVING CYCLE

Perform diagnosis only once in a city driving including normal acceleration and deceleration.

5. DIAGNOSTIC METHOD 1

Detect the malfunction by checking “Cumulative value of time when λ changes from lean → rich” in comparison to “Time during which diagnosis is in progress”.



(A) Time during which diagnosis is in progress

(B) Cumulative value of time when λ changes from lean → rich

Judge as NG when the following conditions are established.

Judgment Value

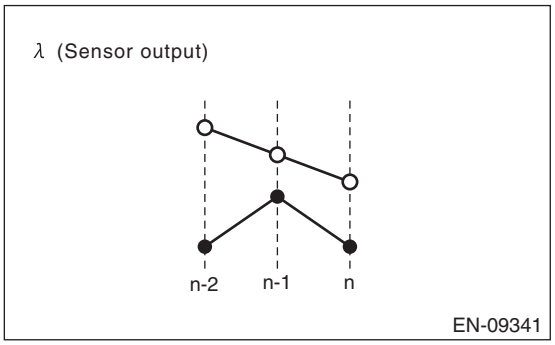
Malfunction Criteria	Threshold Value	DTC
(Cumulative value of time when λ changes from lean → rich) / (Time during which diagnosis is in progress)	< 0.39	P014C
	> 0.61	P014D

Time Needed for Diagnosis: 90 seconds

Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

6. DIAGNOSTIC METHOD 2

Detect the malfunction by the cumulative value obtained from the amount of variation in λ change.



Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
Cumulative value obtained from the amount of variation in λ change Σ |(lambda(n) – lambda(n-1)) – (lambda(n-1) – lambda(n-2))|	< Value from Map	P014C and P014D

Map

Cumulative value obtained from the amount of variation in λ Σ |lambda(n) – lambda(n-1)|	0.00	3.50
Cumulative value obtained from the amount of variation in λ change	0.00	3.50

Time Needed for Diagnosis: 90 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

BH:DTC P014D O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

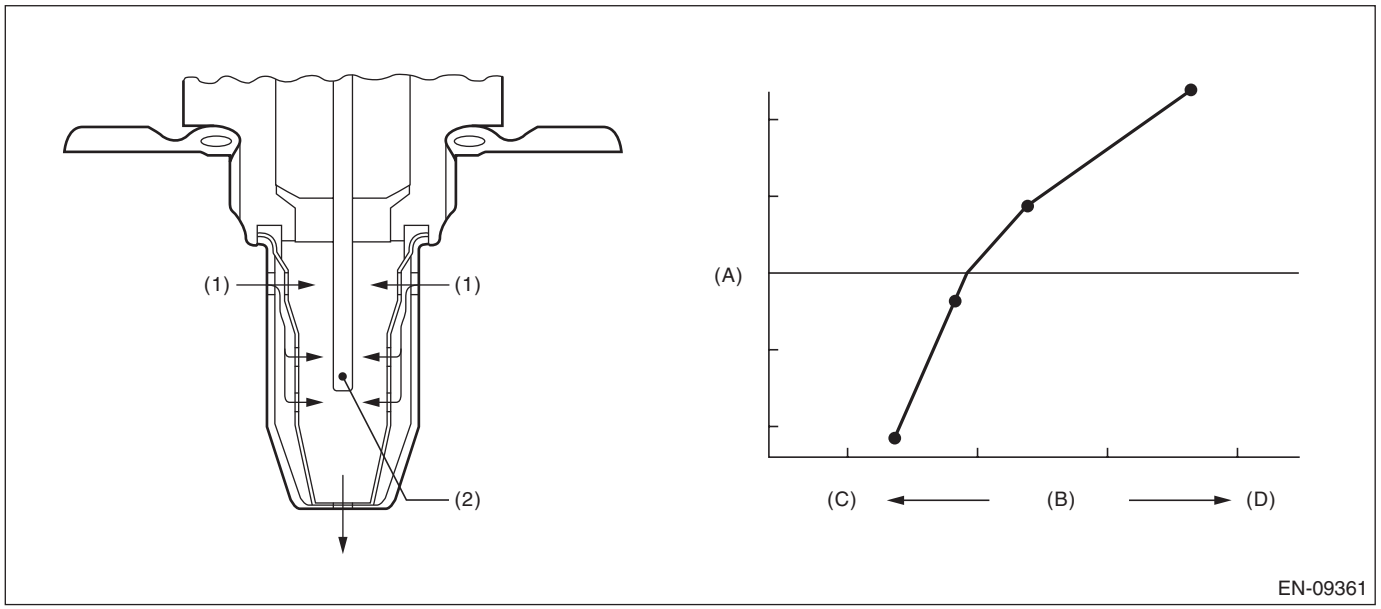
NOTE:
For the detection standard, refer to DTC P014C. <Ref. to GD(H4DO HEV)-68, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

BI: DTC P015A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

Detect the slow response of front oxygen (A/F) sensor.
For diagnosis, detect the trouble by processing the λ waveform in normal driving without forcibly changing the target air fuel ratio.

2. COMPONENT DESCRIPTION



(A) Electromotive force (B) Air fuel ratio (C) Rich
(D) Lean

(1) Exhaust gas (2) ZrO_2

3. ENABLE CONDITIONS

Diagnostic method 1 and 2

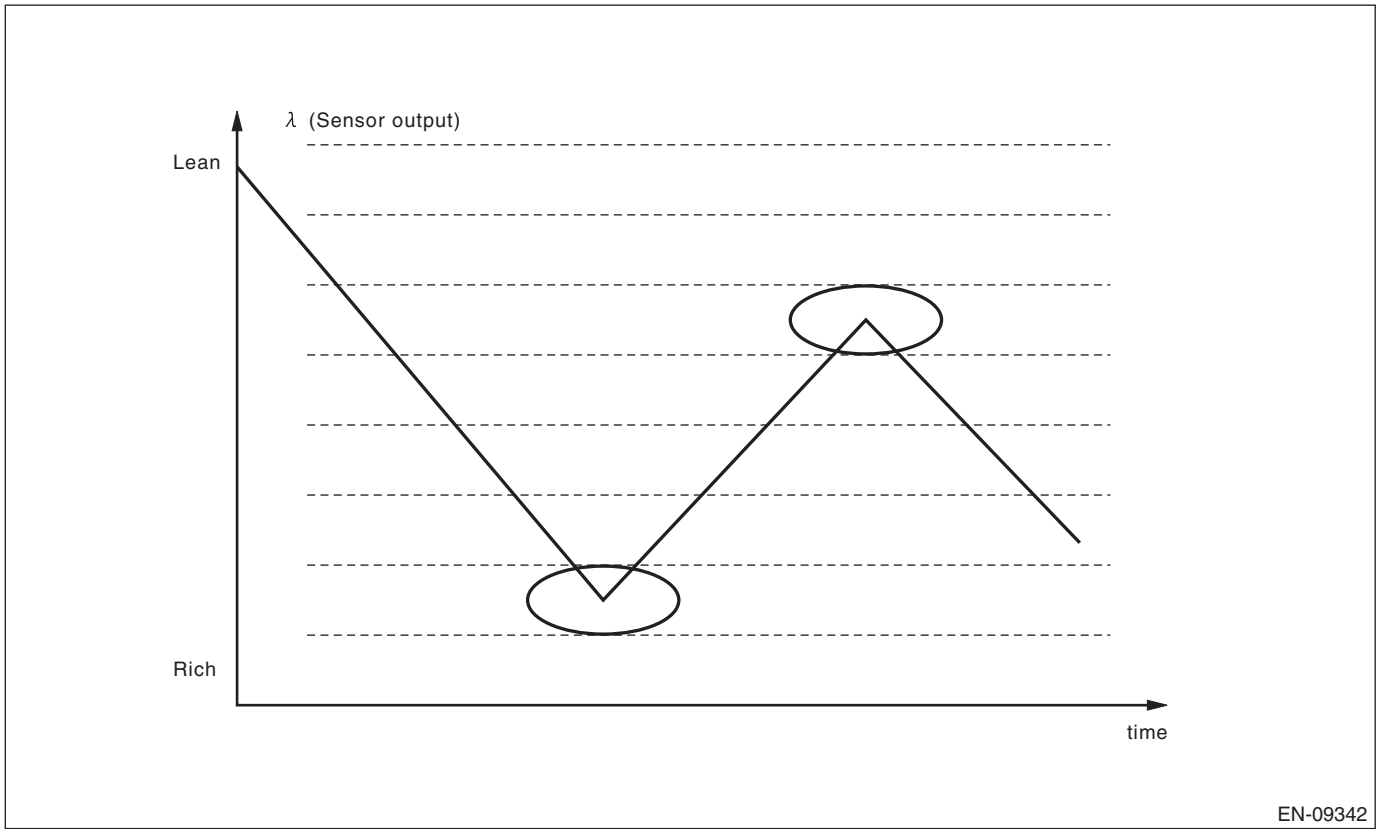
Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
Closed loop control with main feedback	Operation
Engine speed	≥ 1000 rpm
Amount of intake air	≥ 10 g/s (0.35 oz/s)
Elapsed time after returning from the fuel cut	≥ 3000 ms
Accelerator pedal position	≠ 0%

4. GENERAL DRIVING CYCLE

Perform diagnosis only once in a city driving including normal acceleration and deceleration.

5. DIAGNOSTIC METHOD 1

Detect the malfunction depending on the average value of time necessary for λ to inverse the air fuel ratio from “Lean → Rich → Lean” to “Rich → Lean → Rich”.



Judge as NG when the following conditions are established.

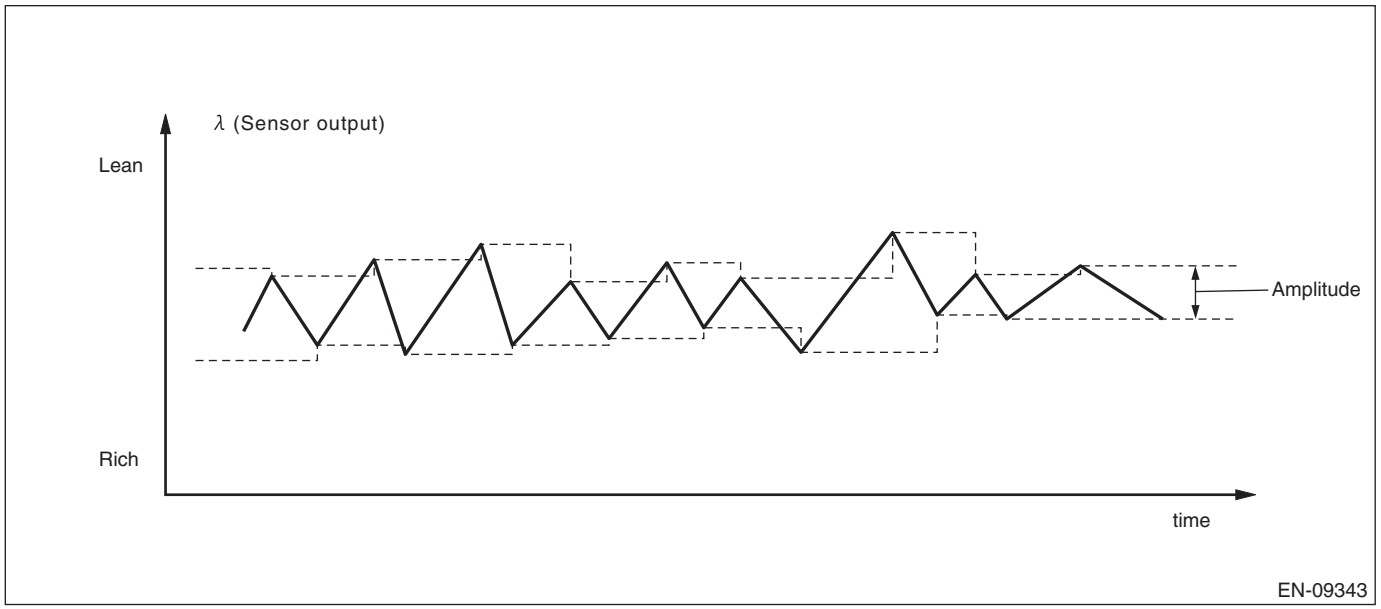
Judgment Value

Malfunction Criteria	Threshold Value	DTC
Average value of time necessary for λ to inverse the air fuel ratio to Lean → Rich → Lean	> 150 ms	P015A
Average value of time necessary for λ to inverse the air fuel ratio to Rich → Lean → Rich	> 300 ms	P015B

Time Needed for Diagnosis: 50 times of inversion
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

6. DIAGNOSTIC METHOD 2

Detect the malfunction by calculating the average amplitude of λ.



Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
Average value for λ amplitude	> 0.06	P015A and P015B

Time Needed for Diagnosis: 11250 time(s) × 8 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

BJ:DTC P015B O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P015A. <Ref. to GD(H4DO HEV)-71, DTC P015A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

BK:DTC P0171 SYSTEM TOO LEAN (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect fuel system malfunction by the amount of main feedback control.

DIAGNOSTIC METHOD

Fuel system is diagnosed by comparing the target air fuel ratio calculated by ECM with the actual air fuel ratio measured by sensor.

2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
A/F main feedback function	In operation
Engine coolant temperature	≥ –40 °C (–40 °F)
Engine load change	< 1 g/rev (0.04 oz/rev)
Engine load	≥ Value of Map 1

Map 1

Engine speed (rpm)	Idling	600	1000	1500	2000	2500	3000	3500	4000	4500
Measured value (g (oz)/rev)	na	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously at idling or at a constant speed after warming up the engine.

4. DIAGNOSTIC METHOD

Compare the diagnostic value (fsobd) with the threshold value, and if a condition meeting the malfunction criteria below continues for 10 s × 3 time(s) or more, judge that there is a fault in the fuel system.

Judgment Value

Malfunction Criteria	Threshold Value
fsobd = (sglmd – tglmda) + faf + flaf In this case: sglmd = measured lambda tglmda = target lambda faf = main feedback compensation coefficient (every 64 milliseconds) flaf = main feedback learning compensation coefficient	≥ Value from Map 2

Map 2

Amount of air (g (oz)/s)	0 (0)	3.2 (0.11)	6.4 (0.23)	9.6 (0.34)	12.8 (0.45)	16 (0.56)	19.2 (0.68)
fsobdL1 (%)	1.33	1.33	1.33	1.33	1.33	1.33	1.33

Time Needed for Diagnosis: 10 s × 3 time(s)
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

BL:DTC P0172 SYSTEM TOO RICH (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect fuel system malfunction by the amount of main feedback control.

2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
A/F main learning system	In operation

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously during the closed loop.

4. DIAGNOSTIC METHOD

Compare the diagnostic value (fsobd) with the threshold value, and if a condition meeting the malfunction criteria listed below continues for 10 s × 3 time(s) or more, judge that there is a fault in the fuel system.

Judgment Value

Malfunction Criteria	Threshold Value
fsobd = (sglmd – tglmda) + faf + flaf In this case: sglmd = measured lambda tglmda = target lambda faf = main feedback compensation coefficient (every 64 milliseconds) flaf = main feedback learning compensation coefficient	< Value from Map

Map

Compensation coefficient of warm-up increase amount	0	0.1	0.2	0.3
Threshold Value	0.67	0.576	0.502	0.436

Compensation coefficient of warm-up increase amount	0.4	0.5
Threshold Value	0.382	0.333

Time Needed for Diagnosis: 10 s × 3 time(s)
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

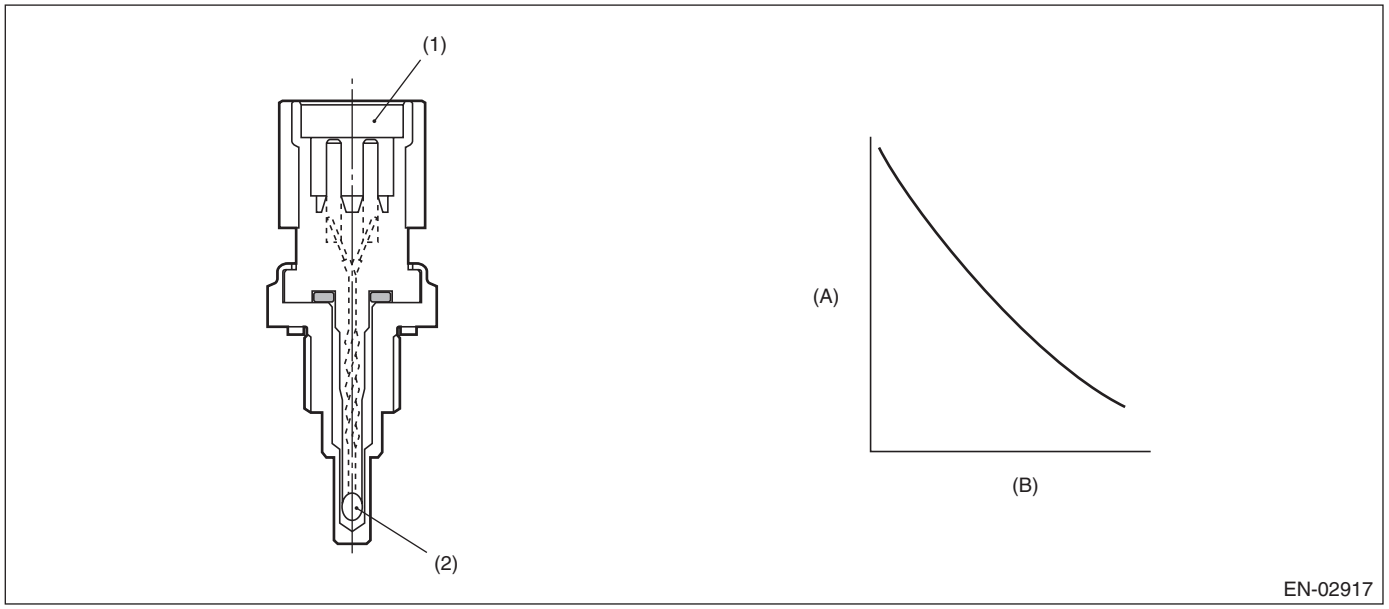
BM:DTC P0196 ENGINE OIL TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Detect the abnormality of the engine oil temperature sensor output characteristics. Perform the following two diagnosis, and judge as NG if either is NG.

- **Diagnosis 1 (relative diagnosis):** Perform diagnosis in reference to the engine oil temperature sensor value, engine coolant temperature sensor value and intake air temperature sensor value after engine start after predetermined time have passed in soak time. Judge as NG when the difference is more than the specific value in comparison respectively between engine oil and engine coolant temperature, engine oil and intake air temperature.
- **Diagnosis 2 (function diagnosis):** Judge as NG when the engine oil temperature does not rise to the specific value even if certain conditions are cleared at driving.

2. COMPONENT DESCRIPTION



(A) Resistance value (kΩ)
(B) Temperature °C (°F)
(1) Connector
(2) Thermistor element

3. ENABLE CONDITIONS

Diagnosis 1

Secondary Parameters	Enable Conditions
Soaking time	≥ 21600 s
Block heater judgment	Completed
Block heater activation	not activate

Diagnosis 2

Secondary Parameters	Enable Conditions
Engine oil temperature at engine starting	≤ 50 °C (122 °F)
Engine speed	> 500 rpm
Percentage of idling	≤ 0.5 × 100

4. GENERAL DRIVING CYCLE

- **Diagnosis 1:** Perform diagnosis only once after engine start after constant soak time.
- **Diagnosis:** Perform the diagnosis only once after starting the engine in cold condition.

5. DIAGNOSTIC METHOD

Judge as NG when diagnosis 1 or diagnosis 2 becomes NG.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Diagnosis 1

Judgment Value

Malfunction Criteria	Threshold Value
|Engine oil temperature at engine start – Engine coolant temperature at engine start|	> 10 °C (18°F)
|Engine oil temperature at engine start – Intake air temperature 30 s after engine start|	> Value of Map 1

Map 1

Ambient air temperature °C (°F)	-30 (-22)	30 (86)	45 (113)	60 (140)
|Engine oil temperature at engine start – Intake air temperature 30 s after engine start| °C (°F)	10 (18°F)	10 (18°F)	22 (39.6°F)	22 (39.6°F)

Time Needed for Diagnosis: Less than 1 second

Diagnosis 2

Judgment Value

Malfunction Criteria	Threshold Value
Engine oil temperature	< 50 °C (122 °F)
Elapsed time after starting the engine	≥ Value from Map 2

Map 2

		Intake air temperature at engine start °C (°F)							
		–30 (–22)	–20 (–4)	–10 (14)	0 (32)	10 (50)	20 (68)	30 (86)	40 (104)
Ratio of time at engine stop during elapsed time after engine start	0.0	2800000	2100000	1500000	1000000	750000	600000	500000	400000
	0.3	2800000	2100000	1500000	1000000	750000	600000	500000	400000
	0.6	2800000	2100000	1500000	1000000	750000	600000	500000	400000
	1.0	2800000	2100000	1500000	1000000	750000	600000	500000	400000
ms									

Time Needed for Diagnosis: Value of Map 2

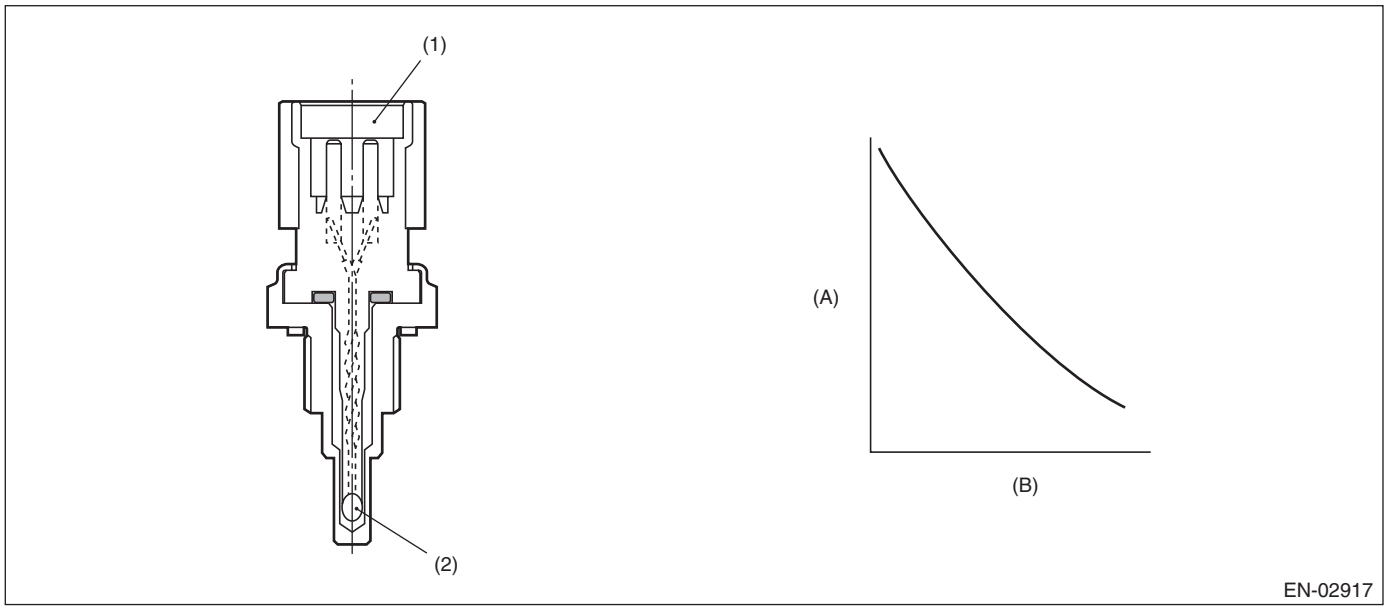
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

BN:DTC P0197 ENGINE OIL TEMPERATURE SENSOR LOW

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the oil temperature sensor.
Judge as NG when outside of the judgment value.

2. COMPONENT DESCRIPTION



(A) Resistance value (kΩ)
(B) Temperature °C (°F)
(1) Connector
(2) Thermistor element

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.203 V

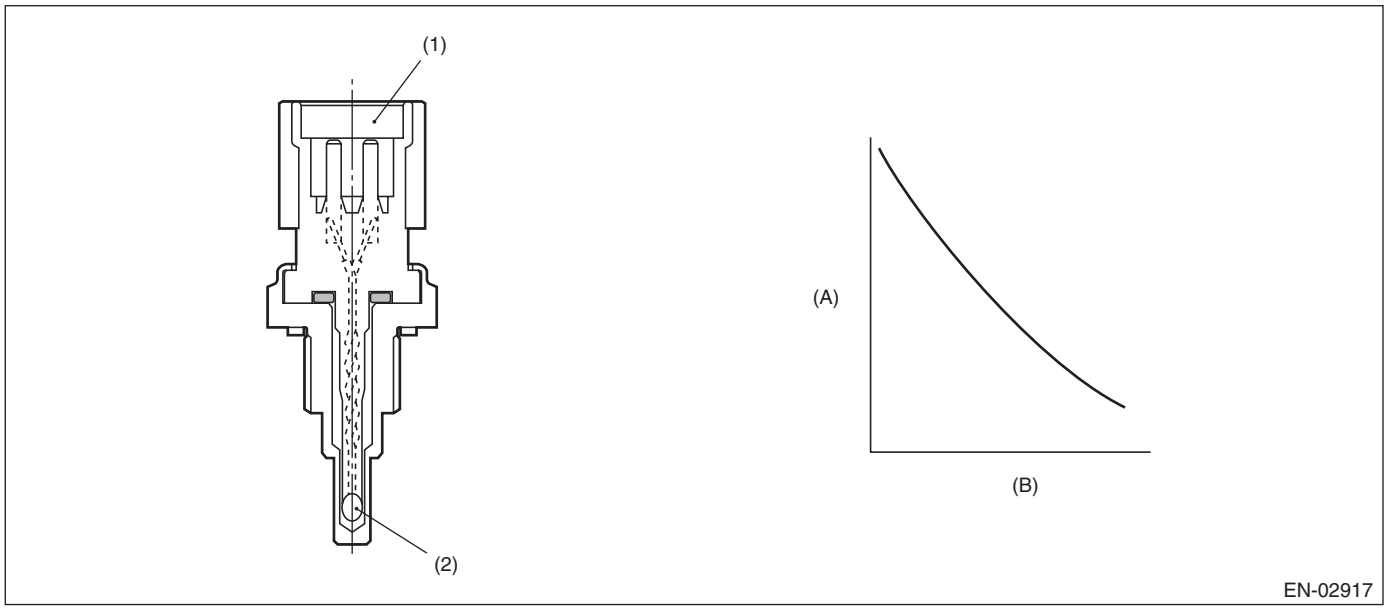
Time Needed for Diagnosis: 500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

BO:DTC P0198 ENGINE OIL TEMPERATURE SENSOR HIGH

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the oil temperature sensor.
Judge as NG when outside of the judgment value.

2. COMPONENT DESCRIPTION



(A) Resistance value (kΩ)
(B) Temperature °C (°F)
(1) Connector
(2) Thermistor element

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.698 V

Time Needed for Diagnosis: 500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

BP:DTC P0201 INJECTOR #1

1. OUTLINE OF DIAGNOSIS

Based on the self-diagnostic result of the injector driving IC, judge the injector driving circuit as normal or abnormal.
Injector driving IC detects the status of “fuel remains injected” or “fuel is not injected” as a malfunction.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Elapsed time after starting the engine	> 1 s
Engine speed	> 500 rpm
Injection status	Not during fuel cut

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Injector driving IC information	Malfunction

Time Needed for Diagnosis: 2560 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

BQ:DTC P0202 INJECTOR #2

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P0201. <Ref. to GD(H4DO HEV)-80, DTC P0201 INJECTOR #1, Diagnostic Trouble Code (DTC) Detecting Criteria.>

BR:DTC P0203 INJECTOR #3

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P0201. <Ref. to GD(H4DO HEV)-80, DTC P0201 INJECTOR #1, Diagnostic Trouble Code (DTC) Detecting Criteria.>

BS:DTC P0204 INJECTOR #4

1. OUTLINE OF DIAGNOSIS

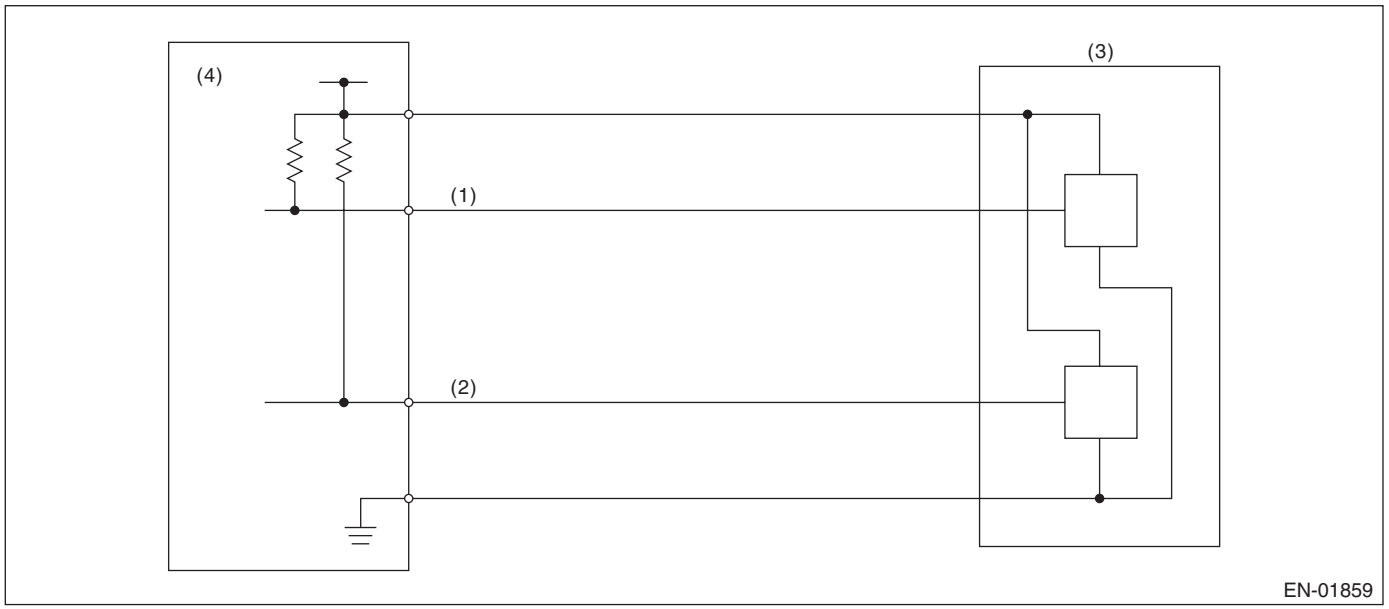
NOTE:
For the detection standard, refer to DTC P0201. <Ref. to GD(H4DO HEV)-80, DTC P0201 INJECTOR #1, Diagnostic Trouble Code (DTC) Detecting Criteria.>

BT:DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 2.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Throttle position sensor 1 signal
(2) Throttle position sensor 2 signal
(3) Throttle position sensor
(4) Engine control module (ECM)

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 6 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	≤ 1.133 V

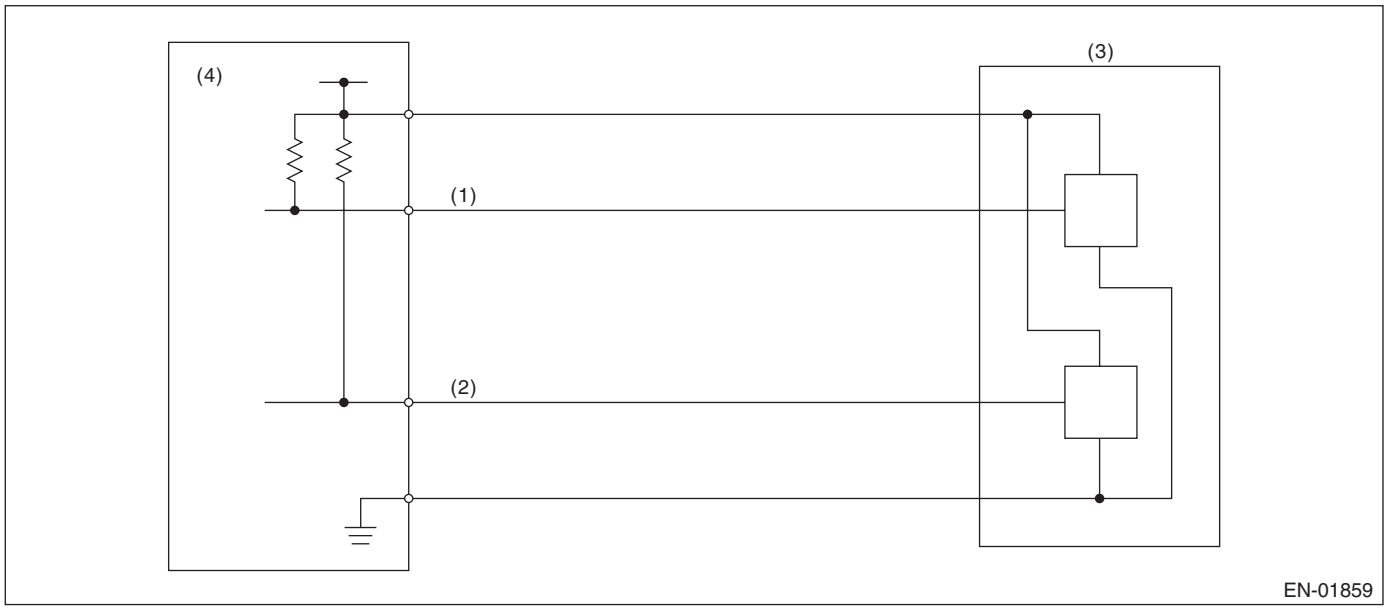
Time Needed for Diagnosis: 24 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

BU:DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 2.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Throttle position sensor 1 signal
(2) Throttle position sensor 2 signal
(3) Throttle position sensor
(4) Engine control module (ECM)

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 6 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	≥ 4.772 V

Time Needed for Diagnosis: 24 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

BV:DTC P0300 RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P0301. <Ref. to GD(H4DO HEV)-83, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

BW:DTC P0301 CYLINDER 1 MISFIRE DETECTED

1. OUTLINE OF DIAGNOSIS

Detect the presence of misfire occurrence. (Revolution fluctuation method)
Monitoring Misfire which influences exhaust deterioration (1.5 times of FTP) and catalyst damage is made obligatory by the law. Misfire affecting these two has two patterns below:

- Intermittent misfire (The same cylinder misfires in random, or different cylinders misfire in random.): FTP 1.5 times misfire
- Every time misfire (The same cylinder misfires every time.): FTP 1.5 times misfire, Catalyst damage misfire

The following detecting methods are adopted for these detection.
1) Intermittent misfire: FTP 1.5 times misfire

- 180° Interval Difference Method (MT: 1,800 rpm or less; AT: None)
- 360° Interval Difference Method (whole range)
- 720° Interval Difference Method (3,000 rpm or more)

2) Misfire every time: FTP 1.5 times misfire, Catalyst damage misfire

- 360° Interval Difference Method

2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
All secondary parameters enable conditions	≥ 10000 ms
Intake manifold pressure change at 180°CA	< Value of Map 1
Throttle position change during 16 milliseconds	< 100 °
Fuel shut-off function	Not in operation
Fuel level	≥ 7.8 ℓ (2.06 US gal, 1.72 Imp gal)
Vehicle dynamic control or AT torque control	Not in operation
Evaporative system leak check	Not in operation
Engine speed	450 rpm — 6400 rpm
Intake manifold pressure	≥ Value from Map 2
Battery voltage	≥ 8 V
Fuel parameter determination	Not extremely low volatility
Engine speed change during 32 milliseconds	< 1000 rpm

Map 1

rpm	700	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6300
kPa (mmHg, inHg)	34 (255, 10)	34 (255, 10)	34 (255, 10)	34 (255, 10)	34 (255, 10)	34 (255, 10)	34 (255, 10)	34 (255, 10)	34 (255, 10)	34 (255, 10)	34 (255, 10)	34 (255, 10)	34 (255, 10)

Map 2

- Normal ignition

		Barometric pressure (kPa (mmHg, inHg))							
		66.4 (498 , 19.6)	72.5 (544 , 21.4)	75.7 (568 , 22.4)	79.5 (596 , 23.5)	82.3 (617 , 24.3)	84.9 (637 , 25.1)	91.6 (687 , 27)	100.5 (754, 29.7)
Engine speed (rpm)	700	17 (127.8 , 5)	17.7 (132.8 , 5.2)	18.1 (135.4 , 5.3)	18.5 (139.1 , 5.5)	19.2 (144.4 , 5.7)	20.3 (152.1 , 6)	21.2 (159.3 , 6.3)	26.3 (197.6 , 7.8)
	1000	17.8 (133.6 , 5.3)	18.5 (138.5 , 5.5)	19.2 (144.2 , 5.7)	19.8 (148.3 , 5.8)	20.3 (152.4 , 6)	20.6 (154.6 , 6.1)	21.7 (162.5 , 6.4)	23 (172.7 , 6.8)
	1200	17.7 (132.8 , 5.2)	18.1 (136.0 , 5.4)	19.2 (144.0 , 5.7)	19.9 (149.4 , 5.9)	20.2 (151.2 , 6)	20.8 (155.8 , 6.1)	21.9 (164.4 , 6.5)	22.7 (170.1 , 6.7)
	1600	17.7 (132.4 , 5.2)	18.2 (136.9 , 5.4)	19.2 (144.4 , 5.7)	19.6 (146.7 , 5.8)	20.3 (152.2 , 6)	20.5 (153.4 , 6)	21.6 (161.7 , 6.4)	22.8 (170.9 , 6.7)
	2000	18.1 (136.0 , 5.4)	19.5 (146.6 , 5.8)	20 (150.2 , 5.9)	20.3 (152.2 , 6)	21 (157.6 , 6.2)	21.5 (161.1 , 6.3)	22.3 (167.6 , 6.6)	23.9 (179.4 , 7.1)
	2400	18.2 (136.4 , 5.4)	20 (150.2 , 5.9)	20.6 (154.3 , 6.1)	21.6 (161.9 , 6.4)	21.8 (163.5 , 6.4)	22.8 (170.7 , 6.7)	23.5 (175.9 , 6.9)	24.8 (186.2 , 7.3)
	2800	18.9 (141.9 , 5.6)	20.5 (153.9 , 6.1)	21 (157.4 , 6.2)	21.6 (161.8 , 6.4)	22.4 (167.8 , 6.6)	22.7 (170.5 , 6.7)	23.7 (178.1 , 7)	25 (187.8 , 7.4)
	3000	19.4 (145.6 , 5.7)	20.1 (150.8 , 5.9)	20.7 (155.1 , 6.1)	21.4 (160.4 , 6.3)	22.4 (167.9 , 6.6)	22.4 (168.0 , 6.6)	23.4 (175.9 , 6.9)	25.2 (188.9 , 7.4)
	3200	21.8 (163.8 , 6.4)	22.7 (170.0 , 6.7)	22.9 (172.0 , 6.8)	23.5 (176.2 , 6.9)	24.4 (183.1 , 7.2)	24.5 (184.1 , 7.2)	25.4 (190.8 , 7.5)	25.1 (188.5 , 7.4)
	3600	23.7 (178.1 , 7)	24.8 (186.3 , 7.3)	25.5 (191.0 , 7.5)	26.2 (196.7 , 7.7)	27.4 (205.2 , 8.1)	27.5 (206.4 , 8.1)	28.1 (210.7 , 8.3)	27.8 (208.2 , 8.2)
	4000	25.4 (190.8 , 7.5)	26.7 (200.2 , 7.9)	27.4 (205.7 , 8.1)	28.7 (215.1 , 8.5)	29.7 (222.9 , 8.8)	29.8 (223.8 , 8.8)	30.1 (225.6 , 8.9)	29.1 (218.0 , 8.6)
	4400	27 (202.5 , 8)	28.3 (211.9 , 8.3)	29 (217.5 , 8.6)	30.2 (226.8 , 8.9)	31.3 (234.7 , 9.2)	31.4 (235.6 , 9.3)	31.6 (237.4 , 9.3)	30.6 (229.8 , 9)
	4800	28.6 (214.3 , 8.4)	29.8 (223.7 , 8.8)	30.6 (229.3 , 9)	31.8 (238.6 , 9.4)	32.9 (246.5 , 9.7)	33 (247.4 , 9.7)	33.2 (249.1 , 9.8)	32.2 (241.5 , 9.5)
	5200	30.1 (226.1 , 8.9)	31.4 (235.5 , 9.3)	32.1 (241.0 , 9.5)	33.4 (250.4 , 9.9)	34.4 (258.2 , 10.2)	34.5 (259.1 , 10.2)	34.8 (260.9 , 10.3)	33.8 (253.3 , 10)
	5600	31.7 (237.8 , 9.4)	33 (247.2 , 9.7)	33.7 (252.8 , 10)	34.9 (262.1 , 10.3)	36 (270.0 , 10.6)	36.1 (270.9 , 10.7)	36.4 (272.7 , 10.7)	35.3 (265.1 , 10.4)
	6000	33.3 (249.6 , 9.8)	34.5 (259.0 , 10.2)	35.3 (264.6 , 10.4)	36.5 (273.9 , 10.8)	37.6 (281.8 , 11.1)	37.7 (282.6 , 11.1)	37.9 (284.4 , 11.2)	36.9 (276.8 , 10.9)
	6400	34.8 (261.4 , 10.3)	36.1 (270.7 , 10.7)	36.8 (276.3 , 10.9)	38.1 (285.6 , 11.2)	39.1 (293.5 , 11.6)	39.3 (294.4 , 11.6)	39.5 (296.2 , 11.7)	38.5 (288.6 , 11.4)
kPa (mmHg, inHg)									

• Idling ignition

		Barometric pressure (kPa (mmHg, inHg))							
		66.4 (498 , 19.6)	72.5 (544 , 21.4)	75.7 (568 , 22.4)	79.5 (596 , 23.5)	82.3 (617 , 24.3)	84.9 (637 , 25.1)	91.6 (687 , 27)	100.5 (754, 29.7)
Engine speed (rpm)	700	17 (127.8 , 5)	17.7 (133.0 , 5.2)	18.1 (135.7 , 5.3)	18.7 (140.4 , 5.5)	19.2 (144.4 , 5.7)	20.3 (152.1 , 6)	21.2 (159.3 , 6.3)	26.3 (197.6 , 7.8)
	1000	18.6 (139.7 , 5.5)	19.5 (146.3 , 5.8)	19.9 (149.1 , 5.9)	20.9 (156.6 , 6.2)	20.9 (157.0 , 6.2)	22.1 (165.9 , 6.5)	23.4 (175.3 , 6.9)	24.4 (183.3 , 7.2)
	1200	18.5 (138.4 , 5.4)	19.3 (144.5 , 5.7)	20.2 (151.8 , 6)	20.7 (154.9 , 6.1)	21.1 (158.0 , 6.2)	23.4 (175.2 , 6.9)	25.8 (193.9 , 7.6)	24.6 (184.2 , 7.3)
	1600	18.3 (137.6 , 5.4)	19.3 (144.6 , 5.7)	19.9 (149.6 , 5.9)	20.4 (153.0 , 6)	20.9 (156.4 , 6.2)	21.9 (164.6 , 6.5)	23.7 (178.0 , 7)	23.8 (178.7 , 7)
	2000	18.4 (137.7 , 5.4)	20 (149.9 , 5.9)	20.4 (153.3 , 6)	20.9 (156.8 , 6.2)	21.4 (160.4 , 6.3)	22.7 (170.5 , 6.7)	24.1 (180.6 , 7.1)	25.4 (190.6 , 7.5)
	2400	18.2 (136.4 , 5.4)	20 (150.2 , 5.9)	20.6 (154.7 , 6.1)	21.6 (161.9 , 6.4)	22 (165.2 , 6.5)	23 (172.8 , 6.8)	24.7 (185.3 , 7.3)	26.2 (196.7 , 7.7)
	2800	18.9 (141.9 , 5.6)	20.5 (153.9 , 6.1)	21 (157.4 , 6.2)	22 (165.0 , 6.5)	22.4 (167.8 , 6.6)	22.7 (170.5 , 6.7)	24.3 (182.0 , 7.2)	25 (187.8 , 7.4)
	3000	19.4 (145.6 , 5.7)	20.1 (150.9 , 5.9)	20.7 (155.1 , 6.1)	21.5 (161.2 , 6.3)	22.4 (167.9 , 6.6)	22.4 (168.0 , 6.6)	23.7 (177.9 , 7)	25.2 (188.9 , 7.4)
	3200	21.8 (163.8 , 6.4)	22.7 (170.0 , 6.7)	22.9 (172.0 , 6.8)	23.5 (176.2 , 6.9)	24.4 (183.1 , 7.2)	24.5 (184.1 , 7.2)	25.7 (192.8 , 7.6)	25.1 (188.5 , 7.4)
	3600	24.4 (183.2 , 7.2)	25.5 (191.5 , 7.5)	25.8 (193.3 , 7.6)	26.9 (201.5 , 7.9)	28.1 (210.5 , 8.3)	28.4 (213.2 , 8.4)	29 (217.5 , 8.6)	28.6 (214.5 , 8.4)
	4000	25.8 (193.5 , 7.6)	27.1 (203.0 , 8)	27.4 (205.8 , 8.1)	28.9 (217.0 , 8.5)	30.1 (225.8 , 8.9)	30.1 (225.8 , 8.9)	30.1 (225.8 , 8.9)	29.4 (220.6 , 8.7)
	4400	27.4 (205.3 , 8.1)	28.6 (214.7 , 8.5)	29 (217.6 , 8.6)	30.5 (228.7 , 9)	31.7 (237.6 , 9.4)	31.7 (237.6 , 9.4)	31.7 (237.6 , 9.4)	31 (232.4 , 9.1)
	4800	28.9 (217.1 , 8.5)	30.2 (226.5 , 8.9)	30.6 (229.4 , 9)	32.1 (240.5 , 9.5)	33.2 (249.4 , 9.8)	33.2 (249.4 , 9.8)	33.2 (249.4 , 9.8)	32.5 (244.1 , 9.6)
	5200	30.5 (228.8 , 9)	31.8 (238.3 , 9.4)	32.1 (241.1 , 9.5)	33.6 (252.3 , 9.9)	34.8 (261.1 , 10.3)	34.8 (261.1 , 10.3)	34.8 (261.1 , 10.3)	34.1 (255.9 , 10.1)
	5600	32.1 (240.6 , 9.5)	33.3 (250.0 , 9.8)	33.7 (252.9 , 10)	35.2 (264.0 , 10.4)	36.4 (272.9 , 10.7)	36.4 (272.9 , 10.7)	36.4 (272.9 , 10.7)	35.7 (267.7 , 10.5)
	6000	33.6 (252.4 , 9.9)	34.9 (261.8 , 10.3)	35.3 (264.6 , 10.4)	36.8 (275.8 , 10.9)	38 (284.7 , 11.2)	38 (284.7 , 11.2)	38 (284.7 , 11.2)	37.3 (279.4 , 11)
	6400	35.2 (264.1 , 10.4)	36.5 (273.6 , 10.8)	36.9 (276.4 , 10.9)	38.3 (287.6 , 11.3)	39.5 (296.4 , 11.7)	39.5 (296.4 , 11.7)	39.5 (296.4 , 11.7)	38.8 (291.2 , 11.5)
kPa (mmHg, inHg)									

3. GENERAL DRIVING CYCLE

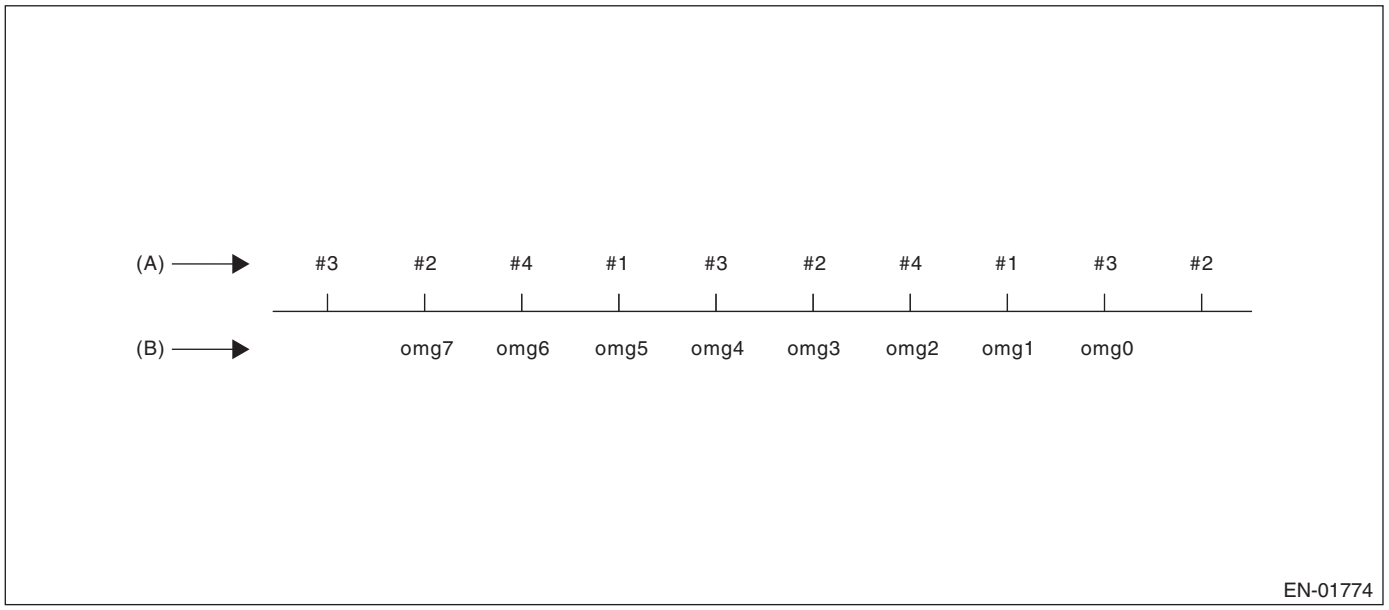
• If conditions are met, it is possible to detect the misfires from idling to high engine speed. However, to avoid excessive load or harm to the engine, perform diagnosis at idle.
• Perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

When a misfire occurs, the engine speed will decrease and the crankshaft position speed will change. Calculate the interval difference value (diagnostic value) from crankshaft position speed by the following formula, and judge whether a misfire is occurring or not comparing the calculated result with judgment value. Count the number of misfires, if the misfire ratio is higher during 1000 revs. or 200 revs., judge corresponding cylinders as NG.

Diagnostic value calculation (Calculate from angle speed) →	Misfire detection every single ignition (Compare diagnostic value with judgment value) →	NG judgment (Misfire occurrence judgment required by the law) (Compare number of misfire with judgment value)
	• 180° Interval Difference Method • 360° Interval Difference Method • 720° Interval Difference Method	• FTP 1.5 times misfire NG judgment • Catalyst damage misfire NG judgment

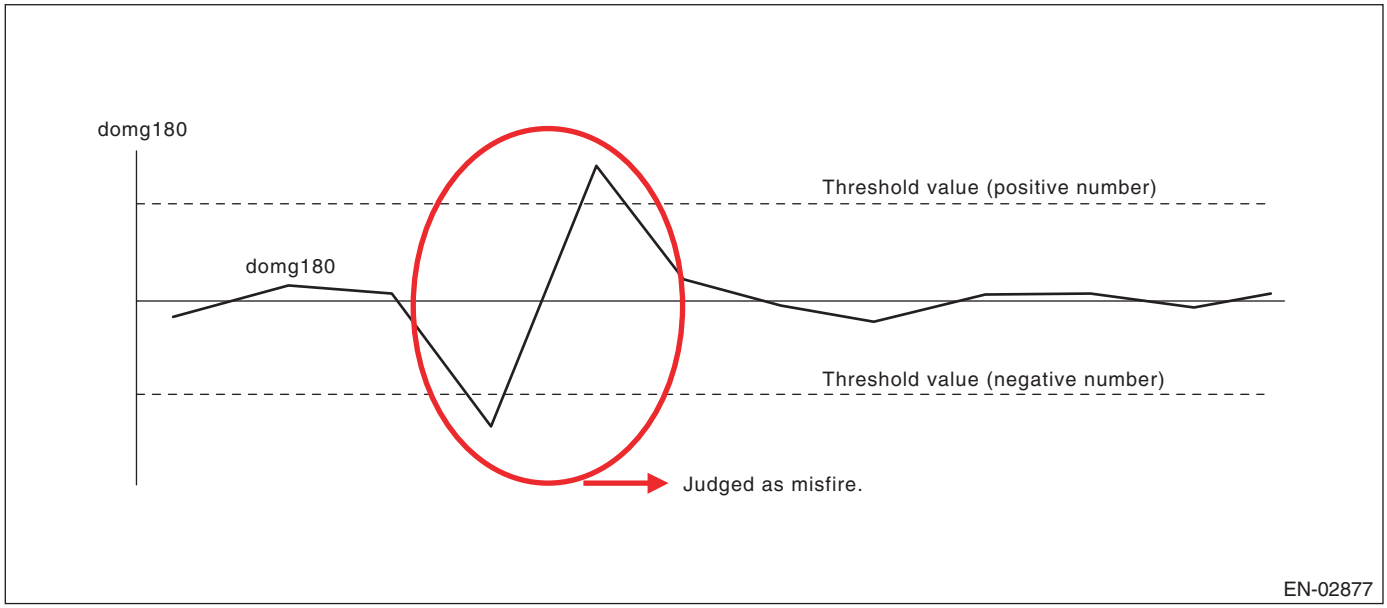
As shown in the following figure, pick a cylinder as the standard and name it omg 0. And the former crankshaft position speed is named omg 1, the second former crankshaft position speed is named omg 2, the third is named omg 3, etc.



(A) Ignition order (B) Crankshaft position speed

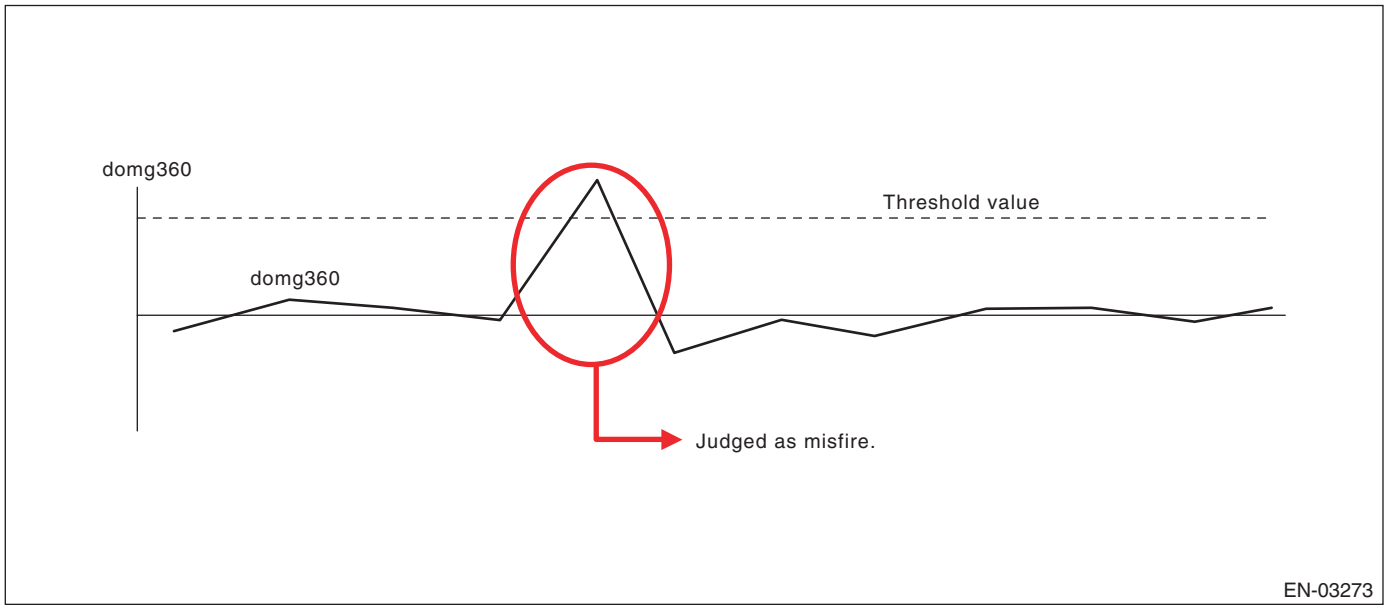
180° Interval Difference Method

Diagnostic value	domg 180 = (omg 1 – omg 0) – (omg 5 – omg 1)/4
Judge as a misfire in the following cases. • domg 180 > judgment value of positive side • domg 180 ≤ judgment value of negative side (Diagnostic value before 180° CA)	



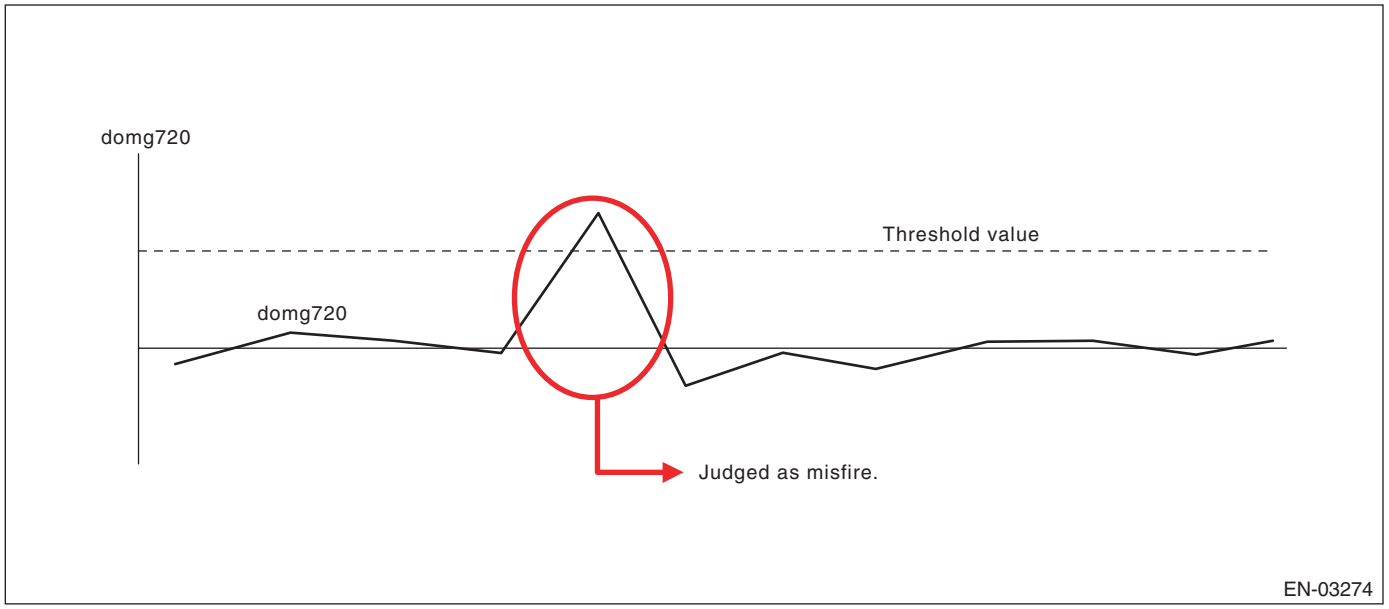
360° Interval Difference Method

Diagnostic value	domg 360 = (omg 1 – omg 0) – (omg 3 – omg 2)
Misfire judgment	domg 360 > Judgment value → Judge as misfire



720° Interval Difference Method

Diagnostic value	domg 720 = (omg 1 – omg 0) – (omg 5 – omg 4)
Misfire judgment	domg 720 > Judgment value → Judge as misfire



- **FTP 1.5 times misfire (Misfire occurrence level which influences exhaust gas)**

Judgment Value (Judge that malfunction occurs when the misfire ratio is high in 1000 engine revs.)

Malfunction Criteria	Threshold Value
FTP emission diagnostic value	≥ 15 × 100/2000% in 1000 revs.

Time Needed for Diagnosis: 1000 engine revs.
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

- **Catalyst damage misfire (Misfire occurrence level damaging catalyst)**

Judgment Value

Malfunction Criteria	Threshold Value
Catalyst damage misfire diagnostic value	≥ Value from Map 3

Map 3

		Intake air (g(oz)/rev)									
		0.2 (0.01)	0.3 (0.01)	0.4 (0.01)	0.5 (0.02)	0.6 (0.02)	0.7 (0.02)	0.8 (0.03)	0.9 (0.03)	1 (0.04)	1.1 (0.04)
Engine speed (rpm)	700	100	100	100	100	80	80	80	80	80	80
	1000	100	100	100	100	80	80	57	44	80	80
	1200	100	100	100	100	100	80	67	57	57	57
	1600	100	100	80	80	80	57	44	36	44	44
	2000	100	80	80	80	80	57	44	27	44	44
	2400	100	80	80	80	80	57	31	36	36	36
	2800	80	80	80	80	57	44	44	36	36	36
	3200	80	80	57	57	44	36	36	36	36	36
	3600	57	57	57	44	44	44	44	44	44	44
	4000	57	57	57	36	36	36	44	44	44	44
	4400	44	44	44	44	44	44	44	44	44	44
	4800	44	44	44	36	36	36	36	36	36	36
	5200	36	36	36	36	36	36	36	44	44	44
	5600	27	27	27	31	36	36	36	44	44	44
	6000	44	44	44	44	44	44	44	44	36	36
	6400	24	24	24	21	21	21	25	31	31	31

Time Needed for Diagnosis: 200 engine revs.
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

BX:DTC P0302 CYLINDER 2 MISFIRE DETECTED

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P0301. <Ref. to GD(H4DO HEV)-83, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

BY:DTC P0303 CYLINDER 3 MISFIRE DETECTED

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P0301. <Ref. to GD(H4DO HEV)-83, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

BZ:DTC P0304 CYLINDER 4 MISFIRE DETECTED

1. OUTLINE OF DIAGNOSIS

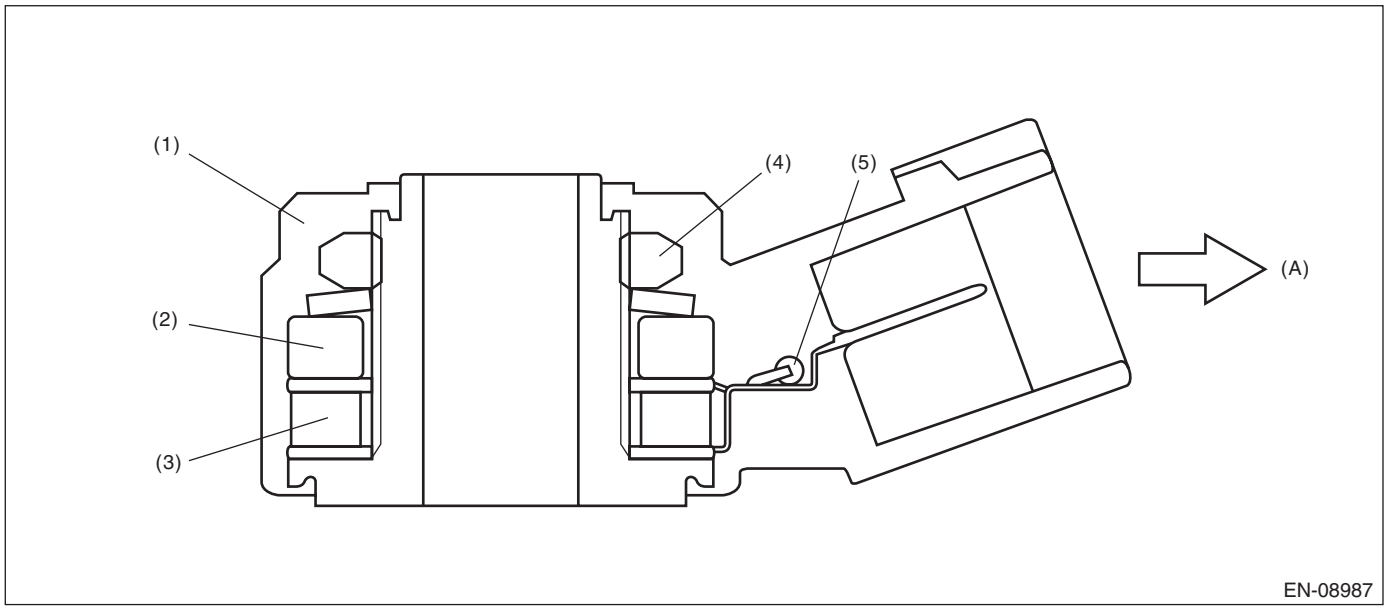
NOTE:
For the detection standard, refer to DTC P0301. <Ref. to GD(H4DO HEV)-83, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CA:DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR)

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of knock sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) To knock sensor harness

(1) Case
(2) Weight
(3) Piezoelectric element
(4) Nut
(5) Resistance

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.154 V

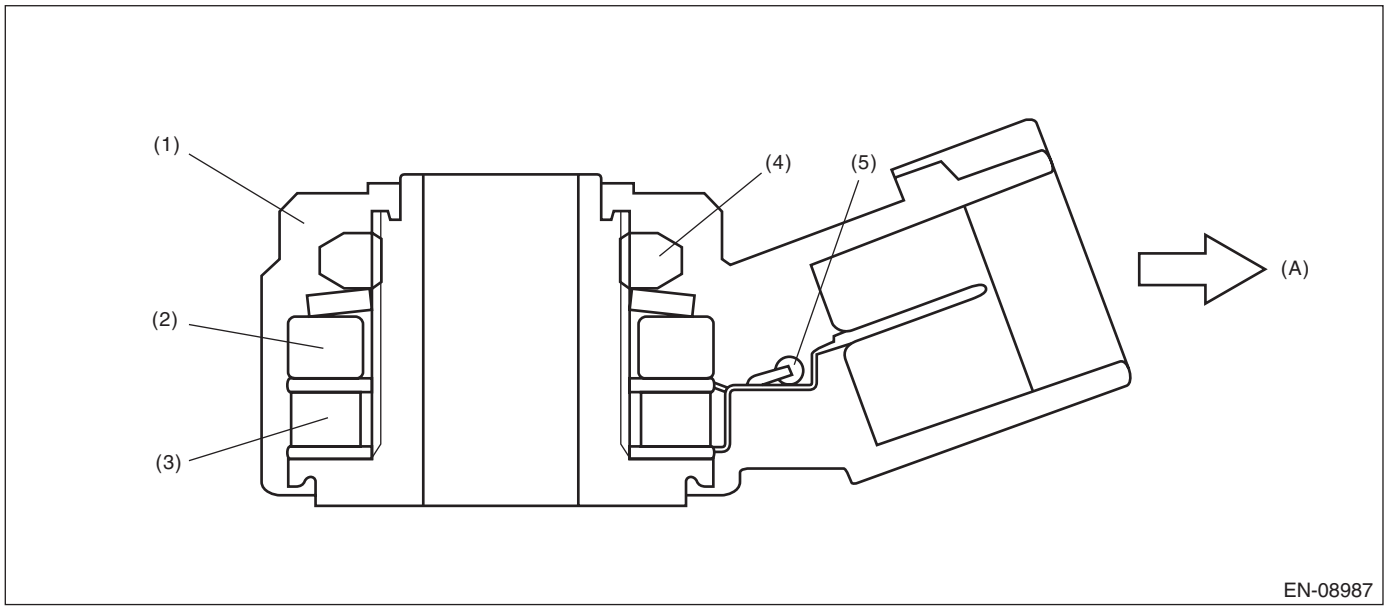
Time Needed for Diagnosis: 1000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

CB:DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR)

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of knock sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) To knock sensor harness

(1) Case
(2) Weight
(3) Piezoelectric element
(4) Nut
(5) Resistance

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.838 V

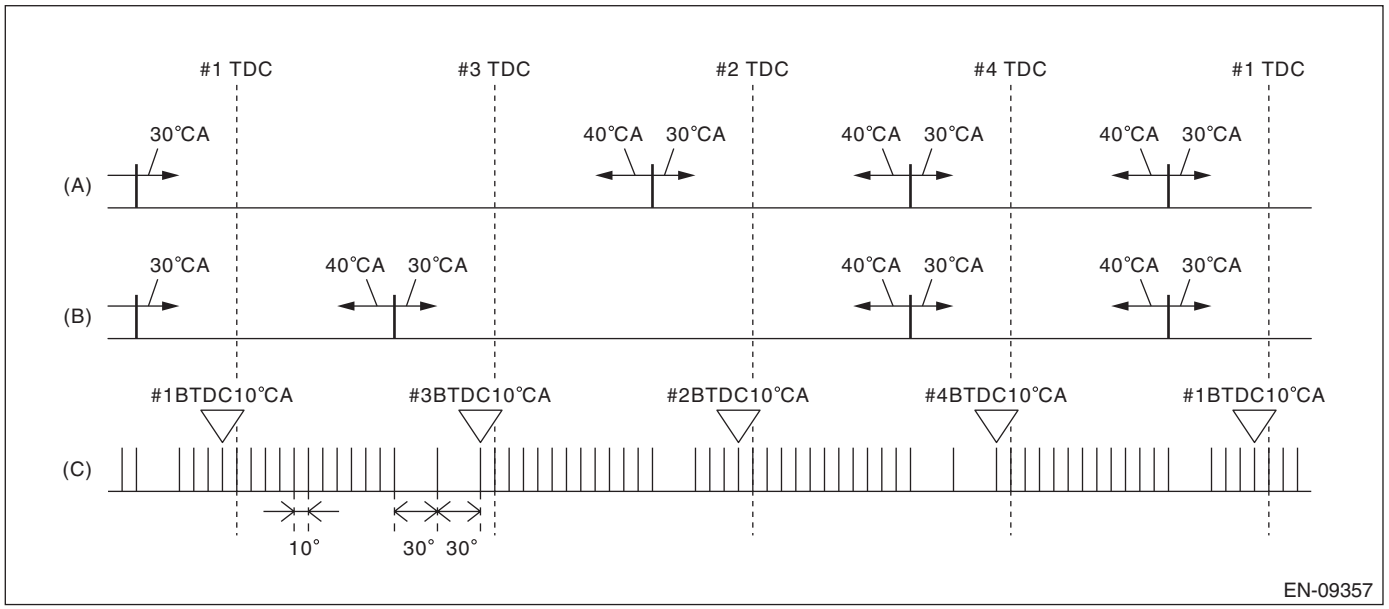
Time Needed for Diagnosis: 1000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

CC:DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT

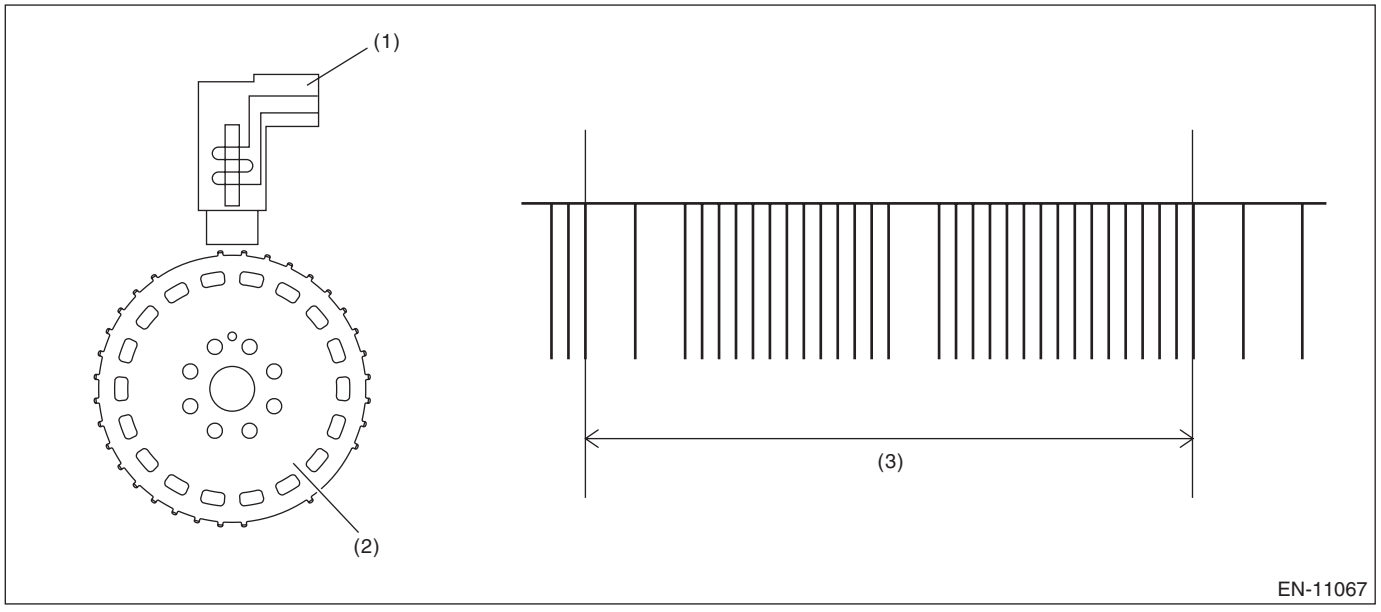
1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the crankshaft position sensor.
Judge as NG when the crank signal is not input even though the starter was rotated.

2. COMPONENT DESCRIPTION



(A) Camshaft signal (RH) (B) Camshaft signal (LH) (C) Crankshaft signal



(1) Crankshaft position sensor (2) Crankshaft position sensor plate (3) Crankshaft one revolution

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 8 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Crankshaft position sensor signal	Not detected

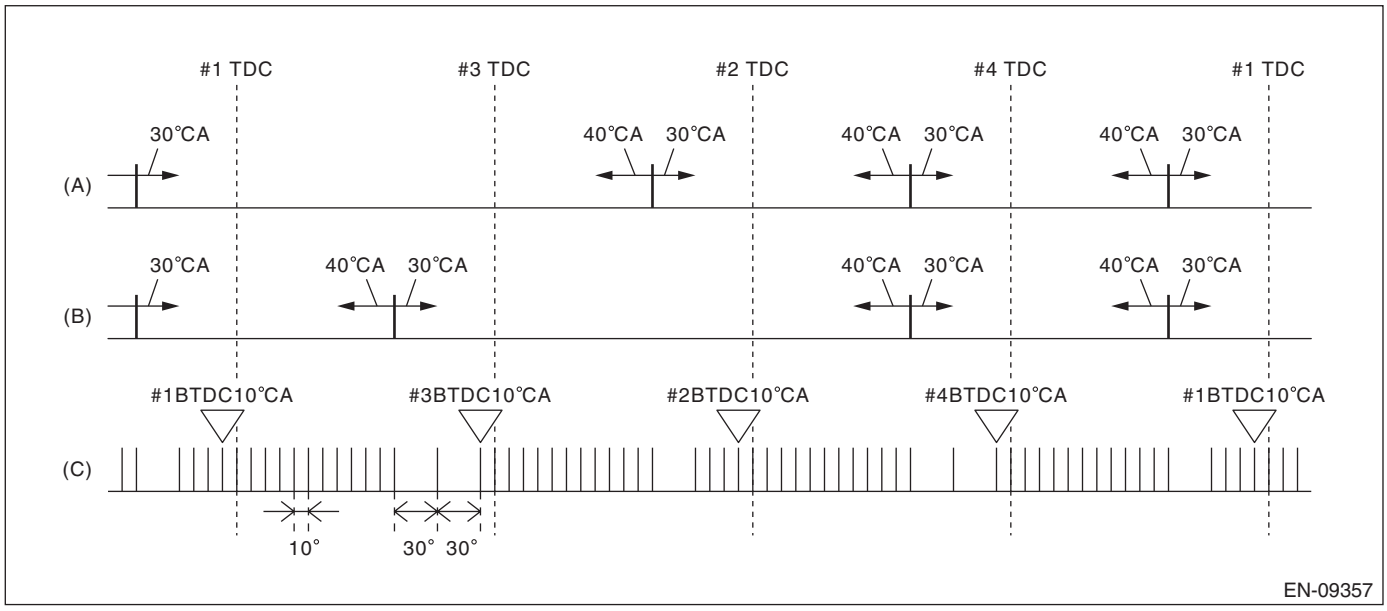
Time Needed for Diagnosis: 3000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

CD:DTC P0336 CRANKSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE

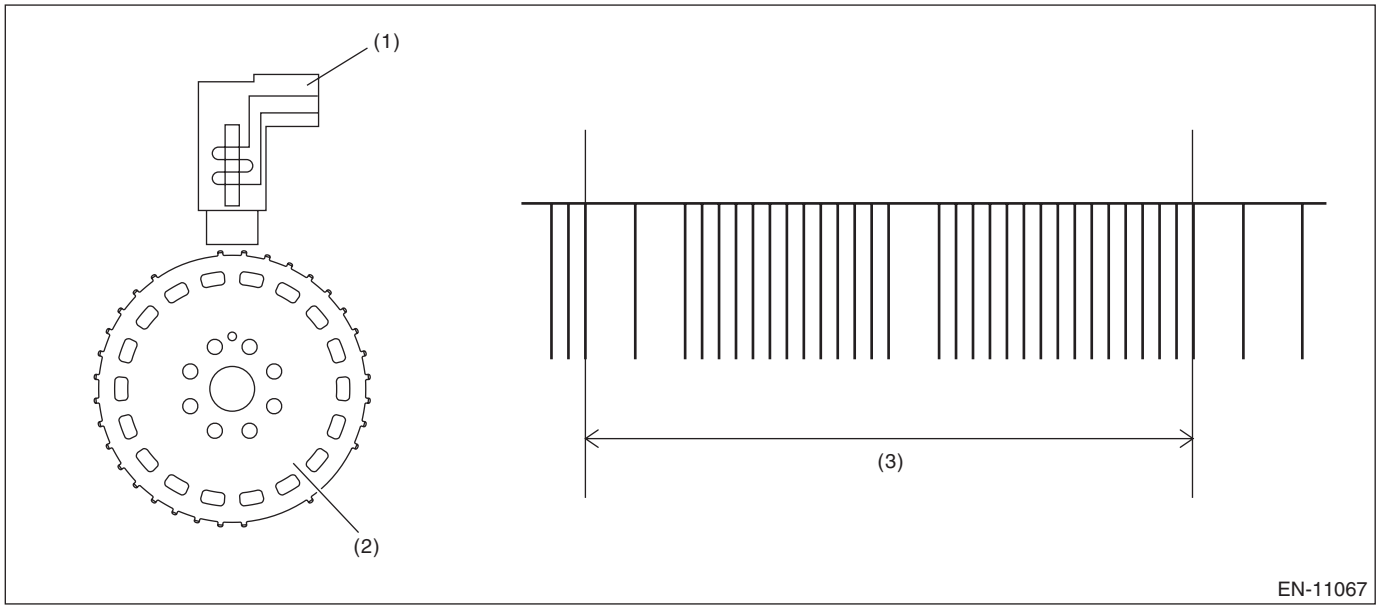
1. OUTLINE OF DIAGNOSIS

Detect for faults in crankshaft position sensor output properties.
Judge as NG when there is a problem in the number of crankshaft signals for every revolution of crankshaft.

2. COMPONENT DESCRIPTION



(A) Camshaft signal (RH) (B) Camshaft signal (LH) (C) Crankshaft signal



(1) Crankshaft position sensor (2) Crankshaft position sensor plate (3) Crankshaft one revolution

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 8 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Amount of crank sensor signal during 1 rev of crankshaft	Not = 30

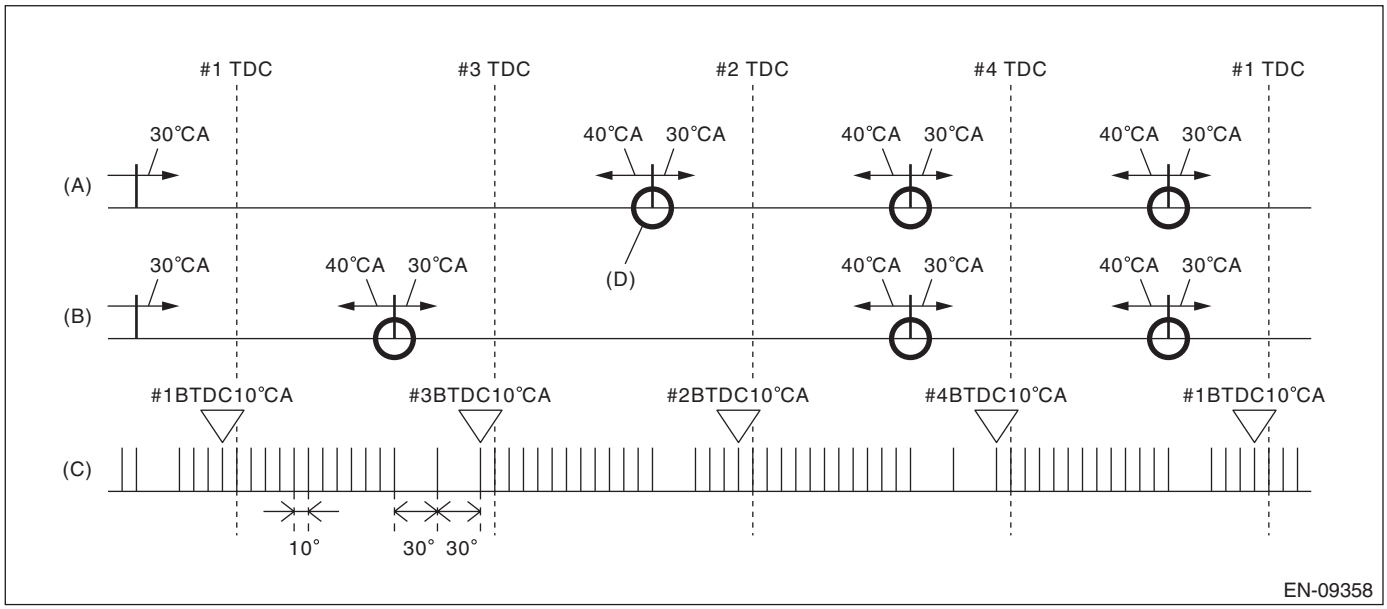
Time Needed for Diagnosis: Engine speed 10 engine revs.
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

CE:DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the camshaft position sensor.
When there is no camshaft position signal input continuously, judge as NG.

2. COMPONENT DESCRIPTION



(A) Camshaft signal (RH)
(B) Camshaft signal (LH)
(C) Crankshaft signal
(D) Camshaft position signal: When normal, there will be 3 camshaft position signals for every 2 crankshaft revolutions.

3. ENABLE CONDITION

Diagnosis 1

Secondary Parameters	Enable Conditions
Battery voltage	≥ 8 V

Diagnosis 2

Secondary Parameters	Enable Conditions
Battery voltage	≥ 8 V
Elapsed time after starting the engine	≥ 200 ms

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Diagnosis 1

Judge as NG when no input of camshaft position sensor signal in TDC remains for (10 time(s)+2)/2 engine rev.

Judgment Value

Malfunction Criteria	Threshold Value
Number of camshaft position sensor signal input in TDC	= 0

Time Needed for Diagnosis: (10 time(s) +2)/2 engine revs.

Diagnosis 2

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Camshaft position sensor signal	No input

Time Needed for Diagnosis: 3000 ms

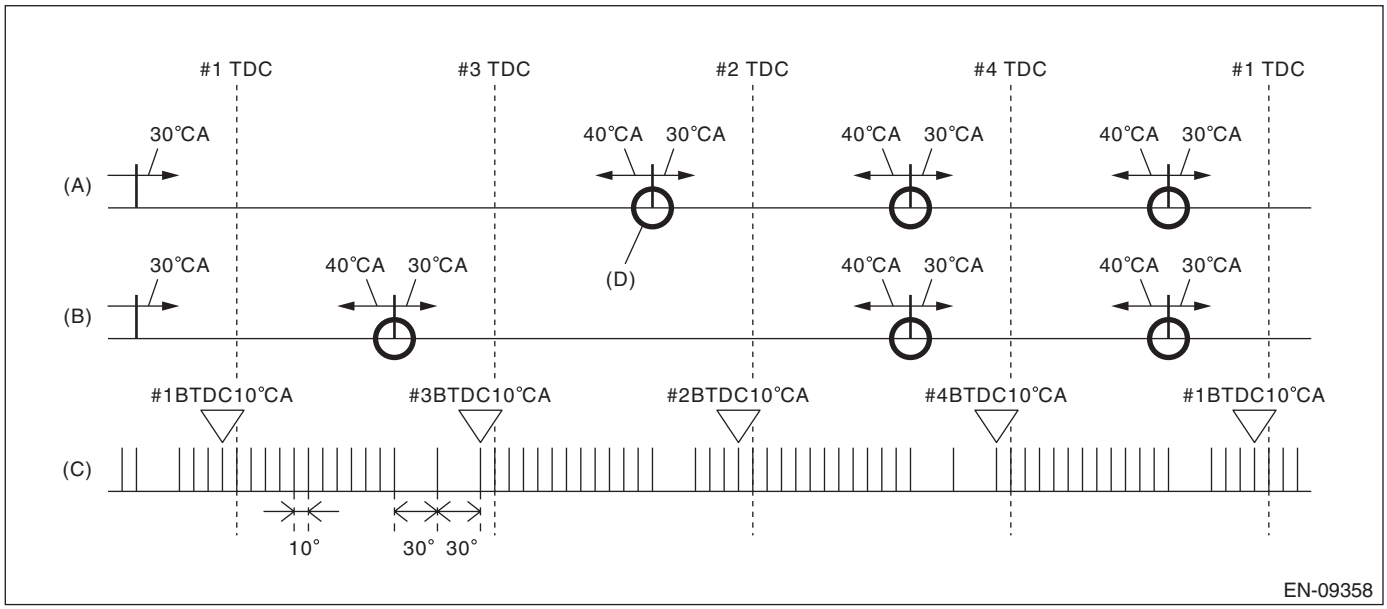
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

CF:DTC P0341 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR)

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of camshaft position sensor property.
Judge as NG when the number of camshaft signals remains abnormal.

2. COMPONENT DESCRIPTION



(A) Camshaft signal (RH)
(B) Camshaft signal (LH)
(C) Crankshaft signal
(D) Camshaft position signal: When normal, there will be 3 camshaft position signals for every 2 crankshaft revolutions.

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 8 V
Elapsed time after starting the engine	≥ 200 ms

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the status where the number of camshaft position sensor signals in two crankshaft revolutions is other than 3 time(s).

Judgment Value

Malfunction Criteria	Threshold Value
Amount of camshaft sensor signal during 2 revs of crankshaft	≠ 3 time(s)

Time Needed for Diagnosis: Two engine revs. × 4 time(s)
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

CG:DTC P0345 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P0340. <Ref. to GD(H4DO HEV)-96, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CH:DTC P0346 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE (BANK 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P0341. <Ref. to GD(H4DO HEV)-98, DTC P0341 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CI: DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT

1. OUTLINE OF DIAGNOSIS

Based on the self-diagnostic result of the ignition coil driving IC, judge the ignition coil driving circuit as normal or abnormal.
The ignition coil driving IC detects “no ignition” status as a malfunction.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Elapsed time after starting the engine	> 1 s
Engine speed	> 500 rpm

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Ignition driving IC information	Malfunction

Time Needed for Diagnosis: 2560 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

CJ:DTC P0352 IGNITION COIL B PRIMARY/SECONDARY CIRCUIT

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P0351. <Ref. to GD(H4DO HEV)-100, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CK:DTC P0353 IGNITION COIL C PRIMARY/SECONDARY CIRCUIT

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P0351. <Ref. to GD(H4DO HEV)-100, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CL:DTC P0354 IGNITION COIL D PRIMARY/SECONDARY CIRCUIT

1. OUTLINE OF DIAGNOSIS

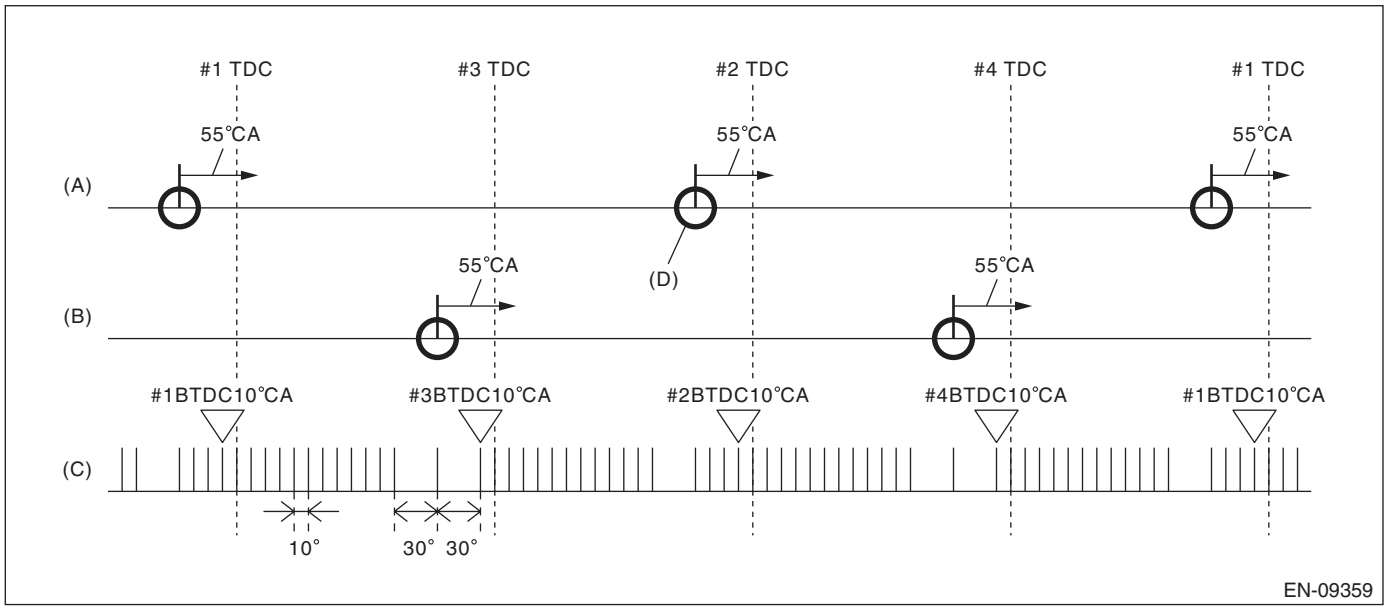
NOTE:
For the detection standard, refer to DTC P0351. <Ref. to GD(H4DO HEV)-100, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CM:DTC P0365 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the camshaft position sensor.
When there is no camshaft position signal input continuously, judge as NG.

2. COMPONENT DESCRIPTION



(A) Camshaft signal (RH)
(B) Camshaft signal (LH)
(C) Crankshaft signal
(D) Camshaft position signal: When normal, there will be 2 camshaft position signals for every 2 crankshaft revolutions.

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Elapsed time after starting the engine	≥ 200 ms

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when no input of camshaft position sensor signal in TDC remains for (10 time(s) +2)/2 engine rev.

Judgment Value

Malfunction Criteria	Threshold Value
Number of camshaft position sensor signal input in TDC	= 0

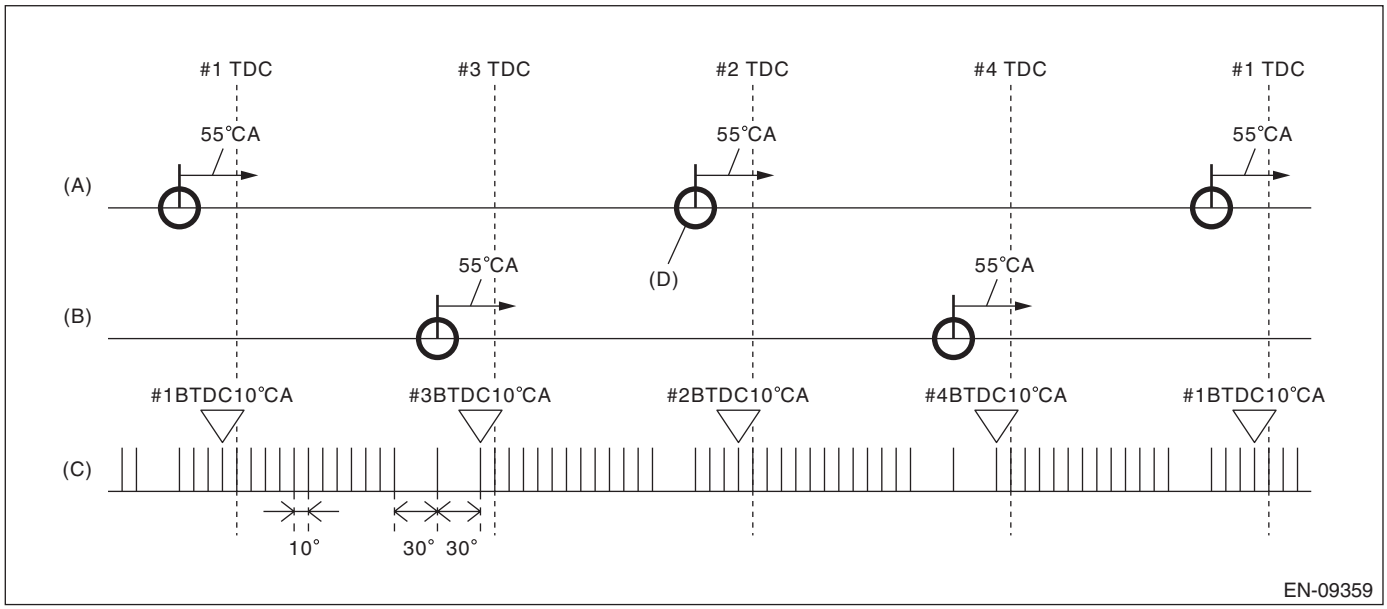
Time Needed for Diagnosis: (10 time(s) +2)/2 engine revs.
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

CN:DTC P0366 CAMSHAFT POSITION SENSOR B CIRCUIT RANGE/PERFORMANCE (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of camshaft position sensor property.
Judge as NG when the number of camshaft signals remains abnormal.

2. COMPONENT DESCRIPTION



(A) Camshaft signal (RH)
(B) Camshaft signal (LH)
(C) Crankshaft signal
(D) Camshaft position signal: When normal, there will be 2 camshaft position signals for every 2 crankshaft revolutions.

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Elapsed time after starting the engine	≥ 200 ms

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the status where the number of camshaft position sensor signals in two crankshaft revolutions is other than 2 time(s).

Judgment Value

Malfunction Criteria	Threshold Value
Amount of camshaft sensor signal during 2 revs of crankshaft	≠ 2 time(s)

Time Needed for Diagnosis: Two engine revs. × 4 time(s)
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

CO:DTC P0390 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P0365. <Ref. to GD(H4DO HEV)-101, DTC P0365 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CP:DTC P0391 CAMSHAFT POSITION SENSOR B CIRCUIT RANGE/PERFORMANCE (BANK 2)

1. OUTLINE OF DIAGNOSIS

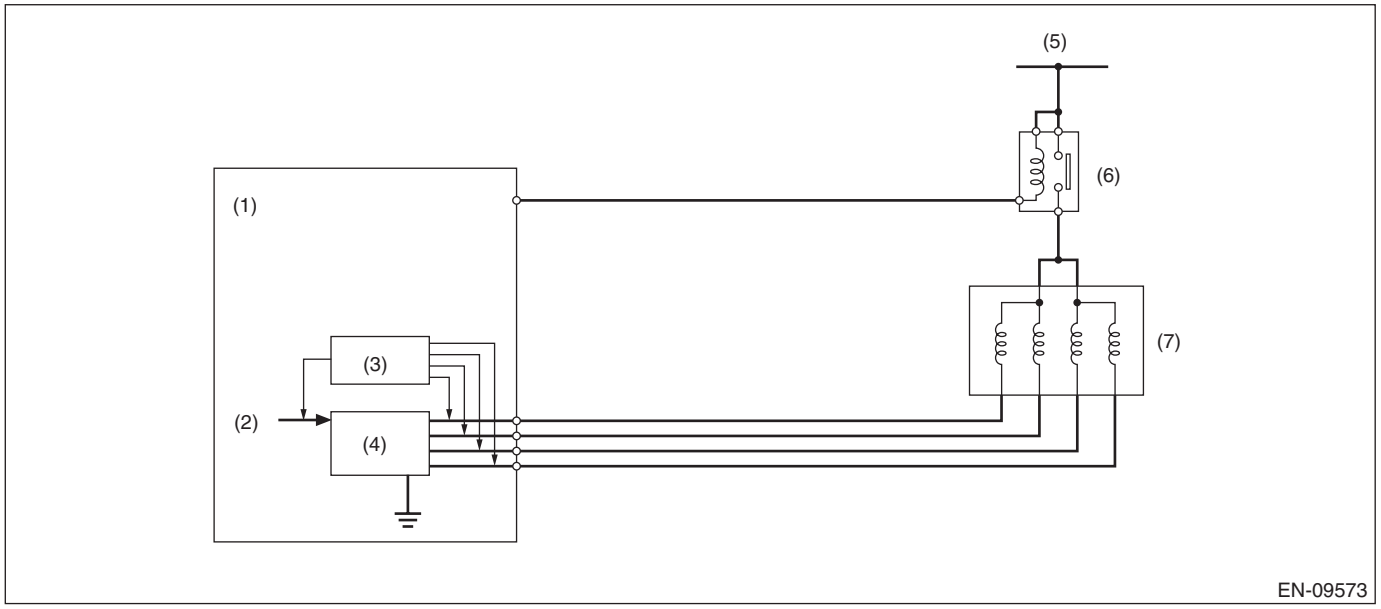
NOTE:
For the detection standard, refer to DTC P0366. <Ref. to GD(H4DO HEV)-102, DTC P0366 CAMSHAFT POSITION SENSOR B CIRCUIT RANGE/PERFORMANCE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CQ:DTC P0400 EXHAUST GAS RECIRCULATION FLOW

1. OUTLINE OF DIAGNOSIS

Detect EGR system malfunction.
Intake manifold pressure (negative pressure) is constant because the throttle valve is fully closed during deceleration fuel cut. At this time, when the EGR control valve is opened/closed, the intake manifold pressure will change. EGR System OK/NG is judged by the range of this change.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Computer unit (CPU)
(3) Detecting circuit
(4) Switching circuit
(5) Battery voltage
(6) Main relay
(7) EGR control valve

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Engine speed	1100 rpm — 5000 rpm
Intake manifold pressure (absolute pressure)	< 133.3 kPa (1000 mmHg, 39.4 inHg)
Intake air temperature	≥ 0 °C(32 °F)
Throttle position	< 0.2442 °
Battery voltage	≥ 10.9 V
Atmospheric pressure	≥ 75.1 kPa (563 mmHg, 22.2 inHg)
Vehicle speed	≥40 km/h (24.9 MPH)
Fuel shut-off function	In operation
Neutral switch	OFF

4. GENERAL DRIVING CYCLE

During deceleration fuel cut from 53 km/h (approx. 33 MPH) or more, perform diagnosis once.
Be careful of vehicle speed and engine speed. (Diagnosis will not be completed if the vehicle speed and engine speed conditions become out of specification due to deceleration.)

5. DIAGNOSTIC METHOD

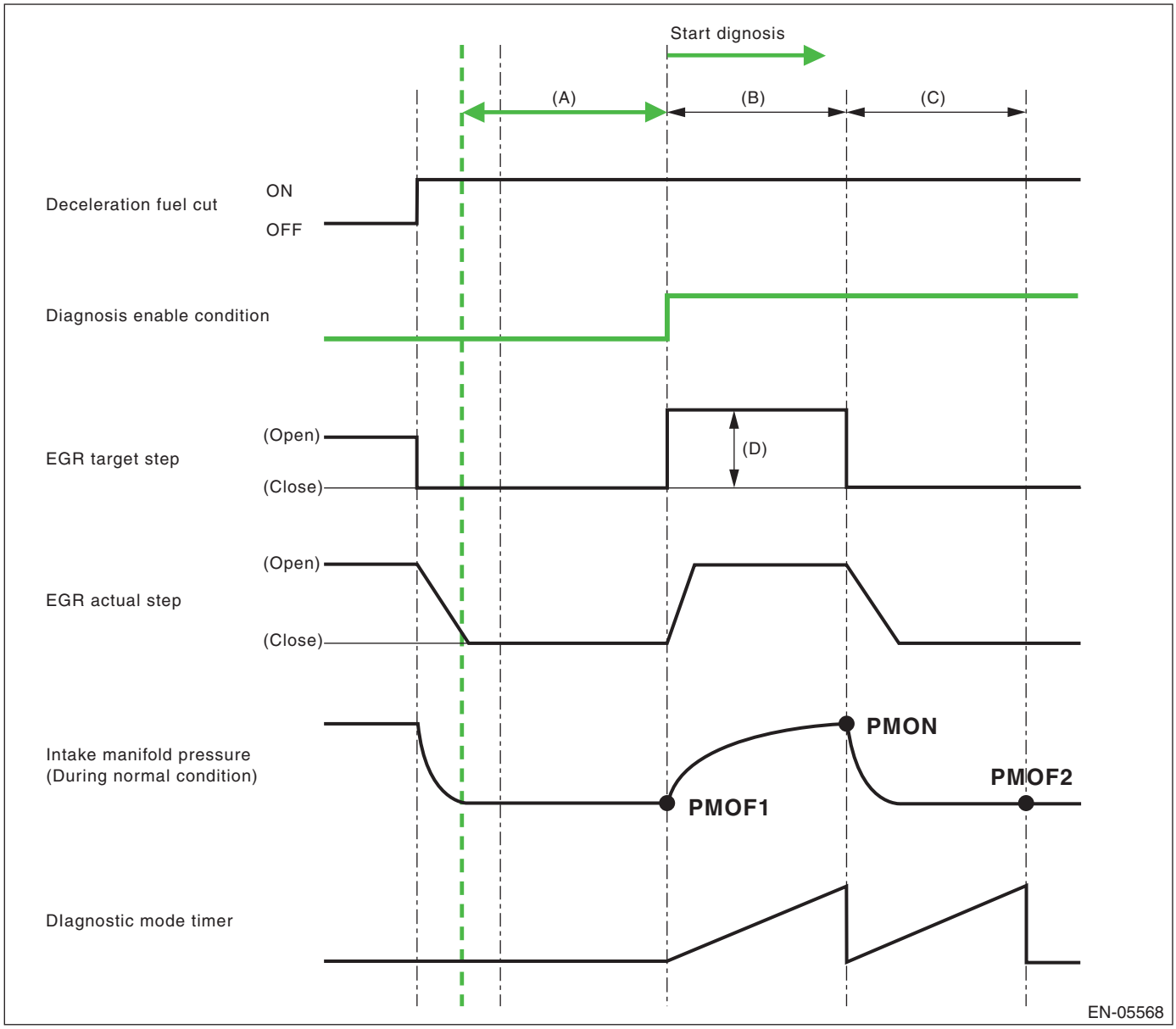
Measure the pressure values when the enable conditions are established, and perform diagnosis by calculating those results.
1. Label the intake manifold pressure value as PMOF1, which is observed when enable conditions are established, and set the EGR target step to 45 step(s) (nearly full open).

2. Label the intake manifold pressure value as PMON, which is observed after 1000 ms has passed since EGR target step was set to 45 step(s) (when the enable conditions were established), and set the EGR target step to 0.
3. Label the intake manifold pressure as PMOF2, which is observed after 1000 ms has passed since EGR target step was set to 0 (after (1000 ms + 1000 ms) have passed since the enable conditions were established).
Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
PMON – (PMOF1 + PMOF2)/2	< 2.5 kPa (18.63 mmHg, 0.7 inHg)

Time Needed for Diagnosis: 1 time
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.



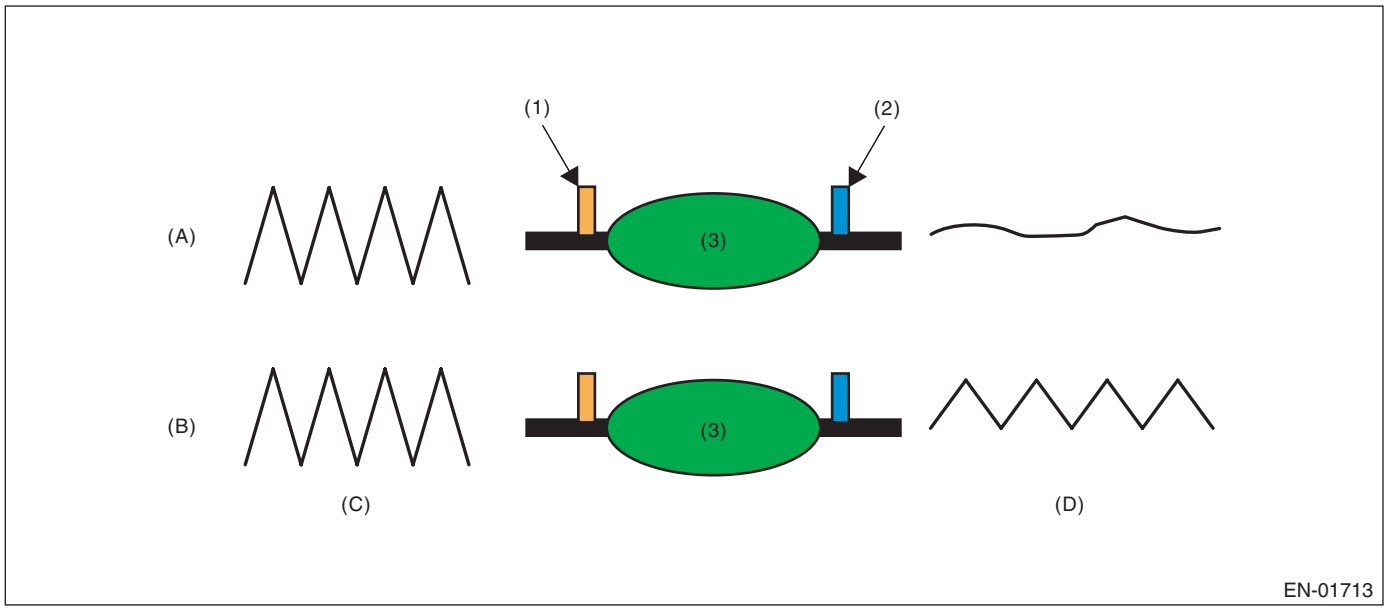
(A) 2000 ms (B) 1000 ms (C) 1000 ms
(D) 45 step(s)

CR:DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect the deterioration of the catalyst function.
Though the front oxygen sensor output would change slowly with a new catalyst, the sensor output with a deteriorated catalyst becomes high and the inversion time is shortened.
For this reason, the catalyst diagnosis is carried out by monitoring the front oxygen sensor output and comparing it with the front oxygen (A/F) sensor output.

2. COMPONENT DESCRIPTION



(A) Normal
(B) Deterioration
(C) Output waveform from the front oxygen (A/F) sensor
(D) Output waveform from the front oxygen sensor

(1) Front oxygen (A/F) sensor
(2) Front oxygen sensor
(3) Catalytic converter

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Atmospheric pressure	≥ 75.1 kPa (563 mmHg, 22.2 inHg)
Estimated catalyst temperature	≥ 480 °C (896 °F)
Misfire detection every 200 rotations	< 65535 time(s)
Sub feedback	In operation
Evaporative system diagnosis	Not in operation
Time of difference (< 0.10) between actual lambda and target lambda	≥ 0 ms
Vehicle speed	> 40 km/h (24.9 MPH)
Amount of intake air	≥ 5 g/s (0.18 oz/s) and < 40 g/s (1.41 oz/s)
Engine load change every 0.5 engine revs.	< 255 g/rev (8.99 oz/rev)
Rear oxygen output change from 660 mV or less to 660 mV or more	Experienced after fuel cut
Purge execution calculated time	≥ 0 s

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once at a constant 40 km/h (24.9 MPH) or higher.

5. DIAGNOSTIC METHOD

After the enable conditions have been established, calculate the front oxygen (A/F) sensor lambda value deviation sum value (Σ |(sglmd$_n$ – sglmd$_{n-1}$)|), and rear oxygen sensor output voltage deviation sum value (Σ |(ro2sad$_n$ – ro2sad$_{n-1}$)|) in every 32 ms × 4 times. If the front oxygen (A/F) sensor lambda value deviation sum value (Σ |(sglmd$_n$ – sglmd$_{n-1}$)|) is the predetermined value or more, calculate the diagnostic value.
If the duration of time while the following conditions are met is within the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Σ |(ro2sad$_n$ – ro2sad$_{n-1}$)| / Σ |(sglmd$_n$ – sglmd$_{n-1}$)|	> 8

Time Needed for Diagnosis: 30 — 55 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

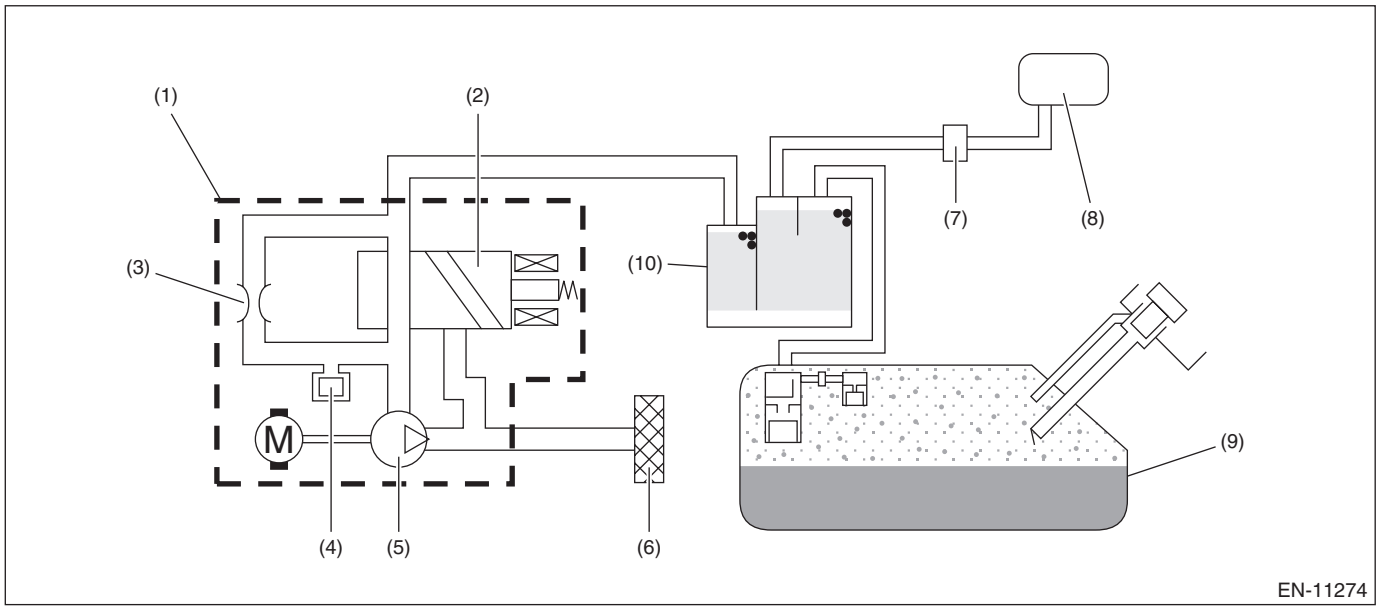
CS:DTC P0441 EVAPORATIVE EMISSION CONT. SYS. INCORRECT PURGE FLOW

1. OUTLINE OF DIAGNOSIS

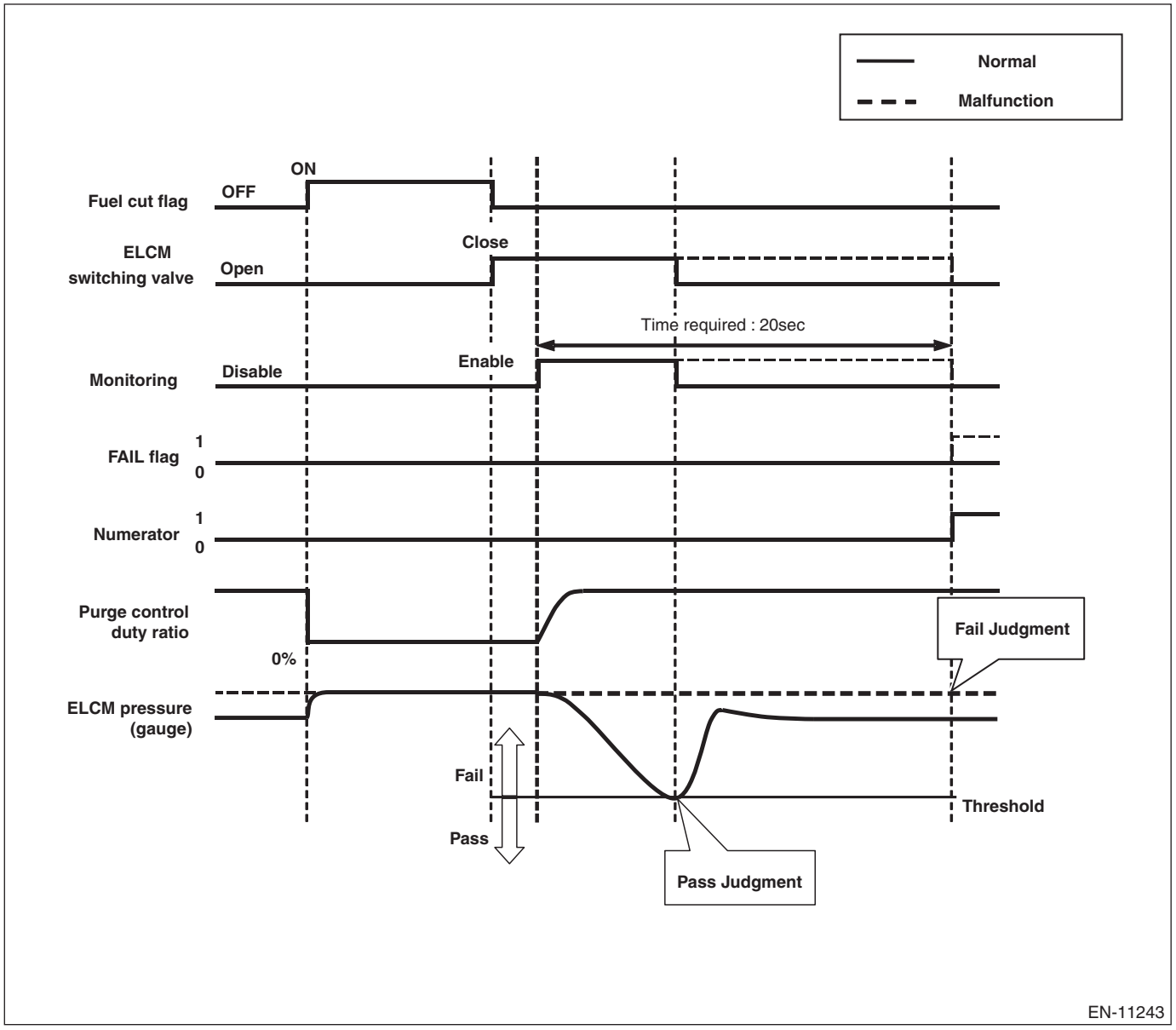
This monitor intrusively performs a functional check to detect incorrect purge flow. The monitor seals the EVAP system (i.e. isolate from atmosphere) by closing the ELCM switching valve intrusively after recovering from a fuel cut event. In the case of normal condition, and the commanded purge control duty ratio is more than 0%, ELCM pressure (gauge) will decrease due to engine vacuum and reach to the threshold value. However, in the case of malfunction condition (e.g. fuel cap open, purge valve stuck closed, purge line disconnected or blocked), if the ELCM pressure (gauge) does not reach the threshold within a predetermined time, the monitor determines a malfunction and stores a fault code.

Malfunction Criteria

ELCM pressure (gauge) > Threshold



(1) ELCM
(2) Switching valve (closed)
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister


Normal
Malfunction
Fuel cut flag
ON
OFF
ELCM switching valve
Close
Open
Time required : 20sec
Monitoring
Disable
Enable
FAIL flag
1
0
Numerator
1
0
Purge control duty ratio
0%
Fail Judgment
ELCM pressure (gauge)
Fail
Pass
Threshold
Pass Judgment
EN-11243

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Time when ELCM switching valve is closed	< 120000 ms
Purge control solenoid valve control duty	> 0%
Precondition Conditions to close the switching valve of ELCM intrusively.	
Battery voltage	≥ 10.9 V
Atmospheric pressure	≥ 75.1 kPa (563 mmHg, 22.2 inHg)
Integrated value of calculated purge airflow since engine start	≥ Value from Map
Atmospheric pressure – Intake manifold absolute pressure	≥ 10 kPa (75 mmHg, 3 inHg)
Fuel cut time	≥ 1000 ms
Ambient air temperature	≥ –25 °C (–13 °F)

Map

Ambient air temperature °C (°F)	0 (32)	10 (50)	20 (68)	30 (86)	40 (104)	50 (122)
Integrated value of calculated purge airflow since engine start g (oz)	2250 (79.36)	2250 (79.36)	2250 (79.36)	2250 (79.36)	2250 (79.36)	2250 (79.36)

3. GENERAL DRIVING CYCLE

Perform the diagnosis only once during ordinary driving.

4. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
ELCM pressure	> 666.6 Pa × –1 (5 mmHg × –1, 0.2 inHg × –1)

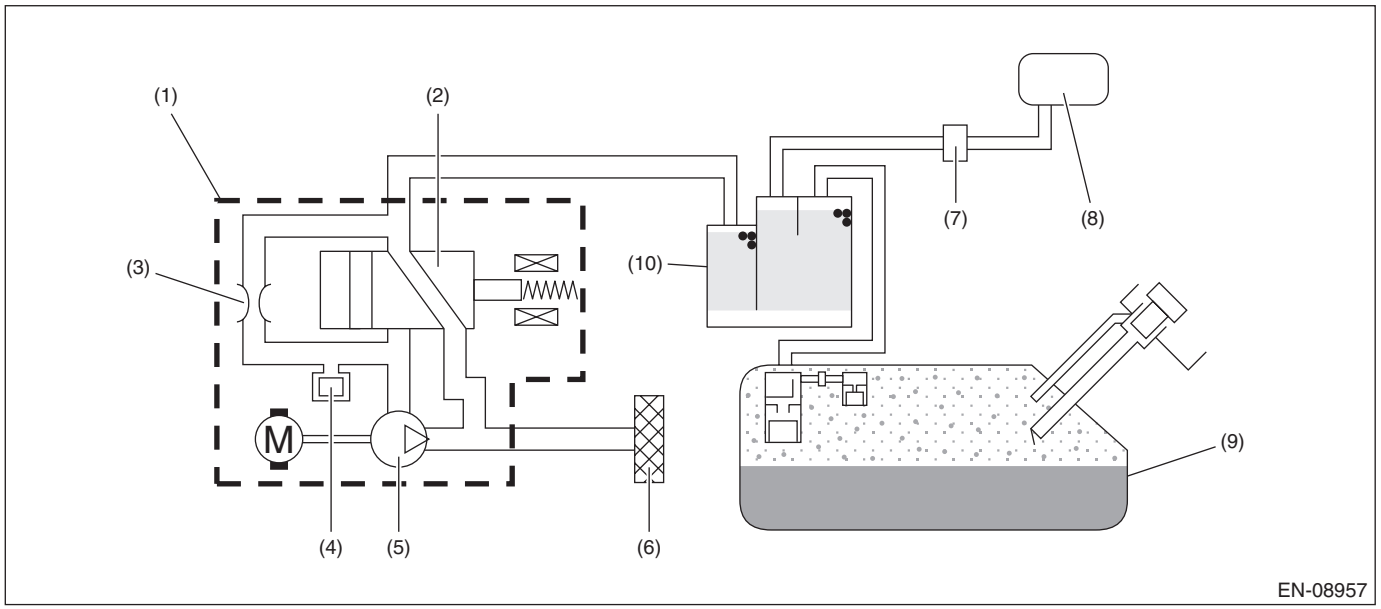
Time Needed for Diagnosis: 30000 ms – 10000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

CT:DTC P0451 EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/ SWITCH RANGE/PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of ELCM pressure sensor output properties.
Judge as NG when the ELCM pressure sensor output value is largely different from the intake manifold pressure when the ignition switch is ON.

2. COMPONENT DESCRIPTION



(1) ELCM
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Elapsed time after ignition switch is turned to ON	≥ 500 ms and < 60000 ms
Vehicle speed	< 1 km/h (0.621 MPH)
Soaking time	≥ 60 s
ELCM vacuum pump	Not in operation
ELCM switching valve	Open
Purge control	Not in operation

4. GENERAL DRIVING CYCLE

Perform the diagnosis once at ignition ON.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
|ELCM pressure sensor output value – intake manifold pressure (absolute pressure) when ignition switch is ON|	> 4732.9 Pa (35.5 mmHg, 1.4 inHg)

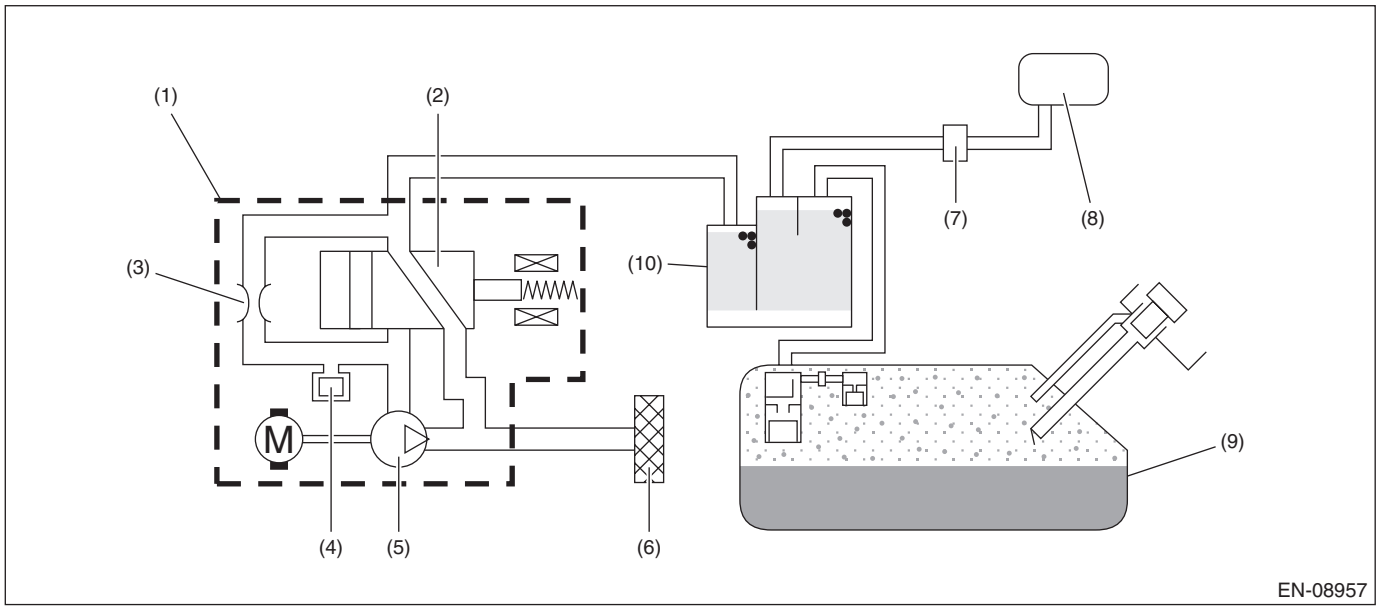
Time Needed for Diagnosis: 328 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

CU:DTC P0452 EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/ SWITCH LOW

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the ELCM pressure sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) ELCM
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.973 V

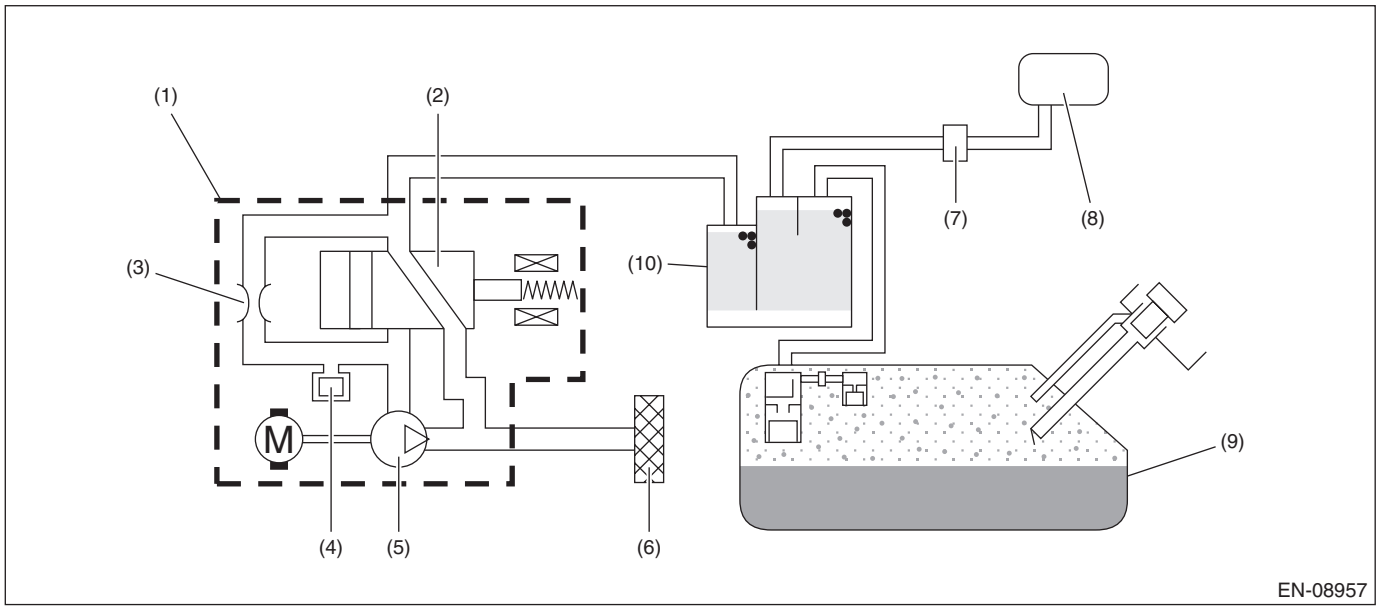
Time Needed for Diagnosis: 1000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

CV:DTC P0453 EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/ SWITCH HIGH

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the ELCM pressure sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) ELCM
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.095 V

Time Needed for Diagnosis: 1000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

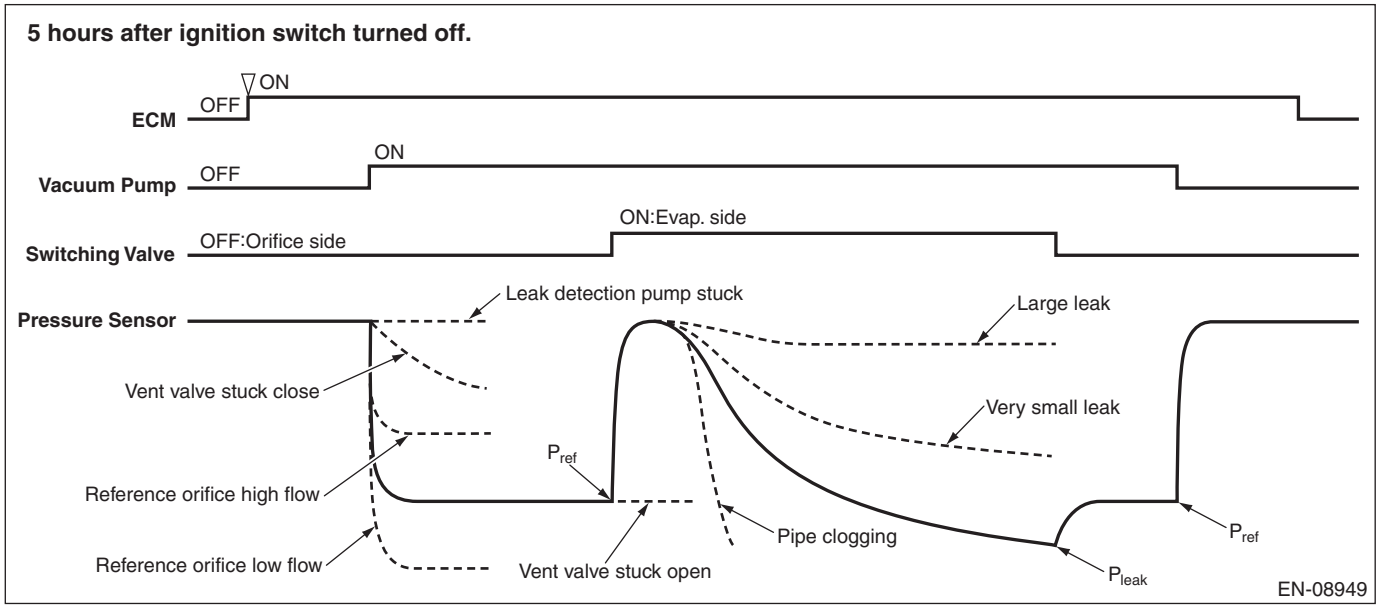
CW:DTC P0455 EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (LARGE LEAK)

1. OUTLINE OF DIAGNOSIS

This diagnosis judges whether the ELCM operation is normal or not, and whether the evaporative emission system has leak and clogging or not.
To purge the canister, after driving, perform the five hours soaking after ignition switch OFF in order to stabilize the evaporative gas status. * After 5, 7 or 9.5 hours passed, ECM is activated by soaking timer, and the leak check is started.
Judges whether the ELCM operation is normal or not, by measuring the reference pressure status via reference orifice (0.02 inch orifice). Judge as malfunction if the reference pressure is out of specified range. Then, judge whether there is a leak or not, by comparing the pressure (leak pressure) when the reference pressure and the evaporative emission system are in negative pressure condition. Judge as system leak in the evaporative emission system if the leak pressure is higher than reference pressure. Judge as clogging of pipe if the leak pressure becomes lower than the reference pressure within the specified amount of time.
0.02 inch leak and 0.04 inch leak can be distinguished by measuring the leak pressure.
The diagnosis results are stored inside ECM until the engine is started again.
*: When the test conditions are not met in 5 hours, perform diagnosis at elapsed time of 7 hours. When the test conditions are not met in 7 hours, perform diagnosis at elapsed time of 9.5 hours.

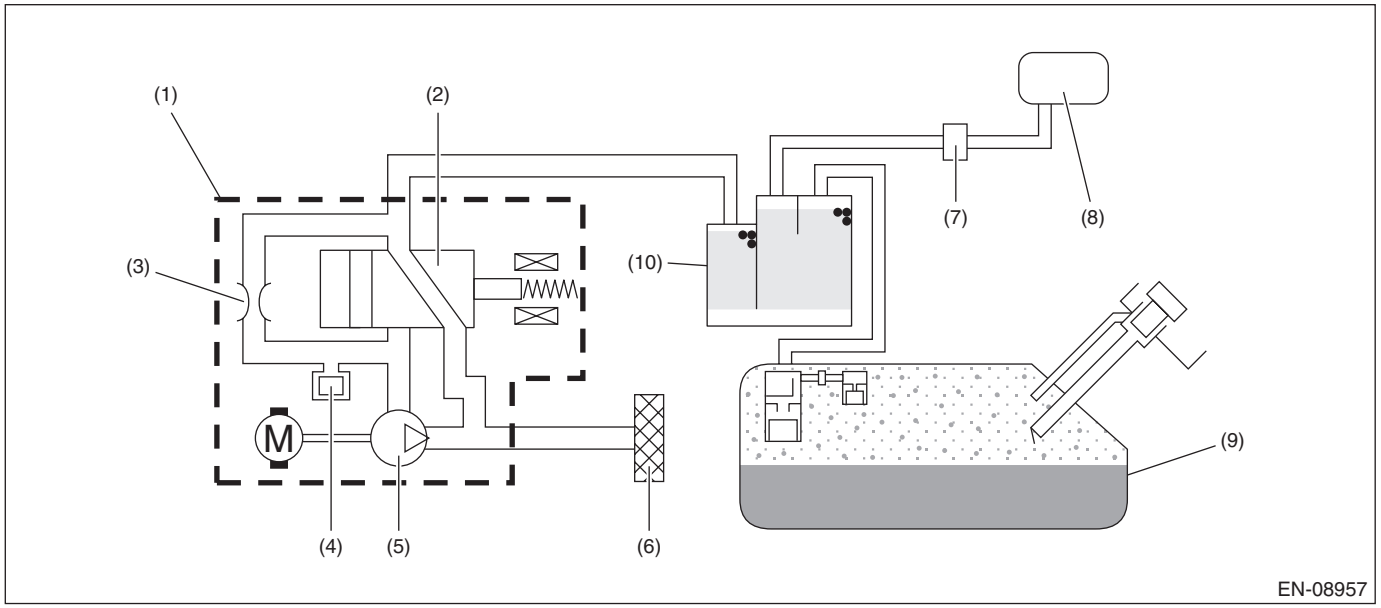
Diagnostic item	
ELCM system (ELCM body)	Vacuum pump stuck Switching valve stuck to open Switching valve stuck to close Reference orifice flow large Reference orifice flow small
Leak check	Large leak • 0.04 inch leak • Fuel cap loose • Fuel cap off • System malfunction
	Very small leak • 0.02 inch leak
Clogging of pipe	—

OUTLINE OF DIAGNOSIS



2. COMPONENT DESCRIPTION

ELCM consists of the pressure sensor, the reference orifice (diameter of 0.02 inch), the vacuum pump which introduces the negative pressure into evaporative emission system, and the switching valve which switches the passage to introduce the negative pressure.



(1) ELCM
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Activation of soaking timer	Completed
Battery voltage	≥ 10.9 V
Ignition switch	OFF
Engine coolant temperature	≥ 4.4 °C (39.9 °F) and < 45 °C (113 °F)
Atmospheric pressure	≥ 75.1 kPa (563 mmHg, 22.2 inHg) and < 110 kPa (825 mmHg, 32.5 inHg)
Accumulated purge amount during previous driving cycle	≥ Value of Map 1

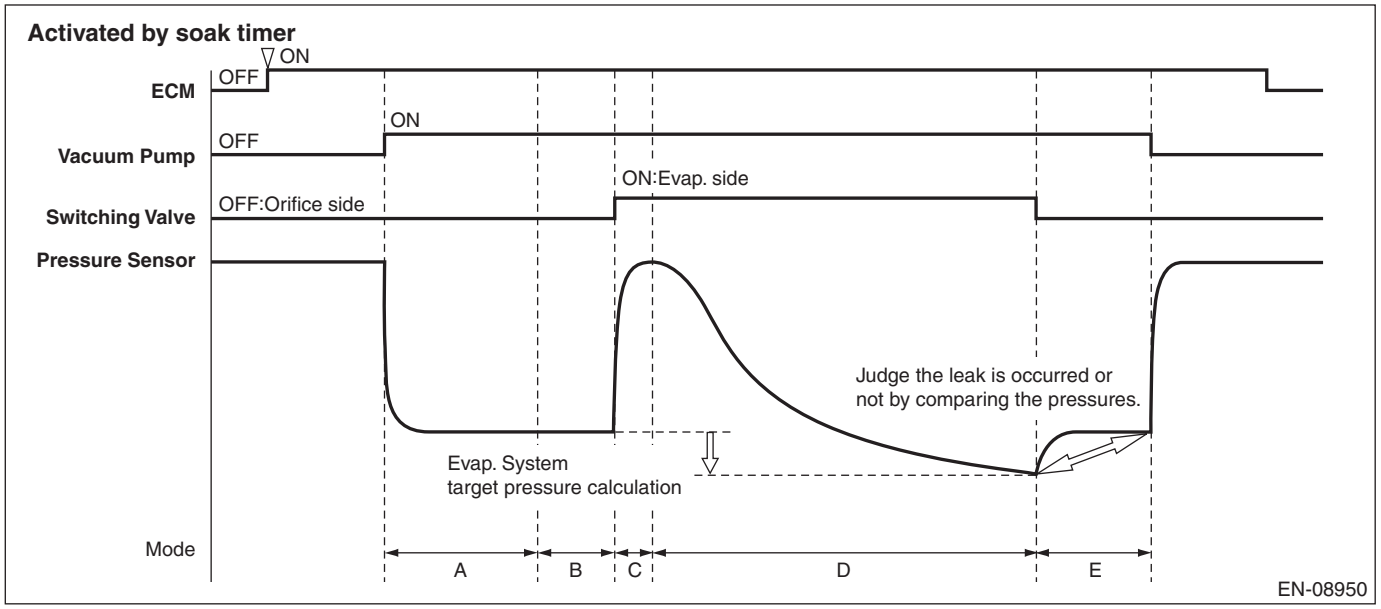
Map 1

Engine coolant temperature °C (°F)	0 (32)	30 (86)	35 (95)	40 (104)	45 (113)
Accumulated purge amount during previous driving cycle g (oz)	1500 (52.91)	1500 (52.91)	15000 (529.05)	25000 (881.75)	35000 (1234.45)

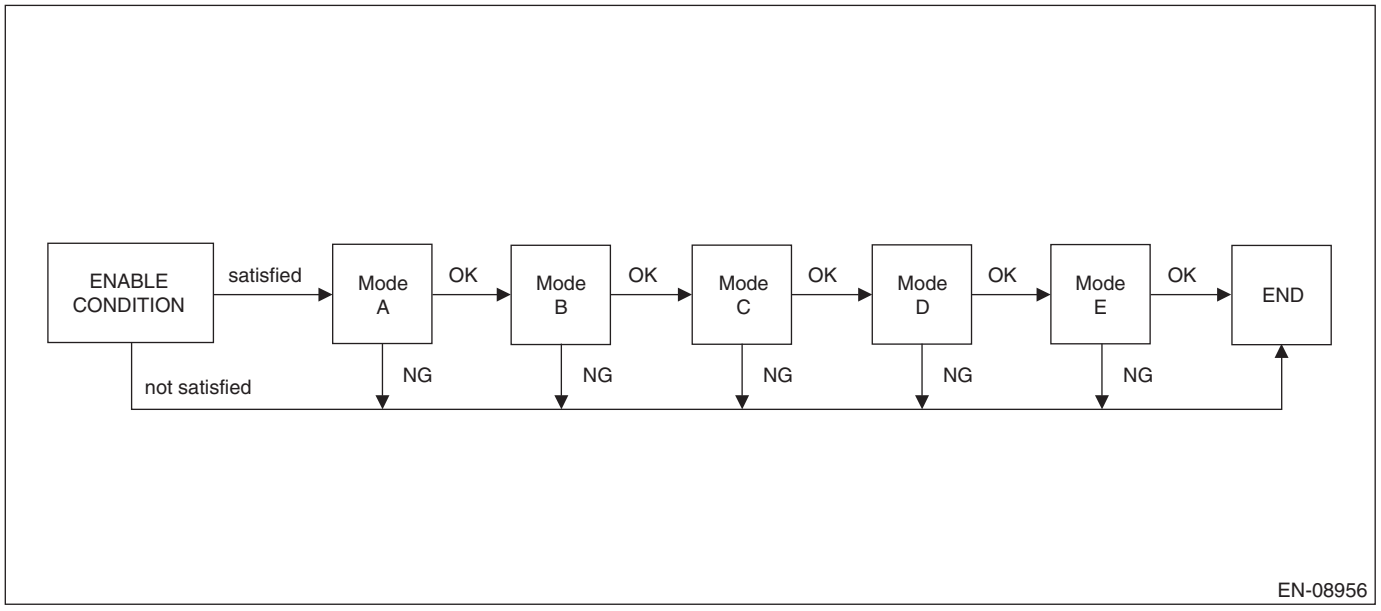
4. GENERAL DRIVING CYCLE

Perform the diagnosis only once when 5, 7 or 9.5 hours has passed after ignition switch is OFF. For more detail, refer to “OUTLINE OF DIAGNOSIS”. <Ref. to GD(H4DO HEV)-115, OUTLINE OF DIAGNOSIS, DTC P0455 EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (LARGE LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>

5. DIAGNOSTIC METHOD



Mode	Explanation of Mode	Diagnosis Period
A	Vacuum pump operation confirmation and characteristics stability	7 s or less & 300 s
B	Measurement of reference pressure for setting the target negative pressure	40 s or less
C	Switching valve operation confirmation	12 s or less
D	Clogging of pipe diagnosis and leak pressure measurement	900 s or less
E	Reference pressure measurement for judgment	40 s or less



Mode A (Vacuum pump operation confirmation and characteristics stability)

Purpose: Detect the vacuum pump operation trouble.
Judge as NG when the following conditions are established.
Judge as OK if the following conditions are not established, and warm up for five minutes to stabilize the vacuum pump characteristics.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
Pressure sensor output value	> –0.2 kPa (–1.68 mmHg, –0.1 inHg)	P2404

Mode B (Measurement of reference pressure for setting the target negative pressure)

1. Purpose: Judge the reference pressure stability.
Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
|Pressure sensor maximum output value – Pressure sensor minimum output value|	> 0.3 kPa (2.355 mmHg, 0.1 inHg)	P2404

2. Purpose: Judge whether the reference pressure is within the normal range, and detect the vacuum pump and orifice malfunctions.
Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
Reference pressure for setting the target negative pressure	< Value of Map 2 or > Value of Map 3	P2404

Map 2

Atmospheric pressure kPa (mmHg, inHg)	70 (525, 20.7)	80 (600, 23.6)	90 (675, 26.6)	100 (750, 29.5)
Reference pressure for setting the target negative pressure kPa (mmHg, inHg)	-4 (-29.790, -1.2)	-4.1 (-30.593, -1.2)	-4.2 (-31.395, -1.2)	-4.3 (-32.190, -1.3)

Map 3

Atmospheric pressure kPa (mmHg, inHg)	70 (525, 20.7)	80 (600, 23.6)	90 (675, 26.6)	100 (750, 29.5)
Reference pressure for setting the target negative pressure kPa (mmHg, inHg)	-0.9 (-7.065, -0.3)	-1 (-7.860, -0.3)	-1.2 (-8.663, -0.3)	-1.3 (-9.465, -0.4)

Mode C (Switching valve operation confirmation)

Purpose: Measure the pressure increase when switching valve is changed from open to close, and detect the stuck to open/close malfunctions of the switching valve.
Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
Pressure sensor output value – Reference pressure for setting the target negative pressure	< 0.2 kPa (1.68 mmHg, 0.1 inHg)	P2404

Mode D (Clogging of pipe diagnosis and leak pressure measurement)

1. **Clogging of pipe**
   Purpose: Measure the time required for the evaporative emission system to reach the target negative pressure by the vacuum pump, and detect the clogging of pipe trouble.
   Judge as clogging of pipe malfunction if the evaporative emission system reaches to the target negative pressure within the specified time.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
Time required to reach to the target negative pressure For target vacuum, use one of the followings. •Reference pressure for target vacuum setting – value of Map 4 •–5 kPa (–37.298 mmHg, –1.5 inHg)	≤ 25000 ms	P1451

Map 4

Time of negative pressure introduction ms	0	100000	200000	300000	400000	500000	600000	700000	800000	900000	1000000	1100000	1200000
Reference pressure for setting the target negative pressure – Pressure sensor output value kPa (mmHg, inHg)	0.9 (7.058, 0.3)	0.9 (7.058, 0.3)	0.9 (7.058, 0.3)	0.9 (7.058, 0.3)	0.9 (7.058, 0.3)	0.9 (7.058, 0.3)	0.9 (7.058, 0.3)	0.9 (7.058, 0.3)	0.9 (7.058, 0.3)	0.9 (7.058, 0.3)	0.9 (7.058, 0.3)	0.9 (7.058, 0.3)	0.9 (7.058, 0.3)

2. **Leak pressure measurement**
   Purpose: Measure the pressure (leak pressure) when the evaporative emission system becomes the negative pressure by the vacuum pump.
   Store the pressure as a leak pressure while the following conditions are met.

Judgment Value

Conditions for storing the leak pressure	Threshold Value
When any one of the followings is established:	
• Reference pressure for setting the target negative pressure – Pressure sensor output value	≥ Value of Map 4
• Pressure sensor output value	< –5 kPa (–37.298 mmHg, –1.5 inHg)
• Time of negative pressure introduction	≥ 900000 ms

Mode E (Measurement of reference pressure for judgment)

1. Purpose: Judge the reference pressure stability.
Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
|Pressure sensor maximum output value – Pressure sensor minimum output value|	> 0.3 kPa (2.355 mmHg, 0.1 inHg)	P2404

2. Purpose: Judge whether the reference pressure is within the normal range, and detect the vacuum pump and orifice malfunctions. Judge the vacuum pump performance stability.
Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
Reference pressure for judgment	< Value of Map 5 or > Value of Map 6	P2404

Map 5

Atmospheric pressure kPa (mmHg, inHg)	70 (525, 20.7)	80 (600, 23.6)	90 (675, 26.6)	100 (750, 29.5)
Reference pressure for judgment kPa (mmHg, inHg)	-4.5 (-34.020, -1.3)	-4.6 (-34.815, -1.4)	-4.7 (-35.618, -1.4)	-4.9 (-36.420, -1.4)

Map 6

Atmospheric pressure kPa (mmHg, inHg)	70 (525, 20.7)	80 (600, 23.6)	90 (675, 26.6)	100 (750, 29.5)
Reference pressure for judgment kPa (mmHg, inHg)	-0.8 (-6.180, -0.2)	-0.9 (-6.983, -0.3)	-1 (-7.785, -0.3)	-1.1 (-8.580, -0.3)

3. Purpose: Judge the presence of evaporative emission system leak.
Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
<Large leak (0.04 inch)> Leak pressure lleakjdg = (Reference pressure for judgment) × 0.377 – (–45.5 Pa)	≥ lleakjdg (Pa)	P0455
<Very small leak (0.02 inch)> Leak pressure	< lleakjdg (Pa)	P0456

Time Needed for Diagnosis: Approx. 23 min
At next engine start, confirm whether the enable conditions are satisfied even though refueling has been done during soaking, and determine the malfunction.
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

CX:DTC P0456 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK)

1. OUTLINE OF DIAGNOSIS

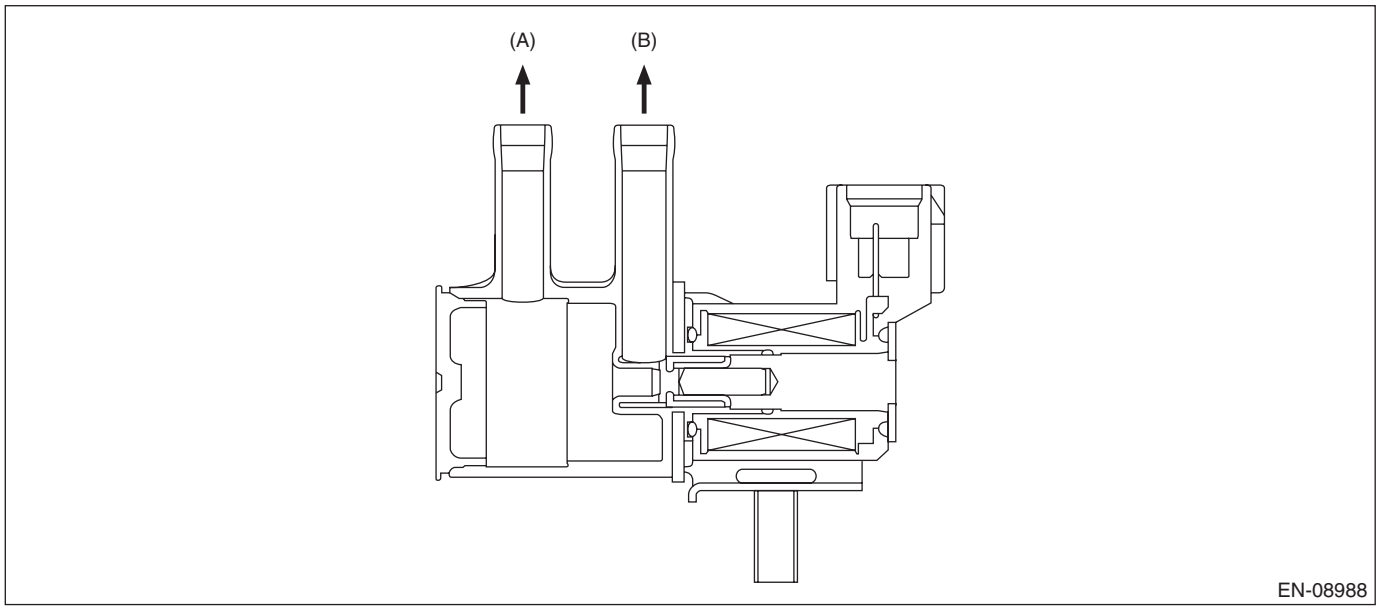
NOTE:
For the detection standard, refer to DTC P0455. <Ref. to GD(H4DO HEV)-115, DTC P0455 EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (LARGE LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CY:DTC P0458 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT LOW

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the purge control solenoid valve.
Judge as NG when the ECM output level differs from the actual terminal level.

2. COMPONENT DESCRIPTION



(A) To canister (B) To intake manifold

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Duty ratio of “ON”	< 0.75

4. GENERAL DRIVING CYCLE

Always perform the diagnosis after starting the engine.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Terminal output voltage	≤ Battery voltage × 0.34

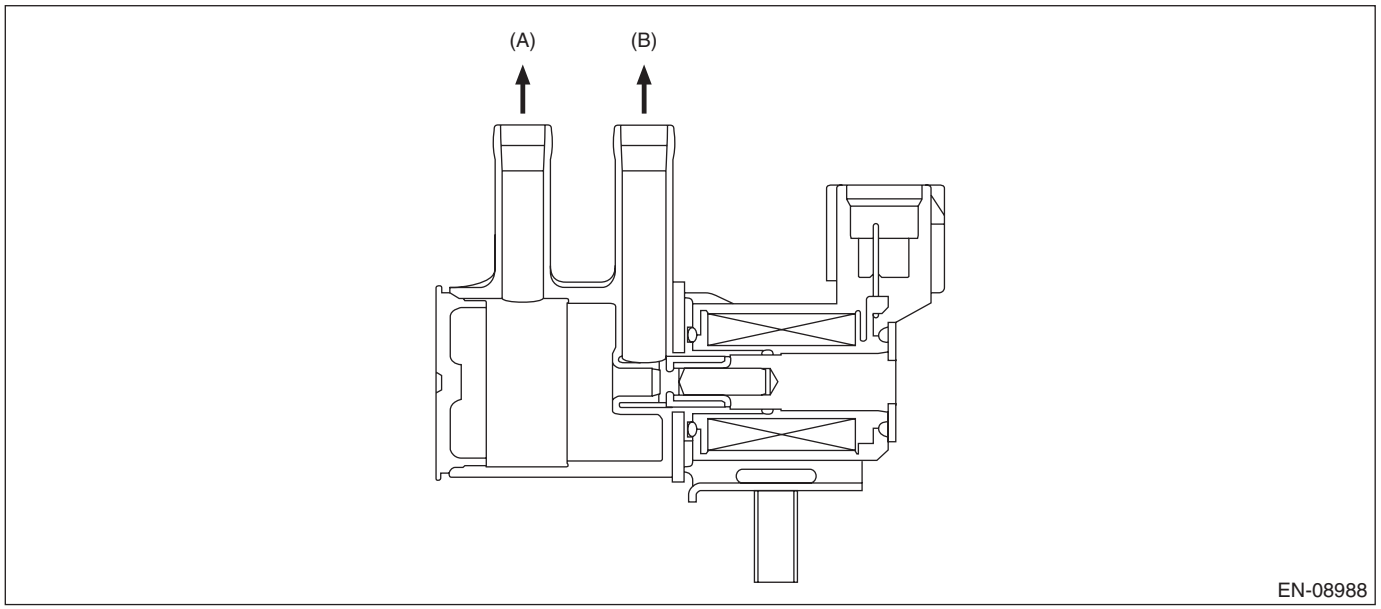
Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

CZ:DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the purge control solenoid valve.
Judge as NG when the ECM output level differs from the actual terminal level.

2. COMPONENT DESCRIPTION



(A) To canister (B) To intake manifold

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Duty ratio of “ON”	≥ 0.25

4. GENERAL DRIVING CYCLE

Always perform the diagnosis after starting the engine.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Terminal output current	≥ 12 A

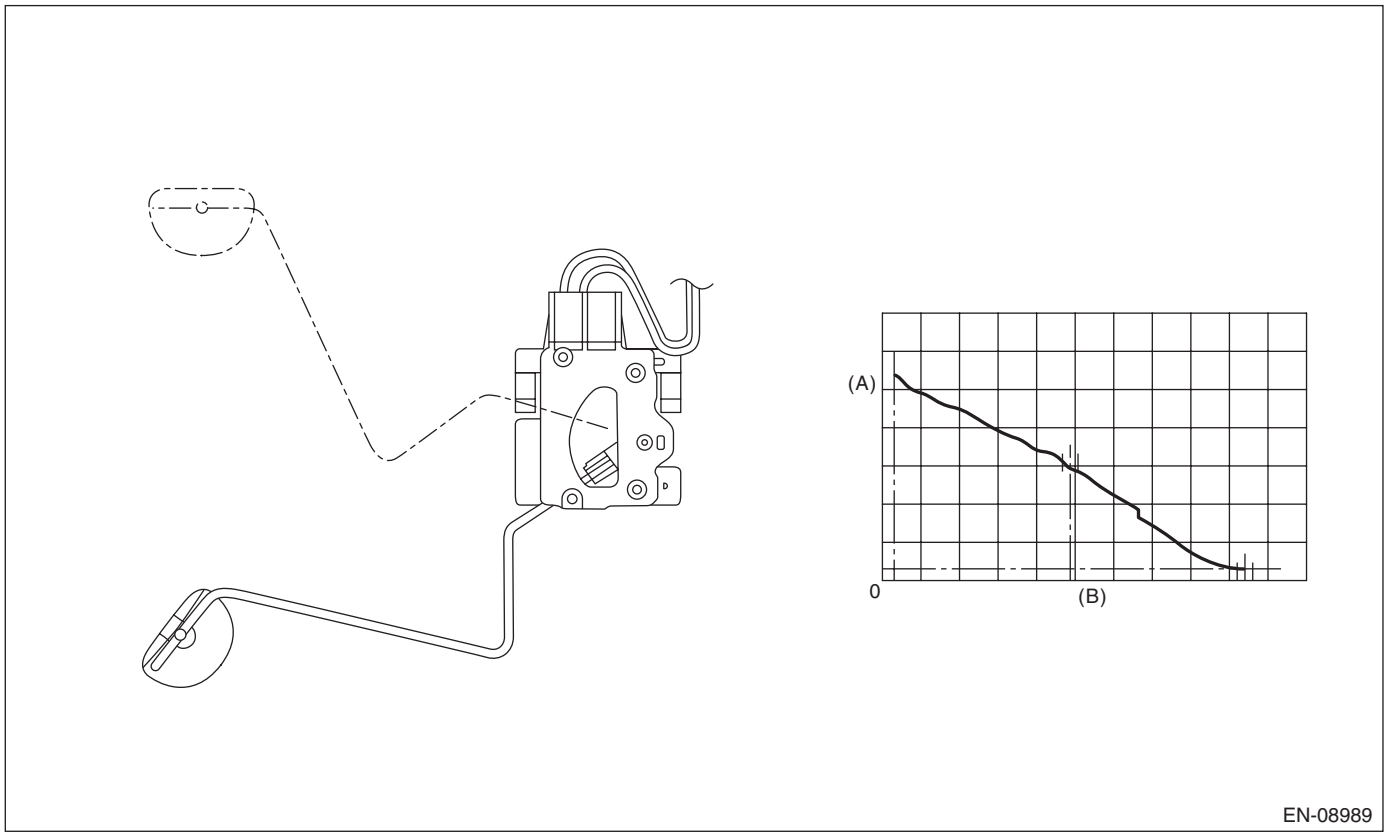
Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DA:DTC P0461 FUEL LEVEL SENSOR "A" CIRCUIT RANGE/PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Detect malfunctions of the fuel level sensor output property.
If the fuel level does not vary in a particular driving condition / engine condition where it should, judge as NG.

2. COMPONENT DESCRIPTION



(A) Fuel level (B) Resistance

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Accumulated amount of intake air	≥ 165375 g (5832.78 oz)
Max. – min. values of fuel level output	< 2.6 ℓ (0.69 US gal, 0.57 Imp gal)
Battery voltage	≥ 10.9 V
Engine speed	< 10000 rpm
Elapsed time after starting the engine	≥ 5000 ms

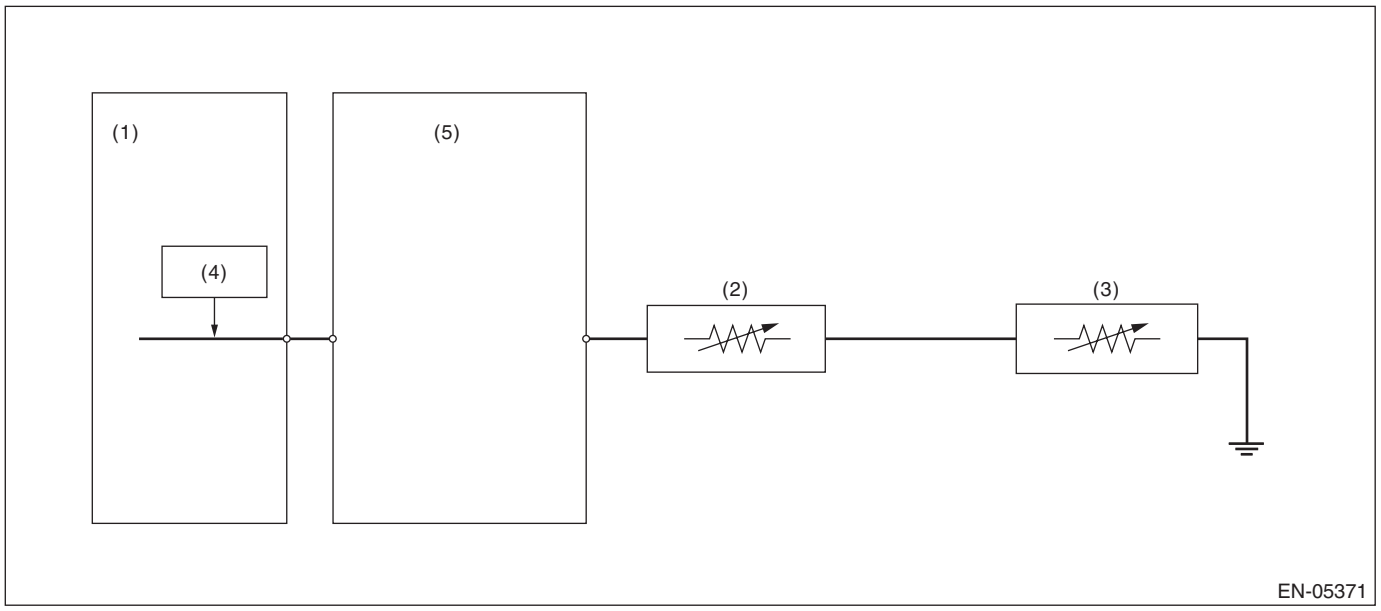
Time Needed for Diagnosis: Less than 1 second
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DB:DTC P0462 FUEL LEVEL SENSOR “A” CIRCUIT LOW

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of fuel level sensor. Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Fuel level sensor
(3) Fuel sub level sensor
(4) Detecting circuit
(5) Body integrated unit

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Elapsed time after ignition switch is turned to ON	≥ 3000 ms

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 2.211 V

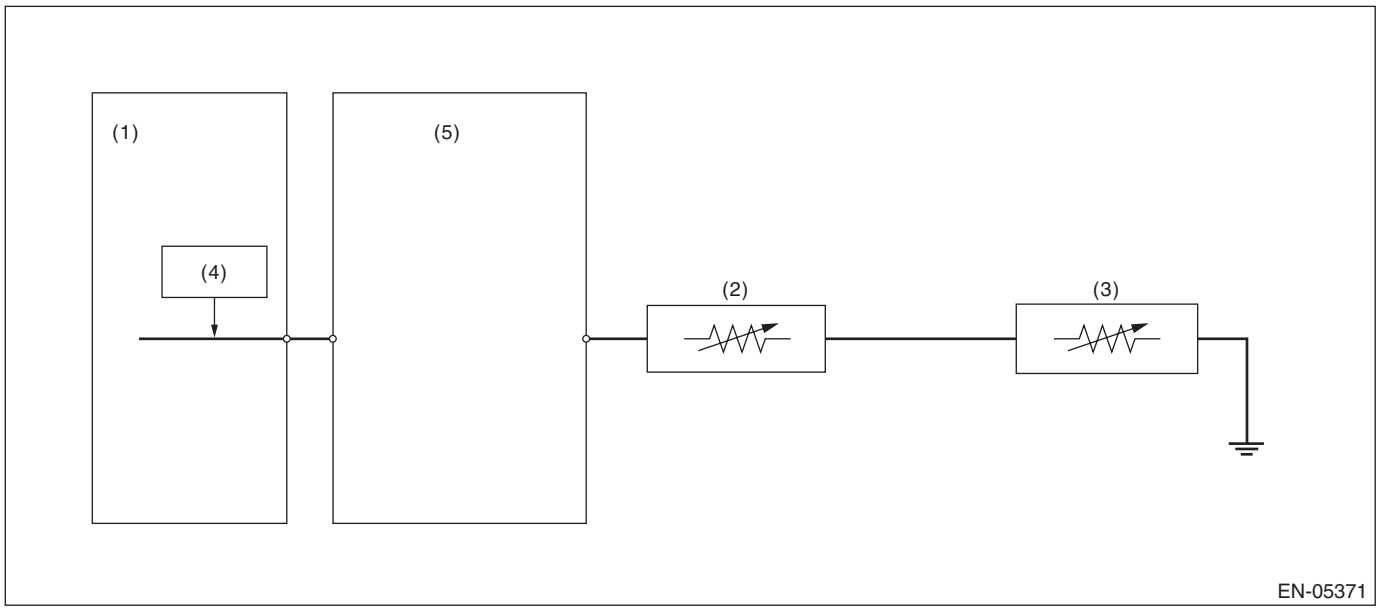
Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DC:DTC P0463 FUEL LEVEL SENSOR “A” CIRCUIT HIGH

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of fuel level sensor. Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Fuel level sensor
(3) Fuel sub level sensor
(4) Detecting circuit
(5) Body integrated unit

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 12 V

Time Needed for Diagnosis: 1000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DD:DTC P0500 VEHICLE SPEED SENSOR “A”

1. OUTLINE OF DIAGNOSIS

Judge as NG when outside of the judgment value.
Judge NG when the received data from VDCCM&H/U is abnormal vehicle speed, and the vehicle speed data is impossible.

2. COMPONENT DESCRIPTION

Vehicle speed signals are taken in to the VDC control module and hydraulic control unit, and normal/erroneous data of the ABS wheel speed sensor is received by CAN communication from the VDC control module and hydraulic control unit.

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Front ABS wheel speed sensor status	Malfunction
Either of the following is established	
Front left wheel speed	≥ 300 km/h (186.4 MPH)
Front right wheel speed	≥ 300 km/h (186.4 MPH)

Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

DE:DTC P0506 IDLE AIR CONTROL SYSTEM RPM LOWER THAN EXPECTED

1. OUTLINE OF DIAGNOSIS

Detect the malfunction that actual engine speed is not close to target engine speed during idling. Judge as NG when actual engine speed is not close to target engine speed during idling.

2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Engine coolant temperature	≥ 50 °C (122 °F)
Battery voltage	≥ 10.9 V
Atmospheric pressure	≥ 75.1 kPa (563 mmHg, 22.2 inHg)
Fuel level	≥ 7.8 ℓ (2.06 US gal, 1.72 Imp gal)
Elapsed time after starting the engine	≥ 10 s
Accelerator pedal position	= 0%
Lambda value (left and right)	≥ 0.85 and < 1.151
After intake manifold pressure changes by 133.3 kPa (1000 mmHg, 39.4 inHg) or more.	> 0 s
Elapsed time after switching neutral position switch to ON/OFF	> 5 s
Vehicle speed	0 km/h (0 MPH)

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously at idling after warming up engine.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Actual engine speed – Targeted engine speed	< –100 rpm

Time Needed for Diagnosis: 15 s × 1 time(s)
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DF:DTC P0507 IDLE AIR CONTROL SYSTEM RPM HIGHER THAN EXPECTED

1. OUTLINE OF DIAGNOSIS

Detect the malfunction that actual engine speed is not close to target engine speed during idling. Judge as NG when actual engine speed is not close to target engine speed during idling.

2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Engine coolant temperature	≥ 50 °C (122 °F)
Battery voltage	≥ 10.9 V
Atmospheric pressure	≥ 75.1 kPa (563 mmHg, 22.2 inHg)
Fuel level	≥ 7.8 ℓ (2.06 US gal, 1.72 Imp gal)
Elapsed time after starting the engine	≥ 10 s
Accelerator pedal position	= 0%
Lambda value (left and right)	≥ 0.85 and < 1.151
After intake manifold pressure changes by 133.3 kPa (1000 mmHg, 39.4 inHg) or more.	> 0 s
Elapsed time after switching neutral position switch to ON/OFF	> 5 s
Vehicle speed	0 km/h (0 MPH)

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously at idling after warming up engine.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Actual – Target engine speed	≥ 200 rpm

Time Needed for Diagnosis: 15 s × 1 time(s)
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DG:DTC P050A COLD START IDLE AIR CONTROL SYSTEM PERFORMANCE

1. OUTLINE OF DIAGNOSIS

• When cold, the abnormality in the control of target engine speed increase is detected. (P050A)

• Idle speed diagnosis

Judge as NG when actual engine speed is not close to target engine speed at cold start.

• Detect malfunctions of the catalyst advanced idling retard angle control. (P050B)

Judge as NG when ECM is not controlling the angle properly during catalyst advanced idling retard angle control.

• Final ignition timing diagnosis

Judge as NG when actual retard amount is under the specified value at cold start.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
<Idle speed diagnosis>	
Atmospheric pressure	≥ 75.1 kPa (563 mmHg, 22.2 inHg)
Battery voltage	> 10.9 V
Engine condition	In operation
Vehicle speed	≤ 2 km/h (1.2 MPH)
Engine coolant temperature	≤ 60 °C (140 °F)
Intake air amount sum value	≤ Value of Map 1
Elapsed time after gear position change (P ←→ D or N ←→ D)	≥ 3000 ms
Throttle opening angle	< 0.37 °
Fuel property	Not extremely low volatility
Elapsed time after starting the engine	≥ 2000 ms
<Final ignition timing diagnosis>	
Atmospheric pressure	≥ 75.1 kPa (563 mmHg, 22.2 inHg)
Battery voltage	> 10.9 V
Engine condition	In operation
Vehicle speed	≤ 2 km/h (1.2 MPH)
Engine coolant temperature	≤ 60 °C (140 °F)
Intake air amount sum value	≤ Value of Map 2
Elapsed time after gear position change (P ←→ D or N ←→ D)	≥ 3000 ms
Throttle opening angle	< 0.37 °
Fuel property	Not extremely low volatility
Target retard amount	≥ Value from Map 3

Map 1

Engine coolant temperature at engine starting °C (°F)	-40 (-40)	-30 (-22)	-20 (-4)	-10 (14)	0 (32)	10 (50)	20 (68)	30 (86)
Intake air amount sum value g (oz)	770 (27.16)	690 (24.34)	620 (21.87)	560 (19.75)	510 (17.99)	450 (15.87)	390 (13.76)	320 (11.29)

Engine coolant temperature at engine starting °C (°F)	40 (104)	50 (122)	60 (140)	70 (158)	80 (176)	90 (194)	100 (212)	110 (230)
Intake air amount sum value g (oz)	260 (9.17)	210 (7.41)	180 (6.35)	180 (6.35)	180 (6.35)	180 (6.35)	180 (6.35)	180 (6.35)

Map 2

Engine coolant temperature at engine starting °C (°F)	-40 (-40)	-30 (-22)	-20 (-4)	-10 (14)	0 (32)	10 (50)	20 (68)	30 (86)
Intake air amount sum value g (oz)	770 (27.16)	690 (24.34)	620 (21.87)	560 (19.75)	510 (17.99)	450 (15.87)	390 (13.76)	320 (11.29)

Engine coolant temperature at engine starting °C (°F)	40 (104)	50 (122)	60 (140)	70 (158)	80 (176)	90 (194)	100 (212)	110 (230)
Intake air amount sum value g (oz)	260 (9.17)	210 (7.41)	180 (6.35)	180 (6.35)	180 (6.35)	180 (6.35)	180 (6.35)	180 (6.35)

Map 3

Engine coolant temperature	-40 °C (-40 °F)	-30 °C (-22 °F)	-20 °C (-4 °F)	-10 °C (14 °F)	0 °C (32 °F)	10 °C (50 °F)	20 °C (68 °F)	30 °C (86 °F)	40 °C (104 °F)	50 °C (122 °F)	60 °C (140 °F)
Target retard amount	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA

3. GENERAL DRIVING CYCLE

Perform the diagnosis at cold start.

4. DIAGNOSTIC METHOD

• Idle speed diagnosis

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Actual engine speed – Target engine speed	< Value of Map 4

Map 4

Engine coolant temperature	–40 °C (–40 °F)	–30 °C (–22 °F)	–20 °C (–4 °F)	–10 °C (14 °F)	0.00 °C (32 °F)	10.00 °C (50 °F)	20.00 °C (68 °F)	30.00 °C (86 °F)	40.00 °C (104 °F)	50.00 °C (122 °F)	60.00 °C (140 °F)
Threshold Value	–300 rpm	–300 rpm	–300 rpm	–300 rpm	–300 rpm	–300 rpm	–300 rpm	–300 rpm	–300 rpm	–300 rpm	–300 rpm

Time Needed for Diagnosis: 6000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

• Final ignition timing diagnosis

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Final ignition timing – ignition timing during CSERS* *: Ignition timing during CSERS (Cold Start Emission Reduction Strategy) = Base ignition timing – retard amount	> Value of Map 5

Map 5

Engine coolant temperature	-40 °C (-40 °F)	-30 °C (-22 °F)	-20 °C (-4 °F)	-10 °C (14 °F)	0 °C (32 °F)	10 °C (50 °F)	20 °C (68 °F)	30 °C (86 °F)	40 °C (104 °F)	50 °C (122 °F)	60 °C (140 °F)
Threshold Value	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA

Time Needed for Diagnosis: 7000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DH:DTC P050B COLD START IGNITION TIMING PERFORMANCE

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P050A. <Ref. to GD(H4DO HEV)-129, DTC P050A COLD START IDLE AIR CONTROL SYSTEM PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

DI: DTC P0512 STARTER REQUEST CIRCUIT

1. OUTLINE OF DIAGNOSIS

Detect abnormal continuity in the starter SW1.
Judge as ON NG when the starter SW 1 signal remains ON.

2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 8 V
Engine revs (only at abnormality judgment)	> 500 rpm

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Starter SW1 voltage	≥ Battery voltage × 0.85

Time Needed for Diagnosis: 30000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

DJ:DTC P0560 SYSTEM VOLTAGE

1. OUTLINE OF DIAGNOSIS

Detect the open/short circuit of back-up power supply circuit.
Judge as NG when the backup power voltage is low.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Voltage of back-up power supply	≤ 3.5 V

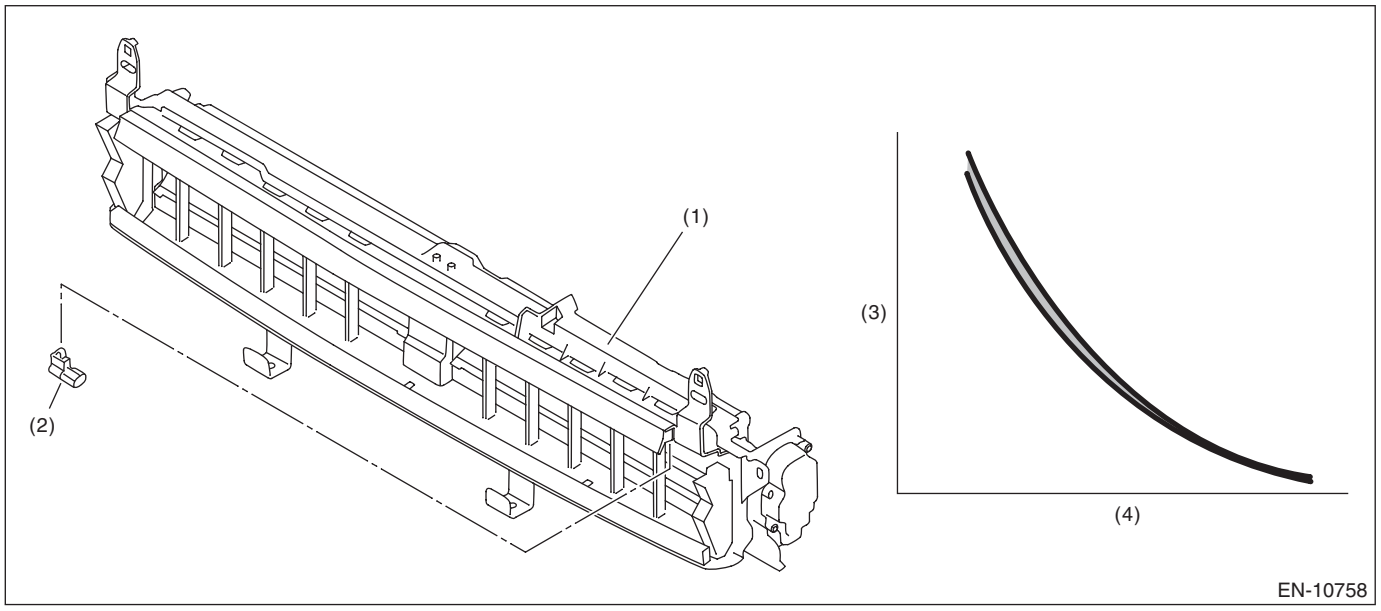
Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

DK:DTC P059A ACTIVE GRILLE SHUTTER "A" POSITION SENSOR CIRCUIT

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of active grille shutter position sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Active grille shutter
(2) Ambient air temperature sensor
(3) Resistance value (kΩ)
(4) Ambient air temperature (°C (°F))

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Command to active grille shutter	Open or close

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Input pulse of active grille shutter position sensor	= 0

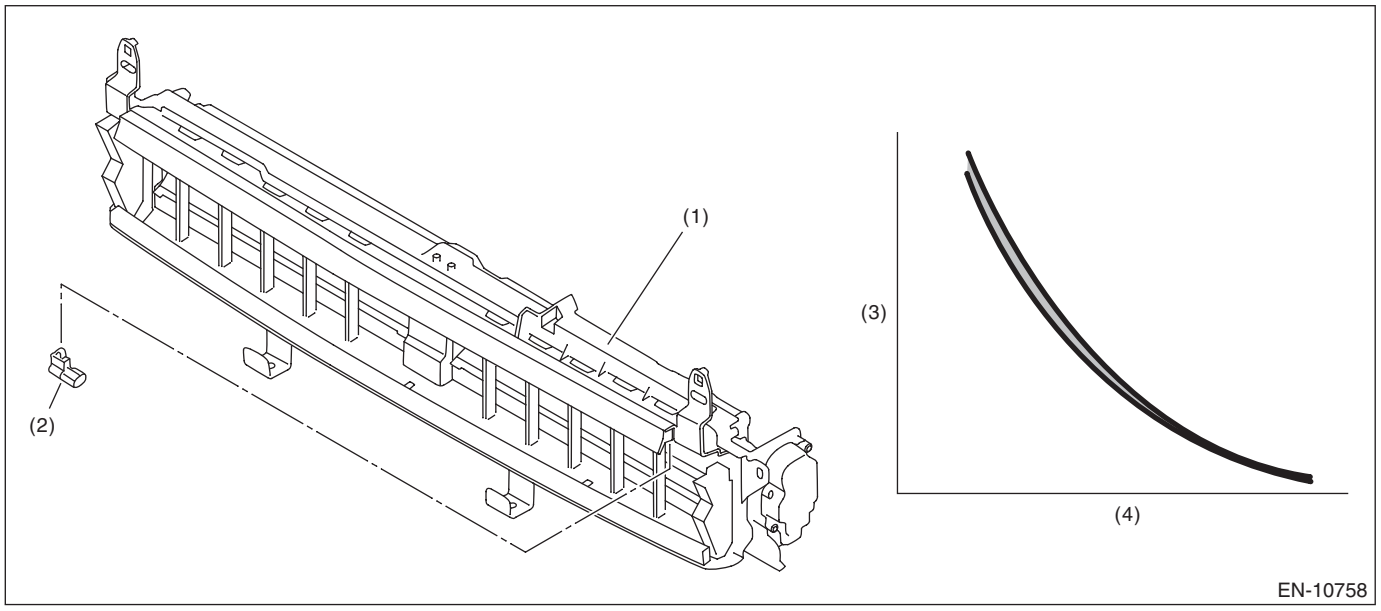
Time Needed for Diagnosis: 2000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

DL:DTC P059F ACTIVE GRILLE SHUTTER "A" PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of the response to active grille shutter open/close request.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Active grille shutter
(2) Ambient air temperature sensor
(3) Resistance value (kΩ)
(4) Ambient air temperature (°C (°F))

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Active grille shutter drive	Yes

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Operation angle in 15000 ms of active grille shutter	< 88%

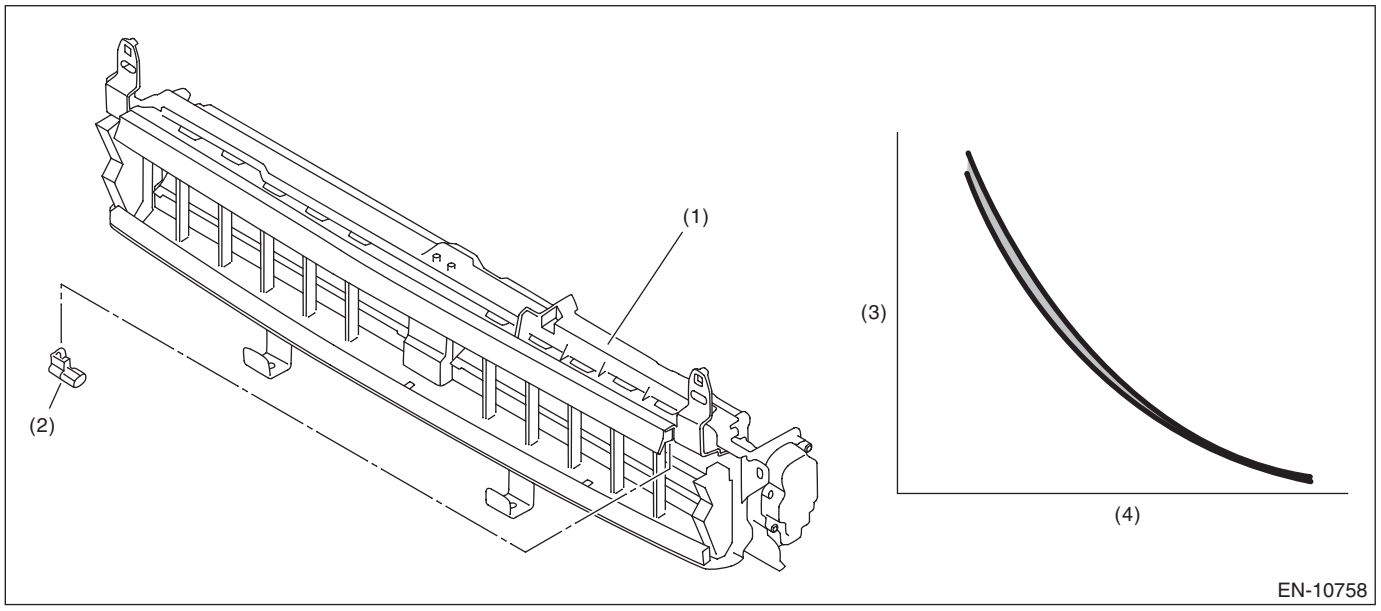
Time Needed for Diagnosis: 15000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DM:DTC P05A0 ACTIVE GRILLE SHUTTER "A" STUCK

1. OUTLINE OF DIAGNOSIS

Detect that active grille shutter does not open/close with foreign matter jammed or a fault.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Active grille shutter
(2) Ambient air temperature sensor
(3) Resistance value (kΩ)
(4) Ambient air temperature (°C (°F))

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Command to active grille shutter	Open or close

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Maximum value of active grille shutter position sensor (when controlled at power supply ON)	< 70 deg
Operating angle of active grille shutter (when controlled at power supply ON)	< 88%

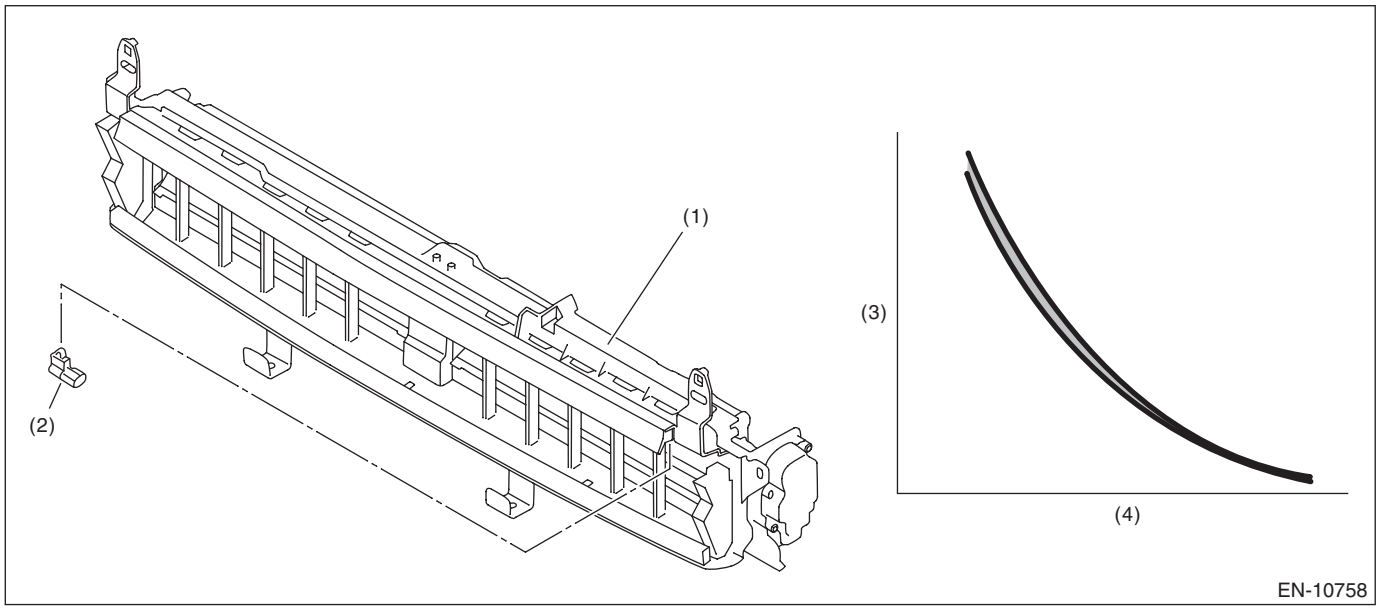
Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DN:DTC P05A1 ACTIVE GRILLE SHUTTER "A" RANGE OVER

1. OUTLINE OF DIAGNOSIS

Detect the excessive rotation beyond the specific angle with active grille shutter fault.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Active grille shutter
(2) Ambient air temperature sensor
(3) Resistance value (kΩ)
(4) Ambient air temperature (°C (°F))

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Command to active grille shutter	Open or close

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Maximum value of active grille shutter position sensor (when controlled at power supply ON)	> 155 deg
Operating angle of active grille shutter (when controlled at power supply ON)	> 112%

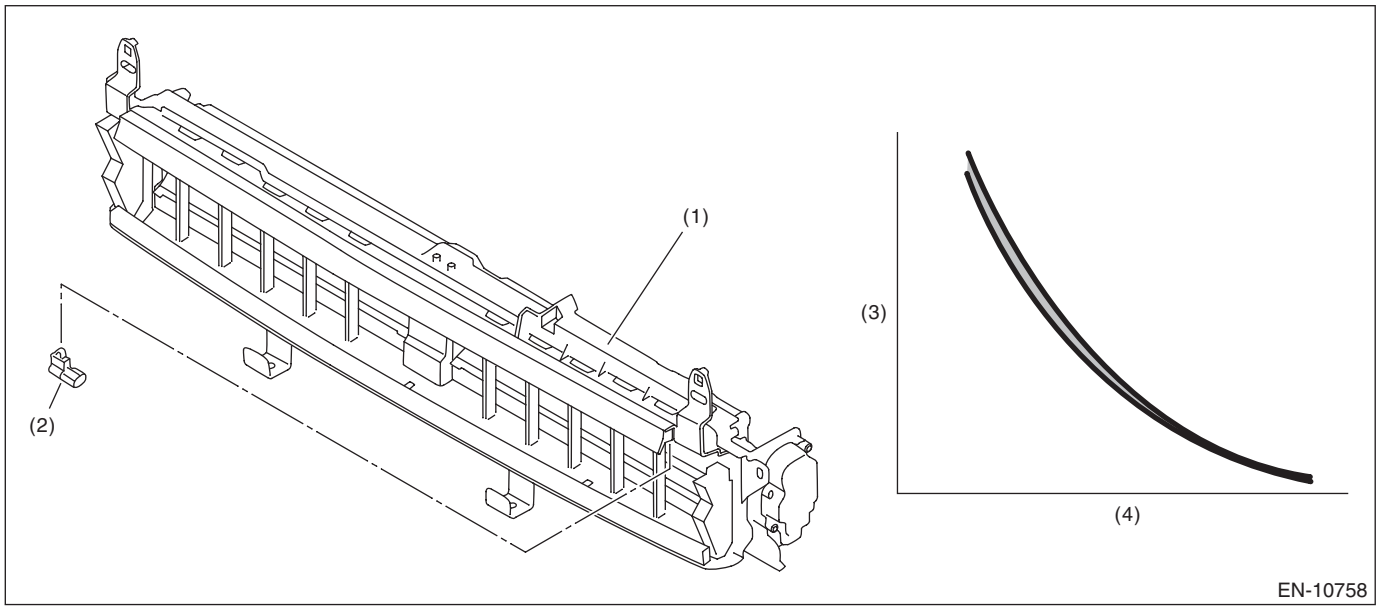
Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DO:DTC P05A2 ACTIVE GRILLE SHUTTER "A" CONTROL CIRCUIT

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of active grille shutter motor circuit.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Active grille shutter
(2) Ambient air temperature sensor
(3) Resistance value (kΩ)
(4) Ambient air temperature (°C (°F))

3. ENABLE CONDITIONS

Diagnosis 1

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

Diagnosis 2

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Command to active grille shutter	Open or close

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Diagnosis 1

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Signal of malfunction from AGASCM	ON
Motor circuit current during open or close command to active grille shutter	< 10 mA or > 650 mA

Time Needed for Diagnosis: 2500 ms

Diagnosis 2

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Signal of malfunction from AGASCM	ON
Motor circuit current during open or close command to active grille shutter	< 10 mA or > 10 mA

Time Needed for Diagnosis: 2500 ms

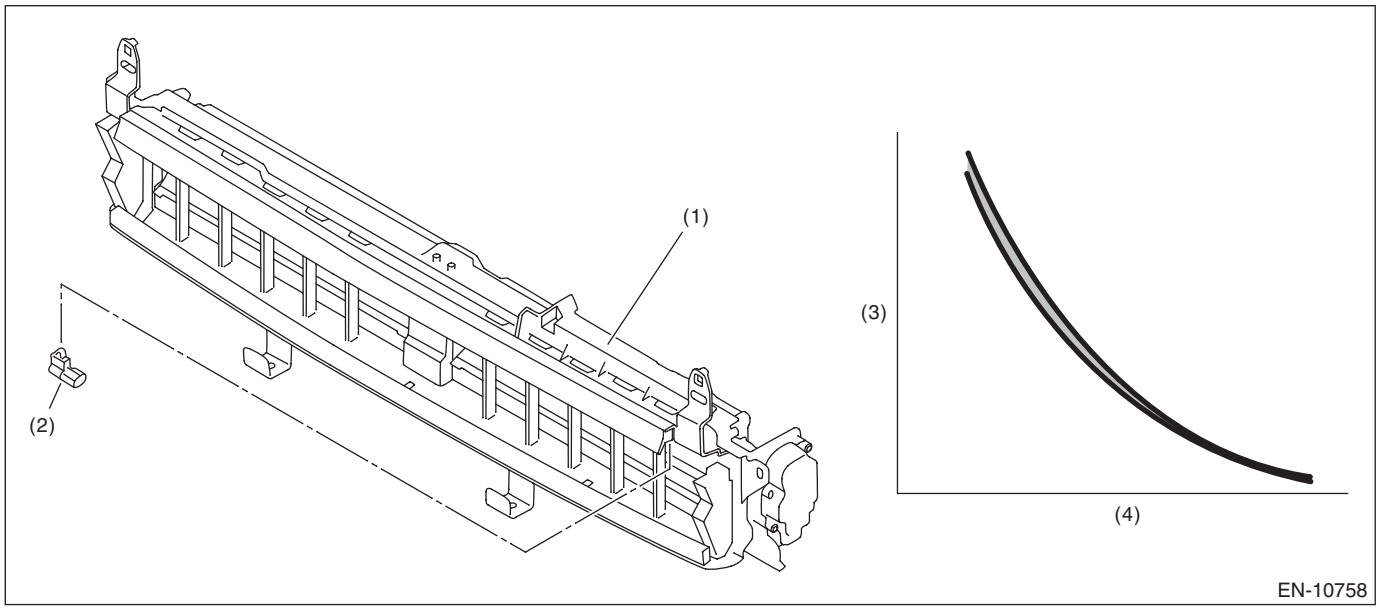
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

DP:DTC P05A6 ACTIVE GRILLE SHUTTER "A" SUPPLY VOLTAGE CIRCUIT/ OPEN

1. OUTLINE OF DIAGNOSIS

Detect the abnormality of active grille shutter power supply voltage.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Active grille shutter
(2) Ambient air temperature sensor
(3) Resistance value (kΩ)
(4) Ambient air temperature (°C (°F))

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Malfunction judgment flag	1

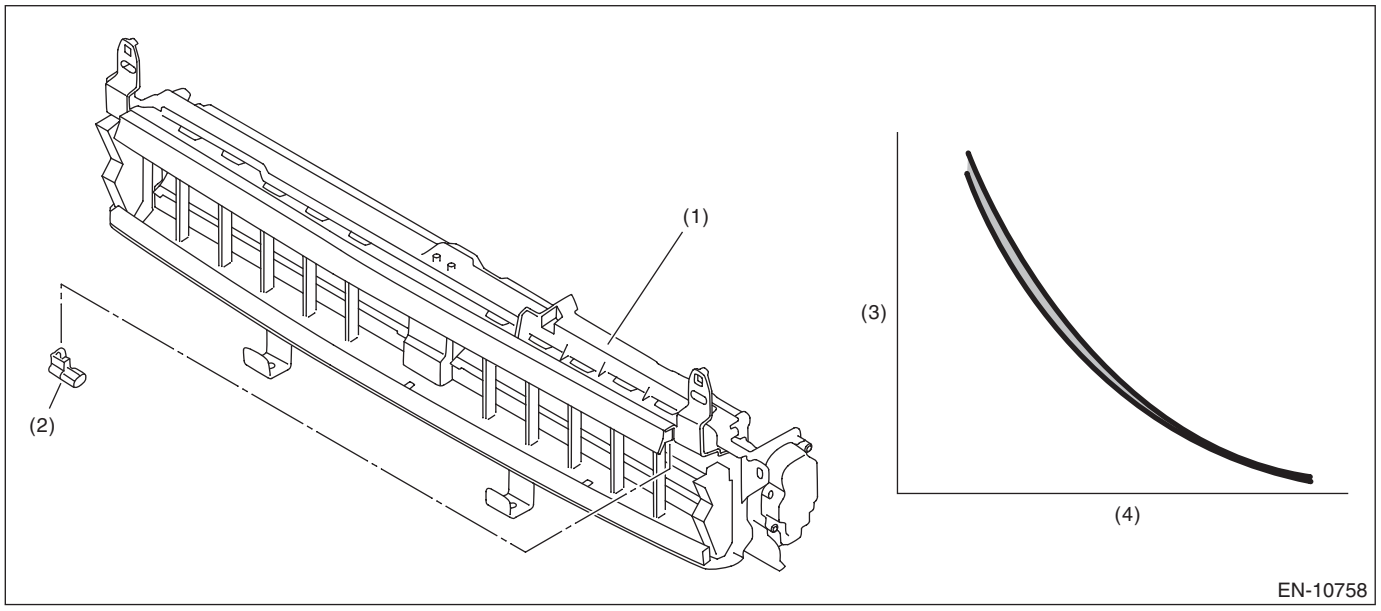
Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Malfunction indicator light does not illuminate.

DQ:DTC P05C0 ACTIVE GRILLE SHUTTER "A" OVER TEMPERATURE

1. OUTLINE OF DIAGNOSIS

Detect the abnormality of active grille shutter internal temperature.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Active grille shutter
(2) Ambient air temperature sensor
(3) Resistance value (kΩ)
(4) Ambient air temperature (°C (°F))

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Malfunction judgment flag	1

Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Malfunction indicator light does not illuminate.

DR:DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of microcomputer (RAM).
When there is a problem in the CPU normal RAM, judge as NG.
If it is possible to write data to the whole area of RAM in the initial routine, and is possible to read the same data, it is judged as OK, and if not, NG.

2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

Diagnosis with the initial routine.

3. GENERAL DRIVING CYCLE

Perform the diagnosis as soon as the ignition switch is turned to ON.

4. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Write the specified value into the RAM.	Unmatch to written value

Time Needed for Diagnosis: less than 512 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

DS:DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR

1. OUTLINE OF DIAGNOSIS

Judge as NG when SUM value of ROM is outside the standard value.

2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

Diagnosis with the initial routine.

3. GENERAL DRIVING CYCLE

Perform the diagnosis as soon as the ignition switch is turned to ON.

4. DIAGNOSTIC METHOD

Judge as NG if the criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
SUM value of ROM	Standard

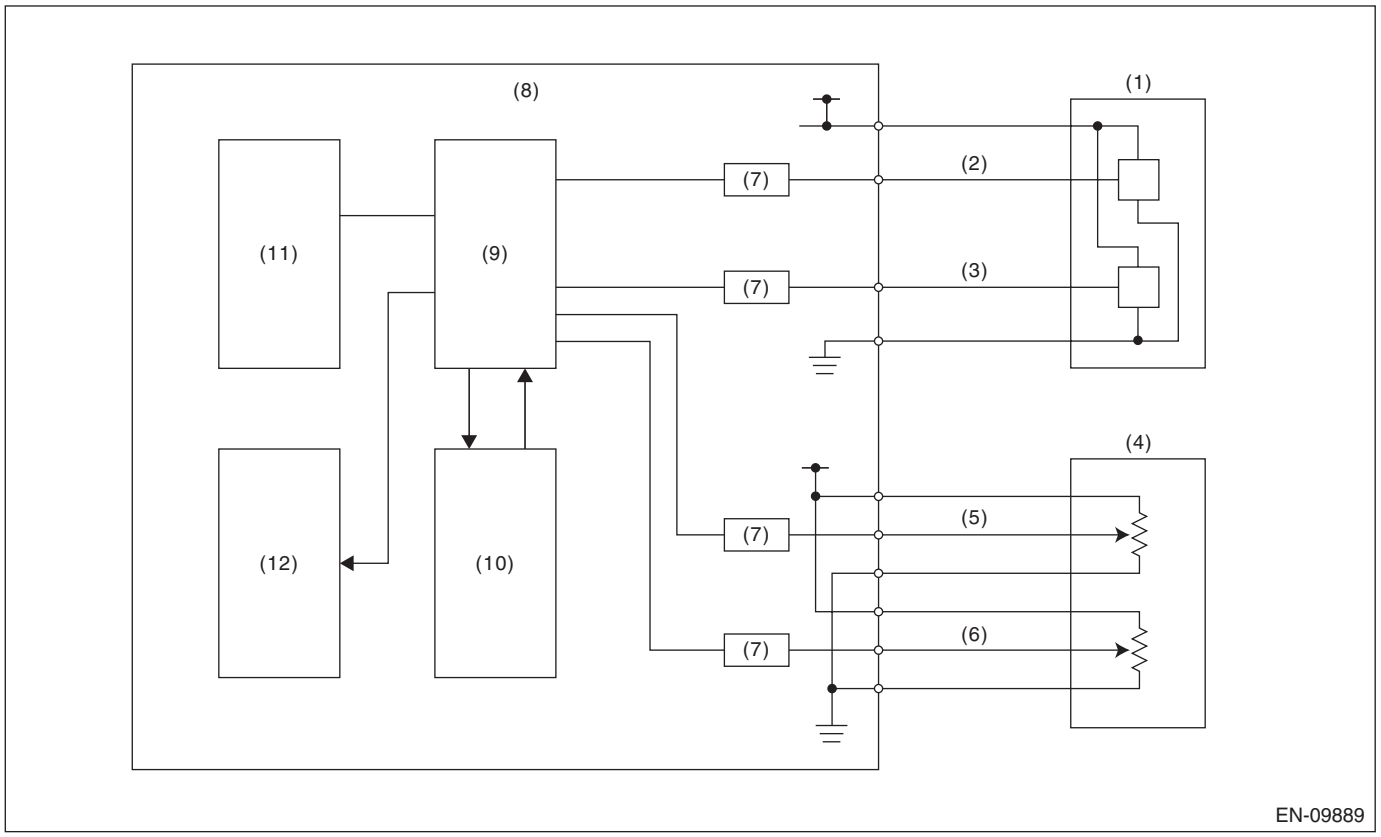
Time Needed for Diagnosis: 512 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

DT:DTC P0606 CONTROL MODULE PROCESSOR

1. OUTLINE OF DIAGNOSIS

Judge as NG when the CPU operation is abnormal.
(1) Instruction check
(2) Software flow check
(3) Software monitor check
(4) CAN register check
(5) If the output IC operation is abnormal

2. COMPONENT DESCRIPTION



(1)	Throttle position sensor	(5)	Accelerator pedal position sensor 1	(9)	CPU
(2)	Throttle position sensor 1	(6)	Accelerator pedal position sensor 2	(10)	Monitoring IC
(3)	Throttle position sensor 2	(7)	I/F circuit	(11)	EEPROM
(4)	Accelerator pedal position sensor	(8)	Engine control module (ECM)	(12)	Output IC

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
(1) — 1 initial routine	
(1) — 2 ignition switch	ON
(1) — 2 Battery voltage	≥ 6.2 V
(1) — 2 Electronic throttle control relay	ON
(2) Ignition switch	ON
(3) Ignition switch	ON
(3) Battery voltage	≥ 6.2 V
(3) Electronic throttle control relay	ON
(4) Ignition switch	ON
(5) Initial routine	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
(1) — 1 instruction value	Unmatch to expected value
(1) — 2 calculation result of CPU and FPU	Unmatch to expected value
(2) Process flow result	The result and expected value do not match.
(3) High integrated IC motor continuity cut demand	Exist
(4) Communication between output driver ICs	Not possible to communicate
(5) Writing value to CAN register	≠ Read out value

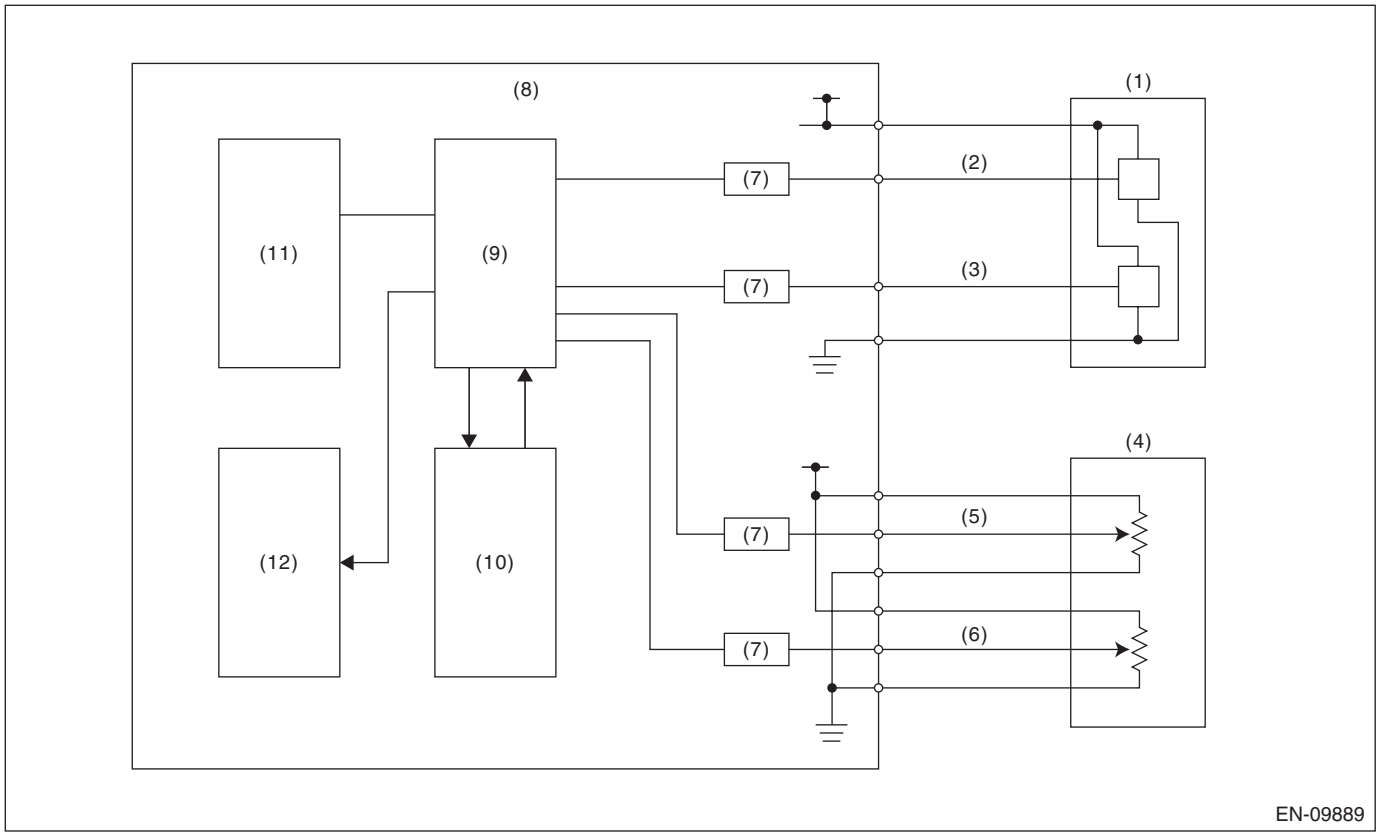
Time Needed for Diagnosis:
(1) — 1: 2 time(s)
(1) — 2: 512 ms
(2): 504 ms
(3): 48 ms
(4): 2500 ms
(5): None
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

DU:DTC P060A INTERNAL CONTROL MODULE MONITORING PROCESSOR PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Judge as NG when the monitoring IC operation is abnormal.
(1) Monitoring IC Disable (motor continuity cut demand) diagnosis
(2) Monitoring IC function diagnosis
(3) Monitoring IC register diagnosis

2. COMPONENT DESCRIPTION



(1)	Throttle position sensor	(5)	Accelerator pedal position sensor 1	(9)	CPU
(2)	Throttle position sensor 1	(6)	Accelerator pedal position sensor 2	(10)	Monitoring IC
(3)	Throttle position sensor 2	(7)	I/F circuit	(11)	EEPROM
(4)	Accelerator pedal position sensor	(8)	Engine control module (ECM)	(12)	Output IC

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
(1) Battery voltage	≥ 6 V
(1) When CPU transmits incorrect data intentionally	
(2) Battery voltage	≥ 6 V
(2) When CPU transmits incorrect data intentionally	
(3) Battery voltage	≥ 6 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when one of the following conditions is established.

Judgment Value

Malfunction Criteria	Threshold Value
(1) Main throttle opening angle – Main throttle opening angle at monitoring start	≥ 2 °
(2) Monitoring IC motor continuity cut demand	None
(3) Monitoring IC register writing value	≠ Reading value

Time Needed for Diagnosis:

(1): 24 ms

(2): 2984 ms = (25 + 6) × 0.008 + (4 × 25 + 4) × 0.008 + (5 × 25 + 9) × 0.008 + (2 × 25) × 0.008 + (25 + 2) × 0.008 × 2

(3): 200 ms

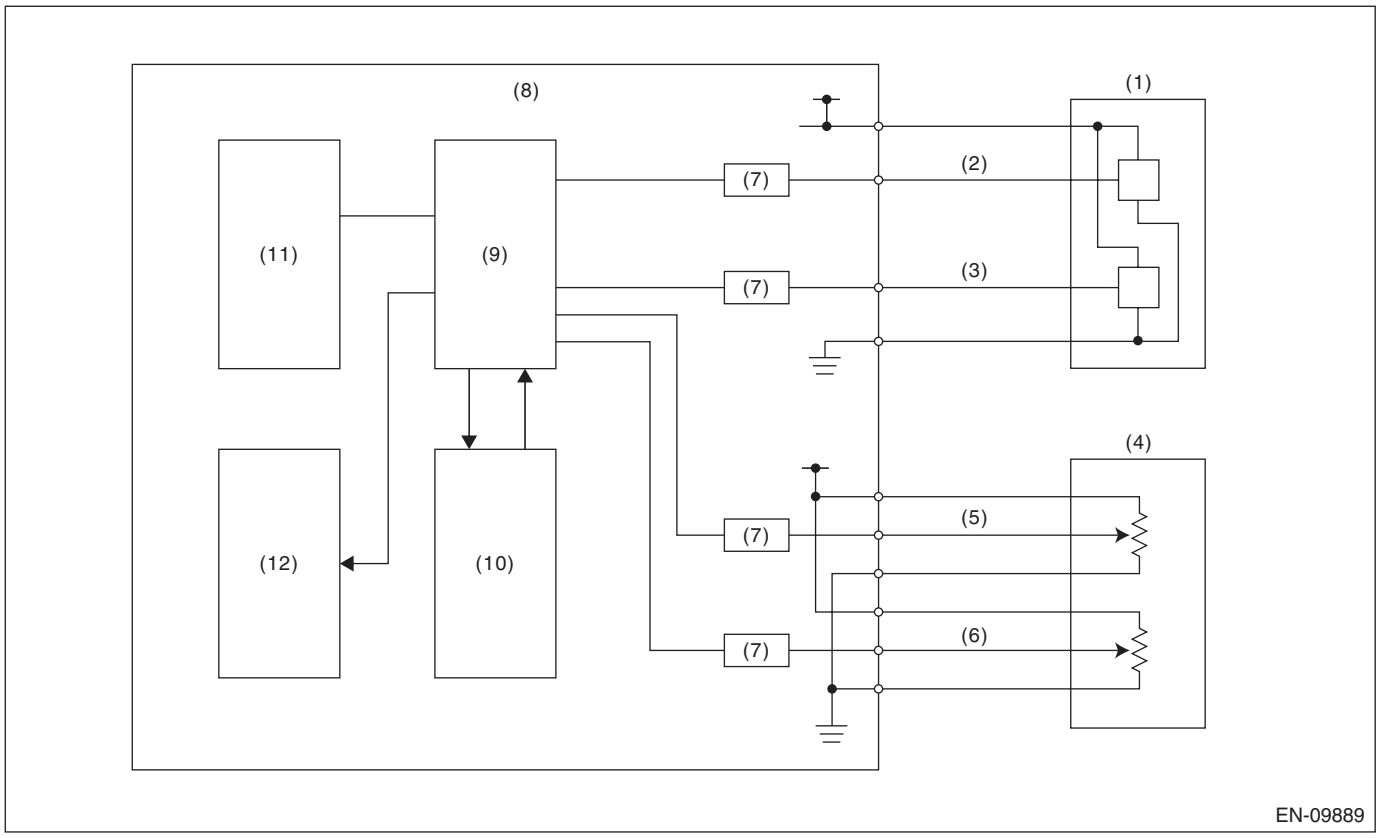
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

DV:DTC P060B INTERNAL CONTROL MODULE A/D PROCESSING PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Judge as NG when the AD converter operation is abnormal.

2. COMPONENT DESCRIPTION



(1)	Throttle position sensor	(5)	Accelerator pedal position sensor 1	(9)	CPU
(2)	Throttle position sensor 1	(6)	Accelerator pedal position sensor 2	(10)	Monitoring IC
(3)	Throttle position sensor 2	(7)	I/F circuit	(11)	EEPROM
(4)	Accelerator pedal position sensor	(8)	Engine control module (ECM)	(12)	Output IC

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 6 V
Target voltage	= 0 V
Battery voltage	≥ 6 V
Target voltage	= 5 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when one of the following conditions is established.

Judgment Value

Malfunction Criteria	Threshold Value
Actual voltage	> 0.01953125 V
Actual voltage	< 4.979248047 V

Time Needed for Diagnosis: 200 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

DW:DTC P0616 STARTER RELAY CIRCUIT LOW

1. OUTLINE OF DIAGNOSIS

- Model without push button start

Detect abnormal continuity in the starter SW1.
Judge as OFF NG when the starter SW 1 signal remains OFF.

- Model with push button start

Detect abnormal continuity in the starter SW 2.
Judge as OFF NG when the starter SW 2 signal remains OFF.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 8 V
Vehicle speed	< 1 km/h (0.6 MPH)
Starter relay command	ON
Engine speed	Change from 0 rpm to 500 rpm or more

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Judge as OFF NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Starter SW1 signal with battery voltage × 0.85 or more (models without push button start) Starter SW2 signal with battery voltage × 0.85 or more (models with push button start)	Not detected

Time Needed for Diagnosis: Less than 1 second
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

DX:DTC P0617 STARTER RELAY CIRCUIT HIGH

1. OUTLINE OF DIAGNOSIS

- Model without push button start

Detect abnormal continuity in the starter SW1.
Judge as ON NG when the starter SW 1 signal remains ON.

- Model with push button start

Detect abnormal continuity in the starter SW 2.
Judge as ON NG when the starter SW 2 signal remains ON.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 8 V
Engine speed	> 500 rpm
Starter relay command	OFF

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Starter SW 1 signal (model without push button start) Starter SW 2 signal (model with push button start)	≥ Battery voltage × 0.85

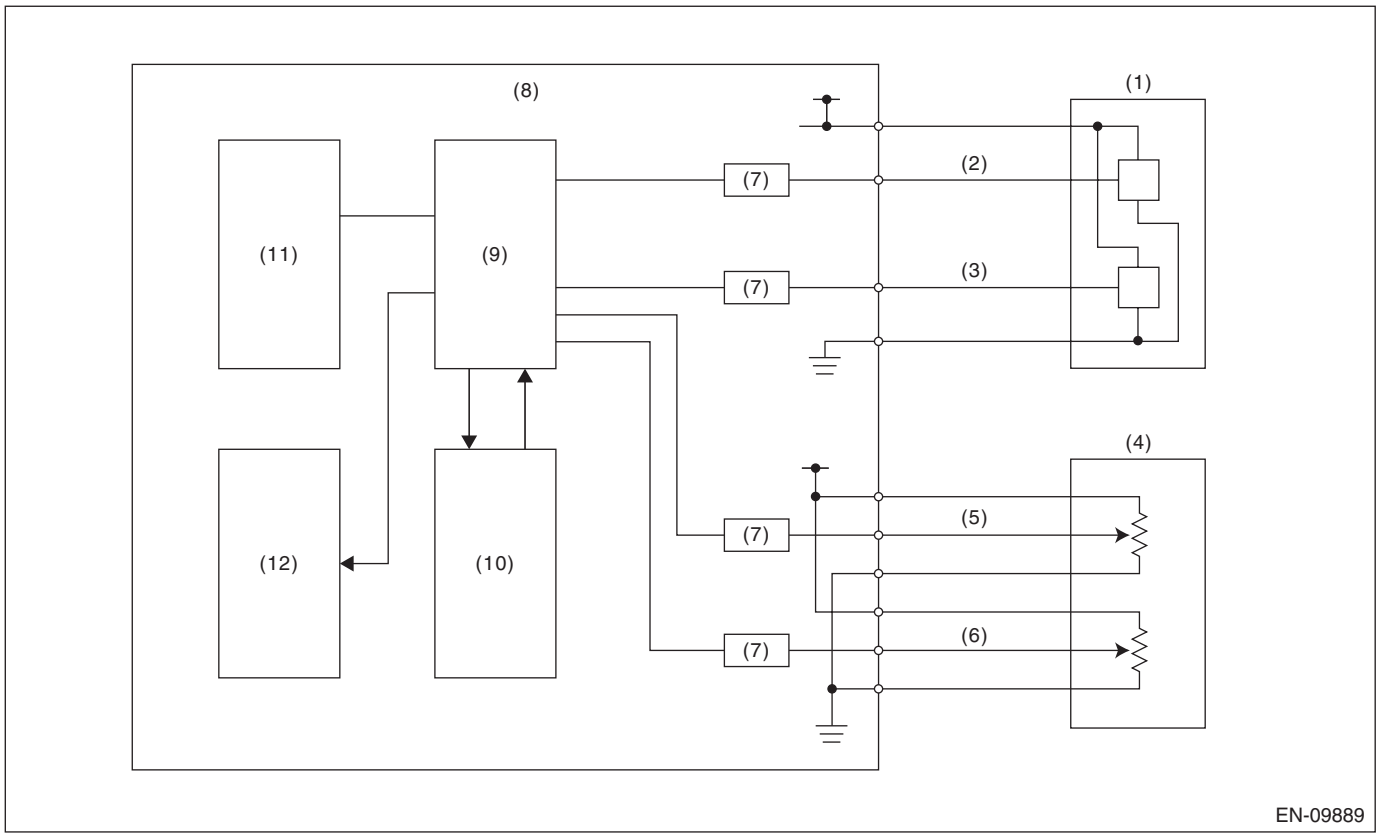
Time Needed for Diagnosis: 30000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

DY:DTC P062F INTERNAL CONTROL MODULE EEPROM ERROR

1. OUTLINE OF DIAGNOSIS

Judge as NG when the EEPROM operation is abnormal.

2. COMPONENT DESCRIPTION



(1)	Throttle position sensor	(5)	Accelerator pedal position sensor 1	(9)	CPU
(2)	Throttle position sensor 1	(6)	Accelerator pedal position sensor 2	(10)	Monitoring IC
(3)	Throttle position sensor 2	(7)	I/F circuit	(11)	EEPROM
(4)	Accelerator pedal position sensor	(8)	Engine control module (ECM)	(12)	Output IC

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON

4. GENERAL DRIVING CYCLE

Perform the diagnosis during self shut.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Writing result to EEPROM	Malfunction

Time Needed for Diagnosis: 2 times
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

DZ:DTC P0685 ECM/PCM POWER RELAY CONTROL CIRCUIT/OPEN

1. OUTLINE OF DIAGNOSIS

Detect the main relay stuck to ON.
Judge as NG when ECM keeps operating for more than predetermined time although the main relay does not turn to OFF after ignition switch is turned to OFF.

2. COMPONENT DESCRIPTION

The main relay controls current of coils by receiving instructions from the ignition switch and ELCM to switch ECM to ON/OFF.

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Main relay	OFF instruction

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once when the enable conditions are established with the ignition switch OFF → ON.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
ECM status	In operation

Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

EA:DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

1. OUTLINE OF DIAGNOSIS

Judge as NG when there is CAN communication with the TCM and there is a MIL lighting request.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
MIL lighting request from TCM	Yes

Time Needed for Diagnosis: 128 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

EB:DTC P081A STARTER DISABLE CIRCUIT LOW

1. OUTLINE OF DIAGNOSIS

Detect abnormal continuity in the starter cut relay.
Judge as NG when the starter cut relay output line is open.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 8 V
Engine speed	Change from 0 rpm to 500 rpm or more
Vehicle speed	< 1 km/h (0.6 MPH)
Starter cut relay command	OFF

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Starter cut relay terminal voltage	> Battery voltage × 0.34 is not experienced

Time Needed for Diagnosis: Less than 1 second
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

EC:DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW (AT MODEL)

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of neutral SW.
Judge as NG when the ECM neutral terminal input differs from the reception data from TCM.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Starter relay feedback voltage	< Battery voltage × 0.35
“P” range/“N” range of TCM	OFF

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously in 2 seconds after starting the engine.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Neutral position switch signal voltage	≤ Battery voltage × 0.19

Time Needed for Diagnosis: 64 ms × 100 time(s)
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

ED:DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH (AT MODEL)

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of neutral SW.
Judge as NG when the ECM neutral terminal input differs from the reception data from TCM.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Starter relay feedback voltage	< Battery voltage × 0.35
“P” range/“N” range of TCM	ON

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously in 2 seconds after starting the engine.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Neutral position switch signal voltage	≥ Battery voltage × 0.6

Time Needed for Diagnosis: 64 ms × 100 time(s)
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

EE:DTC P0A7B BATTERY ENERGY CONTROL MODULE REQUEST MIL ILLUMINATION

1. OUTLINE OF DIAGNOSIS

Judge as NG when MIL lighting request comes from BECM.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
MIL lighting request from BECM	Yes

Time Needed for Diagnosis: 128 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

EF:DTC P0AC4 HYBRID POWERTRAIN CONTROL MODULE REQUEST MIL ILLUMINATION

1. OUTLINE OF DIAGNOSIS

Judge as NG when MIL lighting request comes from HPCM.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
MIL lighting request from HPCM	Yes

Time Needed for Diagnosis: 128 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

EG:DTC P0CA1 DRIVE MOTOR CONTROL MODULE REQUEST MIL ILLUMINATION

1. OUTLINE OF DIAGNOSIS

Judge as NG when MIL lighting request comes from DMCM.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
MIL lighting request from DMCM	Yes

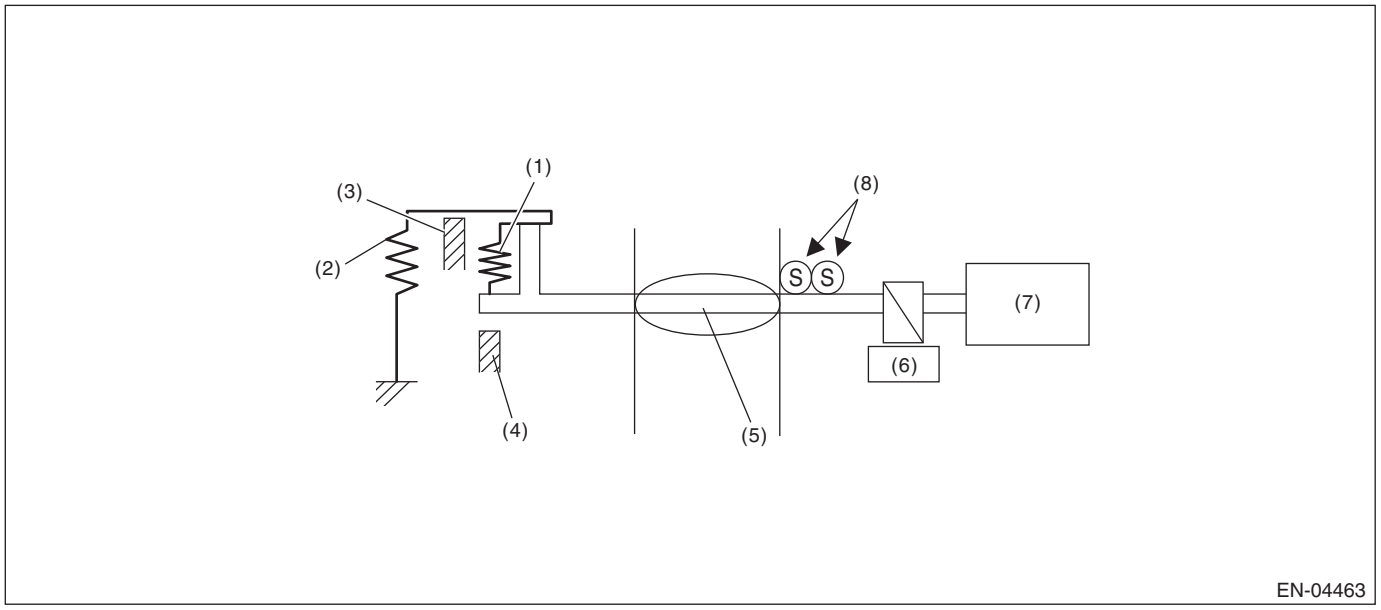
Time Needed for Diagnosis: 128 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

EH:DTC P1160 RETURN SPRING FAILURE

1. OUTLINE OF DIAGNOSIS

Judge as NG when the valve is opened more than the default opening angle, but does not move to the close direction with the motor power stopped.

2. COMPONENT DESCRIPTION



(1) Opener spring
(2) Return spring
(3) Intermediate stopper
(4) Full closed stopper
(5) Throttle valve
(6) Gear
(7) DC motor
(8) Main and sub throttle position sensor

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 6 V
Ignition switch	OFF
Elapsed time after motor continuity is set to OFF	= 1.6 s

4. GENERAL DRIVING CYCLE

- Ignition switch ON → OFF
- Ignition switch OFF → ON (Only after clearing memory)

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Opening variation after motor continuity is set to OFF	< 2 °

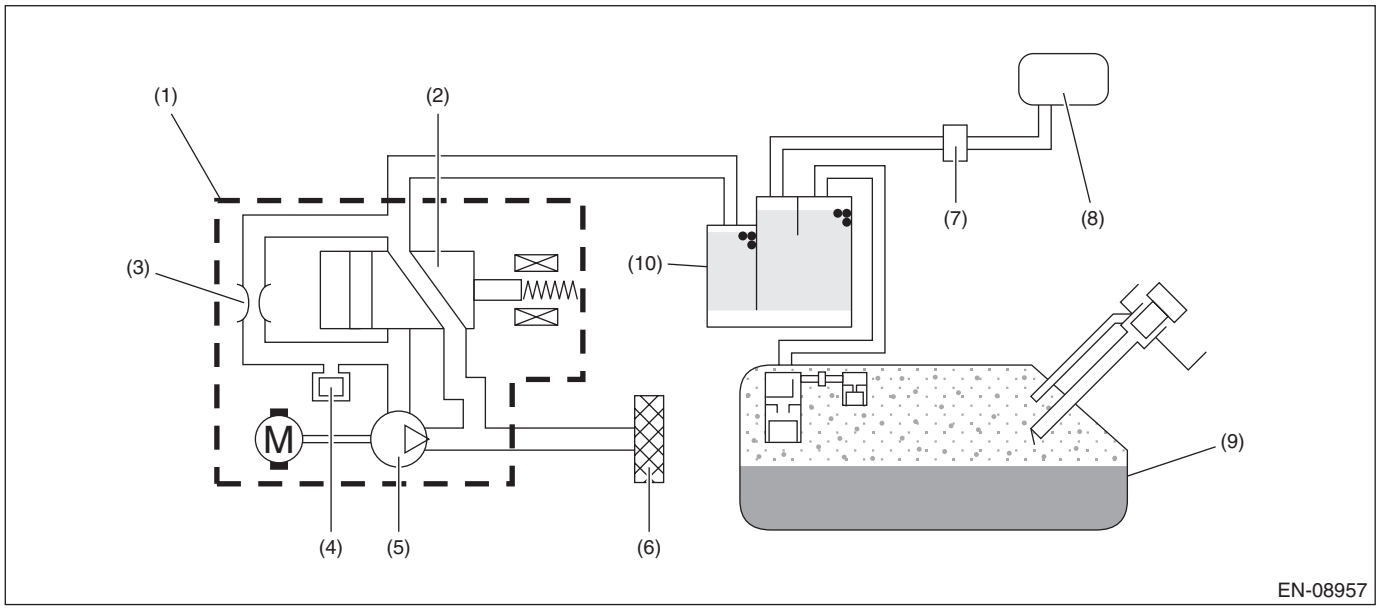
Time Needed for Diagnosis: Less than 1 second
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

EI: DTC P1449 EVAPORATIVE EMISSION CONT. SYS. AIR FILTER CLOG

1. OUTLINE OF DIAGNOSIS

Detect the drain filter clogging by the pressure change during purge introduction.
Judge as drain filter clogging malfunction if the pressure in the evaporative emission system piping suddenly decreases by the purging.

2. COMPONENT DESCRIPTION



(1) ELCM
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

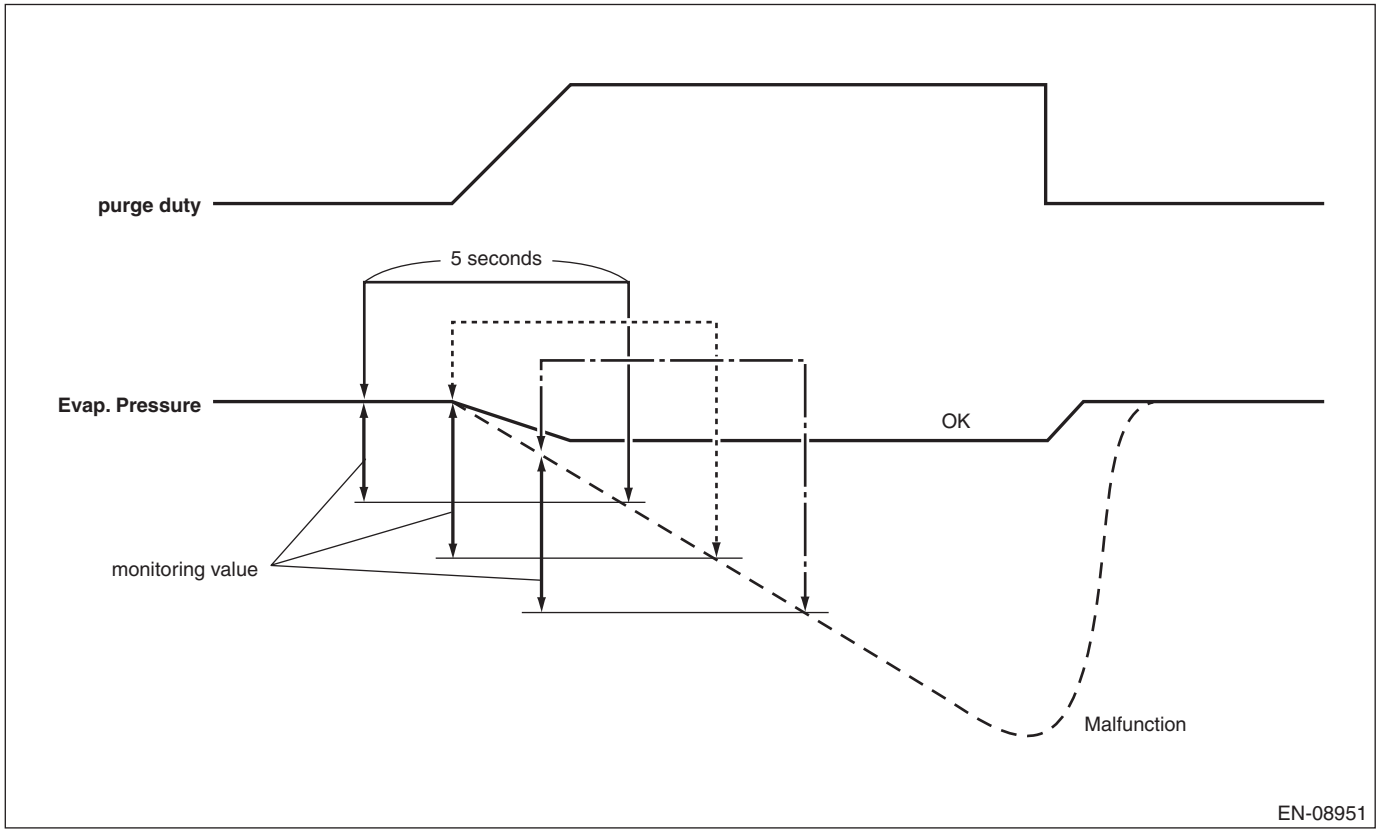
3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Elapsed time after ignition is turned to ON	≥ 20000 ms
ELCM vacuum pump	Not in operation
ELCM switching valve	Open

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously when purging is performed after 20000 ms have passed since the engine started.

5. DIAGNOSTIC METHOD



Calculate the difference between the ELCM pressure sensor output value as of 5 seconds ago and the current one, and if the value is greater than judgment value, detect and judge as filter clogging trouble.
Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
|Pressure sensor output value as of 5 seconds ago – Current pressure sensor output value|	> Value from Map
Number of above conditions established	> 2 time(s)

Map

Vehicle speed km/h (MPH)	0 (0)	20 (12.4)	40 (24.9)	60 (37.3)	80 (49.7)	100 (62.1)	120 (74.6)	300 (186.4)
|Pressure sensor output value as of 5 seconds ago – Current pressure sensor output value| kPa (mmHg, inHg)	1.1 (8.055, 0.3)	1.1 (8.055, 0.3)	1.1 (8.055, 0.3)	1.1 (8.055, 0.3)	1.1 (8.055, 0.3)	1.1 (8.055, 0.3)	1.1 (8.055, 0.3)	2.1 (15.99, 0.6)

Time Needed for Diagnosis: Approx. 5 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

EJ:DTC P1451 EVAPORATIVE EMISSION CONT. SYS.

1. OUTLINE OF DIAGNOSIS

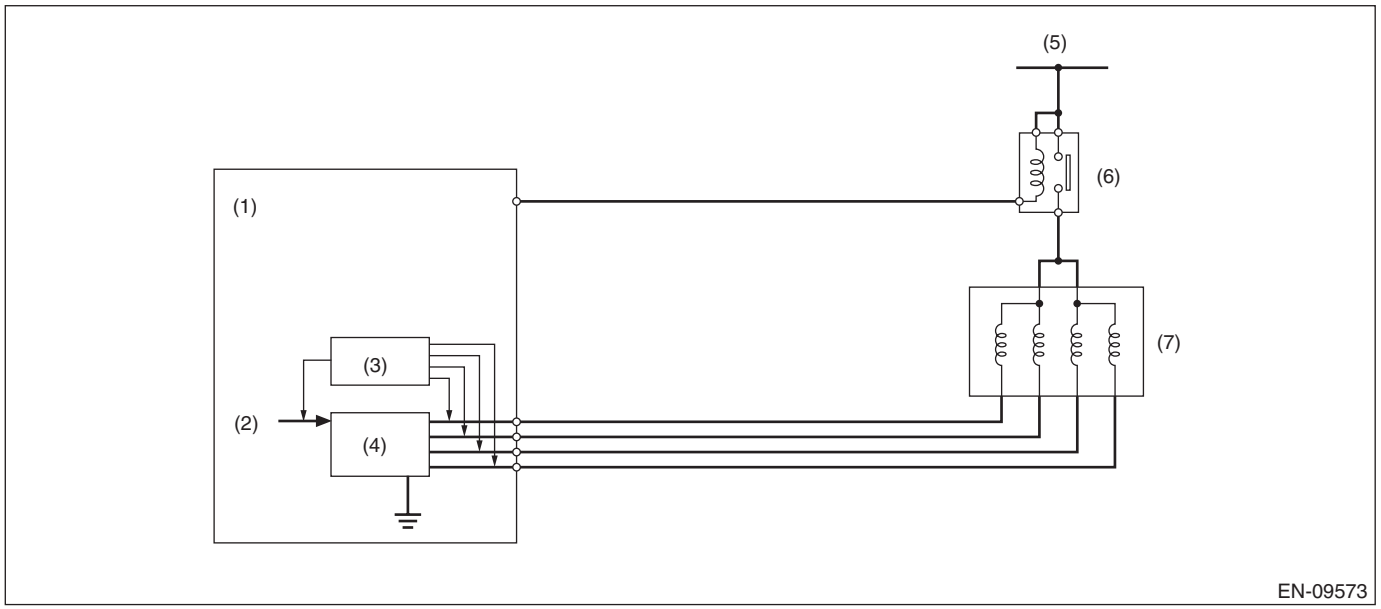
NOTE:
For the detection standard, refer to DTC P0455. <Ref. to GD(H4DO HEV)-115, DTC P0455 EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (LARGE LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>

EK:DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT)

1. OUTLINE OF DIAGNOSIS

- Detects open or short circuit of EGR.
- Judge as NG when the ECM output level differs from the actual terminal level.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Computer unit (CPU)
(3) Detecting circuit
(4) Switch circuit
(5) Battery voltage
(6) Main relay
(7) EGR control valve

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Elapsed time after starting the engine	≥ 1 s
Battery voltage	≥ 10.9 V
EGR drive signal	OFF

4. GENERAL DRIVING CYCLE

Perform diagnosis continuously during EGR operation.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
EGR terminal voltage	≤ Battery voltage × 0.34

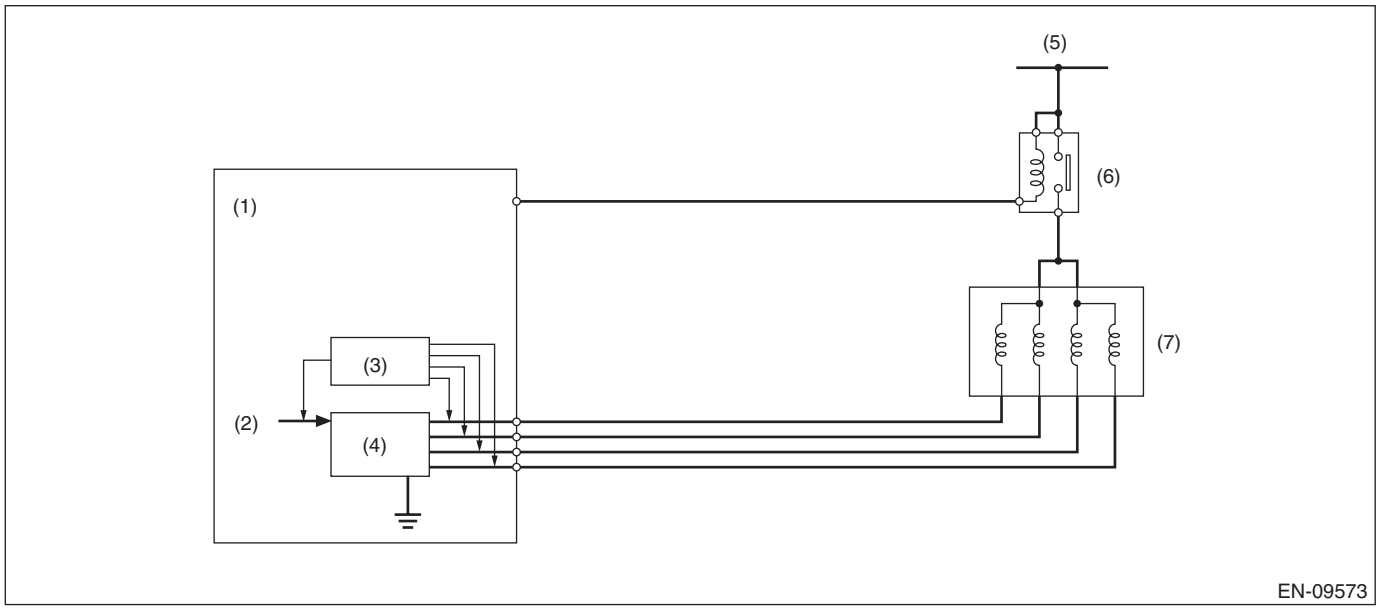
Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

EL:DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT)

1. OUTLINE OF DIAGNOSIS

- Detects open or short circuit of EGR.
- Judge as NG when the ECM output level differs from the actual terminal level.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Computer unit (CPU)
(3) Detecting circuit
(4) Switch circuit
(5) Battery voltage
(6) Main relay
(7) EGR control valve

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Elapsed time after starting the engine	≥ 1 s
Battery voltage	≥ 10.9 V
EGR drive signal	ON

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
EGR terminal current	≥ 6 A

Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

EM:DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P1492. <Ref. to GD(H4DO HEV)-164, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

EN:DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P1493. <Ref. to GD(H4DO HEV)-165, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

EO:DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P1492. <Ref. to GD(H4DO HEV)-164, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

EP:DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P1493. <Ref. to GD(H4DO HEV)-165, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

EQ:DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P1492. <Ref. to GD(H4DO HEV)-164, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

ER:DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC P1493. <Ref. to GD(H4DO HEV)-165, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

ES:DTC P2004 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of tumble generator valve motor function.
Judge open fixing malfunction when the opening degree is large even after finishing the tumble generator valve closing driving.

2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Tumble generator valve “close” signal output time	≥ 1600 ms

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Tumble generator valve	Open

Time Needed for Diagnosis: 3000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

ET:DTC P2005 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 2)

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of tumble generator valve motor function.
Judge open fixing malfunction when the opening degree is large even after finishing the tumble generator valve closing driving.

2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Tumble generator valve “close” signal output time	≥ 1600 ms

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Tumble generator valve	Open

Time Needed for Diagnosis: 3000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

EU:DTC P2006 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of tumble generator valve motor function.
Judge close fixing malfunction when the opening degree is small even after finishing the tumble generator valve open driving.

2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Tumble generator valve “open” signal output time	≥ 1600 ms

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Tumble generator valve	Close

Time Needed for Diagnosis: 3000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

EV:DTC P2007 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 2)

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of tumble generator valve motor function.
Judge close fixing malfunction when the opening degree is small even after finishing the tumble generator valve open driving.

2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Tumble generator valve “open” signal output time	≥ 1600 ms

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Tumble generator valve	Close

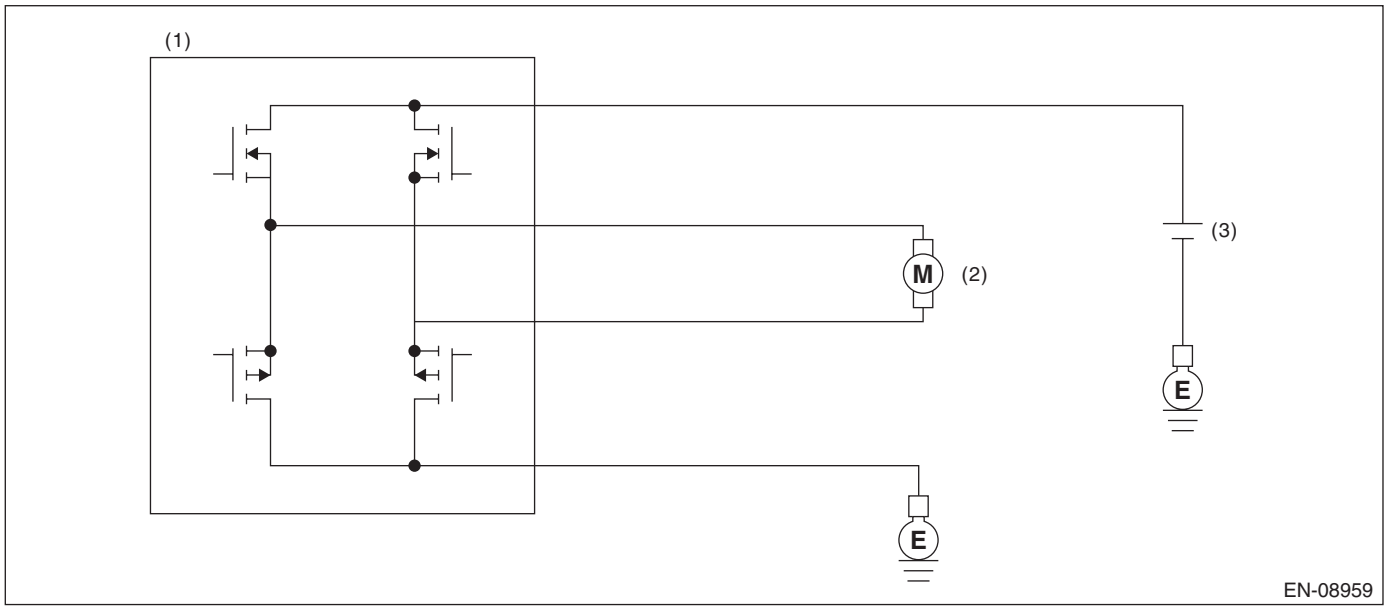
Time Needed for Diagnosis: 3000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

EW:DTC P2009 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of tumble generator valve motor.
Judge as NG when the overcurrent signal is sent from IC after tumble generator valve driving IC diagnosis.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM) (2) Tumble generator valve (3) Battery

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Tumble generator valve command	Open or close

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Overcurrent signal from tumble generator valve drive IC	ON

Time Needed for Diagnosis: 1 second
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

EX:DTC P2012 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 2)

1. OUTLINE OF DIAGNOSIS

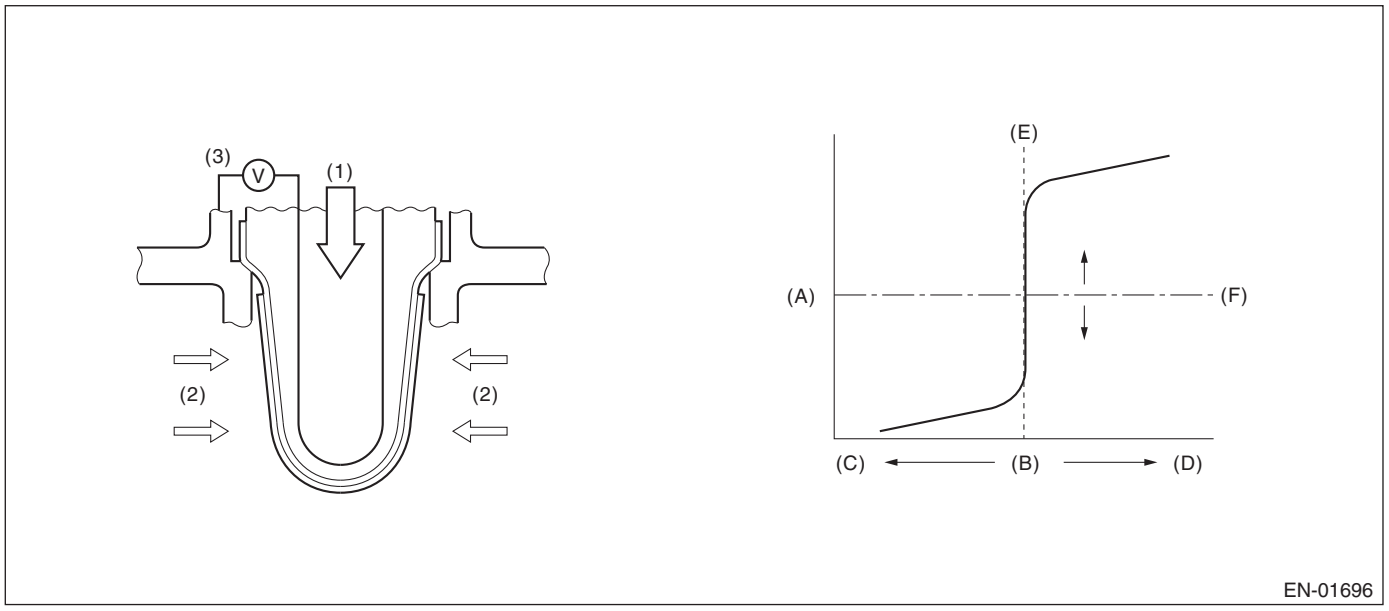
NOTE:
For the detection standard, refer to DTC P2009. <Ref. to GD(H4DO w/o HEV)-172, DTC P2009 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

EY:DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of fuel system from the size of the sub feedback learning value.
Control the sub feedback learning and judge as NG when the learning value is in the lean zone.

2. COMPONENT DESCRIPTION



(A)	Electromotive force	(B)	Air fuel ratio	(C)	Lean
(D)	Rich	(E)	Theoretical air fuel ratio	(F)	Comparative voltage
(1)	Atmosphere	(2)	Exhaust gas	(3)	Electromotive force

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Conditions for carrying out the sub feedback learning	Completed
Continuous time when all conditions are established.	≥ 1 s

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously when the vehicle is idling or running at a constant speed of 80 km/h (50 MPH) or more.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Sub feedback learning value	< –0.0245

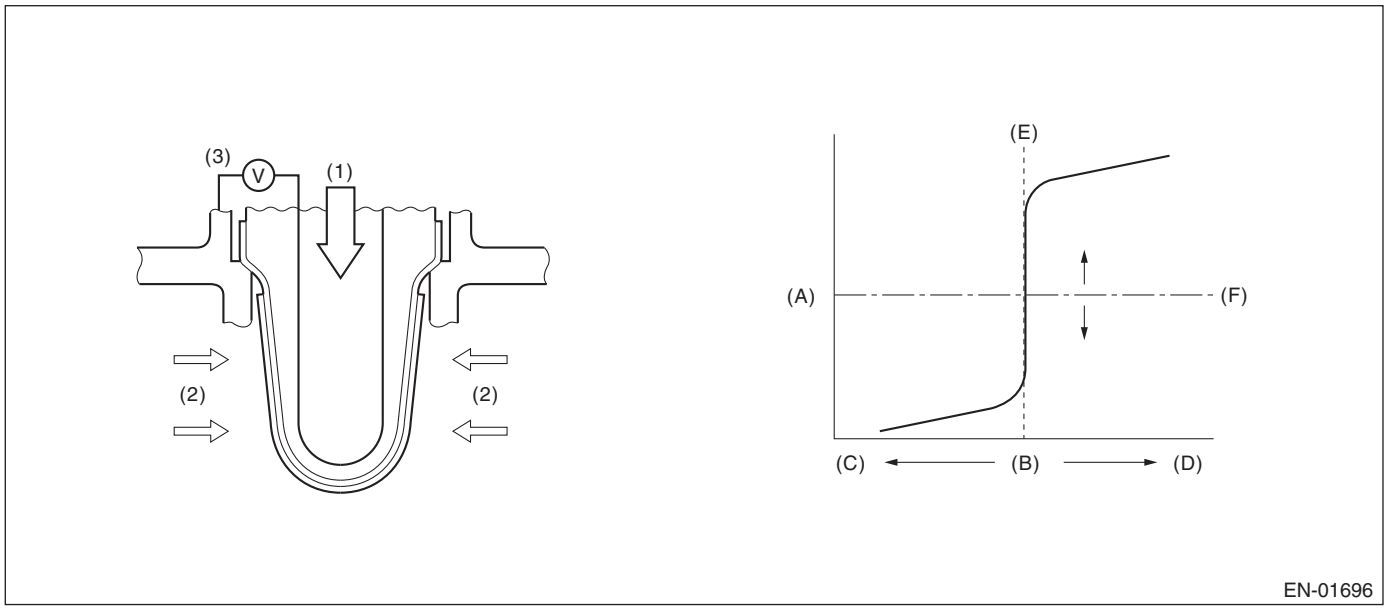
Time Needed for Diagnosis: 1 s × 1 time(s)
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

EZ:DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of fuel system from the size of the sub feedback learning value.
Sub feedback learning is being performed. When the learning value goes to the rich side, judge as NG.

2. COMPONENT DESCRIPTION



(A)	Electromotive force	(B)	Air fuel ratio	(C)	Lean
(D)	Rich	(E)	Theoretical air fuel ratio	(F)	Comparative voltage
(1)	Atmosphere	(2)	Exhaust gas	(3)	Electromotive force

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Conditions for carrying out the sub feedback learning	Completed
Continuous time when all conditions are established.	≥ 1 s

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously when the vehicle is idling or running at a constant speed of 80 km/h (50 MPH) or more.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Sub feedback learning value	≥ 0.0271

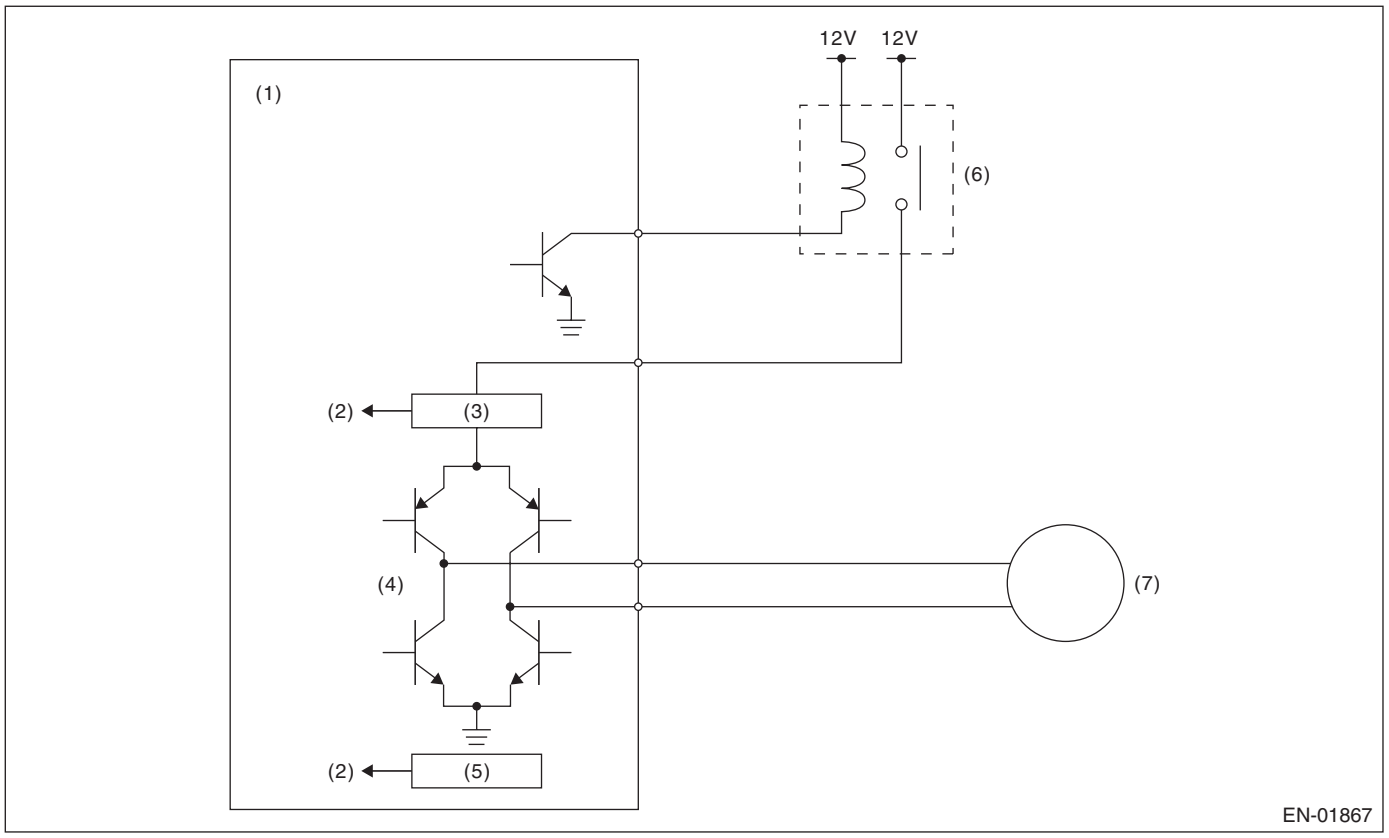
Time Needed for Diagnosis: 1 s × 1 time(s)
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

FA:DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/ PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Judge as NG when the motor current becomes large or drive circuit is heated.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Detecting circuit
(3) Overcurrent detection circuit
(4) Drive circuit
(5) Temperature detection circuit
(6) Electronic throttle control relay
(7) Motor

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Under control of electronic throttle control	ON
Battery voltage	≥ 6.2 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Overcurrent signal from driver	ON

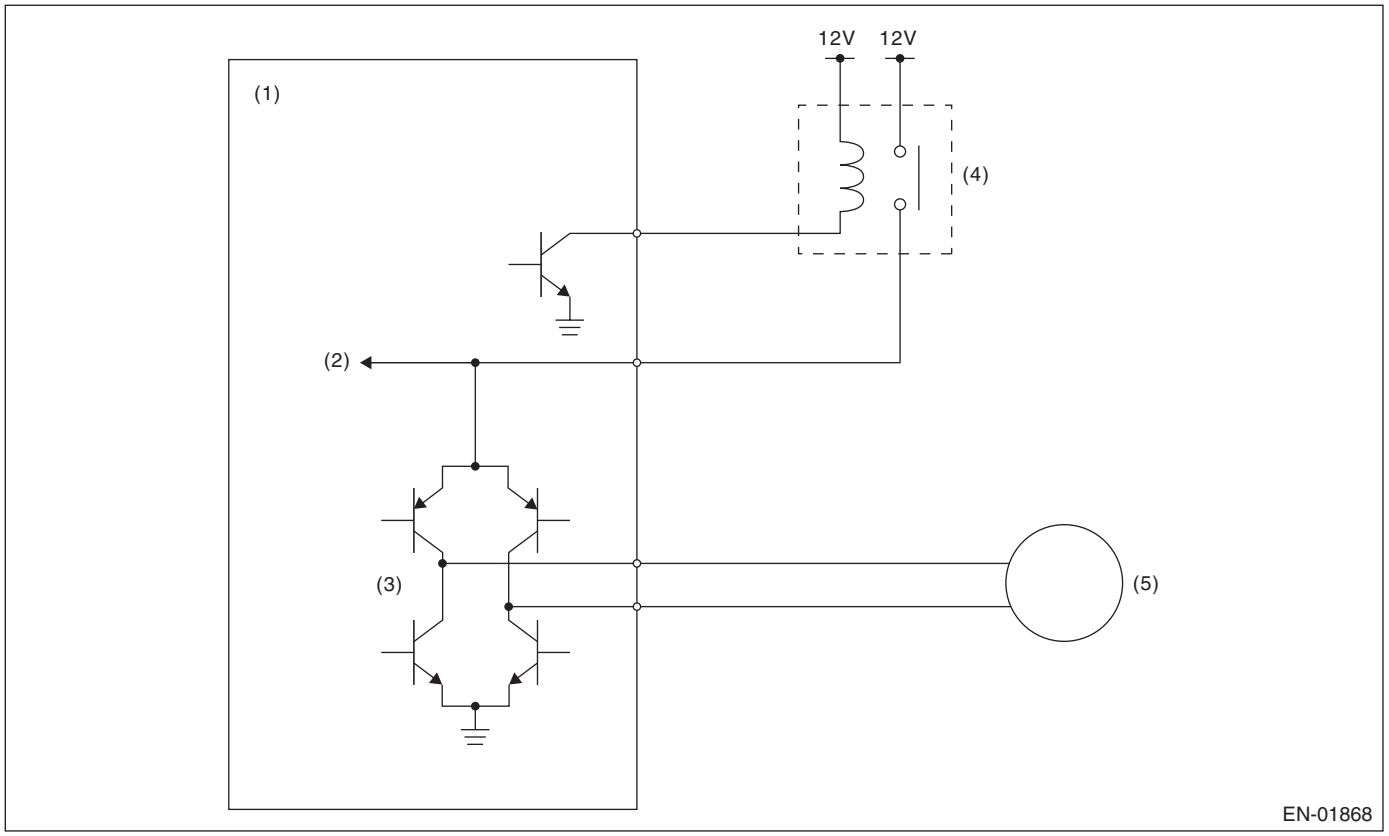
Time Needed for Diagnosis: 512 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FB:DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW

1. OUTLINE OF DIAGNOSIS

Judge as NG when the electronic throttle control power is not supplied even when ECM sets the electronic throttle control relay to ON.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Voltage detection circuit
(3) Drive circuit
(4) Electronic throttle control relay
(5) Motor

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 11 V
Electronic throttle control relay output	ON

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Motor power voltage	≤ 5 V

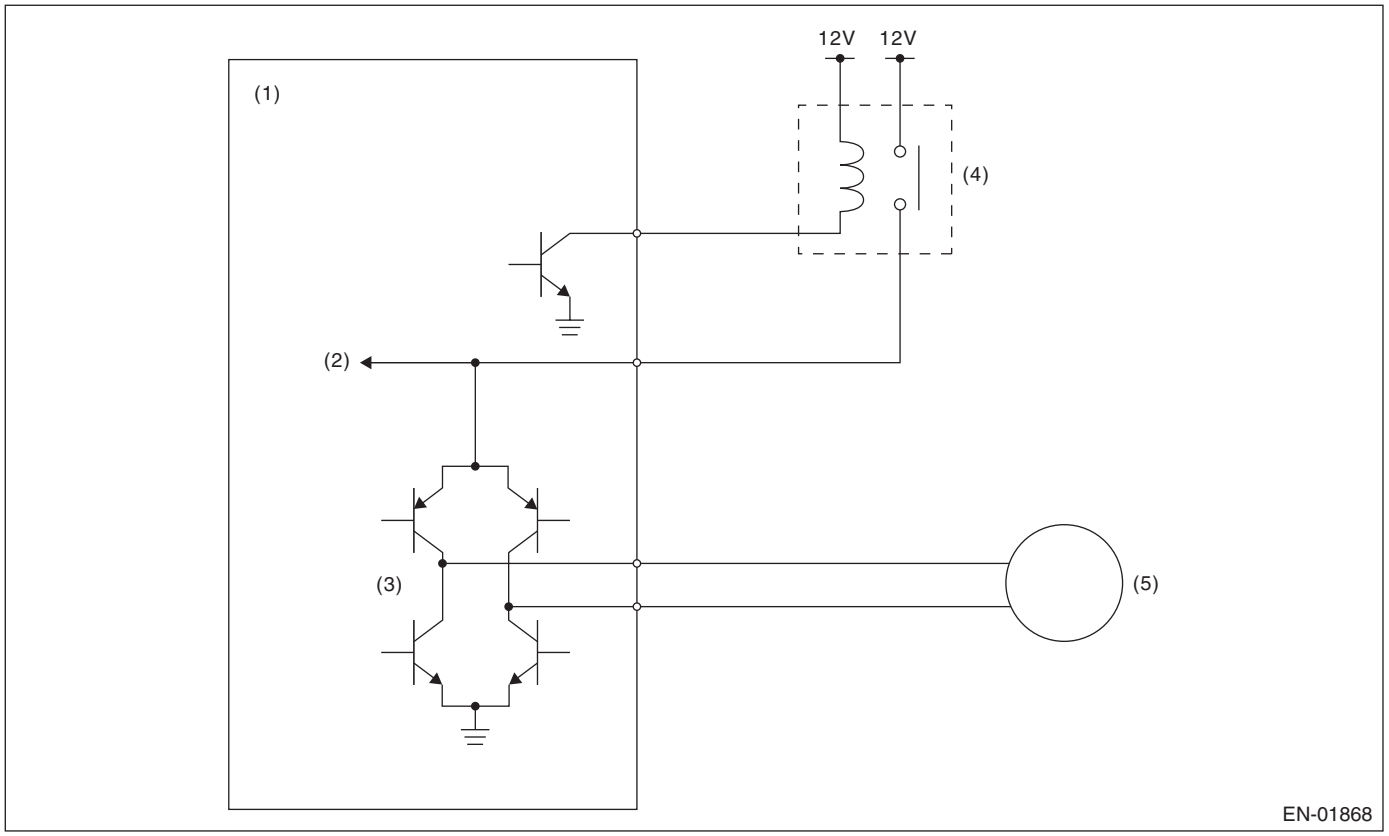
Time Needed for Diagnosis: 352 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FC:DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH

1. OUTLINE OF DIAGNOSIS

Judge as NG when the electronic throttle control power is supplied even when ECM sets the electronic throttle control relay to OFF.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Voltage detection circuit
(3) Drive circuit
(4) Electronic throttle control relay
(5) Motor

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 6 V
Electronic throttle control relay output	OFF

4. GENERAL DRIVING CYCLE

- When ignition switch ON → OFF
- Ignition switch OFF → ON (Only after clearing memory)

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Motor power voltage	≥ 5 V

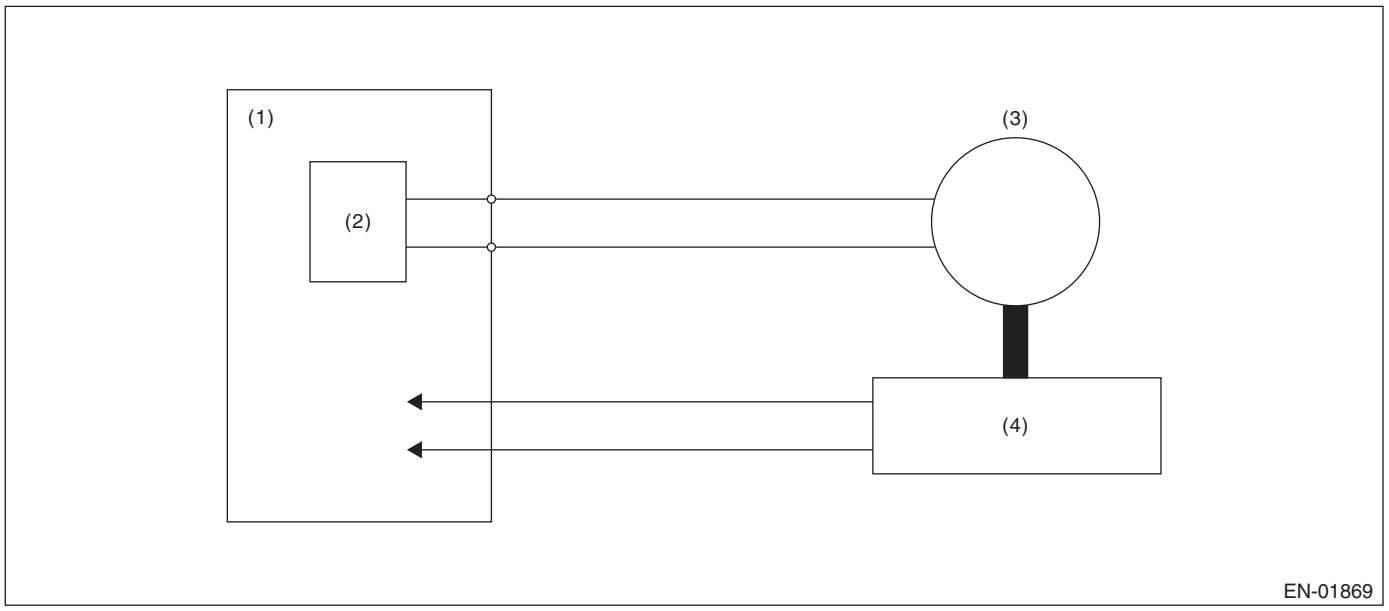
Time Needed for Diagnosis: 600 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FD:DTC P2109 THROTTLE/PEDAL POSITION SENSOR “A” MINIMUM STOP PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Judge as NG when full close point learning cannot conducted or abnormal value is detected.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Drive circuit
(3) Motor
(4) Throttle position sensor

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 6 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis at full closed point learning.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Throttle sensor opening angle at full close point learning	< –4.02% (0.4 V) or > 4.02% (0.8 V)
or	
Throttle opening angle when the ignition switch is ON – Throttle minimum stop position	1.162 °

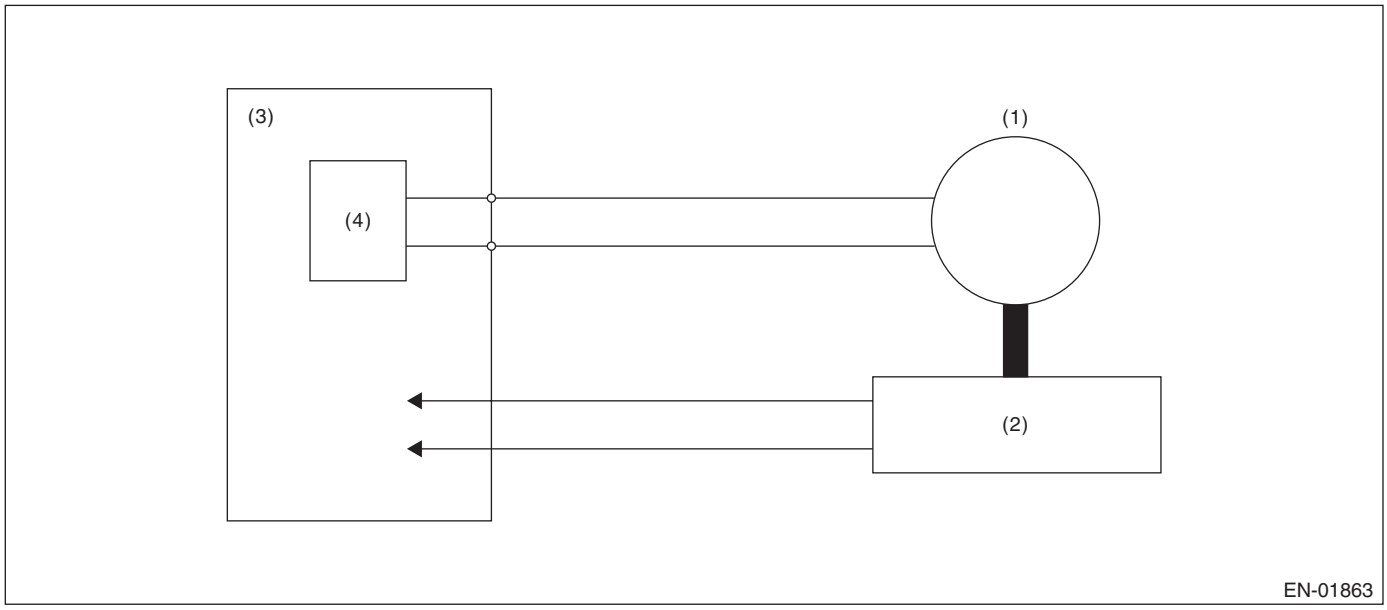
Time Needed for Diagnosis: 8 ms — 80 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FE:DTC P2119 THROTTLE ACTUATOR CONTROL THROTTLE BODY RANGE/ PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Judge as NG when the target opening angle and actual opening angle is mismatched or the current to motor is the specified duty or more for specified time continuously.

2. COMPONENT DESCRIPTION



(1) Motor
(2) Throttle position sensor
(3) Engine control module (ECM)
(4) Drive circuit

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 6.2 V
Normal operation of electronic throttle control	ON

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously when the electronic throttle control is operating.

5. DIAGNOSTIC METHOD

Judge as OK and clear the NG when the malfunction criteria below are met.

Diagnosis 1

Judgment Value

Malfunction Criteria	Threshold Value
Output duty to drive circuit	< 95 %

Time Needed for Diagnosis:

- Engine speed ≥ 500 rpm: 2000 ms
- Engine speed < 500 rpm: 5000 ms

Diagnosis 2

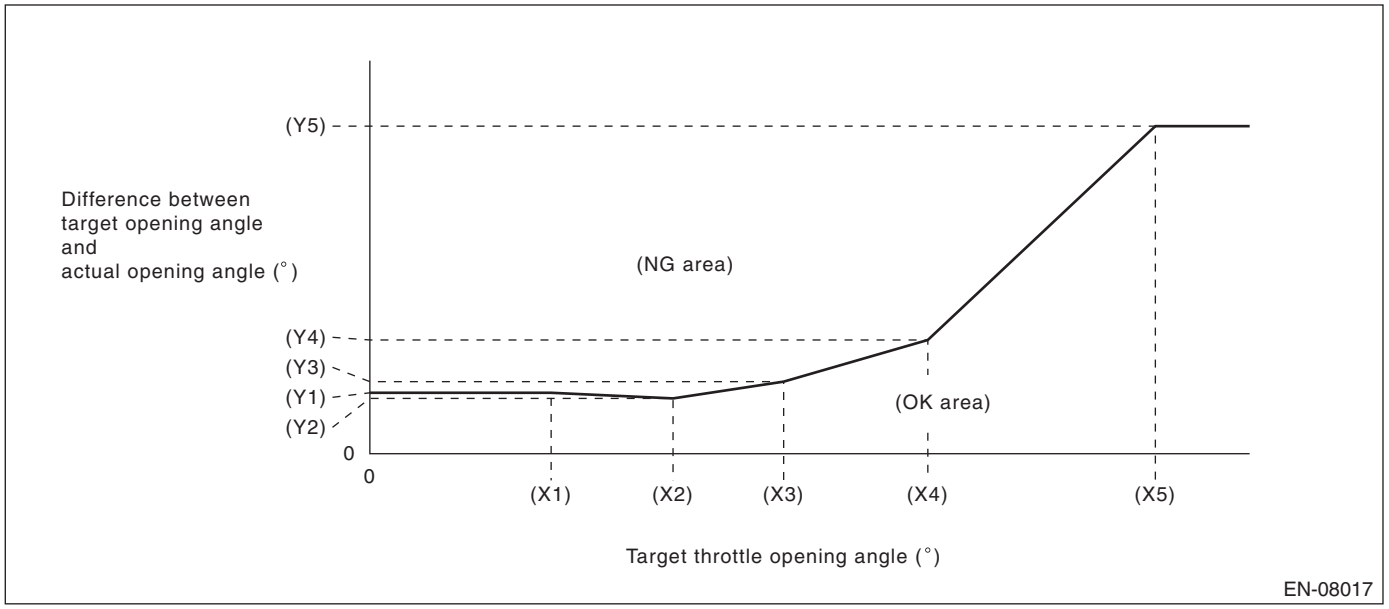
Judgment Value

Malfunction Criteria	Threshold Value
Difference between target opening angle and actual opening angle	Within NG range of **Details of Judgment value**

Time Needed for Diagnosis:

- Engine speed ≥ 500 rpm: Refer to **Details of Judgment time**.
- Engine speed < 500 rpm: 5000 ms

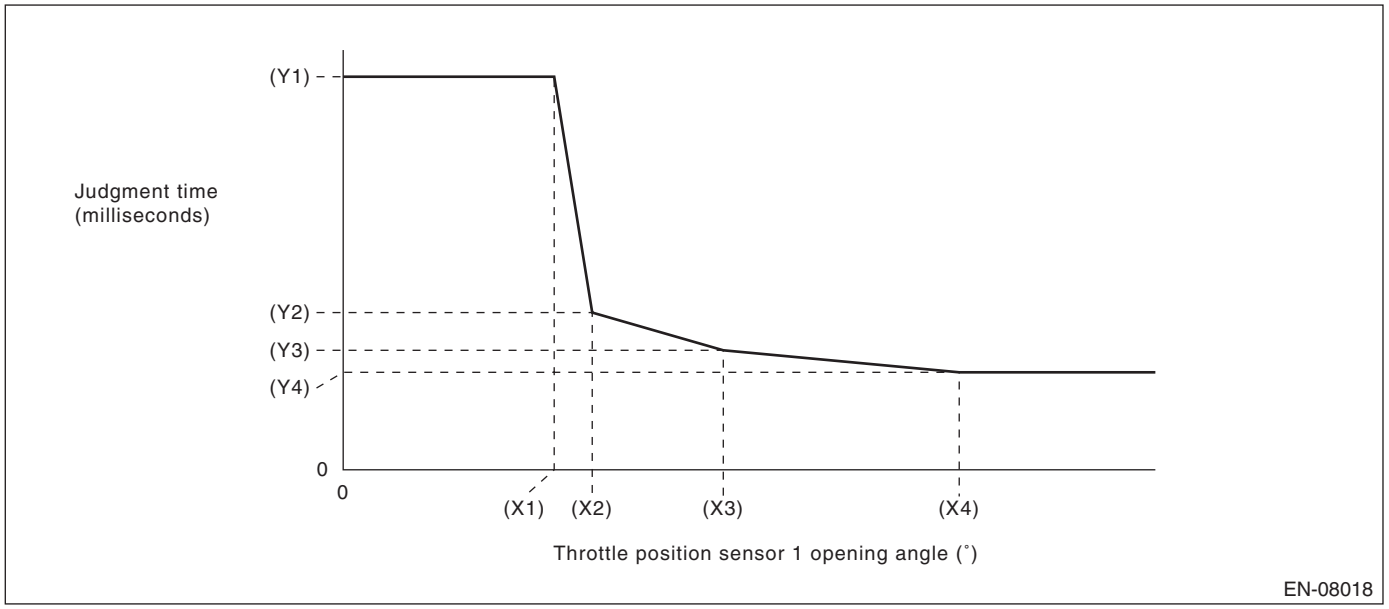
Details of Judgment Value



(X1) 6.915 °
(X2) 11.565 °
(X3) 15.785 °
(X4) 21.285 °
(X5) 29.965 °

(Y1) 4.65 °
(Y2) 4.22 °
(Y3) 5.5 °
(Y4) 8.68 °
(Y5) 25 °

Details of Judgment time



(X1) 8.049999237 °
(X2) 9.5 °
(X3) 14.5 °
(X4) 23.5 °

(Y1) 1000 ms
(Y2) 400 ms
(Y3) 304 ms
(Y4) 248 ms

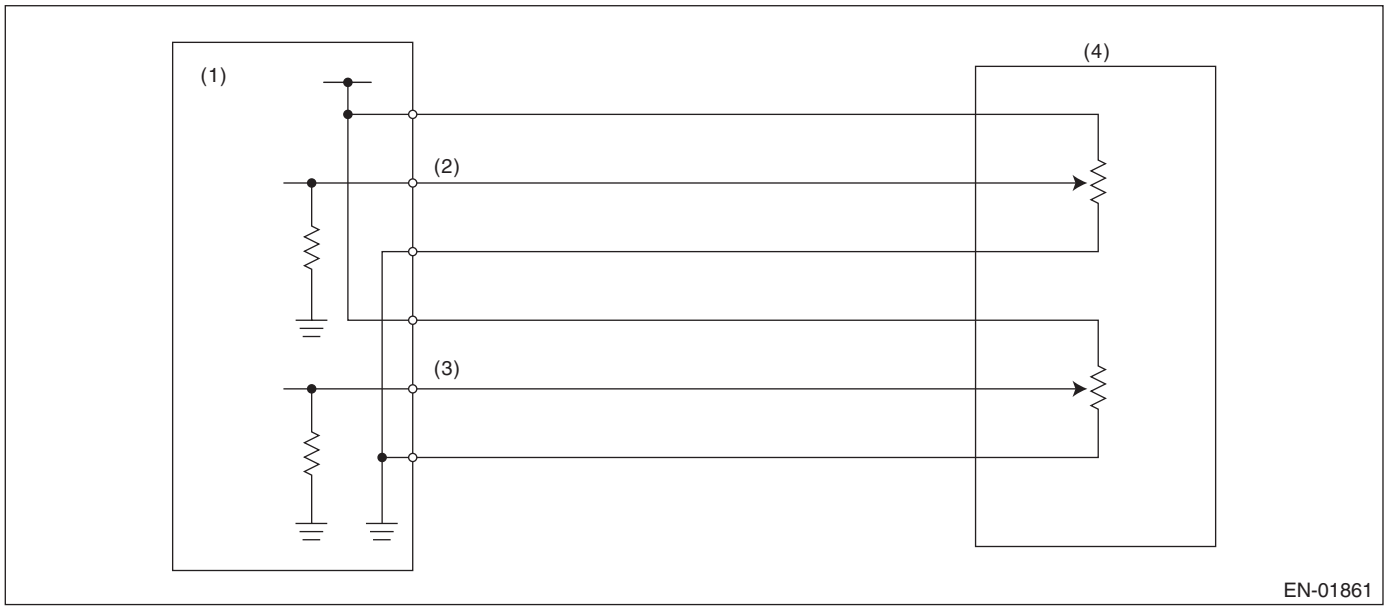
NOTE:
Judgment time when actual opening angle ≤ target opening angle is always 1000 milliseconds.
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FF: DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of accelerator pedal position sensor 1.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal
(4) Accelerator pedal position sensor

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 6 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	< 0.298 V

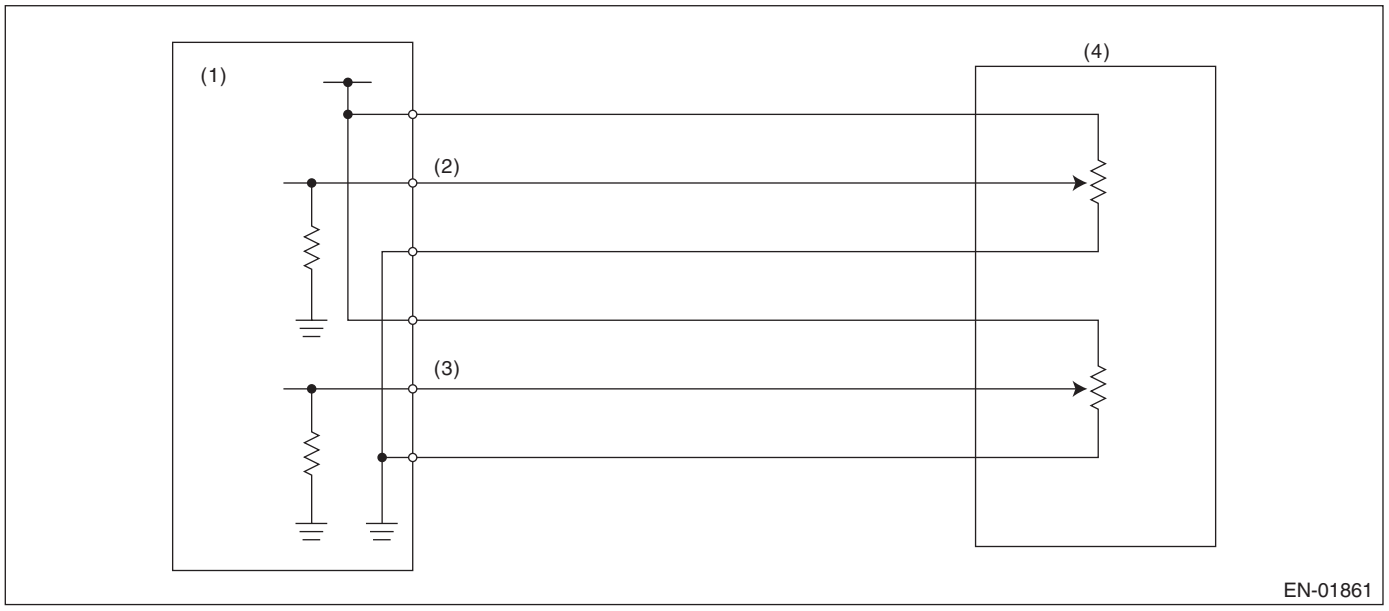
Time Needed for Diagnosis: 100 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FG:DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT HIGH INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of accelerator pedal position sensor 1.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal
(4) Accelerator pedal position sensor

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 6 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	≥ 4.737 V

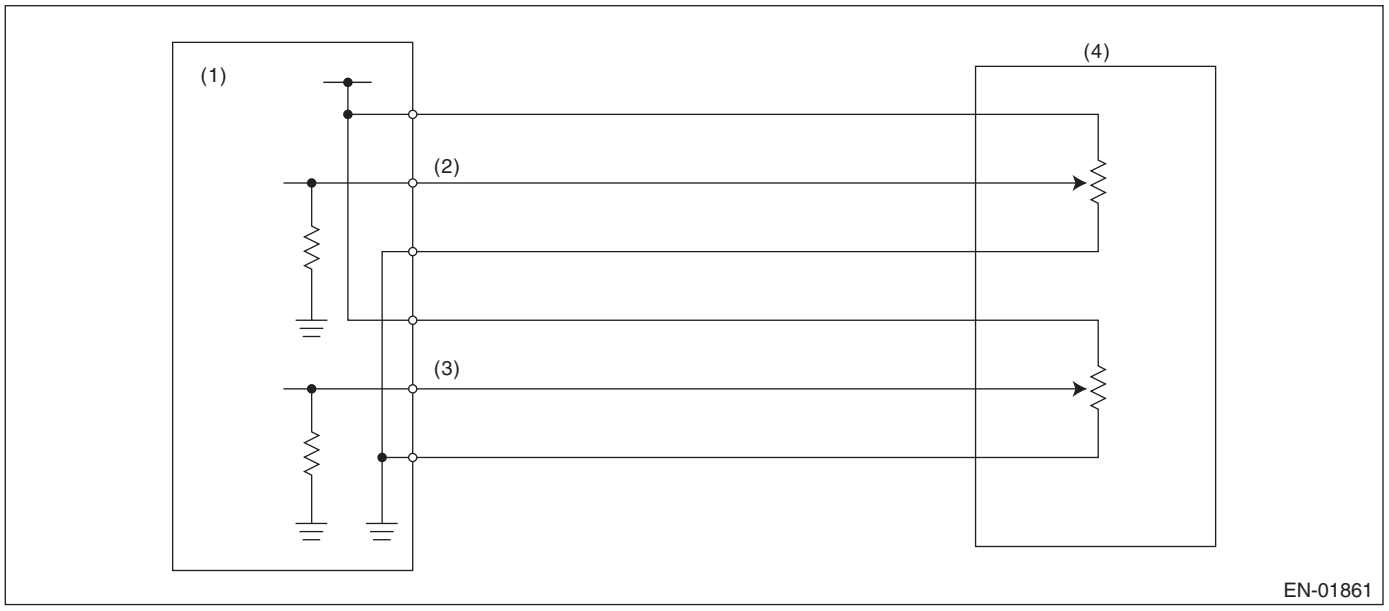
Time Needed for Diagnosis: 32 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FH:DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT LOW INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of accelerator pedal position sensor 2.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal
(4) Accelerator pedal position sensor

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 6 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	< 0.298 V

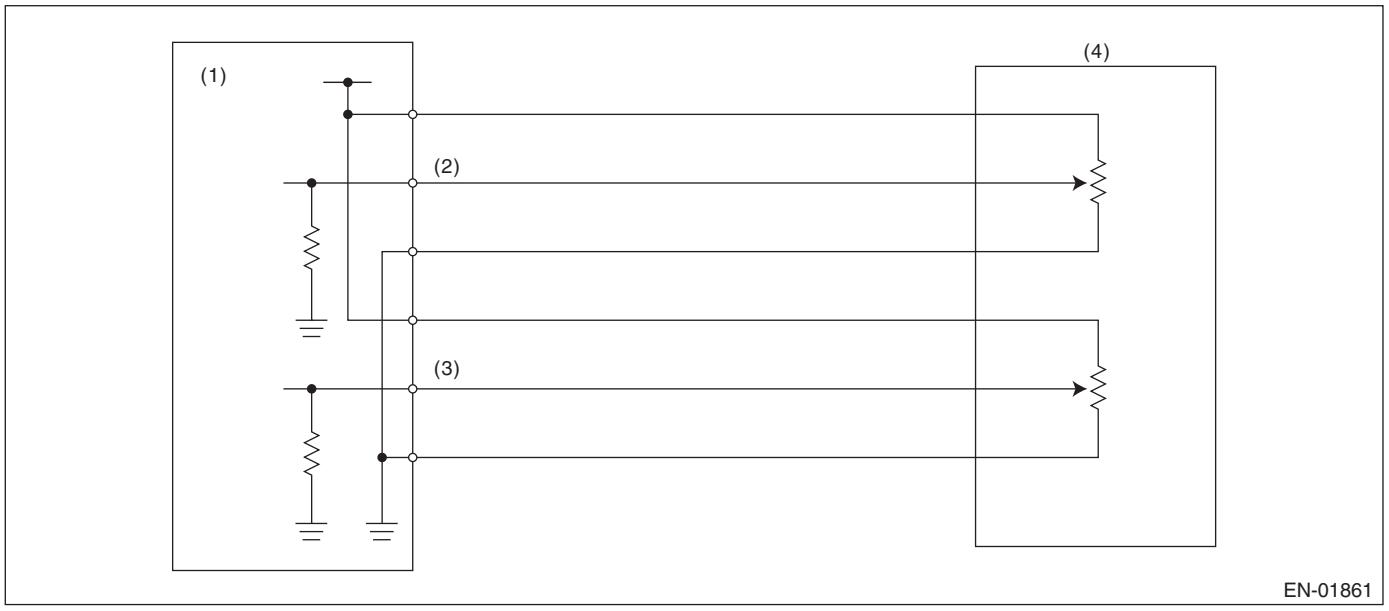
Time Needed for Diagnosis: 100 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FI: DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT HIGH INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of accelerator pedal position sensor 2.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal
(4) Accelerator pedal position sensor

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 6 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	≥ 4.737 V

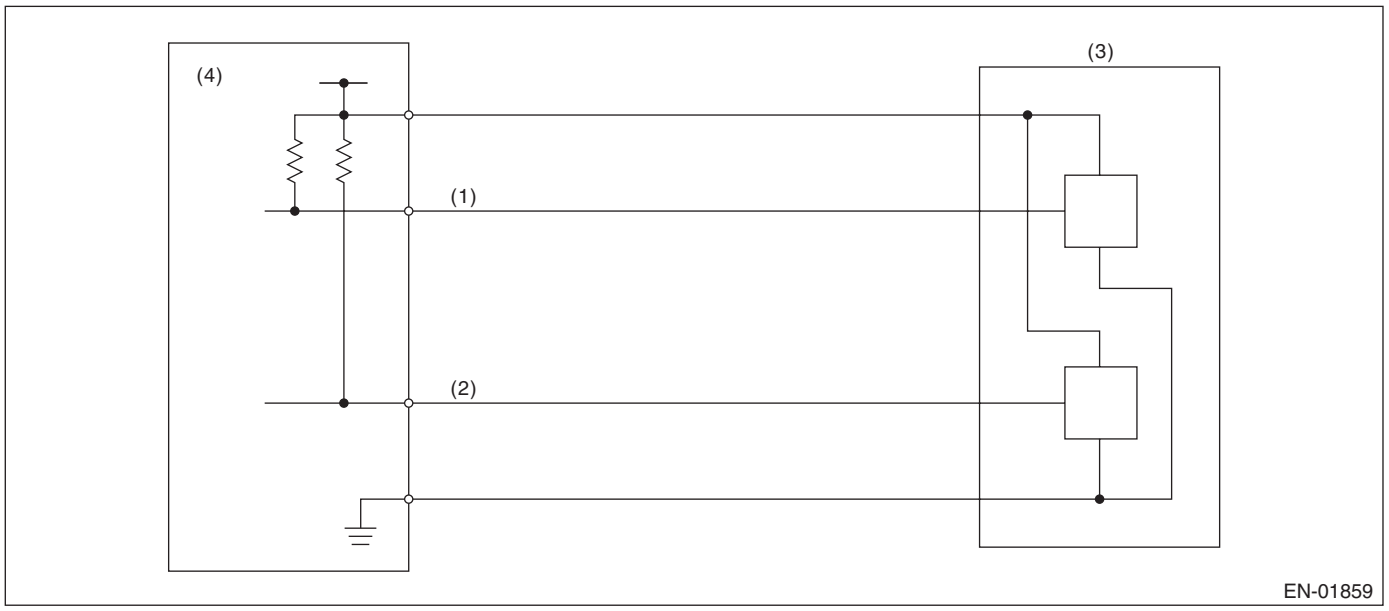
Time Needed for Diagnosis: 100 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FJ: DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A”/“B” VOLTAGE CORRELATION

1. OUTLINE OF DIAGNOSIS

Judge as NG when the signal level of throttle position sensor 1 is different from the throttle position sensor 2.

2. COMPONENT DESCRIPTION



(1) Throttle position sensor 1 signal
(2) Throttle position sensor 2 signal
(3) Throttle position sensor
(4) Engine control module (ECM)

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 6 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

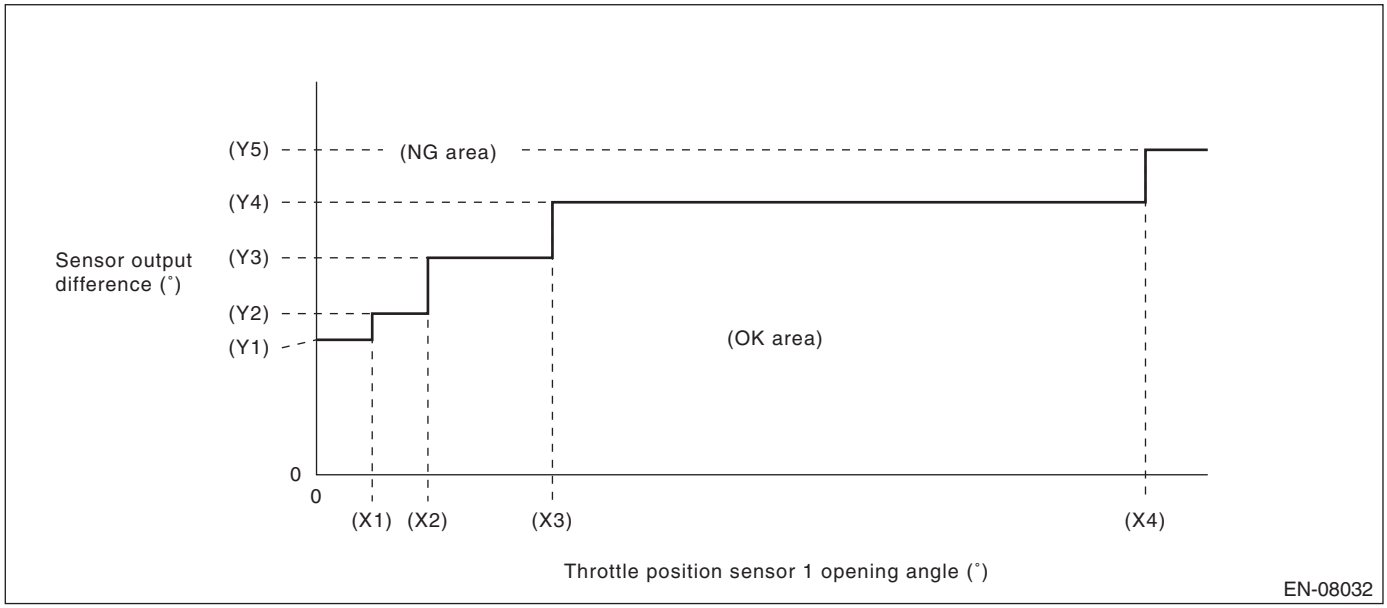
5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Signal difference between two sensors	Within NG range of **Details of Judgment value**

Details of Judgment Value



(X1) 2.125 °
(X2) 4.25 °
(X3) 9 °
(X4) 31.625 °

(Y1) 4.736 °
(Y2) 5.736 °
(Y3) 7.861 °
(Y4) 9.986 °
(Y5) 11.986 °

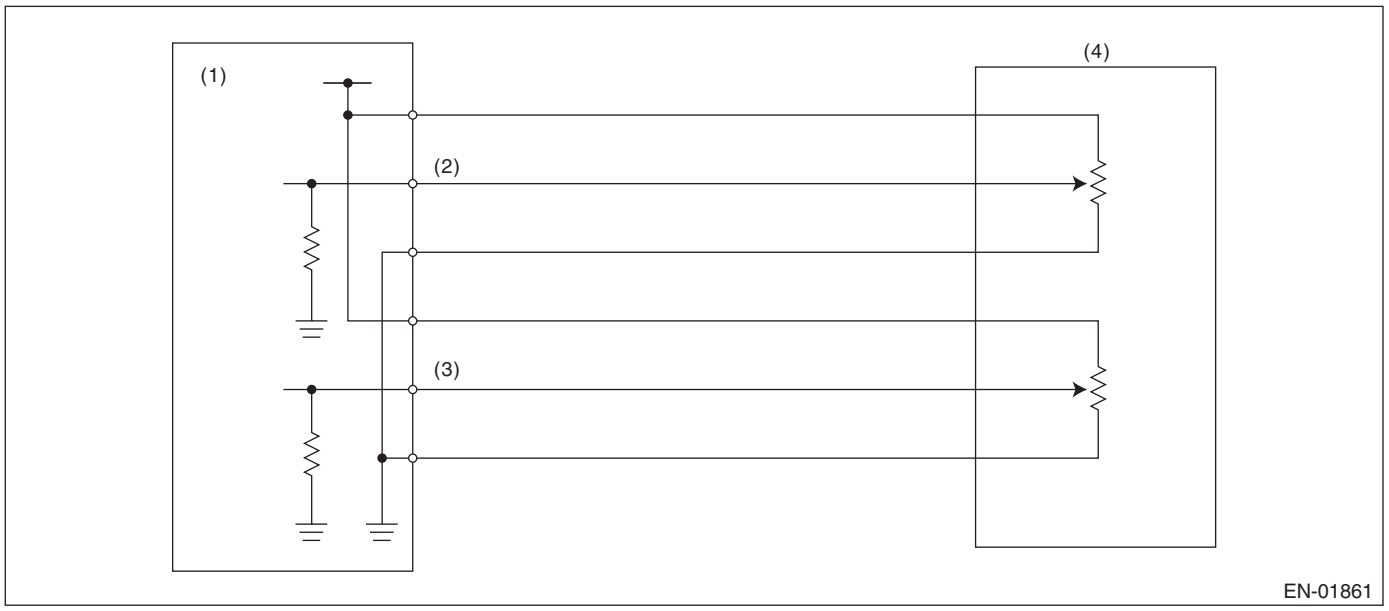
Time Needed for Diagnosis: 212 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FK:DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D”/“E” VOLTAGE CORRELATION

1. OUTLINE OF DIAGNOSIS

Judge as NG when the signal level of throttle position sensor 1 is different from the throttle position sensor 2.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal
(4) Accelerator pedal position sensor

3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 6 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

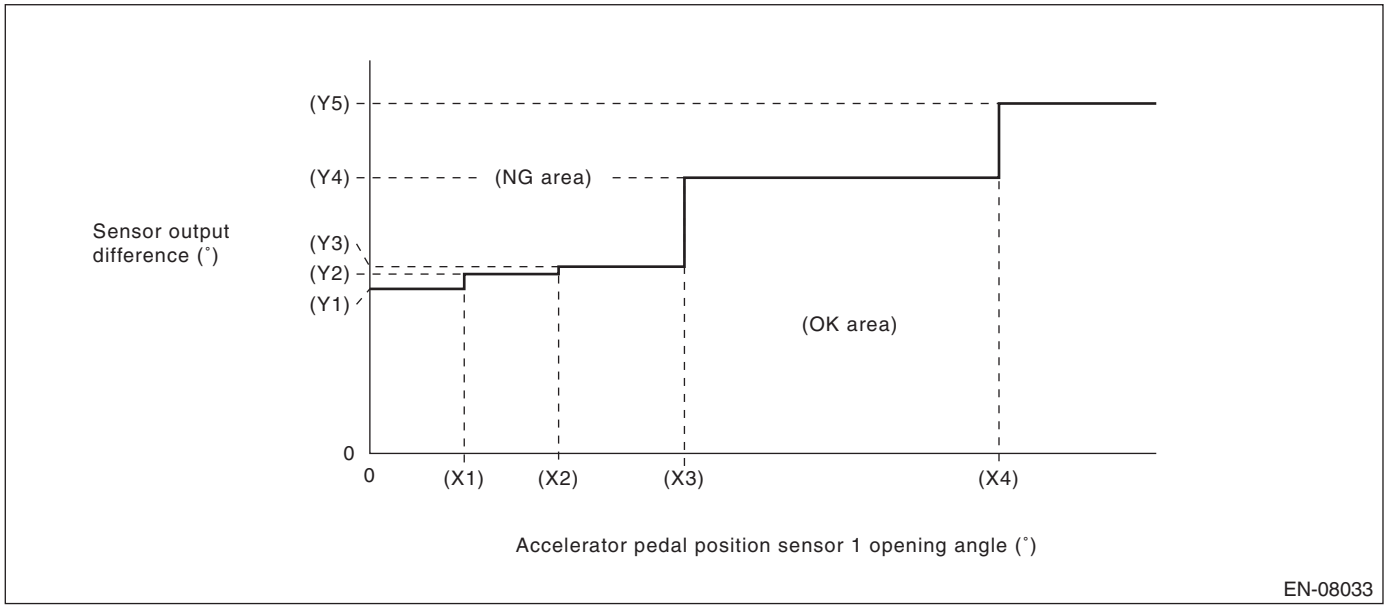
5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Signal difference between two sensors	Within NG range of **Details of Judgment value**

Details of Judgment Value



(X1) 0.6 °
(X2) 1.2 °
(X3) 2 °
(X4) 4 °

(Y1) 1.465 °
(Y2) 1.597 °
(Y3) 1.663 °
(Y4) 2.455 °
(Y5) 3.116 °

Time Needed for Diagnosis: 116 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

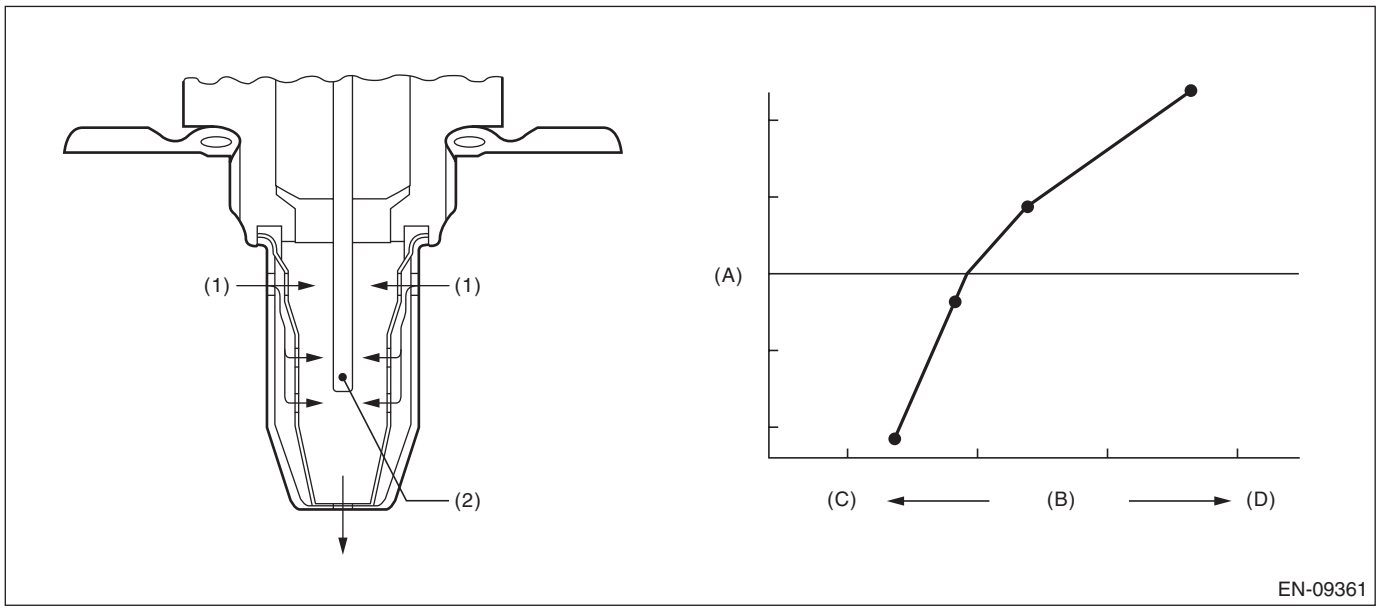
FL: DTC P2195 O2 SENSOR SIGNAL BIASED/STUCK LEAN (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

Detect that λ value remains low.
Judge as NG when lambda value is abnormal in accordance with λ value of front oxygen (A/F) sensor and running conditions such as vehicle speed, amount of intake air, engine coolant temperature, sub feedback control, etc.

λ value = Actual air fuel ratio/Theoretical air fuel ratio
λ > 1: Lean
λ < 1: Rich

2. COMPONENT DESCRIPTION



(A) Electromotive force (B) Air fuel ratio (C) Rich
(D) Lean

(1) Exhaust gas (2) ZrO_2

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Time needed for all secondary parameters to be in enable conditions	≥ 4096 ms
Battery voltage	≥ 10.9 V
Atmospheric pressure	≥ 75.1 kPa (563 mmHg, 22.2 inHg)
Rear oxygen sensor sub feedback	Execution
Rear oxygen sensor output voltage – Feedback target voltage	– 0.2 V — 0.1 V
or rear oxygen sensor sub feedback compensation coefficient	On Min.
or rear oxygen sensor sub feedback compensation coefficient	On Max.
Elapsed time after starting the engine	≥ 0 ms
Engine coolant temperature	≥ –40 °C (–40 °F)
Vehicle speed	≥ 0 km/h (0 MPH)
Amount of intake air	≥ 6 g/s (0.21 oz/s)
Targeted lambda value load compensation coefficient	–1 — 1.000

4. GENERAL DRIVING CYCLE

Perform diagnosis continuously at a constant speed of 0 km/h (0 MPH) or more after 0 ms have passed since the engine started.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
λ value	< 0.85

Time Needed for Diagnosis: 10000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

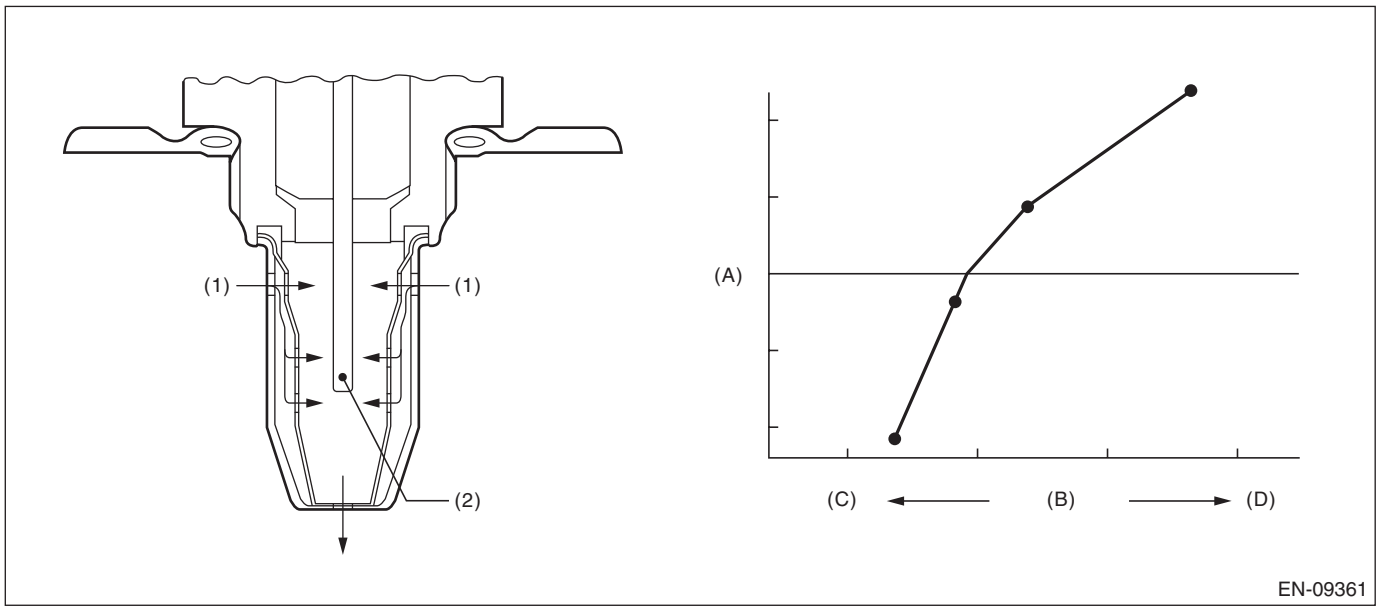
FM:DTC P2196 O2 SENSOR SIGNAL BIASED/STUCK RICH (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

Detect that λ value remains high.
Judge as NG when lambda value is abnormal in accordance with λ value of front oxygen (A/F) sensor and running conditions such as vehicle speed, amount of intake air, engine coolant temperature, sub feedback control, etc.

λ value = Actual air fuel ratio/Theoretical air fuel ratio
λ > 1: Lean
λ < 1: Rich

2. COMPONENT DESCRIPTION



(A) Electromotive force (B) Air fuel ratio (C) Rich
(D) Lean

(1) Exhaust gas (2) ZrO_2

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Time needed for all secondary parameters to be in enable conditions	≥ 4096 ms
Battery voltage	≥ 10.9 V
Atmospheric pressure	≥ 75.1 kPa (563 mmHg, 22.2 inHg)
Rear oxygen sensor sub feedback	Execution
Rear oxygen sensor output voltage – Feedback target voltage	– 0.2 V — 0.1 V
or rear oxygen sensor sub feedback compensation coefficient	On Min.
or rear oxygen sensor sub feedback compensation coefficient	On Max.
Elapsed time after starting the engine	≥ 0 ms
Engine coolant temperature	≥ –40 °C (–40 °F)
Vehicle speed	≥ 0 km/h (0 MPH)
Amount of intake air	≥ 6 g/s (0.21 oz/s)
Targeted lambda value load compensation coefficient	–1 — 1.000

4. GENERAL DRIVING CYCLE

Perform diagnosis continuously at a constant speed of 0 km/h (0 MPH) or more after 0 ms have passed since the engine started.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
λ value	> 1.15

Time Needed for Diagnosis: 10000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

FN:DTC P219A BANK 1 AIR-FUEL RATIO IMBALANCE

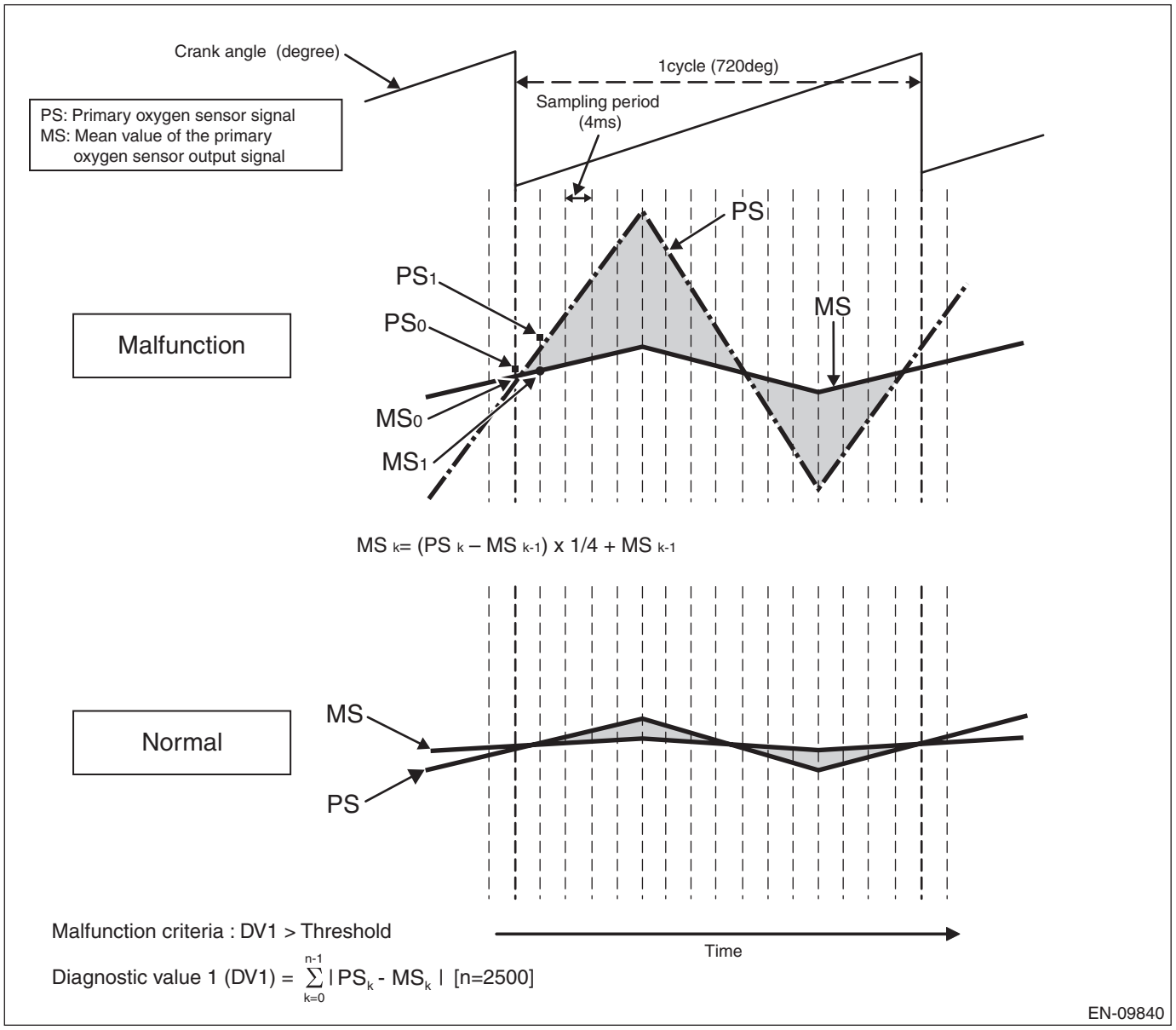
1. OUTLINE OF DIAGNOSIS

This diagnostic monitor performs a functional check of the fuel system to determine an air-fuel ratio cylinder imbalance.
This diagnosis is composed of two monitors.
The outline of “monitor A1” is as follows. When an air-fuel ratio cylinder imbalance occurs, the primary oxygen sensor output signal will oscillate with increased amplitude. This monitor utilizes this behavior to make a diagnosis. The monitor integrates the difference between the amplification value and the mean value of the first oxygen sensor output signal and compares it to a threshold to make a judgment.
The outline of “monitor B1” is as follows. Similarly, when an imbalance occurs, the engine speed also fluctuates with increased amplitude. This monitor utilizes this behavior to make a diagnosis. For reference, it should be noted that this imbalance monitor method is actually similar to the current misfire diagnostic monitor, and the parameter “domg360” (units: degrees CA) is shared between the imbalance and misfire monitors. The imbalance monitor is performed during idle condition when the engine is warm. The monitor integrates the count of “domg360” which exceeds a threshold in 1,000 revolution.
When both the “monitor A1” value and the “monitor B1” value exceed a predetermined threshold, this monitor determines a malfunction and stores a fault code.

Monitor A1

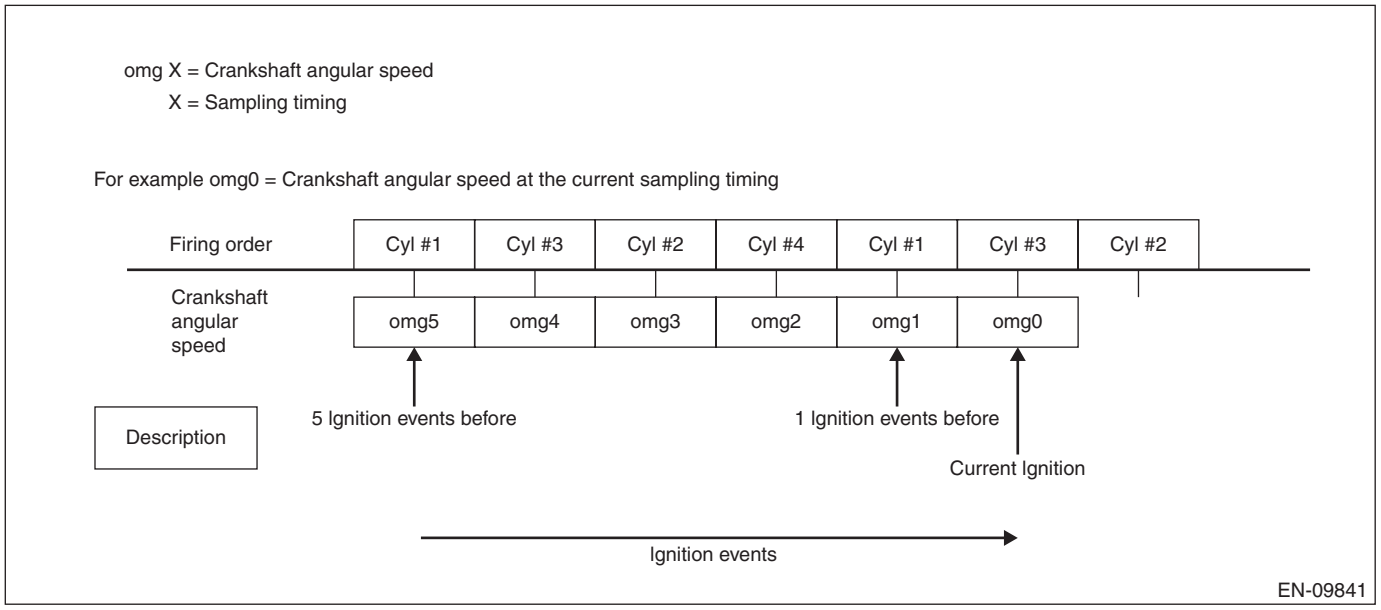
When there is an air-fuel ratio cylinder imbalance malfunction, the primary oxygen sensor output fluctuates widely compared with a normal sensor, as shown by the chain line in Figure 1 below. This monitor makes a diagnosis based on this phenomenon. Each primary oxygen sensor signal (PS) and mean value of the primary oxygen sensor signal (MS) is calculated from the primary oxygen sensor signal. The absolute values of (PS – MS) are sampled every 4 ms as shown in the figure. Diagnostic value 1 (DV1) is obtained by integrating the absolute value of (PS – MS) for 2,500 times. A malfunction is determined when DV1 exceeds the threshold. The judgment values are determined experimentally.

Figure 1. Compare malfunctioned primary oxygen sensor output with a normal sensor

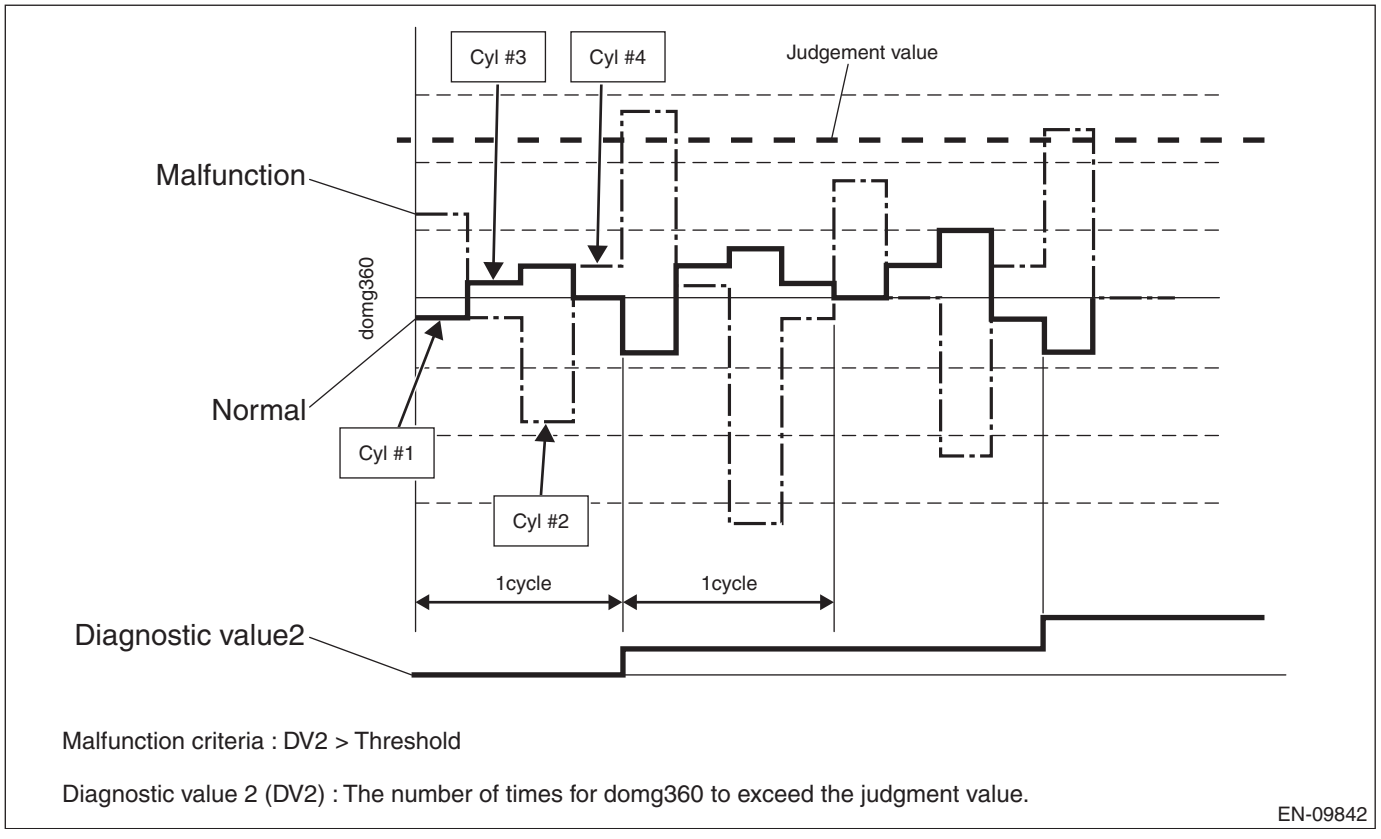


Monitor B1

Method used: Difference method of 360 degrees CA
Monitor value: domg360 = (omg 1 – omg 0) – (omg 3 – omg 2) = angular speed
Each crankshaft angular speed is defined as Figure 2 below.
Figure 2. Description of domg360 output



This method uses the fact that the domg360 of lean conditioned cylinder caused by imbalance malfunction indicates big value, as shown by the chain line in Figure 3 below.
The number of times for domg360 to exceed the judgment value in 1,000 revolutions (500 cycles) is calculated as diagnostic value 2 (DV2). A malfunction is determined when DV2 exceeds the threshold.
Figure 3. Compare malfunctioned domg360 output with a normal output



2. ENABLE CONDITIONS

Monitor A1: Primary oxygen sensor fluctuation

Secondary Parameters	Enable Conditions
Closed loop control with primary oxygen sensor	Active
Engine speed	> 1400 rpm and < 3000 rpm
Engine coolant temperature	> –40 °C (–40 °F)
Intake air mass	≥ 0.70 g/rev (0.02 oz/rev)

Monitor B1: Crankshaft speed fluctuation

Secondary Parameters	Enable Conditions
Misfire diagnosis monitor	Active
Engine coolant temperature	> –40 °C (–40 °F)
Accelerator pedal position	= 0%
Engine speed	> 1400 rpm and < 3000 rpm
Intake air mass per revolution	> 0.7 g/rev (0.02 oz/rev)

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Judge as NG when Monitor A1 and Monitor B1 are both NG, and when either is OK, judge as OK.

Monitor A1

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Diagnostic value 1 (DV1)	> Threshold value 1 (TV1)

Threshold value 1 (TV1):

$$\sum_{k=0}^{n-1} Map_k \quad [n=2500]$$

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Map

		Engine load (g/rev (oz/rev))				
		0.7 (0.02)	0.8 (0.03)	0.9 (0.03)	1 (0.04)	1.1 (0.04)
Engine speed (rpm)	1400	0.0076	0.0110	0.0153	0.0201	0.0201
	1600	0.0116	0.0144	0.0204	0.0269	0.0269
	1800	0.0130	0.0186	0.0247	0.0257	0.0257
	2000	0.0144	0.0197	0.0262	0.0303	0.0303
	2200	0.0134	0.0203	0.0289	0.0356	0.0356
	2400	0.0136	0.0199	0.0288	0.0343	0.0343
	2600	0.0149	0.0209	0.0304	0.0362	0.0362
	2800	0.0156	0.0218	0.0312	0.0373	0.0373
	3000	0.016	0.0198	0.0344	0.0388	0.0388

Time Needed for Diagnosis: 4 ms × 2500 time(s)

Monitor B1

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Diagnostic Value2 (DV2)	> 65535 time(s)

Time Needed for Diagnosis: 1000 engine revs.

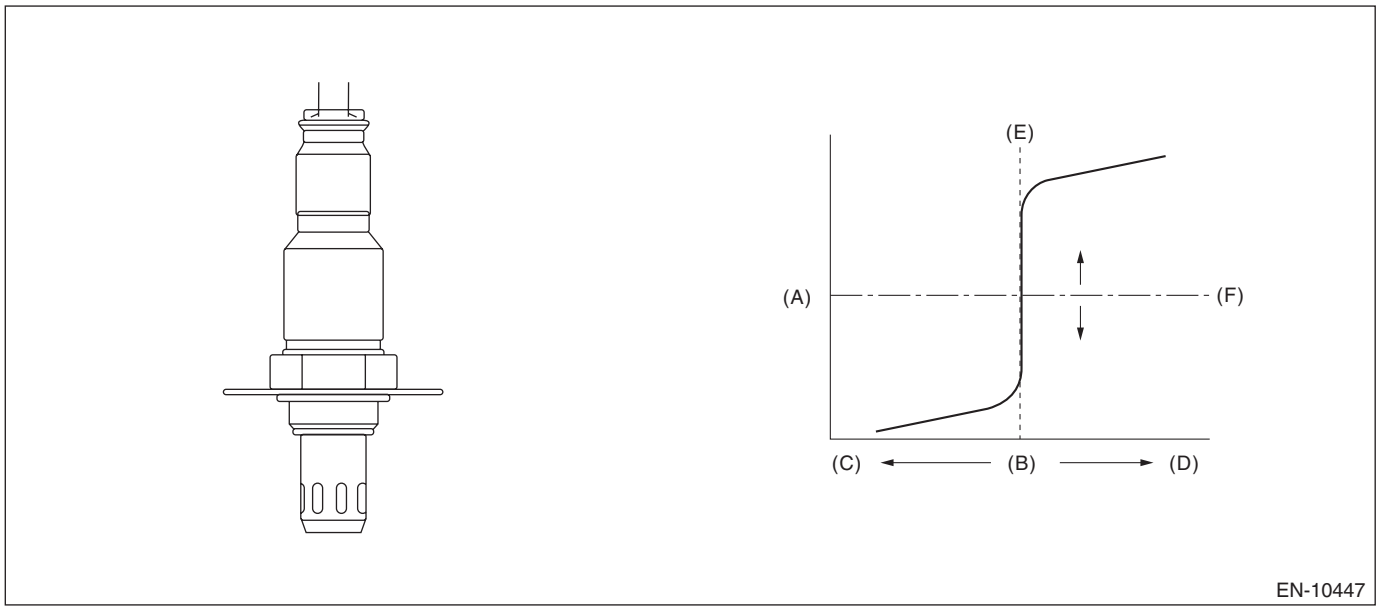
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

FO:DTC P2270 O2 SENSOR SIGNAL BIASED/STUCK LEAN (BANK 1 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

Detect the stuck of rear oxygen sensor voltage in lean state.
When rear oxygen sensor voltage remains below the threshold value for predetermined time, diagnosis interrupts target air fuel ratio for control and raises output voltage.
Judge as NG detecting the stuck in lean state when rear oxygen sensor voltage remains below the threshold value even after the interrupt control.

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Sub feedback	In operation
Amount of intake air	≥ 10 g/s (0.35 oz/s)
Estimated temperature of the rear oxygen sensor element	≥ 500 °C (932 °F)
Enable conditions at interrupt control are as follows	
Air fuel ratio reduced from target air fuel ratio	= Value of Map
Continuous time when rear oxygen sensor output voltage is less than 0.55 V	≥ 5000 ms

Map

Output voltage of rear oxygen sensor V	0.000	0.150	0.200	0.400	0.600
Air fuel ratio reduced from target air fuel ratio %	-0.150	-0.150	-0.040	-0.040	-0.040

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once after the enable conditions have been established.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage of rear oxygen sensor	< 0.55 V

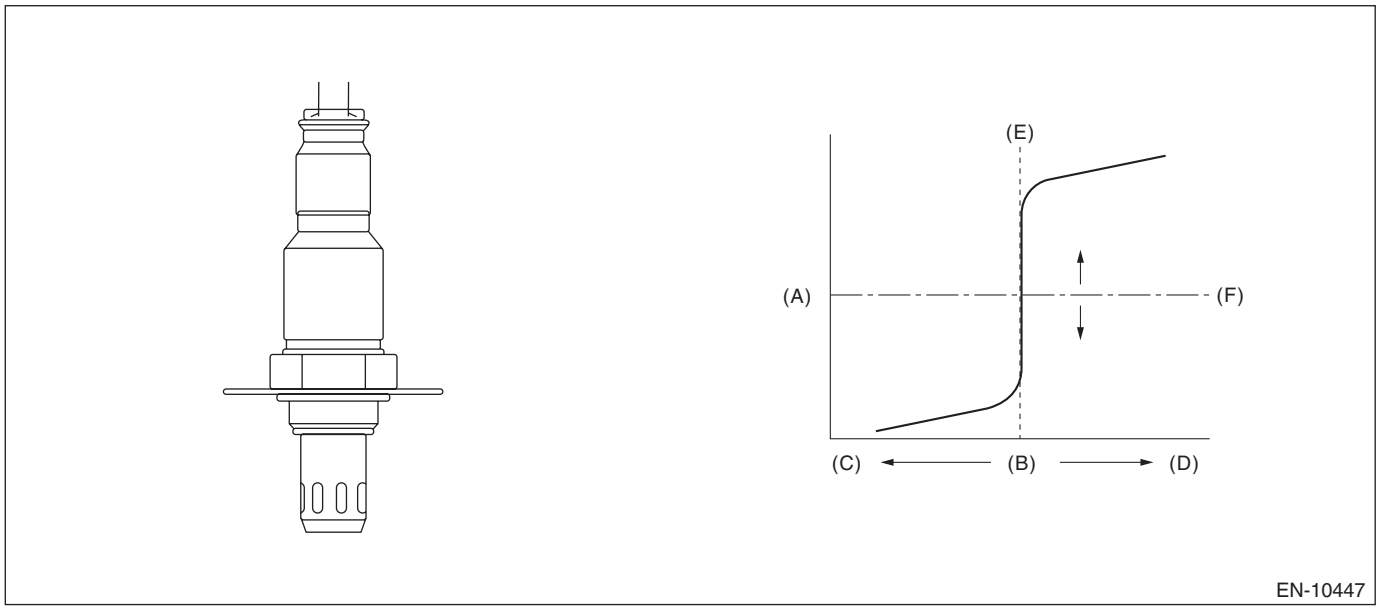
Time Needed for Diagnosis: 15000 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

FP:DTC P2271 O2 SENSOR SIGNAL BIASED/STUCK RICH (BANK 1 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

Detect the stuck of rear oxygen sensor voltage in rich state.
Detect the stuck in rich state and judge as NG if rear oxygen sensor voltage remains above the threshold value for predetermined time.

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Fuel cut time	≥ 5000 ms
Estimated temperature of the rear oxygen sensor element	≥ 500 °C (932 °F)

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once after the enable conditions have been established.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage of rear oxygen sensor	> 0.15 V

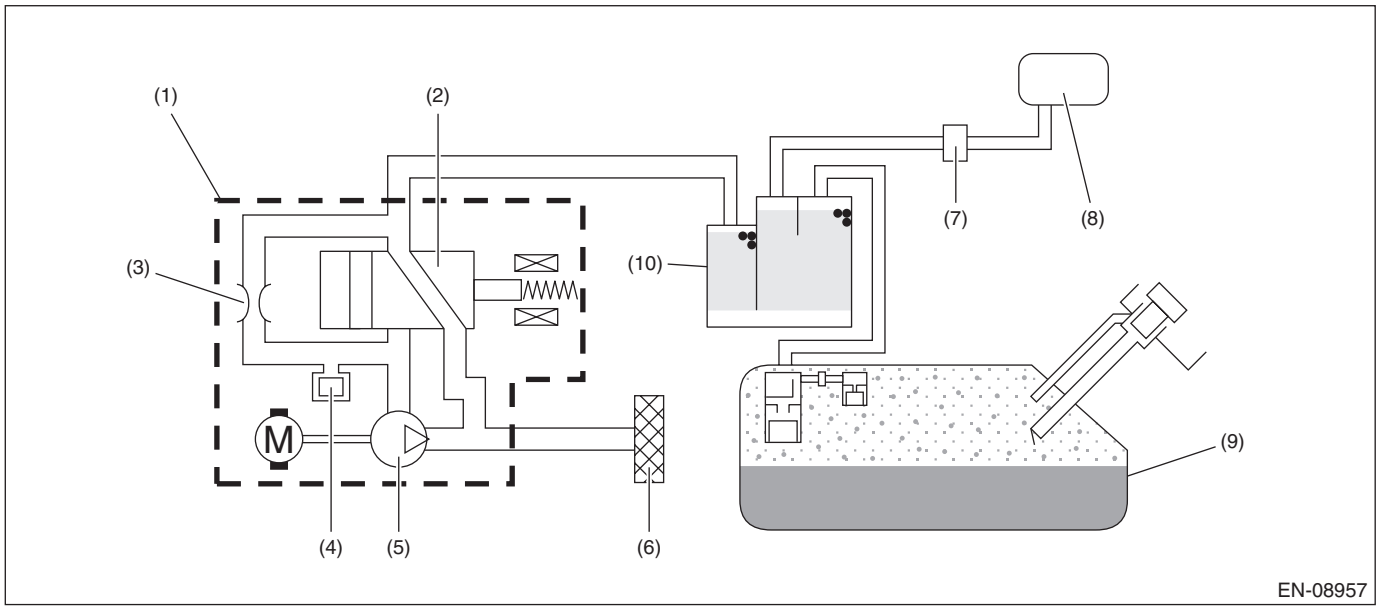
Time Needed for Diagnosis: 500 ms
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

FQ:DTC P2401 EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT LOW

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the ELCM vacuum pump.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) ELCM
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9
ELCM vacuum pump drive signal	OFF

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Terminal output voltage when ECM outputs OFF signal	≤ Battery voltage × 0.34

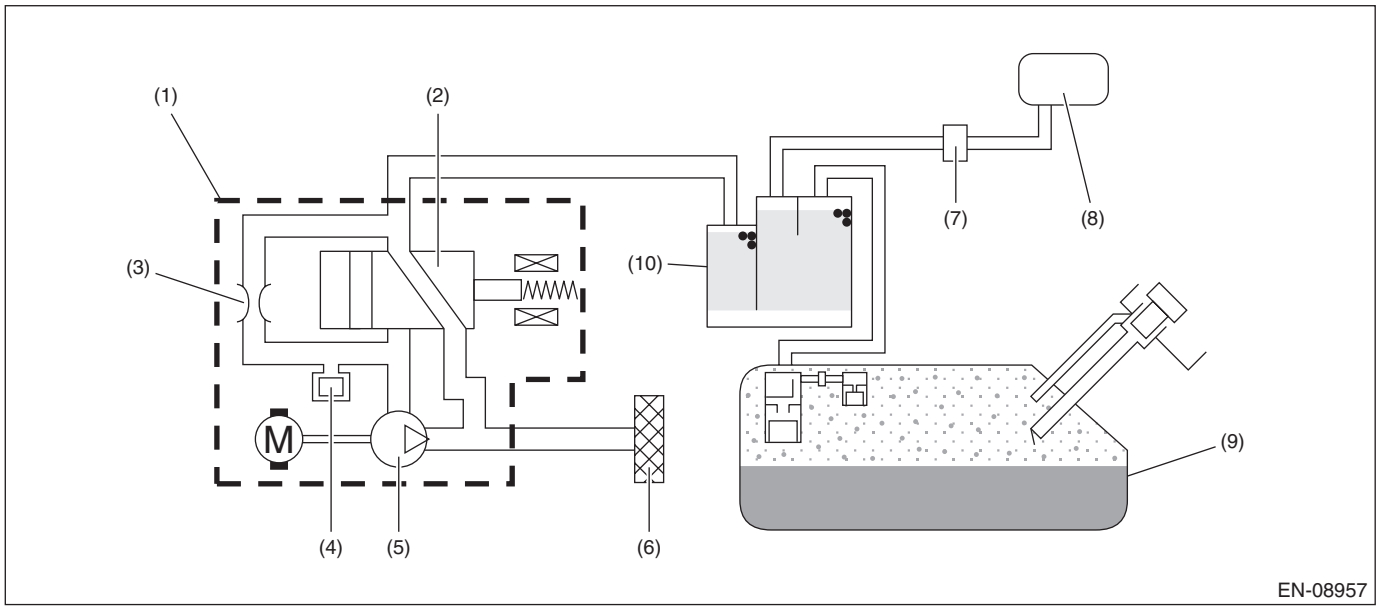
Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FR:DTC P2402 EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT HIGH

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the ELCM vacuum pump.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) ELCM
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9
ELCM vacuum pump drive signal	ON

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Terminal output current when ECM outputs ON signal	≥ 12 A

Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FS:DTC P2404 EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP SENSE CIRCUIT RANGE/PERFORMANCE

1. OUTLINE OF DIAGNOSIS

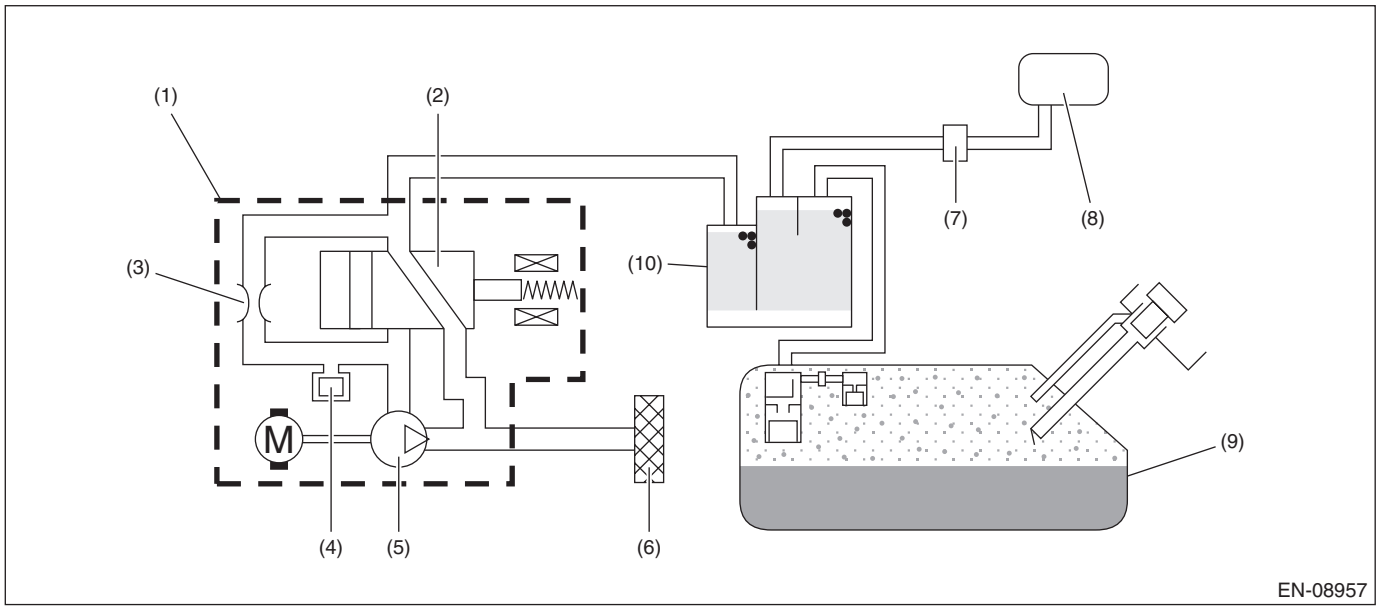
NOTE:
For the detection standard, refer to DTC P0455. <Ref. to GD(H4DO HEV)-115, DTC P0455 EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (LARGE LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>

FT: DTC P2419 EVAPORATIVE EMISSION SYSTEM SWITCHING VALVE CONTROL CIRCUIT LOW

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the ELCM switching valve.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) ELCM
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9
ELCM switching valve drive signal	OFF

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Terminal output voltage when ECM outputs OFF signal	≤ Battery voltage × 0.34

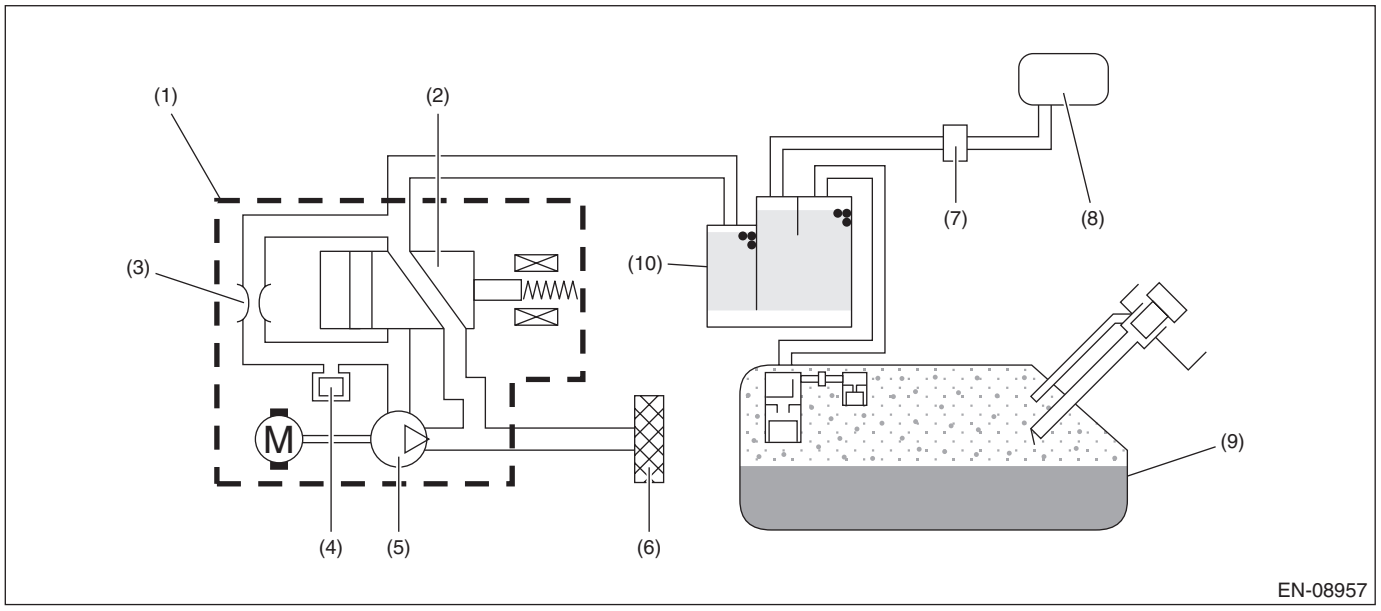
Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FU:DTC P2420 EVAPORATIVE EMISSION SYSTEM SWITCHING VALVE CONTROL CIRCUIT HIGH

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the ELCM switching valve.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) ELCM
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9
ELCM switching valve drive signal	ON

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Terminal output current when ECM outputs ON signal	≥ 12 A

Time Needed for Diagnosis: 2500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FV:DTC P2530 IGNITION SWITCH RUN POSITION CIRCUIT

1. OUTLINE OF DIAGNOSIS

Detect instantaneous open in ignition switch input circuit to ECM.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION

ECM monitors the voltage of the ignition switch input circuit. Judge as ignition switch ON when the voltage is the specified value or more.

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Engine speed or Vehicle speed	≥ 550 rpm or ≥ 2 km/h(1.2 MPH)

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after the enable conditions have been established.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established within the predetermined time.

Judgment Value

Malfunction Criteria	Threshold Value
Number of instantaneous opens in ignition switch input circuit	≥ 5 time(s)

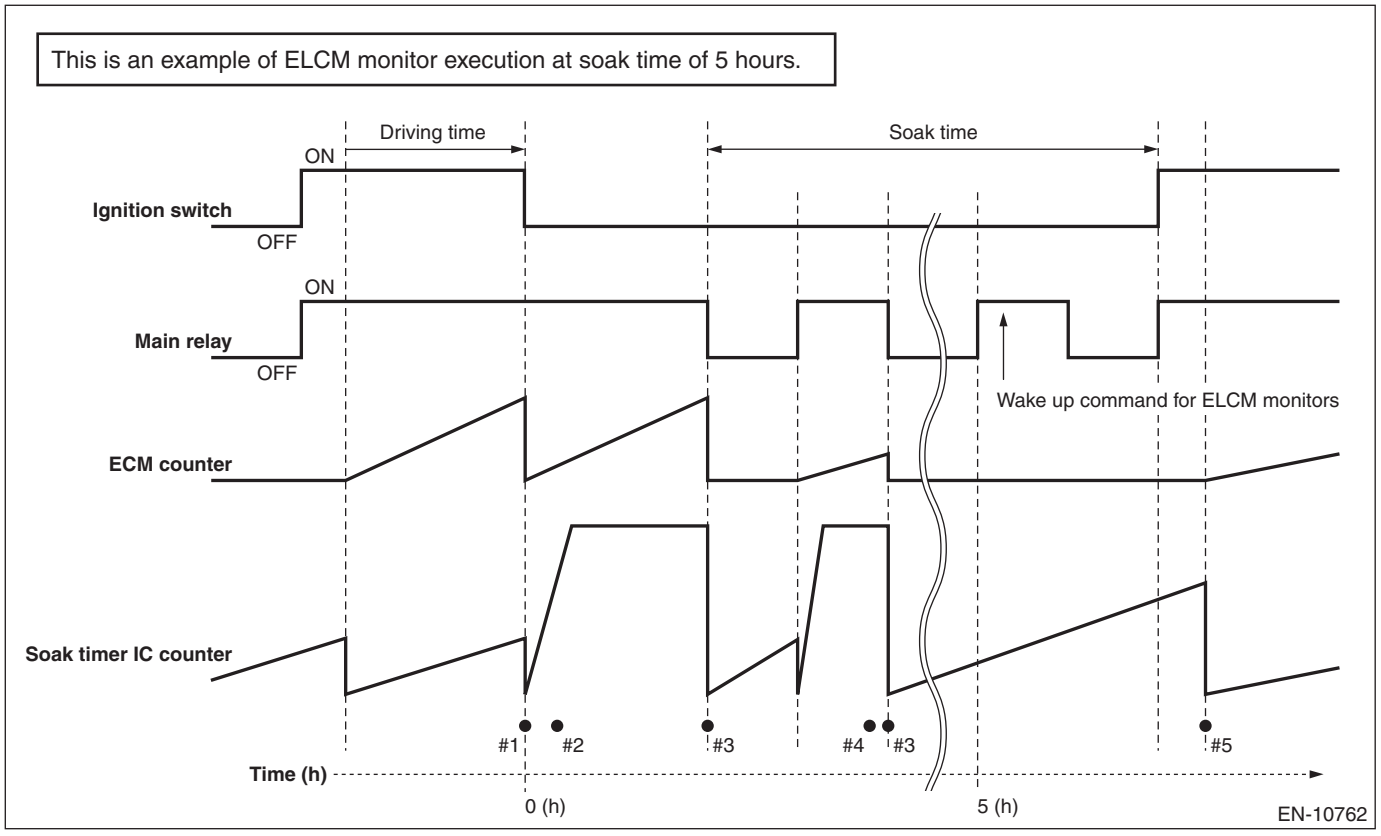
Time Needed for Diagnosis: 5000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

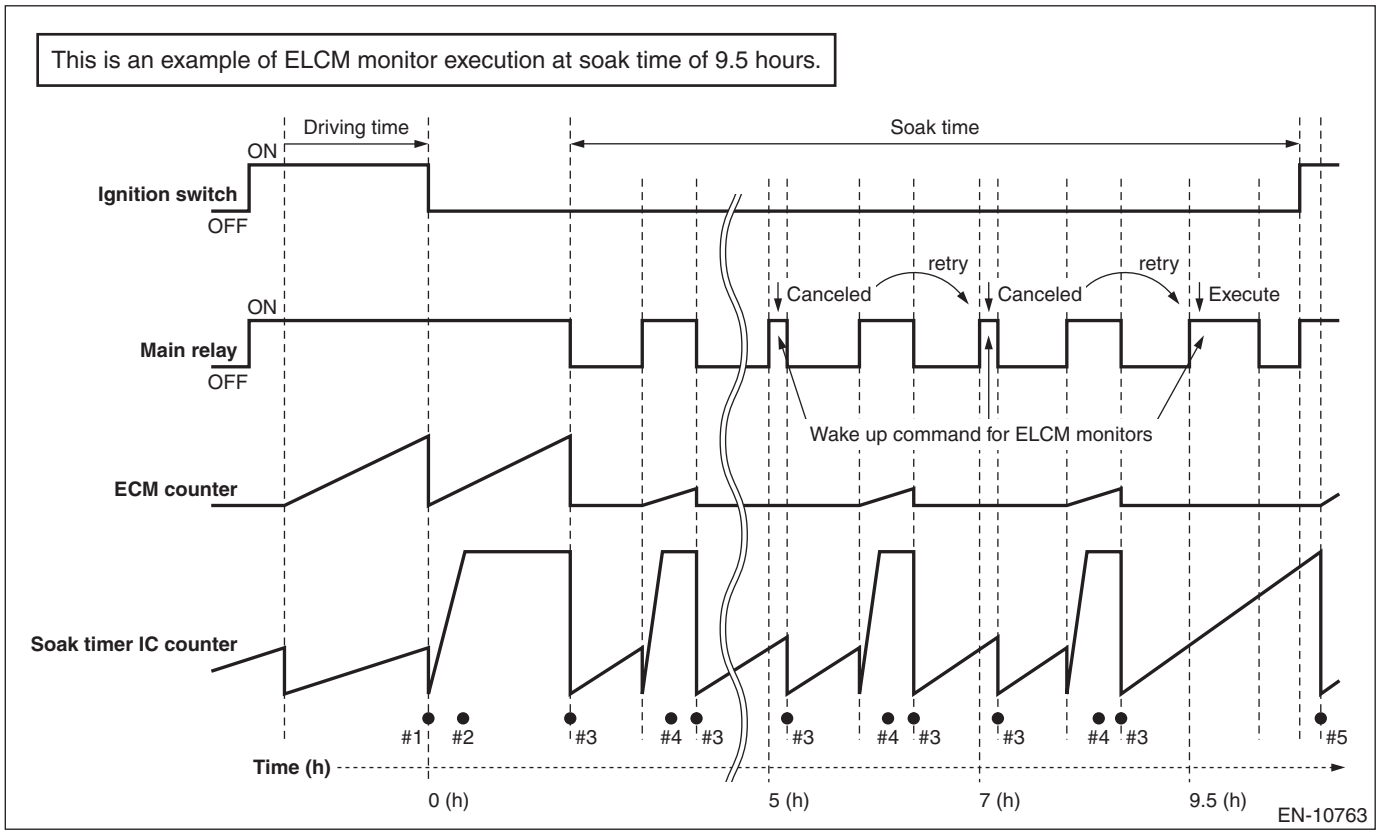
FW:DTC P2610 ECM/PCM INTERNAL ENGINE OFF TIMER PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Detect malfunction of soaking timer IC by the five diagnoses below.

Monitor Number	Explanation	Time required for diagnosis
Monitor #1 <Timer diagnosis>	Perform diagnosis of the soaking timer IC accuracy	128 ms
Monitor #2 <Full count diagnosis>	Perform diagnosis of the soaking timer IC counter function	128 ms
Monitor #3 <Soaking timer IC setting diagnosis>	Perform diagnosis of communication between ECM and soaking timer IC	128 ms
Monitor #4 <Timer diagnosis (during soaking)>	Perform diagnosis of the soaking timer IC accuracy during soaking	None
Monitor #5 <Wake-up diagnosis>	Perform diagnosis of wake-up function	None





2. COMPONENT DESCRIPTION

The soaking timer IC is built into the ECM.

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
<Timer diagnosis>	
Battery voltage	≥ 10.9 V
Ignition switch	OFF
Elapsed time after starting the engine	> 600 s and < 61380 s
<Full count diagnosis>	
Battery voltage	≥ 10.9 V
Ignition switch	OFF
Counter in ECM	≥ 4 s
<Soaking timer IC setting diagnosis>	
Battery voltage	≥ 10.9 V
Ignition switch	OFF
<Timer diagnosis (during soaking)>	
Battery voltage	≥ 10.9 V
Ignition switch	OFF
<Wake-up diagnosis>	
Ignition switch	ON
Time in the soaking timer IC	> 3600 s

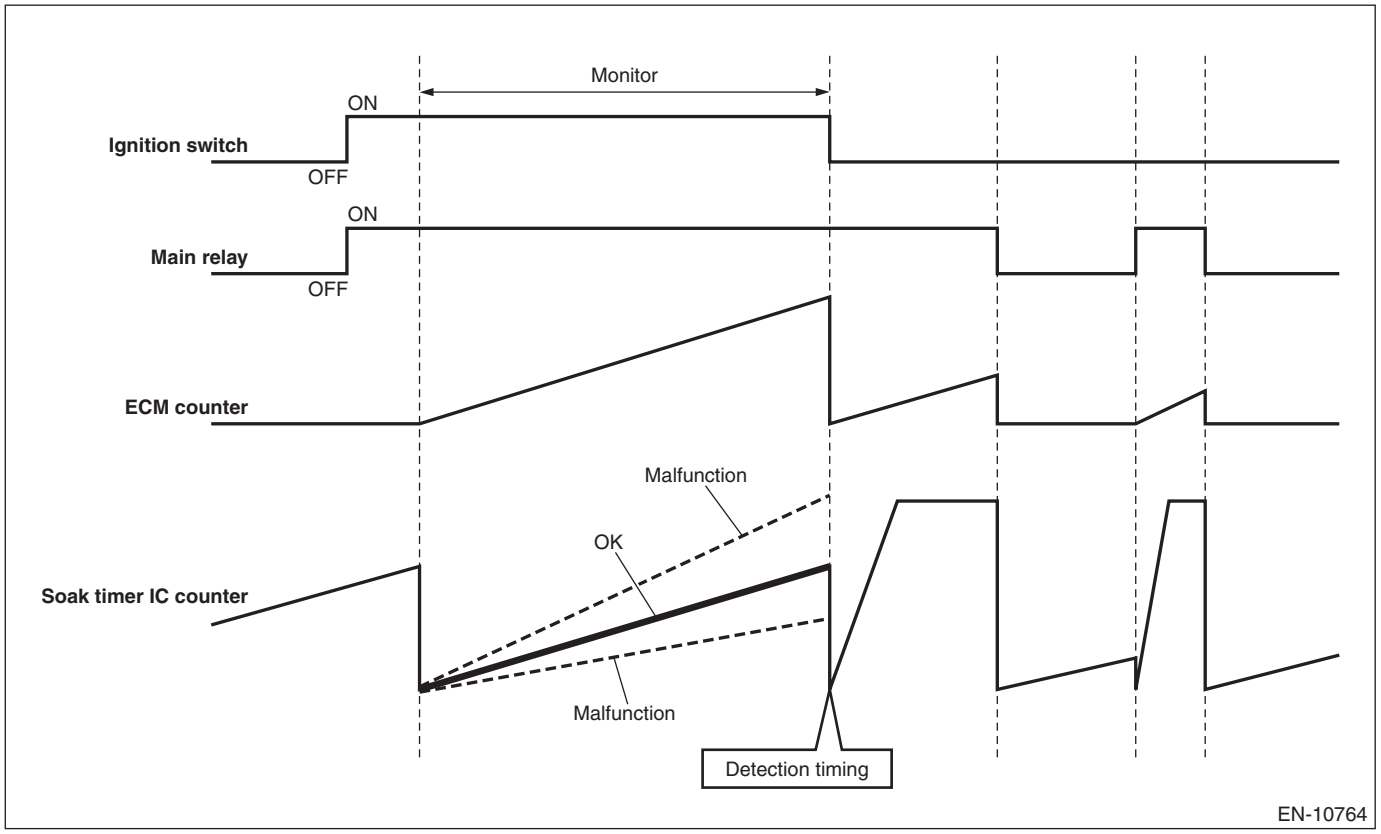
4. GENERAL DRIVING CYCLE

Perform the diagnosis only once when the ignition switch is OFF and when the ignition switch is ON after the soaking of one hour or more.

5. DIAGNOSTIC METHOD

<Timer diagnosis>

Start the count up operation of counters in ECM and in soaking timer IC when the engine is started.
Judge as timer malfunction if the difference between the counter in ECM and counter in soaking timer IC exceeds the allowable limit when the ignition switch is OFF.



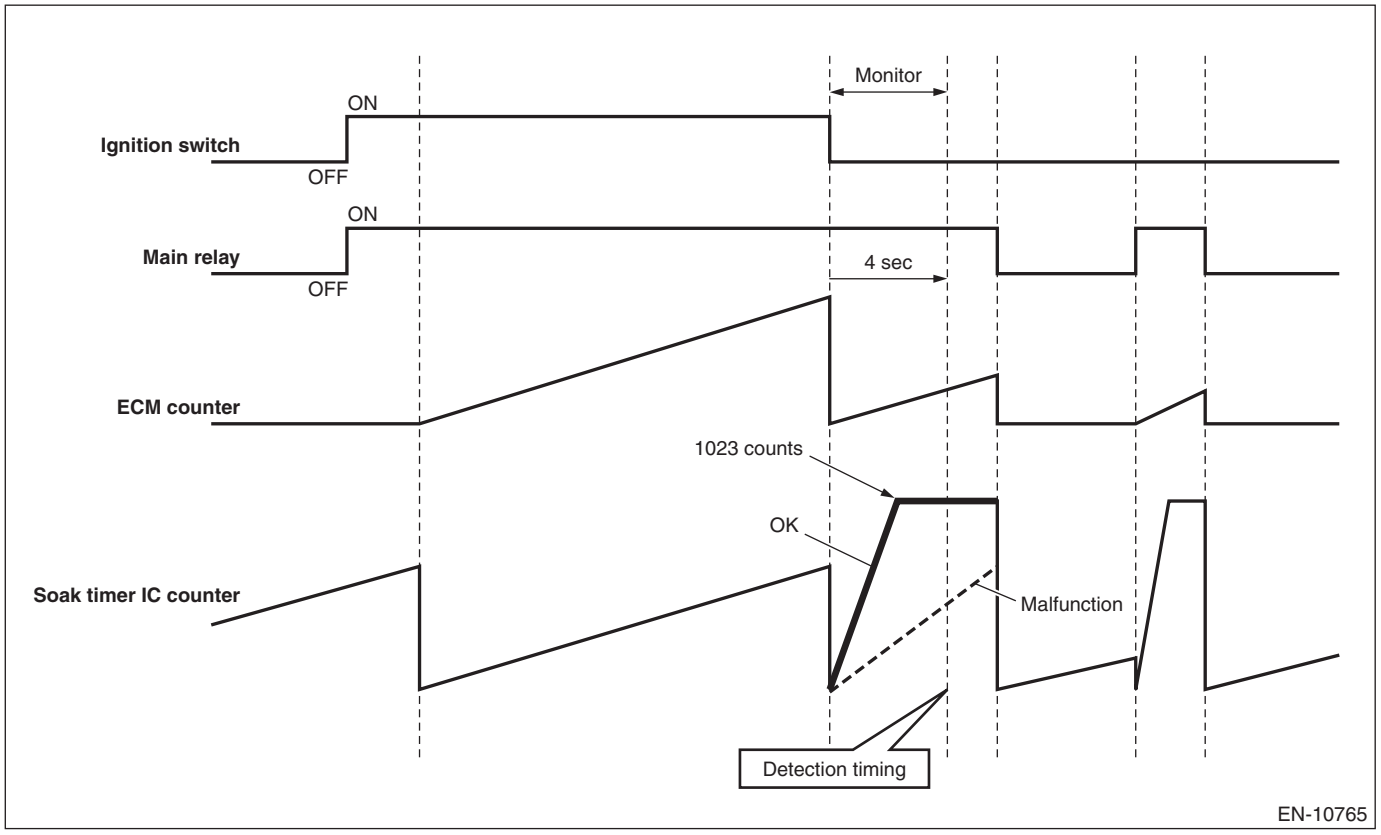
Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
|osoaktimcpu – osoaktimic| / osoaktimcpu osoaktimcpu = Counter in ECM osoaktimic = Counter in soaking timer IC	> 0.24

<Full count diagnosis>

Reset the counter in soaking timer IC and start the count up operation.
Judge as full count diagnosis malfunction if counter in soaking timer IC is not $3FF (1023 count) after 4 seconds.



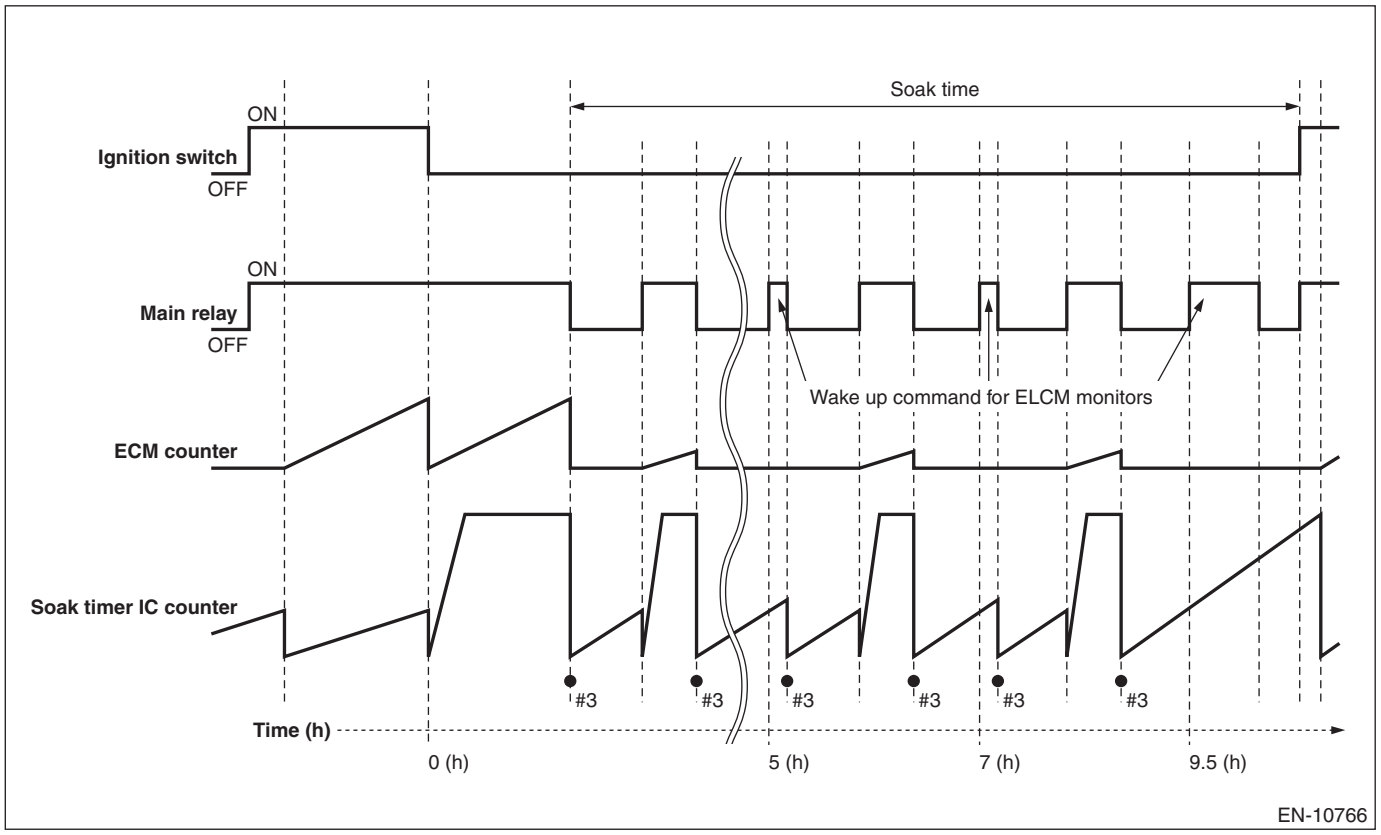
Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
osoakfcntic osoakfcntic = Counter in soaking timer IC	≠ $3FF (1023 count)

<Soaking timer IC setting diagnosis>

When setting the activation setting time to soaking timer IC, compare the writing value to soaking timer IC with read out value. Judge as malfunction if the values do not match 3 times in a row.



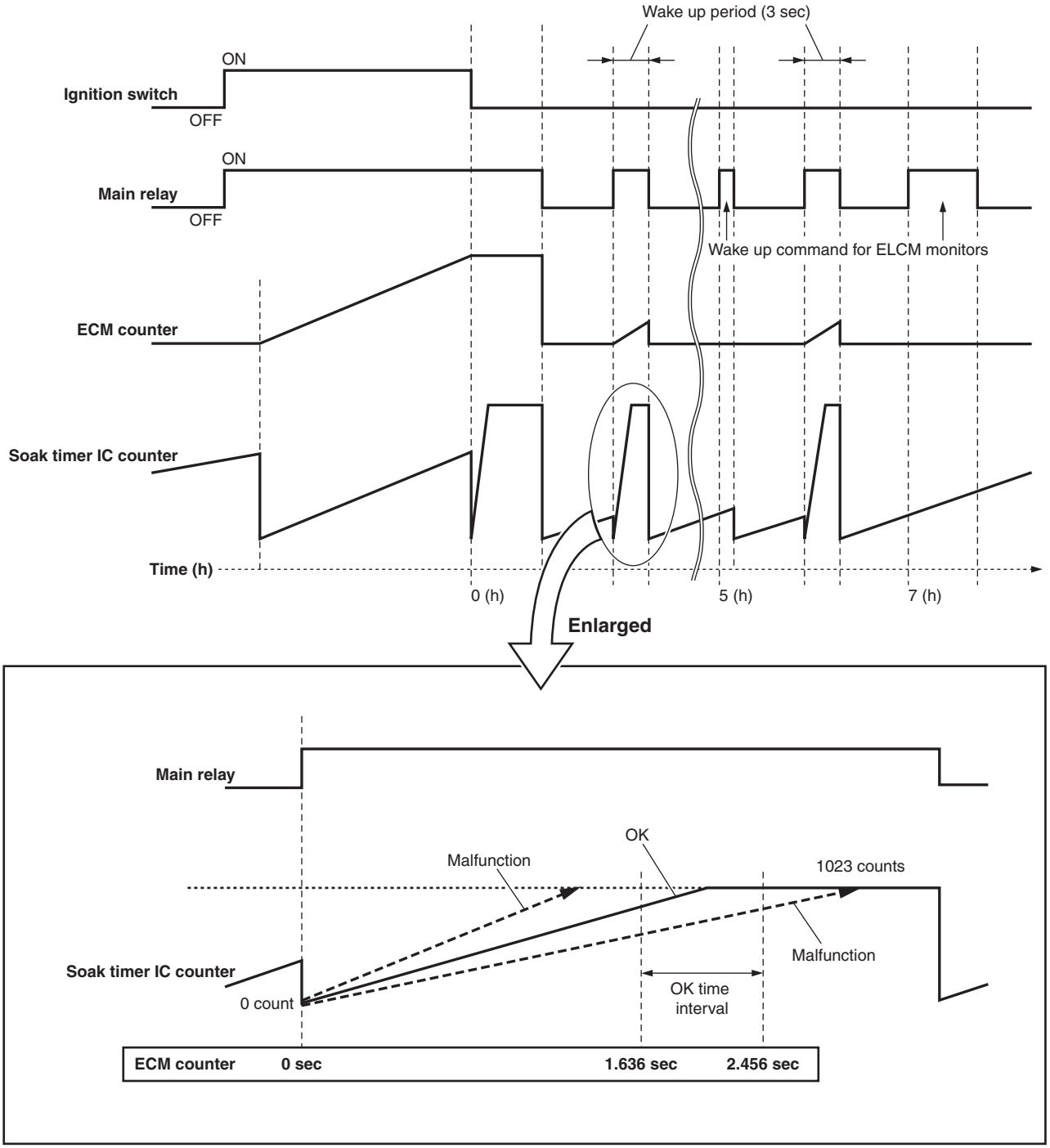
Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Writing value and read out value when setting the soaking timer	Unmatch

<Timer diagnosis (during soaking)>

Wake-up at the predetermined interval until 5, 7 or 9.5 hours have passed after the ignition switch is OFF, and compare the counter in soaking timer IC with the counter in ECM.
Judge as malfunction if the counter in soaking timer IC is counted up to maximum value (1023 count) when the counter in ECM is 1636 ms, or if the counter in soaking timer IC is not counted up to maximum value (1023 count) when the counter in ECM is 2456 ms.



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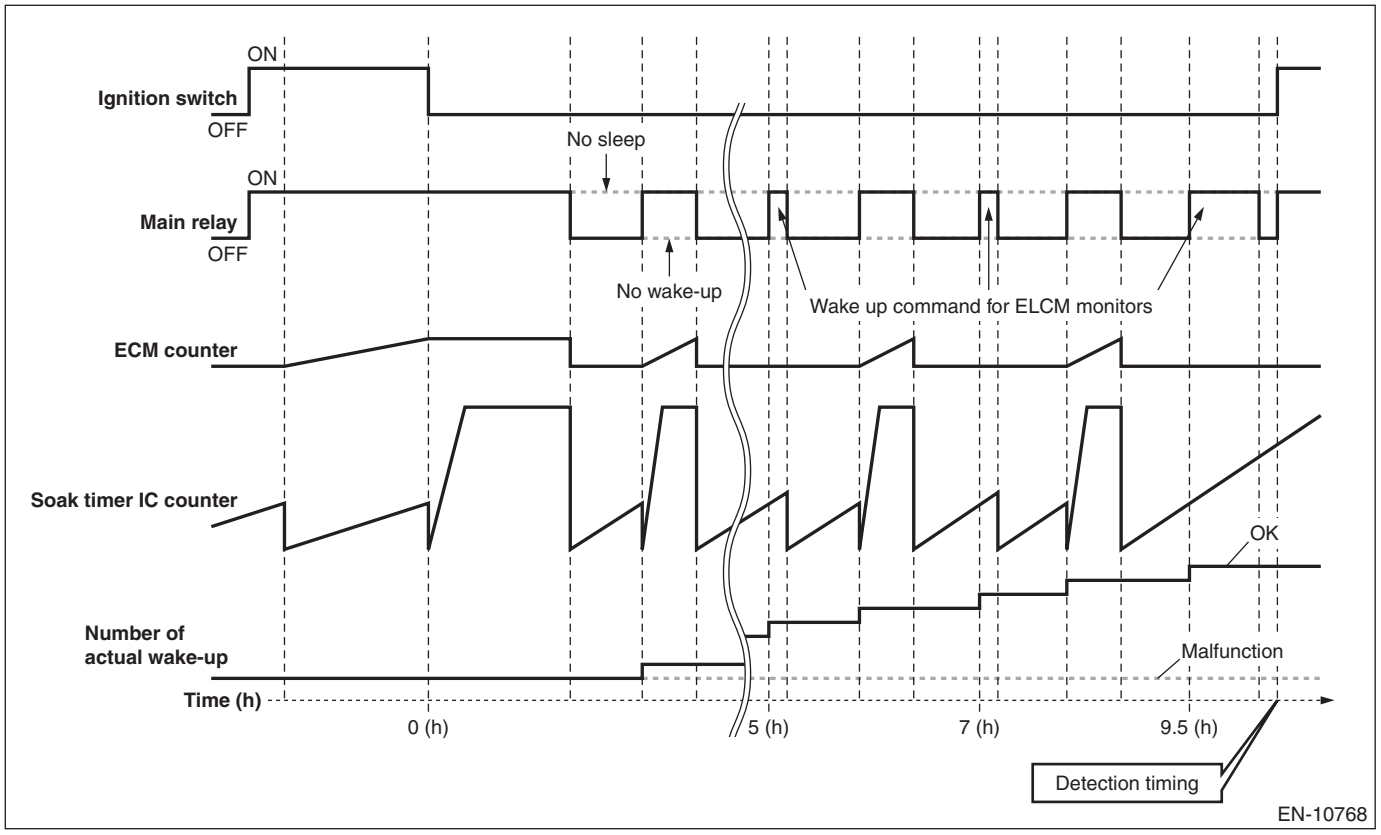
Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
When any one of the followings is established:	
• All of the following conditions are established.	
Counter in ECM	≤ 1636 ms
Counter in soaking timer IC	= $3FF (1023 count)
• All of the following conditions are established.	
Counter in ECM	≥ 2456 ms
Counter in soaking timer IC	≠ $3FF (1023 count)

<Wake-up diagnosis>

Store the number of wake-up activation when the ECM wakes up by the soaking timer IC.
Next time when the ignition switch is ON, if the number of wake-up activation does not reach the predetermined value even though the counter in soaking timer IC operates 1 hour or more, judge as wake-up malfunction.



Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Number of wake-up	≠ Wake-up indication count

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Ignition switch	ON
Driving cycle	Completed
When any one of the followings is established:	
• Timer diagnosis	NG
• Full count diagnosis	NG
• Soaking timer IC setting diagnosis	NG
• Timer diagnosis (during soaking)	NG
• Wake-up diagnosis	NG

Time Needed for Diagnosis: Approx. 5 — 9.5 hours
Malfunction Indicator Light Illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

FX:DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF

1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when CAN communication failure has occurred.

2. COMPONENT DESCRIPTION

(Common Specifications)
CAN Protocol 2.0 B (Active)
Frame Format: 11 Bit ID Frame (Standard Frame)
Conforms to ISO11898
Communication Speed: 500 kbps

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
CAN bus condition	Bus off

Time Needed for Diagnosis: 436 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FY:DTC U0075 CONTROL MODULE COMMUNICATION BUS "PU-CAN" OFF

1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when CAN communication failure has occurred.

2. COMPONENT DESCRIPTION

(Common Specifications)
CAN Protocol 2.0 B (Active)
Frame Format: 11 Bit ID Frame (Standard Frame)
Conforms to ISO11898
Communication Speed: 500 kbps

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after ignition switch ON.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
CAN bus condition	Bus off

Time Needed for Diagnosis: 436 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

FZ: DTC U0101 LOST COMMUNICATION WITH TCM

1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when CAN communication failure between TCM, VDC CM and combination meter has occurred.

2. COMPONENT DESCRIPTION

(Common Specifications)
CAN Protocol 2.0 B (Active)
Frame Format: 11 Bit ID Frame (Standard Frame)
Conforms to ISO11898
Communication Speed: 500 kbps

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
CAN data from TCM	Lost

Time Needed for Diagnosis: 500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

GA:DTC U0122 LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE

1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when CAN communication failure between TCM, VDC CM and combination meter has occurred.

2. COMPONENT DESCRIPTION

(Common Specifications)
CAN Protocol 2.0 B (Active)
Frame Format: 11 Bit ID Frame (Standard Frame)
Conforms to ISO11898
Communication Speed: 500 kbps

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
CAN data from vehicle dynamics control module	Lost

Time Needed for Diagnosis: 500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

GB:DTC U0155 LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER (IPC) CONTROL MODULE

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC U0101. <Ref. to GD(H4DO HEV)-216, DTC U0101 LOST COMMUNICATION WITH TCM, Diagnostic Trouble Code (DTC) Detecting Criteria.>

GC:DTC U0284 LOST COMMUNICATION WITH ACTIVE GRILLE SHUTTER MODULE "A"

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of LIN communication.
Judge as NG when LIN communication failure has occurred with active grille shutter.

2. COMPONENT DESCRIPTION

(Common Specifications)
Communication protocol: LIN 2.0
Communication Speed: 19.20 kbps

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
ID received from control module connected to LIN	None

Time Needed for Diagnosis: 2000 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

GD:DTC U0293 LOST COMMUNICATION WITH HYBRID POWERTRAIN CONTROL MODULE

1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when CAN communication failure occurs with HPCM MAIN-CAN.

2. COMPONENT DESCRIPTION

(Common Specifications)
CAN Protocol 2.0 B (Active)
Frame Format: 11 Bit ID Frame (Standard Frame)
Conforms to ISO11898
Communication Speed: 500 kbps

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after ignition switch ON.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
ID received from HPCM MAIN-CAN	None

Time Needed for Diagnosis: 500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

GE:DTC U0402 INVALID DATA RECEIVED FROM TCM

1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when data received from TCM, VDC CM and combination meter is not normal.

2. COMPONENT DESCRIPTION

(Common Specifications)
CAN Protocol 2.0 B (Active)
Frame Format: 11 Bit ID Frame (Standard Frame)
Conforms to ISO11898
Communication Speed: 500 kbps

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Data received from control module connected to CAN	No change or Parity error

Time Needed for Diagnosis: 2 seconds
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

GF:DTC U0416 INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC U0402. <Ref. to GD(H4DO HEV)-220, DTC U0402 INVALID DATA RECEIVED FROM TCM, Diagnostic Trouble Code (DTC) Detecting Criteria.>

GG:DTC U0423 INVALID DATA RECEIVED FROM INSTRUMENT PANEL CLUSTER CONTROL MODULE

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection standard, refer to DTC U0402. <Ref. to GD(H4DO HEV)-220, DTC U0402 INVALID DATA RECEIVED FROM TCM, Diagnostic Trouble Code (DTC) Detecting Criteria.>

GH:DTC U0594 INVALID DATA RECEIVED FROM HYBRID POWERTRAIN CONTROL MODULE

1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when data from HPCM MAIN-CAN is not correct.

2. COMPONENT DESCRIPTION

(Common Specifications)
CAN Protocol 2.0 B (Active)
Frame Format: 11 Bit ID Frame (Standard Frame)
Conforms to ISO11898
Communication Speed: 500 kbps

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after ignition switch ON.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Data update from HPCM MAIN-CAN	None

Time Needed for Diagnosis: 564 ms
Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Data from HPCM MAIN-CAN	Parity error

Time Needed for Diagnosis: 64 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

GI: DTC U1101 LOST COMMUNICATION WITH TCM PU-CAN

1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when CAN communication failure occurs with TCM PU-CAN.

2. COMPONENT DESCRIPTION

(Common Specifications)
CAN Protocol 2.0 B (Active)
Frame Format: 11 Bit ID Frame (Standard Frame)
Conforms to ISO11898
Communication Speed: 500 kbps

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after ignition switch ON.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
ID received from TCM PU-CAN	None

Time Needed for Diagnosis: 500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

GJ:DTC U1293 LOST COMMUNICATION WITH HYBRID POWERTRAIN CONTROL MODULE PU-CAN

1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when CAN communication failure occurs with HPCM PU-CAN.

2. COMPONENT DESCRIPTION

(Common Specifications)
CAN Protocol 2.0 B (Active)
Frame Format: 11 Bit ID Frame (Standard Frame)
Conforms to ISO11898
Communication Speed: 500 kbps

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after ignition switch ON.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
ID received from HPCM PU-CAN	None

Time Needed for Diagnosis: 500 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

GK:DTC U1402 INVALID DATA RECEIVED FROM TCM PU-CAN

1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when data from TCM PU-CAN is not correct.

2. COMPONENT DESCRIPTION

(Common Specifications)
CAN Protocol 2.0 B (Active)
Frame Format: 11 Bit ID Frame (Standard Frame)
Conforms to ISO11898
Communication Speed: 500 kbps

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after ignition switch ON.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Data from TCM PU-CAN	Check sum error

Time Needed for Diagnosis: 64 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

GL:DTC U1594 INVALID DATA RECEIVED FROM HYBRID POWERTRAIN CONTROL MODULE PU-CAN

1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when data from HPCM PU-CAN is not correct.

2. COMPONENT DESCRIPTION

(Common Specifications)
CAN Protocol 2.0 B (Active)
Frame Format: 11 Bit ID Frame (Standard Frame)
Conforms to ISO11898
Communication Speed: 500 kbps

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after ignition switch ON.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Data update from HPCM PU-CAN	None

Time Needed for Diagnosis: 564 ms
Judge as NG when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Data from HPCM PU-CAN	Check sum error

Time Needed for Diagnosis: 64 ms
Malfunction Indicator Light Illumination: Illuminates as soon as a malfunction occurs.

TRANSMISSION SECTION

CONTROL SYSTEMS	CS
CONTINUOUSLY VARIABLE TRANSMISSION	CVT(TR580)
CONTINUOUSLY VARIABLE TRANSMISSION (DIAGNOSTICS)	CVT (w/o HEV)(diag)
GENERAL DESCRIPTION (CVT)	GD(CVT) (w/o HEV)
CONTINUOUSLY VARIABLE TRANSMISSION	CVT(TH58A)
CONTINUOUSLY VARIABLE TRANSMISSION (DIAGNOSTICS)	CVT(HEV)(diag)
GENERAL DESCRIPTION (CVT)	GD(CVT)(HEV)
MANUAL TRANSMISSION AND DIFFERENTIAL	5MT
CLUTCH SYSTEM	CL

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

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

FUJI HEAVY INDUSTRIES LTD.

CONTROL SYSTEMS

CS

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6. Body Integrated Unit 62
7. MT Gear Shift Lever 63
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1. General Description

A: SPECIFICATION

Specifications for the HEV model are included in the IG (H4DO (w/o HEV)) section. <Ref. to IG(H4DO(w/o HEV))-2, General Description.>

STARTING/CHARGING SYSTEMS

SC(H4DO(HEV))

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6.	Battery Sensor	60
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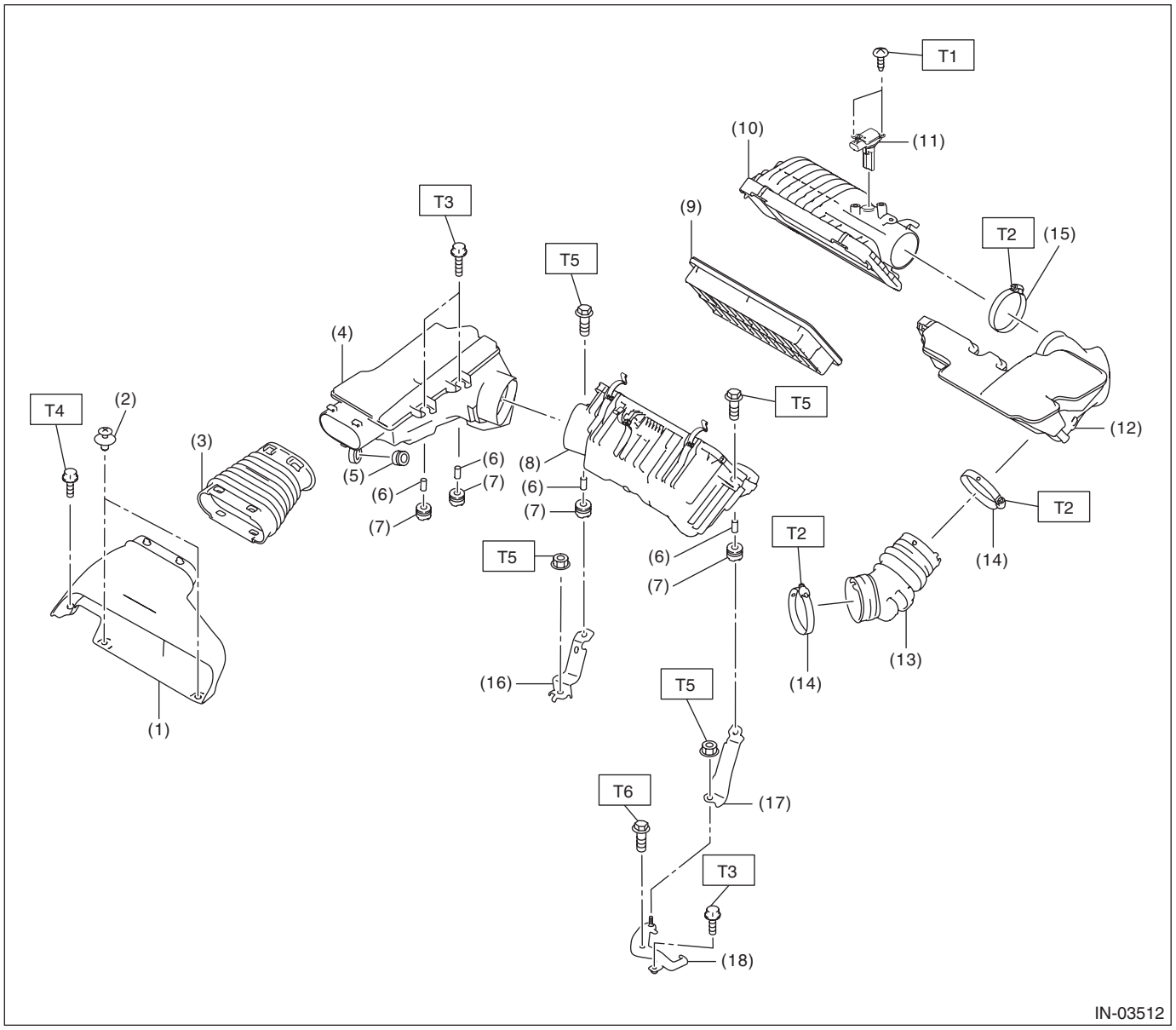
1. General Description

A: COMPONENT



(1)	Air intake duct	(10)	Air cleaner case (rear)	(18)	Air cleaner case bracket No. 2
(2)	Clip	(11)	Mass air flow and intake air temperature sensor		
(3)	Air intake boot No. 1	(12)	Resonator chamber	***Tightening torque: N·m (kgf-m, ft-lb)***	
(4)	Intake duct	(13)	Air intake boot No. 2	***T1:***	***1 (0.1, 0.7)***
(5)	Cushion	(14)	Clamp	***T2:***	***3 (0.3, 2.2)***
(6)	Spacer	(15)	Clamp	***T3:***	***6.4 (0.7, 4.7)***
(7)	Cushion	(16)	Air cleaner case bracket No. 1 RH	***T4:***	***7.5 (0.8, 5.5)***
(8)	Air cleaner case (front)	(17)	Air cleaner case bracket No. 1 LH	***T5:***	***16 (1.6, 11.8)***
(9)	Air cleaner element			***T6:***	***18 (1.8, 13.3)***

B: CAUTION

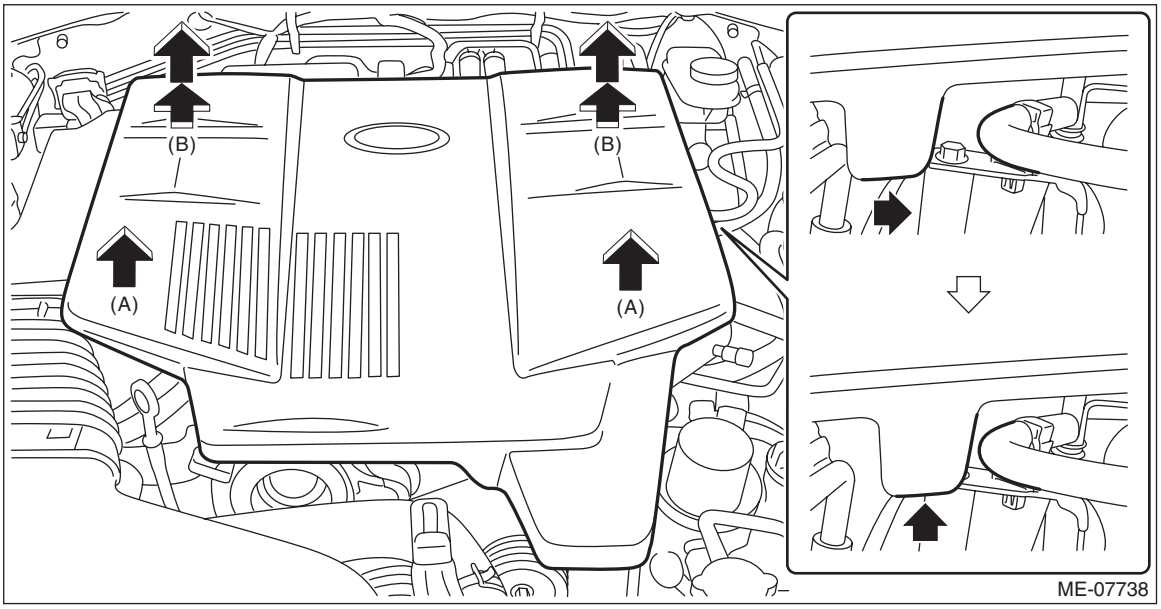
- Prior to starting work, pay special attention to the following:
  1. Always wear work clothes, a work cap, and protective shoes. Additionally, wear a helmet, protective goggles, etc. if necessary.
  2. Protect the vehicle using a seat cover, fender cover, etc.
  3. Prepare the service tools, clean cloth, containers to catch grease and oil, etc.
- 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.
- Be sure to tighten the fasteners including bolts and nuts to the specified torque.

2. Air Cleaner Element

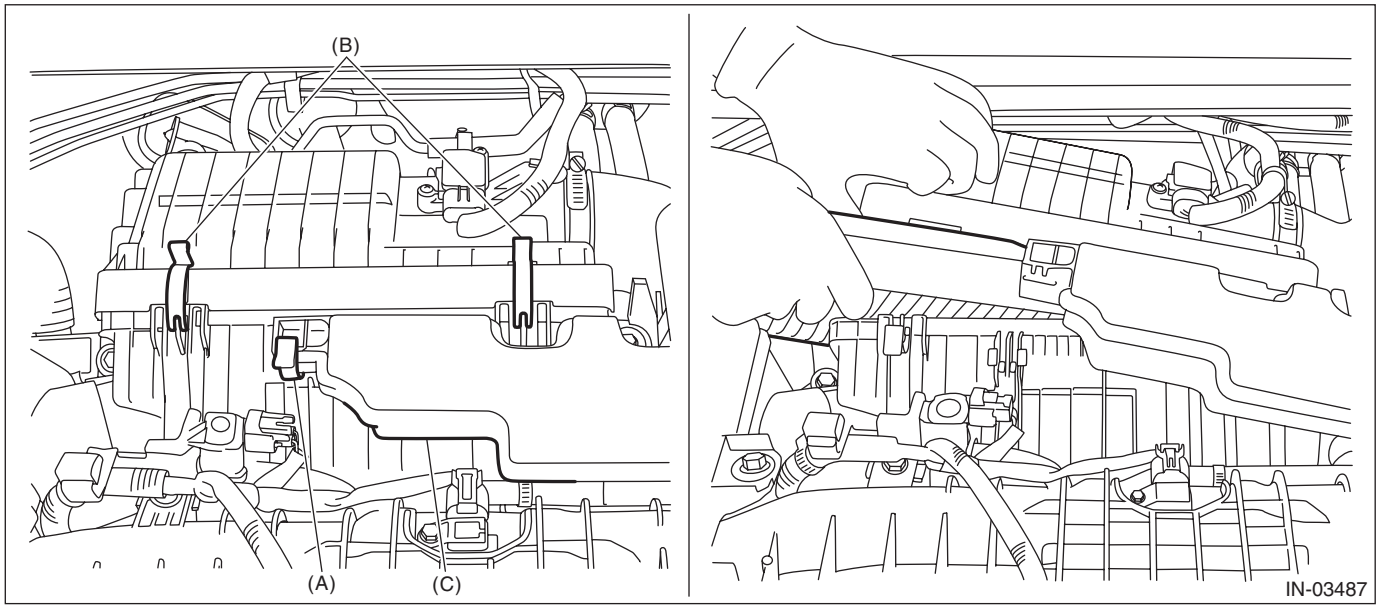
A: REMOVAL

1) Turn the ignition switch to OFF.
2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



3) Remove the clip (A) from the resonator chamber, and remove the clip (B) from the air cleaner case (rear).
4) Lift the resonator chamber (C) and open the air cleaner case (rear).
5) Put aside the air cleaner case (rear) as shown in the figure, and remove the air cleaner element.

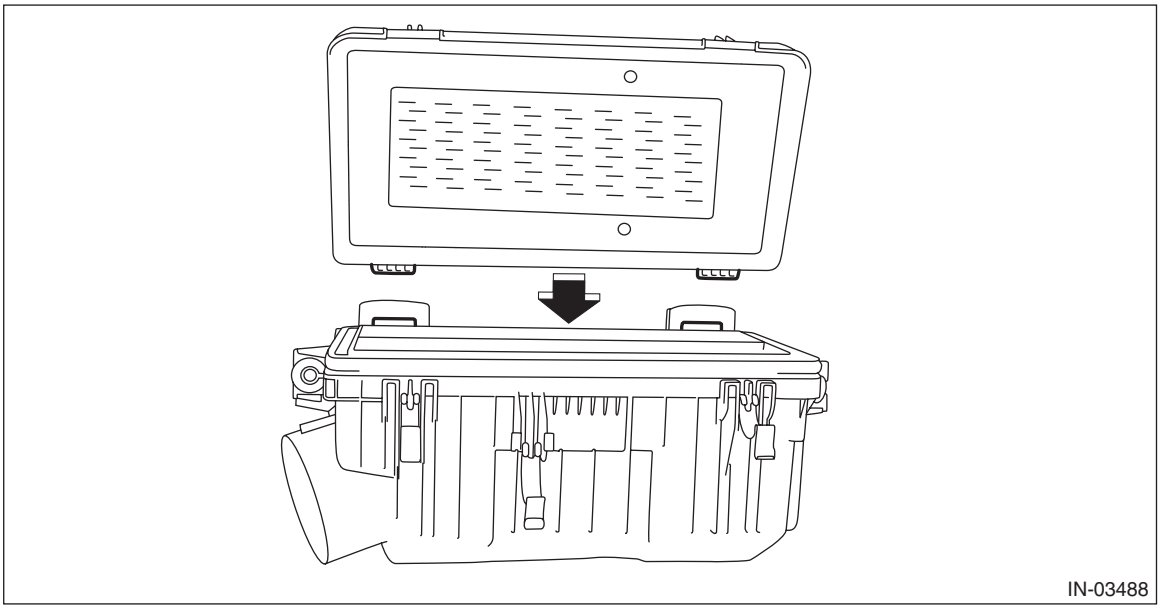


B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
Be sure to use SUBARU genuine air cleaner element depending on the engine type when replacing the air cleaner elements. Using other air cleaner element may affect the engine performance.

NOTE:
- Check that there are no foreign objects in the air cleaner case.
- When installing the air cleaner case (rear), align the protrusion of the air cleaner case (rear) to the hole on the air cleaner case (front).



C: INSPECTION

1) Check that the air cleaner element has no deformation, cracks or other damages.
2) Check the air cleaner element for excessive dirt.
3) Replace the air cleaner case (rear) if the HC absorption filter is damaged.

3. Air Cleaner Case

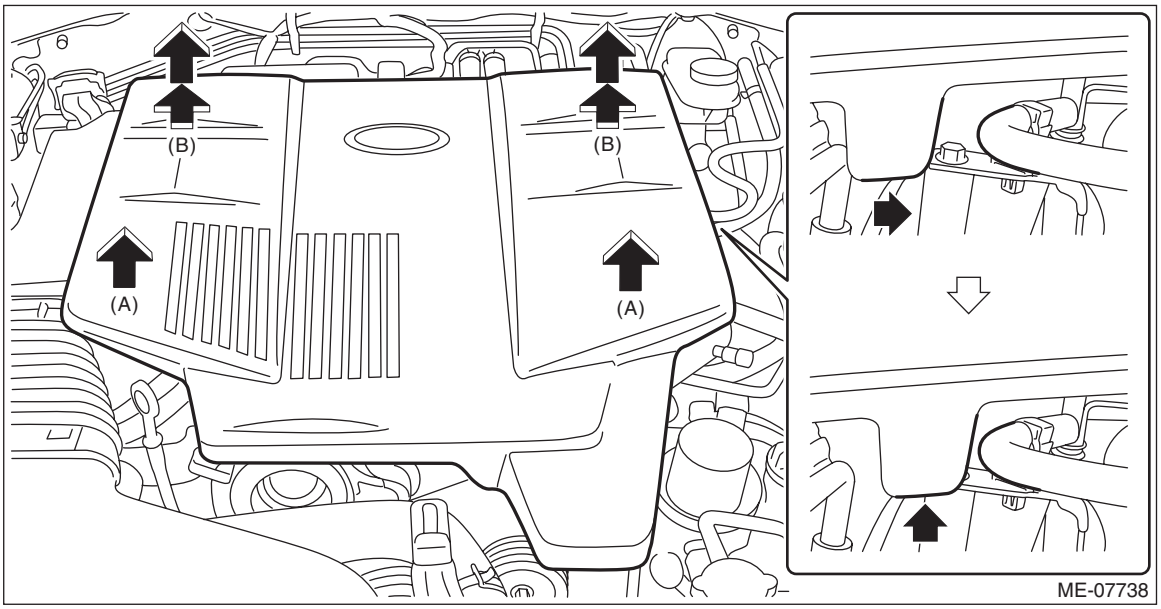
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

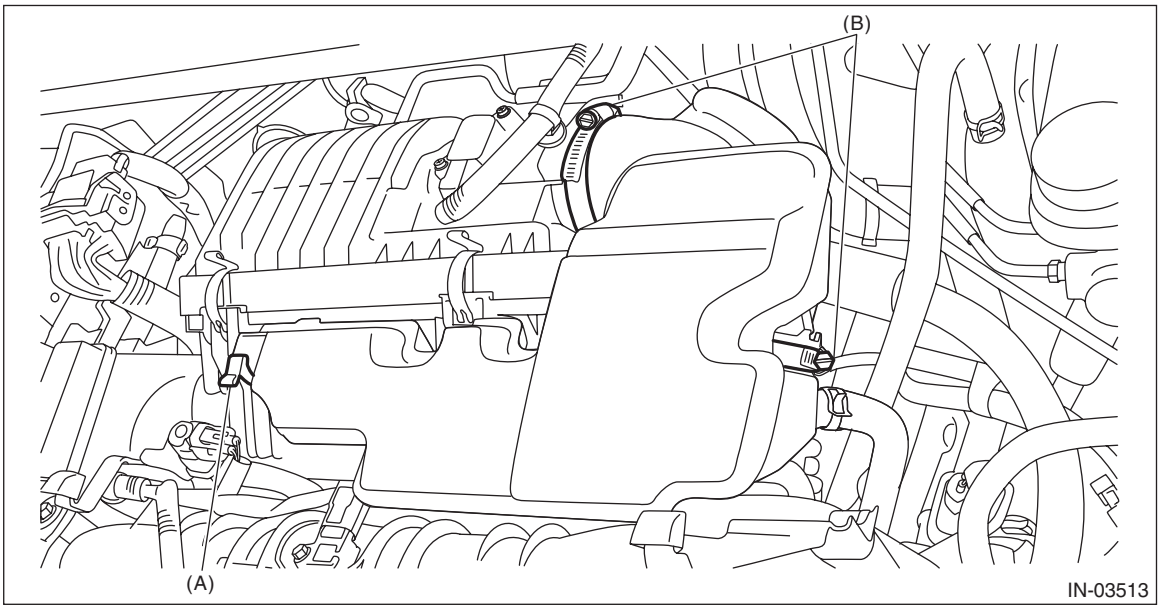
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

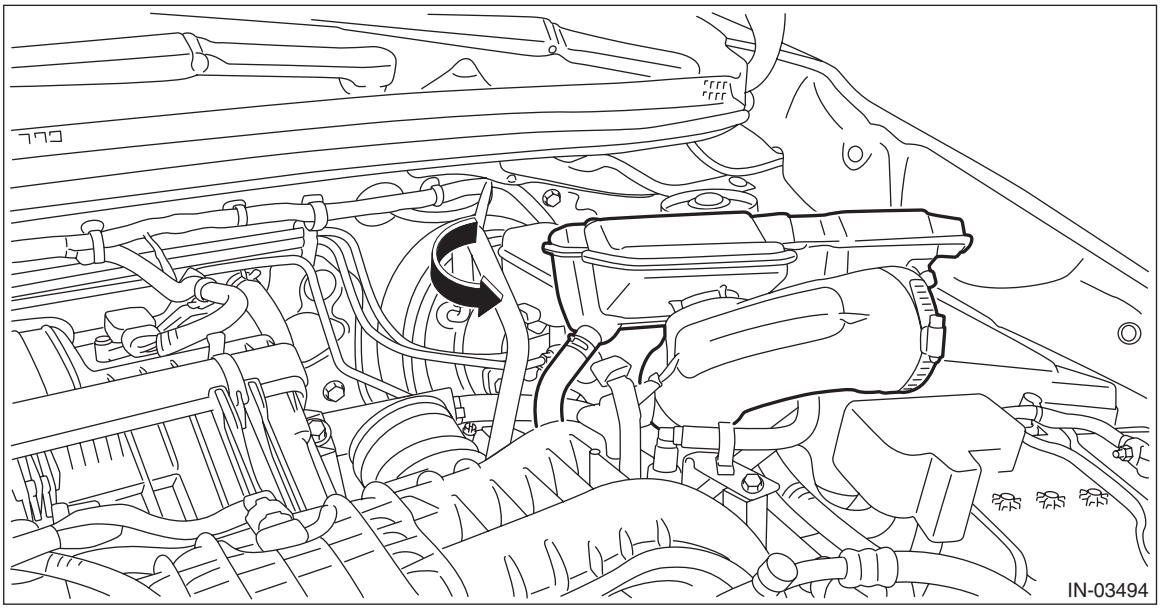
NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



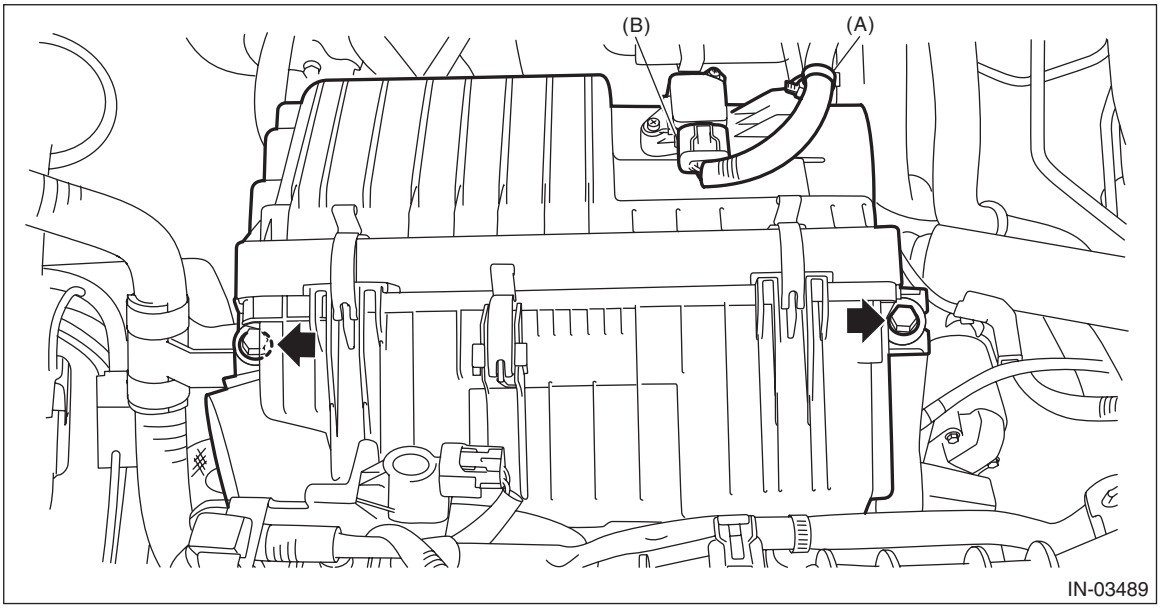
3) Remove the intake duct. <Ref. to IN(H4DO(HEV))-16, REMOVAL, Intake Duct.>
4) Remove the clip (A) which secures the resonator chamber to the air cleaner case (rear), and then loosen the clamp (B) which secures the resonator chamber to the air intake boot No. 2.



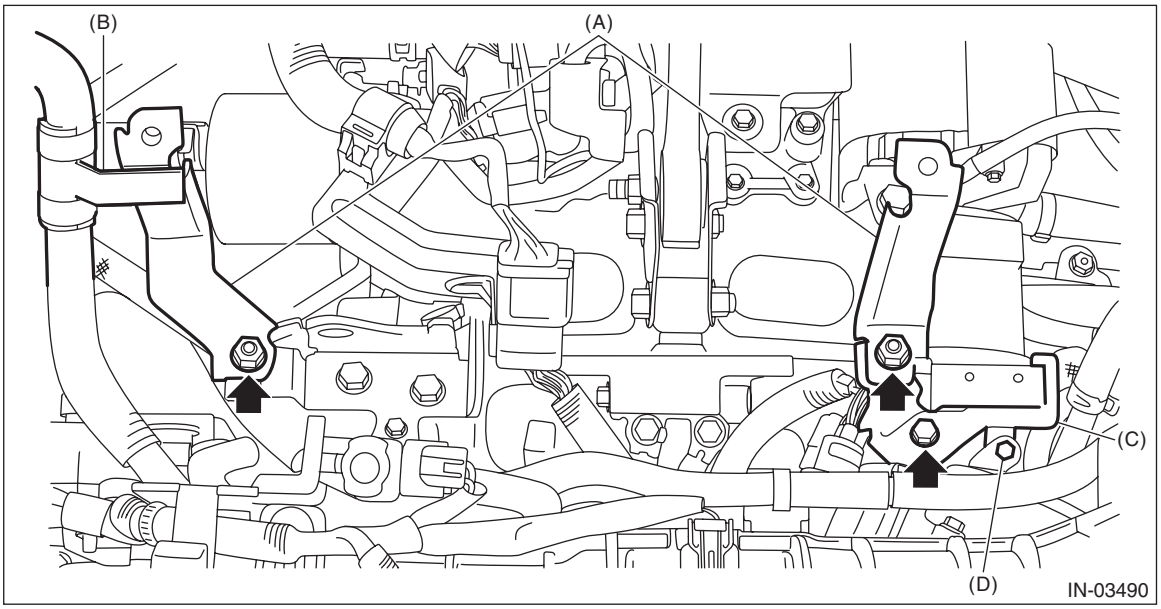
5) Remove the resonator chamber from the air cleaner case (rear) and the air intake boot No. 2, and move the resonator chamber to the left side wheel apron.



6) Remove the air intake boot No. 2. <Ref. to IN(H4DO(HEV))-11, AIR INTAKE BOOT NO. 2, REMOVAL, Air Intake Boot.>
7) Remove the clip (A) securing the bulk head wiring harness to the air cleaner case (rear), and disconnect the connector (B) from the mass air flow and intake air temperature sensor.
8) Remove the air cleaner case assembly from the air cleaner case bracket No. 1.



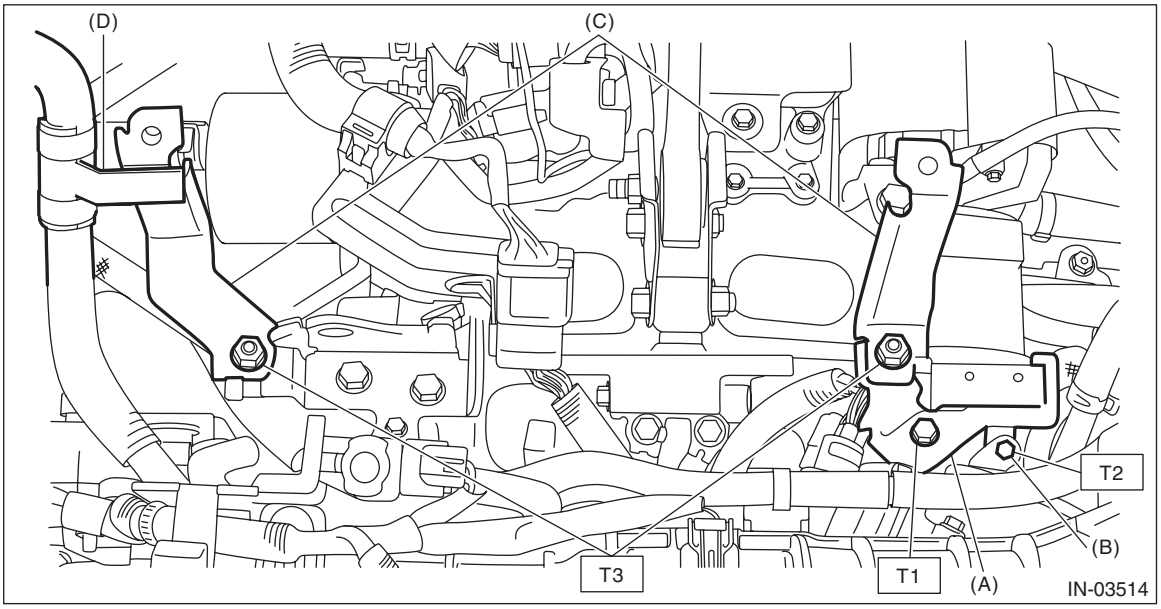
9) Remove the engine wiring harness (B) from the air cleaner case bracket No. 1 (A).
10) Remove the air cleaner case bracket No. 1 (A) from the engine rear hanger and the air cleaner case bracket No. 2 (C).
11) Remove the bolt (D) securing the brake vacuum pipe from the air cleaner case bracket No. 2 (C).
12) Remove the air cleaner case bracket No. 2 (C) from the cylinder block LH.



B: INSTALLATION

1) Install the air cleaner case bracket No. 2 (A) to the cylinder block LH, and install the bolt (B) which secures the brake vacuum pipe to the air cleaner case bracket No. 2 (A).
2) Install the air cleaner case bracket No. 1 (C) to the engine rear hanger and the air cleaner case bracket No. 2 (A).
3) Install the engine wiring harness (D) to the air cleaner case bracket No. 1 (C).

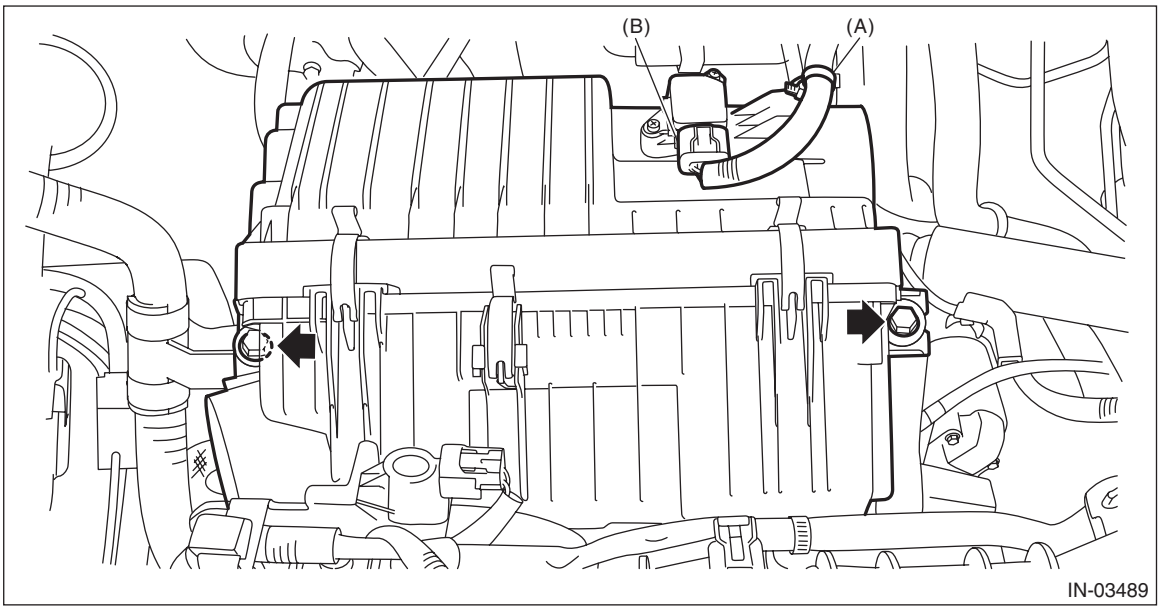
Tightening torque:
T1: 18 N·m (1.8 kgf-m, 13.3 ft-lb)
T2: 6.4 N·m (0.7 kgf-m, 4.7 ft-lb)
T3: 16 N·m (1.6 kgf-m, 11.8 ft-lb)



4) Install the air cleaner case assembly to the air cleaner case bracket No. 1.

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)

5) Connect the connector (B) to the mass air flow and intake air temperature sensor, and secure the bulk head wiring harness to the air cleaner case (rear) with the clip (A).



6) Install the air intake boot No. 2. <Ref. to IN(H4DO(HEV))-14, AIR INTAKE BOOT NO. 2, INSTALLATION, Air Intake Boot.>
7) Install the intake duct. <Ref. to IN(H4DO(HEV))-17, INSTALLATION, Intake Duct.>
8) Install the collector cover.
9) Connect the battery ground terminal. <Ref. to NT-5, BATTERY, NOTE, Note.>

C: DISASSEMBLY

1) Remove the air cleaner element. <Ref. to IN(H4DO(HEV))-4, REMOVAL, Air Cleaner Element.>
2) Remove the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, REMOVAL, Mass Air Flow and Intake Air Temperature Sensor.>

D: ASSEMBLY

1) Install the mass air flow and intake air temperature sensor. <Ref. to FU(H4DO(HEV))-63, INSTALLATION, Mass Air Flow and Intake Air Temperature Sensor.>
2) Install the air cleaner element. <Ref. to IN(H4DO(HEV))-5, INSTALLATION, Air Cleaner Element.>

E: INSPECTION

Check that the air cleaner case has no deformation, cracks or other damages.

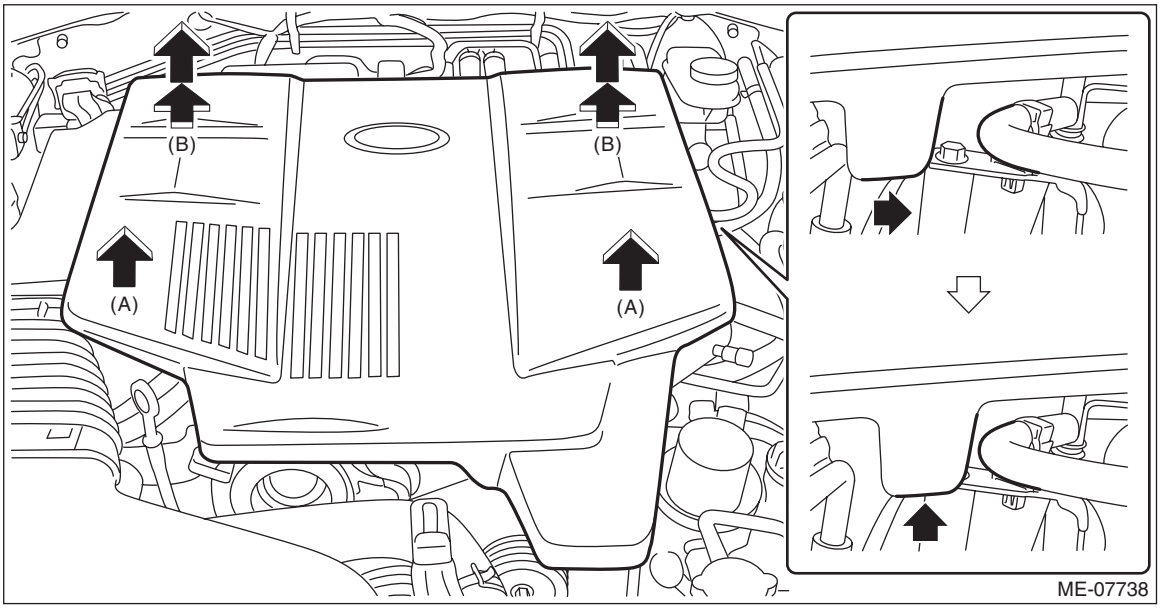
4. Air Intake Boot

A: REMOVAL

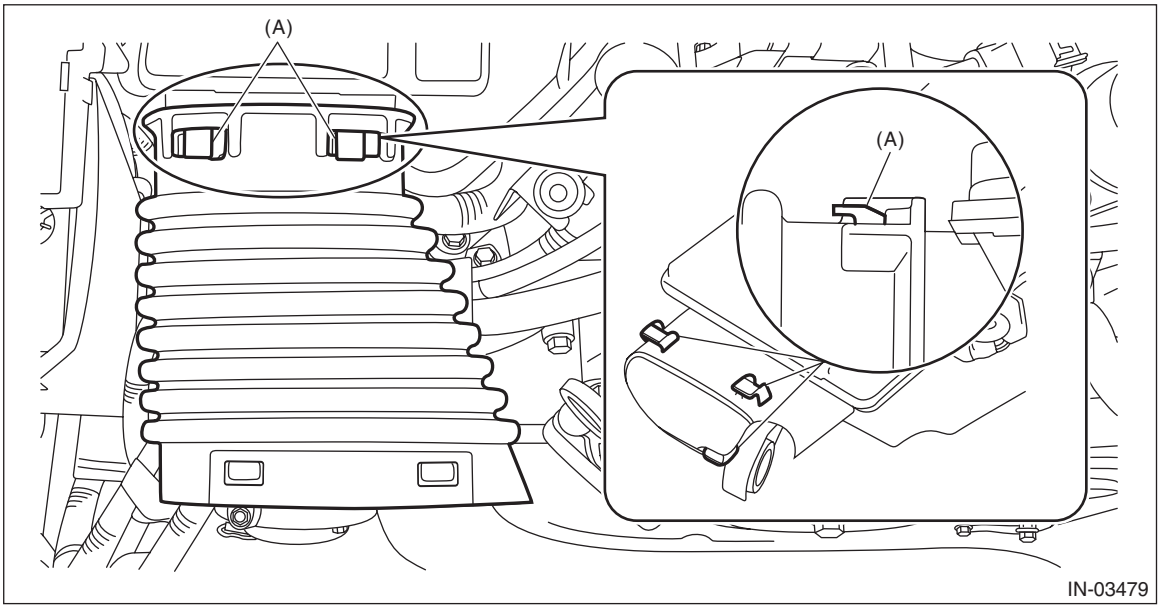
1. AIR INTAKE BOOT NO. 1

1) Turn the ignition switch to OFF.
2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



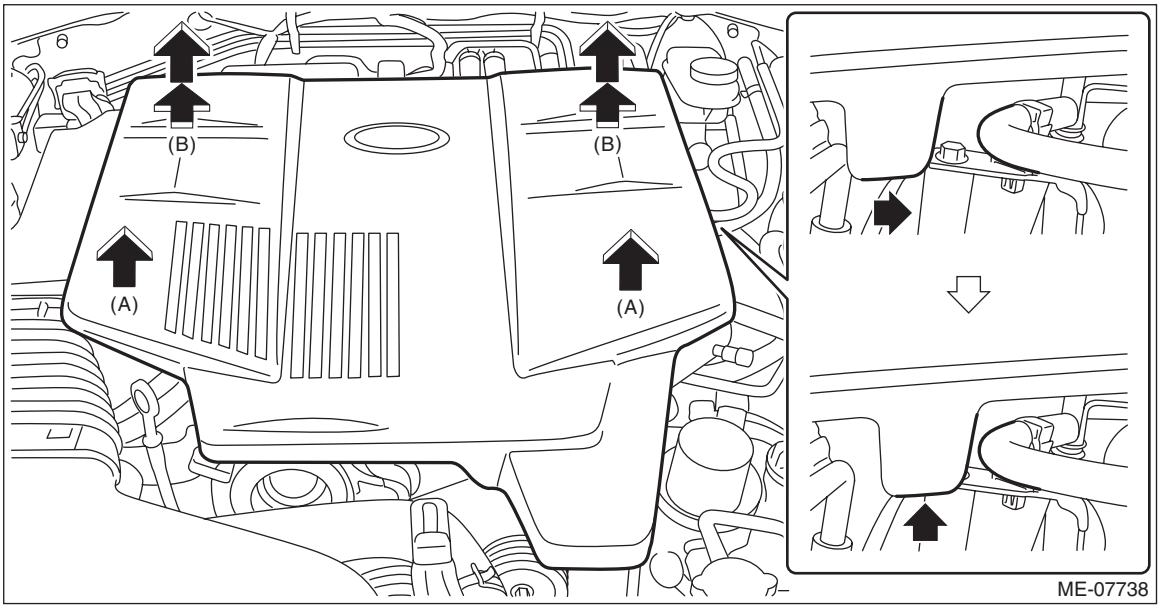
3) Remove the air intake duct. <Ref. to IN(H4DO(HEV))-15, REMOVAL, Air Intake Duct.>
4) Remove the air intake boot No. 1 from the protrusion (A) on the intake duct.



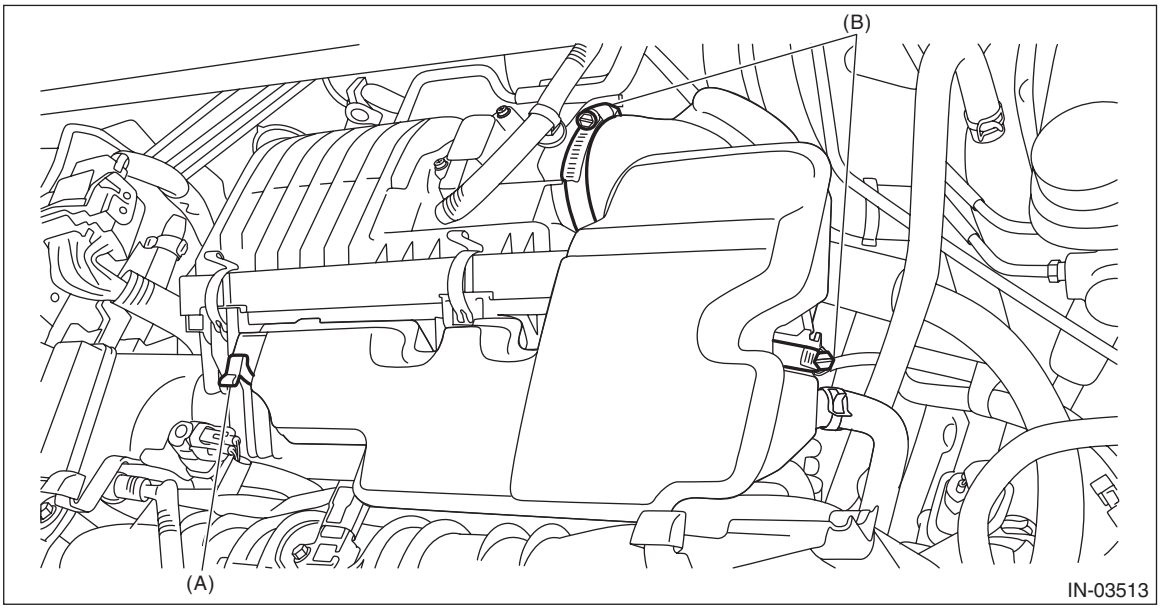
2. AIR INTAKE BOOT NO. 2

1) Turn the ignition switch to OFF.
2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

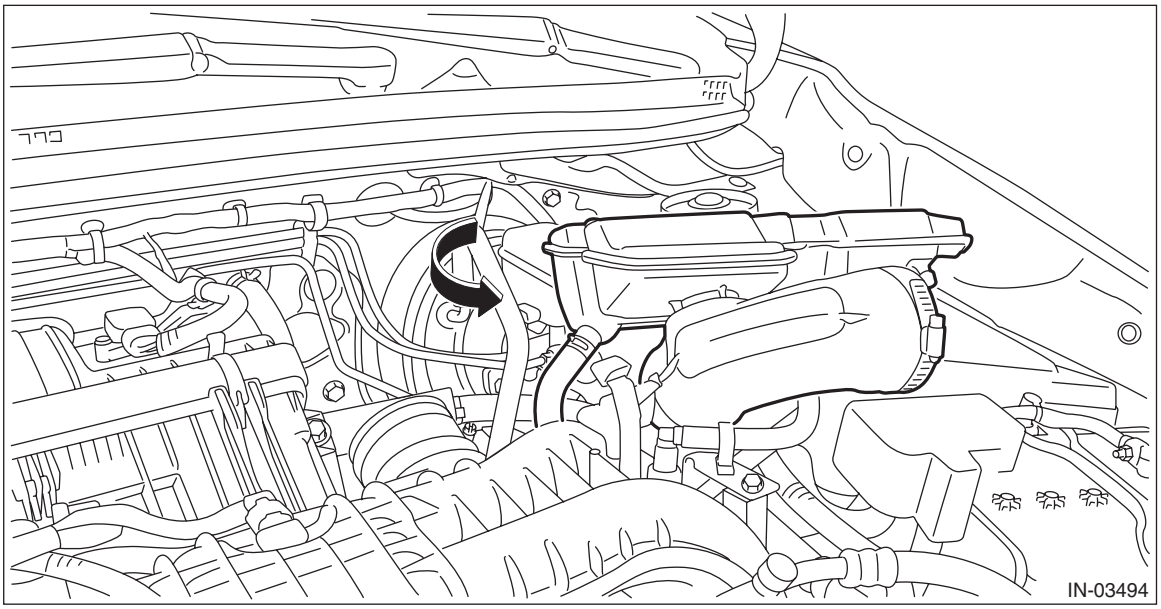
NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



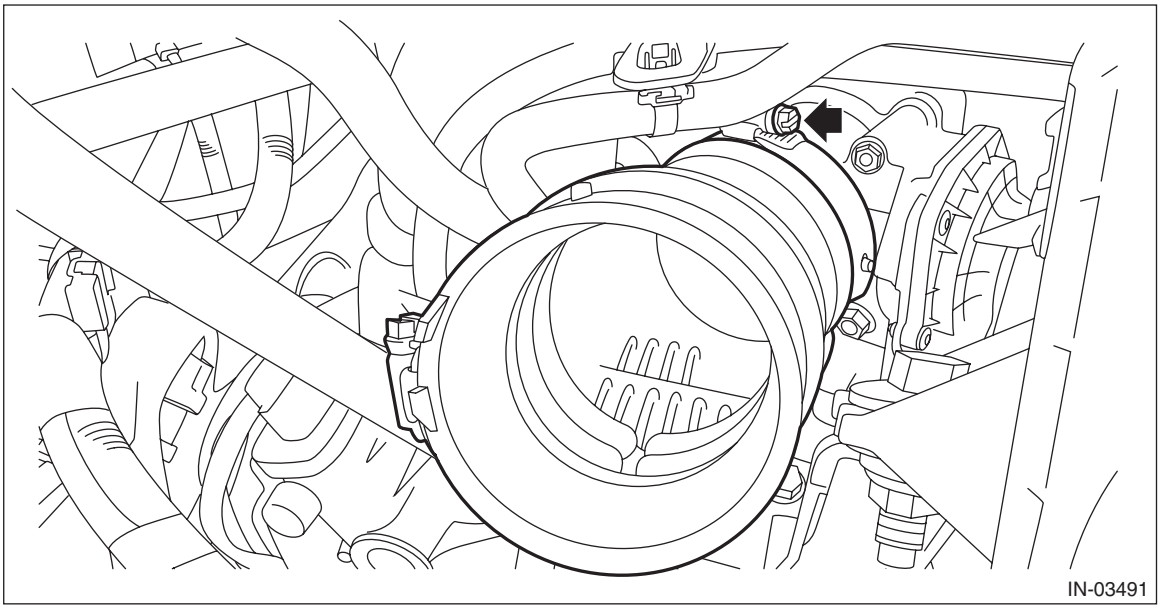
3) Remove the clip (A) which secures the resonator chamber to the air cleaner case (rear), and then loosen the clamp (B) which secures the resonator chamber to the air cleaner case (rear) and the air intake boot No. 2.



4) Remove the resonator chamber from the air cleaner case (rear) and the air intake boot No. 2, and move the resonator chamber to the left side wheel apron.



5) Remove the air intake boot No. 2 from the throttle body.



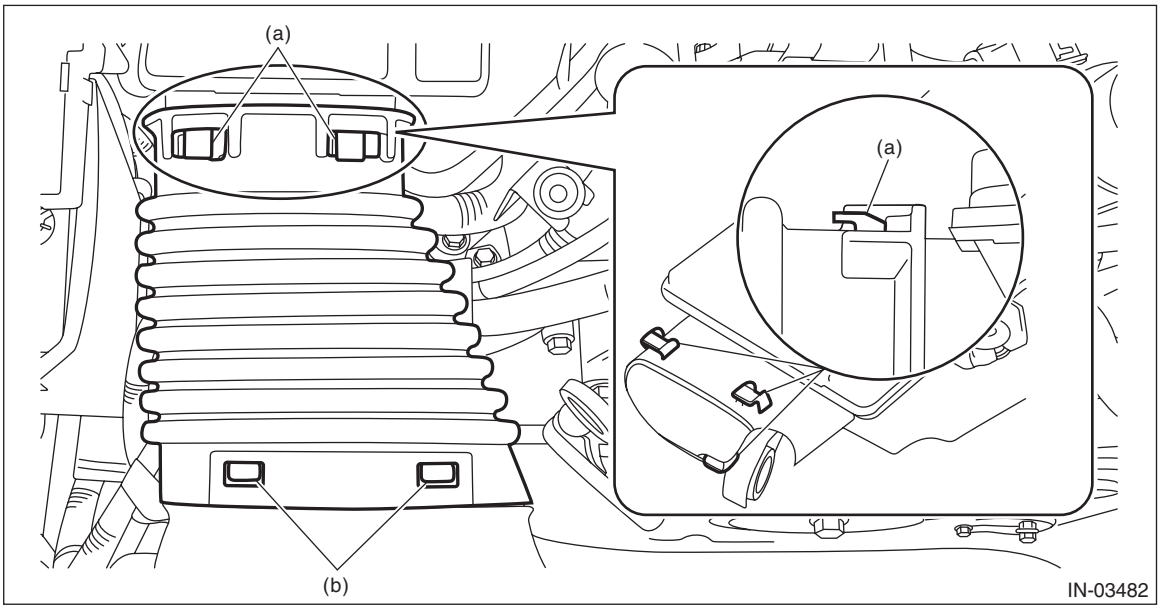
B: INSTALLATION

1. AIR INTAKE BOOT NO. 1

Install in the reverse order of removal.

NOTE:

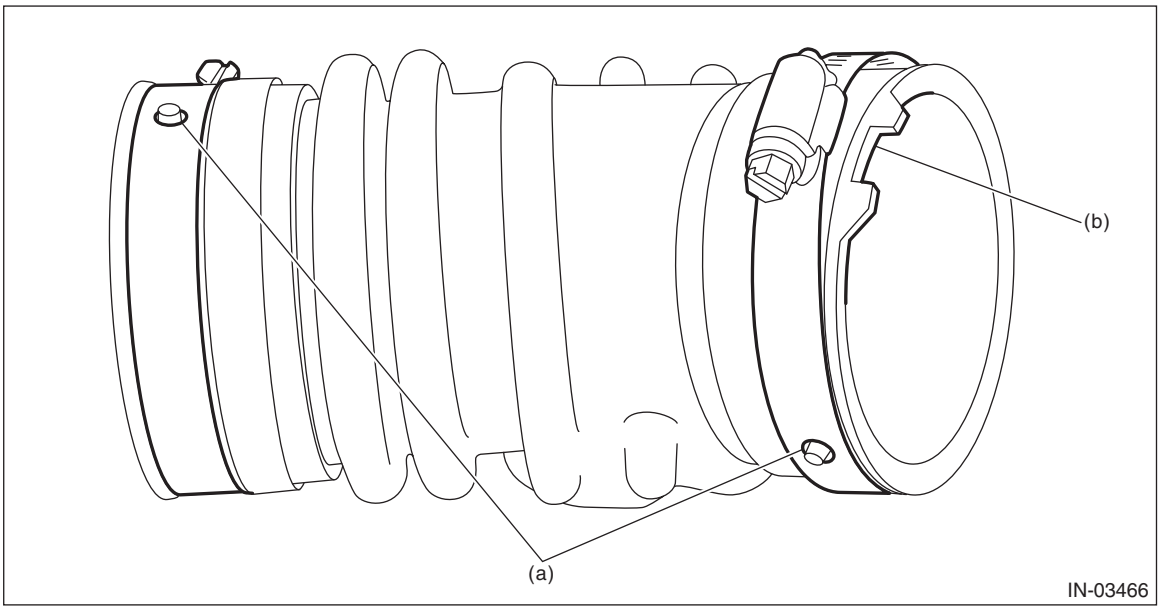
- Make sure that the air intake boot No. 1 is securely installed to the protrusion (a) on the intake duct and the protrusion (b) on the air intake duct.
- Check the air intake boot No. 1 for peel-off.



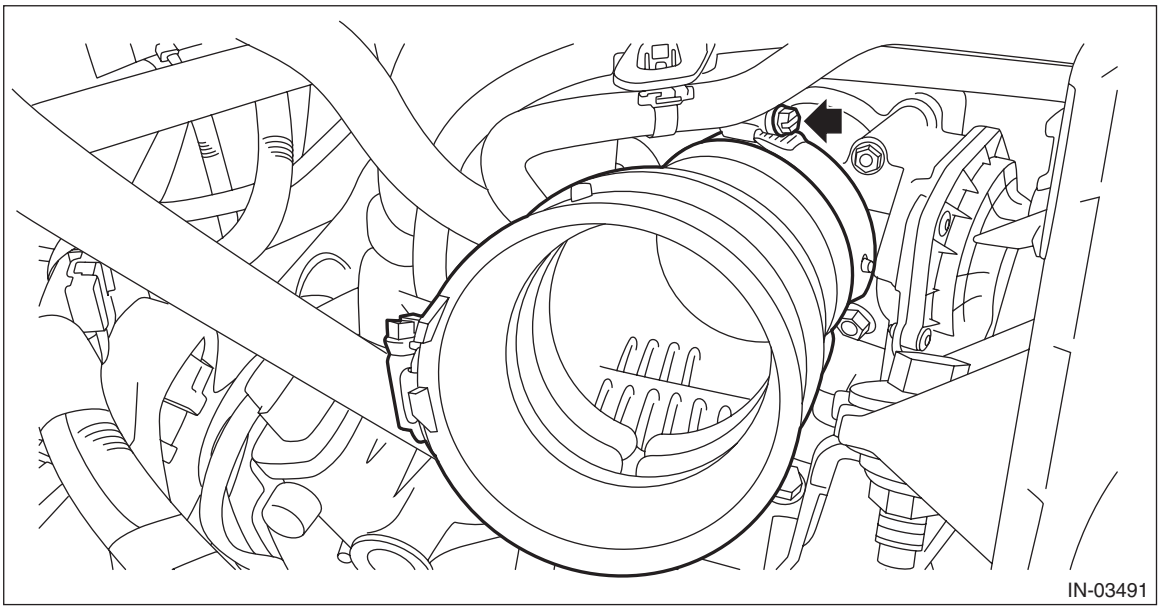
2. AIR INTAKE BOOT NO. 2

1) Install the air intake boot No. 2 to the throttle body.

NOTE:
• Align the clamp hole (a) with the protrusion of the air intake boot No. 2, and install the clamp in the direction as shown in the figure below.
• When installing the air intake boot No. 2 to the throttle body, align the air intake boot No. 2 (b) with the protrusion on the throttle body.



Tightening torque:
3 N·m (0.3 kgf-m, 2.2 ft-lb)



2) Install the resonator chamber. <Ref. to IN(H4DO(HEV))-19, INSTALLATION, Resonator Chamber.>
3) Install the collector cover.

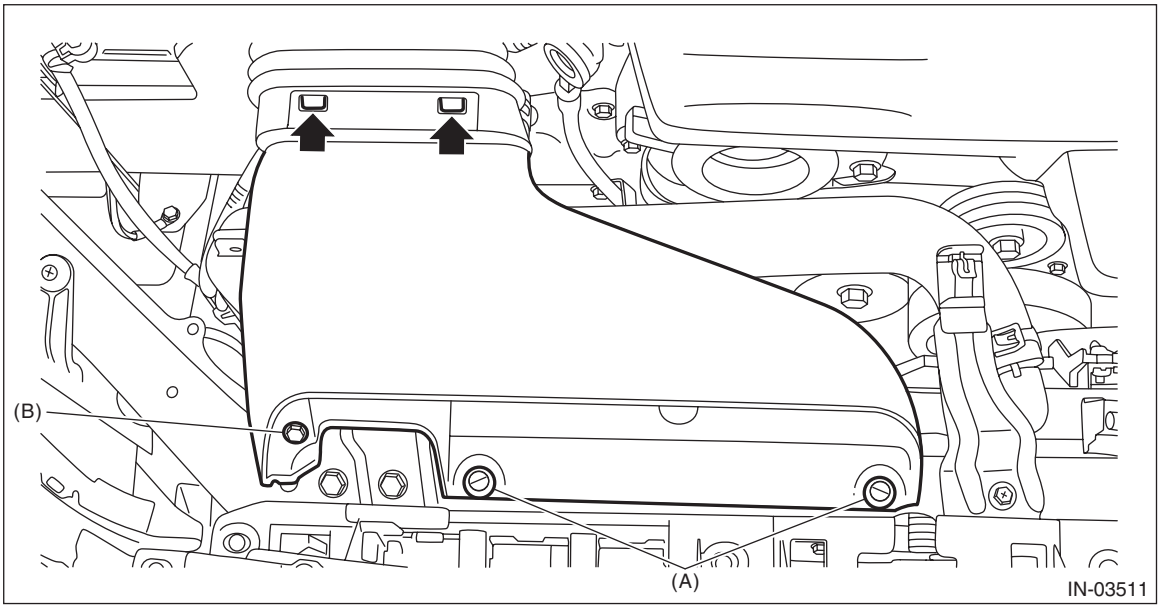
C: INSPECTION

1) Check that the air intake boot has no deformation, cracks or other damages.
2) Inspect that no foreign objects are mixed in the air intake boot.

5. Air Intake Duct

A: REMOVAL

1) Turn the ignition switch to OFF.
2) Remove the clip (A) and the bolt (B) which hold the air intake duct.
3) Remove the protrusion on the air intake duct from the air intake boot No. 1, and remove the air intake duct.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
- Make sure that the air intake boot No. 1 is securely installed to the protrusion on the air intake duct.
- Check the air intake boot No. 1 for peel-off.

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

C: INSPECTION

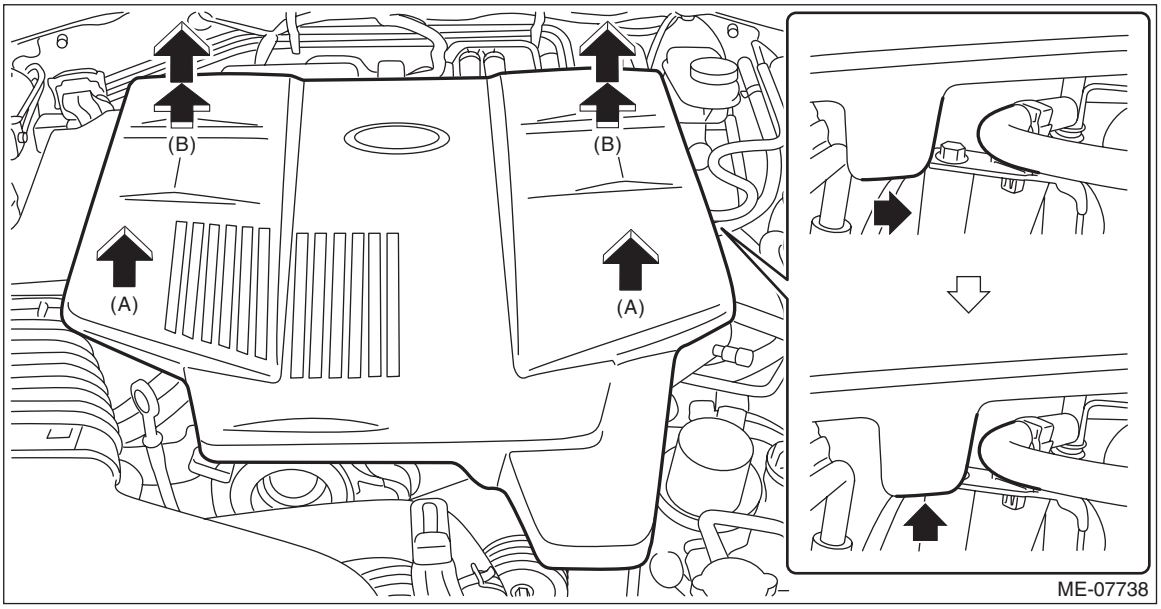
1) Check that the air intake duct has no deformation, cracks or other damages.
2) Inspect that no foreign objects are mixed in the air intake duct.

6. Intake Duct

A: REMOVAL

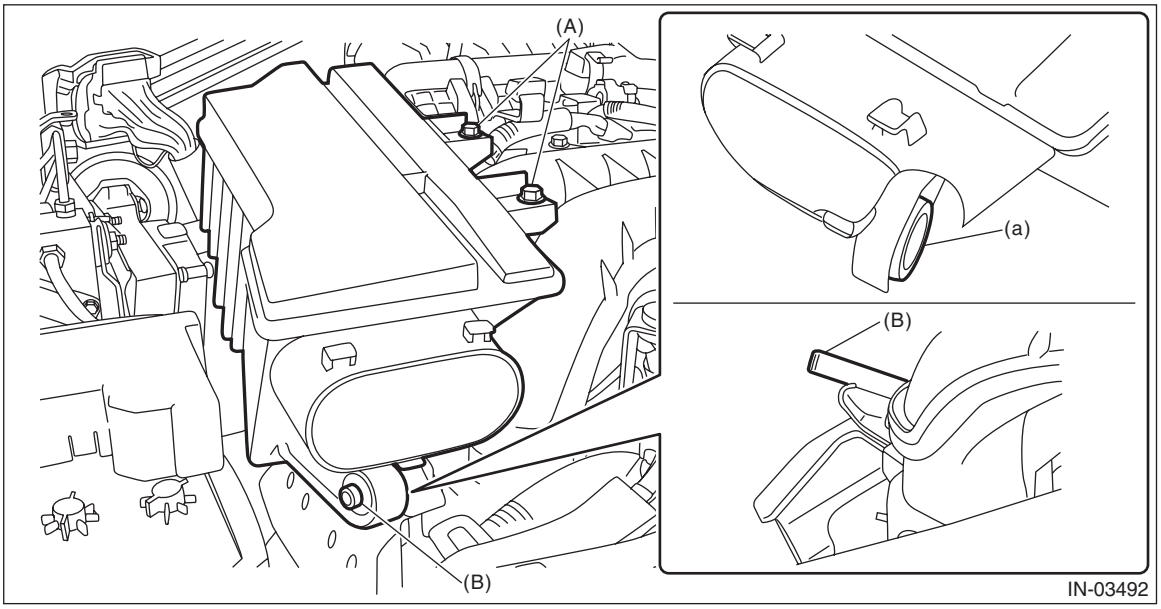
1) Turn the ignition switch to OFF.
2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



3) Remove the air intake boot No. 1. <Ref. to IN(H4DO(HEV))-10, AIR INTAKE BOOT NO. 1, REMOVAL, Air Intake Boot.>
4) Remove the bolt (A) which holds the intake duct to the intake manifold.
5) Remove the intake duct from the air cleaner case front and the protrusion (B) on the intake manifold protector RH.

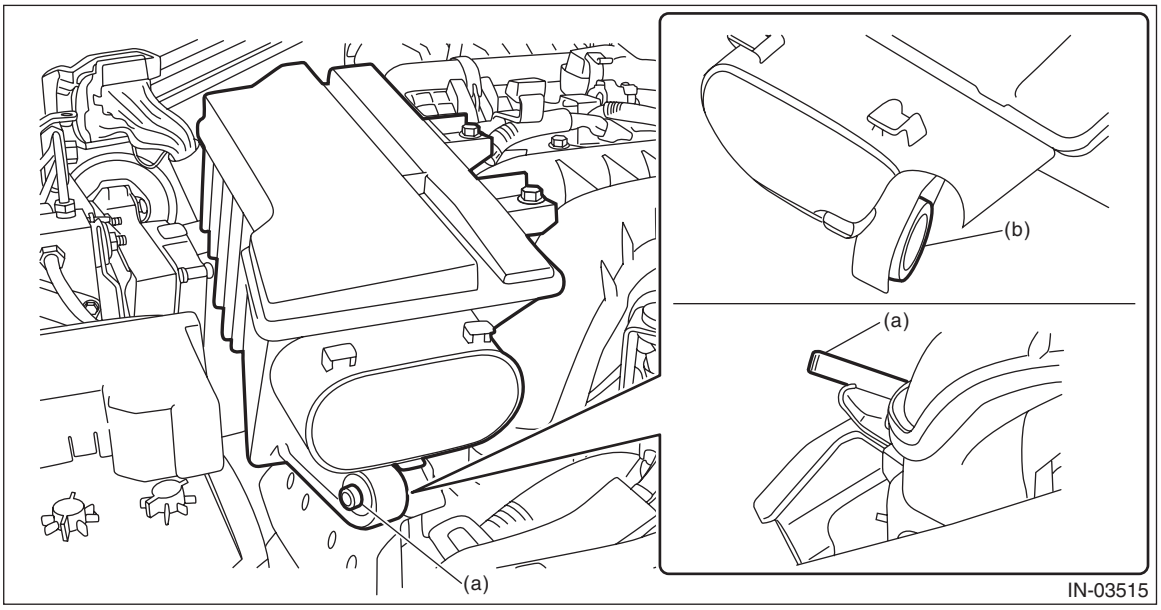
NOTE:
When removing the intake duct, check the cushion (a) of the intake duct for peel-off or misalignment.



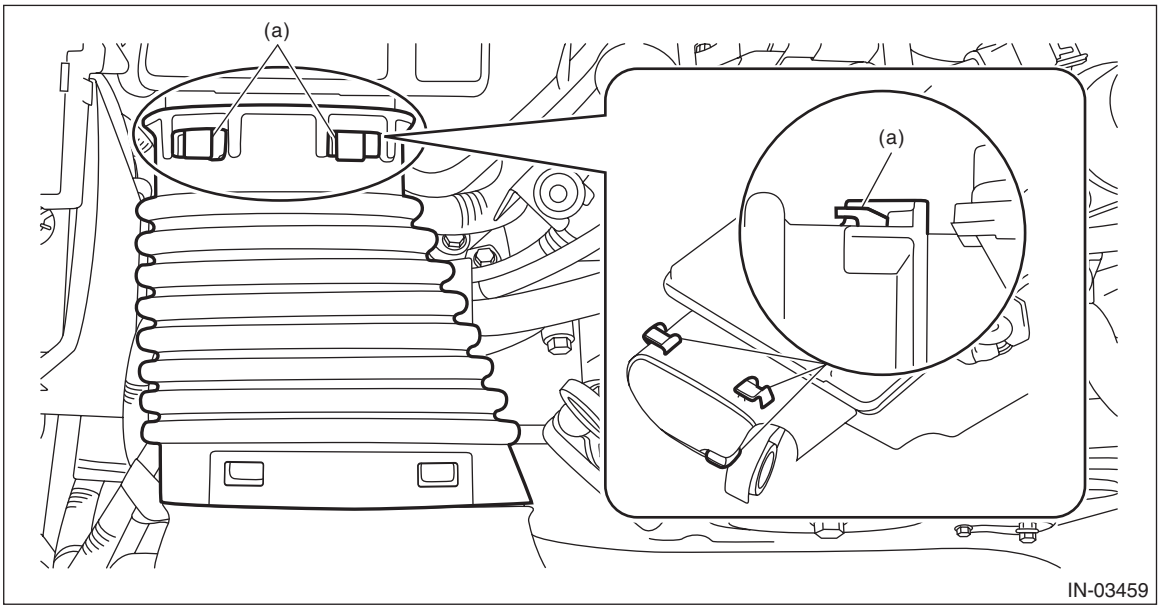
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
- Check that the intake duct is firmly inserted into the protrusion (a) on the intake manifold protector RH.
- Check the cushion (b) for peel-off.



- Make sure that the air intake boot No. 1 is securely installed to the protrusion (a) on the intake duct.
- Check the air intake boot No. 1 for peel-off.



Tightening torque:
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

C: INSPECTION

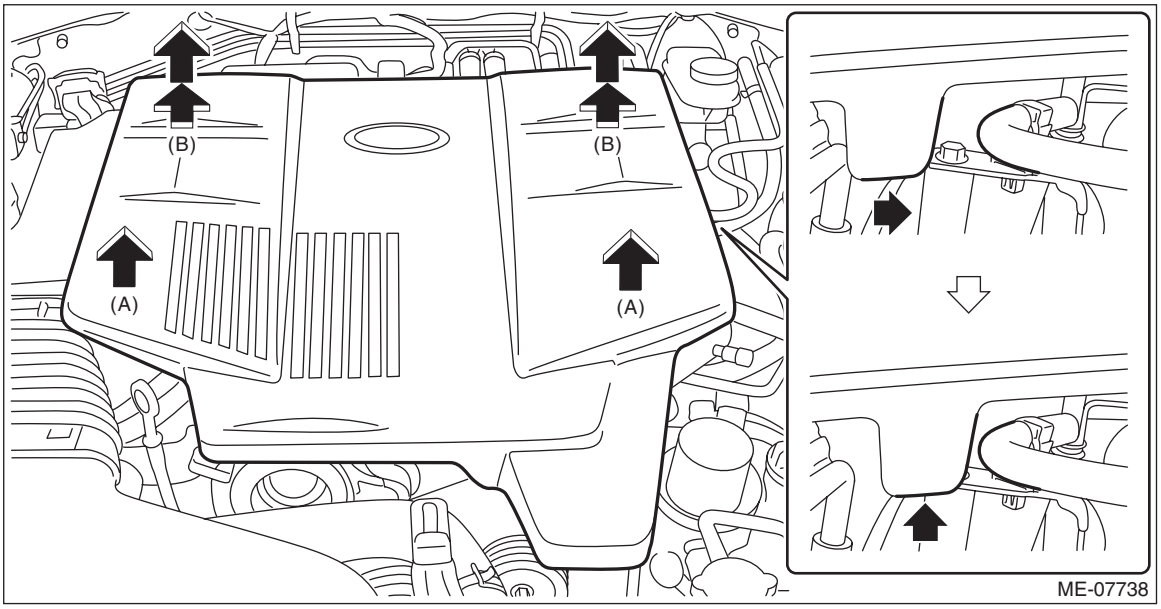
1) Check that the intake duct has no deformation, cracks or other damages.
2) Inspect that no foreign objects are mixed in the intake duct.

7. Resonator Chamber

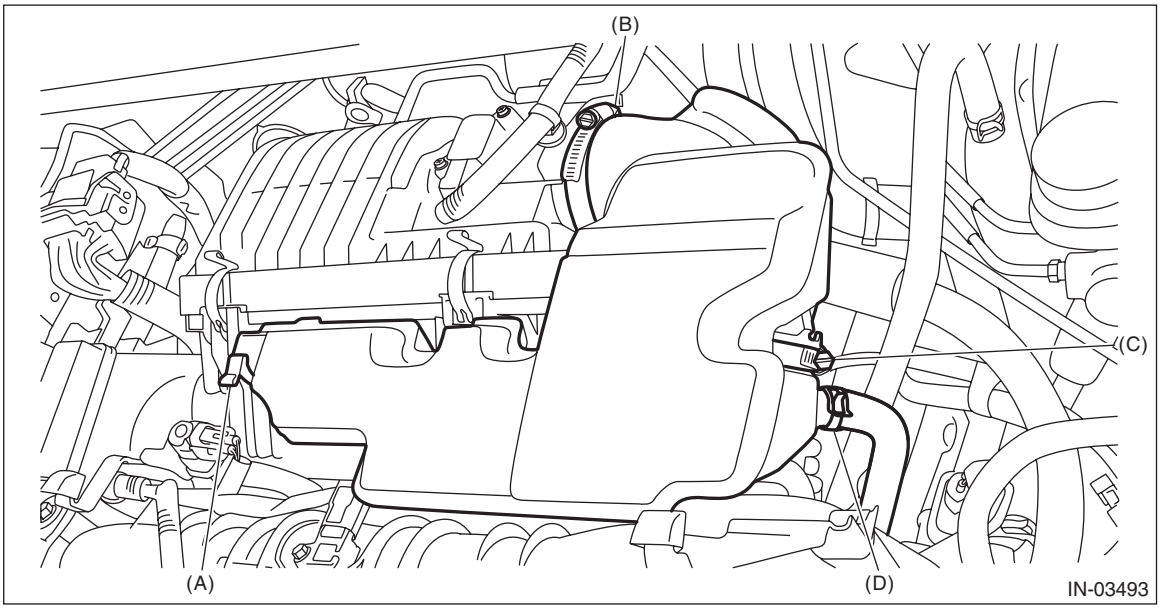
A: REMOVAL

1) Turn the ignition switch to OFF.
2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



3) Remove the clip (A) from the resonator chamber, and loosen the clamp (B) securing the resonator chamber to the air cleaner case (rear).
4) Loosen the clamp (C) which secures the resonator chamber to the air intake boot No. 2.
5) Disconnect the PCV hose (D), and remove the resonator chamber from the air cleaner case (rear) and the air intake boot No. 2.

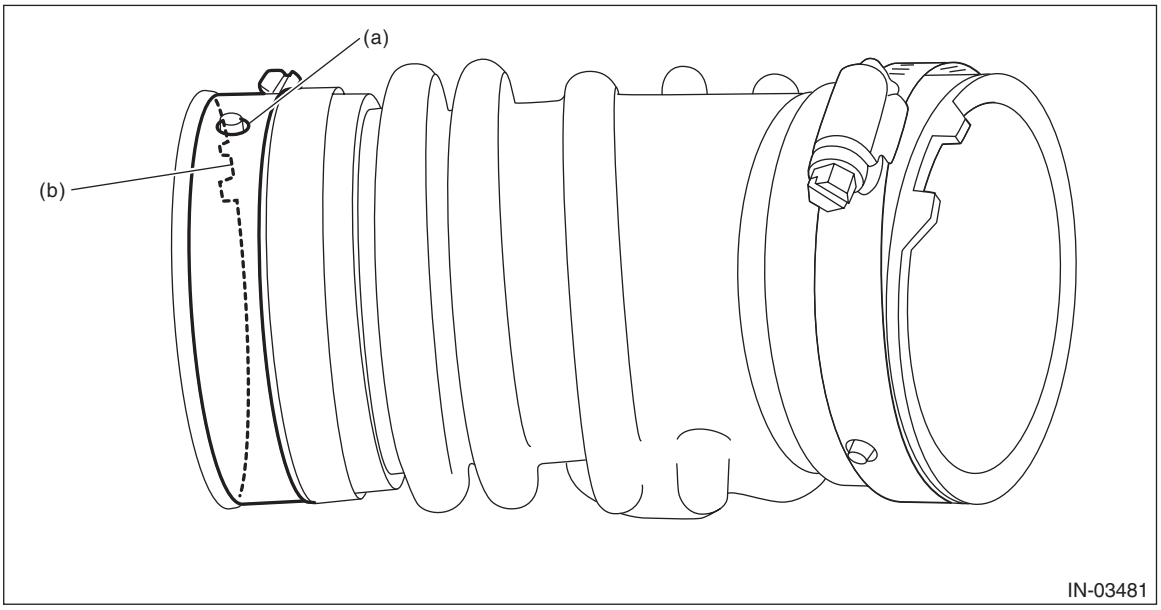


B: INSTALLATION

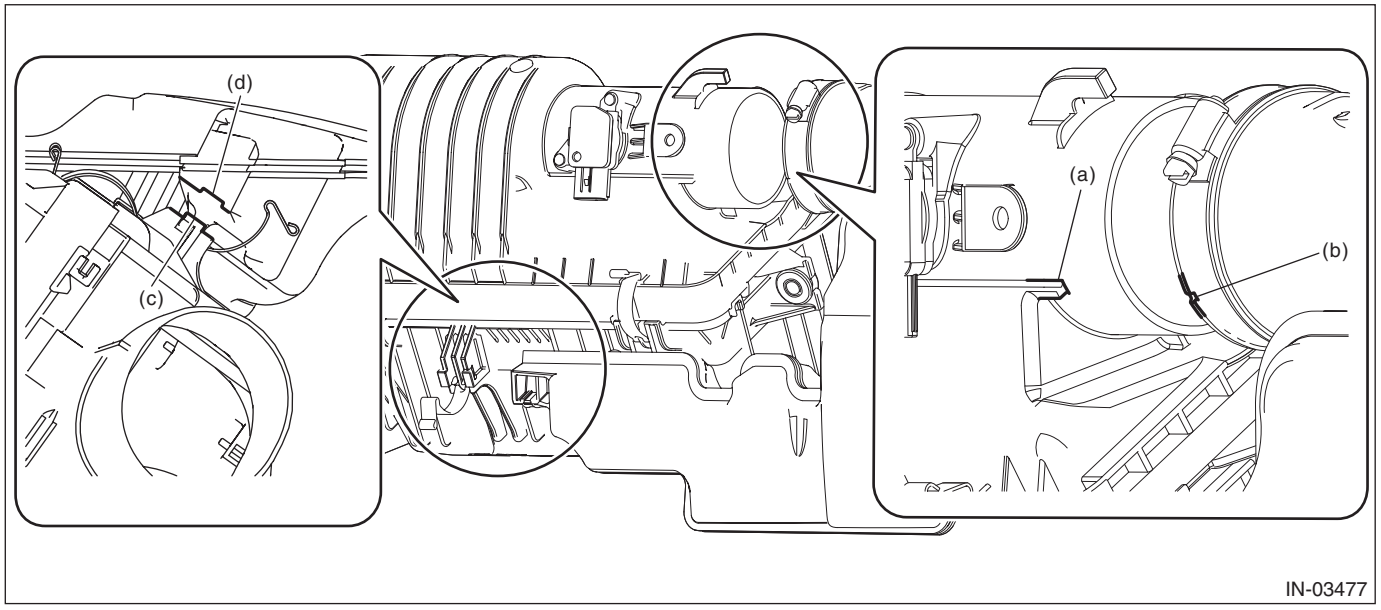
Install in the reverse order of removal.

NOTE:

- Align the clamp hole (a) with the protrusion of the air intake boot No. 2, and install the clamp in the direction as shown in the figure below.
- When installing the resonator chamber to the air intake boot No. 2, align the air intake boot No. 2 (b) with the protrusion on the resonator chamber.



- When installing the resonator chamber to the air cleaner case (rear), align the resonator chamber (b) to the protrusion (a) of the air cleaner case (rear), and align the resonator chamber (d) to the protrusion (c) of the air cleaner case (front).



Tightening torque:
3 N·m (0.3 kgf-m, 2.2 ft-lb)

C: INSPECTION

1) Check that the resonator chamber has no deformation, cracks or other damages.
2) Inspect that no foreign objects are mixed in the resonator chamber.

MECHANICAL

ME(H4DO(HEV))

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for the HEV model are included in the LU (H4DO (w/o HEV)) section. <Ref. to LU(H4DO(w/o HEV))-2, General Description.>

SPEED CONTROL SYSTEMS

SP(H4DO(HEV))

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for the HEV model are included in the ME (H4DO (w/o HEV)) section. <Ref. to ME(H4DO(w/o HEV))-2, General Description.>

EXHAUST

EX(H4DO(HEV))

Page
1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for the HEV model are the same as those for the gasoline engine model. <Ref. to SP(H4DO(w/o HEV))-2, General Description.>

IGNITION

IG(H4DO(HEV))

Page
1. General Description 2

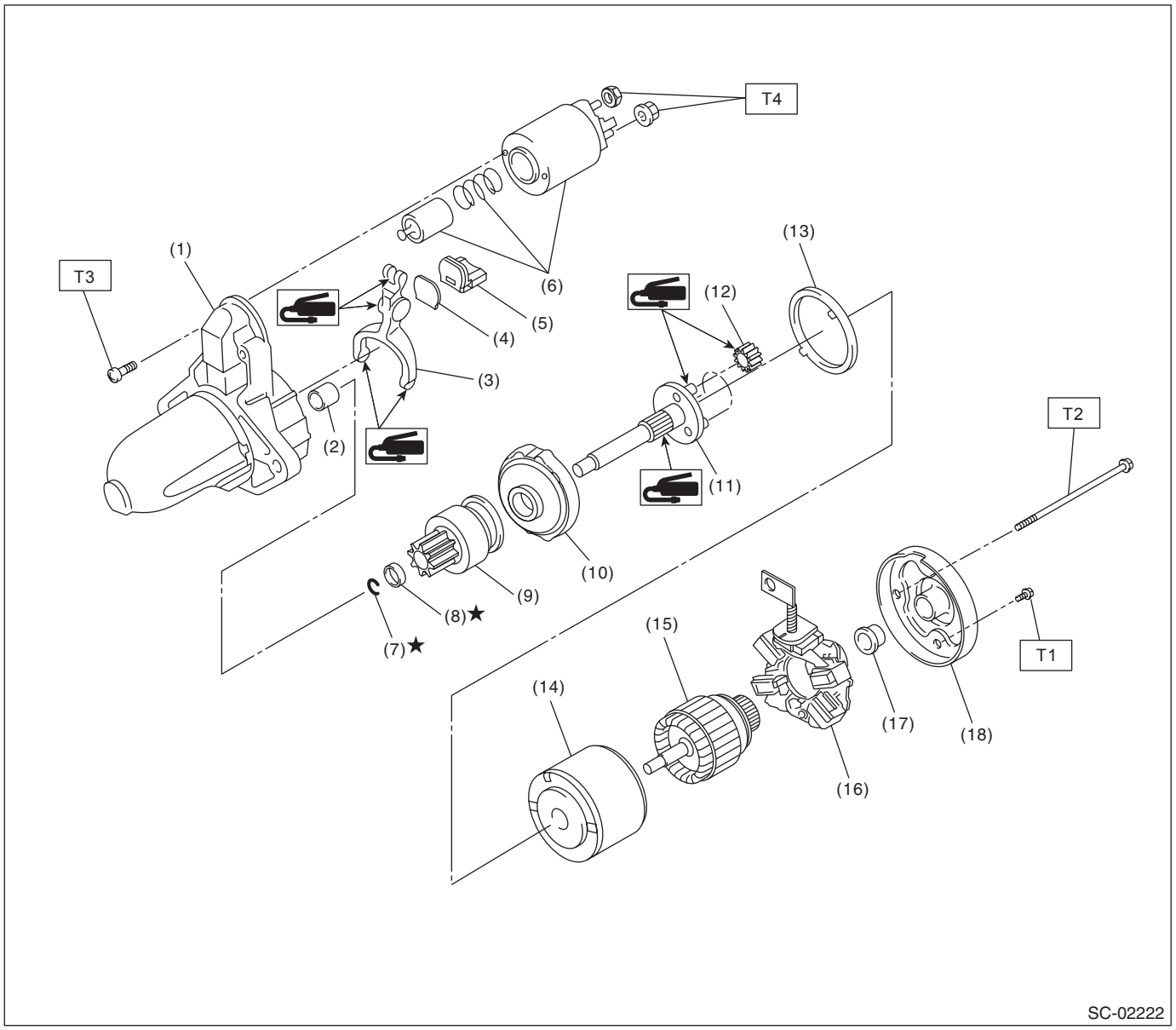
1. General Description

A: SPECIFICATION

Item			Specifications
Vehicle model			CVT
Starter	Type		Reduction type
	Model		M000T38571
	Manufacturer		Mitsubishi Electric
	Voltage and output		12 V — 1.2 kW
	Direction of rotation		Counterclockwise (when observed from pinion)
	Number of pinion teeth		9
	Armature commutator runout	Standard	0.05 mm (0.0020 in)
		Limit	0.10 mm (0.0039 in)
	Armature depth of segment mold	Standard	0.50 mm (0.020 in)
	Brush length	Standard	12.3 mm (0.484 in)
		Limit	7.0 mm (0.276 in)
	Brush spring force	Standard	15.9 — 19.5 N (1.62 — 1.99 kgf, 3.57 — 4.38 lbf)
		Limit	2.5 N (0.25 kgf, 0.56 lbf)
	No-load characteristics	Voltage	11 V
		Current	90 A or less
		Rotating speed	2,370 rpm or more
	Load characteristics	Voltage	7.5 V
		Current	300 A
		Torque	10.65 N·m (1.1 kgf-m, 7.8 ft-lb) or more
		Rotating speed	840 rpm or more
	Lock characteristics	Voltage	4 V
		Current	780 A or less
		Torque	20 N·m (2.0 kgf-m, 14.8 ft-lb) or more
Integrated starter generator (ISG)	Type		Rotating-field three-phase type, voltage regulator built-in type, with load response control system, with inverter mode and self-diagnosis feature via LIN communication
	Model		iST60C021
	Manufacturer		Valeo
	Voltage and output		12 V — 200A
	Polarity on ground side		Negative
	Direction of rotation		Clockwise (when observed from pulley side)
	Stator connection		3-phase △ type
	Output current		1,500 rpm — 79.7 A or more 2,500 rpm — 166.6 A or more 5,000 rpm — 196.9 A or more
	Regulated voltage		14.1 — 14.5 V [20°C (68°F)]
Battery	Type and capacity	For 12 volt auxiliary	12 V — 48 AH (55D 23L)
		For 12 volt engine restart	12 V — 41 AH (N55-R)
	CCA	For 12 volt auxiliary	390 A
		For 12 volt engine restart	450 A

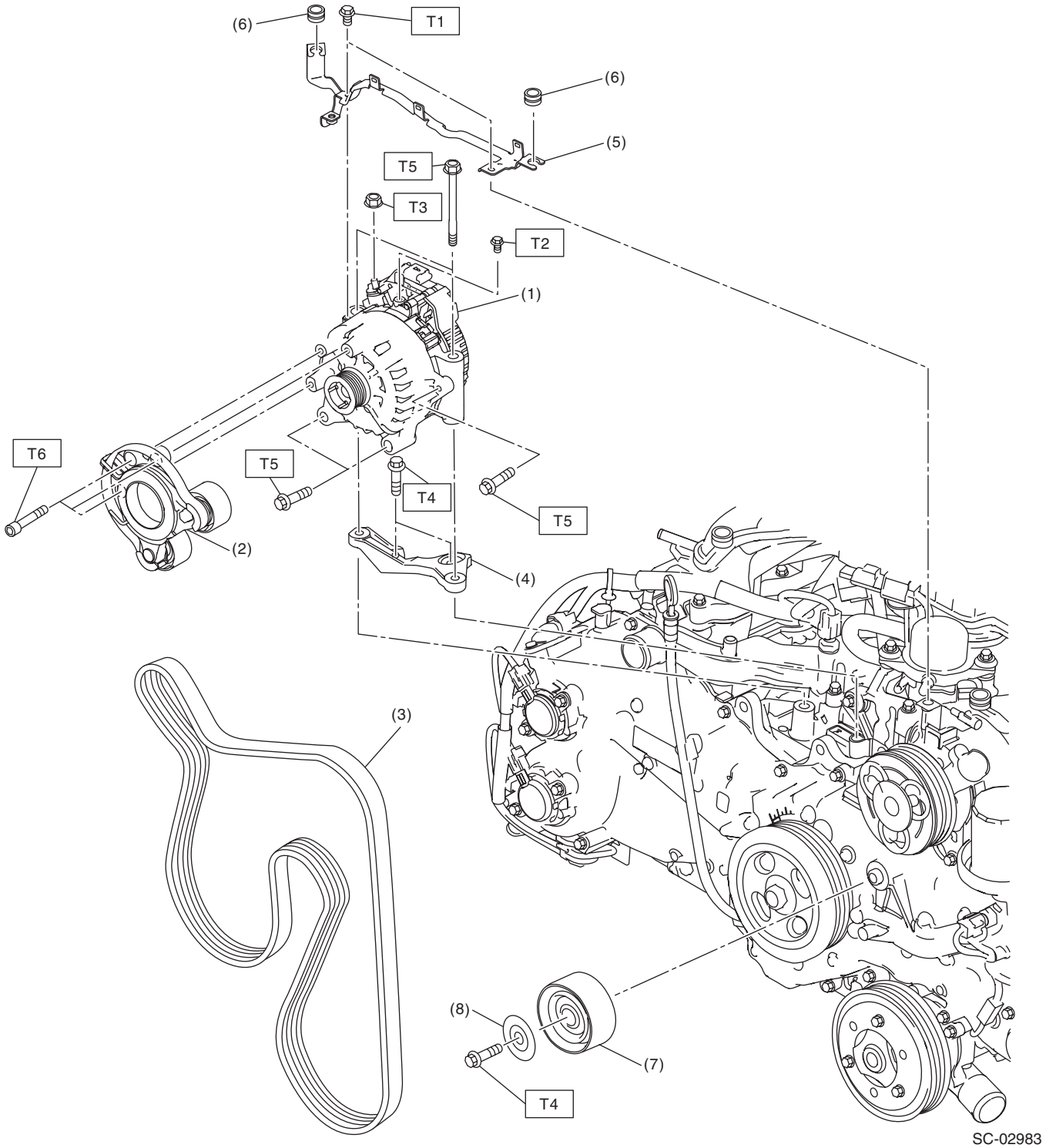
B: COMPONENT

1. STARTER



(1)	Starter housing ASSY	(9)	Overrunning clutch	(17)	Sleeve bearing
(2)	Sleeve bearing	(10)	Internal gear ASSY	(18)	Starter cover ASSY
(3)	Shift lever	(11)	Shaft		
(4)	Plate	(12)	Pinion gear	***Tightening torque: N·m (kgf-m, ft-lb)***	
(5)	Seal rubber	(13)	Seal rubber	***T1:***	***1.4 (0.1, 1.0)***
(6)	Magnet switch ASSY	(14)	Yoke ASSY	***T2:***	***6 (0.6, 4.4)***
(7)	Snap ring	(15)	Armature ASSY	***T3:***	***7.5 (0.8, 5.5)***
(8)	Stopper	(16)	Brush holder ASSY	***T4:***	***10 (1.0, 7.4)***

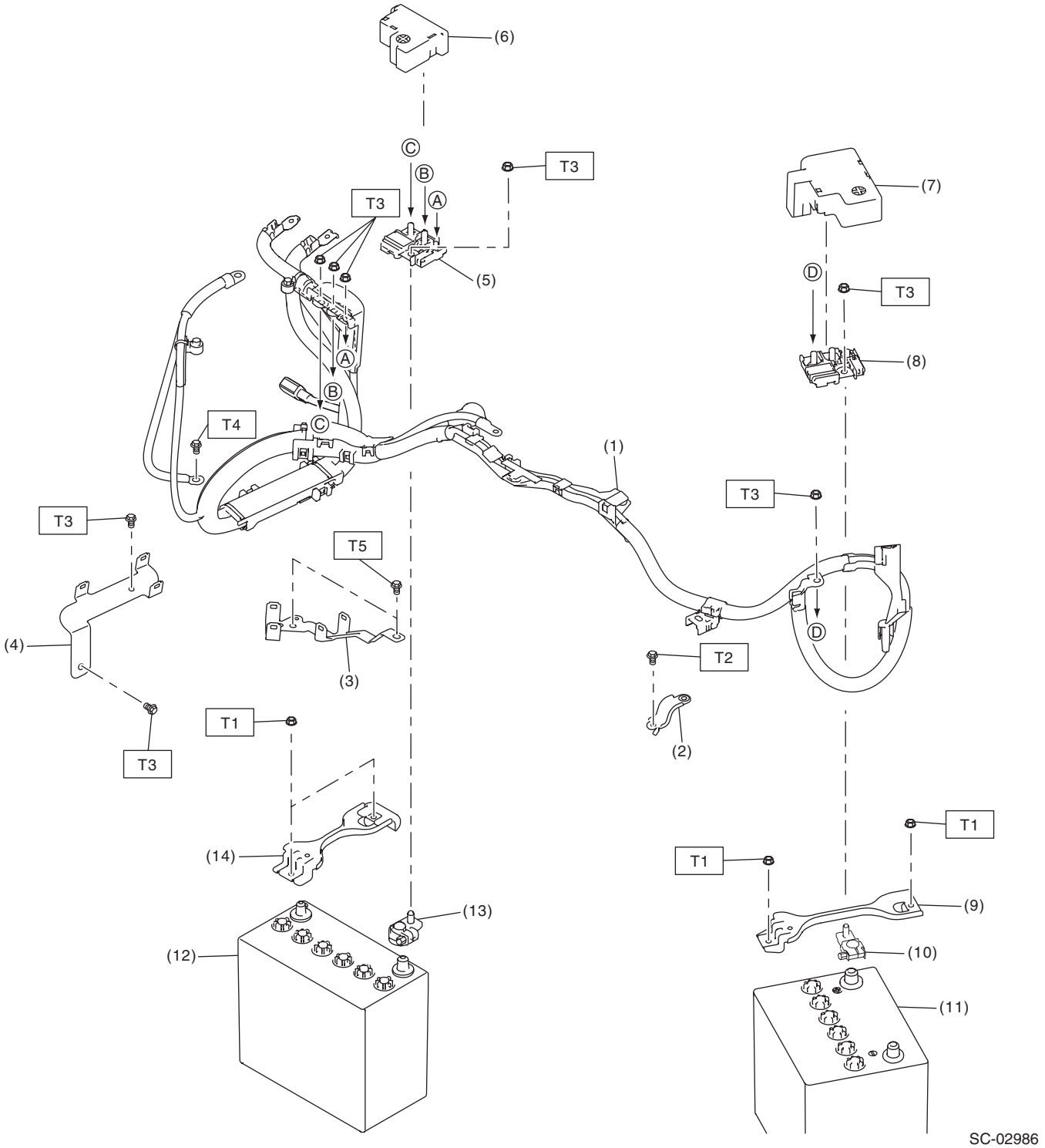
2. INTEGRATED STARTER GENERATOR (ISG) & ISG BRACKET



(1) Integrated starter generator (ISG)
(2) V-belt tensioner ASSY
(3) V-belt
(4) ISG bracket
(5) Collector cover bracket
(6) Cushion
(7) Idler pulley
(8) Idler pulley cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.7, 4.7)
T2: 7.5 (0.8, 5.5)
T3: 15.5 (1.6, 11.4)
T4: 36 (3.7, 26.6)
T5: <Ref. to SC(H4DO(HEV))-35, INSTALLATION, Integrated Starter Generator (ISG).>
T6: <Ref. to ME(H4DO(w/o HEV))-134, HEV MODEL, INSTALLATION, V-belt.>

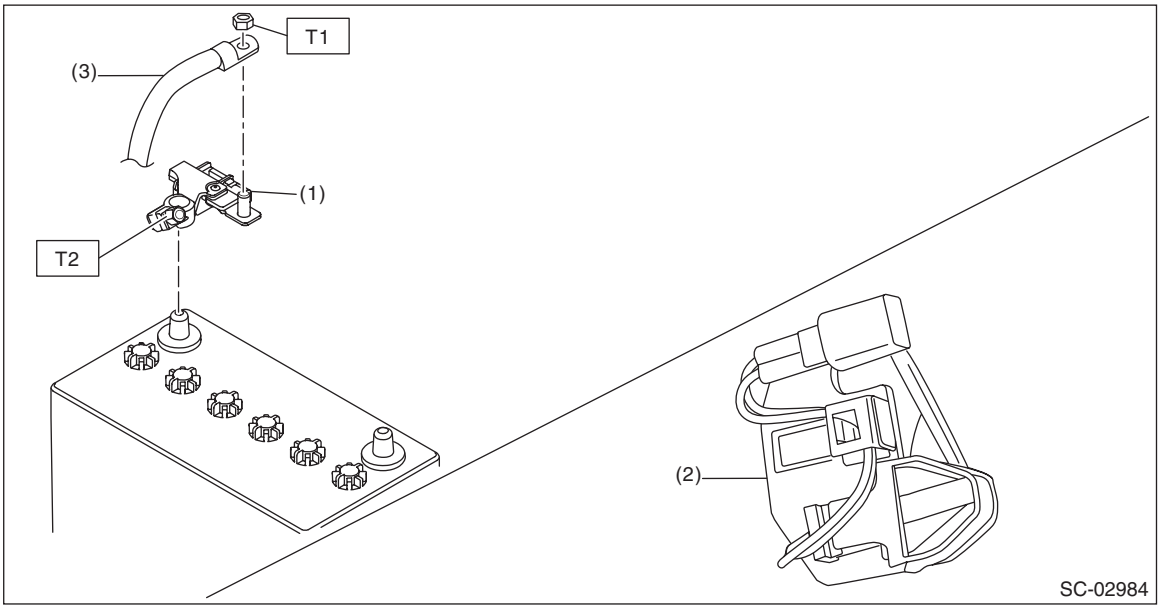
3. BATTERY CABLE ASSY



(1) Battery cable ASSY
(2) Battery cable stay
(3) Battery cable bracket No. 1
(4) Battery cable bracket No. 2
(5) Slow blow fuse (12 volt engine restart battery)
(6) Terminal boot (12 volt engine restart battery)
(7) Terminal boot (12 volt auxiliary battery)
(8) Slow blow fuse (12 volt auxiliary battery)
(9) Battery holder (12 volt auxiliary battery)
(10) Terminal base (12 volt auxiliary battery)
(11) 12 volt auxiliary battery
(12) 12 volt engine restart battery
(13) Terminal base (12 volt engine restart battery)
(14) Battery holder (12 volt engine restart battery)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 3.5 (0.4, 2.6)
T2: 6.4 (0.7, 4.7)
T3: 7.5 (0.8, 5.5)
T4: 13 (1.3, 9.6)
T5: 19 (1.9, 14.0)

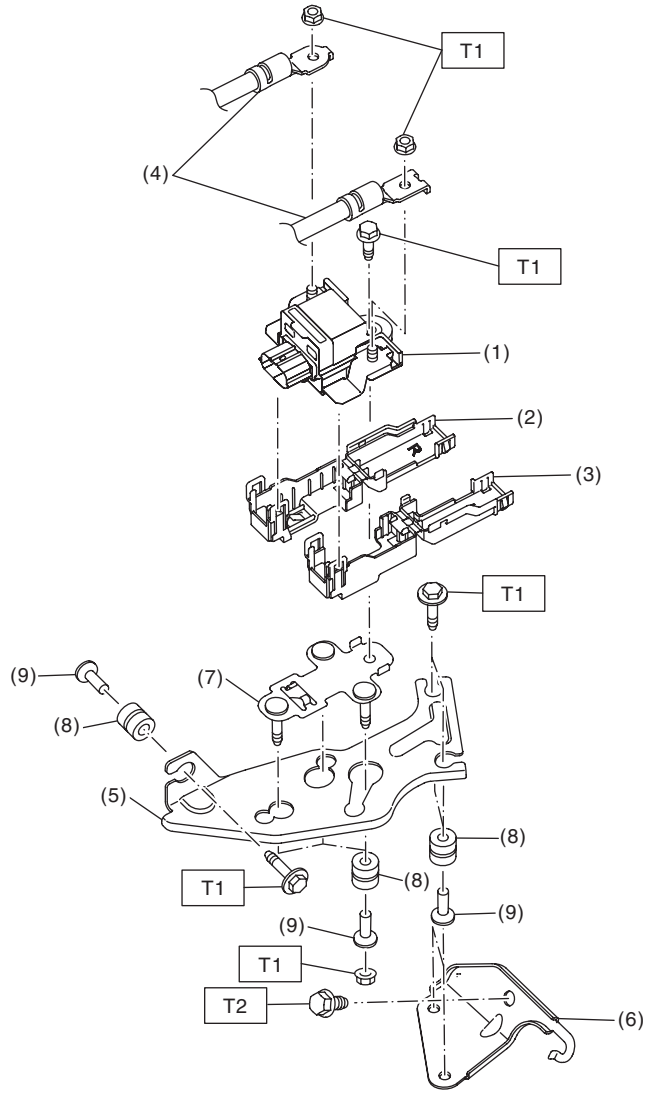
4. 12V ENGINE RESTART BATTERY SENSOR & BATTERY TEMPERATURE SENSOR



(1) 12V engine restart battery sensor
(2) Battery temperature sensor
(3) Ground terminal

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.8, 5.5)
T2: <Ref. to SC(H4DO(HEV))-61, INSTALLATION, Battery Sensor.>

5. 12V BATTERY RELAY



SC-02985

(1) 12V battery relay
(2) 12V battery relay cover RH
(3) 12V battery relay cover LH
(4) Battery cable ASSY
(5) 12V battery relay bracket No. 1
(6) 12V battery relay bracket No. 2
(7) 12V battery relay bracket No. 3
(8) Cushion
(9) Collar

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.8, 5.5)
T2: 33 (3.4, 24.3)

C: CAUTION

- Prior to starting work, pay special attention to the following:
  1. Always wear work clothes, a work cap, and 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.
- 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.
- Be sure to tighten the fasteners including bolts and nuts to the specified torque.

D: PREPARATION TOOL

1. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current. NOTE: • For measuring standby current, prepare a circuit tester that can measure by 1 mA unit. • For measuring standby current in the models with keyless access, prepare an analog type circuit tester.

2. Starter

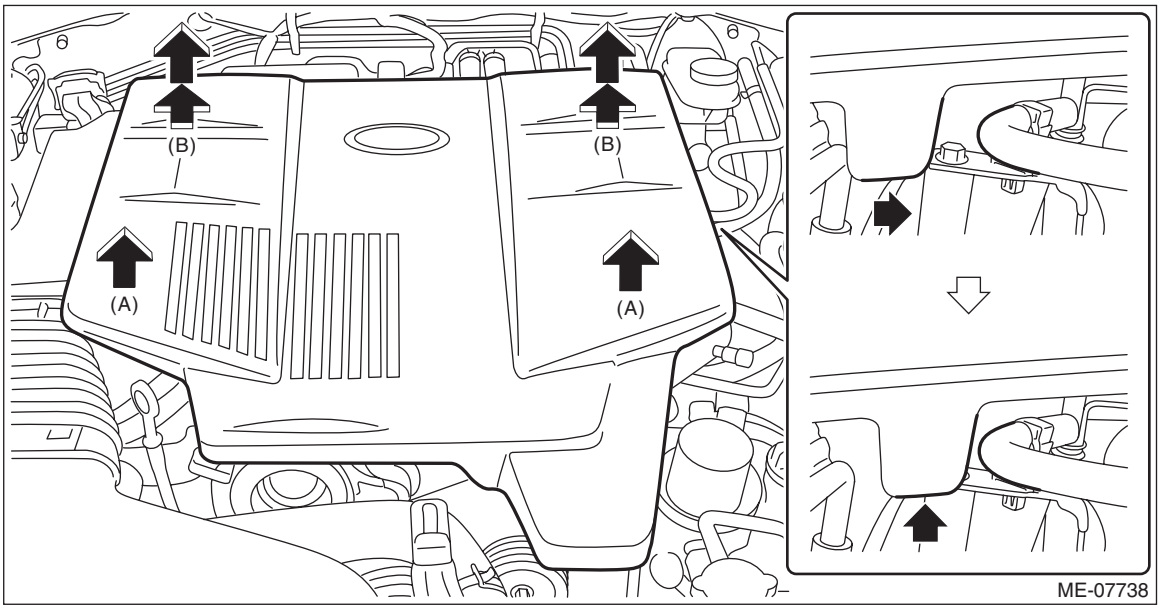
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

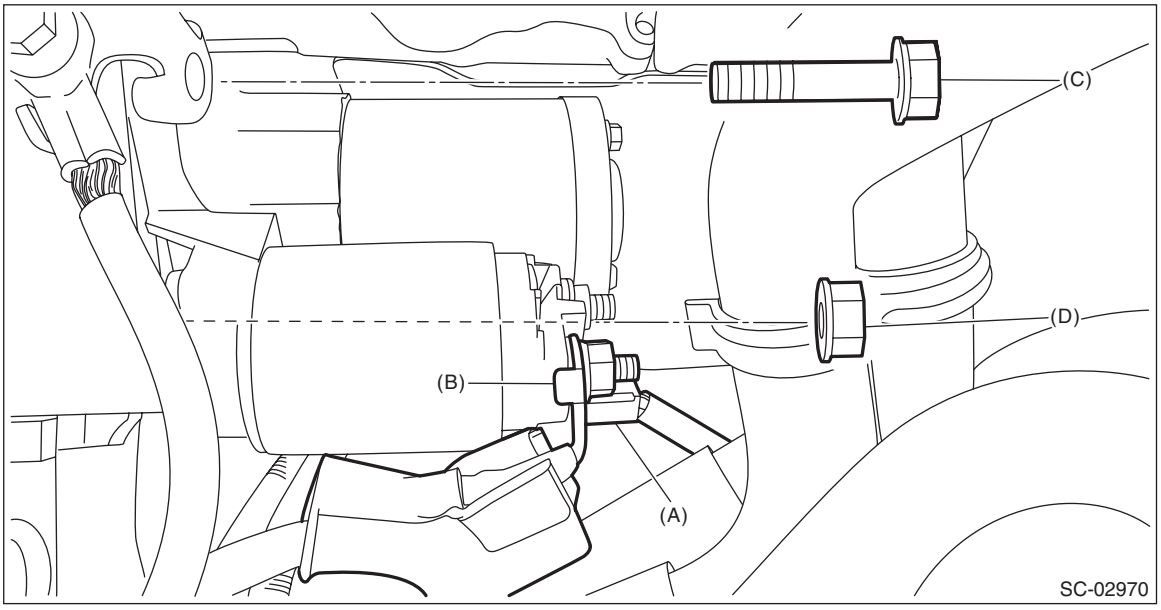
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



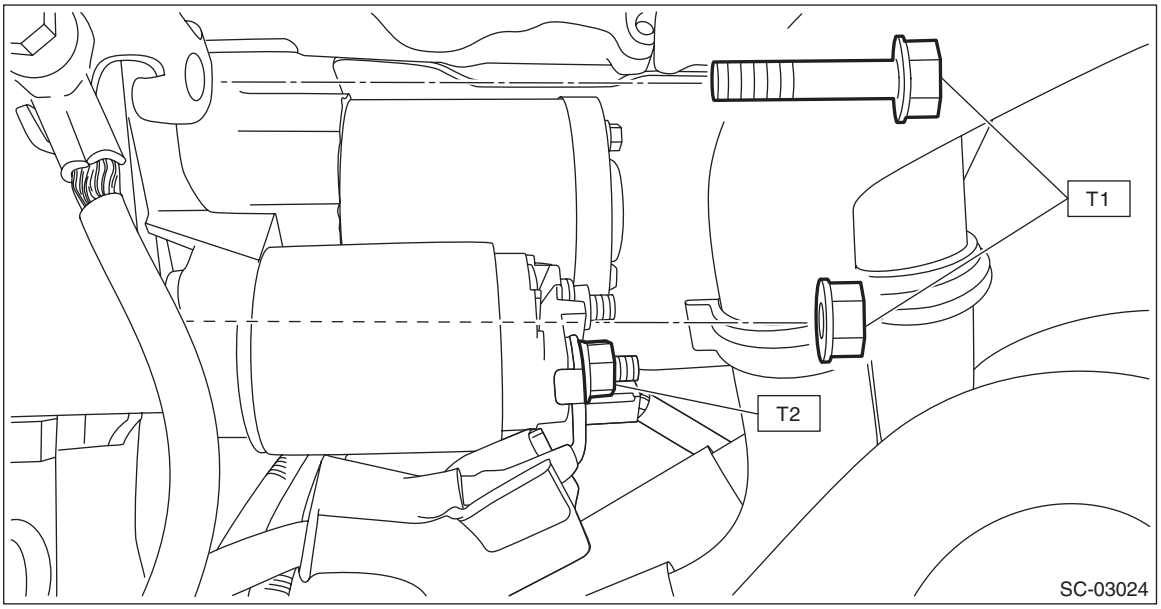
3) Remove the air cleaner case. <Ref. to IN(H4DO(HEV))-6, REMOVAL, Air Cleaner Case.>
4) Disconnect the connector (A) and terminal (B) from starter.
5) Remove the bolt (C) and the nut (D) securing the starter, and remove the starter from the transmission.



B: INSTALLATION

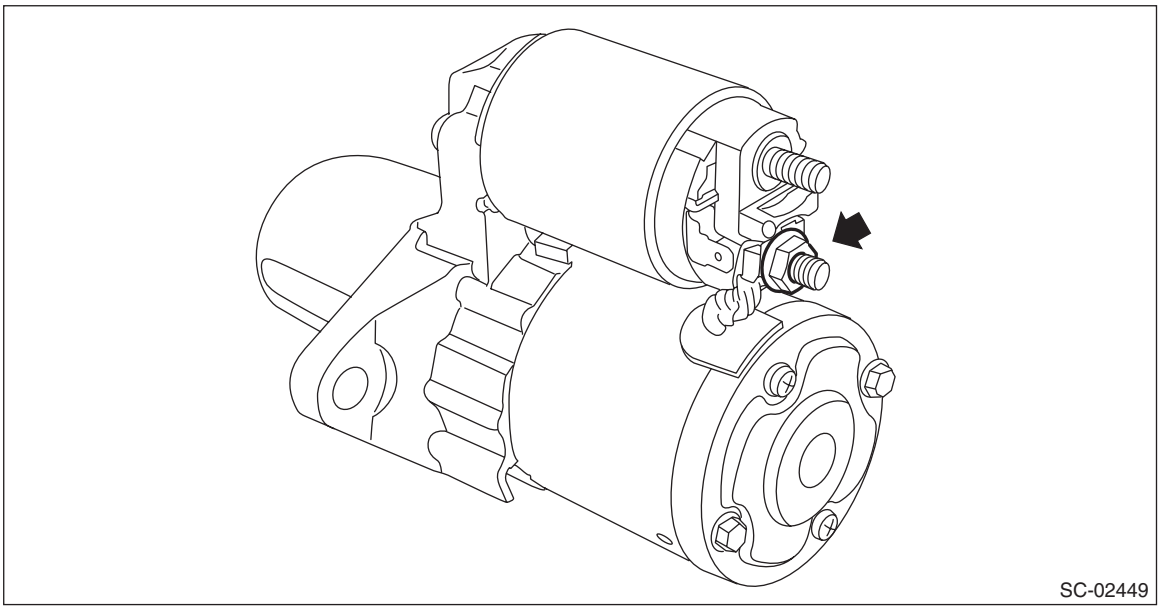
Install in the reverse order of removal.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 11 N·m (1.1 kgf-m, 8.1 ft-lb)

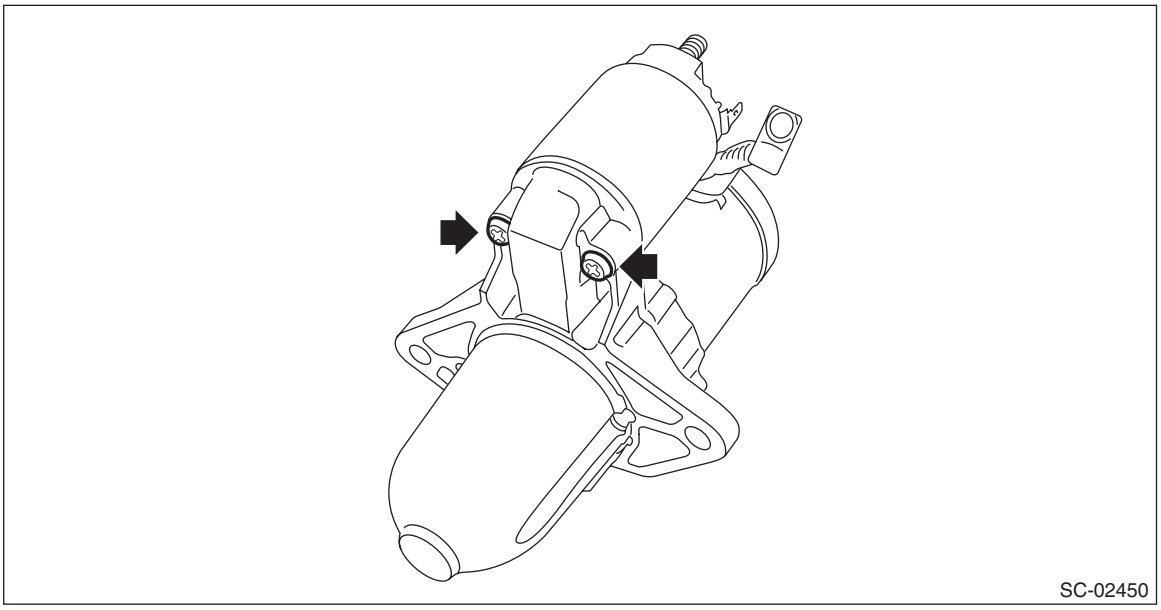


C: DISASSEMBLY

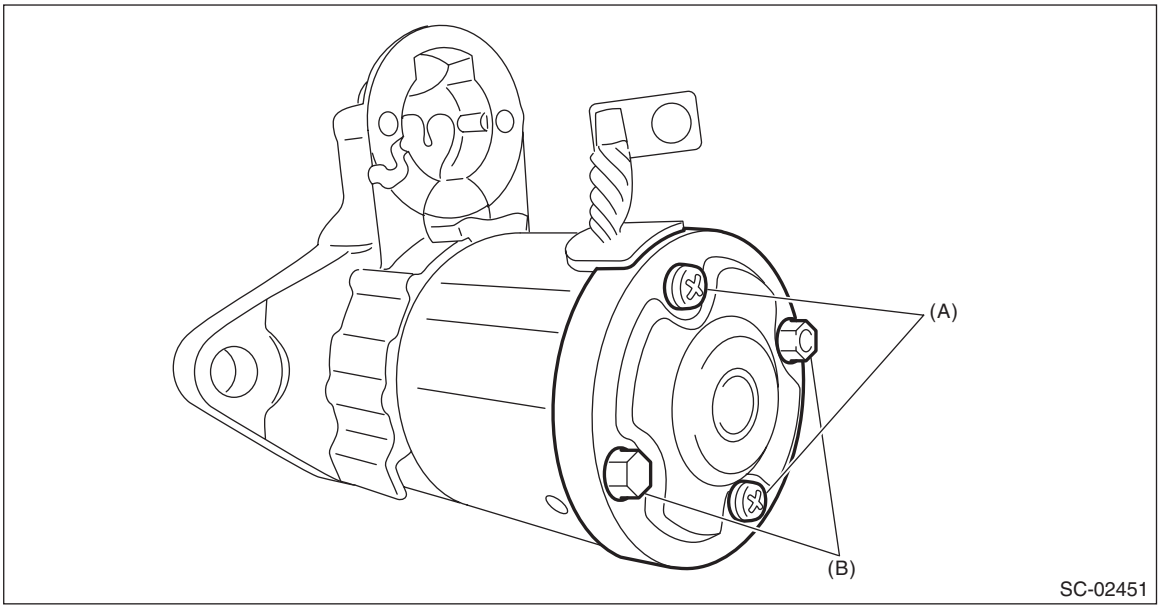
1) Disconnect the terminal M from the magnet switch assembly.



2) Remove the magnet switch assembly from the starter housing assembly.

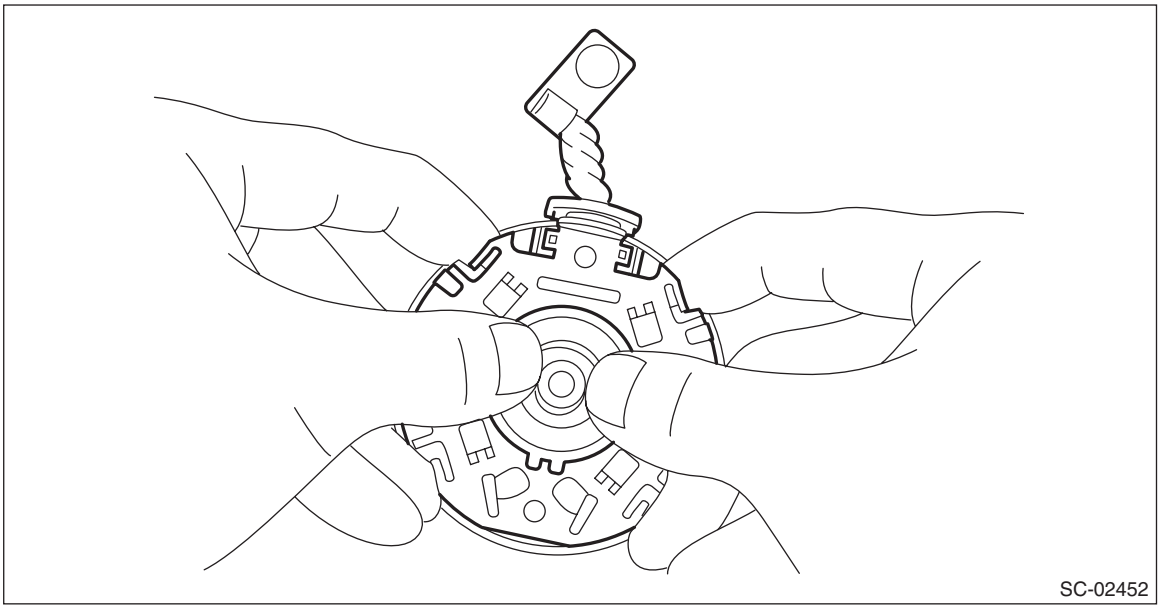


3) Remove screws (A) of the brush holder assembly, and through bolts (B) on both sides, and remove the starter cover assembly.

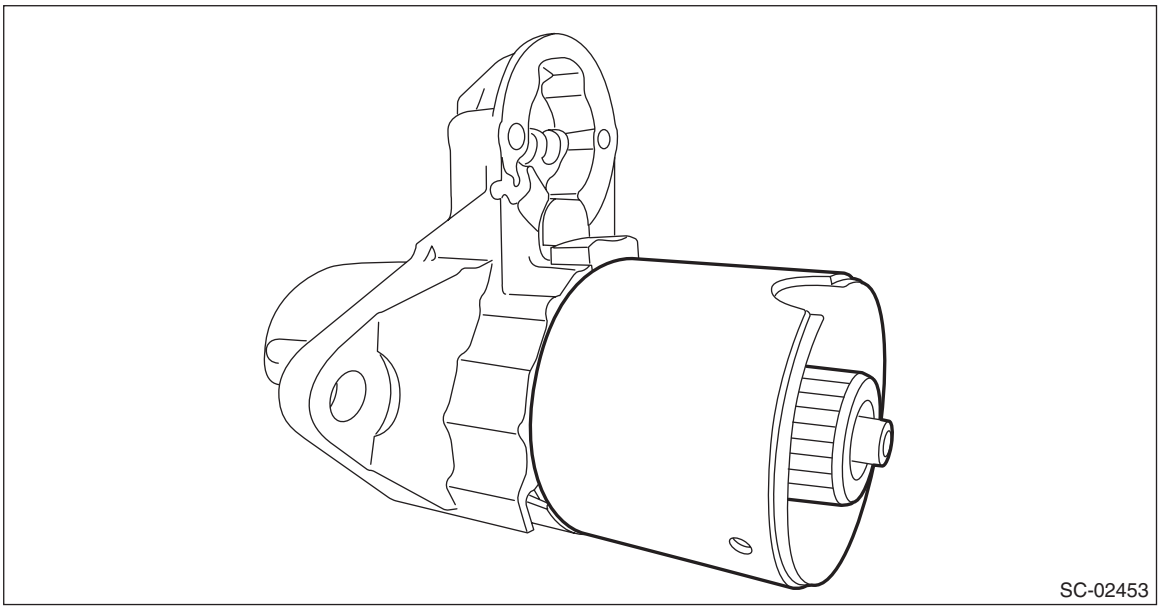


4) Remove the brush holder assembly from the armature assembly.

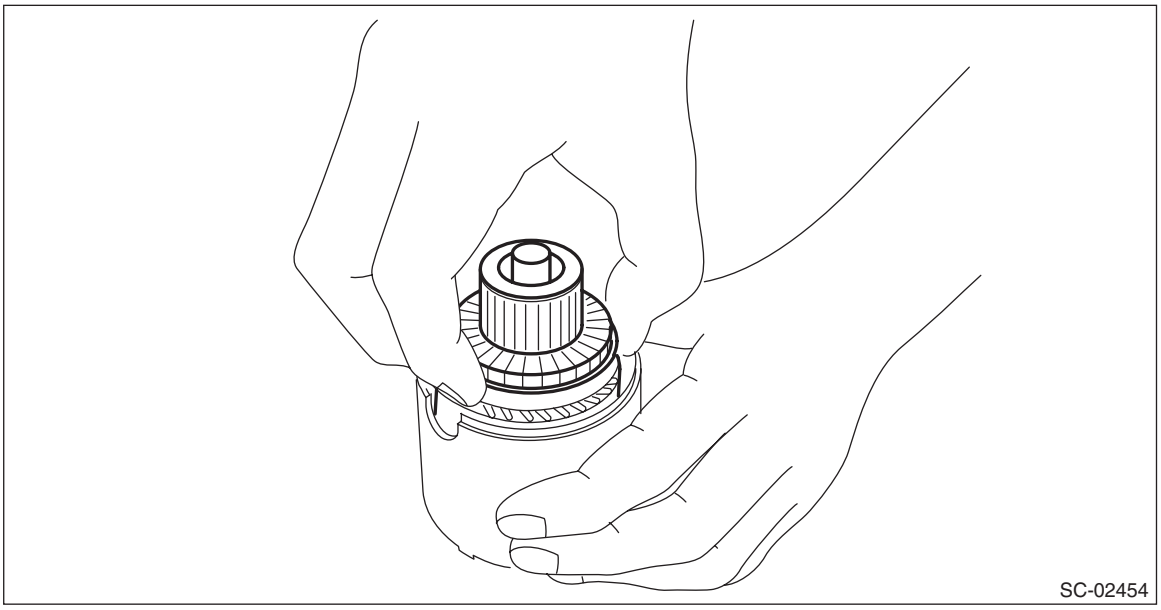
NOTE:
Hold the brush with your fingers so that the brush spring does not come flying out.


SC-02452

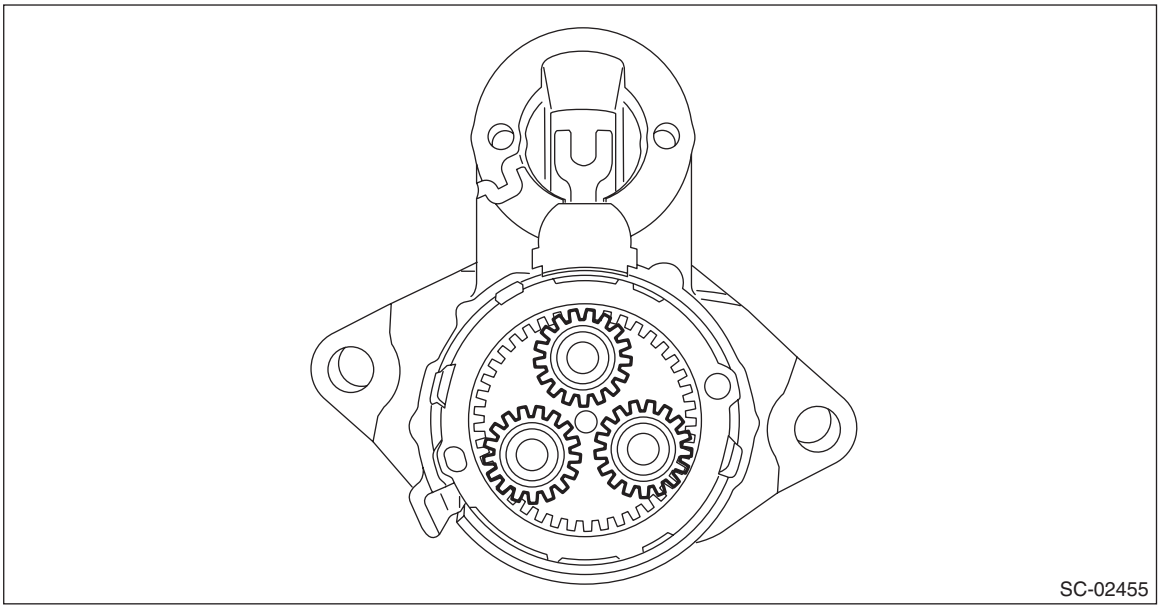
5) Remove the armature assembly and yoke assembly from the starter housing assembly together as a single unit.


SC-02453

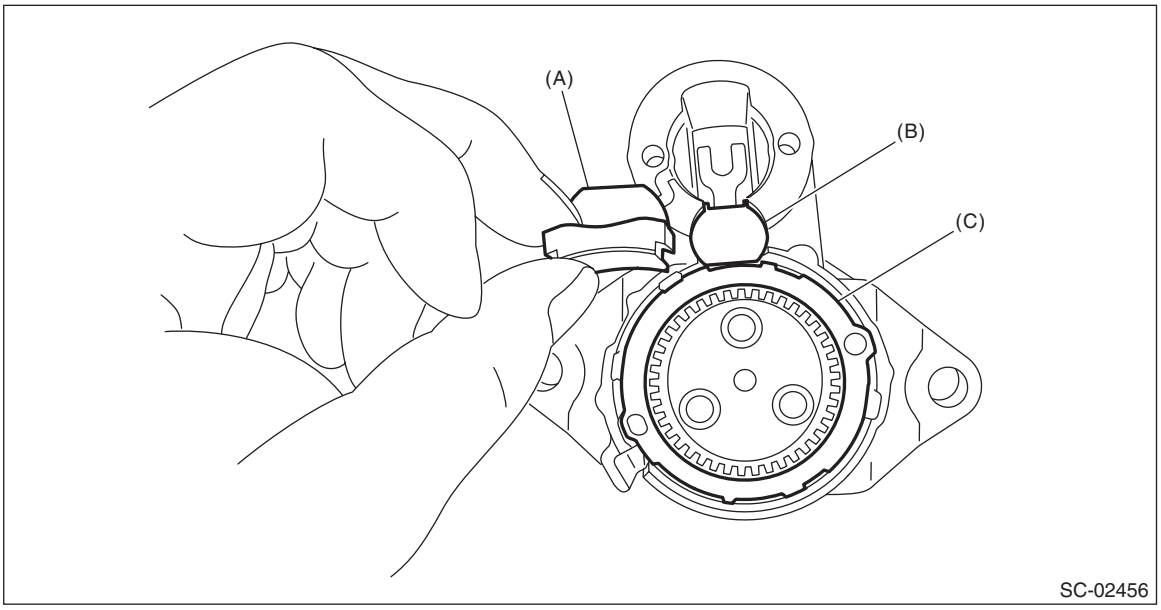
6) Separate the armature assembly and yoke assembly.


SC-02454

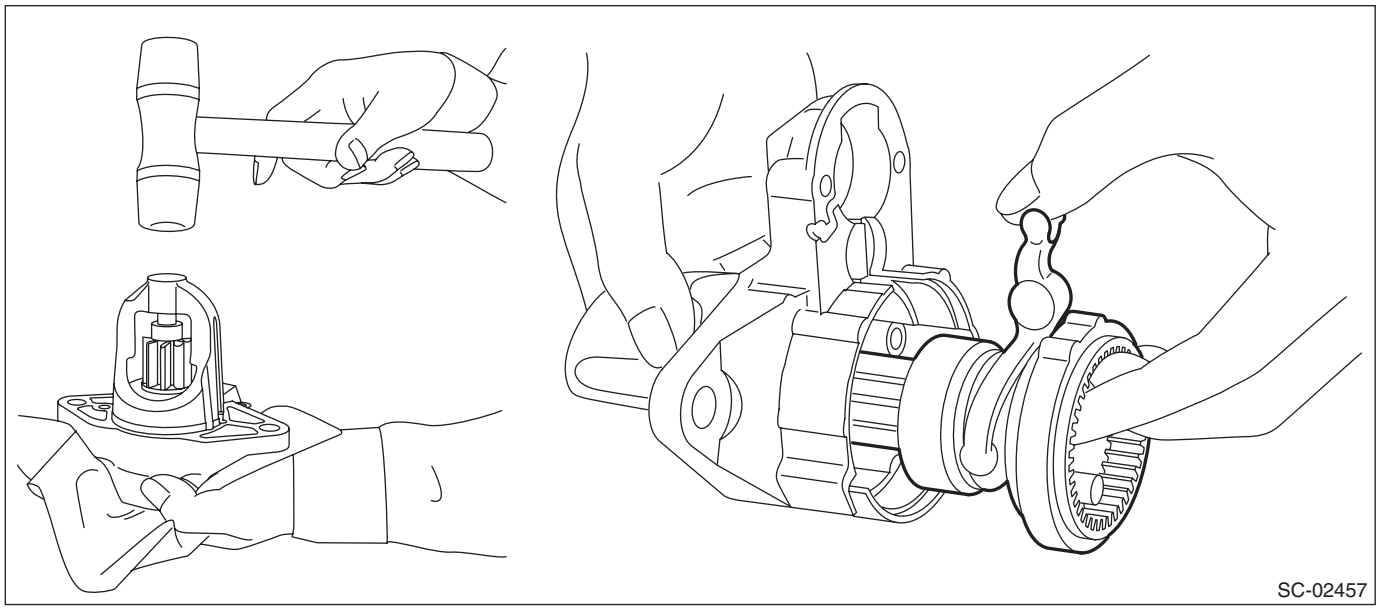
7) Remove the pinion gear from the internal gear assembly.


SC-02455

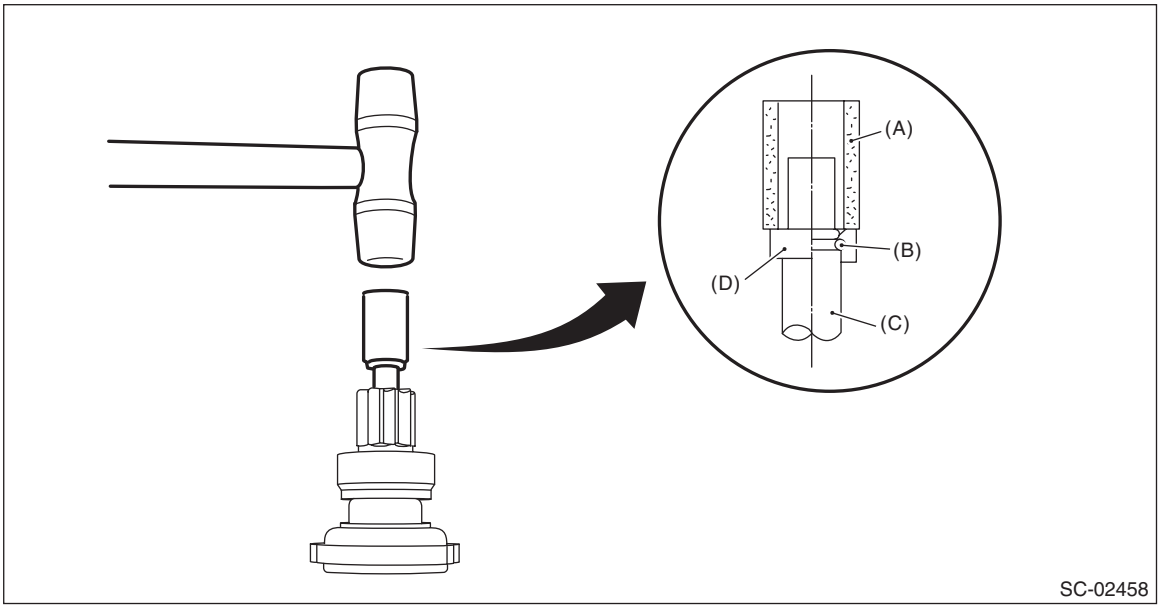
8) Remove seal rubber (A), plate (B), and seal rubber (C).



9) Lightly tap the starter housing assembly with a plastic hammer as shown in the figure, and remove the overrunning clutch, internal gear assembly, shaft and shift lever together as one unit.

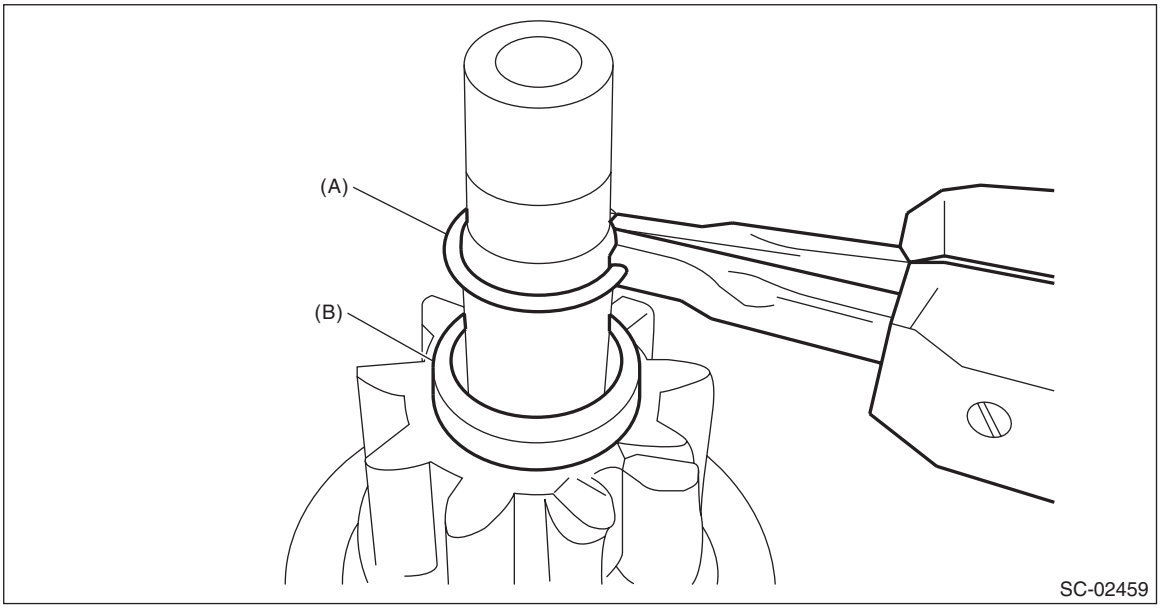


10) Use the following procedures to remove the overrunning clutch from the shaft.
(1) Use an appropriate tool (such as a fit socket wrench), and remove the stopper from snap ring by lightly tapping the stopper with a plastic hammer.

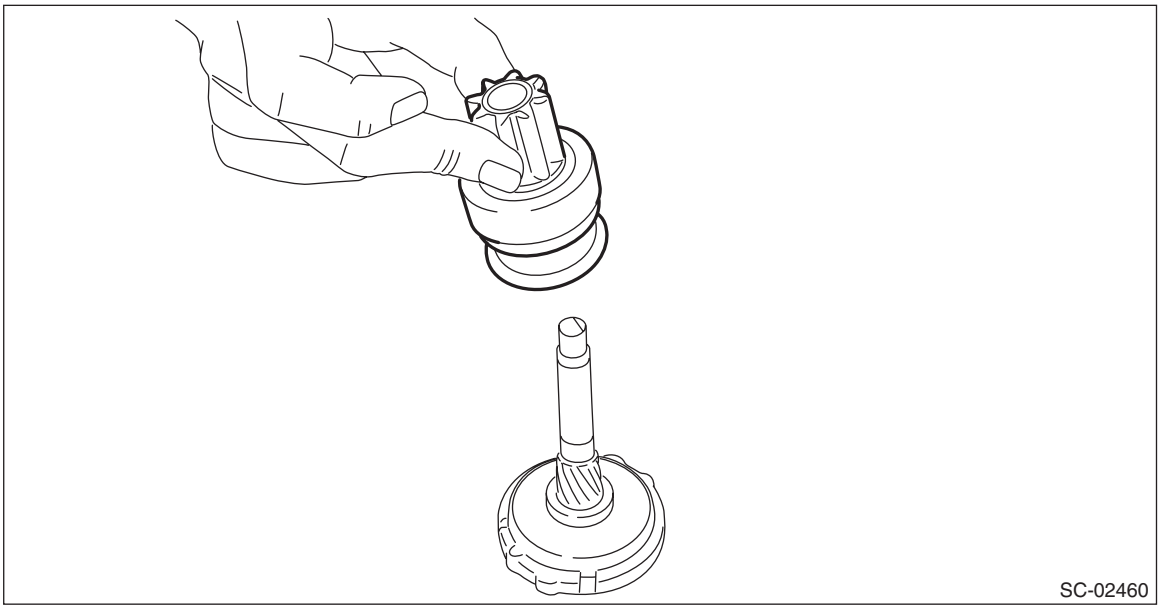


(A) Appropriate tool (B) Snap ring (C) Shaft
(D) Stopper

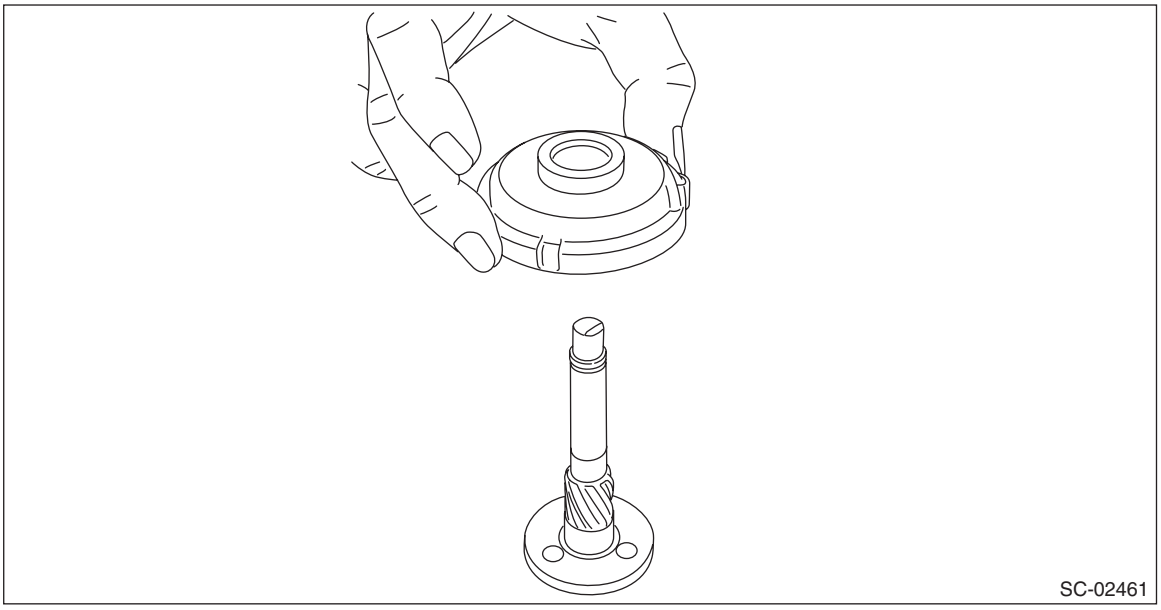
(2) Remove snap ring (A) from the shaft, and remove stopper (B).



(3) Remove the overrunning clutch from the shaft.


SC-02460

11) Separate the internal gear assembly and shaft.

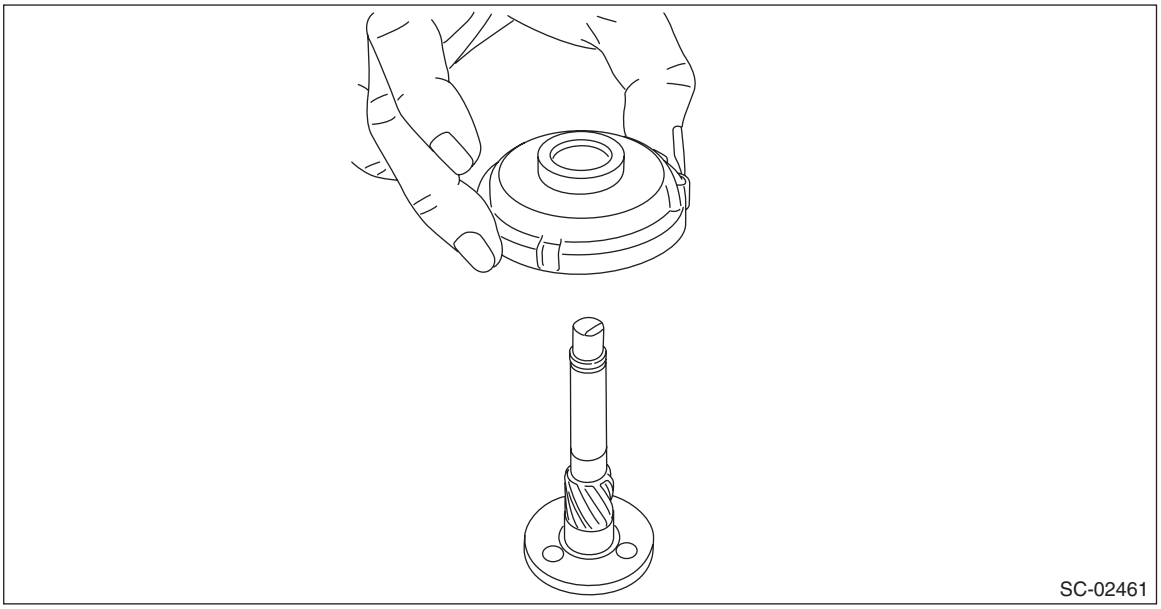

SC-02461

D: ASSEMBLY

1) Apply grease to the shaft sliding surfaces of the internal gear assembly.

Grease:
Multemp #6129 or equivalent

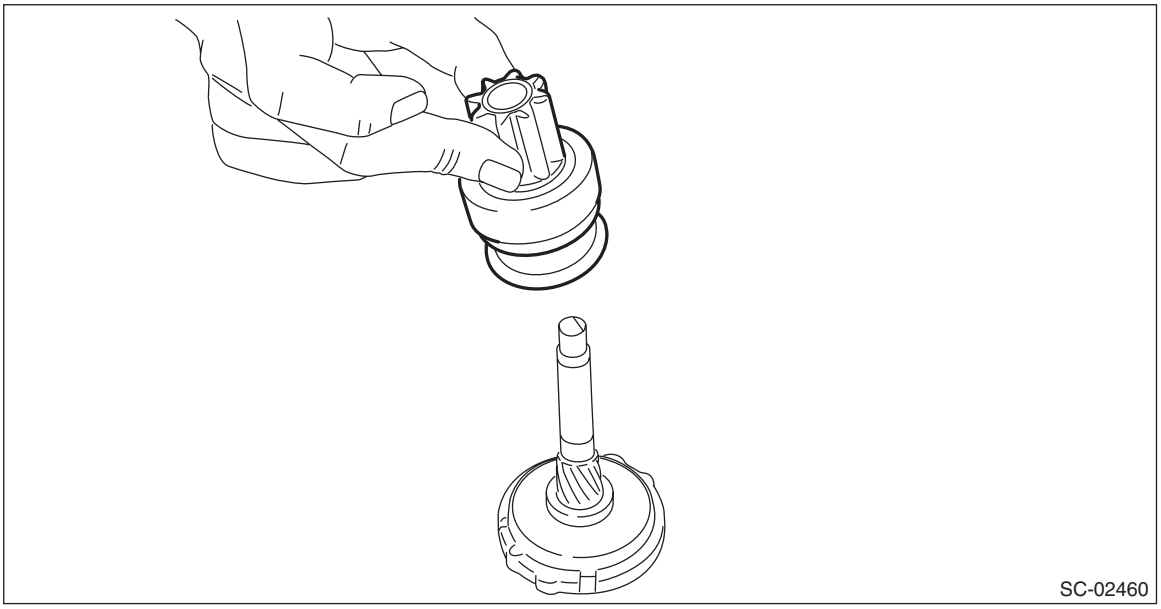
2) Assemble the shaft to the internal gear assembly.



3) Assemble the overrunning clutch as follows:
(1) Apply grease to the spline portion of the shaft.

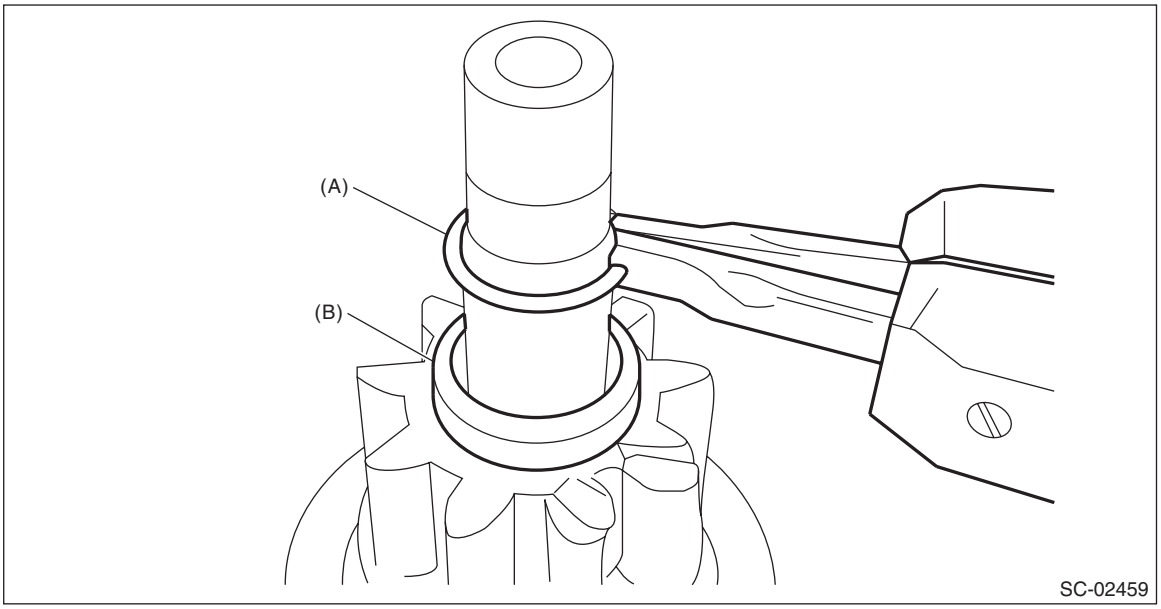
Grease:
Multemp #6129 or equivalent

(2) Install the overrunning clutch to shaft.

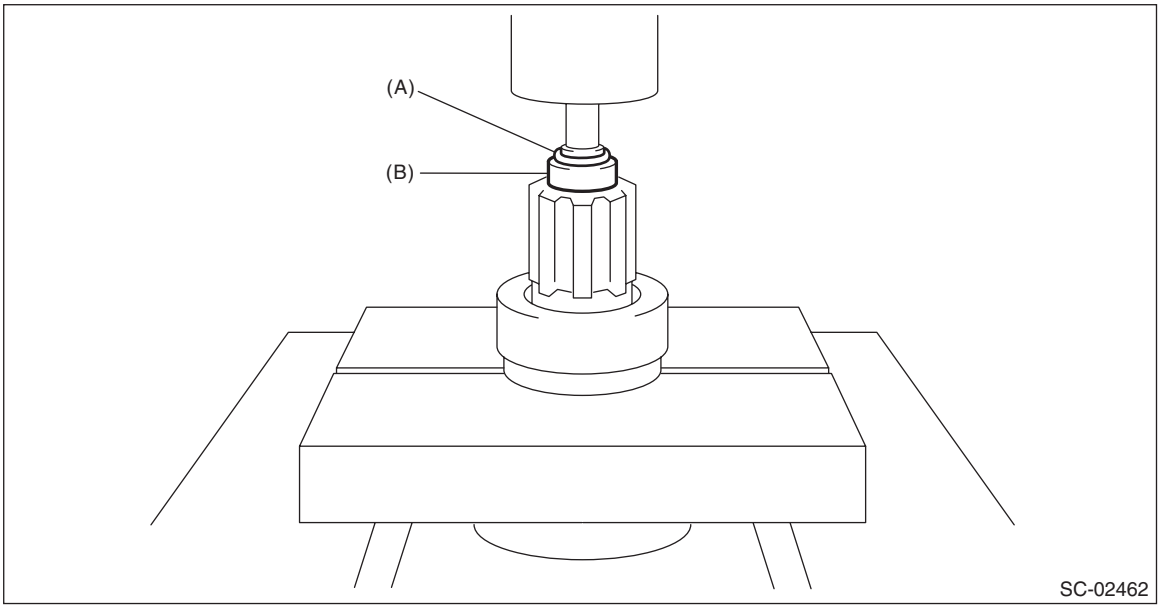


(3) Pass stopper (B) through the shaft assembly, and attach snap ring (A).

NOTE:
Use new stoppers and snap rings.



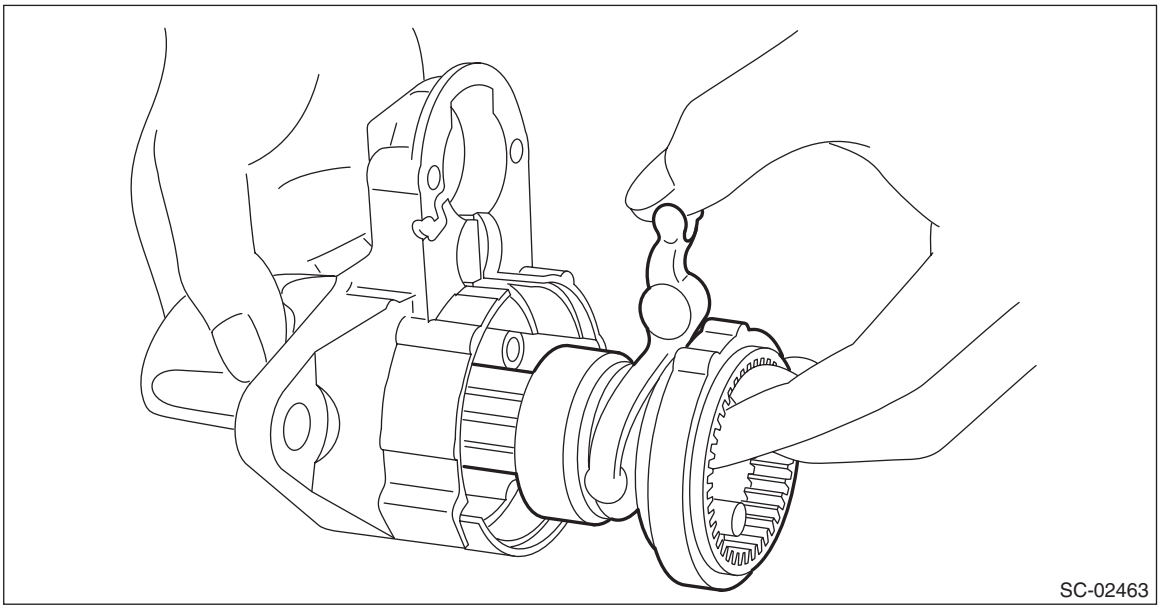
(4) Using a press, pressure fit stopper (B) into snap ring (A).



4) Assemble the overrunning clutch, internal gear assembly, shaft and shift lever as a single unit into the starter housing assembly.

NOTE:
Apply grease to the moving parts of the shift lever.

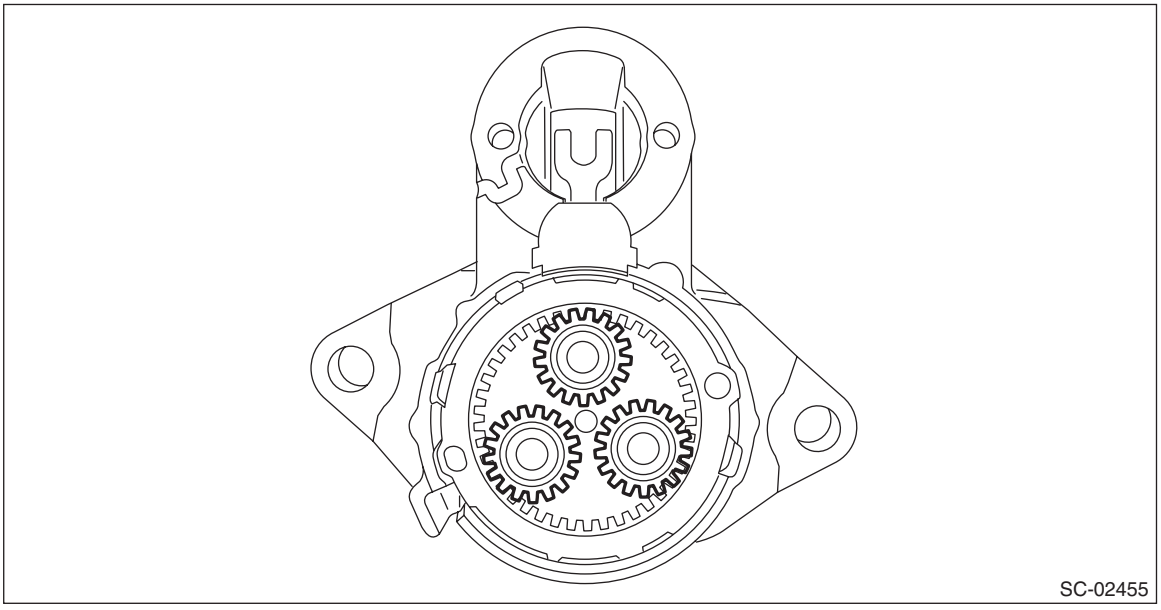
Grease:
Multemp #6129 or equivalent



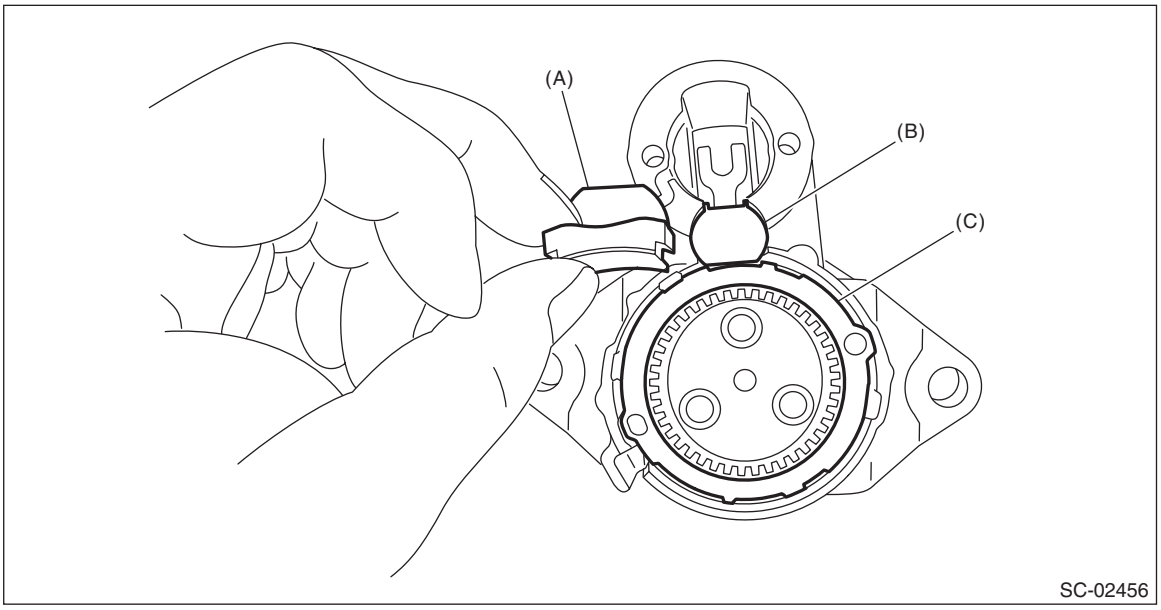
5) Apply grease to the inside of the internal gear assembly and pinion gear, and attach the pinion gear to the internal gear assembly.

NOTE:
- Apply grease evenly to the contact surfaces of each gear.
- Be careful that no debris becomes attached.

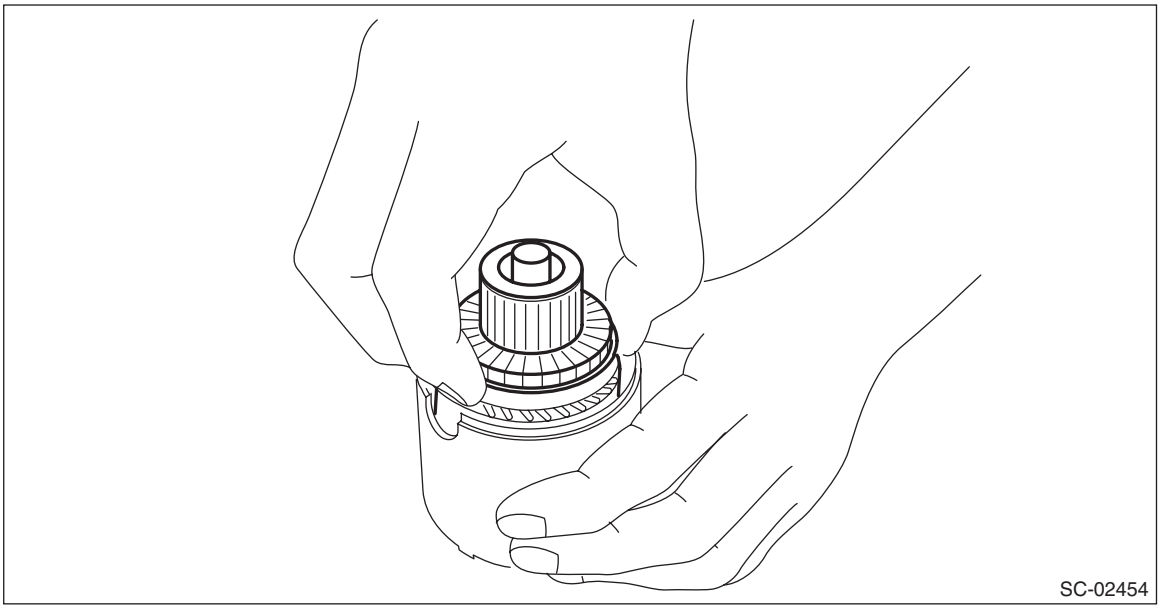
Grease:
Molykote® AG650 or equivalent



6) Install seal rubber (A), plate (B), and seal rubber (C).

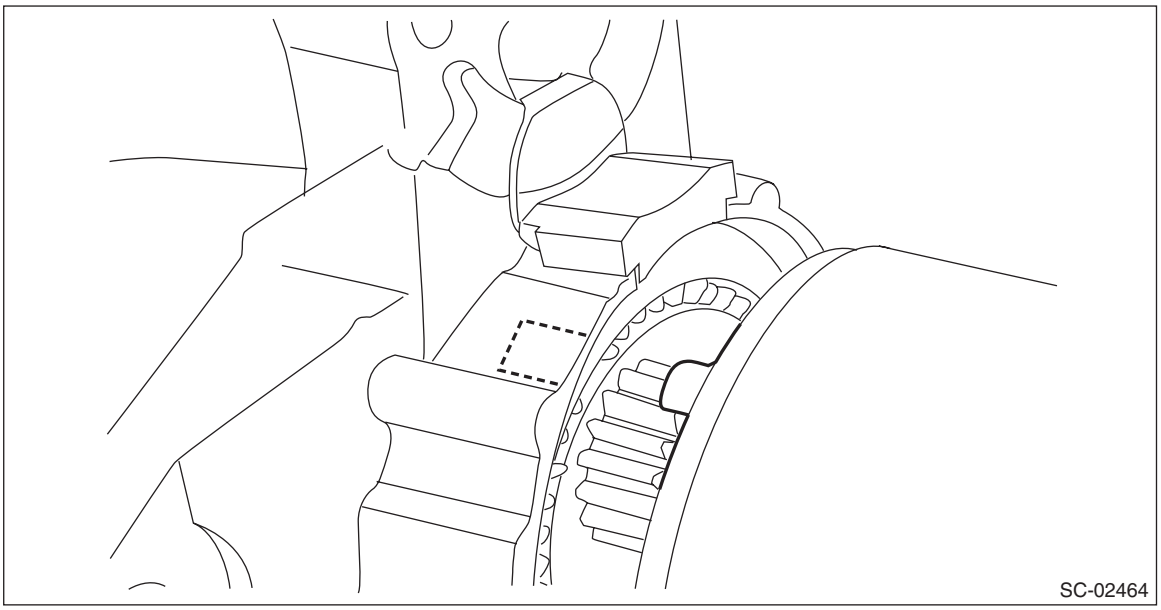


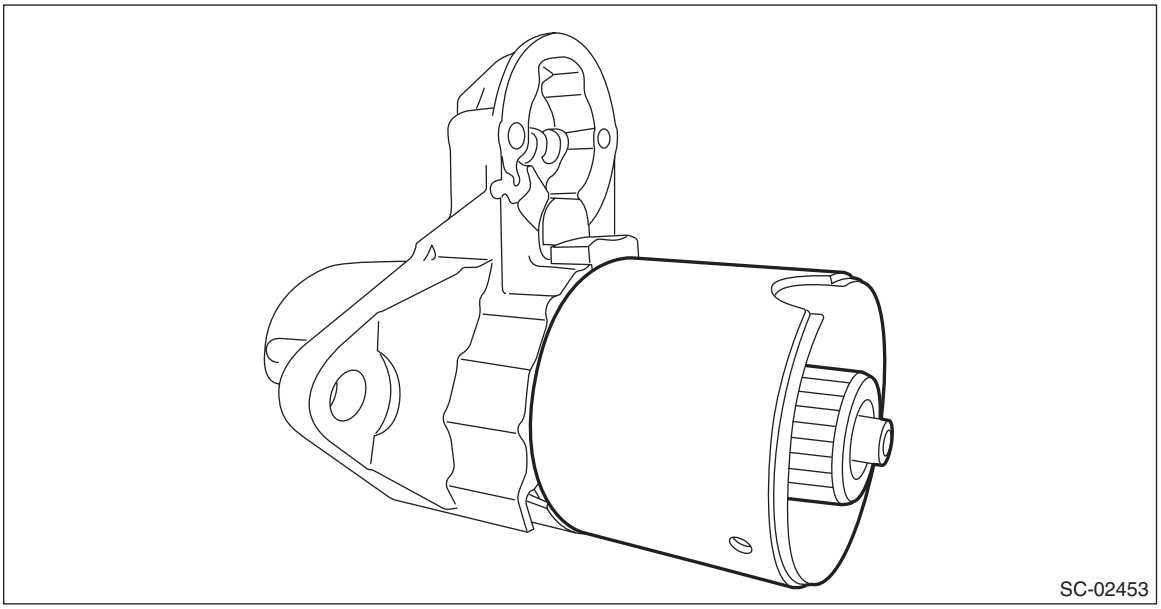
7) Assemble the armature assembly to the yoke assembly.



8) Attach the armature assembly and yoke assembly to the starter housing assembly together as a single unit.

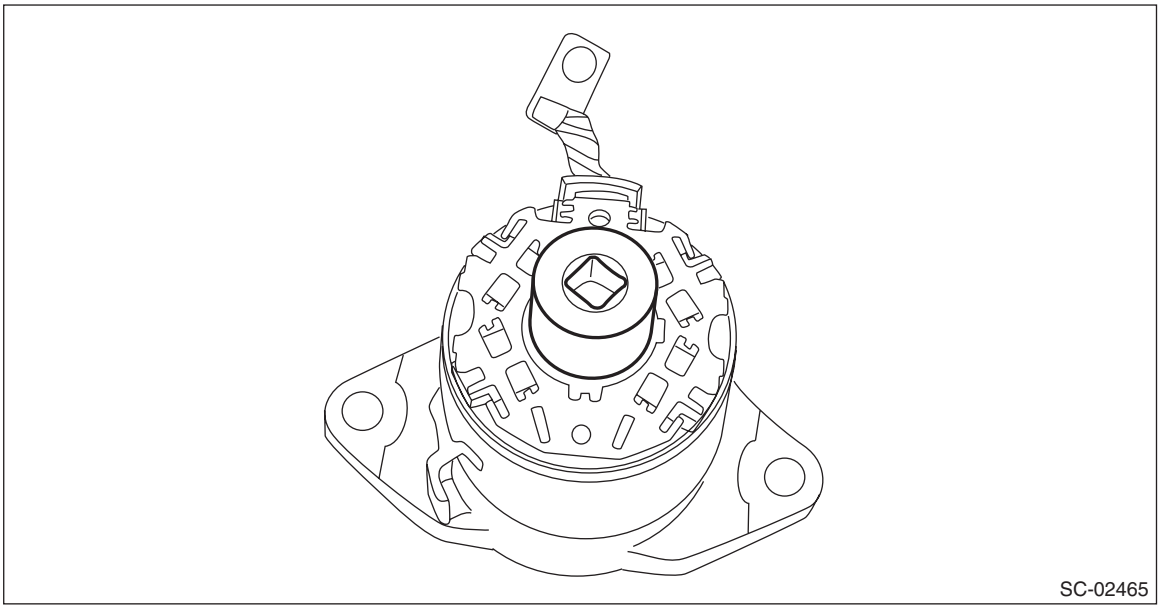
NOTE:
As shown in the figure, match the protrusion of the yoke assembly to the cut out of the starter housing assembly.


SC-02464


SC-02453

9) Use an appropriate tool (such as correctly sized socket wrenches) and attach the brush holder assembly to the armature assembly.

NOTE:
Be careful not to damage the brushes.

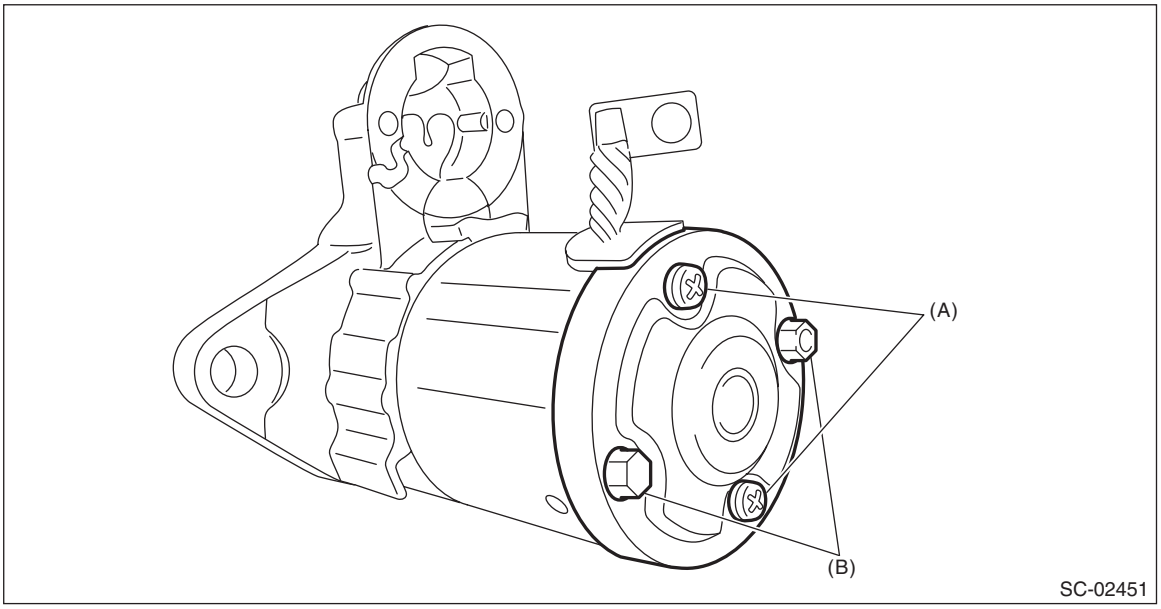


10) Secure starter cover assembly to the brush holder assembly with screws (A).

Tightening torque:
1.4 N·m (0.1 kgf-m, 1.0 ft-lb)

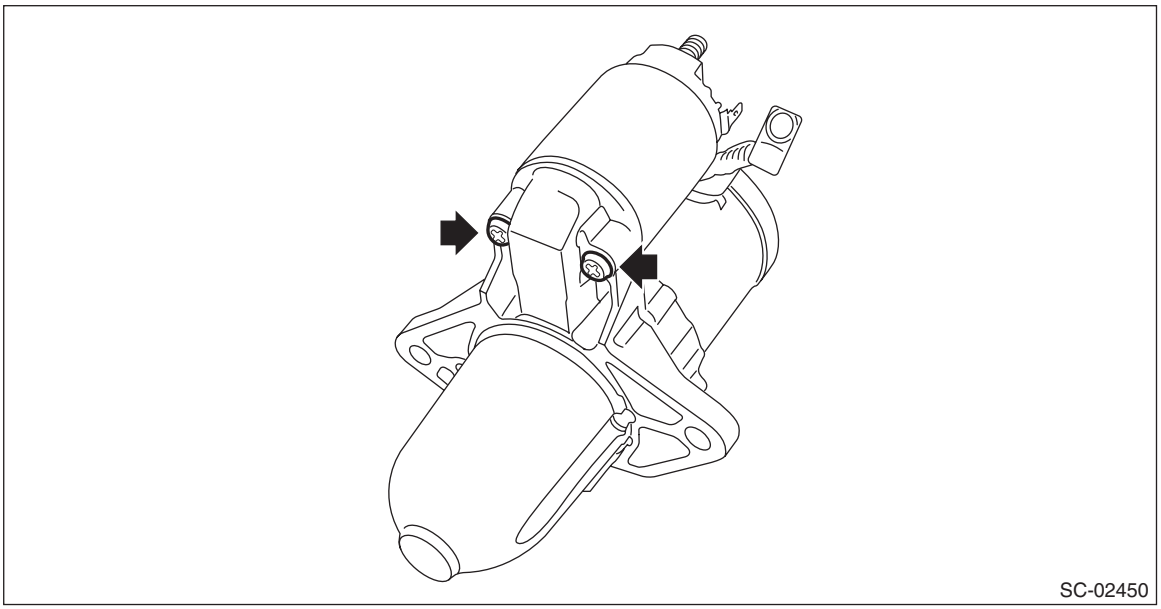
11) Tighten through bolts (B) on both sides.

Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)



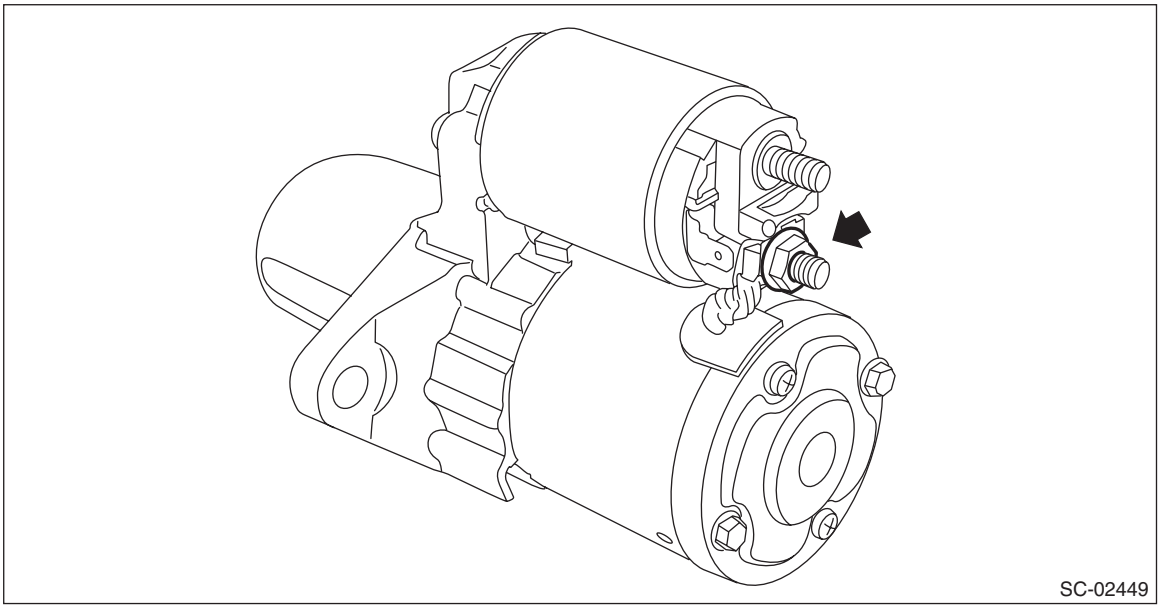
12) Attach the magnet switch assembly to the starter housing assembly.

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



13) Attach the cable to the terminal M of the magnet switch assembly, and secure with nuts.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)

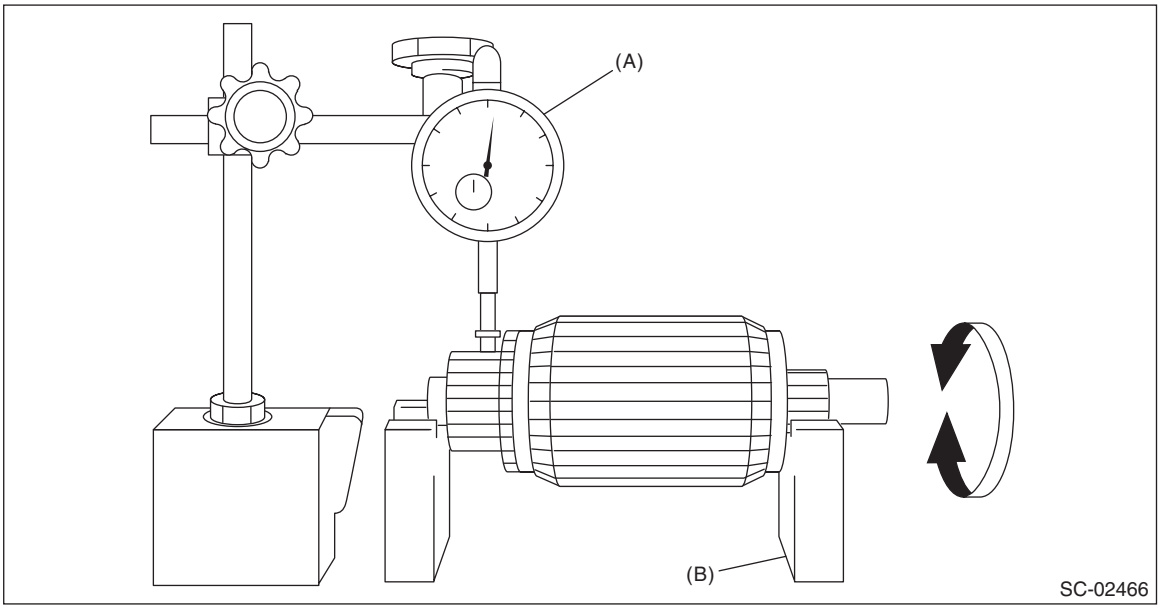


E: INSPECTION

1. ARMATURE

1) Check the commutator for signs of seizure or stepped wear caused by roughness of the surface. If there is light wear, use sandpaper to repair.
2) Check for runout on the commutator. If excessive, replace the armature.

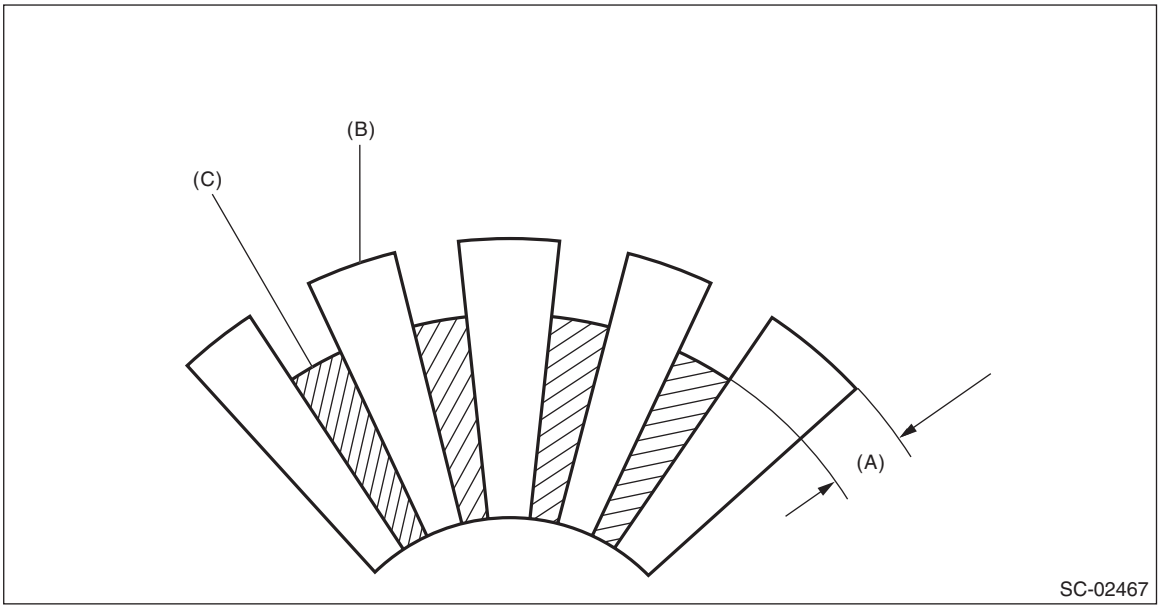
Commutator runout:
Standard
0.05 mm (0.0020 in)
Limit
0.10 mm (0.0039 in)



(A) Dial gauge
(B) V-block

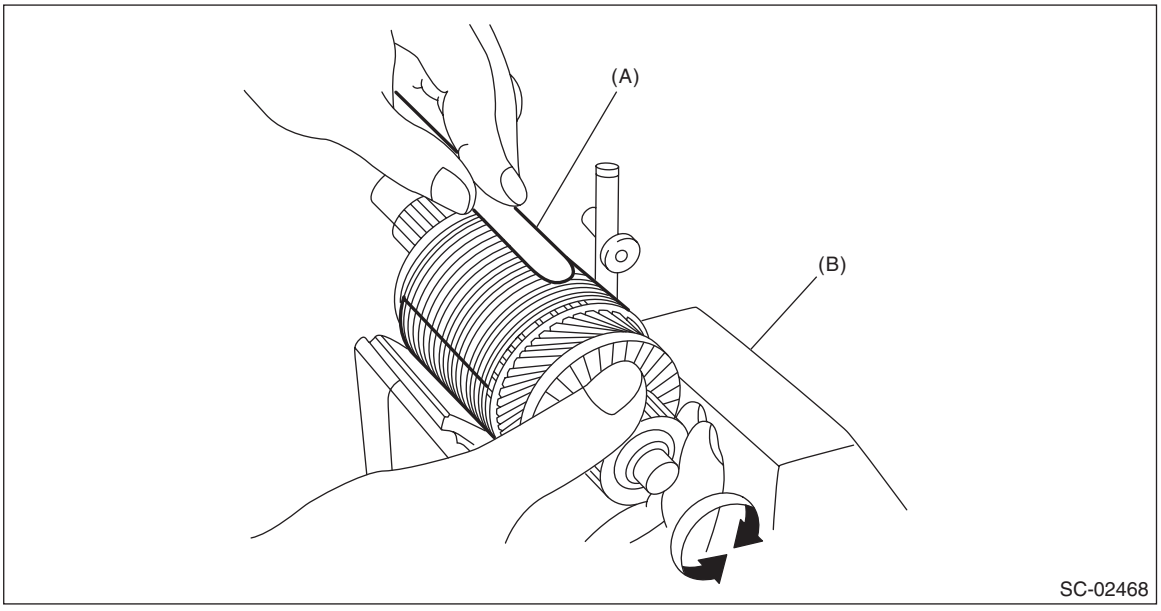
3) Check the depth of the segment mold. If it is not within the standard, replace the armature.

Depth of segment mold:
Standard
0.50 mm (0.020 in)



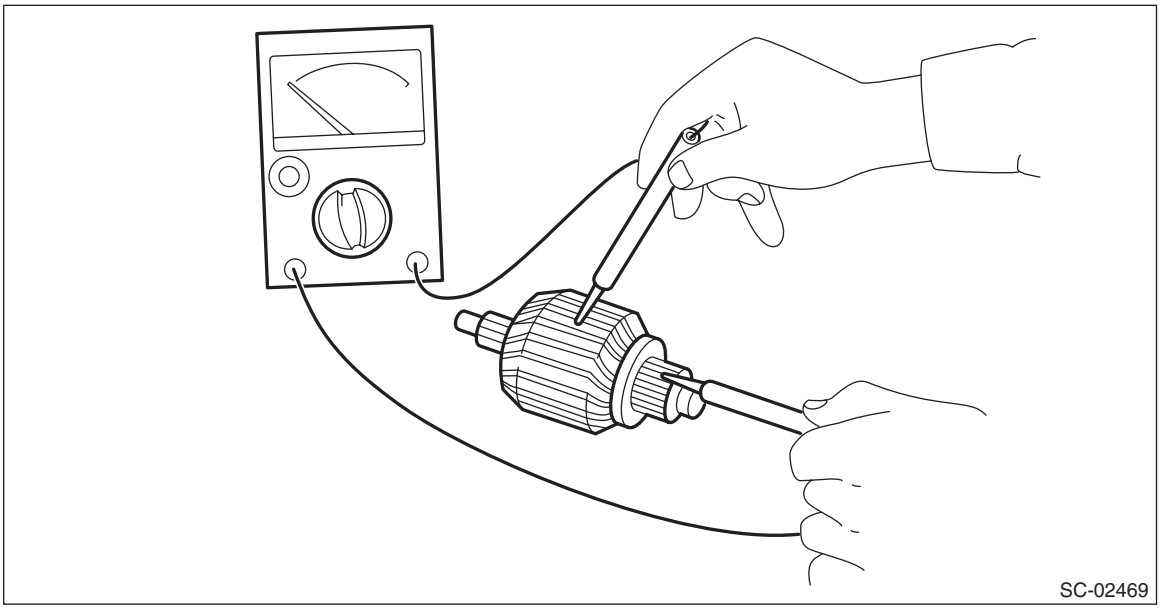
(A) Depth of mold (B) Segment (C) Mold

4) Place the armature on the growler tester to check for short circuits. While slowly turning the armature, support the steel sheet for the armature core. If the circuit of the armature is shorted, the steel sheet will vibrate, causing it to move towards the core. When the steel sheet has moved or vibrated, replace the armature.



(A) Steel sheet (B) Growler tester

5) Use a circuit tester to touch the probe of one side to the commutator segment, and the other probe to the shaft. If there is continuity, replace the armature.



2. YOKE

Make sure that the pole is set at the predetermined position.

3. OVERRUNNING CLUTCH

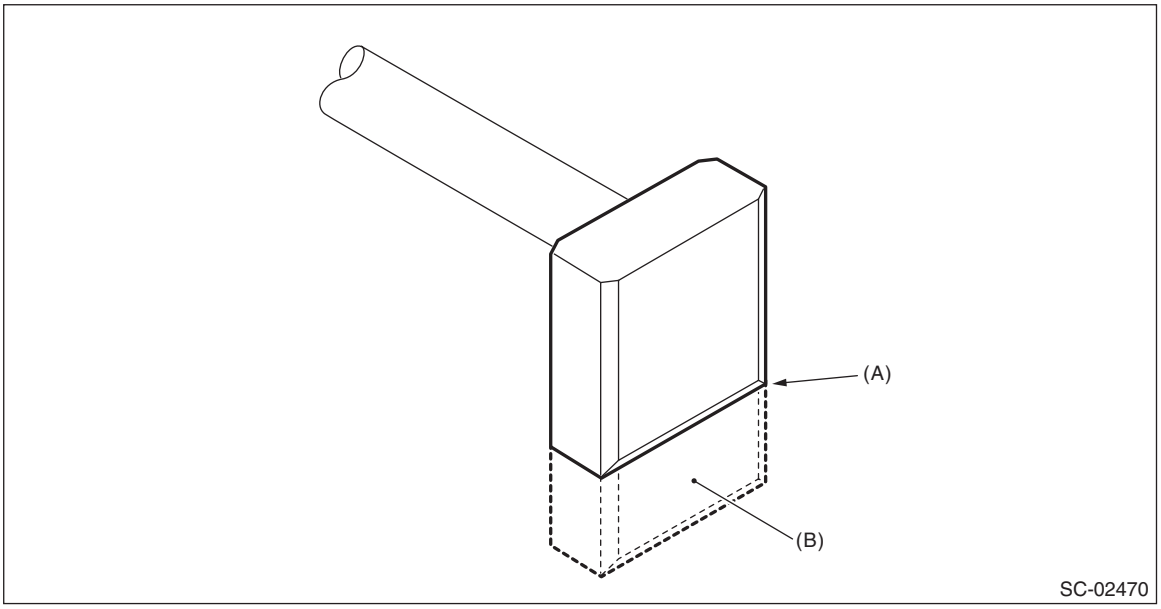
Inspect the pinion, and if there is any wear or damage, replace the overrunning clutch. Also, check that the pinion rotates counterclockwise smoothly and does not rotate clockwise. If there is any fault, replace the overrunning clutch.

CAUTION:
To prevent spilling of grease, do not clean the overrunning clutch with oil.

4. BRUSH AND BRUSH HOLDER

1) Visually check the brush. If there is any abnormal wear or cracks, replace the brush.
2) Measure the length of the brush. If it exceeds service limits, replace the brush.

Brush length:
Standard
12.3 mm (0.484 in)
Limit
7.0 mm (0.276 in)



(A) Service limit line (B) Brush

3) Check that the brush moves smoothly in the brush holder.
4) Measure the brush spring force with a spring scale. Replace the brush holder if below the service limit.

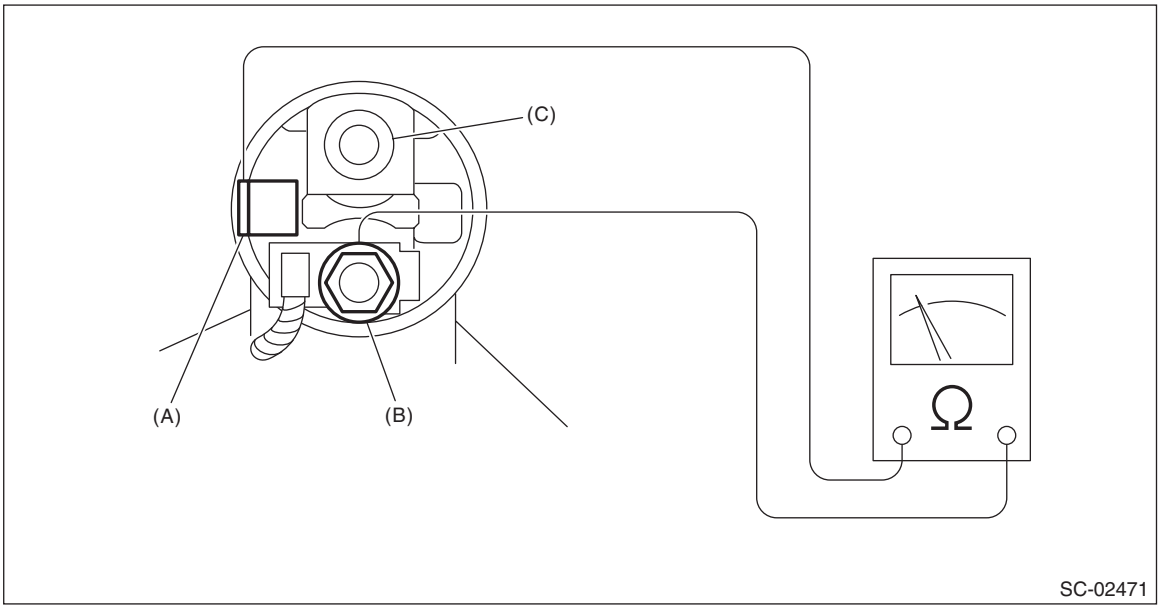
Brush spring force:
Standard
15.9 — 19.5 N (1.62 — 1.99 kgf, 3.57 — 4.38 lbf) (when new)
Limit
2.5 N (0.25 kgf, 0.56 lbf)

5. SWITCH ASSEMBLY

Using a circuit tester (set to “ohm”), check that there is continuity between terminals S and M, and between terminal S and ground. Also check to be sure there is no continuity between terminal M and B.

Resistance between switch assembly terminals:

Terminals	Standard
S — M	1 Ω or less
S — Ground	1 Ω or less
M — B	1 MΩ or more



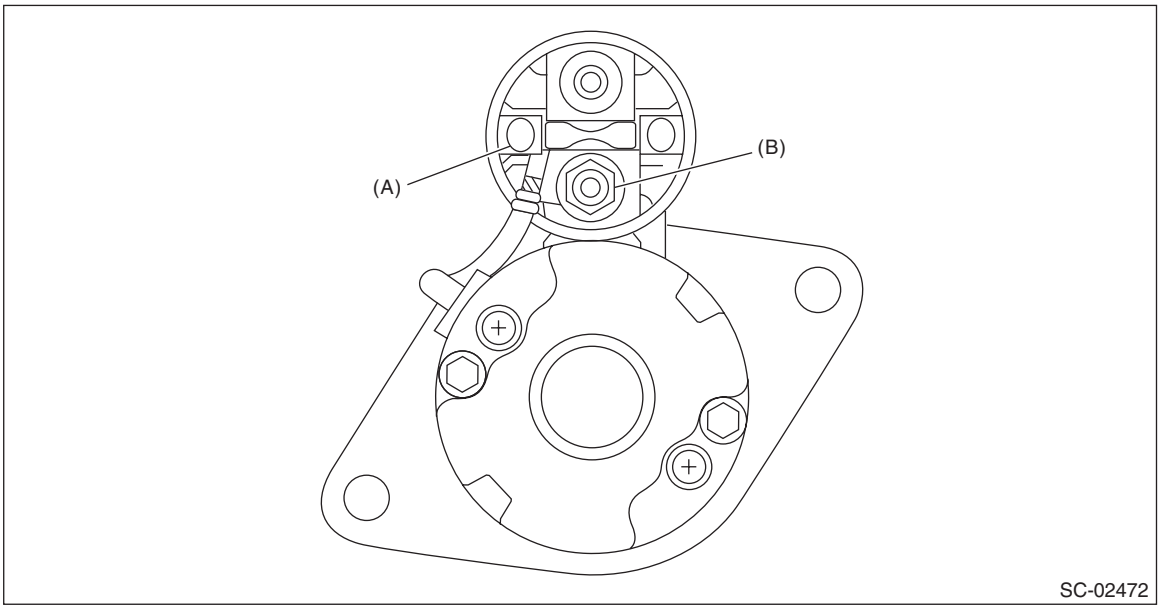
(A) Terminal S (B) Terminal M (C) Terminal B

6. SWITCH ASSEMBLY OPERATION

1) Using a lead wire, connect the switch assembly terminal S to the positive terminal of battery, and the starter body to the ground terminal of battery. The pinion should be forced endwise on shaft.

NOTE:
With the pinion forced endwise on shaft, starter motor can sometimes rotate because current flows, through pull-in coil, to motor. This is not a problem.

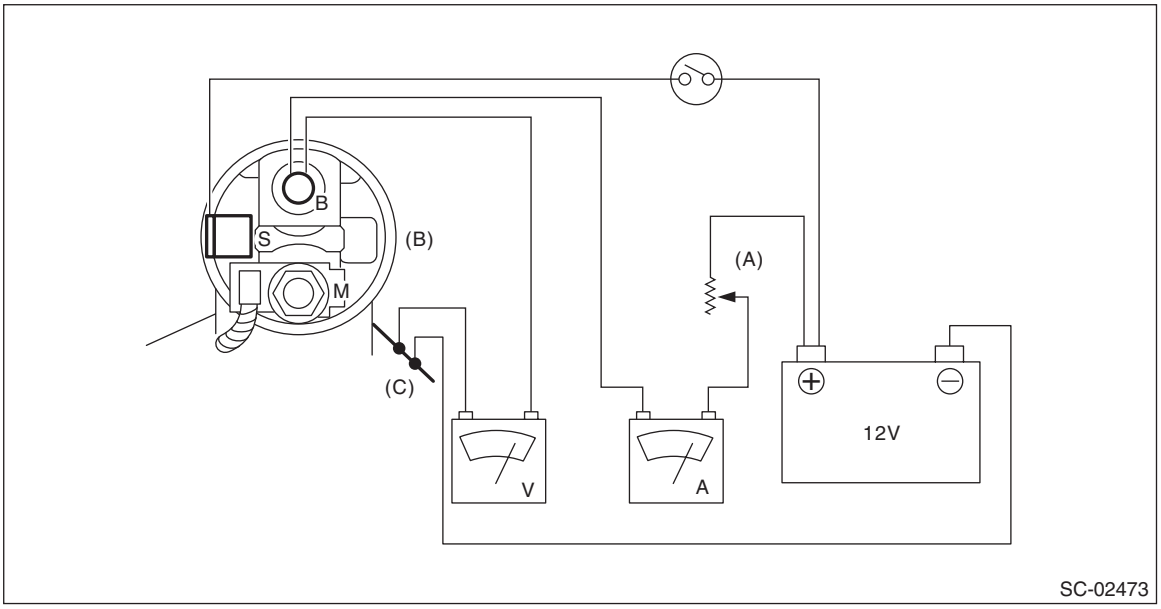
2) Disconnect the connector from terminal M. Then using a lead wire, connect the positive terminal of battery and terminal M, and ground terminal to starter body.
In this test set up, the pinion should return to its original position even when it is pulled out with a screwdriver.



(A) Terminal S (B) Terminal M

7. PERFORMANCE TEST

The starter should be submitted to performance tests whenever it has been overhauled, to assure its satisfactory performance when installed on the engine.
Three performance tests, no-load test, load test, and lock test, are presented here; however, if the load test and lock test cannot be performed, carry out at least the no-load test.
For these performance tests, use the circuit shown in figure.



(A) Variable resistance (B) Magnet switch (C) Starter body

1) Adjust the variable resistance with the switch on until the voltage is 11 V, and read the value displayed by the ammeter to measure starter speed. Compare these values with the standard.

No-load test (standard):

Voltage/Current
Max. 11 V/90 A or less

Rotating speed
2,370 rpm or more

2) Apply the specified braking torque to starter. The condition is normal if the current draw and starter speed are within standard.

Load test (standard):

Voltage/Load
7.5 V/10.65 N·m (1.1 kgf-m, 7.8 ft-lb)

Current/Speed
300 A/840 rpm or more

3) With the starter stalled, or not rotating, measure the torque developed and current draw when the voltage is adjusted to standard voltage.

Lock test (standard):

Voltage/Current
4 V/780 A or less

Torque
20 N·m (2.0 kgf-m, 14.8 ft-lb) or more

8. OTHER INSPECTIONS

Check that the starter does not have deformation, cracks and any other damage.

3. Integrated Starter Generator (ISG)

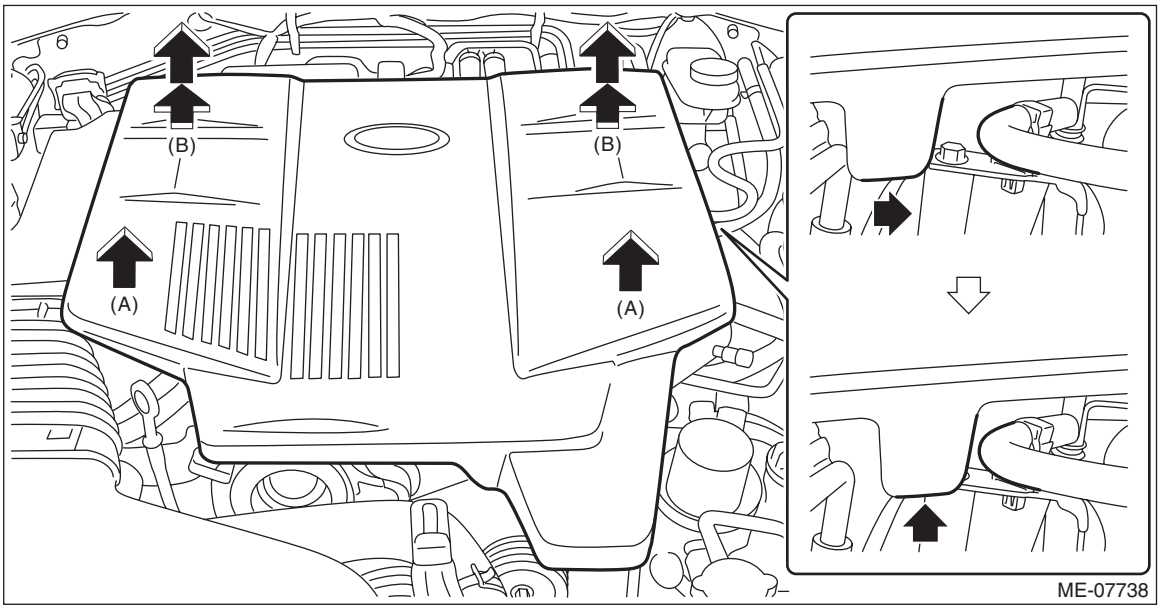
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

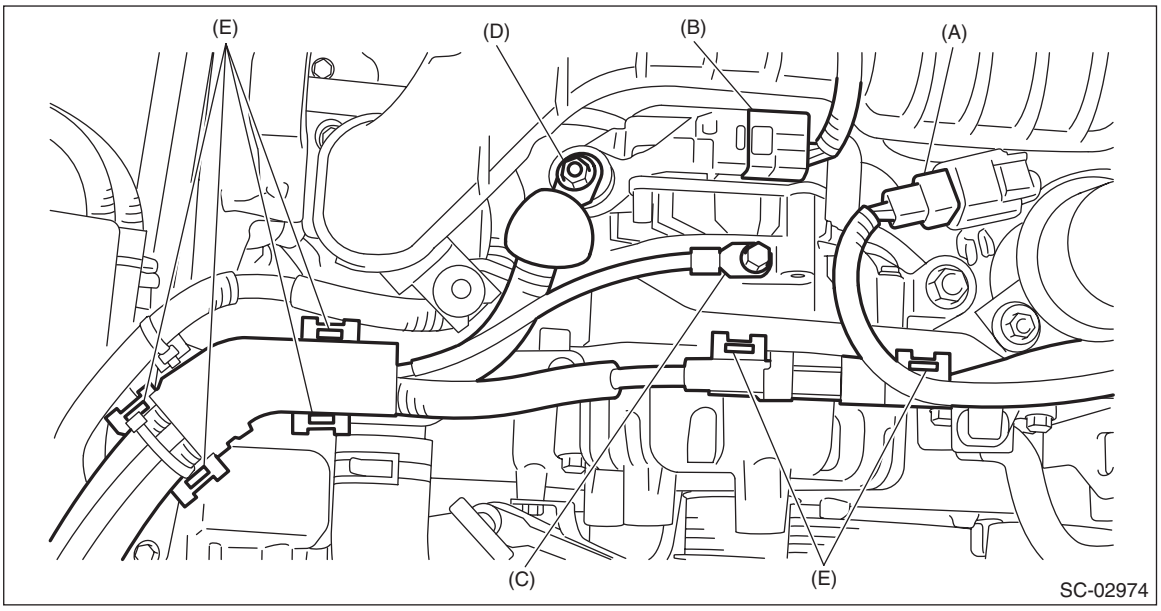
2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.

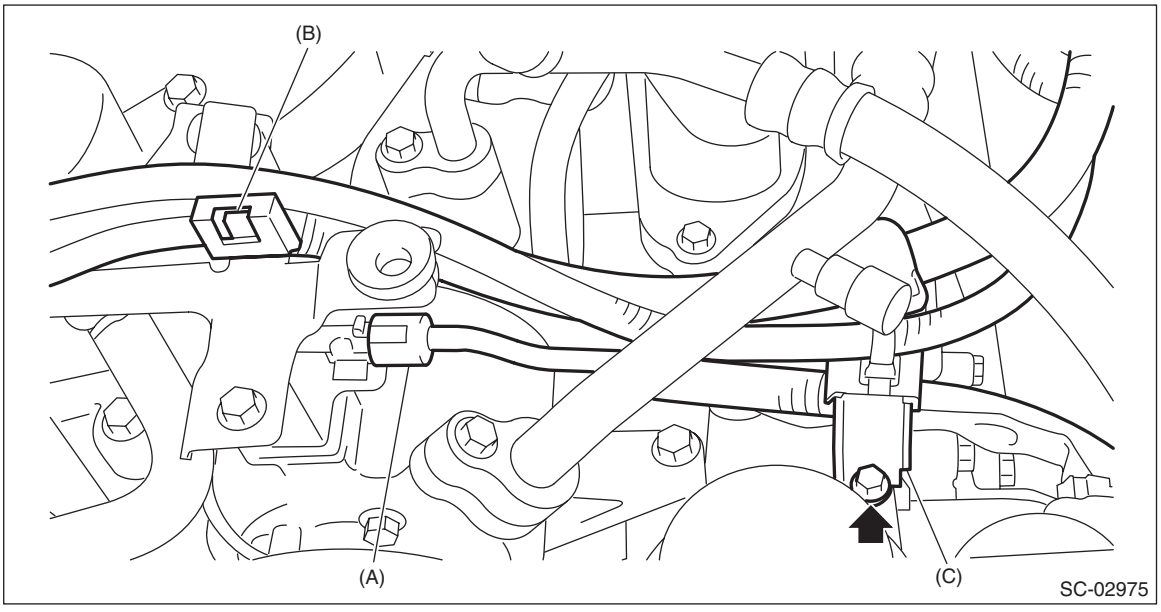


3) Remove the air intake duct. <Ref. to IN(H4DO(HEV))-15, REMOVAL, Air Intake Duct.>
4) Remove the intake duct. <Ref. to IN(H4DO(HEV))-16, REMOVAL, Intake Duct.>
5) Remove the V-belts. <Ref. to ME(H4DO(w/o HEV))-124, HEV MODEL, REMOVAL, V-belt.>

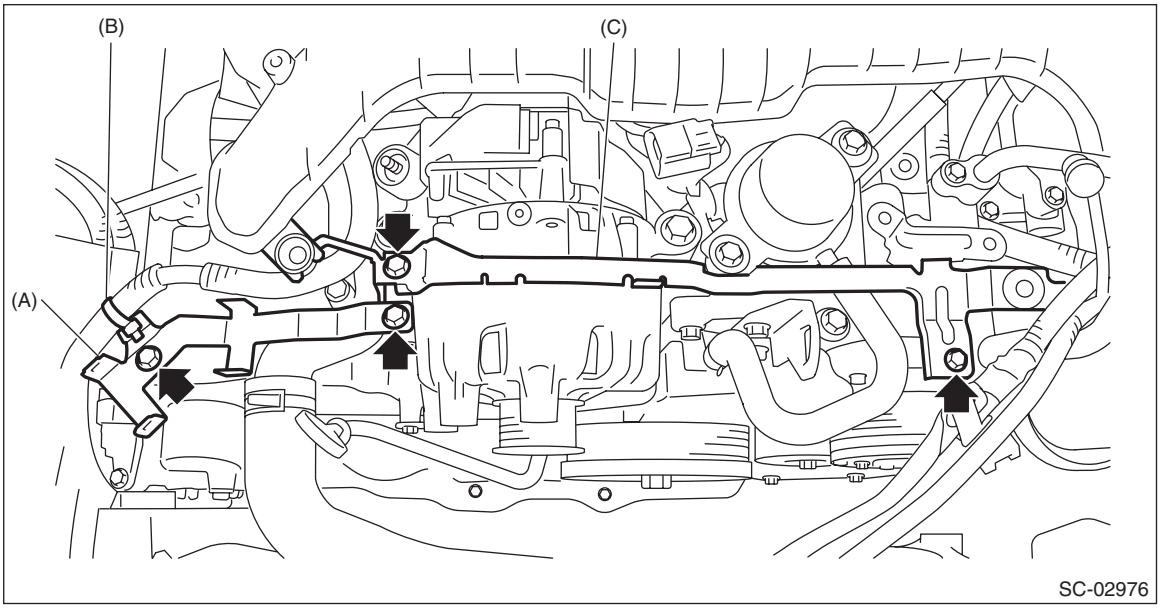
6) Disconnect the connector (A) from the brake vacuum pump, and disconnect the connector (B) from ISG.
7) Disconnect the terminal (C) and the terminal (D) from ISG.
8) Remove the clip (E) securing the battery cable assembly, and remove the battery cable assembly from the battery cable bracket No. 1 and the collector cover bracket.



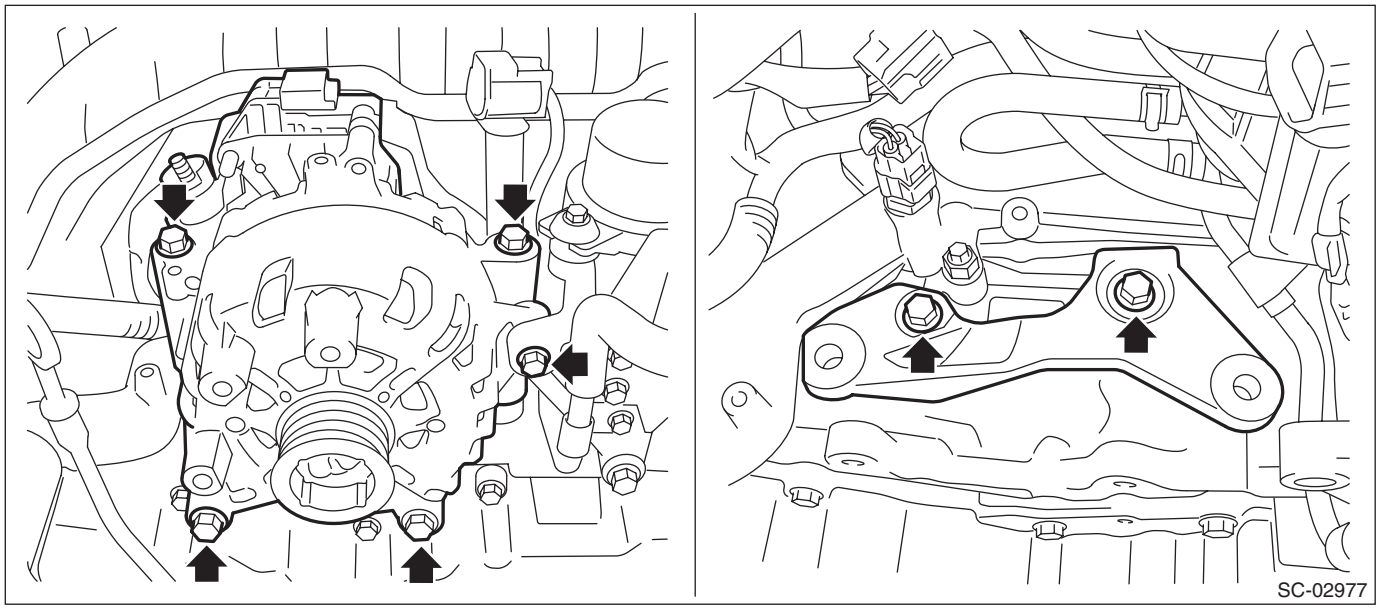
9) Disconnect the connector (A) from the A/C compressor, and remove the clip (B) securing the battery cable assembly to the collector cover bracket.
10) Remove the bolts which secure the battery cable stay (C) to the chain cover, and move the battery cable assembly to the front of the vehicle.



11) Remove the clip (B) which holds the engine harness to the battery cable bracket No. 1 (A).
12) Remove the battery cable bracket No. 1 (A) and collector cover bracket (C).



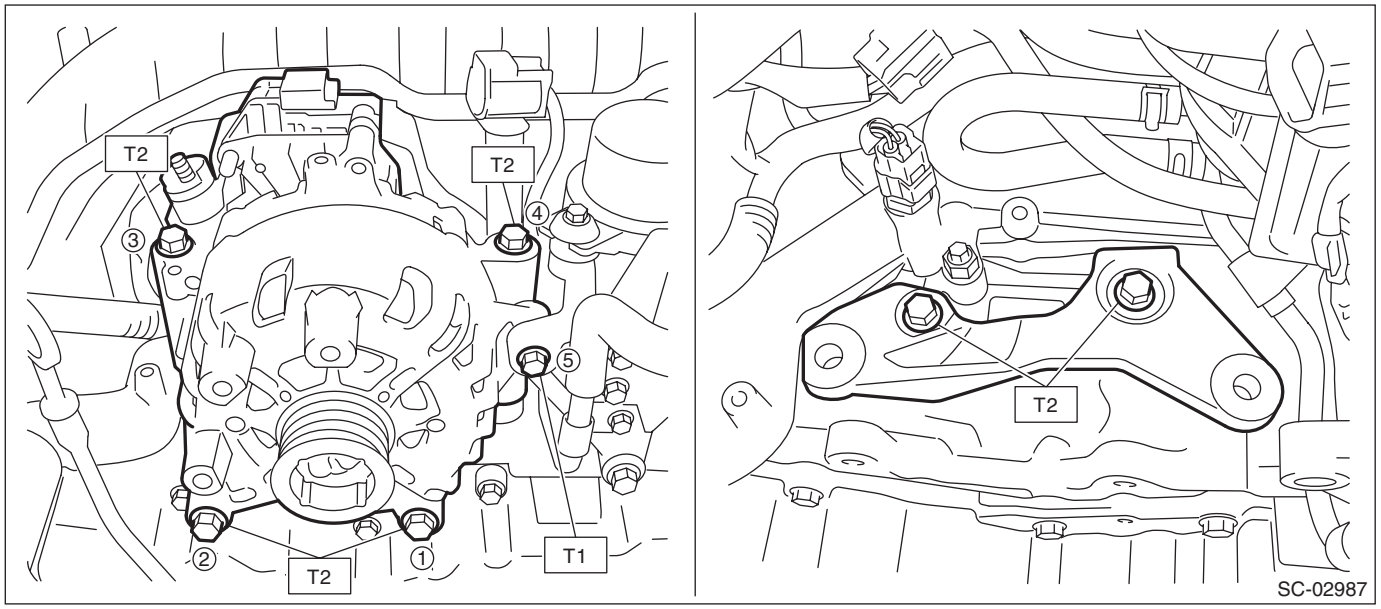
13) Remove ISG from the engine assembly, ISG bracket and brake vacuum pump bracket.
14) Remove the ISG bracket from the engine assembly.



B: INSTALLATION

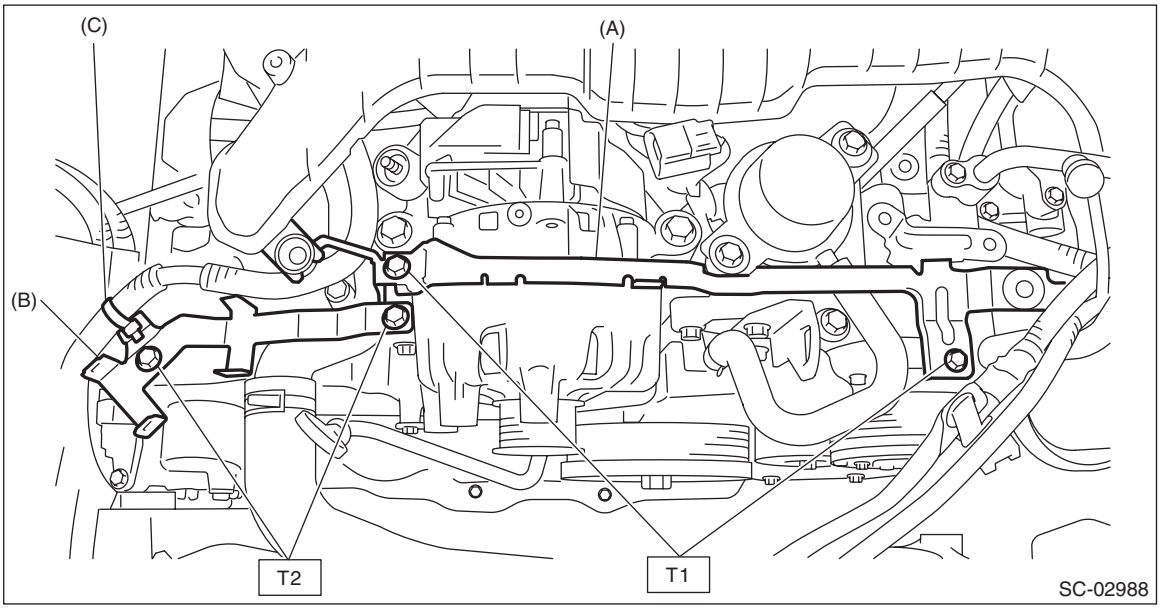
1) Install the ISG bracket to the engine assembly.
2) Set ISG to the engine, ISG bracket and brake vacuum pump bracket, and tighten the bolts in numerical order as shown in the figure.

Tightening torque:
T1: 18 N·m (1.8 kgf-m, 13.3 ft-lb)
T2: 36 N·m (3.7 kgf-m, 26.6 ft-lb)



3) Install the collector cover bracket (A).
4) Install the battery cable bracket No. 1 (B), and secure the engine harness to the battery cable bracket No. 1 (B) with the clip (C).

Tightening torque:
T1: 6.4 N·m (0.7 kgf-m, 4.7 ft-lb)
T2: 19 N·m (1.9 kgf-m, 14.0 ft-lb)

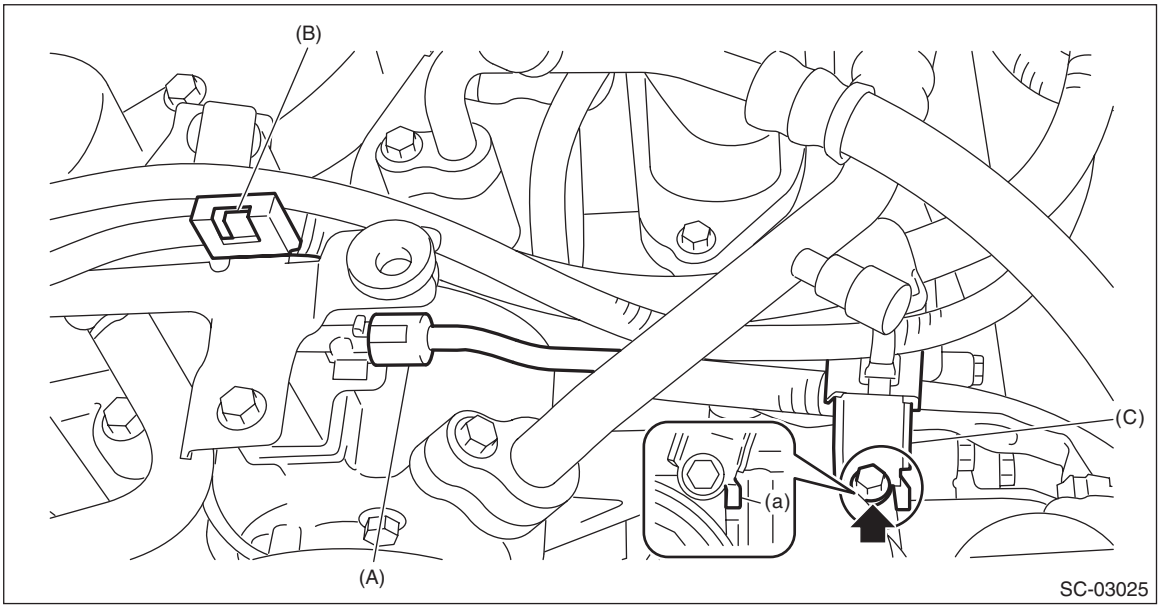


5) Set the battery cable assembly, and install the battery cable stay (C) to the chain cover.

NOTE:
When installing the battery cable stay, install it by fitting the folded end (a) of the battery cable stay to the chain cover boss.

Tightening torque:
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

6) Connect the connector (A) to the A/C compressor, and secure the battery cable assembly to the collector cover bracket with the clip (B).

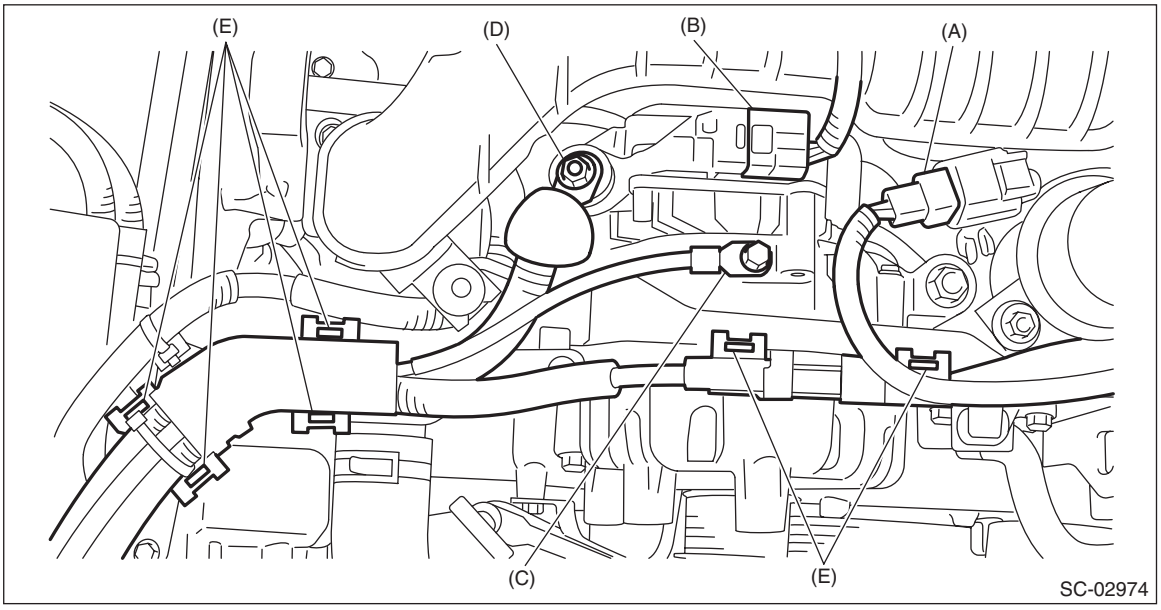


7) Secure the battery cable assembly to the battery cable bracket No. 1 and the collector cover bracket with the clip (E).
8) Connect the connector (B) to ISG, and install the terminal (D) to ISG.

Tightening torque:
15.5 N·m (1.6 kgf-m, 11.4 ft-lb)

9) Install the terminal (C) to ISG, and connect the connector (A) to the brake vacuum pump.

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

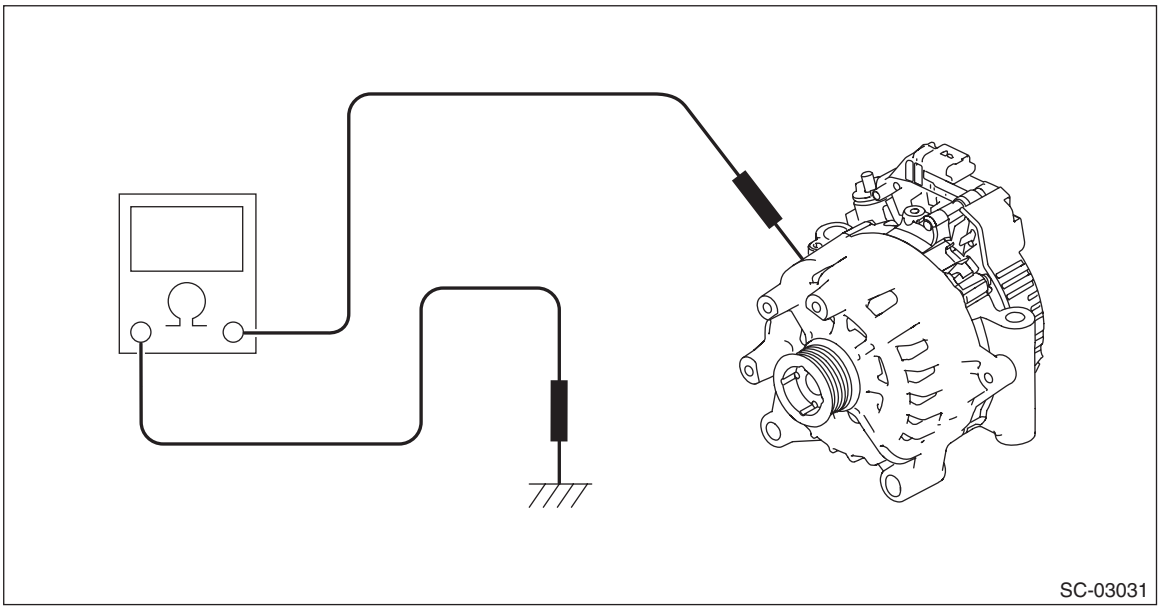


10) Install the V-belts. <Ref. to ME(H4DO(w/o HEV))-134, HEV MODEL, INSTALLATION, V-belt.>
11) Install the intake duct. <Ref. to IN(H4DO(HEV))-17, INSTALLATION, Intake Duct.>
12) Install the air intake duct. <Ref. to IN(H4DO(HEV))-15, INSTALLATION, Air Intake Duct.>
13) Install the collector cover.
14) Connect the battery ground terminal. <Ref. to NT-5, BATTERY, NOTE, Note.>

C: INSPECTION

1. CHECK ISG SENSOR

1) Check ISG for deformation, cracks or damage.
2) Check the ISG ground circuit.
   (1) Check the continuity between the ISG unit and chassis ground.



   (2) If no continuity exists, inspect the ISG installation condition, chassis ground and engine ground conditions, then repair as necessary.

2. CHECK CHARGE WARNING LIGHT

Inspect as follows, if the charge warning light illuminates.

Step		Check	Yes	No
1	**CHECK DTC.**	Is DTC of HEV and IDI displayed? <Ref. to HEV(diag)-24, Read Diagnostic Trouble Code (DTC).> <Ref. to IDI(diag)-15, Read Diagnostic Trouble Code (DTC).>	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to HEV(diag)-74, List of Diagnostic Trouble Code (DTC).> <Ref. to IDI(diag)-27, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK ISG SENSOR.** 1) Turn the ignition switch to OFF and wait for 20 minutes. 2) Start the engine. 3) Check the warning light in the combination meter.	Does the warning light illuminate?	Go to step **3**.	Temporary overheat occurs in ISG. Currently returned to normal.
3	**CHECK COMBINATION METER.** 1) Check the combination meter. <Ref. to IDI(diag)-21, OPERATION, System Operation Check Mode.>	Is combination meter OK?	Replace ISG. <Ref. to SC(H4DO(HEV))-32, REMOVAL, Integrated Starter Generator (ISG).>	Repair or replace the combination meter. <Ref. to IDI-12, INSPECTION, Combination Meter System.>

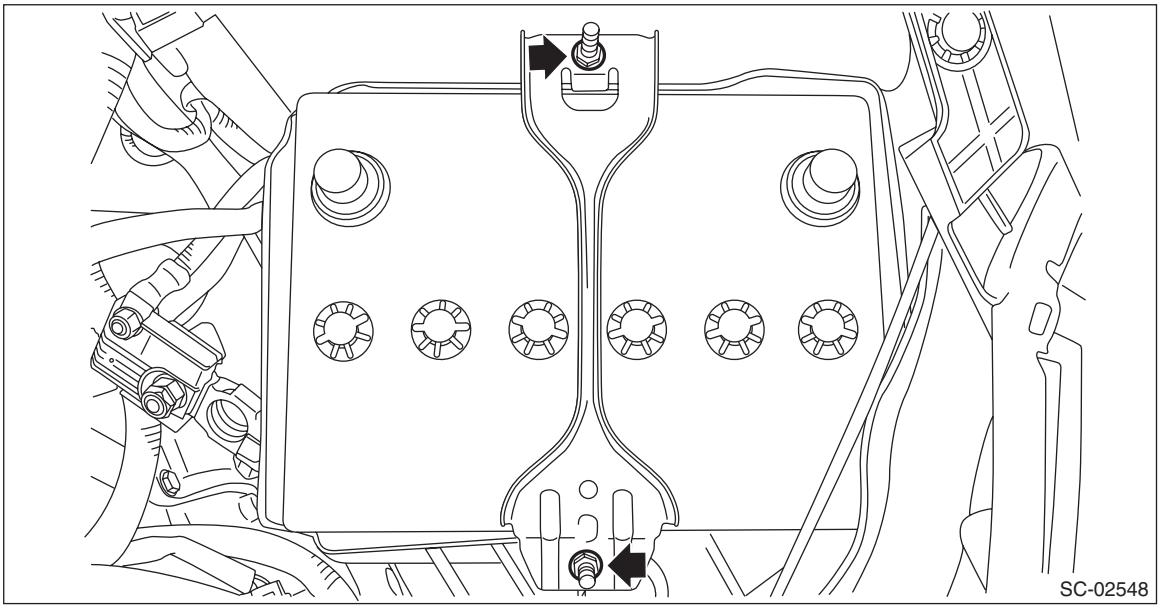
4. Battery

A: REMOVAL

1. 12 VOLT AUXILIARY BATTERY

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Disconnect the terminal boot from the battery positive terminal, and disconnect the positive terminal.
3) Remove the battery cable holder from the battery rod.
4) Remove the flange nut from battery rod and remove battery holder.



5) Remove the battery.

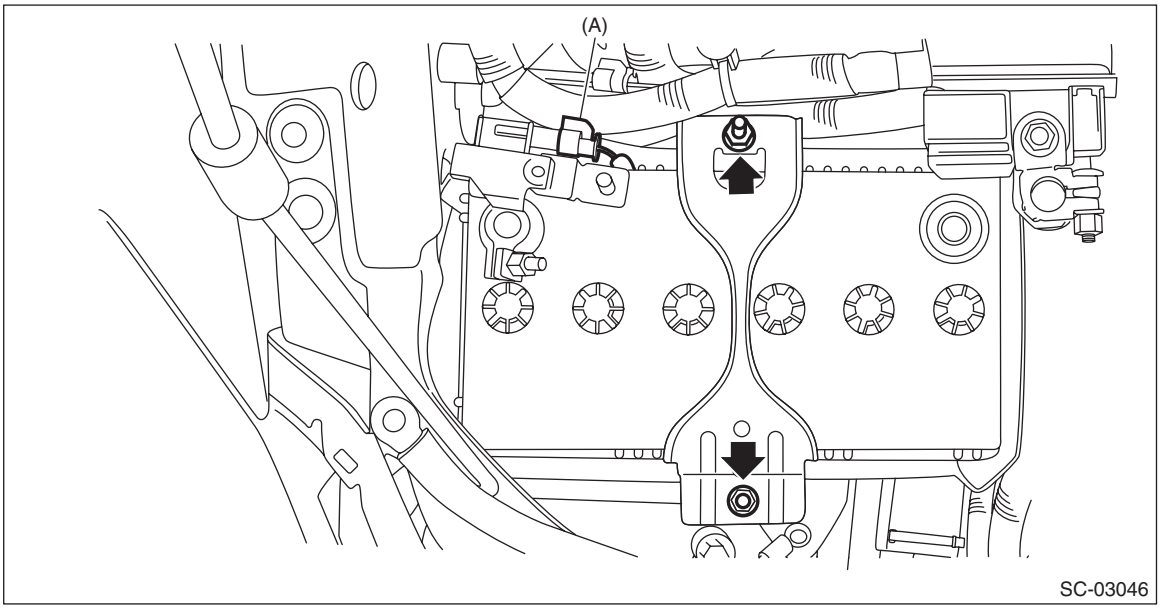
2. 12 VOLT ENGINE RESTART BATTERY

CAUTION:
Do not detach the 12V engine restart battery sensor from the 12 volt engine restart battery except when replacing the 12 volt engine restart battery.

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Disconnect the positive (+) terminal after disconnecting the negative (–) terminal of battery.
3) Remove the battery cable holder from the battery rod.
4) Disconnect the connector (A) from the 12V engine restart battery sensor.
5) Remove the flange nut from battery rod and remove battery holder.



6) Remove the battery.

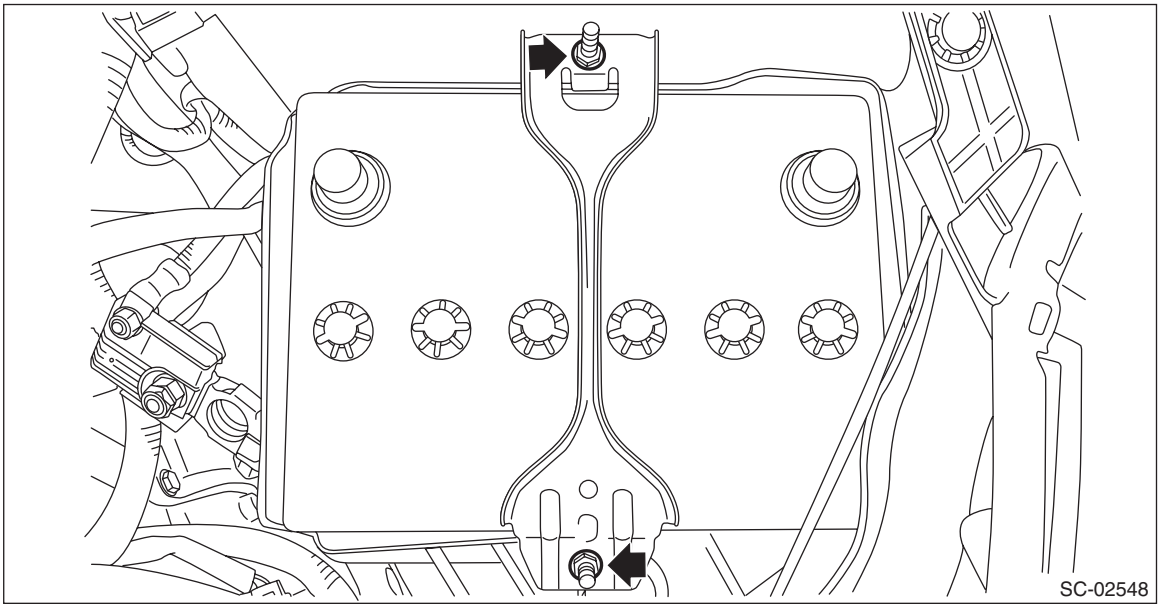
B: INSTALLATION

1. 12 VOLT AUXILIARY BATTERY

CAUTION:
• When installing the 12 volt auxiliary battery, wait at least one minute after removing the 12 volt auxiliary battery.
• Be careful not to contact the cable with the battery terminal during work because the power supply switches ON/OFF in a short time. Besides, in case trouble occurs in the vehicle during work, remove the 12 volt auxiliary battery again, and wait for one minute or more to install the 12 volt auxiliary battery. After that make sure there is no trouble anymore.
• After connecting the ground terminal to the battery, the following operations are automatically performed in the vehicle. Therefore, before starting the engine, place the select lever in the "P" position and wait for 10 seconds or more after turning the ignition switch to ON with the brake pedal released.
– Initial diagnosis of electronic throttle control
– Learning control of brake pedal stroke sensor

1) Install the battery.
2) Set the battery holder and install the flange nut to the battery rod.

Tightening torque:
3.5 N·m (0.4 kgf-m, 2.6 ft-lb)



3) Install the battery cable holder to the battery rod.
4) Connect the positive terminal to the battery and install the terminal boot.

NOTE:
Clean the battery cable terminals and apply grease to prevent corrosion as necessary.
5) Connect the ground cable to battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For 12 volt engine restart battery, connect the ground terminal to the 12V engine restart battery sensor.

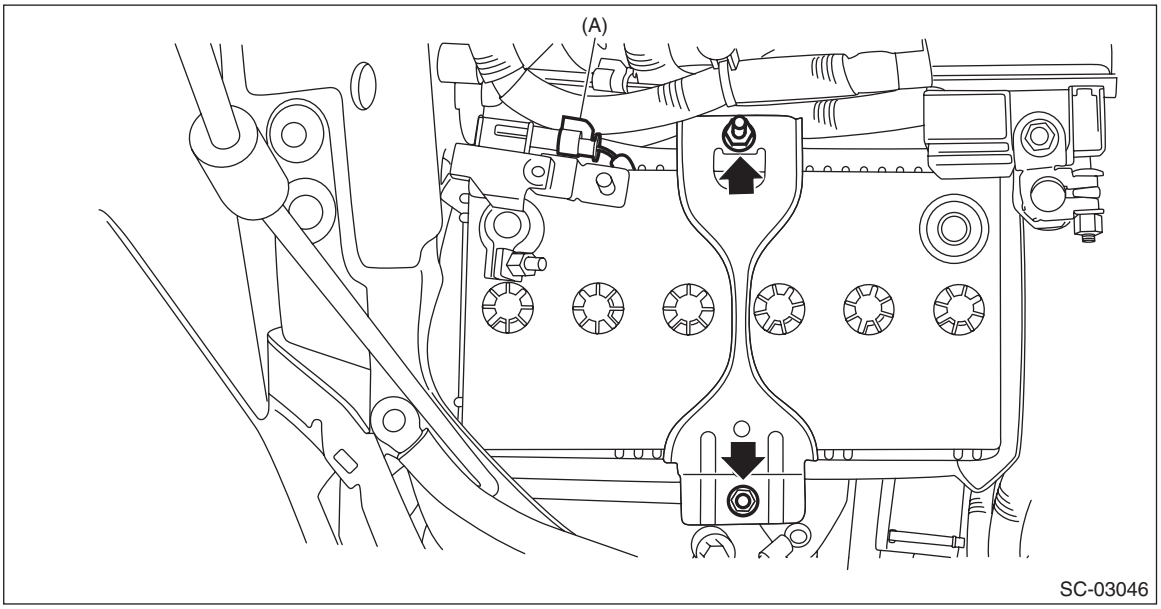
2. 12 VOLT ENGINE RESTART BATTERY

CAUTION:
• Do not detach the 12V engine restart battery sensor from the 12 volt engine restart battery except when replacing the 12 volt engine restart battery.
• After connecting the ground terminal to the battery, the following operations are automatically performed in the vehicle. Therefore, before starting the engine, place the select lever in the "P" position and wait for 10 seconds or more after turning the ignition switch to ON with the brake pedal released.
– Initial diagnosis of electronic throttle control
– Learning control of brake pedal stroke sensor

1) Install the battery.
2) Set the battery holder and install the flange nut to the battery rod.

Tightening torque:
3.5 N·m (0.4 kgf-m, 2.6 ft-lb)

3) Connect the connector (A) to 12V engine restart battery sensor.



4) Install the battery cable holder to the battery rod.
5) Connect the positive terminal and then connect the negative terminal to the battery.

NOTE:
Clean the battery cable terminals and apply grease to prevent corrosion as necessary.

6) Connect the ground cable to battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For 12 volt engine restart battery, connect the ground terminal to the 12V engine restart battery sensor.

C: DISASSEMBLY

Remove the 12V engine restart battery sensor. <Ref. to SC(H4DO(HEV))-60, REMOVAL, Battery Sensor.>

D: ASSEMBLY

Install the 12V engine restart battery sensor. <Ref. to SC(H4DO(HEV))-61, INSTALLATION, Battery Sensor.>

E: INSPECTION

WARNING:
- **As batteries produce flammable gases, be careful not to bring an open flame close to the batteries.**
- **Ventilate sufficiently when using or charging battery in enclosed space.**
- **Electrolyte is corrosive acid, and has toxicity; be careful of handling the fluid.**
- **For safety, in case an explosion does occur, wear eye protection or shield your eyes when working near any battery. In addition, never lean over the battery.**
- **Be careful that the electrode does not come into contact with skin, eyes or clothing. Especially at contact with eyes, flush with water for 15 minutes and get prompt medical attention.**
- **Be careful not to let the electrode contact with the coated parts.**
- **Before starting work, remove rings, metal watch-bands, and other metal jewelry.**
- **Be careful not to let the metal tools contact the positive battery terminal and anything connected to it. When the operation using a metal tool to the positive terminal or anything connected to it is required, disconnect the battery ground terminal before starting the operation.**

1. APPEARANCE

Check the battery case, top cover and terminal post for contamination or cracks and perform the following procedures as necessary.
- Clean the battery with water and wipe with a dry cloth.
- Apply a light coat of grease to the terminal post to prevent corrosion.

Check

- ***Normal → Go to the check item 2.***
- ***Abnormal → Replace the battery.***

2. ELECTROLYTE LEVEL

Check the electrolyte level in each cell.

CAUTION:
Do not fill beyond MAX level.

NOTE:
If the level is below the middle point between MIN level and MAX level, pour distilled water into the battery cell to bring the level to MAX.

Check

- ***MAX level → Go to the check item 3.***
- ***Below the middle point between MIN level and MAX level → Fill → Go to the check item 3.***

3. SPECIFIC GRAVITY OF ELECTROLYTE

Check the specific gravity of the electrolyte using a hydrometer and a thermometer.

NOTE:
- Specific gravity varies with temperature of electrolyte so that it must be corrected at 20°C (68°F) using the following calculation:

$$S_{20} = St + 0.0007 \times (t - 20)$$

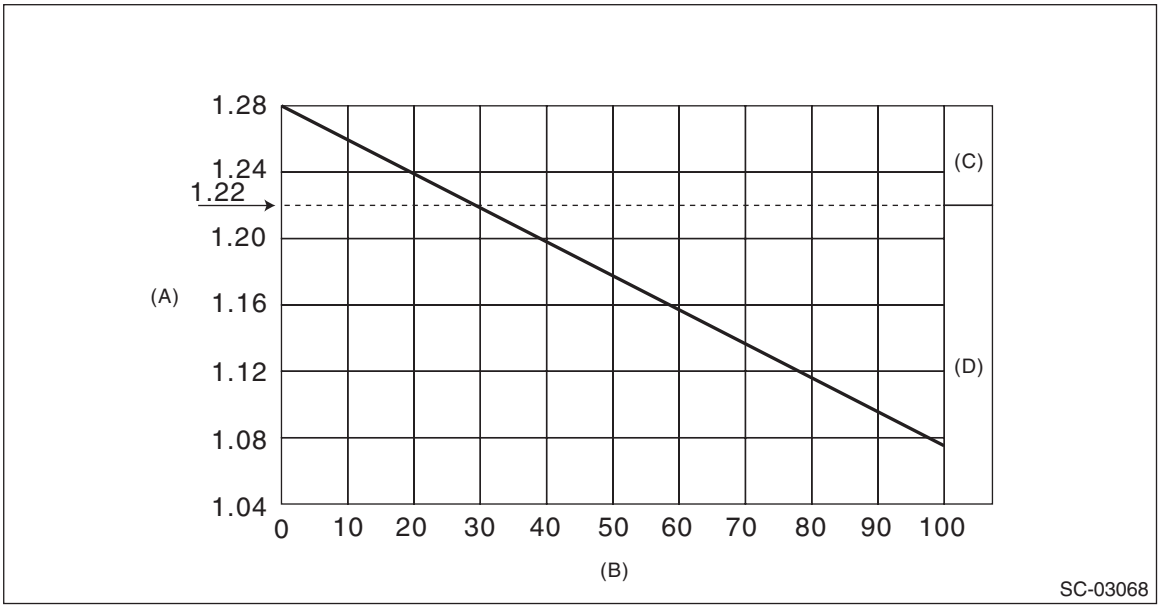
S_{20}: Specific gravity corrected at electrolyte temperature of 20°C
St: Measured specific gravity
t: Measured temperature (°C)

- When measuring in a simplified manner using the battery terminal voltage, calculate the specific gravity by the following formula.

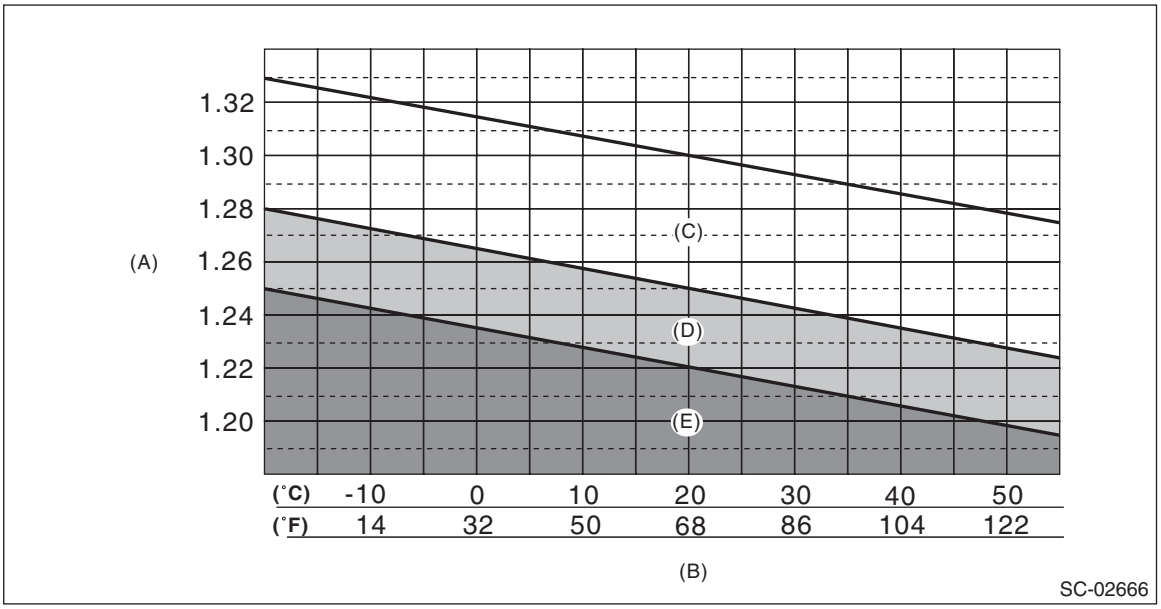
Specific gravity = [0.187 × battery terminal voltage (V)] – 1.1

Perform the steps 1) and 2) before measuring the voltage in order to stabilize the voltage.
1) Turn the ignition switch to OFF and illuminate the headlight for 30 seconds.

2) After turning off the headlight, leave the vehicle for one minute.
• Measuring the specific gravity of the electrolyte in the battery will disclose the state of charge of the battery. The relation between specific gravity and state of charge is as shown in the figure.



(A) Specific gravity [20°C (68°F)] (B) Amount of discharge (%) (C) Good
(D) Need to charge or replace



(A) Specific gravity [20°C (68°F)] (B) Electrolyte temperature (C) Good
(D) Caution (E) Need charging

Check

- ***Specific gravity: 1.250 — 1.290, and difference between cells is 0.04 or less → Battery is normal***
- ***Specific gravity: Less than 1.250, or difference between cells is 0.04 or more → Battery needs to be charged or replaced***

4. STANDBY CURRENT

1) Prepare the circuit tester which can measure down to 1 mA.

NOTE:
For models with keyless access function, the standby current changes regularly. Therefore, prepare an analog type circuit tester.

2) Using the circuit tester, check the standby current.
   (1) Check the battery. <Ref. to SC(H4DO(HEV))-43, APPEARANCE, INSPECTION, Battery.> <Ref. to SC(H4DO(HEV))-43, ELECTROLYTE LEVEL, INSPECTION, Battery.> <Ref. to SC(H4DO(HEV))-43, SPECIFIC GRAVITY OF ELECTROLYTE, INSPECTION, Battery.>

NOTE:
The standby current may be displayed lower than the actual value if the battery is weak, so be sure to check the battery. Charge or replace if necessary.

   (2) Check that the fuse is not blown out and is properly inserted.
   (3) When non-genuine electrical parts (including parts sold in authorized workshops) are installed, remove all parts except for genuine electrical parts.
   (4) Check that back-up fuse is inserted. <Ref. to PI-4, FUSE INSTALLATION, PRE-DELIVERY INSPECTION (PDI) PROCEDURE, Pre-delivery Inspection.>
   (5) Start the engine, and set the switch positions for each system as shown in the following table.

NOTE:
Some of the listed systems are not equipped depending on the vehicle. Set only the systems equipped on the vehicle to the positions as shown.

System	Position
Headlight	ON or Auto
Fog light	ON
Wiper (front and rear)	ON or Low speed
Audio and navigation system	ON
Rear defogger	ON
Room light	DOOR
Luggage light	DOOR
Map light	OFF
Auto A/C	ON (AUTO)
Manual A/C	ON (Speed 1)
Electronic parking brake	ON
Electrical parts other than listed above (electrical parts that users can confirm the operation with the key removed)	OFF

   (6) Turn the ignition switch to OFF.
   (7) Operate the front hood lock release lever to unlock the front hood.

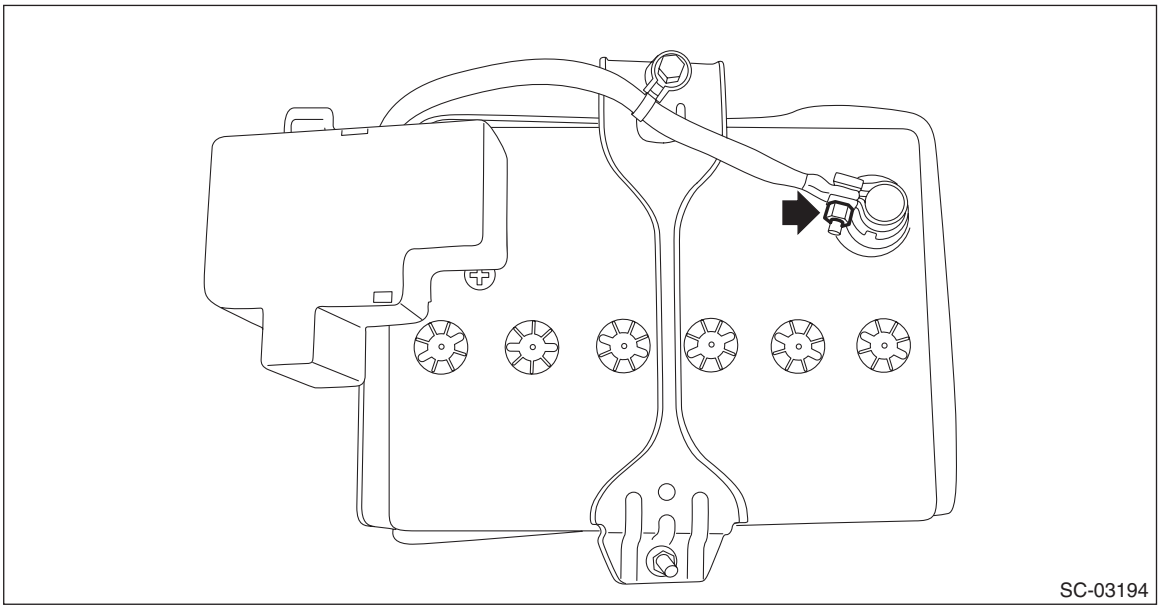
(8) Close all the doors (including rear gate and trunk lid) and then lock the doors. (Security alarm is in set condition)

NOTE:
For models with keyless access function, take the access key 1.5 m or more away from the vehicle after the door lock. And do not put the access key close to the vehicle while measuring the standby current.

(9) Wait for 5 minutes after door lock until the standby current stabilizes.

(10) Loosen the nut which holds the ground terminal to the battery.

NOTE:
Do not remove the ground terminal.

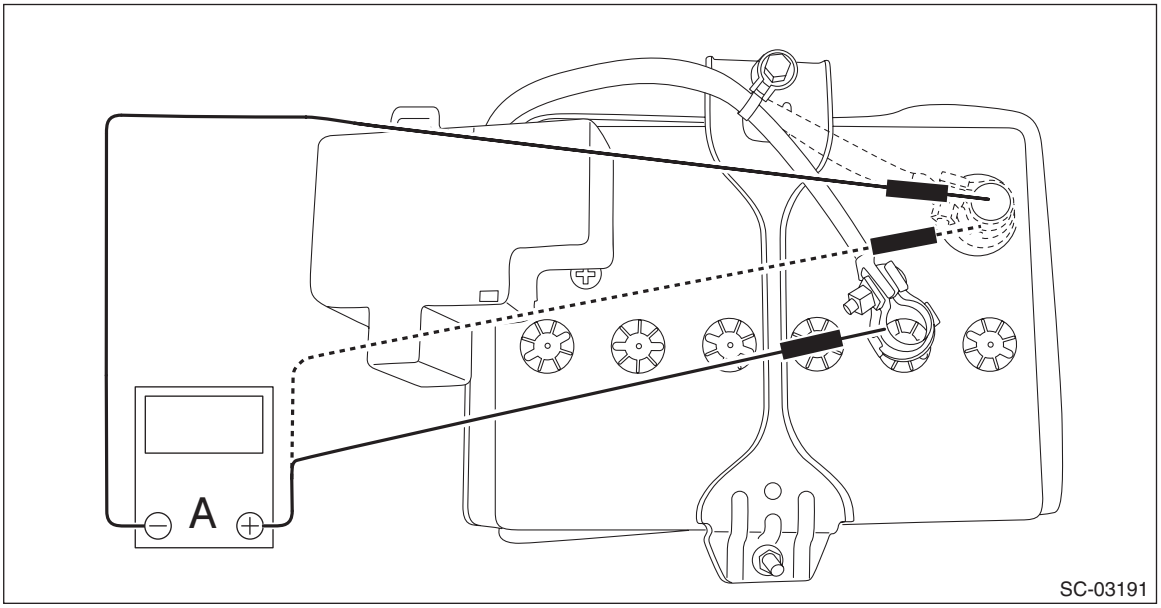


(11) Connect the circuit tester positive terminal to the ground terminal.

NOTE:
To prevent the damage to the circuit tester, set the circuit tester range to a large value first, then gradually change it to smaller values.

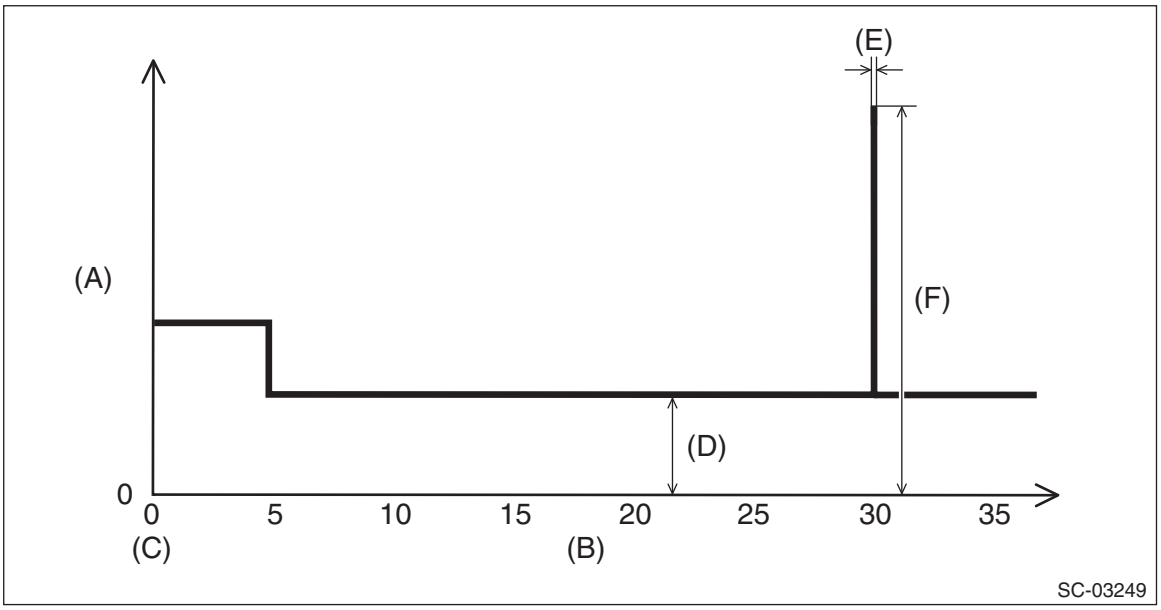
(12) Connect the circuit tester negative terminal to the ground terminal installation part of the battery.

(13) While connecting the circuit tester positive terminal with the ground terminal as shown in the figure below, remove the ground terminal from the battery.



(14) Check the standby current.

NOTE:
• For models with keyless access function, the standby current changes periodically because the keyless access system continuously searches the access key (polling).
• When measuring the standby current, the reading of the circuit tester oscillates. Therefore, read the average value (median value).
• As shown in the figure below, the standby current may become large when the vehicle system is activated 5 times at 30-minute intervals or 5 hours after turning the ignition switch to OFF. Therefore, the measurement should be completed in 20 minutes. If it takes more than 20 minutes, start the engine once, stop the engine, then perform the inspection.



(A)	Current/mA	(B)	Time/minute	(C)	Ignition OFF
(D)	Less than 70 mA	(E)	5 seconds (system operation)	(F)	300 mA or more

Check

- ***When the maximum measurement value is less than 70 mA → Standby current is normal.***
- ***When the maximum measurement value is 70 mA or more → Go to step (15).***

(15) Remove all fuses one by one to identify which system changes the standby current value significantly. <Ref. to WI(HEV)-21, WIRING DIAGRAM, Power Supply Circuit.>
(16) Check the harness and connector of the system whose standby current has changed significantly.

F: CHARGE

WARNING:
• Do not bring an open flame close to the battery when working.

CAUTION:
• Prior to charging, corroded terminals should be cleaned with a brush and common caustic soda solution.
• Be careful while charging the battery because it produces flammable gasses.
• Observe instructions when handling the battery charger.
• Before charging the battery on the vehicle, disconnect the battery ground terminal to prevent damage of generator diodes or other electrical units.

1. NORMAL CHARGE (CONSTANT CURRENT CHARGE)

Charge the battery with the current value specified by manufacturer or with approximately 1/10 of battery's rating capacity. (See the table below.)

Battery size	Charging current (A)	CCA (A)
55D23L	4.0 — 5.0	390
N55-R	4.0 — 5.0	450

CAUTION:
• The charge control feature and specifications for judgment of charge completion depend on the device. Follow the instruction manual of the charger used.
• Keep the electrolyte temperature at 45°C (113°F) or less while charging. Stop charging when the temperature exceeds this value.

NOTE:
The characteristics of typical charging methods are as follows.
• Constant current charging
This method makes it easy to charge to 100%, since the electrolyte is agitated by the gassing occurred at the end of charging. However, the time for charging is comparatively long because the current value is kept constant.
• Constant voltage charging
This method completes charging in a short period of time due to the large current. However, it is difficult to charge to 100% because no gassing occurred at the end of charging and the electrolyte is not agitated. Therefore, the combined use with the constant current charging is preferable.
• Quasi-constant voltage charging
This method is widely used for commercially available chargers.
Compared to the constant voltage charging whose charging current at the beginning of charging becomes large, it reduces the charging current by lowering the voltage at the initial stage, resulting in battery load reduction. The time for charging is comparatively long. However, this type of chargers can be manufactured comparatively inexpensive due to the simple control circuit (or manual settings). After the initial stage of charging is completed, it gradually raises the charging voltage so that the charging current is within the specification, until the battery is fully charged.
• Constant voltage/current charging
In addition to the constant voltage charging, this method controls the upper limit of the current.
The constant current charging is applied at the beginning of charging, and the constant voltage charging is applied at the end. This makes battery charge comparatively efficient in a short period of time. Charging by generators is similar to this method.
Judgment of charge completion
1) Specific gravity of electrolyte should be held within the specific range of 1.250 — 1.290 for one hour or more.
2) Voltage while charging should be held within the specified range of 15.0 — 16.8 V for one hour or more.
3) Gas is actively generated in all cells.

4) The amount of charge reaches 1.2 — 1.5 times of the amount of discharge.

NOTE:
The amount of discharge/charge can be calculated by the following formula.
Amount of discharge (Ah) = Remaining capacity (%) calculated by specific gravity × 5 hour rate capacity (Ah)
Amount of charge (Ah) = Charging current value (A) × Time for charging

2. QUICK CHARGING

Charge the battery in a short period of time with a relatively large current by using a quick charger.
Charge the battery with the current value at approximately 1/2 of battery's rating capacity. (See the table below.)

CAUTION:
• Quick charging is accompanied by a large amount of heat generation. Charging should be completed in up to 30 minutes regardless of battery size.
• Quick charging is used to recover the battery until it can start the vehicle. For full charging, use the normal charging method.
• Keep the electrolyte temperature at 55°C (131°F) or less while quick charging. Stop charging when the temperature exceeds this value.

Battery size	Charging current (A)	CCA (A)
55D23L	20.0 — 25.0	390
N55-R	20.0 — 25.0	450

5. Battery Cable Assembly

A: REMOVAL

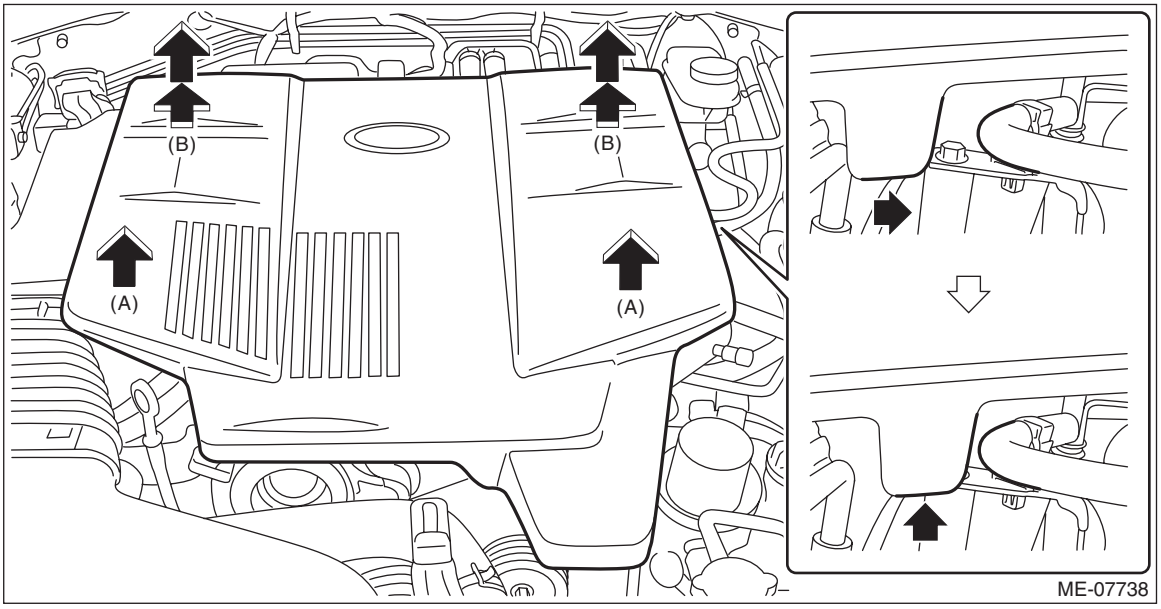
1. BATTERY CABLE ASSY

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

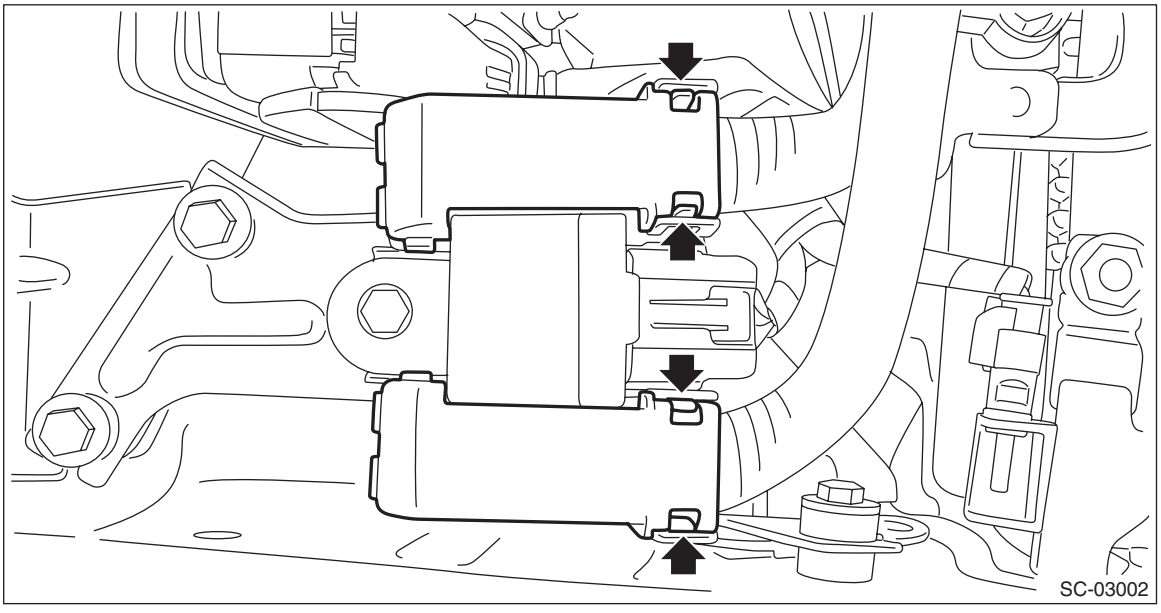
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.

2) Remove the collector cover.
   (1) Carefully pull up the front of collector cover at two positions (A).
   (2) Carefully pull up the rear of collector cover at two positions (B) while moving it backward.

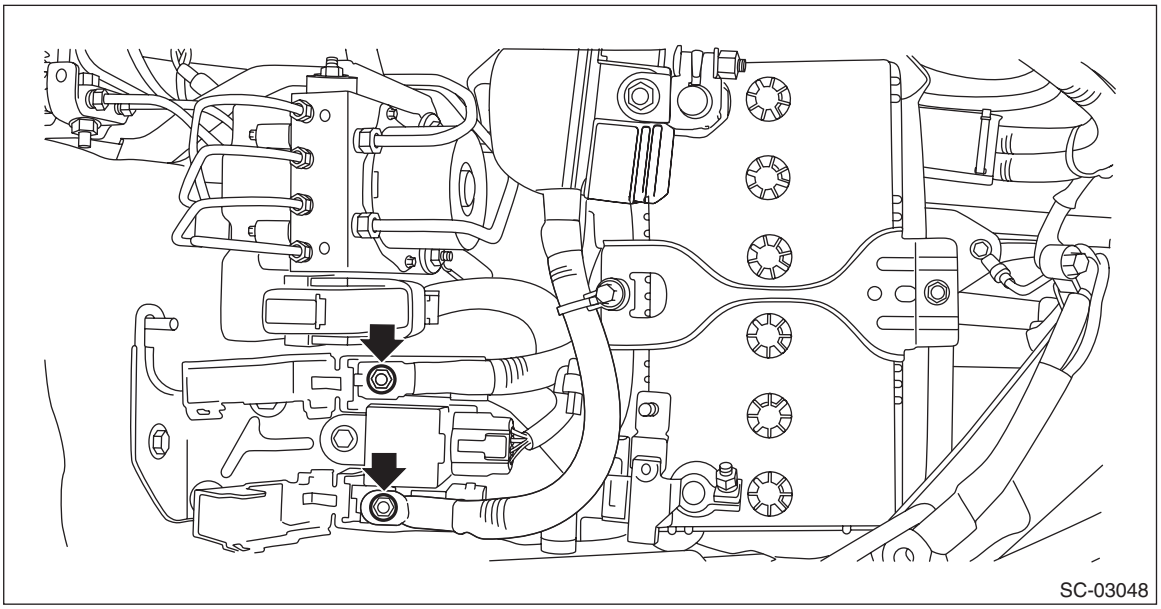
NOTE:
Be careful not to contact the fuel delivery tube when moving the collector cover rearward.



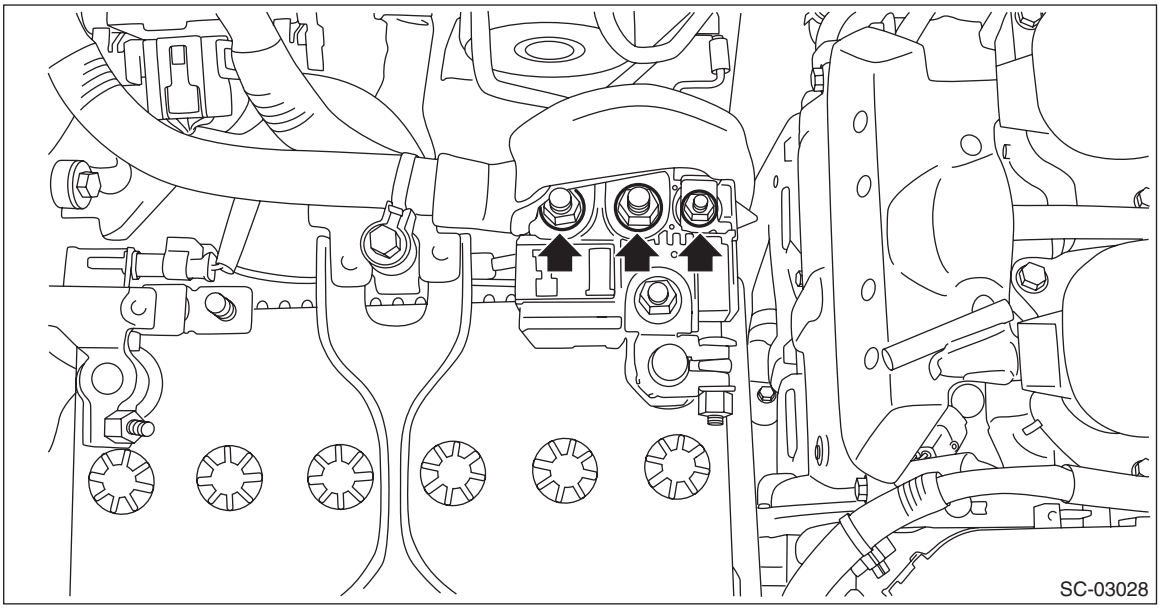
3) Remove the air intake duct. <Ref. to IN(H4DO(HEV))-15, REMOVAL, Air Intake Duct.>
4) Remove the intake duct. <Ref. to IN(H4DO(HEV))-16, REMOVAL, Intake Duct.>
5) Open the 12V battery relay cover RH and the 12V battery relay cover LH.



6) Remove the nuts fastening the battery cable assembly from the 12V battery relay terminal, and remove the battery cable assembly.

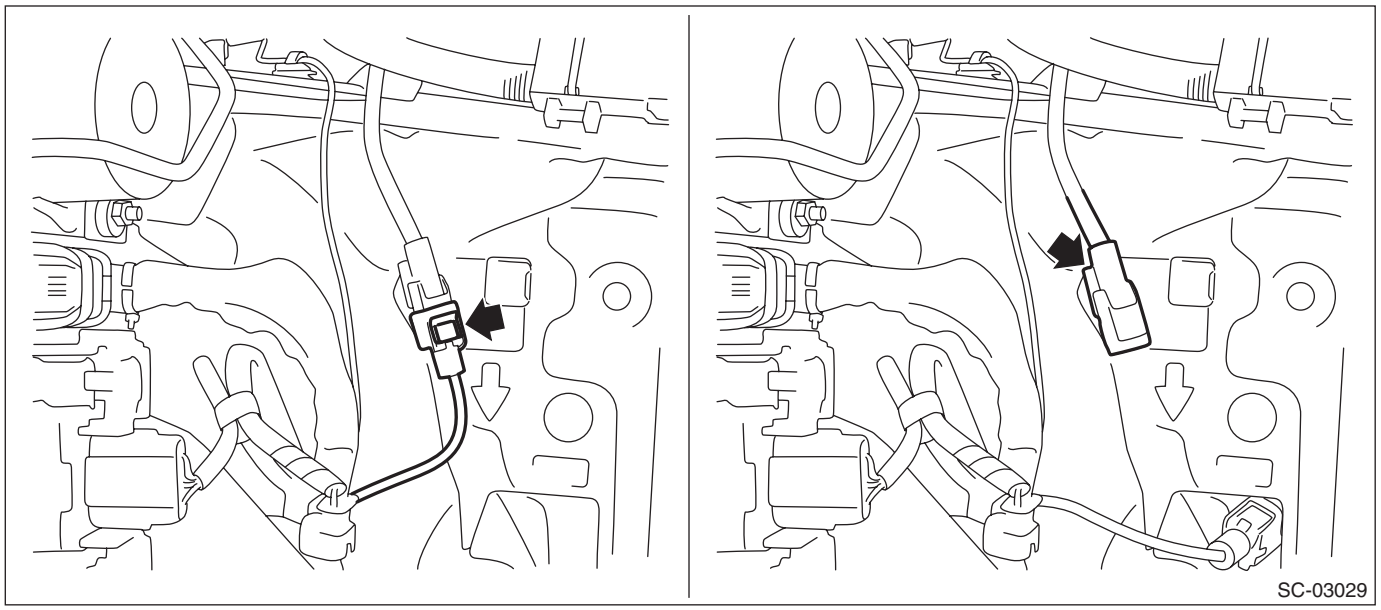


7) Remove the nuts fastening the battery cable assembly to the slow blow fuse (12 volt engine restart battery), and remove the battery cable assembly.

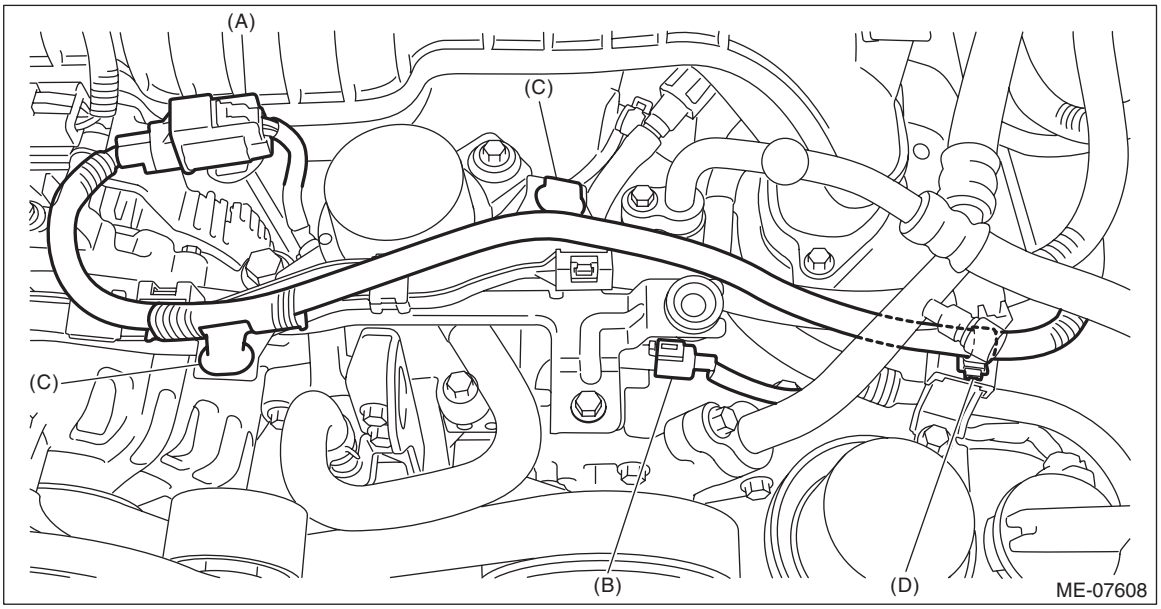


8) Remove the 12 volt engine restart battery. <Ref. to SC(H4DO(HEV))-40, 12 VOLT ENGINE RESTART BATTERY, REMOVAL, Battery.>

9) Disconnect the battery cable assembly connector from the bulk head wiring harness, and remove the battery cable assembly from the clip.

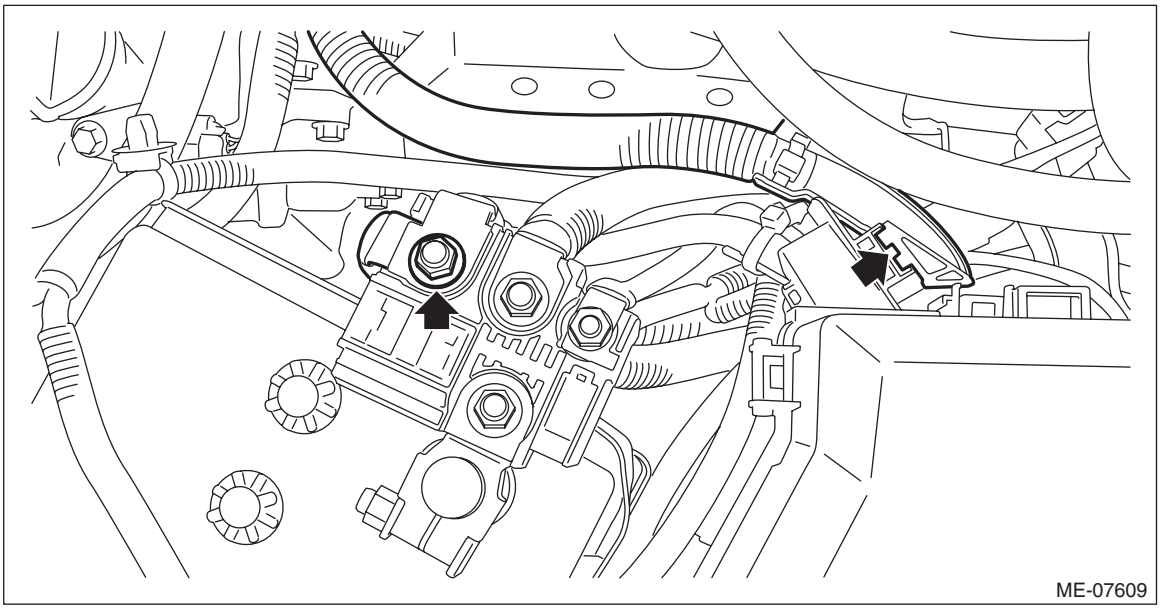


10) Disconnect the connector (A) from the brake vacuum pump, and disconnect the connector (B) from the A/C compressor.
11) Remove the clip (C) and the clip (D) securing the harness to the battery cable assembly, and move the harness to the left side wheel apron.

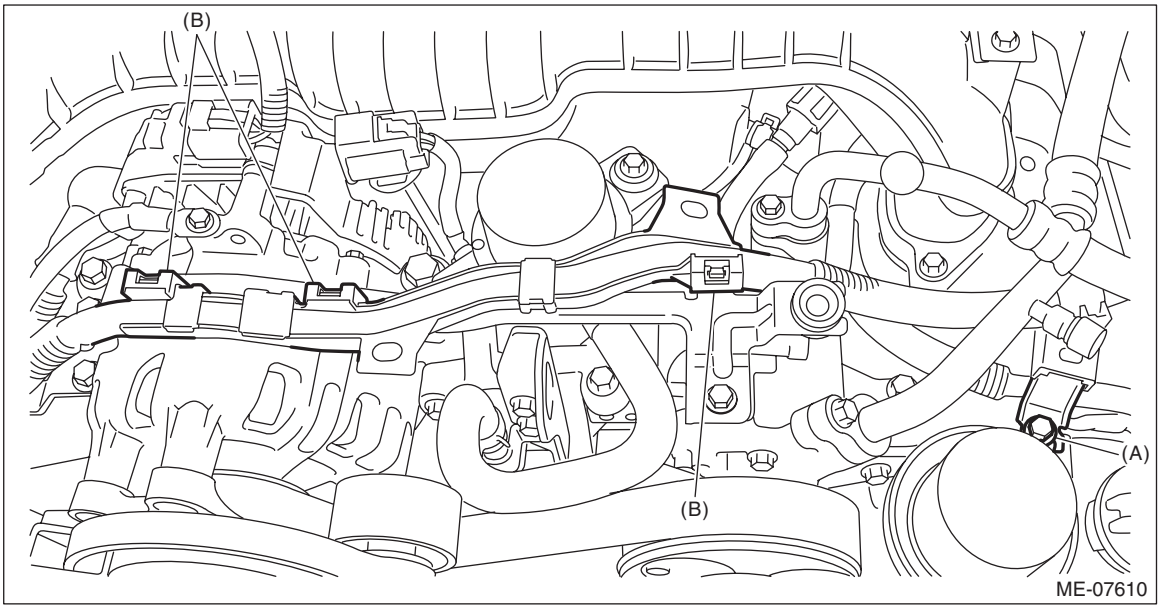


12) Remove the terminal boot from the positive terminal of the 12 volt auxiliary battery.

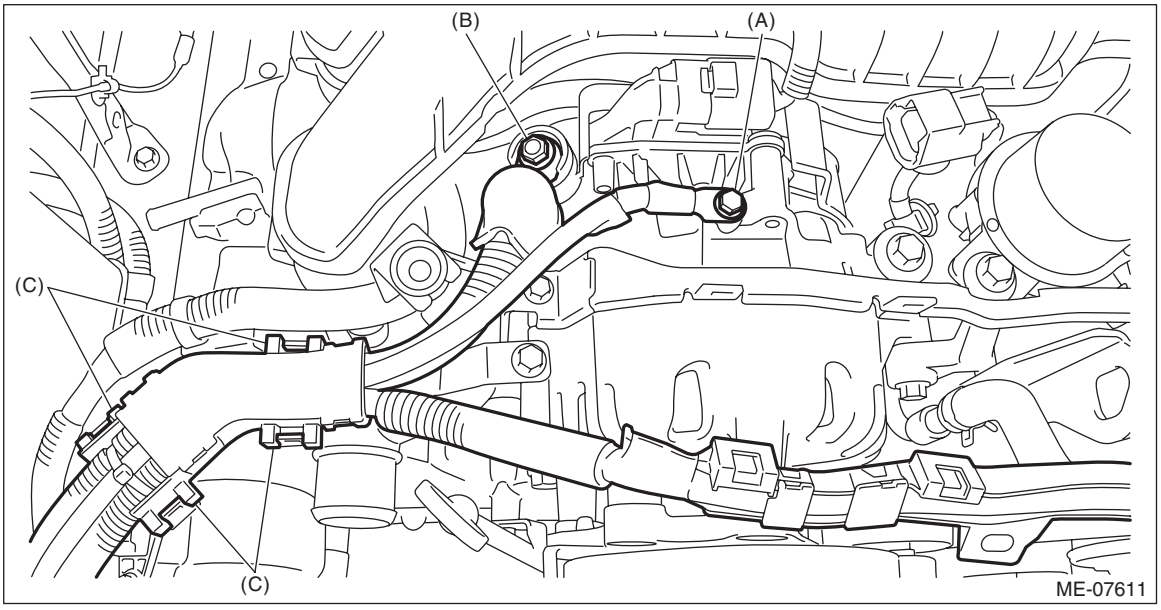
13) Remove the nuts fastening the battery cable assembly to the slow blow fuse (12 volt auxiliary battery), and remove the battery cable assembly from the main fuse box.



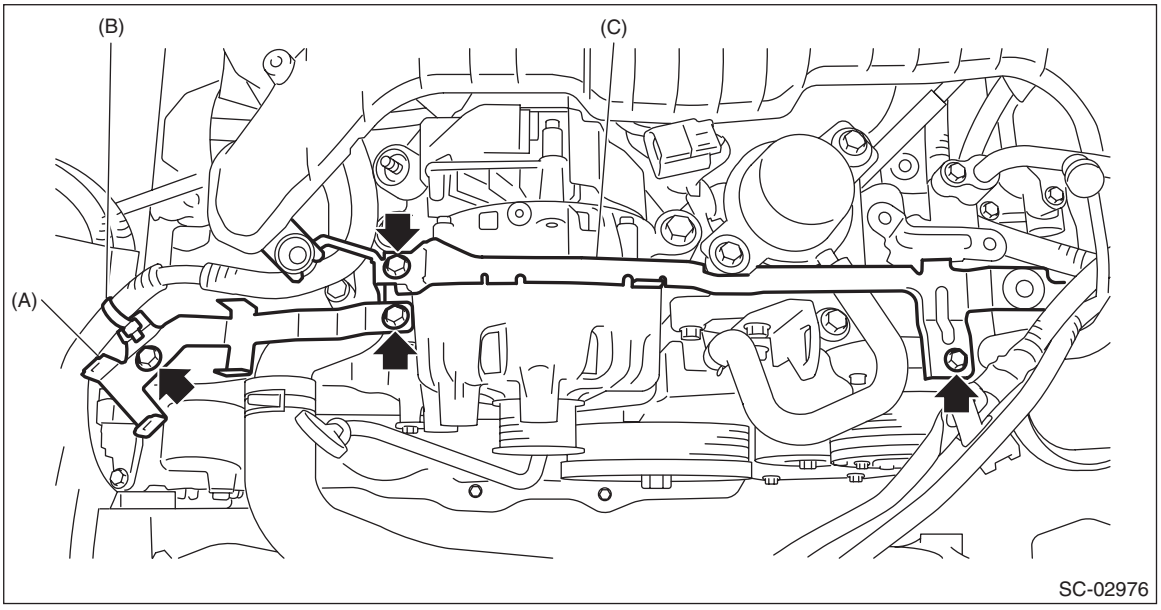
14) Remove the bolt (A) securing the battery cable stay to the chain cover, and remove the clip (B) securing the battery cable assembly to the collector cover bracket.



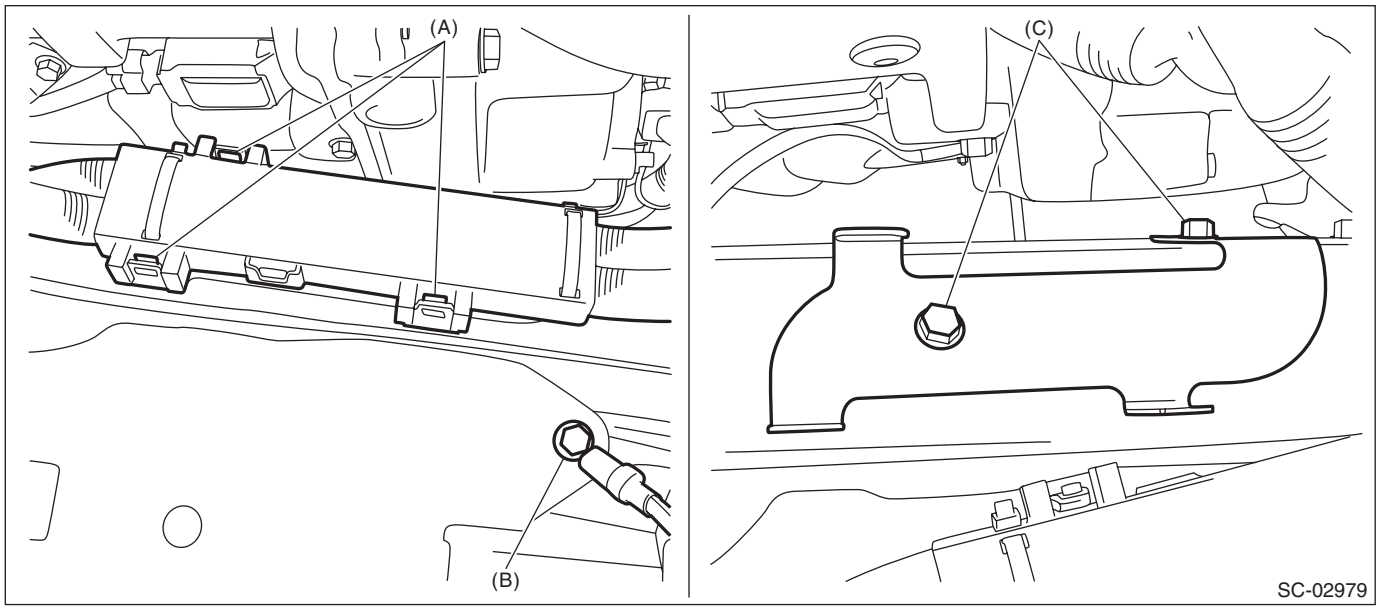
15) Disconnect the terminal (A) and the terminal (B) from ISG.
16) Remove the clip (C) which holds the battery cable assembly to the battery cable bracket No. 1.



17) Remove the clip (B) which holds the engine harness from the battery cable bracket No. 1 (A).
18) Remove the battery cable bracket No. 1 (A) and collector cover bracket (C).



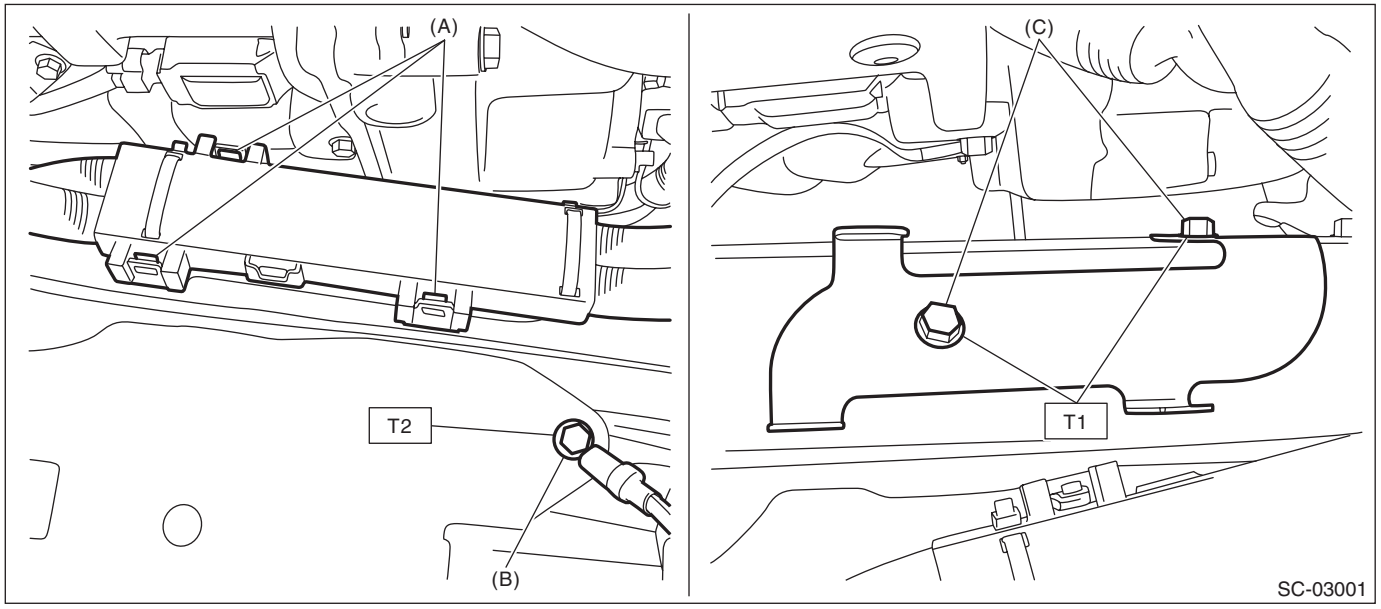
19) Remove the clip (A) securing the battery cable assembly, and remove the battery cable assembly from the battery cable bracket No. 2.
20) Remove the bolt (B) which holds the chassis ground terminal of the battery cable assembly from the vehicle.
21) Remove the bolt (C) securing the battery cable bracket No. 2 from the vehicle, and remove the battery cable bracket No. 2.



B: INSTALLATION

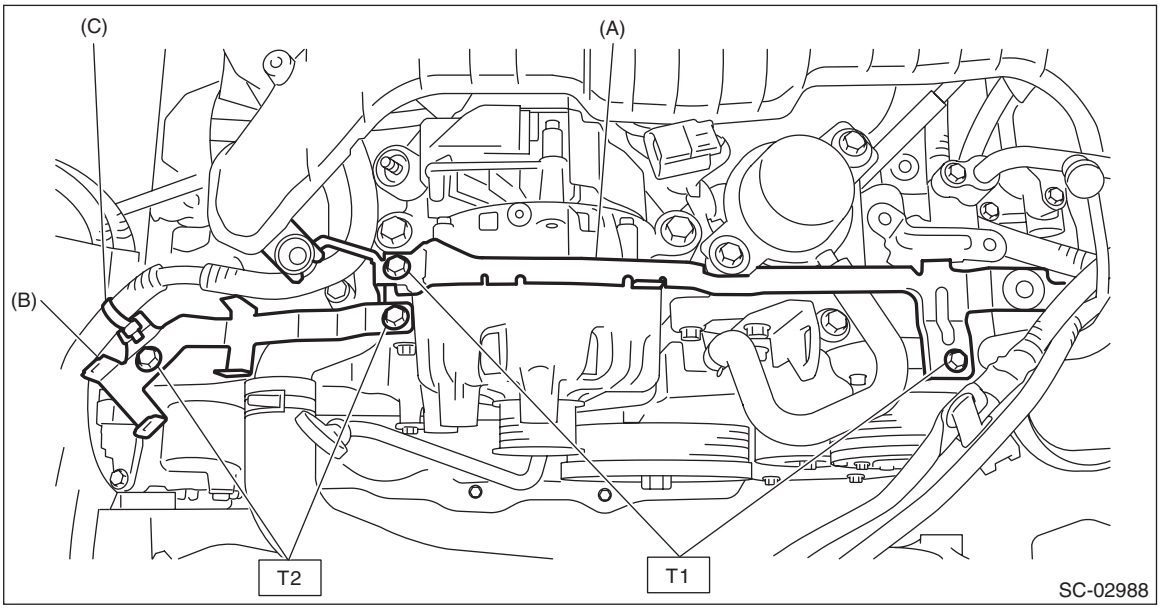
1) Install the bolt (C) which secures the battery cable bracket No. 2 to the vehicle, and secure the battery cable assembly to the battery cable bracket No. 2 with the clip (A).
2) Install the chassis ground terminal (B) of the battery cable assembly to the vehicle.

Tightening torque:
T1: 7.5 N·m (0.8 kgf-m, 5.5 ft-lb)
T2: 13 N·m (1.3 kgf-m, 9.6 ft-lb)



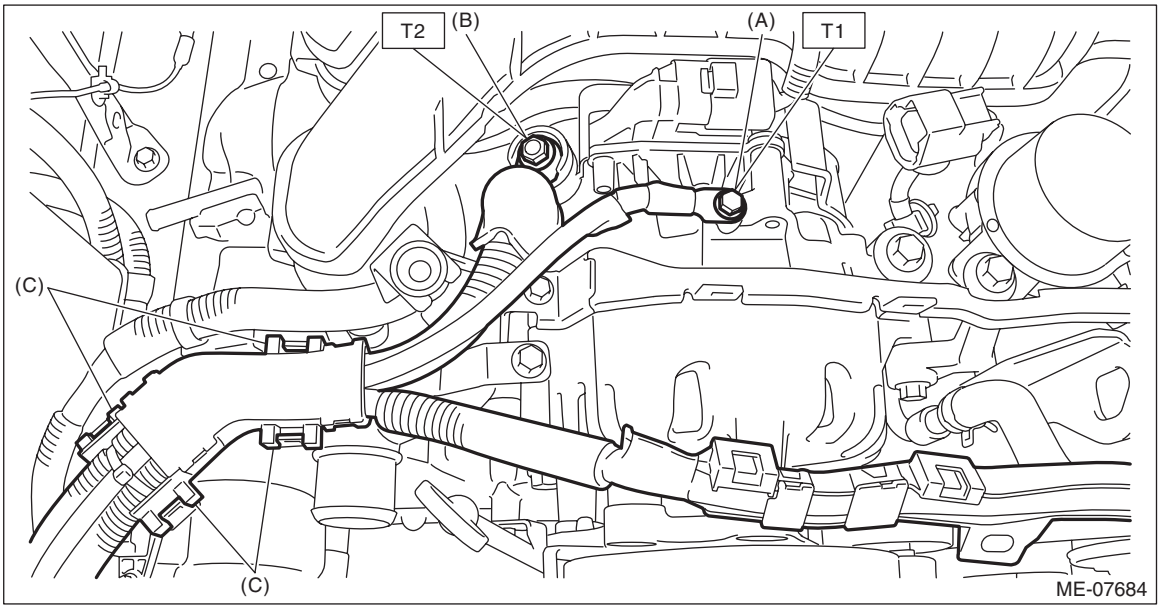
3) Install the collector cover bracket (A).
4) Install the battery cable bracket No. 1 (B), and secure the engine harness with the clip (C).

Tightening torque:
T1: 6.4 N·m (0.7 kgf-m, 4.7 ft-lb)
T2: 19 N·m (1.9 kgf-m, 14.0 ft-lb)



5) Set the battery cable assembly, and secure the battery cable assembly to the battery cable bracket No. 1 with the clip (C).
6) Connect the terminal (A) and the terminal (B) to ISG.

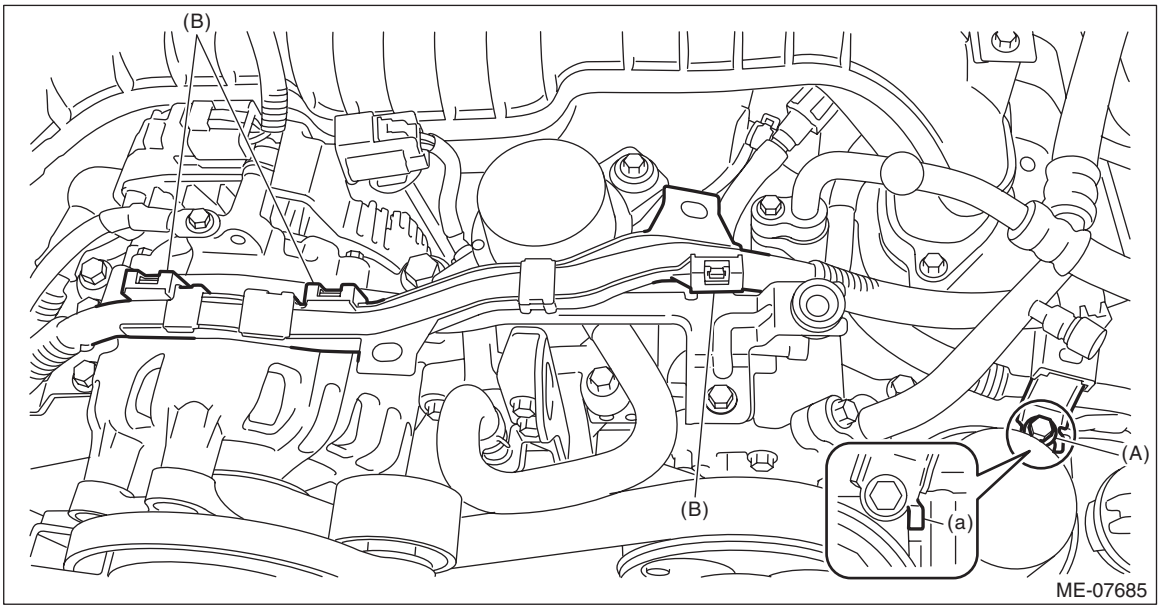
Tightening torque:
T1: 7.5 N·m (0.8 kgf-m, 5.5 ft-lb)
T2: 15.5 N·m (1.6 kgf-m, 11.4 ft-lb)



7) Secure the battery cable assembly to the collector cover bracket with the clip (B), and install the bolt (A) which secures the battery cable stay to the chain cover.

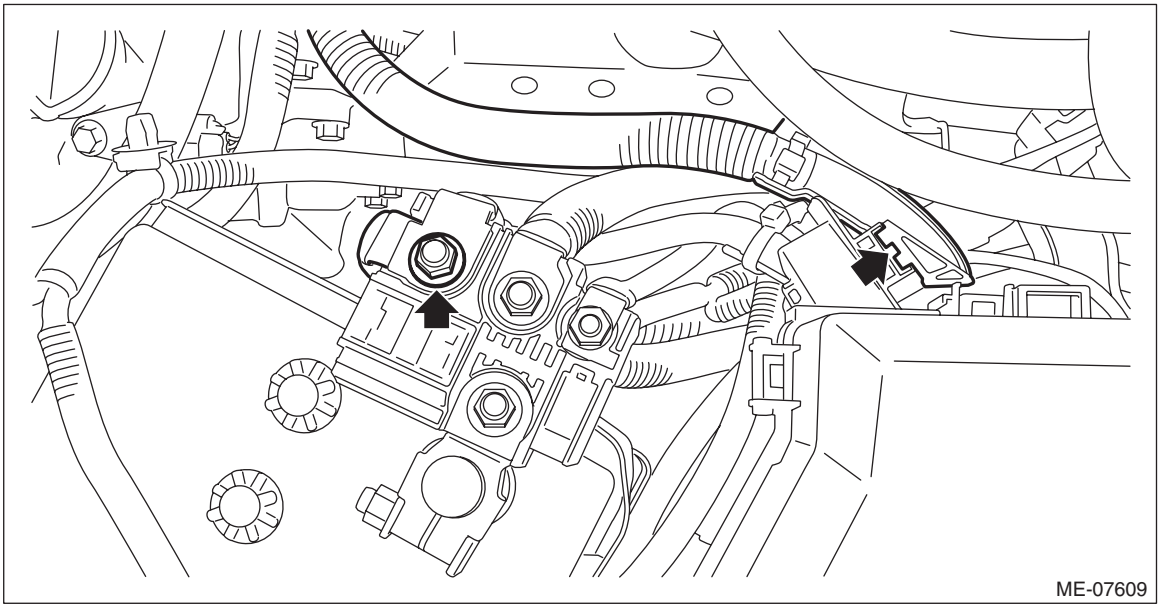
NOTE:
When installing the battery cable stay, install it by fitting the folded end (a) of the battery cable stay to the chain cover boss.

Tightening torque:
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

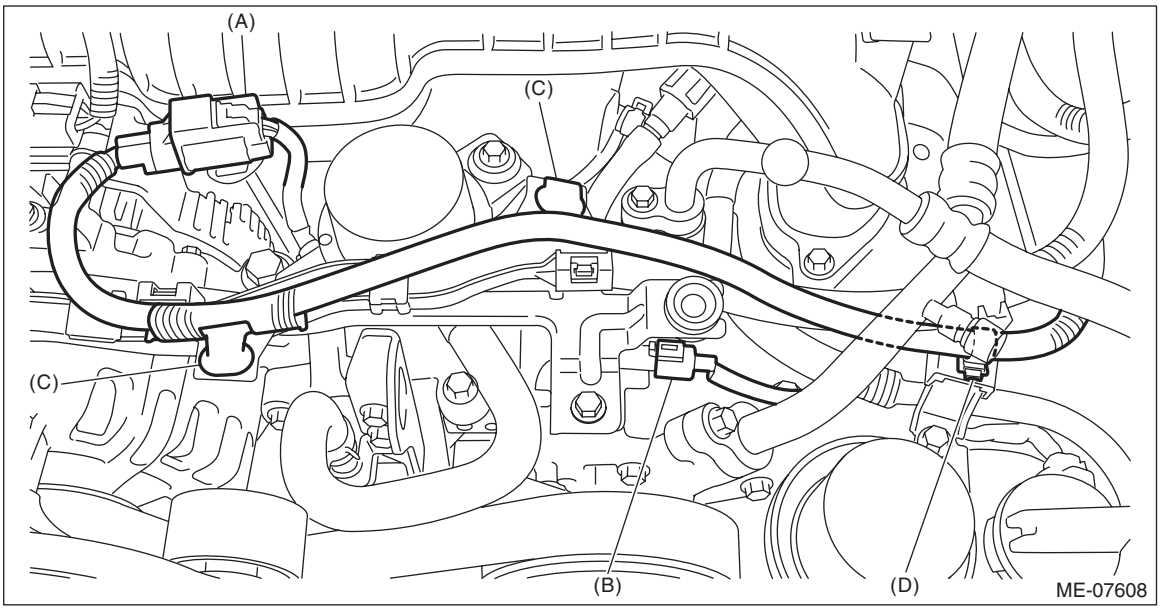


8) Install the battery cable assembly to the main fuse box, and install the nut which secures the battery cable assembly to the slow blow fuse (12 volt auxiliary battery).

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

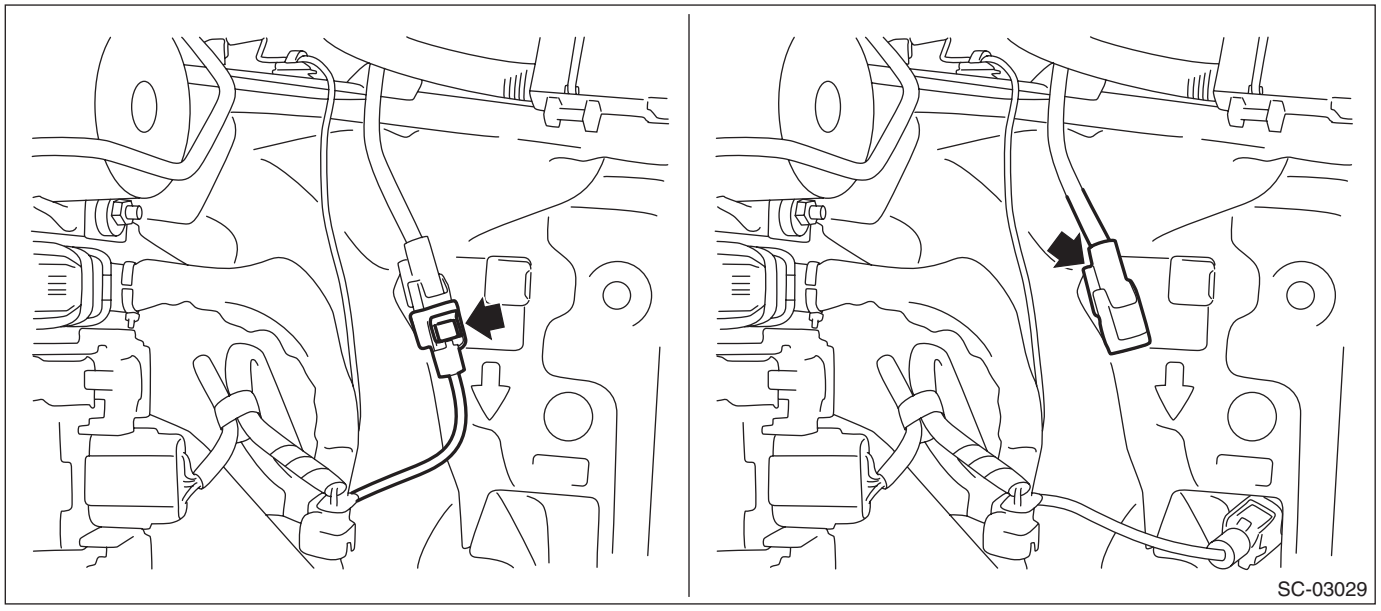


9) Install the terminal boot to the positive terminal of the 12 volt auxiliary battery.
10) Set the harness, and secure the harness to the battery cable assembly with the clip (C) and the clip (D).
11) Connect the connector (A) to the brake vacuum pump, and connect the connector (B) to the A/C compressor.



12) Install the battery cable assembly connector to the clip, and connect the battery cable assembly connector to the bulk head wiring harness.

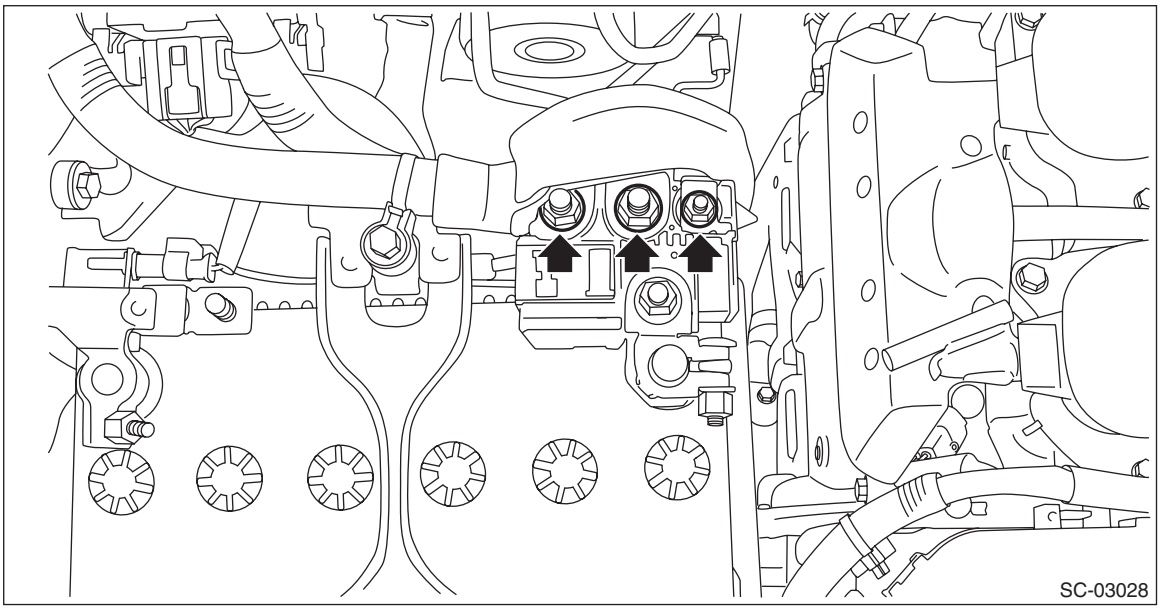
NOTE:
If the clip is damaged, replace it with a new part.



13) Install the 12 volt engine restart battery. <Ref. to SC(H4DO(HEV))-42, 12 VOLT ENGINE RESTART BATTERY, INSTALLATION, Battery.>

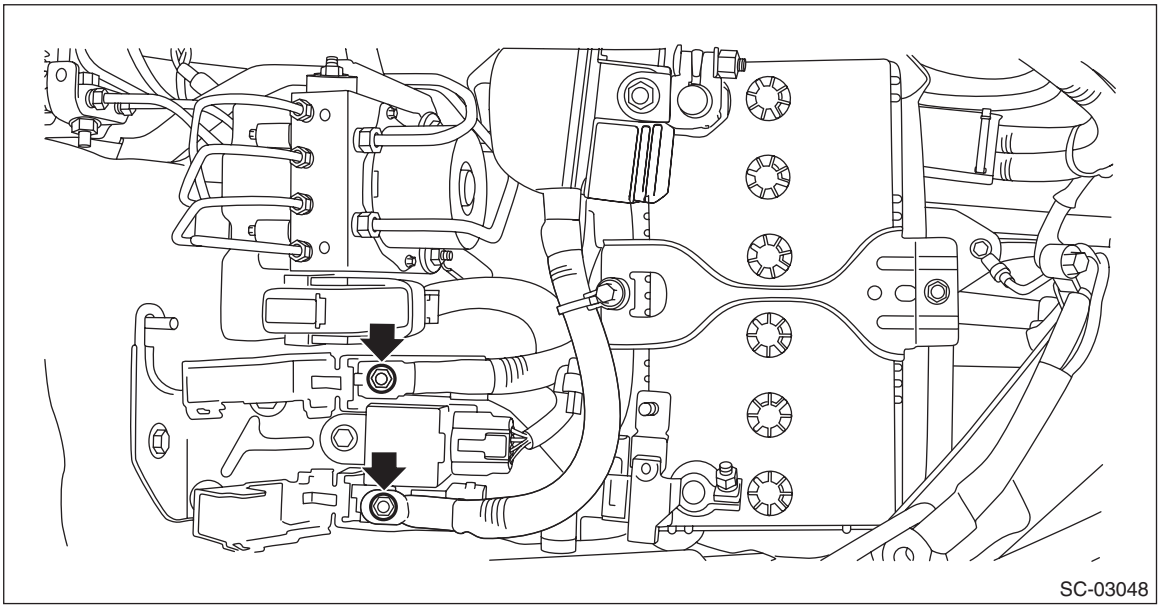
14) Install the battery cable assembly to the slow blow fuse (12 volt engine restart battery), and install the nut which secures the battery cable assembly.

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



15) Install the battery cable assembly to the 12V battery relay, and close the install the 12V battery relay cover.

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



16) Install the intake duct. <Ref. to IN(H4DO(HEV))-17, INSTALLATION, Intake Duct.>
17) Install the air intake duct. <Ref. to IN(H4DO(HEV))-15, INSTALLATION, Air Intake Duct.>
18) Install the collector cover.
19) Connect the battery ground terminal. <Ref. to NT-5, BATTERY, NOTE, Note.>

C: INSPECTION

Check that the battery cable assembly has no deformation, cracks or other damages.

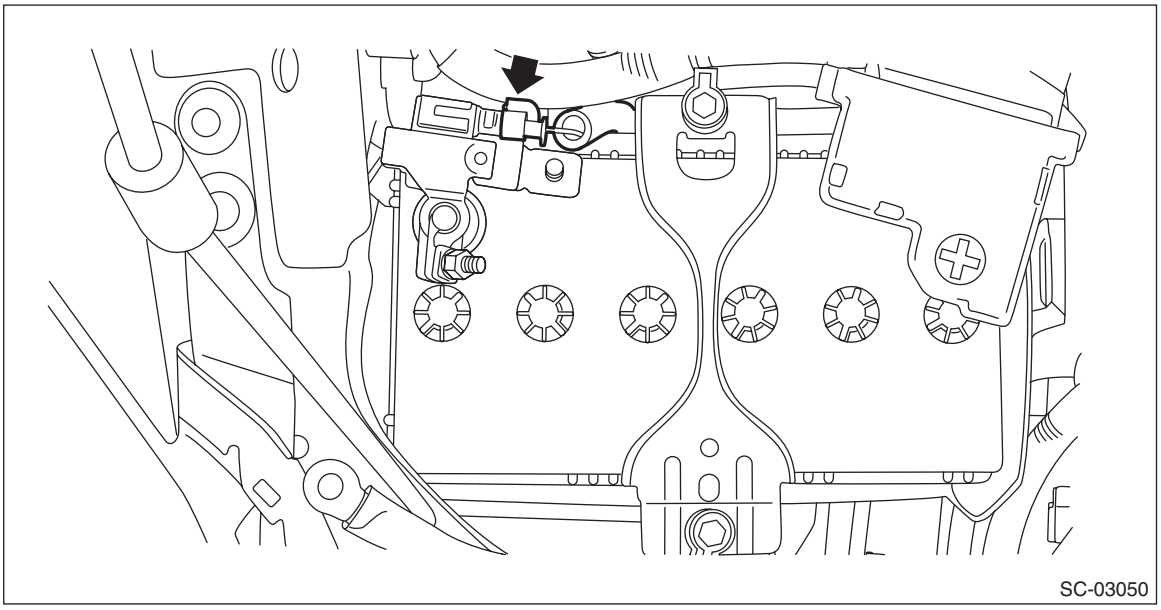
6. Battery Sensor

A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Disconnect the connector from the 12V engine restart battery sensor.
3) Remove the 12V engine restart battery sensor from the 12 volt engine restart battery.

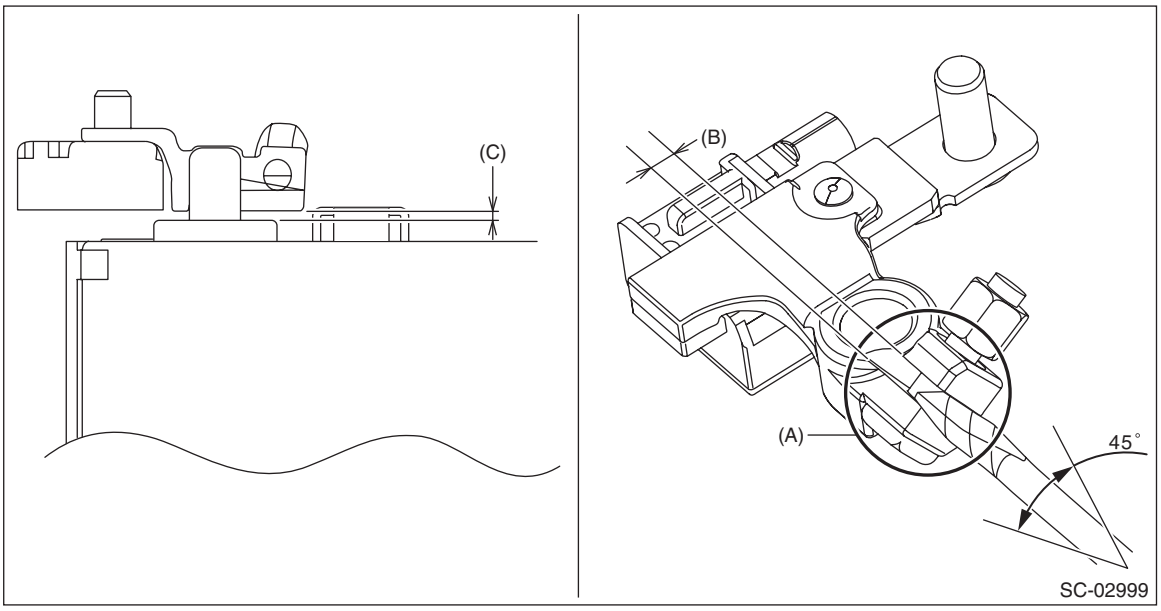
NOTE:
When removing the 12V engine restart battery sensor, pry the terminal tightening point of the 12V engine restart battery sensor using a flat tip screwdriver or similar tool wrapped with a protection tape.


SC-03050

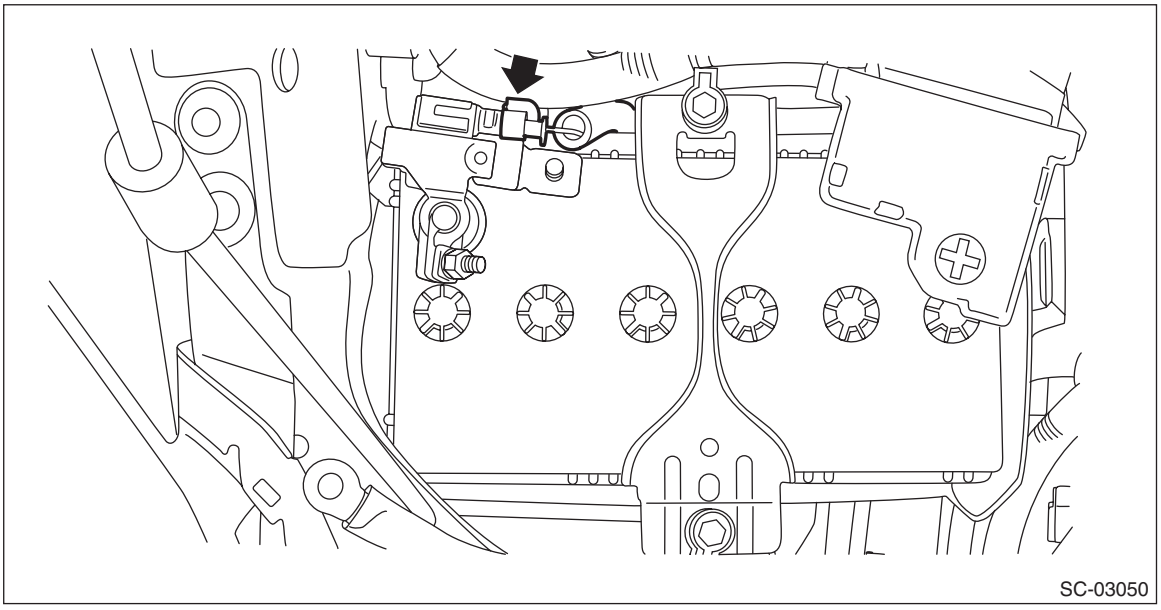
B: INSTALLATION

1) Pry the terminal tightening point (A) of the 12V engine restart battery sensor by approx. 45° using a flat tip screwdriver or similar tool wrapped with a protection tape, and adjust the clearance (B) to be approx. 2.5 mm (0.0984 in).
2) Adjust the clearance (C) to be 1.5 mm (0.0591 in) or less for the 12 volt engine restart battery and the 12V engine restart battery sensor, and install the 12V engine restart battery sensor to the 12 volt engine restart battery.

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)



3) Connect the connector to 12V engine restart battery sensor.



4) Connect the battery ground terminal. <Ref. to NT-5, BATTERY, NOTE, Note.>

C: INSPECTION

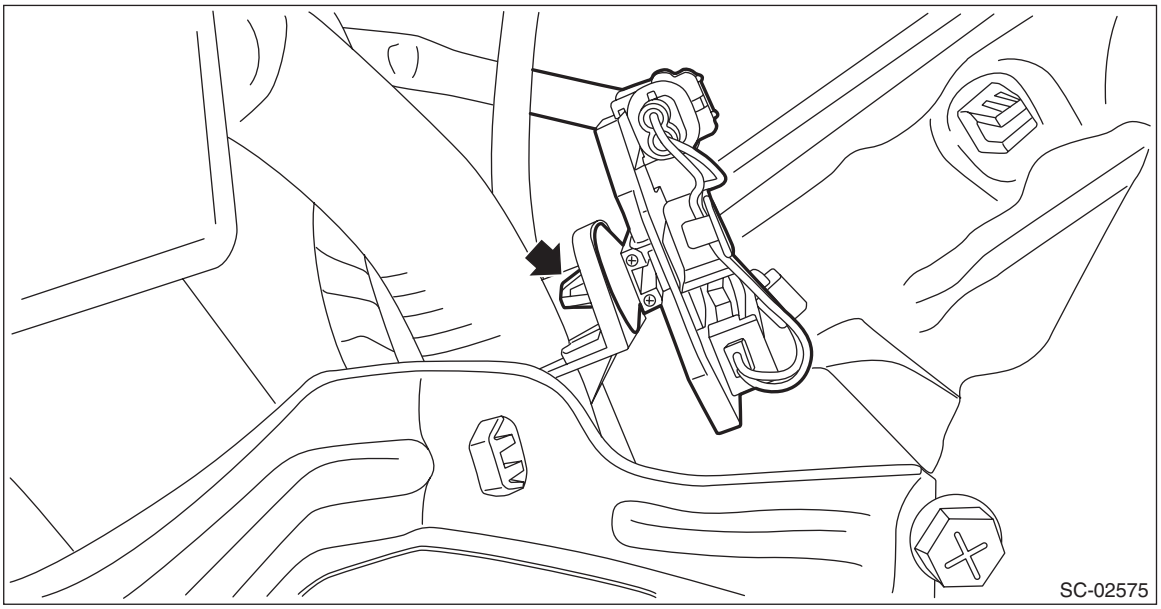
Check that the 12V engine restart battery sensor has no deformation, cracks or other damages.

7. Battery Temperature Sensor

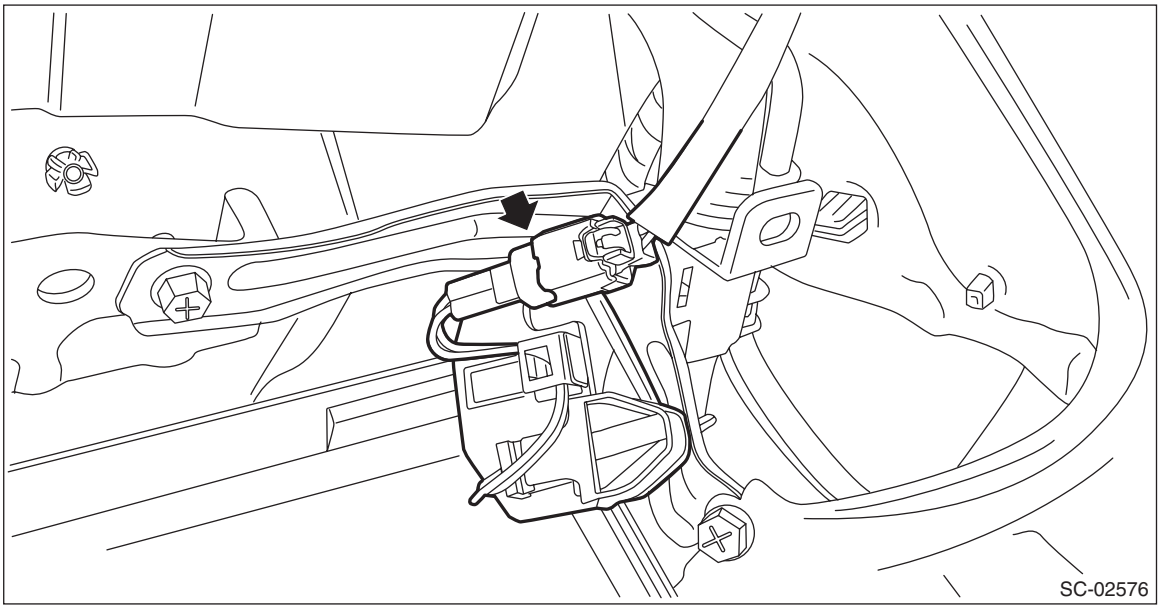
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Remove the 12 volt auxiliary battery. <Ref. to SC(H4DO(HEV))-39, 12 VOLT AUXILIARY BATTERY, REMOVAL, Battery.>
3) Remove the battery temperature sensor from the bracket.



4) Disconnect the connector and remove the battery temperature sensor.



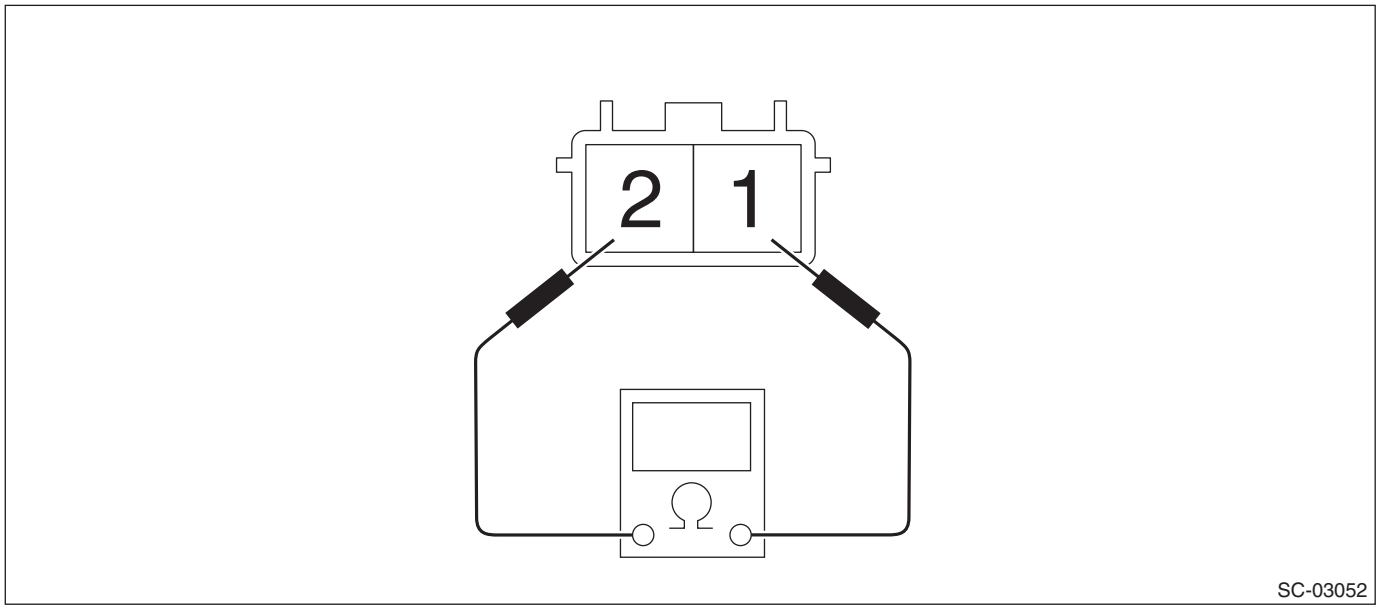
B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1) Check that the battery current & temperature sensor has no deformation, cracks or other damages.
2) Check the resistance between the battery temperature sensor terminals.

Temperature	Terminal No.	Standard
20 — 30°C (68 — 86°F)	1 and 2	1.5 — 2.8 kΩ

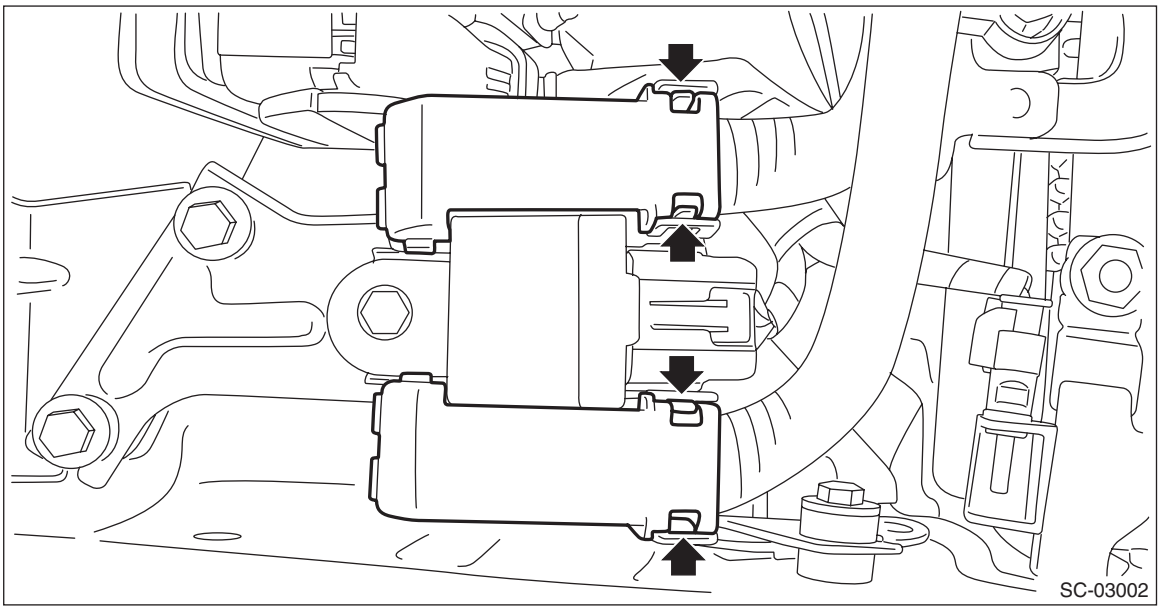


8. 12V Battery Relay

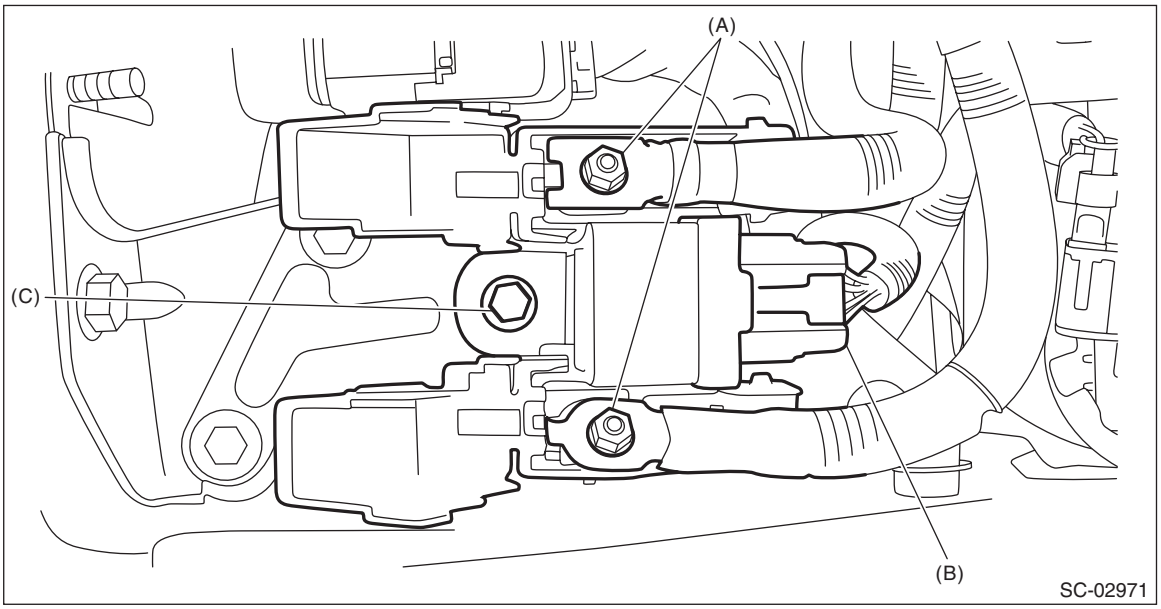
A: REMOVAL

1) Disconnect the ground cable from battery. <Ref. to NT-5, BATTERY, NOTE, Note.>

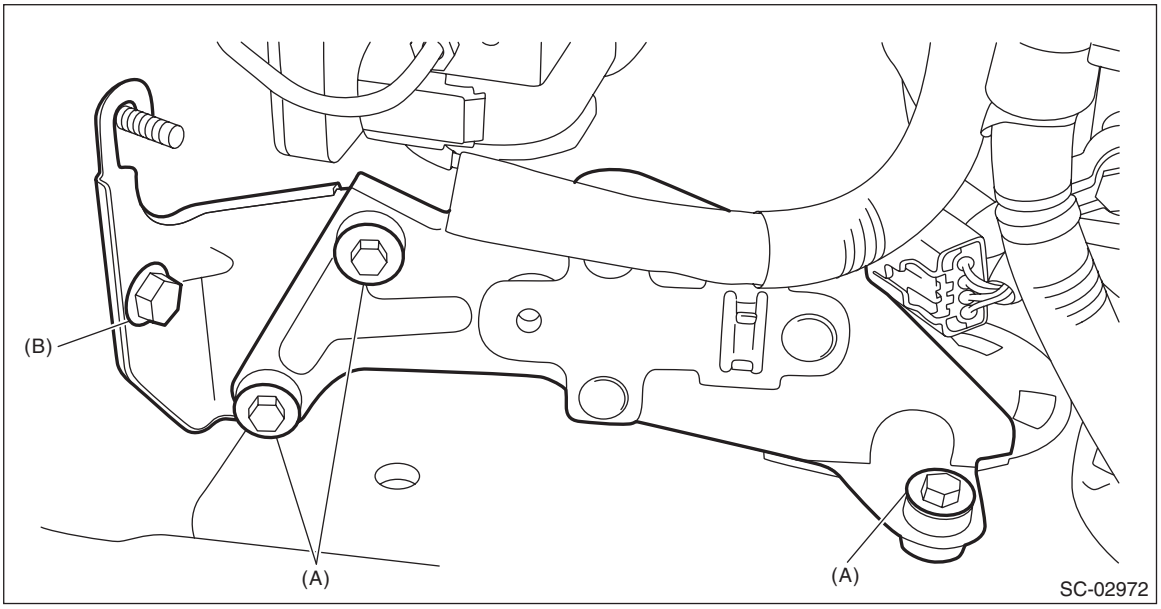
NOTE:
For the 12 volt engine restart battery, disconnect the ground terminal from 12V engine restart battery sensor.
2) Open the 12V battery relay cover RH and the 12V battery relay cover LH.



3) Disconnect the battery cable assembly terminal (A) from the 12V battery relay.
4) Disconnect the connector (B) from the 12V battery relay, and remove the bolt (C) holding the 12V battery relay.
5) Remove the 12V battery relay from the 12V battery relay bracket assembly.



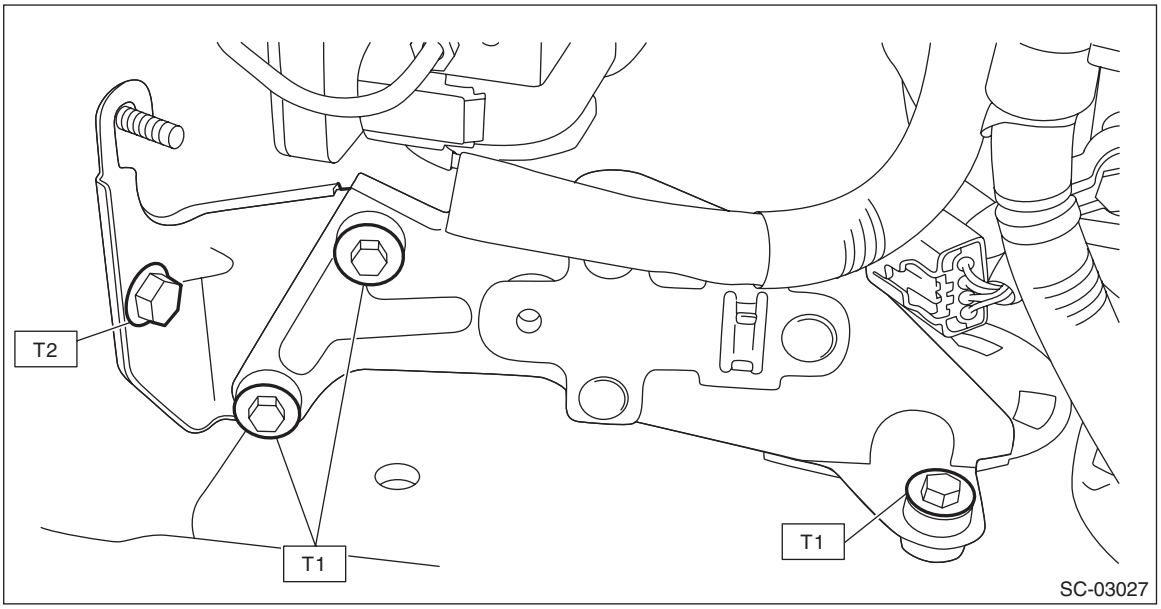
6) Remove the bolt (A) securing the 12V battery relay bracket assembly, and remove the 12V battery relay bracket assembly.
7) Remove the bolt (B) securing the 12V battery relay bracket No. 2 to the vehicle, and remove the 12V battery relay bracket No. 2.

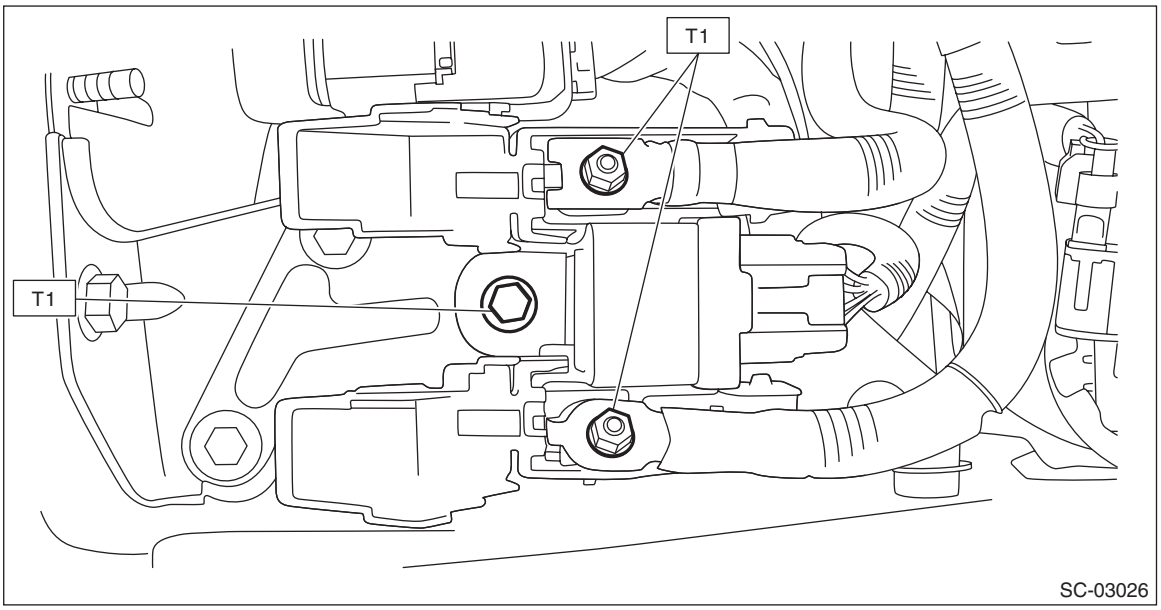


B: INSTALLATION

Install in the reverse order of removal.

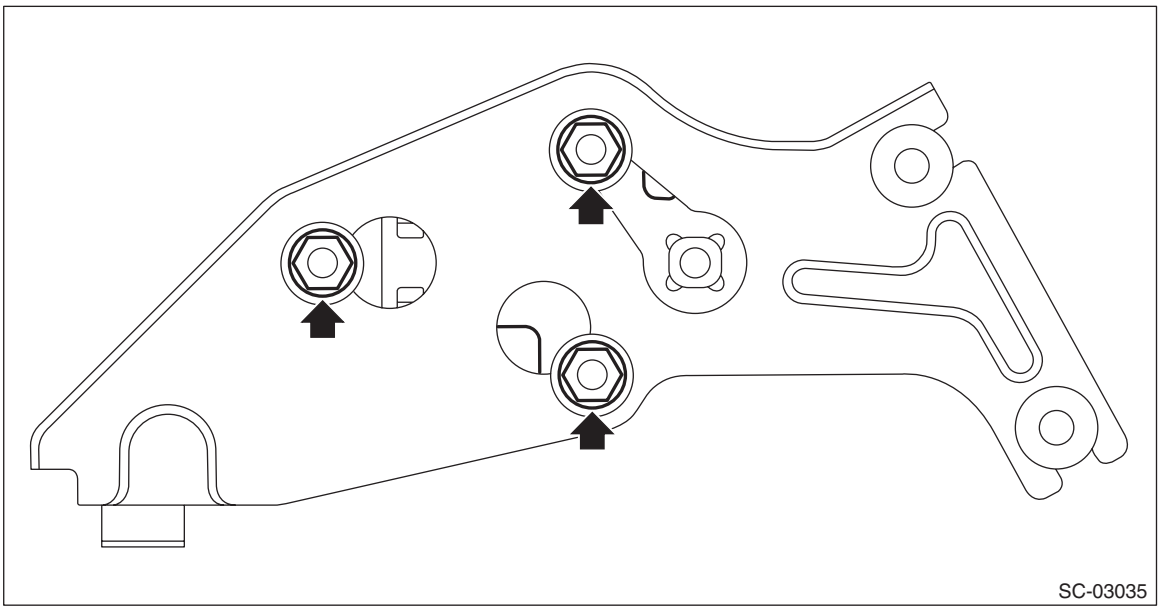
Tightening torque:
T1: 7.5 N·m (0.8 kgf-m, 5.5 ft-lb)
T2: 33 N·m (3.4 kgf-m, 24.3 ft-lb)





C: DISASSEMBLY

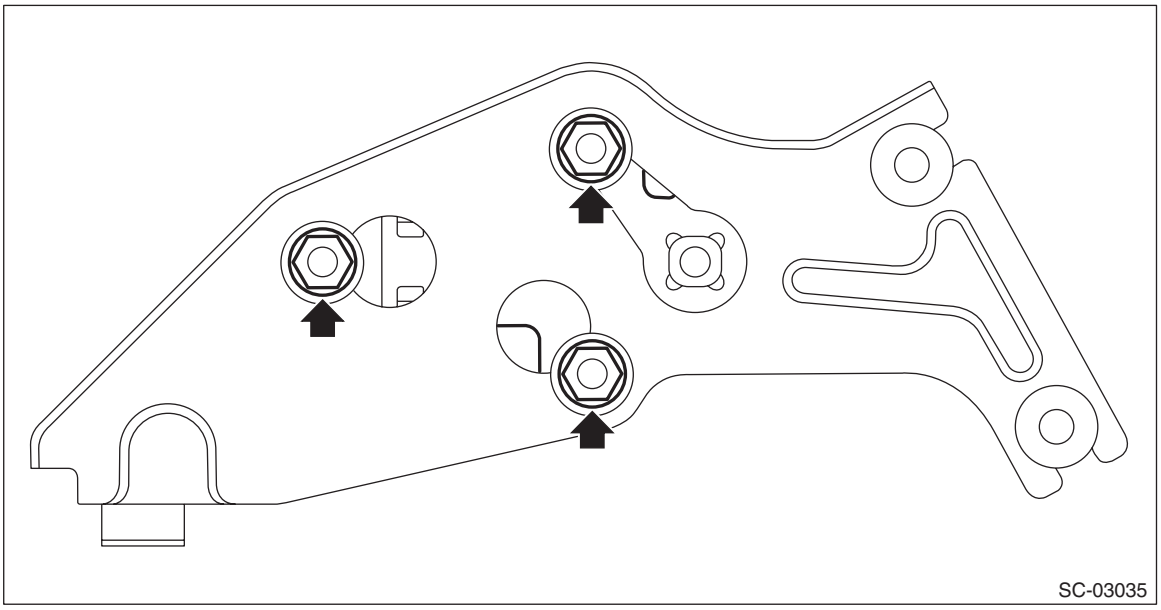
Remove the 12V battery relay bracket No. 3 from the 12V battery relay bracket No. 1.



D: ASSEMBLY

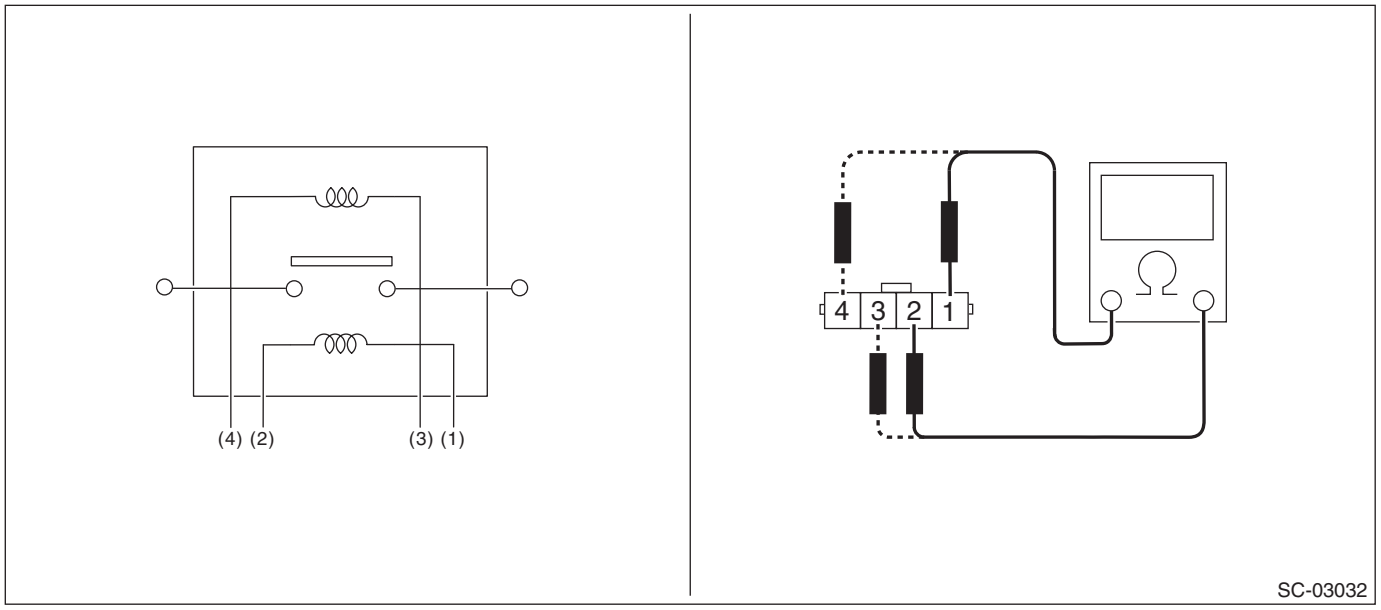
Install the 12V battery relay bracket No. 3 to the 12V battery relay bracket No. 1.

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



E: INSPECTION

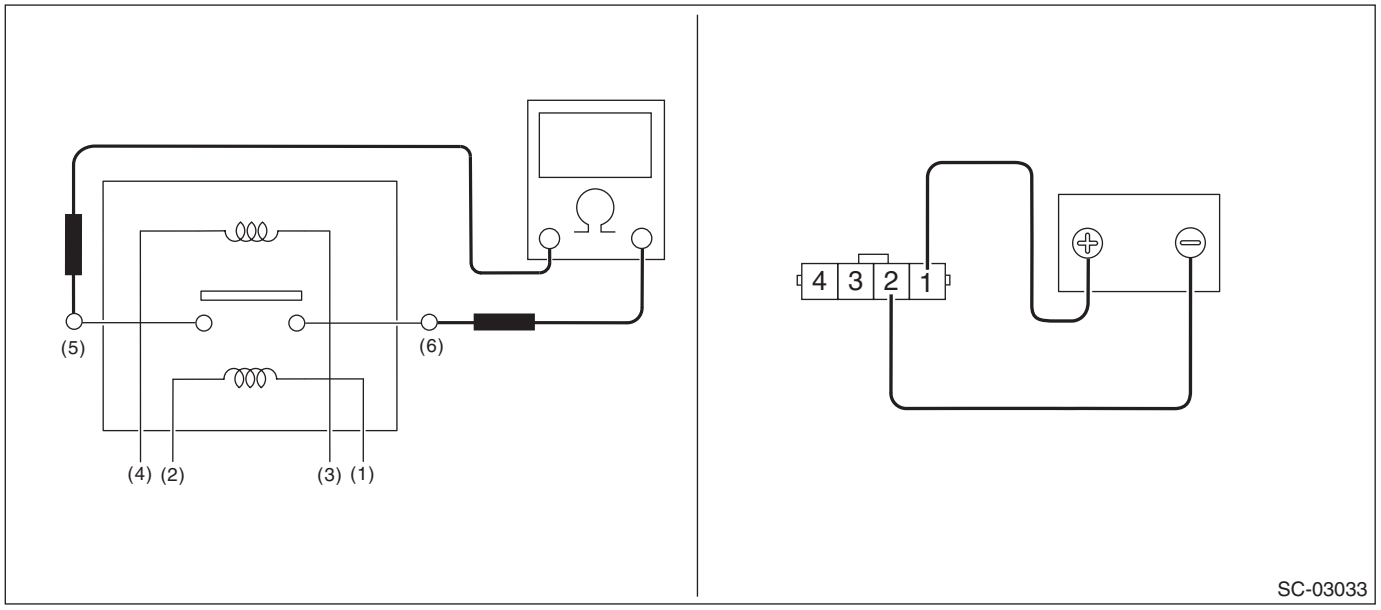
1) Check that the 12V battery relay has no deformation, cracks or other damages.
2) Measure the resistance between the 12V battery relay terminals.



Terminal No.	Standard
1 and 2	Approx. 4.3 Ω (when 20°C (68°F))
3 and 4	Approx. 4.3 Ω (when 20°C (68°F))

3) Connect battery positive terminal to terminal No. 1 and battery ground terminal to terminal No. 2, and measure the resistance between the terminal No. 5 and the terminal No. 6.

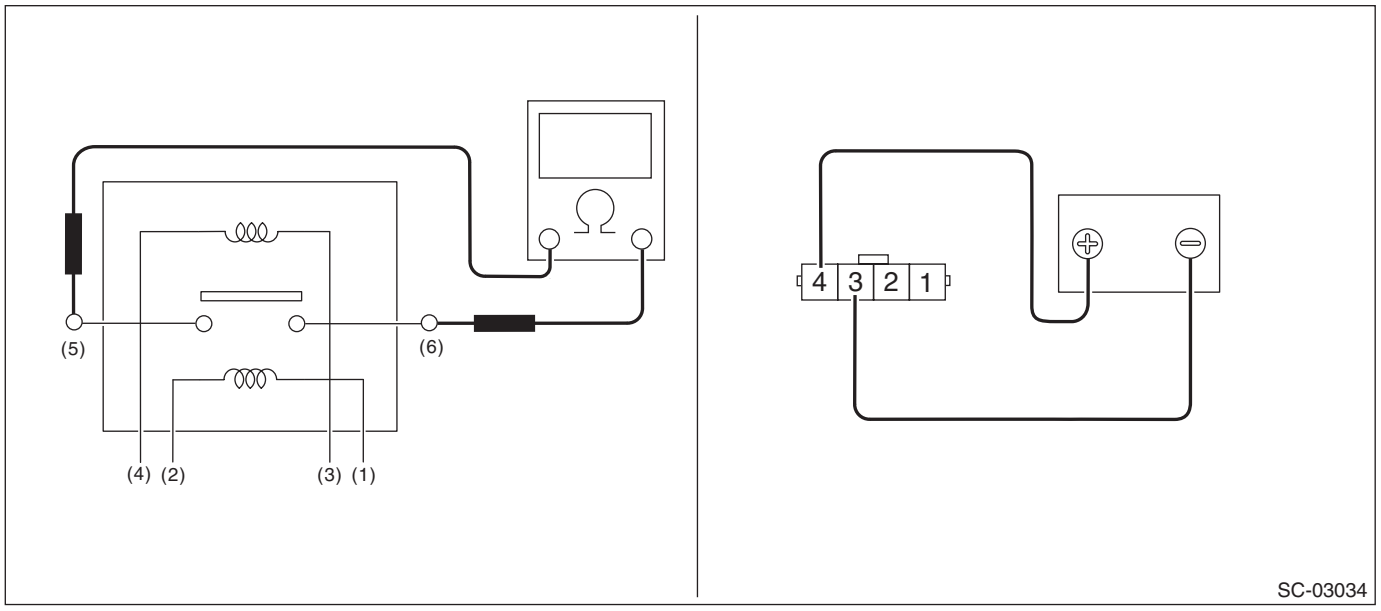
CAUTION:
To avoid burning a magnetizing coil, continuity time should be within 1 second.



Terminal No.	Standard
5 and 6	Less than 1 Ω

4) Connect battery positive terminal to terminal No. 4 and battery ground terminal to terminal No. 3, and measure the resistance between the terminal No. 5 and the terminal No. 6.

CAUTION:
To avoid burning a magnetizing coil, continuity time should be within 1 second.



Terminal No.	Standard
5 and 6	1 MΩ or more

9. DC/DC Converter

A: SPECIFICATION

Refer to “HYBRID ELECTRIC VEHICLE” for specification. <Ref. to HEV-2, SPECIFICATION, General Description.>

B: REMOVAL

Refer to “HYBRID ELECTRIC VEHICLE” for removal procedure. <Ref. to HEV-38, REMOVAL, DC/DC Converter.>

C: INSTALLATION

Refer to “HYBRID ELECTRIC VEHICLE” for the installation procedure. <Ref. to HEV-41, INSTALLATION, DC/DC Converter.>

ENGINE (DIAGNOSTICS)

EN(H4DO HEV)(diag)

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